



**Generation Interconnection
Feasibility Study Report
for
PJM Generation Interconnection Request
Queue Project AE1-040
“GREENFIELD 69 KV”
31.6 MW Capacity / 47.5 MW Energy**

March, 2019

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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 The Dayton Power and Light Company (Dayton).

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.

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 (IC) has proposed a solar facility to be located in Fayette County near Greenfield, Ohio. The project will have a total capability of **47.5 MW** with **31.6 MW** of this output being recognized by PJM as capacity. The expected Commercial Operation Date for this uprate project is **June 30, 2021**. **This study does not imply a Dayton Power & Light Company (Dayton) commitment to this in-service date.**

Queue Number	AE1-040
Project Name	GREENFIELD 69 KV
Interconnection Customer	
State	None
County	Fayette
Transmission Owner	Dayton
MFO	47.5
MWE	47.5
MWC	31.6
Fuel	Solar
Basecase Study Year	2022

Point of Interconnection

Primary Point of Interconnection

The AE1-040 project will interconnect directly into the Greenfield 69 kV Substation. The physical Point of Interconnection (POI) will be the last takeoff structure leaving the Greenfield 69 kV yard. Dayton will own the takeoff structure and all attachment hardware. Customer will own the conductor terminating onto the structure.

Under the AE1-040 project, the IC will construct a single 69kV line up to the POI in the Greenfield 69 kV yard.

See Attachment 1 for a one line of the physical interconnection point. Attachment 2 provides the Project Location.

Secondary Point of Interconnection

The IC requested that a secondary POI be reviewed for network impacts (Option 2). The secondary interconnection chosen was a tap off of the Greenfield-Washington Court House 69 kV line.

Cost Summary

The AE1-040 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ 0
Direct Connection Network Upgrade	\$ 1,100,000
Non Direct Connection Network Upgrades	\$ 280,000
Total Costs	\$ 1,380,000

In addition, the AE1-040 project may be responsible for a contribution to the following costs:

Description	Total Cost
System Upgrades	\$43,650,443

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

The transmission and substation costs given above exclude the Contribution in Aid of Construction (“CIAC”) Federal Income Tax Gross up charge. If at a future date Federal CIAC taxes are deemed necessary by the IRS for this project, Dayton shall be reimbursed by the Interconnection Customer for such taxes.

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of the AE1-040 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.

Transmission Owner Scope of Work

Attachment Facilities

The Interconnection Customer will construct the generator lead line to the proposed Point of Interconnection as depicted on the one line diagram in Attachment 1.

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

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
Install three new 69 kV breakers at the Greenfield Substation to interconnect the AE1-040 project. This will include the installation of all physical structures, P&C equipment, communications equipment, metering equipment, and associated facilities.	\$1,100,000
Total Direct Connection Facility Costs	\$1,100,000

The substation direct connection cost estimate for the AE1-040 project is approximately **\$1,100,000**. The substation direct connection work for this project includes the addition of three new 69 kV breakers to the Greenfield Substation. The Greenfield Substation is designed for a two bus, two breaker configuration. Thus, to create a reliable connection to the system will require three new breakers. The 69 kV generator lead line will be constructed by the developer and will be terminated onto the 69 kV takeoff structure leaving the Greenfield Substation. The new 69kV breaker will be equipped with the necessary communication systems to facilitate remote supervisory control of the breaker and status monitoring. Dayton will install the physical structures, line relaying, communications, and interconnection metering to accommodate the interconnection of the AE1-040 generator.

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
Protection System changes at Greenfield Substation	\$ 15,000
Protection System changes at Washington CH Substation	\$ 15,000
Protection System changes at AEP Buckskin Substation	\$ 250,000 ¹
Total Non-Direct Connection Facility Costs	\$ 280,000

The substation non-direct connection cost estimate for the AE1-040 project is approximately **\$280,000**. Remote end relaying will need to be evaluated for settings changes at Greenfield, Washington CH, and Buckskin (AEP) Substations to facilitate the interconnection of the new generation.

¹ AEP will evaluate the true scope and cost of the Protection System Changes in the Facilities Study Phase.

Incremental Capacity Transfer Rights (ICTRs)

Will be determined at a later study phase.

Schedule

Based on the extent of the Dayton primary Direct Connection and Non-Direct Connection upgrades required to support the AE1-040 generation project, it is expected to take a minimum of **18 months** from the date of a fully executed Interconnection Construction Service Agreement to complete the installation subject to market conditions and vendor lead times. This includes the requirement for the Interconnection Customer to make a preliminary payment to Dayton which funds the first three months of engineering design that is related to the construction of the Non-Direct Connection facilities. It assumes that there will be no environmental or permitting issues to implement the Non-Direct Connection upgrades for this project and that all system outages will be allowed when requested.

The schedule for the required Network Impact Reinforcements will be more clearly identified in future study phases. The estimate elapsed time to complete each of the required reinforcements is identified in the “**System Reinforcements**” section of the report.

Interconnection Customer Requirements

Dayton Interconnection Requirements

Dayton 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-001-3. These connection requirements apply to all generation facilities, transmission facilities, and end-users connecting to the Dayton transmission system. Detailed information outlining Dayton interconnection requirements can be reviewed utilizing the following link:

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

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 Attachment O, Appendix 2, Section 8.

Dayton Metering Requirements

The Interconnection Customer will be required to comply with all Dayton Revenue Metering Requirements for Generation Interconnection Customers as outlined in the link below. The Revenue Metering Requirements may be found within the Dayton Power & Light Co. "Requirements for the Connection of Facilities to the Dayton Power & Light Co. Transmission System" document located at the following link:

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

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

Network Impacts – Option 1

The Queue Project AE1-040 was evaluated as a 47.5 MW (Capacity 31.6 MW) injection at the Greenfield 69 kV substation in the Dayton area. Project AE1-040 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-040 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)

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
64650	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P1-2_#5913-A	single	50.0	99.17	115.22	DC	8.02
64654	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	Base Case	single	50.0	89.33	105.54	DC	8.1

Multiple Facility Contingency

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

None

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64253	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P4_#8110_05HILLSB138_F	breaker	50.0	172.58	196.43	DC	11.92
64254	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P4_#2085_05BEATTY345_304C	breaker	50.0	167.92	192.37	DC	12.22
64649	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_SUBT_P1-3_#1443_05HIGHLA138_1	single	50.0	107.13	117.83	DC	5.35
64282	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P4_#8110_05HILLSB138_F	breaker	50.0	149.98	173.83	DC	11.92
64283	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P4_#2085_05BEATTY345_304C	breaker	50.0	145.52	169.97	DC	12.22
64543	246893	05BIERSRUN	AEP	243617	05SLATE	AEP	1	AEP_P4_#9726_05LICK138_106	breaker	50.0	104.54	107.75	DC	3.56
64580	246946	05WLDCAT	AEP	247034	05EMERSS	AEP	1	AEP_P4_#8109_05HILLSB138_D	breaker	185.0	100.42	101.03	DC	2.49
64625	247853	05LATTAVLSS	AEP	246893	05BIERSRUN	AEP	1	AEP_SUBT_P1-2_#413	single	50.0	101.1	128.3	DC	13.6
64626	247853	05LATTAVLSS	AEP	246893	05BIERSRUN	AEP	1	AEP_P1-3_#6781_05BIERSR345_1	single	50.0	105.62	123.6	DC	8.99
64432	249995	08CLINCO	DEO&K	250122	08WARRN1	DEO&K	1	AEP_P4_#8109_05HILLSB138_C	breaker	198.0	126.67	127.42	DC	3.29
64334	932430	AC2-061TAP	DEO&K	249995	08CLINCO	DEO&K	1	AEP_P4_#8109_05HILLSB138_C	breaker	185.0	148.92	149.73	DC	3.29
6420	93245	AC2-064	AEP	24304	05MILLBR	AEP	1	.138.DEO&K.C1 CLINTON	bus	173.0	108.24	108.96	DC	2.75

2	0	TAP		2				COUNTY						
64450	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	AEP_P4_#8108_05HILLSB138_D	breaker	173.0	123.93	124.79	DC	3.31
64451	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	.138.DEO&K.WARREN BUS1+RELAYFAIL	breaker	173.0	108.36	109.07	DC	2.75
64452	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	.138.DEO&K.C1 CLINTON COUNTY	breaker	173.0	108.24	108.96	DC	2.75

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC/DC	MW IMPACT
64834	243019	05HILLSB	AEP	932430	AC2-061 TAP	DEO&K	1	AEP_P1-2_#5891	operation	185.0	122.69	123.28	DC	2.41
64643	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P1-2_#762	operation	50.0	167.23	191.68	DC	12.23
64648	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	Base Case	operation	50.0	157.88	182.24	DC	12.18
64796	243598	05BCKSKI	AEP	247853	05LATTAVL SS	AEP	1	AEP_SUBT_P1-2_#413	operation	100.0	112.69	133.13	DC	20.44
64675	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P1-2_#762	operation	50.0	144.63	169.08	DC	12.23
64680	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	Base Case	operation	50.0	135.48	159.84	DC	12.18
64929	246893	05BIERSRUN	AEP	243617	05SLATE	AEP	1	AEP_P1-2_#6786	operation	50.0	103.24	106.68	DC	3.82
64619	247853	05LATTAVL SS	AEP	246893	05BIERSRUN	AEP	1	AEP_SUBT_P1-2_#413	operation	50.0	215.78	256.66	DC	20.44
64624	247853	05LATTAVL SS	AEP	246893	05BIERSRUN	AEP	1	Base Case	operation	50.0	144.33	172.65	DC	14.16
64848	249995	08CLINCO	DEO&K	250122	08WARRN1	DEO&K	1	AEP_P1-2_#5891	operation	198.0	121.36	121.9	DC	2.41
64849	249995	08CLINCO	DEO&K	250122	08WARRN1	DEO&K	1	DAY_P1_13804A	operation	198.0	121.36	121.9	DC	2.41
64739	932430	AC2-061 TAP	DEO&K	249995	08CLINCO	DEO&K	1	AEP_P1-2_#5891	operation	185.0	143.87	144.46	DC	2.41
64911	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	.138.DEO&K.B2 WARREN-CLINTONCO-HILLSBORO 2381	operation	173.0	108.18	108.9	DC	2.75

System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
64334	7	AC2-061 TAP 138.0 kV - 08CLINCO 138.0 kV Ckt 1	<u>DEO&K</u> Description : Replace terminal equipment. DEOK will replace a meter and free-standing CT. They will each be rated 2000 A continuous. Time Estimate : 9.0 Months Cost : \$110,000	\$110,000
64432	6	08CLINCO 138.0 kV - 08WARRN1 138.0 kV Ckt 1	<u>DEO&K</u> Description : Rebuild and reconductor 16.03 miles of 138 kV line from Clinton County to Warren. This will require new poles as well. Time Estimate : 42.0 Months Cost : \$28,810,443	\$28,810,443
64543	3	05BIERSRUN 69.0 kV - 05SLATE 69.0 kV Ckt 1	<u>AEP</u> Description : PJM supplemental upgrade s1559.1: Rebuild ~18.7 miles of the Ross – Highland 69kV Line using 795 ACSR conductor (128 MVA rating) and 69kV Self Supporting steel with partial reroute around Hillsboro. The supplemental project has an projected in-service date of 12/01/2019.	\$0
64580	4	05WLDCAT 138.0 kV - 05EMERSS 138.0 kV Ckt 1	<u>AEP</u> Description : Replace ACSR 477 26/7 HAWK - Conductor Section 1. A Sag Study will be required on the 1.3 miles of ACSR ~ 477 ~ 26/7 ~ HAWK - Conductor Section 1 to mitigate the overload. Depending on the sag study results, the cost for this upgrade is expected to be between \$5,200 (no remediations required, just sag study) and \$1.95 million (complete line reconductor/rebuild). 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 : 24-36 Months Cost : \$1,950,000	\$1,950,000
64202,64451,64452, 64450	8	AC2-064 TAP 138.0 kV - 05MILLBR 138.0 kV Ckt 1	<u>AEP</u> Description : A Sag Study will be required on the 8.52 miles of ACSR ~ 477 ~ 26/7 ~ HAWK - Conductor Section 3 to mitigate the overload. Depending on the sag study results, the cost for this upgrade is expected to be between \$34,080 (no remediations required, just sag study) and \$12.78 million (complete line reconductor/rebuild). 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 : 24-36 Months Cost : \$12,780,000	\$12,780,000

ID	Index	Facility	Upgrade Description	Cost
64654,64649,64650, 64253,64254	1	05BCKSKI 69.0 kV - 05PETERSB8 69.0 kV Ckt 1	<u>AEP</u> Description : PJM supplemental upgrade s1559.1: Rebuild ~18.7 miles of the Ross – Highland 69kV Line using 795 ACSR conductor (128 MVA rating) and 69kV Self Supporting steel with partial reroute around Hillsboro. The supplemental project has an projected in-service date of 12/01/2019.	\$0
64282,64283	2	05PETERSB8 69.0 kV - 05HIGHLA 69.0 kV Ckt 1	<u>AEP</u> Description : PJM supplemental upgrade s1559.1: Rebuild ~18.7 miles of the Ross – Highland 69kV Line using 795 ACSR conductor (128 MVA rating) and 69kV Self Supporting steel with partial reroute around Hillsboro. The supplemental project has an projected in-service date of 12/01/2019.	\$0
64625,64626	5	05LATTAVL SS 69.0 kV - 05BIERSRUN 69.0 kV Ckt 1	<u>AEP</u> Description : No Violation. AEP Rating Sufficient, Current AEP End Rating: S/N: 99, S/E: 99	\$0
			TOTAL COST	\$43,650,443

Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate 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 flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gauge 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
64253	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P4_#8110_05HILLSB 138_F	breaker	50.0	172.58	196.43	DC	11.92

Bus #	Bus	MW Impact
932381	AC2-055 C	5.52
932382	AC2-055 E	9.0
932421	AC2-060 C	19.57
932422	AC2-060 E	11.01
932651	AC2-087 C O1	14.49
932652	AC2-087 E O1	11.5
934491	AD1-073 C	4.04
934492	AD1-073 E	2.08
938271	AE1-040 C O1	7.93
938272	AE1-040 E O1	3.99
BAYOU	BAYOU	0.06
BIG_CAJUN1	BIG_CAJUN1	0.09
BIG_CAJUN2	BIG_CAJUN2	0.18
BLUEG	BLUEG	0.69
CALDERWOOD	CALDERWOOD	0.02
CANNELTON	CANNELTON	0.04
CATAWBA	CATAWBA	0.0
CBM-N	CBM-N	0.03
CHEOAH	CHEOAH	0.02
CHILHOWEE	CHILHOWEE	0.01
CHOCTAW	CHOCTAW	0.06
COFFEEN	COFFEEN	0.04
COTTONWOOD	COTTONWOOD	0.23
DEARBORN	DEARBORN	0.01
DUCKCREEK	DUCKCREEK	0.08
EDWARDS	EDWARDS	0.04
ELMERSMITH	ELMERSMITH	0.06
FARMERCITY	FARMERCITY	0.02
G-007A	G-007A	0.08
GIBSON	GIBSON	0.02
HAMLET	HAMLET	0.01
NEWTON	NEWTON	0.12
NYISO	NYISO	0.12
O-066A	O-066A	0.04
PRAIRIE	PRAIRIE	0.19
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.04
TILTON	TILTON	0.06
TRIMBLE	TRIMBLE	0.08
TVA	TVA	0.1

Bus #	Bus	MW Impact
UNIONPOWER	UNIONPOWER	0.04
VFT	VFT	0.22

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
64282	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P4_#8110_05HILLSB 138_F	breaker	50.0	149.98	173.83	DC	11.92

Bus #	Bus	MW Impact
932381	AC2-055 C	5.52
932382	AC2-055 E	9.0
932421	AC2-060 C	19.57
932422	AC2-060 E	11.01
932651	AC2-087 C O1	14.49
932652	AC2-087 E O1	11.5
934491	AD1-073 C	4.04
934492	AD1-073 E	2.08
938271	AE1-040 C O1	7.93
938272	AE1-040 E O1	3.99
BAYOU	BAYOU	0.06
BIG_CAJUN1	BIG_CAJUN1	0.09
BIG_CAJUN2	BIG_CAJUN2	0.18
BLUEG	BLUEG	0.69
CALDERWOOD	CALDERWOOD	0.02
CANNELTON	CANNELTON	0.04
CATAWBA	CATAWBA	0.0
CBM-N	CBM-N	0.03
CHEOAH	CHEOAH	0.02
CHILHOWEE	CHILHOWEE	0.01
CHOCTAW	CHOCTAW	0.06
COFFEEN	COFFEEN	0.04
COTTONWOOD	COTTONWOOD	0.23
DEARBORN	DEARBORN	0.01
DUCKCREEK	DUCKCREEK	0.08
EDWARDS	EDWARDS	0.04
ELMERSMITH	ELMERSMITH	0.06
FARMERCITY	FARMERCITY	0.02
G-007A	G-007A	0.08
GIBSON	GIBSON	0.02
HAMLET	HAMLET	0.01
NEWTON	NEWTON	0.12
NYISO	NYISO	0.12
O-066A	O-066A	0.04
PRAIRIE	PRAIRIE	0.19
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.04
TILTON	TILTON	0.06
TRIMBLE	TRIMBLE	0.08
TVA	TVA	0.1

Bus #	Bus	MW Impact
UNIONPOWER	UNIONPOWER	0.04
VFT	VFT	0.22

Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64543	246893	05BIERSRUN	AEP	243617	05SLATE	AEP	1	AEP_P4_#9726_05LICK 138_106	breaker	50.0	104.54	107.75	DC	3.56

Bus #	Bus	MW Impact
932381	AC2-055 C	1.63
932382	AC2-055 E	2.66
932421	AC2-060 C	5.78
932422	AC2-060 E	3.25
932651	AC2-087 C O1	4.28
932652	AC2-087 E O1	3.4
934491	AD1-073 C	1.19
934492	AD1-073 E	0.61
938271	AE1-040 C O1	2.37
938272	AE1-040 E O1	1.19
CARR	CARR	0.01
CBM-S1	CBM-S1	0.14
CBM-S2	CBM-S2	0.01
CBM-W1	CBM-W1	0.26
CBM-W2	CBM-W2	1.13
CIN	CIN	0.17
G-007	G-007	0.02
IPL	IPL	0.12
LGEE	LGEE	0.06
MEC	MEC	0.23
MECS	MECS	0.11
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.03

Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64580	246946	05WLDCA	AEP	247034	05EMERSS	AEP	1	AEP_P4_#8108_05HILLSB 138_D	breaker	185.0	100.42	101.03	DC	2.49

Bus #	Bus	MW Impact
924371	AB2-085 C O1	6.77
924372	AB2-085 E O1	3.19
926101	AC1-089 C O1	23.54
926102	AC1-089 E O1	38.4
932381	AC2-055 C	1.14
932382	AC2-055 E	1.86
932421	AC2-060 C	4.03
932422	AC2-060 E	2.27
932451	AC2-064 C	14.15
932452	AC2-064 E	9.43
932651	AC2-087 C O1	2.99
932652	AC2-087 E O1	2.37
934491	AD1-073 C	0.83
934492	AD1-073 E	0.43
936091	AD2-012 C	57.05
936092	AD2-012 E	38.04
936251	AD2-031 C O1	1.2
936252	AD2-031 E O1	1.96
938271	AE1-040 C O1	1.66
938272	AE1-040 E O1	0.83
BAYOU	BAYOU	0.35
BIG_CAJUN1	BIG_CAJUN1	0.53
BIG_CAJUN2	BIG_CAJUN2	1.06
BLUEG	BLUEG	3.75
CALDERWOOD	CALDERWOOD	0.16
CANNELTON	CANNELTON	0.21
CATAWBA	CATAWBA	0.03
CBM-N	CBM-N	0.09
CHEOAH	CHEOAH	0.15
CHILHOWEE	CHILHOWEE	0.05
CHOCTAW	CHOCTAW	0.35
COFFEEN	COFFEEN	0.19
COTTONWOOD	COTTONWOOD	1.38
DEARBORN	DEARBORN	0.06
DUCKCREEK	DUCKCREEK	0.34
EDWARDS	EDWARDS	0.15
ELMERSMITH	ELMERSMITH	0.35
FARMERCITY	FARMERCITY	0.11
G-007A	G-007A	0.27
GIBSON	GIBSON	0.11
HAMLET	HAMLET	0.06

Bus #	Bus	MW Impact
NEWTON	NEWTON	0.52
NYISO	NYISO	0.37
O-066A	O-066A	0.12
PRAIRIE	PRAIRIE	0.94
SANTEETLA	SANTEETLA	0.04
SMITHLAND	SMITHLAND	0.09
TATANKA	TATANKA	0.19
TILTON	TILTON	0.22
TRIMBLE	TRIMBLE	0.41
TVA	TVA	0.63
UNIONPOWER	UNIONPOWER	0.23
VFT	VFT	0.72

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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
64625	247853	05LATTAVL SS	AEP	246893	05BIERSRUN	AEP	1	AEP_SUBT_P1-2_#413	single	50.0	101.1	128.3	DC	13.6

Bus #	Bus	MW Impact
932381	AC2-055 C	9.4
932421	AC2-060 C	33.33
932651	AC2-087 C O1	24.68
934491	AD1-073 C	6.87
938271	AE1-040 C O1	13.6
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.15
CBM-W1	CBM-W1	0.3
CBM-W2	CBM-W2	1.2
CIN	CIN	0.21
HAMLET	HAMLET	0.02
IPL	IPL	0.15
LGEE	LGEE	0.07
MEC	MEC	0.24
MECS	MECS	0.16
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.04

Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64432	249995	08CLINCO	DEO&K	250122	08WARRN1	DEO&K	1	AEP_P4_#8109_05HILLSB 138_C	breaker	198.0	126.67	127.42	DC	3.29

Bus #	Bus	MW Impact
916272	Z1-080 E	3.84
918802	AA1-099 E	2.56
924371	AB2-085 C O1	8.85
924372	AB2-085 E O1	4.16
926101	AC1-089 C O1	16.61
926102	AC1-089 E O1	27.1
932381	AC2-055 C	1.49
932382	AC2-055 E	2.44
932421	AC2-060 C	5.3
932422	AC2-060 E	2.98
932431	AC2-061 C	24.36
932432	AC2-061 E	24.7
932651	AC2-087 C O1	3.93
932652	AC2-087 E O1	3.11
934491	AD1-073 C	1.09
934492	AD1-073 E	0.56
936091	AD2-012 C	75.85
936092	AD2-012 E	50.57
936251	AD2-031 C O1	1.62
936252	AD2-031 E O1	2.65
938271	AE1-040 C O1	2.19
938272	AE1-040 E O1	1.1
BAYOU	BAYOU	0.03
BIG_CAJUN1	BIG_CAJUN1	0.03
BIG_CAJUN2	BIG_CAJUN2	0.06
BLUEG	BLUEG	1.15
CANNELTON	CANNELTON	0.04
CBM-N	CBM-N	0.06
CBM-S2	CBM-S2	0.13
CHOCTAW	CHOCTAW	0.01
COFFEEN	COFFEEN	0.09
COTTONWOOD	COTTONWOOD	0.13
CPL	CPL	0.06
DEARBORN	DEARBORN	0.08
DUCKCREEK	DUCKCREEK	0.2
EDWARDS	EDWARDS	0.09
ELMERSMITH	ELMERSMITH	0.07
FARMERCITY	FARMERCITY	0.05
G-007A	G-007A	0.18
GIBSON	GIBSON	0.05
NEWTON	NEWTON	0.26

Bus #	Bus	MW Impact
NYISO	NYISO	0.24
O-066A	O-066A	0.09
PRAIRIE	PRAIRIE	0.34
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.09
TILTON	TILTON	0.14
TRIMBLE	TRIMBLE	0.14
UNIONPOWER	UNIONPOWER	0.01
VFT	VFT	0.5

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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
64334	932430	AC2-061 TAP	DEO&K	249995	08CLINCO	DEO&K	1	AEP_P4_#8109_05HILLSB 138_C	breaker	185.0	148.92	149.73	DC	3.29

Bus #	Bus	MW Impact
916272	Z1-080 E	2.16
918802	AA1-099 E	1.44
924371	AB2-085 C O1	8.85
924372	AB2-085 E O1	4.16
926101	AC1-089 C O1	16.61
926102	AC1-089 E O1	27.1
932381	AC2-055 C	1.49
932382	AC2-055 E	2.44
932421	AC2-060 C	5.3
932422	AC2-060 E	2.98
932431	AC2-061 C	24.36
932432	AC2-061 E	24.7
932651	AC2-087 C O1	3.93
932652	AC2-087 E O1	3.11
934491	AD1-073 C	1.09
934492	AD1-073 E	0.56
936091	AD2-012 C	75.85
936092	AD2-012 E	50.57
936251	AD2-031 C O1	1.62
936252	AD2-031 E O1	2.65
938271	AE1-040 C O1	2.19
938272	AE1-040 E O1	1.1
BAYOU	BAYOU	0.03
BIG_CAJUN1	BIG_CAJUN1	0.03
BIG_CAJUN2	BIG_CAJUN2	0.06
BLUEG	BLUEG	1.15
CANNELTON	CANNELTON	0.04
CBM-N	CBM-N	0.06
CBM-S2	CBM-S2	0.13
CHOCTAW	CHOCTAW	0.01
COFFEEN	COFFEEN	0.09
COTTONWOOD	COTTONWOOD	0.13
CPL	CPL	0.06
DEARBORN	DEARBORN	0.08
DUCKCREEK	DUCKCREEK	0.2
EDWARDS	EDWARDS	0.09
ELMERSMITH	ELMERSMITH	0.07
FARMERCITY	FARMERCITY	0.05
G-007A	G-007A	0.18
GIBSON	GIBSON	0.05

Bus #	Bus	MW Impact
NEWTON	NEWTON	0.26
NYISO	NYISO	0.24
O-066A	O-066A	0.09
PRAIRIE	PRAIRIE	0.34
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.09
TILTON	TILTON	0.14
TRIMBLE	TRIMBLE	0.14
UNIONPOWER	UNIONPOWER	0.01
VFT	VFT	0.5

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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
64450	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	AEP_P4_#8108_05HILLSB138_D	breaker	173.0	123.93	124.79	DC	3.31

Bus #	Bus	MW Impact
924371	AB2-085 C O1	8.3
924372	AB2-085 E O1	3.91
926101	AC1-089 C O1	16.25
926102	AC1-089 E O1	26.52
932381	AC2-055 C	1.47
932382	AC2-055 E	2.4
932421	AC2-060 C	5.21
932422	AC2-060 E	2.93
932451	AC2-064 C	35.6
932452	AC2-064 E	23.74
932651	AC2-087 C O1	3.86
932652	AC2-087 E O1	3.06
934491	AD1-073 C	1.08
934492	AD1-073 E	0.55
936091	AD2-012 C	73.83
936092	AD2-012 E	49.22
936251	AD2-031 C O1	1.72
936252	AD2-031 E O1	2.81
938271	AE1-040 C O1	2.2
938272	AE1-040 E O1	1.11
CARR	CARR	0.03
CATAWBA	CATAWBA	0.02
CBM-S1	CBM-S1	0.97
CBM-W1	CBM-W1	1.41
CBM-W2	CBM-W2	6.46
CIN	CIN	1.05
G-007	G-007	0.1
HAMLET	HAMLET	0.07
IPL	IPL	0.7
LGEE	LGEE	0.5
MEC	MEC	1.23
MECS	MECS	0.7
O-066	O-066	0.34
RENSSELAER	RENSSELAER	0.03
WEC	WEC	0.18

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 List

Contingency Name	Contingency Definition
AEP_P4_#9726_05LICK 138_106	CONTINGENCY 'AEP_P4_#9726_05LICK 138_106' OPEN BRANCH FROM BUS 243465 TO BUS 243561 CKT 1 / 243465 05ADDISO 138 243561 05RODNEY 138 1 OPEN BRANCH FROM BUS 243501 TO BUS 243534 CKT 1 / 243501 05E.BEAV 138 243534 05LICK 138 1 OPEN BRANCH FROM BUS 243501 TO BUS 243034 CKT 1 / 243501 05E.BEAV 138 243034 05MARQUI 138 1 OPEN BRANCH FROM BUS 243534 TO BUS 927010 CKT 1 / 243534 05LICK 138 927010 AC1-188 TAP 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 243465 TO BUS 243595 CKT 3 / 243465 05ADDISO 138 243595 05ADDISON 69.0 3 OPEN BRANCH FROM BUS 243501 TO BUS 243166 CKT 1 / 243501 05E.BEAV 138 243166 05E.BEAV 69.0 1 OPEN BRANCH FROM BUS 243534 TO BUS 246738 CKT 1 / 243534 05LICK 138 246738 05JACKSON 13.8 1 OPEN BRANCH FROM BUS 243821 TO BUS 243166 CKT 1 / 243821 05BEAVER 69.0 243166 05E.BEAV 69.0 1 OPEN BRANCH FROM BUS 244928 TO BUS 243166 CKT 1 / 244928 05BEAVER 8 69.0 243166 05E.BEAV 69.0 1 END
AEP_P1-3_#6781_05BIERSR 345_1	CONTINGENCY 'AEP_P1-3_#6781_05BIERSR 345_1' OPEN BRANCH FROM BUS 246888 TO BUS 246889 CKT 1 / 246888 05BIERSR 345 246889 05BIERSR 138 1 END
DAY_P1_13804A	CONTINGENCY 'DAY_P1_13804A' OPEN BRANCH FROM BUS 243019 TO BUS 253111 CKT 1 / 243019 05HILLSB 138 253111 09MIDDLE 138 1 OPEN BRANCH FROM BUS 253111 TO BUS 253057 CKT 1 / 253111 09MIDDLE 138 253057 09OHH 138 1 END
AEP_P4_#8108_05HILLSB 138_D	CONTINGENCY 'AEP_P4_#8108_05HILLSB 138_D' OPEN BRANCH FROM BUS 243019 TO BUS 932430 CKT 1 / 243019 05HILLSB 138 932430 AC2- 061 TAP 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 243019 TO BUS 253111 CKT 1 / 243019 05HILLSB 138 253111 09MIDDLE 138 1 END
AEP_P4_#8110_05HILLSB 138_F	CONTINGENCY 'AEP_P4_#8110_05HILLSB 138_F' OPEN BRANCH FROM BUS 243019 TO BUS 243102 CKT 1 / 243019 05HILLSB 138 243102 05SINKG8 138 1 OPEN BRANCH FROM BUS 243019 TO BUS 246946 CKT 1 / 243019 05HILLSB 138 246946 05WLDCAT 138 1 OPEN BRANCH FROM BUS 932450 TO BUS 243102 CKT 1 / 932450 AC2-064 TAP 138 243102 05SINKG8 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD END

Contingency Name	Contingency Definition
AEP_P1-2_#5891	CONTINGENCY 'AEP_P1-2_#5891' OPEN BRANCH FROM BUS 243019 TO BUS 253111 CKT 1 / 243019 05HILLSB 138 253111 09MIDDLE 138 1 END
AEP_SUBT_P1-3_#1443_05HIGHLA 138_1	CONTINGENCY 'AEP_SUBT_P1-3_#1443_05HIGHLA 138_1' OPEN BRANCH FROM BUS 246911 TO BUS 243606 CKT 3 / 246911 05HIGHLA 138 243606 05HIGHLA 69.0 3 END
AEP_P1-2_#5913-A	CONTINGENCY 'AEP_P1-2_#5913-A' OPEN BRANCH FROM BUS 243042 TO BUS 932450 CKT 1 / 243042 05MILLBR 138 932450 AC2- 064 TAP 138 1 END
.138.DEO&K.B2 WARREN-CLINTONCO-HILLSBORO 2381	CONTINGENCY '.138.DEO&K.B2 WARREN-CLINTONCO-HILLSBORO 2381' OPEN BUS 249995 END
AEP_SUBT_P1-2_#413	CONTINGENCY 'AEP_SUBT_P1-2_#413' OPEN BRANCH FROM BUS 243598 TO BUS 243612 CKT 1 / 243598 05BCKSKI 69.0 243612 05PETERSB8 69.0 1 OPEN BRANCH FROM BUS 243606 TO BUS 243612 CKT 1 / 243606 05HIGHLA 69.0 243612 05PETERSB8 69.0 1 END
AEP_P4_#8109_05HILLSB 138_C	CONTINGENCY 'AEP_P4_#8109_05HILLSB 138_C' OPEN BRANCH FROM BUS 243019 TO BUS 243102 CKT 1 / 243019 05HILLSB 138 243102 05SINKG8 138 1 OPEN BRANCH FROM BUS 243019 TO BUS 253111 CKT 1 / 243019 05HILLSB 138 253111 09MIDDLE 138 1 OPEN BRANCH FROM BUS 932450 TO BUS 243102 CKT 1 / 932450 AC2-064 TAP 138 243102 05SINKG8 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD END
AEP_P4_#2085_05BEATTY 345_304C	CONTINGENCY 'AEP_P4_#2085_05BEATTY 345_304C' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
Base Case	
.138.DEO&K.C1 CLINTON COUNTY	CONTINGENCY '.138.DEO&K.C1 CLINTON COUNTY' OPEN BRANCH FROM BUS 932430 TO BUS 249995 CKT 1 /* 932430 AC2-061 TAP 138.00 249995 08CLINCO 138.00 OPEN BRANCH FROM BUS 249995 TO BUS 250122 CKT 1 OPEN BUS 251803 END

Contingency Name	Contingency Definition
AEP_P1-2_#762	CONTINGENCY 'AEP_P1-2_#762' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
AEP_P1-2_#6786	CONTINGENCY 'AEP_P1-2_#6786' OPEN BRANCH FROM BUS 246889 TO BUS 246890 CKT 1 / 246889 05BIERSR 138 246890 05HOPETN 138 1 END
.138.DEO&K.WARREN BUS1+RELAYFAIL	CONTINGENCY '.138.DEO&K.WARREN BUS1+RELAYFAIL' OPEN BUS 250138 OPEN BUS 249995 OPEN BRANCH FROM BUS 250123 TO BUS 250147 CKT 1 OPEN BRANCH FROM BUS 250122 TO BUS 250123 CKT Z1 OPEN BRANCH FROM BUS 249995 TO BUS 250122 CKT 1 OPEN BRANCH FROM BUS 250122 TO BUS 250138 CKT 1 OPEN BRANCH FROM BUS 250122 TO BUS 251546 CKT 1 OPEN BUS 252383 END

Short Circuit

Short Circuit

The following Breakers are overdutied:

None.

Network Impacts – Option 2

The Queue Project AE1-040 was evaluated as a 47.5 MW (Capacity 31.6 MW) injection tapping the Greenfield to Washington Court 69 kV line in the Dayton area. Project AE1-040 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-040 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)

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
64894	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P1-2_#5913-A	single	50.0	99.17	114.61	DC	7.72
64898	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	Base Case	single	50.0	89.33	104.92	DC	7.8

Multiple Facility Contingency

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

None

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64704	243019	05HILLSB	AEP	932430	AC2-061 TAP	DEO&K	1	AEP_P4_#8109_05HILLSB138_C	breaker	185.0	122.46	123.24	DC	3.18
64501	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P4_#8110_05HILLSB138_F	breaker	50.0	172.58	195.52	DC	11.47
64502	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P4_#2085_05BEATTY345_304C	breaker	50.0	167.92	191.45	DC	11.76
64893	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_SUBT_P1-3_#1443_05HIGHLA138_1	single	50.0	107.13	117.39	DC	5.13
64530	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P4_#8110_05HILLSB138_F	breaker	50.0	149.98	172.92	DC	11.47
64531	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P4_#2085_05BEATTY345_304C	breaker	50.0	145.52	169.05	DC	11.76
64788	246893	05BIERSRUN	AEP	243617	05SLATE	AEP	1	AEP_P4_#9726_05LICK138_106	breaker	50.0	104.54	107.64	DC	3.43
64825	246946	05WLDCAT	AEP	247034	05EMERSS	AEP	1	AEP_P4_#8108_05HILLSB138_D	breaker	185.0	100.42	101.01	DC	2.41
64869	247853	05LATTAVLSS	AEP	246893	05BIERSRUN	AEP	1	AEP_SUBT_P1-2_#413	single	50.0	101.1	127.3	DC	13.1
64870	247853	05LATTAVLSS	AEP	246893	05BIERSRUN	AEP	1	AEP_P1-3_#6781_05BIERSR345_1	single	50.0	105.62	122.95	DC	8.66
64679	249995	08CLINCO	DEO&K	250122	08WARRN1	DEO&K	1	AEP_P4_#8109_05HILLSB138_C	breaker	198.0	126.67	127.39	DC	3.18

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 LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64577	932430	AC2-061 TAP	DEO&K	249995	08CLINCO	DEO&K	1	AEP_P4_#8109_05HILLSB138_C	breaker	185.0	148.92	149.7	DC	3.18
64450	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	.138.DEO&K.C1 CLINTON COUNTY	bus	173.0	108.24	108.94	DC	2.68
64696	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	AEP_P4_#8108_05HILLSB138_D	breaker	173.0	123.93	124.77	DC	3.21
64697	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	.138.DEO&K.WARREN BUS1+RELAYFAIL	breaker	173.0	108.36	109.05	DC	2.68
64698	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	.138.DEO&K.C1 CLINTON COUNTY	breaker	173.0	108.24	108.94	DC	2.68

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
65121	243019	05HILLSB	AEP	932430	AC2-061 TAP	DEO&K	1	AEP_P1-2_#8309	operation	185.0	114.73	115.33	DC	2.44
64887	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P1-2_#762	operation	50.0	167.23	190.76	DC	11.77
64892	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	Base Case	operation	50.0	157.88	181.32	DC	11.72
65034	243598	05BCKSKI	AEP	247853	05LATTAVL SS	AEP	1	AEP_SUBT_P1-2_#413	operation	100.0	112.69	132.38	DC	19.69
64917	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P1-2_#762	operation	50.0	144.63	168.16	DC	11.77
64922	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	Base Case	operation	50.0	135.48	158.92	DC	11.72
65160	246893	05BIERSRUN	AEP	243617	05SLATE	AEP	1	AEP_P1-2_#6786	operation	50.0	103.24	106.55	DC	3.68
64863	247853	05LATTAVL SS	AEP	246893	05BIERSRUN	AEP	1	AEP_SUBT_P1-2_#413	operation	50.0	215.78	255.16	DC	19.69
64868	247853	05LATTAVL SS	AEP	246893	05BIERSRUN	AEP	1	Base Case	operation	50.0	144.33	171.63	DC	13.65
65122	249995	08CLINCO	DEO&K	250122	08WARRN1	DEO&K	1	AEP_P1-2_#8309	operation	198.0	114.21	114.76	DC	2.44
65011	932430	AC2-061 TAP	DEO&K	249995	08CLINCO	DEO&K	1	AEP_P1-2_#8309	operation	185.0	136.19	136.78	DC	2.44
65142	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	.138.DEO&K.B2 WARREN-CLINTONCO-HILLSBORO 2381	operation	173.0	108.18	108.88	DC	2.68

Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate 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 flowgate 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
64501	243598	05BCKSKI	AEP	243612	05PETERSB8	AEP	1	AEP_P4_#8110_05HILLSB 138_F	breaker	50.0	172.58	195.52	DC	11.47

Bus #	Bus	MW Impact
932381	AC2-055 C	5.52
932382	AC2-055 E	9.0
932421	AC2-060 C	19.57
932422	AC2-060 E	11.01
932651	AC2-087 C O1	14.49
932652	AC2-087 E O1	11.5
934491	AD1-073 C	4.04
934492	AD1-073 E	2.08
938271	AE1-040 C O2	7.63
938272	AE1-040 E O2	3.84
BAYOU	BAYOU	0.06
BIG_CAJUN1	BIG_CAJUN1	0.09
BIG_CAJUN2	BIG_CAJUN2	0.18
BLUEG	BLUEG	0.69
CALDERWOOD	CALDERWOOD	0.02
CANNELTON	CANNELTON	0.04
CATAWBA	CATAWBA	0.0
CBM-N	CBM-N	0.03
CHEOAH	CHEOAH	0.02
CHILHOWEE	CHILHOWEE	0.01
CHOCTAW	CHOCTAW	0.06
COFFEEN	COFFEEN	0.04
COTTONWOOD	COTTONWOOD	0.23
DEARBORN	DEARBORN	0.01
DUCKCREEK	DUCKCREEK	0.08
EDWARDS	EDWARDS	0.04
ELMERSMITH	ELMERSMITH	0.06
FARMERCITY	FARMERCITY	0.02
G-007A	G-007A	0.08
GIBSON	GIBSON	0.02
HAMLET	HAMLET	0.01
NEWTON	NEWTON	0.12
NYISO	NYISO	0.12
O-066A	O-066A	0.04
PRAIRIE	PRAIRIE	0.19
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.04
TILTON	TILTON	0.06
TRIMBLE	TRIMBLE	0.08
TVA	TVA	0.1

Bus #	Bus	MW Impact
UNIONPOWER	UNIONPOWER	0.04
VFT	VFT	0.22

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
64704	243019	05HILLSB	AEP	932430	AC2-061 TAP	DEO&K	1	AEP_P4_#8109_05HILLSB 138_C	breaker	185.0	122.46	123.24	DC	3.18

Bus #	Bus	MW Impact
916272	Z1-080 E	2.16
918802	AA1-099 E	1.44
924371	AB2-085 C O1	8.85
924372	AB2-085 E O1	4.16
926101	AC1-089 C O1	16.61
926102	AC1-089 E O1	27.1
932381	AC2-055 C	1.49
932382	AC2-055 E	2.44
932421	AC2-060 C	5.3
932422	AC2-060 E	2.98
932651	AC2-087 C O1	3.93
932652	AC2-087 E O1	3.11
934491	AD1-073 C	1.09
934492	AD1-073 E	0.56
936091	AD2-012 C	75.85
936092	AD2-012 E	50.57
936251	AD2-031 C O1	1.62
936252	AD2-031 E O1	2.65
938271	AE1-040 C O2	2.12
938272	AE1-040 E O2	1.06
BAYOU	BAYOU	0.03
BIG_CAJUN1	BIG_CAJUN1	0.03
BIG_CAJUN2	BIG_CAJUN2	0.06
BLUEG	BLUEG	1.15
CANNELTON	CANNELTON	0.04
CBM-N	CBM-N	0.06
CBM-S2	CBM-S2	0.13
CHOCTAW	CHOCTAW	0.01
COFFEEN	COFFEEN	0.09
COTTONWOOD	COTTONWOOD	0.13
CPL	CPL	0.06
DEARBORN	DEARBORN	0.08
DUCKCREEK	DUCKCREEK	0.2
EDWARDS	EDWARDS	0.09
ELMERSMITH	ELMERSMITH	0.07
FARMERCITY	FARMERCITY	0.05
G-007A	G-007A	0.18
GIBSON	GIBSON	0.05
NEWTON	NEWTON	0.26
NYISO	NYISO	0.24

Bus #	Bus	MW Impact
O-066A	O-066A	0.09
PRAIRIE	PRAIRIE	0.34
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.09
TILTON	TILTON	0.14
TRIMBLE	TRIMBLE	0.14
UNIONPOWER	UNIONPOWER	0.01
VFT	VFT	0.5

Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64530	243612	05PETERSB8	AEP	243606	05HIGHLA	AEP	1	AEP_P4_#8110_05HILLSB 138_F	breaker	50.0	149.98	172.92	DC	11.47

Bus #	Bus	MW Impact
932381	AC2-055 C	5.52
932382	AC2-055 E	9.0
932421	AC2-060 C	19.57
932422	AC2-060 E	11.01
932651	AC2-087 C O1	14.49
932652	AC2-087 E O1	11.5
934491	AD1-073 C	4.04
934492	AD1-073 E	2.08
938271	AE1-040 C O2	7.63
938272	AE1-040 E O2	3.84
BAYOU	BAYOU	0.06
BIG_CAJUN1	BIG_CAJUN1	0.09
BIG_CAJUN2	BIG_CAJUN2	0.18
BLUEG	BLUEG	0.69
CALDERWOOD	CALDERWOOD	0.02
CANNELTON	CANNELTON	0.04
CATAWBA	CATAWBA	0.0
CBM-N	CBM-N	0.03
CHEOAH	CHEOAH	0.02
CHILHOWEE	CHILHOWEE	0.01
CHOCTAW	CHOCTAW	0.06
COFFEEN	COFFEEN	0.04
COTTONWOOD	COTTONWOOD	0.23
DEARBORN	DEARBORN	0.01
DUCKCREEK	DUCKCREEK	0.08
EDWARDS	EDWARDS	0.04
ELMERSMITH	ELMERSMITH	0.06
FARMERCITY	FARMERCITY	0.02
G-007A	G-007A	0.08
GIBSON	GIBSON	0.02
HAMLET	HAMLET	0.01
NEWTON	NEWTON	0.12
NYISO	NYISO	0.12
O-066A	O-066A	0.04
PRAIRIE	PRAIRIE	0.19
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.04
TILTON	TILTON	0.06
TRIMBLE	TRIMBLE	0.08
TVA	TVA	0.1

Bus #	Bus	MW Impact
UNIONPOWER	UNIONPOWER	0.04
VFT	VFT	0.22

Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64788	246893	05BIERSRUN	AEP	243617	05SLATE	AEP	1	AEP_P4_#9726_05LICK 138_106	breaker	50.0	104.54	107.64	DC	3.43

Bus #	Bus	MW Impact
932381	AC2-055 C	1.63
932382	AC2-055 E	2.66
932421	AC2-060 C	5.78
932422	AC2-060 E	3.25
932651	AC2-087 C O1	4.28
932652	AC2-087 E O1	3.4
934491	AD1-073 C	1.19
934492	AD1-073 E	0.61
938271	AE1-040 C O2	2.28
938272	AE1-040 E O2	1.15
CARR	CARR	0.01
CBM-S1	CBM-S1	0.14
CBM-S2	CBM-S2	0.01
CBM-W1	CBM-W1	0.26
CBM-W2	CBM-W2	1.13
CIN	CIN	0.17
G-007	G-007	0.02
IPL	IPL	0.12
LGEE	LGEE	0.06
MEC	MEC	0.23
MECS	MECS	0.11
O-066	O-066	0.08
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.03

Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64825	246946	05WLDCA	AEP	247034	05EMERSS	AEP	1	AEP_P4_#8108_05HILLSB 138_D	breaker	185.0	100.42	101.01	DC	2.41

Bus #	Bus	MW Impact
924371	AB2-085 C O1	6.77
924372	AB2-085 E O1	3.19
926101	AC1-089 C O1	23.54
926102	AC1-089 E O1	38.4
932381	AC2-055 C	1.14
932382	AC2-055 E	1.86
932421	AC2-060 C	4.03
932422	AC2-060 E	2.27
932451	AC2-064 C	14.15
932452	AC2-064 E	9.43
932651	AC2-087 C O1	2.99
932652	AC2-087 E O1	2.37
934491	AD1-073 C	0.83
934492	AD1-073 E	0.43
936091	AD2-012 C	57.05
936092	AD2-012 E	38.04
936251	AD2-031 C O1	1.2
936252	AD2-031 E O1	1.96
938271	AE1-040 C O2	1.6
938272	AE1-040 E O2	0.81
BAYOU	BAYOU	0.35
BIG_CAJUN1	BIG_CAJUN1	0.53
BIG_CAJUN2	BIG_CAJUN2	1.06
BLUEG	BLUEG	3.75
CALDERWOOD	CALDERWOOD	0.16
CANNELTON	CANNELTON	0.21
CATAWBA	CATAWBA	0.03
CBM-N	CBM-N	0.09
CHEOAH	CHEOAH	0.15
CHILHOWEE	CHILHOWEE	0.05
CHOCTAW	CHOCTAW	0.35
COFFEEN	COFFEEN	0.19
COTTONWOOD	COTTONWOOD	1.38
DEARBORN	DEARBORN	0.06
DUCKCREEK	DUCKCREEK	0.34
EDWARDS	EDWARDS	0.15
ELMERSMITH	ELMERSMITH	0.35
FARMERCITY	FARMERCITY	0.11
G-007A	G-007A	0.27
GIBSON	GIBSON	0.11
HAMLET	HAMLET	0.06

Bus #	Bus	MW Impact
NEWTON	NEWTON	0.52
NYISO	NYISO	0.37
O-066A	O-066A	0.12
PRAIRIE	PRAIRIE	0.94
SANTEETLA	SANTEETLA	0.04
SMITHLAND	SMITHLAND	0.09
TATANKA	TATANKA	0.19
TILTON	TILTON	0.22
TRIMBLE	TRIMBLE	0.41
TVA	TVA	0.63
UNIONPOWER	UNIONPOWER	0.23
VFT	VFT	0.72

Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
64869	247853	05LATTAVL SS	AEP	246893	05BIERSRUN	AEP	1	AEP_SUBT_P1-2_#413	single	50.0	101.1	127.3	DC	13.1

Bus #	Bus	MW Impact
932381	AC2-055 C	9.4
932421	AC2-060 C	33.33
932651	AC2-087 C O1	24.68
934491	AD1-073 C	6.87
938271	AE1-040 C O2	13.1
CARR	CARR	0.01
CATAWBA	CATAWBA	0.0
CBM-S1	CBM-S1	0.15
CBM-W1	CBM-W1	0.3
CBM-W2	CBM-W2	1.2
CIN	CIN	0.21
HAMLET	HAMLET	0.02
IPL	IPL	0.15
LGEE	LGEE	0.07
MEC	MEC	0.24
MECS	MECS	0.16
RENSSELAER	RENSSELAER	0.01
WEC	WEC	0.04

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
64679	249995	08CLINCO	DEO&K	250122	08WARRN1	DEO&K	1	AEP_P4_#8109_05HILLSB 138_C	breaker	198.0	126.67	127.39	DC	3.18

Bus #	Bus	MW Impact
916272	Z1-080 E	3.84
918802	AA1-099 E	2.56
924371	AB2-085 C O1	8.85
924372	AB2-085 E O1	4.16
926101	AC1-089 C O1	16.61
926102	AC1-089 E O1	27.1
932381	AC2-055 C	1.49
932382	AC2-055 E	2.44
932421	AC2-060 C	5.3
932422	AC2-060 E	2.98
932431	AC2-061 C	24.36
932432	AC2-061 E	24.7
932651	AC2-087 C O1	3.93
932652	AC2-087 E O1	3.11
934491	AD1-073 C	1.09
934492	AD1-073 E	0.56
936091	AD2-012 C	75.85
936092	AD2-012 E	50.57
936251	AD2-031 C O1	1.62
936252	AD2-031 E O1	2.65
938271	AE1-040 C O2	2.12
938272	AE1-040 E O2	1.06
BAYOU	BAYOU	0.03
BIG_CAJUN1	BIG_CAJUN1	0.03
BIG_CAJUN2	BIG_CAJUN2	0.06
BLUEG	BLUEG	1.15
CANNELTON	CANNELTON	0.04
CBM-N	CBM-N	0.06
CBM-S2	CBM-S2	0.13
CHOCTAW	CHOCTAW	0.01
COFFEEN	COFFEEN	0.09
COTTONWOOD	COTTONWOOD	0.13
CPL	CPL	0.06
DEARBORN	DEARBORN	0.08
DUCKCREEK	DUCKCREEK	0.2
EDWARDS	EDWARDS	0.09
ELMERSMITH	ELMERSMITH	0.07
FARMERCITY	FARMERCITY	0.05
G-007A	G-007A	0.18
GIBSON	GIBSON	0.05
NEWTON	NEWTON	0.26

Bus #	Bus	MW Impact
NYISO	NYISO	0.24
O-066A	O-066A	0.09
PRAIRIE	PRAIRIE	0.34
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.09
TILTON	TILTON	0.14
TRIMBLE	TRIMBLE	0.14
UNIONPOWER	UNIONPOWER	0.01
VFT	VFT	0.5

Index 8

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
64577	932430	AC2-061 TAP	DEO&K	249995	08CLINCO	DEO&K	1	AEP_P4_#8109_05HILLSB 138_C	breaker	185.0	148.92	149.7	DC	3.18

Bus #	Bus	MW Impact
916272	Z1-080 E	2.16
918802	AA1-099 E	1.44
924371	AB2-085 C O1	8.85
924372	AB2-085 E O1	4.16
926101	AC1-089 C O1	16.61
926102	AC1-089 E O1	27.1
932381	AC2-055 C	1.49
932382	AC2-055 E	2.44
932421	AC2-060 C	5.3
932422	AC2-060 E	2.98
932431	AC2-061 C	24.36
932432	AC2-061 E	24.7
932651	AC2-087 C O1	3.93
932652	AC2-087 E O1	3.11
934491	AD1-073 C	1.09
934492	AD1-073 E	0.56
936091	AD2-012 C	75.85
936092	AD2-012 E	50.57
936251	AD2-031 C O1	1.62
936252	AD2-031 E O1	2.65
938271	AE1-040 C O2	2.12
938272	AE1-040 E O2	1.06
BAYOU	BAYOU	0.03
BIG_CAJUN1	BIG_CAJUN1	0.03
BIG_CAJUN2	BIG_CAJUN2	0.06
BLUEG	BLUEG	1.15
CANNELTON	CANNELTON	0.04
CBM-N	CBM-N	0.06
CBM-S2	CBM-S2	0.13
CHOCTAW	CHOCTAW	0.01
COFFEEN	COFFEEN	0.09
COTTONWOOD	COTTONWOOD	0.13
CPL	CPL	0.06
DEARBORN	DEARBORN	0.08
DUCKCREEK	DUCKCREEK	0.2
EDWARDS	EDWARDS	0.09
ELMERSMITH	ELMERSMITH	0.07
FARMERCITY	FARMERCITY	0.05
G-007A	G-007A	0.18
GIBSON	GIBSON	0.05

Bus #	Bus	MW Impact
NEWTON	NEWTON	0.26
NYISO	NYISO	0.24
O-066A	O-066A	0.09
PRAIRIE	PRAIRIE	0.34
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.09
TILTON	TILTON	0.14
TRIMBLE	TRIMBLE	0.14
UNIONPOWER	UNIONPOWER	0.01
VFT	VFT	0.5

Index 9

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
64696	932450	AC2-064 TAP	AEP	243042	05MILLBR	AEP	1	AEP_P4_#8108_05HILLSB138_D	breaker	173.0	123.93	124.77	DC	3.21

Bus #	Bus	MW Impact
924371	AB2-085 C O1	8.3
924372	AB2-085 E O1	3.91
926101	AC1-089 C O1	16.25
926102	AC1-089 E O1	26.52
932381	AC2-055 C	1.47
932382	AC2-055 E	2.4
932421	AC2-060 C	5.21
932422	AC2-060 E	2.93
932451	AC2-064 C	35.6
932452	AC2-064 E	23.74
932651	AC2-087 C O1	3.86
932652	AC2-087 E O1	3.06
934491	AD1-073 C	1.08
934492	AD1-073 E	0.55
936091	AD2-012 C	73.83
936092	AD2-012 E	49.22
936251	AD2-031 C O1	1.72
936252	AD2-031 E O1	2.81
938271	AE1-040 C O2	2.14
938272	AE1-040 E O2	1.07
CARR	CARR	0.03
CATAWBA	CATAWBA	0.02
CBM-S1	CBM-S1	0.97
CBM-W1	CBM-W1	1.41
CBM-W2	CBM-W2	6.46
CIN	CIN	1.05
G-007	G-007	0.1
HAMLET	HAMLET	0.07
IPL	IPL	0.7
LGEE	LGEE	0.5
MEC	MEC	1.23
MECS	MECS	0.7
O-066	O-066	0.34
RENSSELAER	RENSSELAER	0.03
WEC	WEC	0.18

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 List

Contingency Name	Contingency Definition
AEP_P1-2_#8309	CONTINGENCY 'AEP_P1-2_#8309' OPEN BRANCH FROM BUS 242996 TO BUS 247034 CKT 1 / 242996 05EMERA8 138 247034 05EMERSS 138 1 OPEN BRANCH FROM BUS 247034 TO BUS 246946 CKT 1 / 247034 05EMERSS 138 246946 05WLDCAT 138 1 OPEN BRANCH FROM BUS 247034 TO BUS 324267 CKT 1 / 247034 05EMERSS 138 324267 4KENTON 138 1 END
AEP_P4_#9726_05LICK 138_106	CONTINGENCY 'AEP_P4_#9726_05LICK 138_106' OPEN BRANCH FROM BUS 243465 TO BUS 243561 CKT 1 / 243465 05ADDISO 138 243561 05RODNEY 138 1 OPEN BRANCH FROM BUS 243501 TO BUS 243534 CKT 1 / 243501 05E.BEAV 138 243534 05LICK 138 1 OPEN BRANCH FROM BUS 243501 TO BUS 243034 CKT 1 / 243501 05E.BEAV 138 243034 05MARQUI 138 1 OPEN BRANCH FROM BUS 243534 TO BUS 927010 CKT 1 / 243534 05LICK 138 927010 AC1-188 TAP 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 243465 TO BUS 243595 CKT 3 / 243465 05ADDISO 138 243595 05ADDISON 69.0 3 OPEN BRANCH FROM BUS 243501 TO BUS 243166 CKT 1 / 243501 05E.BEAV 138 243166 05E.BEAV 69.0 1 OPEN BRANCH FROM BUS 243534 TO BUS 246738 CKT 1 / 243534 05LICK 138 246738 05JACKSON 13.8 1 OPEN BRANCH FROM BUS 243821 TO BUS 243166 CKT 1 / 243821 05BEAVER 69.0 243166 05E.BEAV 69.0 1 OPEN BRANCH FROM BUS 244928 TO BUS 243166 CKT 1 / 244928 05BEAVER 8 69.0 243166 05E.BEAV 69.0 1 END
AEP_P1-3_#6781_05BIERSR 345_1	CONTINGENCY 'AEP_P1-3_#6781_05BIERSR 345_1' OPEN BRANCH FROM BUS 246888 TO BUS 246889 CKT 1 / 246888 05BIERSR 345 246889 05BIERSR 138 1 END
AEP_P4_#8108_05HILLSB 138_D	CONTINGENCY 'AEP_P4_#8108_05HILLSB 138_D' OPEN BRANCH FROM BUS 243019 TO BUS 932430 CKT 1 / 243019 05HILLSB 138 932430 AC2- 061 TAP 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 243019 TO BUS 253111 CKT 1 / 243019 05HILLSB 138 253111 09MIDDLE 138 1 END
AEP_P4_#8110_05HILLSB 138_F	CONTINGENCY 'AEP_P4_#8110_05HILLSB 138_F' OPEN BRANCH FROM BUS 243019 TO BUS 243102 CKT 1 / 243019 05HILLSB 138 243102 05SINKG8 138 1 OPEN BRANCH FROM BUS 243019 TO BUS 246946 CKT 1 / 243019 05HILLSB 138 246946 05WLDCAT 138 1 OPEN BRANCH FROM BUS 932450 TO BUS 243102 CKT 1 / 932450 AC2-064 TAP 138 243102 05SINKG8 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD END

Contingency Name	Contingency Definition
AEP_SUBT_P1-3_#1443_05HIGHLA 138_1	CONTINGENCY 'AEP_SUBT_P1-3_#1443_05HIGHLA 138_1' OPEN BRANCH FROM BUS 246911 TO BUS 243606 CKT 3 / 246911 05HIGHLA 138 243606 05HIGHLA 69.0 3 END
AEP_P1-2_#5913-A	CONTINGENCY 'AEP_P1-2_#5913-A' OPEN BRANCH FROM BUS 243042 TO BUS 932450 CKT 1 / 243042 05MILLBR 138 932450 AC2- 064 TAP 138 1 END
.138.DEO&K.B2 WARREN-CLINTONCO-HILLSBORO 2381	CONTINGENCY '.138.DEO&K.B2 WARREN-CLINTONCO-HILLSBORO 2381' OPEN BUS 249995 END
AEP_SUBT_P1-2_#413	CONTINGENCY 'AEP_SUBT_P1-2_#413' OPEN BRANCH FROM BUS 243598 TO BUS 243612 CKT 1 / 243598 05BCKSKI 69.0 243612 05PETERSB8 69.0 1 OPEN BRANCH FROM BUS 243606 TO BUS 243612 CKT 1 / 243606 05HIGHLA 69.0 243612 05PETERSB8 69.0 1 END
AEP_P4_#8109_05HILLSB 138_C	CONTINGENCY 'AEP_P4_#8109_05HILLSB 138_C' OPEN BRANCH FROM BUS 243019 TO BUS 243102 CKT 1 / 243019 05HILLSB 138 243102 05SINKG8 138 1 OPEN BRANCH FROM BUS 243019 TO BUS 253111 CKT 1 / 243019 05HILLSB 138 253111 09MIDDLE 138 1 OPEN BRANCH FROM BUS 932450 TO BUS 243102 CKT 1 / 932450 AC2-064 TAP 138 243102 05SINKG8 138 1 /* CONTINGENCY LINE ADDED FOR AE1 BUILD END
AEP_P4_#2085_05BEATTY 345_304C	CONTINGENCY 'AEP_P4_#2085_05BEATTY 345_304C' OPEN BRANCH FROM BUS 243453 TO BUS 243454 CKT 1 / 243453 05BEATTY 345 243454 05BIXBY 345 1 OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END
Base Case	
.138.DEO&K.C1 CLINTON COUNTY	CONTINGENCY '.138.DEO&K.C1 CLINTON COUNTY' OPEN BRANCH FROM BUS 932430 TO BUS 249995 CKT 1 /* 932430 AC2-061 TAP 138.00 249995 08CLINCO 138.00 OPEN BRANCH FROM BUS 249995 TO BUS 250122 CKT 1 OPEN BUS 251803 END
AEP_P1-2_#762	CONTINGENCY 'AEP_P1-2_#762' OPEN BRANCH FROM BUS 243453 TO BUS 253110 CKT 1 / 243453 05BEATTY 345 253110 09ADKINS 345 1 END

Contingency Name	Contingency Definition
AEP_P1-2_#6786	CONTINGENCY 'AEP_P1-2_#6786' OPEN BRANCH FROM BUS 246889 TO BUS 246890 CKT 1 / 246889 05BIERSR 138 246890 05HOPETN 138 1 END
.138.DEO&K.WARREN BUS1+RELAYFAIL	CONTINGENCY '.138.DEO&K.WARREN BUS1+RELAYFAIL' OPEN BUS 250138 OPEN BUS 249995 OPEN BRANCH FROM BUS 250123 TO BUS 250147 CKT 1 OPEN BRANCH FROM BUS 250122 TO BUS 250123 CKT Z1 OPEN BRANCH FROM BUS 249995 TO BUS 250122 CKT 1 OPEN BRANCH FROM BUS 250122 TO BUS 250138 CKT 1 OPEN BRANCH FROM BUS 250122 TO BUS 251546 CKT 1 OPEN BUS 252383 END

Short Circuit

Short Circuit

The following Breakers are overdutied:

None.

Attachment 1: One Line Diagram

Attachment 2: Project Location