Generation Interconnection

System Impact Study Report

for

Queue Project AG1-448

OLIVE-UNIVERSITY PARK 345 KV

55 MW Capacity / 55 MW Energy

August 2021

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1 Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 205, as well as the System Impact Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is AEP.

2 Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. 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 System Impact Study is performed.

The System Impact 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.

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.

3 General

The Interconnection Customer (IC) has proposed an uprate to a planned/existing Storage generating facility located in LaPorte, Indiana. This project is an increase to the Interconnection Customer's AF2-359 project, which will share the same point of interconnection. The AG1-448 queue position is a 55 MW uprate (55 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 360 MW with 262 MW of this output being recognized by PJM as Capacity.

The proposed in-service date for this uprate project is December 31, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-448
Project Name	OLIVE-UNIVERSITY PARK 345 KV
State	Indiana
County	LaPorte
Transmission Owner	AEP
MFO	360
MWE	55
MWC	55
Fuel	Storage
Basecase Study Year	2024

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

4 Point of Interconnection

AG1-448 will interconnect with the AEP transmission system via a direct connection to the AF2-359 proposed 345 kV Station cut into Olive (AEP) – University Park (ComEd) as an uprate to PJM project AF2-359.

Note: It is assumed that the existing 345 kV revenue metering system, generation lead and protection & control equipment that will be installed for AF2-359 will be adequate for the increased generation of AG1-448. Depending on the timing of the completion of the AF2-359 interconnection construction relative to the AG1-448 completion, there may (or may not) be a need to review and revise the relay settings for the increased generation of AG1-448.

5 Cost Summary

The AG1-448 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$45,000
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	$20,780,000
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	$0
Allocation towards System Network Upgrade Costs (TO Identified)*	$0
Total Costs	**$20,825,000**

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

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

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

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not

closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

6 Transmission Owner Scope of Work

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

6.1 Attachment Facilities

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

Description	Total Cost
None.	$0
Total Attachment Facility Costs	**$0**

6.2 Direct Connection Cost Estimate

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

Description	Total Cost
None.	$0
Total Direct Connection Facility Costs	**$0**

6.3 Non-Direct Connection Cost Estimate

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

Description	Total Cost
Review protection and control settings at the AF2-359 proposed 345 kV Station	$45,000
Total Non-Direct Connection Facility Costs	**$45,000**

7 Schedule

Based on the scope of work for the interconnection facilities, it is expected to take a minimum of 12 to 18 months after the signing of an Interconnection Construction Service Agreement (or "Interconnection Agreement" if non-FERC) and construction kickoff call to complete the installation of the physical connection work. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined interconnection work, and that all system outages will be allowed when requested.

The schedule for any required Network Impact Reinforcements will be more clearly identified in future study phases. The estimated time to complete each of the required reinforcements is identified in the "System Reinforcements" section of the report.

8 Transmission Owner Analysis

AEP did not find any sub-transmission overloads with the interconnection of AG1-448.

9 Interconnection Customer Requirements

It is understood that the Interconnection Customer (IC) is responsible for all costs associated with this interconnection. The costs above are reimbursable to the Transmission Owner. The cost of the IC's generating plant and the costs for the line connecting the generating plant to the Point of Interconnection are not included in this report; these are assumed to be the IC's responsibility.
The Generation Interconnection Agreement does not in or by itself establish a requirement for the Transmission Owner to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

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

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

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

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

10.2 Meteorological Data Reporting Requirements

None.

10.3 Interconnected Transmission Owner Requirements

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

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

11 Summer Peak Analysis

The Queue Project AG1-448 was evaluated as a 55.0 MW (Capacity 55.00 MW) injection/withdrawal as an uprate to AF2-359 tapping the Olive to University Park 345 kV line in the AEP area. Project AG1-448 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-448 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

None

11.2 Multiple Facility Contingency

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

None

11.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
180646781	243229	05OLIVE	345.0	AEP	960680	AF2-359 TAP	345.0	AEP	1	COMED_P4_112-65-BT4-5__	breaker	971.0	110.58	116.3	AC	47.05
174481944	243918	05ELDERBERRY	345.0	AEP	243219	05DUMONT	345.0	AEP	1	AEP_P4_#8165_05OLIVE 345_B1	breaker	1868.0	101.31	102.8	AC	28.2
170040274	960680	AF2-359 TAP	345.0	AEP	243229	05OLIVE	345.0	AEP	1	COMED_P1-2_765-L11215__-S	single	971.0	142.57	144.52	AC	47.05
170040275	960680	AF2-359 TAP	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P1-2_#695_1681	single	971.0	142.57	144.52	AC	47.05
179457322	960680	AF2-359 TAP	345.0	AEP	243229	05OLIVE	345.0	AEP	1	COMED_P4_112-65-BT4-5__	breaker	971.0	165.98	168.25	AC	47.05
179457323	960680	AF2-359 TAP	345.0	AEP	243229	05OLIVE	345.0	AEP	1	COMED_P4_112-65-BT3-4__	breaker	971.0	165.98	168.25	AC	47.05

11.4 Steady-State Voltage Requirements

To be determined during the Facilities Study phase.

11.5 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
180648545	243229	05OLIVE	345.0	AEP	960680	AF2-359 TAP	345.0	AEP	1	AEP_P1-2_#695_1681	operation	971.0	110.56	116.28	AC	47.05
180648986	243229	05OLIVE	345.0	AEP	960680	AF2-359 TAP	345.0	AEP	1	COMED_P1-2_765-L11215__-S	operation	971.0	110.56	116.28	AC	47.05
170040272	960680	AF2-359 TAP	345.0	AEP	243229	05OLIVE	345.0	AEP	1	AEP_P1-2_#695_1681	operation	971.0	165.95	168.22	AC	47.05
170040273	960680	AF2-359 TAP	345.0	AEP	243229	05OLIVE	345.0	AEP	1	COMED_P1-2_765-L11215__-S	operation	971.0	165.95	168.22	AC	47.05

11.6 System Reinforcements

<table>
<tr><th>ID</th><th>Idx</th><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AG1-448</th><th>Upgrade Number</th></tr>
<tr><td>174481944</td><td>2</td><td>05ELDERBRYSS 345.0 kV - 05DUMONT 345.0 kV Ckt 1</td><td>Replace 3000A non oil Circuit Breaker at Dumont. Cost estimate is $1 M. Time Estimate is 12-18 months. New expected SE rating to be 1887 MVA.

Reconductor/Rebuild 14 miles of ACSR ~ 954 ~ 45/7 ~ RAIL Dumont - Elderberry 345kV line. Cost estimate is $28 M. Time Estimate is 24-36 months. New expected SE rating to be 2034 MVA.

The cost allocation is:

<table>
<tr><th>Queue</th><th>MW contribution</th><th>Percentage of Cost</th><th>$ cost ($29 M)</th></tr>
<tr><td>AG1-447</td><td>28.2</td><td>50.00%</td><td>14.500</td></tr>
<tr><td>AG1-448</td><td>28.2</td><td>50.00%</td><td>14.500</td></tr>
</table>

Note: mitigating the stuck breaker contingency causing this overload should be evaluated during the Facilities Study as an alternative upgrade option, if feasible.</td><td>$1 M
$28 M</td><td>$14.5 M</td><td>N7619.1
N7619.2</td></tr>
</table>

180646781 & 179457322, 179457323, 170040274, 170040275	1, 3	**05OLIVE 345.0 kV - AF2-359 TAP 345.0 kV Ckt 1 & AF2-359 TAP 345.0 kV - 05OLIVE 345.0 kV Ckt 1**	AEP end: SE rating is 971 MVA. A sag check will be required for the ACSR/PE ~ 1414 ~ 62/19 ~ Conductor Section 1 to determine if the line section can be operated above its emergency rating of 971 MVA. The results could prove that no additional upgrades are necessary, that some upgrades on the circuit are necessary, or that the entire 40.61 mile section of line would need to be rebuilt. Estimated Cost: $162,440 (2016 dollars). If deemed necessary to rebuild the entire 40.61 miles of the section of the line, Estimated Cost: $81,220,000. Schedule: (1) Sag Study: 6 to 12 months. (2) 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. New AEP end ratings to be 971/1304 MVA SN/SE. PJM Network Upgrade N4057. The N4057 upgrade is needed for a prior queue cycle. Replace 5 Jumpers (Sub cond 2156 ACSR 84/19 STD at Olive station, estimated cost: $175,000. New expected SE rating to be 1370 MVA. PJM Network Upgrade N6990. Perform an engineering study to determine if the Olive Relay Compliance Trip limits settings can be adjusted to mitigate the overload, Estimated Cost: $25,000. New relay packages will be required if the settings cannot be adjusted, Estimated Cost: $600,000. PJM NUN N5914. Rebuild/Reconductor 40.61 miles of the AEP owned section of the Olive - University Park (CE) 345 kV ACSR/PE 1414 62/19 line section 1. Estimated Cost	$162,440 $82.8 M	$0 $6.28 M	N4057 N6990 N5914 N5303

to reconductor/rebuild AEP section of line: $81.2 Million. The Olive switches to Line Riser will have to be replaced; Estimated Cost: $1.4 Million. PJM Network Upgrade N5303

The cost allocation is:

Queue	MW contribution	Percentage of Cost	$ cost ($82.8 M)
AF2-095	21.5	3.47%	2.870
AF2-096	41.4	6.67%	5.526
AF2-142	16.7	2.69%	2.229
AF2-143	15.4	2.48%	2.056
AF2-349	29.8	4.80%	3.978
AF2-350	10.8	1.74%	1.442
AF2-359	106.7	17.20%	14.242
AG1-118	30.44	4.91%	4.063
AG1-119	29.98	4.83%	4.002
AG1-120	11.85	1.91%	1.582
AG1-127	10.61	1.71%	1.416
AG1-298	53.8	8.67%	7.181
AG1-379	20.35	3.28%	2.716
AG1-423	19.99	3.22%	2.668
AG1-436	106.92	17.24%	14.271
AG1-447	47.05	7.58%	6.280
AG1-448	47.05	7.58%	6.280

				Total Cost	**$111,962,440**	**$20,780,000**	

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

11.7 Flow Gate Details

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

11.7.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
180646781	243229	05OLIVE	AEP	960680	AF2-359 TAP	AEP	1	COMED_P4_112-65-BT4-5__	breaker	971.0	110.58	116.3	AC	47.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
276165	Z1-106 BAT2	1.04	80|50	1.04
276166	Z1-106 BAT1	1.04	80|50	1.04
276171	Z1-107 BAT	2.21	80|50	2.21
276172	Z1-108 BAT	2.05	80|50	2.05
276591	L-013 2	-2.57	Adder	-3.02
904211	W3-135	-1.1	Adder	-1.29
915011	Y3-013 1	-2.62	Adder	-3.08
915021	Y3-013 2	-2.62	Adder	-3.08
915031	Y3-013 3	-2.62	Adder	-3.08
920273	AA2-123 BAT	2.01	80|50	2.01
924472	**AB2-096 CT1 (Suspended)**	**-13.33**	**Adder**	**-15.68**
924473	**AB2-096 CT2 (Suspended)**	**-13.33**	**Adder**	**-15.68**
924474	**AB2-096 CT3 (Suspended)**	**-13.33**	**Adder**	**-15.68**
927451	AC1-142A 1	-2.98	Adder	-3.51
927461	AC1-142A 2	-2.98	Adder	-3.51
930771	AB1-122 CT2	-51.83	Adder	-60.98
943803	AF1-048 BAT	5.25	80|50	5.25
945352	AF1-200 NFTW	223.17	80|50	223.17
957333	AF2-027 BAT	5.15	80|50	5.15
957403	AF2-034 BAT	2.12	80|50	2.12
958013	AF2-095 BAT	4.33	80|50	4.33
958023	AF2-096 BAT	8.32	80|50	8.32
959353	AF2-226 BAT	5.01	80|50	5.01
960283	AF2-319 BAT	5.01	80|50	5.01
960382	AF2-329 BAT	5.46	80|50	5.46
960603	AF2-351 BAT	2.16	80|50	2.16
965792	AG1-447 BAT	47.05	80|50	47.05
965802	AG1-448 BAT	47.05	80|50	47.05
966083	AG1-477 BAT	1.05	80|50	1.05
966093	AG1-478 BAT	1.08	80|50	1.08
966433	AG1-512 BAT	9.16	80|50	9.16
966443	AG1-513 BAT	1.05	80|50	1.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
950351	J466	1.92	Queue MISO	1.92
950791	J201 C	0.26	Queue MISO	0.26
950792	J201 E	1.04	Queue MISO	1.04
950871	J246 C	0.09	Queue MISO	0.09
950872	J246 E	0.37	Queue MISO	0.37
950942	J325 E	0.26	Queue MISO	0.26
952161	J571	0.43	Queue MISO	0.43
952201	J589 C	2.07	Queue MISO	2.07
952202	J589 E	11.18	Queue MISO	11.18
952312	J646 E	0.1	Queue MISO	0.1
952401	J752 C	1.0	Queue MISO	1.0
952402	J752 E	5.42	Queue MISO	5.42
952611	J717 C	2.05	Queue MISO	2.05
952612	J717 E	11.09	Queue MISO	11.09
952761	J728 C	1.91	Queue MISO	1.91
952762	J728 E	10.33	Queue MISO	10.33
952881	J758	13.31	Queue MISO	13.31
952971	J793	83.39	Queue MISO	83.39
953071	J794 C	0.13	Queue MISO	0.13
953072	J794 E	0.7	Queue MISO	0.7
953161	J837 C	1.88	Queue MISO	1.88
953162	J837 E	10.15	Queue MISO	10.15
953171	J838 C	0.94	Queue MISO	0.94
953172	J838 E	5.07	Queue MISO	5.07
953271	J701 C	0.49	Queue MISO	0.49
953272	J701 E	2.66	Queue MISO	2.66
953291	J796	15.63	Queue MISO	15.63
953321	J799	11.65	Queue MISO	11.65
953361	J806	9.78	Queue MISO	9.78
953771	J832	6.67	Queue MISO	6.67
953781	J833	6.16	Queue MISO	6.16
953941	J857	8.23	Queue MISO	8.23
954111	J875	9.41	Queue MISO	9.41
954421	J913 C	9.62	Queue MISO	9.62
954751	J351	37.07	Queue MISO	37.07
954941	J968 C	1.88	Queue MISO	1.88
954942	J968 E	10.14	Queue MISO	10.14
955071	J984 C	2.1	Queue MISO	2.1
955072	J984 E	11.35	Queue MISO	11.35

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
955141	J992	10.83	Queue MISO	10.83
955181	J996	4.93	Queue MISO	4.93
955591	J1043 C	1.36	Queue MISO	1.36
955592	J1043 E	24.16	Queue MISO	24.16
955781	J1062	9.04	Queue MISO	9.04
955821	J1067	12.66	Queue MISO	12.66
955841	J1069 C	1.88	Queue MISO	1.88
955842	J1069 E	10.14	Queue MISO	10.14
955861	J1071	6.86	Queue MISO	6.86
956011	J1088	9.8	Queue MISO	9.8
956021	J1089	11.09	Queue MISO	11.09
956031	J1090	5.81	Queue MISO	5.81
956251	J1112	8.47	Queue MISO	8.47
956741	J1172	3.24	Queue MISO	3.24
956801	J1178	4.23	Queue MISO	4.23
990011	J1192	2.28	Queue MISO	2.28
990021	J1194 C	2.3	Queue MISO	2.3
990022	J1194 E	12.42	Queue MISO	12.42
990031	J1196	12.67	Queue MISO	12.67
990066	J1203	8.08	Queue MISO	8.08
990081	J1207	3.28	Queue MISO	3.28
990096	J1210	3.29	Queue MISO	3.29
990141	J1224	10.51	Queue MISO	10.51
990151	J1226	12.05	Queue MISO	12.05
990231	J1248	6.59	Queue MISO	6.59
990256	J1255	13.7	Queue MISO	13.7
990267	J1262 E	1.54	Queue MISO	1.54
990281	J1265	2.65	Queue MISO	2.65
990356	J1292 C	2.13	Queue MISO	2.13
990357	J1292 E	11.54	Queue MISO	11.54
990371	J1297	11.12	Queue MISO	11.12
990421	J1307	9.92	Queue MISO	9.92
990431	J1310	8.15	Queue MISO	8.15
990476	J1319 C	1.17	Queue MISO	1.17
990477	J1319 E	6.33	Queue MISO	6.33
990481	J1320	9.81	Queue MISO	9.81
990496	J1323	1.55	Queue MISO	1.55
990526	J1329	1.24	Queue MISO	1.24
990536	J1331	6.32	Queue MISO	6.32

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
990626	J1350	9.17	Queue MISO	9.17
990646	J1355	8.33	Queue MISO	8.33
990716	J1375	6.88	Queue MISO	6.88
990736	J1379	13.49	Queue MISO	13.49
990741	J1381	11.33	Queue MISO	11.33
990776	J1389	7.96	Queue MISO	7.96
990791	J1392	6.19	Queue MISO	6.19
990826	J1399	5.81	Queue MISO	5.81
990831	J1401	9.86	Queue MISO	9.86
990836	J1403	13.63	Queue MISO	13.63
990941	J1430	6.68	Queue MISO	6.68
991066	J1472	6.34	Queue MISO	6.34
991111	J1481	11.33	Queue MISO	11.33
991116	J1482	7.66	Queue MISO	7.66
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.3538	Confirmed LTF	0.3538
LTFEXP_AC1-056	LTFEXP_AC1-056->LTFIMP_AC1-056	3.701	Confirmed LTF	3.701
LTFEXP_CALDERWOOD	LTFEXP_CALDERWOOD->LTFIMP_CALDERWOOD	0.0072	Confirmed LTF	0.0072
LTFEXP_CBM-N	LTFEXP_CBM-N->LTFIMP_CBM-N	1.8365	LTF/CBM	1.8365
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	5.5888	LTF/CBM	5.5888
LTFEXP_COTTONWOOD	LTFEXP_COTTONWOOD->LTFIMP_COTTONWOOD	3.9035	Confirmed LTF	3.9035
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.525	Confirmed LTF	0.525
LTFEXP_G-007A	LTFEXP_G-007A->LTFIMP_G-007A	3.661	LTF/CMTX	3.661
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.5195	Confirmed LTF	0.5195
LTFEXP_PRAIRIE	LTFEXP_PRAIRIE->LTFIMP_PRAIRIE	7.6899	Confirmed LTF	7.6899
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0162	Confirmed LTF	0.0162
LTFEXP_VFT	LTFEXP_VFT->LTFIMP_VFT	9.8561	Confirmed LTF	9.8561

11.7.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
174481944	243918	05ELDERBERRY	AEP	243219	05DUMONT	AEP	1	AEP_P4_#8165_05OLIVE 345_B1	breaker	1868.0	101.31	102.8	AC	28.2

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
247900	05FR-11G E	7.61	Adder	8.95
247901	05FR-12G E	7.48	Adder	8.8
247902	05FR-21G E	8.0	Adder	9.41
247903	05FR-22G E	7.66	Adder	9.01
247904	05FR-3G E	15.51	Adder	18.25
247905	05FR-4G E	12.15	Adder	14.29
247906	05MDL-1G E	17.74	Adder	20.87
247907	05MDL-2G E	8.89	Adder	10.46
247912	05MDL-3G E	8.89	Adder	10.46
247913	05MDL-4G E	8.89	Adder	10.46
247943	T-127 E	8.89	Adder	10.46
270100	X2-052 CT1	21.52	80|50	21.52
270101	X2-052 CT2	21.52	80|50	21.52
270102	X2-052 ST	23.29	80|50	23.29
274805	UNIV PK N;1U	0.9	80|50	0.9
274807	UNIV PK N;3U	0.91	80|50	0.91
274808	UNIV PK N;4U	0.91	80|50	0.91
274810	UNIV PK N;6U	0.91	80|50	0.91
274811	UNIV PK N;7U	0.91	80|50	0.91
274816	UNIV PK N;YU	0.91	80|50	0.91
930042	AB1-006 E	19.33	Adder	22.74
939631	AE1-193 C	6.09	Adder	7.16
939632	AE1-193 E	40.78	Adder	47.98
939641	AE1-194 C	6.09	Adder	7.16
939642	AE1-194 E	40.78	Adder	47.98
939651	AE1-195 C	6.09	Adder	7.16
939652	AE1-195 E	40.78	Adder	47.98
939681	AE1-198 C	18.09	Adder	21.28
939682	AE1-198 E	15.37	Adder	18.08
940581	AE2-045 C O1	17.81	80|50	17.81
940582	AE2-045 E O1	24.46	80|50	24.46
941571	AE2-154 C	3.61	Adder	4.25

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941572	AE2-154 E	24.16	Adder	28.42
945421	AF1-207 C O1	4.07	Adder	4.79
945422	AF1-207 E O1	17.5	Adder	20.59
945501	AF1-215 C O1	61.28	80|50	61.28
945502	AF1-215 E O1	40.85	80|50	40.85
946581	AF1-322 C	9.33	Adder	10.98
946582	AF1-322 E	12.89	Adder	15.16
957841	AF2-078 C O1	14.38	Adder	16.92
957842	AF2-078 E O1	9.59	Adder	11.28
958381	AF2-132 C O1	51.43	80|50	51.43
958382	AF2-132 E O1	34.29	80|50	34.29
958391	AF2-133 C O1	46.34	80|50	46.34
958392	AF2-133 E O1	30.89	80|50	30.89
958401	AF2-134 C O1	20.43	80|50	20.43
958402	AF2-134 E O1	13.62	80|50	13.62
958971	AF2-188 C O1	7.87	Adder	9.26
958972	AF2-188 E O1	5.24	Adder	6.16
959141	AF2-205 C	28.44	80|50	28.44
959142	AF2-205 E	18.96	80|50	18.96
960681	AF2-359 C	38.46	80|50	38.46
960682	AF2-359 E	25.64	80|50	25.64
963741	AG1-226 C O1	25.7	Adder	30.24
963742	AG1-226 E O1	9.19	Adder	10.81
963841	AG1-237 C O1	2.37	Adder	2.79
963842	AG1-237 E O1	15.88	Adder	18.68
964401	AG1-302 C O1	51.43	80|50	51.43
964402	AG1-302 E O1	34.29	80|50	34.29
964861	AG1-349 C O1	43.35	80|50	43.35
964862	AG1-349 E O1	28.9	80|50	28.9
965681	AG1-436 C	38.46	80|50	38.46
965682	AG1-436 E	25.64	80|50	25.64
965791	AG1-447	28.2	80|50	28.2
965801	AG1-448	28.2	80|50	28.2
966431	AG1-512 C	1.93	Adder	2.27
966432	AG1-512 E	2.89	Adder	3.4
966841	AG1-555 C	8.59	Adder	10.11
966842	AG1-555 E	3.07	Adder	3.61
953161	J837 C	3.51	Queue MISO	3.51
953162	J837 E	19.02	Queue MISO	19.02

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
953171	J838 C	1.76	Queue MISO	1.76
953172	J838 E	9.5	Queue MISO	9.5
954421	J913 C	18.02	Queue MISO	18.02
954941	J968 C	3.51	Queue MISO	3.51
954942	J968 E	19.01	Queue MISO	19.01
955741	J1058	25.13	Queue MISO	25.13
955841	J1069 C	3.51	Queue MISO	3.51
955842	J1069 E	19.01	Queue MISO	19.01
990636	J1353	12.57	Queue MISO	12.57
990761	J1386	8.38	Queue MISO	8.38
990976	J1447	24.53	Queue MISO	24.53
LTFEXP_AC1-131	LTFEXP_AC1-131->LTFIMP_AC1-131	0.1848	Confirmed LTF	0.1848
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.5528	LTF/CBM	0.5528
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	0.3466	LTF/CBM	0.3466
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	28.8252	LTF/CBM	28.8252
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	24.4489	LTF/CBM	24.4489
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	1.3557	LTF/CMTX NF	1.3557
LTFEXP_HAMLET	LTFEXP_HAMLET->LTFIMP_HAMLET	0.0704	Confirmed LTF	0.0704
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	3.8683	Confirmed LTF	3.8683
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.5332	Confirmed LTF	0.5332
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	7.8578	Confirmed LTF	7.8578
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.7463	Confirmed LTF	0.7463
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	8.7068	LTF/CMTX NF	8.7068
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.2183	Confirmed LTF	0.2183
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	2.225	Confirmed LTF	2.225

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	1.9492	Confirmed LTF	1.9492

11.7.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
179457323	960680	AF2-359 TAP	AEP	243229	05OLIVE	AEP	1	COMED_P4_112-65-BT3-4__	breaker	971.0	165.98	168.25	AC	47.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274658	DRESDEN ;2U	81.47	Adder	95.85
274659	DRESDEN ;3U	77.41	Adder	91.07
274807	UNIV PK N;3U	1.47	80|50	1.47
274808	UNIV PK N;4U	1.46	80|50	1.46
274810	UNIV PK N;6U	1.46	80|50	1.46
274811	UNIV PK N;7U	1.47	80|50	1.47
274815	UNIV PK N;XU	1.46	80|50	1.46
274816	UNIV PK N;YU	1.47	80|50	1.47
275149	KELLYCK ;1E	12.88	Adder	15.15
276167	Z1-106 E2	0.89	Adder	1.05
276168	Z1-106 E1	0.89	Adder	1.05
276169	Z1-107 E	1.88	Adder	2.21
276170	Z1-108 E	1.74	Adder	2.05
276591	L-013 2	2.57	Adder	3.02
290021	O50 E	13.84	Adder	16.28
290108	LEEDK;1U E	17.03	Adder	20.04
293061	N-015 E	10.93	Adder	12.86
293644	O22 E1	6.95	Adder	8.18
293645	O22 E2	13.5	Adder	15.88
293799	PILOT HIL;1E	12.88	Adder	15.15
294392	P-010 E	13.88	Adder	16.33
904211	W3-135	1.1	Adder	1.29
915011	Y3-013 1	2.62	Adder	3.08
915021	Y3-013 2	2.62	Adder	3.08
915031	Y3-013 3	2.62	Adder	3.08
918052	AA1-018 E OP	12.54	Adder	14.75
920272	AA2-123 E	1.71	Adder	2.01
924472	**AB2-096 CT1 (Suspended)**	**13.33**	**Adder**	**15.68**
924473	**AB2-096 CT2 (Suspended)**	**13.33**	**Adder**	**15.68**
924474	**AB2-096 CT3 (Suspended)**	**13.33**	**Adder**	**15.68**
926331	AC1-110 1	1.33	Adder	1.56
926341	AC1-110 2	1.33	Adder	1.56

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
927451	AC1-142A 1	2.98	Adder	3.51
927461	AC1-142A 2	2.98	Adder	3.51
930501	AB1-091 CT	27.59	Adder	32.46
930502	AB1-091 ST	21.94	Adder	25.81
930771	AB1-122 CT2	51.83	Adder	60.98
933411	AC2-154 C	1.75	Adder	2.06
933412	AC2-154 E	2.85	Adder	3.35
933912	AD1-013 E	2.06	Adder	2.42
933931	AD1-016 C	0.65	Adder	0.76
933932	AD1-016 E	1.06	Adder	1.25
934111	AD1-039 2	5.08	Adder	5.98
934721	AD1-100 C	13.48	Adder	15.86
934722	AD1-100 E	62.9	Adder	74.0
934871	AD1-116 C	0.73	Adder	0.86
934872	AD1-116 E	1.19	Adder	1.4
934971	AD1-129 C	0.63	Adder	0.74
934972	AD1-129 E	0.42	Adder	0.49
936291	AD2-038 C O1	2.44	Adder	2.87
936292	AD2-038 E O1	11.42	Adder	13.44
936371	AD2-047 C O1	3.13	Adder	3.68
936372	AD2-047 E O1	15.27	Adder	17.96
936461	AD2-060	1.84	Adder	2.16
936511	AD2-066 C O1	5.95	Adder	7.0
936512	AD2-066 E O1	3.97	Adder	4.67
937401	AD2-194 1	5.49	Adder	6.46
937411	AD2-194 2	5.49	Adder	6.46
938511	AE1-070 1	6.45	Adder	7.59
938521	AE1-070 2	5.9	Adder	6.94
938851	AE1-113 C O1	5.71	Adder	6.72
938852	AE1-113 E O1	20.24	Adder	23.81
939321	AE1-163 C O1	4.53	Adder	5.33
939322	AE1-163 E O1	27.8	Adder	32.71
939351	AE1-166 C O1	7.17	Adder	8.44
939352	AE1-166 E O1	6.62	Adder	7.79
940752	AE2-062 E	0.09	Adder	0.11
941131	AE2-107 C	4.6	Adder	5.41
941132	AE2-107 E	3.07	Adder	3.61
941551	AE2-152 C O1	8.27	Adder	9.73
941552	AE2-152 E O1	5.51	Adder	6.48

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941561	AE2-153 C O1	3.31	Adder	3.89
941562	AE2-153 E O1	15.52	Adder	18.26
942421	AE2-255 C O1	2.16	Adder	2.54
942422	AE2-255 E O1	6.49	Adder	7.64
942651	AE2-281 C O1	0.65	Adder	0.76
942652	AE2-281 E O1	3.97	Adder	4.67
942991	AE2-321 C	5.72	Adder	6.73
942992	AE2-321 E	2.82	Adder	3.32
943121	AE2-341 C	8.94	Adder	10.52
943122	AE2-341 E	4.39	Adder	5.16
943591	AF1-030 C O1	5.94	Adder	6.99
943592	AF1-030 E O1	2.94	Adder	3.46
943801	AF1-048 C	2.68	Adder	3.15
943802	AF1-048 E	1.78	Adder	2.09
944041	AF1-072	1.51	Adder	1.78
944911	AF1-156 C	8.47	Adder	9.96
944912	AF1-156 E	5.65	Adder	6.65
945351	AF1-200 FTIR	216.26	Adder	254.42
946661	AF1-330 C	1.4	Adder	1.65
946662	AF1-330 E	0.31	Adder	0.36
957331	AF2-027 C	1.75	Adder	2.06
957332	AF2-027 E	2.62	Adder	3.08
957401	AF2-034 C	0.97	Adder	1.14
957402	AF2-034 E	0.83	Adder	0.98
958011	AF2-095 C O1	12.51	Adder	14.72
958012	AF2-095 E O1	5.89	Adder	6.93
958021	AF2-096 C	24.05	Adder	28.29
958022	AF2-096 E	11.32	Adder	13.32
958481	AF2-142 C	8.65	Adder	10.18
958482	AF2-142 E	5.76	Adder	6.78
958491	AF2-143 C	8.31	Adder	9.78
958492	AF2-143 E	5.54	Adder	6.52
959351	AF2-226 C	1.7	Adder	2.0
959352	AF2-226 E	2.56	Adder	3.01
960281	AF2-319 C	1.7	Adder	2.0
960282	AF2-319 E	2.56	Adder	3.01
960381	AF2-329	4.64	Adder	5.46
960581	AF2-349 C	15.22	Adder	17.91
960582	AF2-349 E	10.15	Adder	11.94

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960591	AF2-350 C O1	5.52	Adder	6.49
960592	AF2-350 E O1	3.68	Adder	4.33
960601	AF2-351 C O1	0.74	Adder	0.87
960602	AF2-351 E O1	1.1	Adder	1.29
960681	AF2-359 C	64.15	80|50	64.15
960682	AF2-359 E	42.77	80|50	42.77
960721	AF2-363 C O1	4.14	Adder	4.87
960722	AF2-363 E O1	2.76	Adder	3.25
960751	AF2-366 C	4.89	Adder	5.75
960752	AF2-366 E	3.26	Adder	3.84
962691	AG1-118 C O1	15.52	Adder	18.26
962692	AG1-118 E O1	10.35	Adder	12.18
962701	AG1-119 C	15.29	Adder	17.99
962702	AG1-119 E	10.19	Adder	11.99
962711	AG1-120 C O1	6.04	Adder	7.11
962712	AG1-120 E O1	4.03	Adder	4.74
962781	AG1-127 C	5.41	Adder	6.36
962782	AG1-127 E	3.61	Adder	4.25
965141	AG1-379 C	11.87	Adder	13.96
965142	AG1-379 E	5.43	Adder	6.39
965551	AG1-423 C O1	10.19	Adder	11.99
965552	AG1-423 E O1	6.8	Adder	8.0
965681	AG1-436 C	64.15	80|50	64.15
965682	AG1-436 E	42.77	80|50	42.77
965791	AG1-447	47.05	80|50	47.05
965801	AG1-448	47.05	80|50	47.05
966081	AG1-477 C	1.31	Adder	1.54
966082	AG1-477 E	0.28	Adder	0.33
966091	AG1-478 C	1.46	Adder	1.72
966092	AG1-478 E	0.37	Adder	0.44
966431	AG1-512 C	3.12	Adder	3.67
966432	AG1-512 E	4.67	Adder	5.49
966441	AG1-513 C	0.36	Adder	0.42
966442	AG1-513 E	0.53	Adder	0.62
LTFEXP_AC1-131	LTFEXP_AC1-131->LTFIMP_AC1-131	0.5775	Confirmed LTF	0.5775
LTFEXP_BlueG	LTFEXP_BlueG->LTFIMP_BlueG	1.5316	Confirmed LTF	1.5316

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_CATAWBA	LTFEXP_CATAWBA->LTFIMP_CATAWBA	0.1957	Confirmed LTF	0.1957
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.2159	LTF/CBM	0.2159
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	55.5262	LTF/CBM	55.5262
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	16.4857	LTF/CBM	16.4857
LTFEXP_CHEOAH	LTFEXP_CHEOAH->LTFIMP_CHEOAH	0.001	Confirmed LTF	0.001
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	1.6034	LTF/CMTX NF	1.6034
LTFEXP_GIBSON	LTFEXP_GIBSON->LTFIMP_GIBSON	0.0894	Confirmed LTF	0.0894
LTFEXP_HAMLET	LTFEXP_HAMLET->LTFIMP_HAMLET	0.3846	Confirmed LTF	0.3846
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	3.2529	Confirmed LTF	3.2529
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.2454	Confirmed LTF	0.2454
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	10.7876	Confirmed LTF	10.7876
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.8628	Confirmed LTF	0.8628
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	10.2872	LTF/CMTX NF	10.2872
LTFEXP_TRIMBLE	LTFEXP_TRIMBLE->LTFIMP_TRIMBLE	0.5219	Confirmed LTF	0.5219
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	1.2286	Confirmed LTF	1.2286
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	3.0828	Confirmed LTF	3.0828

11.8 Queue Dependencies

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

Queue Number	Project Name	Status
AA1-018	Powerton-Goodings Grove	In Service
AA2-074	CPLE-PJM	Confirmed
AA2-123	Marengo 34kV	In Service
AB1-006	Meadow Lake 345kV	In Service
AB1-091	Davis Creek 345kV	Active
AB1-122	Kendall-Tazewell & Dresden-Mole Creek	Under Construction
AB2-096	Silver Lake-Cherry Valley	Suspended
AC1-056	PJM-AMIL	Confirmed
AC1-110	Aurora 138kV	Active
AC1-131	PJM-CPLE	Confirmed
AC1-142A	Joliet	In Service
AC2-154	Davis Creek 138kV	Active
AD1-013	Twombly Road 138kV	Active
AD1-016	Marengo	Active
AD1-039	Kendall-Tazewell & Dresden-Mole Creek	Active
AD1-100	Loretto-Wilton 345 kV & Braidwood-Davis Creek 345 kV	Active
AD1-116	Nevada 345 kV	Active
AD1-129	Belvidere 34 kV	Active
AD2-038	Powerton	Active
AD2-047	Davis Creek 138 kV	Active
AD2-060	Davis Creek 138kV	Active
AD2-066	Mazon-Crescent Ridge	Active
AD2-194	Elwood	Active
AE1-070	Elwood 345 kV	Active
AE1-113	Mole Creek 345 kV	Active
AE1-163	Powerton-Nevada 345 kV	Active
AE1-166	Loretto-Wilton & Braidwood-Davis Creek	Active

Queue Number	Project Name	Status
AE1-193	Crete 345 kV	Active
AE1-194	Crete 345 kV	Active
AE1-195	Crete 345 kV	Active
AE1-198	Crete 345 kV	Active
AE2-045	Olive-Reynolds 345 kV	Active
AE2-062	Romeoville 12 kV	In Service
AE2-107	Haumesser Road 138 kV	Active
AE2-152	Loretto-Wilton & Braidwood-Davis Creek	Active
AE2-153	Braidwood-Davis Creek	Active
AE2-154	Meadow Lake 345 kV (MLV VIII)	Active
AE2-255	Molecreek 345 kV	Active
AE2-281	Powerton-Nevada 345 kV	Active
AE2-321	Belvidere-Marengo 138 kV	Active
AE2-341	Sandwich-Plano	Active
AF1-030	Plano-R 138 kV	Active
AF1-048	Belvidere-Marengo	Active
AF1-072	Rocky Road	Active
AF1-156	Braidwood-Davis Creek	Active
AF1-200	Plano 345 kV	Active
AF1-207	Reynolds–Olive #1 345 kV	Active
AF1-215	Reynolds-Olive 345 kV	Active
AF1-322	Meadow Lake 345 kV	Active
AF1-330	Marengo	Active
AF2-027	Zion Energy Center 345 kV	Active
AF2-034	Kendall 345kV	Active
AF2-078	Reynolds-Olive #1 345 kV	Active
AF2-095	Davis Creek 138 kV	Active
AF2-096	Braidwood-East Frankfort 345 kV	Active
AF2-132	Reynolds-Olive #1 345 kV	Active
AF2-133	Reynolds-Olive #2 345 kV	Active
AF2-134	Reynolds-Olive #2 345 kV	Active
AF2-142	Nevada 345 kV	Active
AF2-143	Powerton-Nevada 345 kV	Active
AF2-188	Reynolds-Meadow Lake #1 345 kV	Active
AF2-205	Olive-Reynolds #2 345 kV	Active
AF2-226	Katydid Road 345 kV	Active
AF2-319	Katydid Road 345 kV	Active
AF2-329	Sandwich-Plano 138 kV	Active
AF2-349	Garden Prairie 345 kV	Active

Queue Number	Project Name	Status
AF2-350	Kensington 138 kV	Active
AF2-351	Kensington 138 kV	Active
AF2-359	Olive-University Park 345 kV	Active
AF2-363	Cherry Valley-Glidden 138 kV	Active
AF2-366	Glidden-Waterman 138 kV	Active
AG1-118	Sugar Grove-Waterman 138kV	Active
AG1-119	Wayne-Byron 345 kV	Active
AG1-120	Glidden-Cherry Valley 138 kV	Active
AG1-127	Crego Rd 138 kV	Active
AG1-226	Eugene-Dequine 345 kV	Active
AG1-237	Dequine-Eugene 345 kV	Active
AG1-302	Olive-Reynolds #1 345 kV	Active
AG1-349	Olive-Reynolds #2 345 kV	Active
AG1-379	Minonk 345 kV	Active
AG1-423	Byron-Wayne 345 kV	Active
AG1-436	Olive-University Park 345 kV	Active
AG1-447	Olive-University Park 345 kV	Active
AG1-448	Olive-University Park 345 kV	Active
AG1-477	Grundy County 34.5 kV	Active
AG1-478	Will County 34.5 kV	Active
AG1-512	University Park North 345 kV	Active
AG1-513	Aurora 138 kV	Active
AG1-555	Dequine 345 kV	Active
W3-135	Goose Lake 34.5kV	Engineering and Procurement
X2-052	Dumont-Olive 345kV	In Service
Y3-013	Zion Energy Center	In Service
Z1-106	West Chicago 34kV	In Service
Z1-107	Joliet 34kV	In Service
Z1-108	McHenry 34kV	In Service
J1043	MISO	MISO
J1058	MISO	MISO
J1062	MISO	MISO
J1067	MISO	MISO
J1069	MISO	MISO
J1071	MISO	MISO
J1088	MISO	MISO
J1089	MISO	MISO
J1090	MISO	MISO
J1112	MISO	MISO
J1172	MISO	MISO

Queue Number	Project Name	Status
J1178	MISO	MISO
J1192	MISO	MISO
J1194	MISO	MISO
J1196	MISO	MISO
J1203	MISO	MISO
J1207	MISO	MISO
J1210	MISO	MISO
J1224	MISO	MISO
J1226	MISO	MISO
J1248	MISO	MISO
J1255	MISO	MISO
J1262	MISO	MISO
J1265	MISO	MISO
J1292	MISO	MISO
J1297	MISO	MISO
J1307	MISO	MISO
J1310	MISO	MISO
J1319	MISO	MISO
J1320	MISO	MISO
J1323	MISO	MISO
J1329	MISO	MISO
J1331	MISO	MISO
J1350	MISO	MISO
J1353	MISO	MISO
J1355	MISO	MISO
J1375	MISO	MISO
J1379	MISO	MISO
J1381	MISO	MISO
J1386	MISO	MISO
J1389	MISO	MISO
J1392	MISO	MISO
J1399	MISO	MISO
J1401	MISO	MISO
J1403	MISO	MISO
J1430	MISO	MISO
J1447	MISO	MISO
J1472	MISO	MISO
J1481	MISO	MISO
J1482	MISO	MISO
J201	MISO	MISO

Queue Number	Project Name	Status
J246	MISO	MISO
J325	MISO	MISO
J351	MISO	MISO
J466	MISO	MISO
J571	MISO	MISO
J589	MISO	MISO
J646	MISO	MISO
J701	MISO	MISO
J717	MISO	MISO
J728	MISO	MISO
J752	MISO	MISO
J758	MISO	MISO
J793	MISO	MISO
J794	MISO	MISO
J796	MISO	MISO
J799	MISO	MISO
J806	MISO	MISO
J832	MISO	MISO
J833	MISO	MISO
J837	MISO	MISO
J838	MISO	MISO
J857	MISO	MISO
J875	MISO	MISO
J913	MISO	MISO
J968	MISO	MISO
J984	MISO	MISO
J992	MISO	MISO
J996	MISO	MISO

11.9 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#695_1681	CONTINGENCY 'AEP_P1-2_#695_1681' OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
AEP_P4_#8165_05OLIVE 345_B1	CONTINGENCY 'AEP_P4_#8165_05OLIVE 345_B1' OPEN BRANCH FROM BUS 243215 TO BUS 243229 CKT 1 / 243215 05COOK 345 243229 05OLIVE 345 1 OPEN BRANCH FROM BUS 243229 TO BUS 243353 CKT 2 / 243229 05OLIVE 345 243353 05OLIVE 138 2 END
COMED_P4_112-65-BT3-4__	CONTINGENCY 'COMED_P4_112-65-BT3-4__' / CONTINGENCY # 414 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTON ; 765 05DUMONT 765 REMOVE SHUNT 1 FROM BUS 270644 / WILTON ; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTON ;3M 345 WILTON ; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTON ;3M 345 WILTON ; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTON ;3M 345 WILTON ;3C 33 END
COMED_P1-2_765-L11215__-S	CONTINGENCY 'COMED_P1-2_765-L11215__-S' / CONTINGENCY # 199 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTON ; 765 05DUMONT 765 REMOVE SHUNT 1 FROM BUS 270644 / WILTON ; 765 END

Contingency Name	Contingency Definition
COMED_P4_112-65-BT4-5__	CONTINGENCY 'COMED_P4_112-65-BT4-5__' / CONTINGENCY # 415 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTON ; 765 05DUMONT 765 REMOVE SHUNT 1 FROM BUS 270644 / WILTON ; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTON ;4M 345 WILTON ; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTON ;4M 345 WILTON ; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTON ;4M 345 WILTON ;4C 33 END

12 Light Load Analysis

The Queue Project AG1-448 was evaluated as a 55.0 MW injection/withdrawal tapping the Olive to University Park 345 kV line in the AEP area. Project AG1-448 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-448 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

12.1 Light Load Deliverability

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

None.

12.2 Multiple Facility Contingency

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

None.

12.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
170040274	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	COMED_P1-2_765-L11215__-S	single	971.0	154.78	157.53	DC	46.86
170040275	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	AEP_P1-2_#695_1681	single	971.0	154.78	157.53	DC	46.86
178676956	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	COMED_P1-2_345-L94507_B-S	single	971.0	108.85	113.66	DC	46.75
179457321	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	AEP_P4_#2978_05DUMONT 765_B	breaker	971.0	121.69	124.66	DC	46.72
179457322	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	COMED_P4_112-65-BT4-5__	breaker	971.0	121.76	124.66	DC	46.86
179457323	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	COMED_P4_112-65-BT3-4__	breaker	971.0	121.76	124.66	DC	46.86

12.4 Steady-State Voltage Requirements

To be determined during the Facilities Study phase.

12.5 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed

with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
17004027 2	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	AEP_P1-2_#695_1681	operation	971.0	121.73	124.63	DC	46.86
17004027 3	960680	AF2-359 TAP	345.0	CE	243229	05OLIVE	345.0	AEP	1	COMED_P1-2_765-L11215__-S	operation	971.0	121.73	124.63	DC	46.86

12.6 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AG1-448	Upgrade Number
170040274,170040275,178676956,179457321,179457323,179457322	1	**AF2-359 TAP 345.0 kV - 05OLIVE 345.0 kV Ckt 1**	See Summer Peak Load Flow Reinforcements section.			

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

12.7 Flow Gate Details

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

12.7.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
170040275	960680	AF2-359 TAP	CE	243229	05OLIVE	AEP	1	AEP_P1-2_#695_1681	single	971.0	154.78	157.53	DC	46.86

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274658	DRESDEN ;2U	92.9665	80/20	92.9665
274659	DRESDEN ;3U	89.7649	80/20	89.7649
274847	GR RIDGE ;BU	1.1401	80/20	1.1401
274848	CAMPGROVE;RU	0.8661	80/20	0.8661
274849	CRESCENT ;1U	0.3406	80/20	0.3406
274850	MENDOTA H;RU	0.5051	80/20	0.5051
274851	PROVIDENC;RU	0.3509	80/20	0.3509
274853	TWINGROVE;U1	0.9709	80/20	0.9709
274854	TWINGROVE;U2	0.9988	80/20	0.9988
274855	GSG-6 ;RU	0.8318	80/20	0.8318
274856	ECOGROVE ;U1	0.7187	80/20	0.7187
274857	BIG SKY ;U1	0.5508	80/20	0.5508
274858	BIG SKY ;U2	0.5508	80/20	0.5508
274859	EASYR;U1 E	3.4787	80/20	3.4787
274860	EASYR;U2 E	3.4787	80/20	3.4787
274861	TOP CROP ;1U	0.7015	80/20	0.7015
274862	TOP CROP ;2U	1.3382	80/20	1.3382
274863	CAYUGA RI;1U	0.7874	80/20	0.7874
274864	CAYUGA RI;2U	0.7874	80/20	0.7874
274871	GR RIDGE ;2U	0.4244	80/20	0.4244
274872	LEE DEKAL;1U	1.5480	80/20	1.5480
274877	BISHOP HL;1U	0.6756	80/20	0.6756
274878	BISHOP HL;2U	0.6756	80/20	0.6756
274879	MINONK ;1U	1.5392	80/20	1.5392
274887	PILOT HIL;1U	1.4727	80/20	1.4727
274888	KELLY CRK;1U	1.4727	80/20	1.4727
274889	BRIGHTSTK;1U	0.7645	80/20	0.7645
274891	OTTER CRK;1U	0.8419	80/20	0.8419
275149	KELLYCK ;1E	5.8906	80/20	5.8906
276156	O-029 C	0.3890	80/20	0.3890
276157	O-029 C	0.4206	80/20	0.4206
276158	O-029 C	0.7676	80/20	0.7676
290021	O50 E	6.1568	80/20	6.1568
290051	GSG-6; E	3.3270	80/20	3.3270
290108	LEEDK;1U E	7.7400	80/20	7.7400
290261	S-027 E	4.4194	80/20	4.4194
290265	S-028 E	4.4194	80/20	4.4194
293061	N-015 E	4.9930	80/20	4.9930
293513	O-009 C1	0.7185	80/20	0.7185
293514	O-009 C2	0.3645	80/20	0.3645
293515	O-009 C3	0.4031	80/20	0.4031

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
293516	O-009 E1	2.8780	80/20	2.8780
293517	O-009 E2	1.4618	80/20	1.4618
293518	O-009 E3	1.6098	80/20	1.6098
293644	O22 E1	3.1109	80/20	3.1109
293645	O22 E2	6.0388	80/20	6.0388
293715	O-029 E	3.0769	80/20	3.0769
293716	O-029 E	1.6870	80/20	1.6870
293717	O-029 E	1.5505	80/20	1.5505
293771	O-035 E	2.0166	80/20	2.0166
293777	CAYUG;1U E	4.1957	80/20	4.1957
293778	CAYUG;2U E	4.1957	80/20	4.1957
293799	PILOT HIL;1E	5.8853	80/20	5.8853
294392	P-010 E	6.3411	80/20	6.3411
294401	BSHIL;1U E	2.7024	80/20	2.7024
294410	BSHIL;2U E	2.7024	80/20	2.7024
294763	P-046 E	2.9635	80/20	2.9635
295108	WESTBROOK C	0.2697	80/20	0.2697
295109	WESTBROOK E	1.7796	80/20	1.7796
295110	SUBLETTE C	0.1151	80/20	0.1151
295111	SUBLETTE E	0.8194	80/20	0.8194
916211	Z1-072 E	3.0521	80/20	3.0521
916221	Z1-073 E	1.7265	80/20	1.7265
917502	Z2-087 E	5.1212	80/20	5.1212
918052	AA1-018 E OP	5.6340	80/20	5.6340
924041	AB2-047 C O1	0.9565	80/20	0.9565
924042	AB2-047 E O1	6.4015	80/20	6.4015
925581	AC1-033 C	0.8850	80/20	0.8850
925582	AC1-033 E	5.9250	80/20	5.9250
926821	AC1-168 C O1	0.7258	80/20	0.7258
926822	AC1-168 E O1	4.8709	80/20	4.8709
926841	AC1-171 C O1	0.6501	80/20	0.6501
926842	AC1-171 E O1	4.3427	80/20	4.3427
927201	AC1-214 C O1	0.6472	80/20	0.6472
927202	AC1-214 E O1	2.0575	80/20	2.0575
934431	AD1-067 C	0.0418	80/20	0.0418
934432	AD1-067 E	0.1757	80/20	0.1757
934721	AD1-100 C	12.3252	80/20	12.3252
934722	AD1-100 E	57.5176	80/20	57.5176
936371	AD2-047 C O1	2.8614	80/20	2.8614
936372	AD2-047 E O1	13.9706	80/20	13.9706
937001	AD2-134 C	1.6483	80/20	1.6483
937002	AD2-134 E	6.5800	80/20	6.5800
938851	AE1-113 C O1	5.0794	80/20	5.0794
938852	AE1-113 E O1	18.0086	80/20	18.0086
938861	AE1-114 C O1	2.4861	80/20	2.4861
938862	AE1-114 E O1	8.4819	80/20	8.4819
939321	AE1-163 C O1	4.0352	80/20	4.0352
939322	AE1-163 E O1	24.7880	80/20	24.7880
939401	AE1-172 C O1	3.2769	80/20	3.2769
939402	AE1-172 E O1	15.3749	80/20	15.3749
940101	AE1-252 C O1	0.0001	80/20	0.0001
940102	AE1-252 E O1	6.8573	80/20	6.8573

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941561	AE2-153 C O1	3.0334	80/20	3.0334
941562	AE2-153 E O1	14.2018	80/20	14.2018
941731	AE2-173 O1	3.6790	80/20	3.6790
942111	AE2-223 C	1.1478	80/20	1.1478
942112	AE2-223 E	7.6818	80/20	7.6818
942421	AE2-255 C O1	1.9240	80/20	1.9240
942422	AE2-255 E O1	5.7720	80/20	5.7720
942651	AE2-281 C O1	0.5765	80/20	0.5765
942652	AE2-281 E O1	3.5411	80/20	3.5411
943801	AF1-048 C	3.0431	80/20	3.0431
943802	AF1-048 E	2.0287	80/20	2.0287
943921	AF1-060	0.9576	80/20	0.9576
945351	AF1-200 FTIR	210.1748	80/20	210.1748
946161	AF1-281 C O1	0.2699	80/20	0.2699
946162	AF1-281 E O1	1.5297	80/20	1.5297
946321	AF1-296 C O1	2.4877	80/20	2.4877
946322	AF1-296 E O1	11.6467	80/20	11.6467
946501	AF1-314 C	2.7644	80/20	2.7644
946502	AF1-314 E	12.9423	80/20	12.9423
946541	AF1-318 C O1	3.6378	80/20	3.6378
946542	AF1-318 E O1	17.0313	80/20	17.0313
957331	AF2-027 C	1.9942	80/20	1.9942
957332	AF2-027 E	2.9913	80/20	2.9913
957371	AF2-031 C O1	0.6317	80/20	0.6317
957372	AF2-031 E O1	0.9475	80/20	0.9475
957401	AF2-034 C	1.1126	80/20	1.1126
957402	AF2-034 E	0.9478	80/20	0.9478
957751	AF2-069 C	0.1499	80/20	0.1499
957752	AF2-069 E	0.4837	80/20	0.4837
957761	AF2-070 C	0.2112	80/20	0.2112
957762	AF2-070 E	1.0253	80/20	1.0253
958011	AF2-095 C O1	4.2072	80/20	4.2072
958012	AF2-095 E O1	0.0001	80/20	0.0001
958021	AF2-096 C	8.0925	80/20	8.0925
958022	AF2-096 E	0.0001	80/20	0.0001
958341	AF2-128 C O1	0.9663	80/20	0.9663
958342	AF2-128 E O1	4.5242	80/20	4.5242
958921	AF2-183 C	2.8794	80/20	2.8794
958922	AF2-183 E	4.3190	80/20	4.3190
959101	AF2-201 C O1	3.8081	80/20	3.8081
959102	AF2-201 E O1	10.9354	80/20	10.9354
959351	AF2-226 C	1.9062	80/20	1.9062
959352	AF2-226 E	2.8593	80/20	2.8593
959611	AF2-252 C	1.3950	80/20	1.3950
959612	AF2-252 E	2.0925	80/20	2.0925
960281	AF2-319 C	1.9062	80/20	1.9062
960282	AF2-319 E	2.8593	80/20	2.8593
960381	AF2-329	5.2946	80/20	5.2946
960601	AF2-351 C O1	0.8415	80/20	0.8415
960602	AF2-351 E O1	1.2623	80/20	1.2623
960611	AF2-352 C	1.3950	80/20	1.3950
960612	AF2-352 E	2.0925	80/20	2.0925

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
961011	AF2-392 C O1	2.5110	80/20	2.5110
961012	AF2-392 E O1	11.7562	80/20	11.7562
961021	AF2-393 O1	5.3502	80/20	5.3502
961031	AF2-394 O1	3.5668	80/20	3.5668
961501	AF2-441 C O1	6.9584	80/20	6.9584
961502	AF2-441 E O1	10.4376	80/20	10.4376
962012	AG1-044 E	0.0494	80/20	0.0494
962721	AG1-121 C	3.5574	80/20	3.5574
962722	AG1-121 E	16.6425	80/20	16.6425
964361	AG1-298 O1	44.1450	80/20	44.1450
965061	AG1-371	2.8272	80/20	2.8272
965081	AG1-373	0.9424	80/20	0.9424
965092	AG1-374 E	5.2313	80/20	5.2313
965342	AG1-399 E O1	12.3303	80/20	12.3303
965351	AG1-400 O1	9.3525	80/20	9.3525
965362	AG1-401 E O1	12.3303	80/20	12.3303
965371	AG1-402 O1	9.3525	80/20	9.3525
965382	AG1-403 E O1	8.2202	80/20	8.2202
965661	AG1-434 C	2.6144	80/20	2.6144
965662	AG1-434 E	12.2400	80/20	12.2400
965671	AG1-435 C	2.3998	80/20	2.3998
965672	AG1-435 E	11.2354	80/20	11.2354
965791	AG1-447	46.8572	80/20	46.8572
965801	AG1-448	46.8572	80/20	46.8572
966081	AG1-477 C	0.4057	80/20	0.4057
966082	AG1-477 E	0.6085	80/20	0.6085
966091	AG1-478 C	0.4188	80/20	0.4188
966092	AG1-478 E	0.6282	80/20	0.6282
966431	AG1-512 C	3.6157	80/20	3.6157
966432	AG1-512 E	5.4235	80/20	5.4235
966441	AG1-513 C	0.4076	80/20	0.4076
966442	AG1-513 E	0.6113	80/20	0.6113
966651	AG1-535 O1	6.7957	80/20	6.7957
966821	AG1-553 C O1	5.4338	80/20	5.4338
966822	AG1-553 E O1	8.1507	80/20	8.1507

12.8 Queue Dependencies

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

Queue Number	Project Name	Status
AA1-018	Powerton-Goodings Grove	In Service
AB2-047	Brokaw-Pontiac Midpoint	In Service
AC1-033	Kewanee	Active
AC1-168	Kewanee-Streator	Active
AC1-171	Powerton	Active
AC1-214	Crescent Ridge	In Service
AD1-067	Mendota Hills	In Service
AD1-100	Loretto-Wilton 345 kV & Braidwood-Davis Creek 345 kV	Active
AD2-047	Davis Creek 138 kV	Active
AD2-134	Shady Oaks	Active
AE1-113	Mole Creek 345 kV	Active
AE1-114	Maryland-Lancaster 138 kV	Active
AE1-163	Powerton-Nevada 345 kV	Active
AE1-172	Loretto-Wilton Center	Active
AE1-252	Loretto-Wilton Center	Active
AE2-153	Braidwood-Davis Creek	Active
AE2-173	McLean 345 kV	Active
AE2-223	McLean 345 kV	Active
AE2-255	Molecreek 345 kV	Active
AE2-281	Powerton-Nevada 345 kV	Active
AF1-048	Belvidere-Marengo	Active
AF1-060	Lena 138 kV	Active
AF1-200	Plano 345 kV	Active
AF1-281	Nelson-Lee County	Active
AF1-296	Garden Plain 138 kV	Active
AF1-314	Lena 138 kV	Active
AF1-318	Crescent Ridge-Corbin	Active
AF2-027	Zion Energy Center 345 kV	Active
AF2-031	River E.C.	Active
AF2-034	Kendall 345kV	Active
AF2-069	Crescent Ridge 138 kV	Active
AF2-070	Crescent Ridge 138 kV	Active
AF2-095	Davis Creek 138 kV	Active
AF2-096	Braidwood-East Frankfort 345 kV	Active
AF2-128	Crescent Ridge-Corbin 138 kV	Active
AF2-183	Nelson-Lee County 345 kV	Active
AF2-201	Lena 138 kV	Active
AF2-226	Katydid Road 345 kV	Active
AF2-252	Blue Mound 345 kV	Active
AF2-319	Katydid Road 345 kV	Active
AF2-329	Sandwich-Plano 138 kV	Active

Queue Number	Project Name	Status
AF2-351	Kensington 138 kV	Active
AF2-352	Blue Mound 345 kV	Active
AF2-392	Nelson-Dixon 138 kV	Active
AF2-393	Nelson-Dixon 138 kV	Active
AF2-394	Nelson-Dixon 138 kV	Active
AF2-441	Burnham 138kV	Active
AG1-044	Whiteside County	Engineering and Procurement
AG1-121	Kewanee-Streator 138 kV	Active
AG1-298	Calumet-Burnham 345 kV	Active
AG1-371	Nelson-Electric Junction 345 kV	Active
AG1-373	Nelson-Electric Junction 345 kV	Active
AG1-374	Blue Mound 345 kV	Active
AG1-399	Blue Mound-Chestnut 345 kV	Active
AG1-400	Blue Mound-Chestnut 345 kV	Active
AG1-401	Blue Mound-Chestnut 345 kV	Active
AG1-402	Blue Mound-Chestnut 345 kV	Active
AG1-403	Clinton-Brokaw 345 kV	Active
AG1-434	Electric Junction-Nelson 345 kV	Active
AG1-435	Kewanee-Hennepin 138 kV	Active
AG1-447	Olive-University Park 345 kV	Active
AG1-448	Olive-University Park 345 kV	Active
AG1-477	Grundy County 34.5 kV	Active
AG1-478	Will County 34.5 kV	Active
AG1-512	University Park North 345 kV	Active
AG1-513	Aurora 138 kV	Active
AG1-535	State Line-S. Chicago Properties 138 kV	Active
AG1-553	Cordova 345 kV	Active
Z1-072	Crescent Ridge	In Service
Z1-073	Mendota Hills	In Service
Z2-087	Pontiac MidPoint-Brokaw 345kV	In Service

12.9 Contingency Descriptions

Contingency Name	Contingency Definition
AEP_P1-2_#695_1681	CONTINGENCY 'AEP_P1-2_#695_1681' OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
COMED_P1-2_345-L94507_B-S	CONTINGENCY 'COMED_P1-2_345-L94507_B-S' / CONTINGENCY # 571 TRIP BRANCH FROM BUS 274750 TO BUS 255112 CKT 1 / CRETE EC ;BP 345 17STJOHN 345 END
COMED_P1-2_765-L11215__-S	CONTINGENCY 'COMED_P1-2_765-L11215__-S' / CONTINGENCY # 199 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTON ; 765 05DUMONT 765 REMOVE SHUNT 1 FROM BUS 270644 / WILTON ; 765 END
COMED_P4_112-65-BT3-4__	CONTINGENCY 'COMED_P4_112-65-BT3-4__' / CONTINGENCY # 414 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTON ; 765 05DUMONT 765 REMOVE SHUNT 1 FROM BUS 270644 / WILTON ; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTON ;3M 345 WILTON ; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTON ;3M 345 WILTON ; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTON ;3M 345 WILTON ;3C 33 END
COMED_P4_112-65-BT4-5__	CONTINGENCY 'COMED_P4_112-65-BT4-5__' / CONTINGENCY # 415 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTON ; 765 05DUMONT 765 REMOVE SHUNT 1 FROM BUS 270644 / WILTON ; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTON ;4M 345 WILTON ; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTON ;4M 345 WILTON ; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTON ;4M 345 WILTON ;4C 33 END
AEP_P4_#2978_05DUMONT 765_B	CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B' OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END

13 Short Circuit Analysis

The following Breakers are overdutied:

None.

14 Stability and Reactive Power

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

To be determined in the Facilities Study Phase.

15 Affected Systems

15.1 MISO

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

16 Attachment 1: One Line Diagram and Project Site Location