Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-199

"NELSON-ELECTRIC JUNCTION 345 KV"

July 2020

1 Introduction

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

2 Preface

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

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

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

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

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

3 General

The Interconnection Customer (IC) has proposed a solar generating facility located in Lee County, Illinois. The installed facilities will have a total capability of 100 MW with 60 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is November 01, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-199
Project Name	NELSON-ELECTRIC JUNCTION 345 KV
State	Illinois
County	Lee
Transmission Owner	ComEd
MFO	100
MWE	100
MWC	60
Fuel	Solar
Basecase Study Year	2023

A new service customer with a generating facility that could be commercially operable prior to June 1st of the basecase study year is required to request an interim deliverability analysis from PJM.

4 Point of Interconnection

Queue Position AF2-199, a 100 MW solar facility, proposes to interconnect with the ComEd transmission system by tying into the 345kV bus at the Interconnection Substation that would be built to interconnect PJM queue position AF2-041.

5 Cost Summary

The AF2-199 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$5,000,000
Total System Network Upgrade Costs	$43,500,000
Total Costs	**$48,500,000**

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

6 Transmission Owner Scope of Work

Attachment Facilities

The AF2-199 generator lead would interconnect to the 345kV bus at the Interconnection Substation that would be built to interconnect PJM queue position AF2-041. The required Attachment Facilities are one 345kV line MOD, a dead-end structure and revenue metering.

Scope of Work	Cost Estimate
Installation of one 345kV line MOD, one dead-end structure and one set of revenue metering (see notes below on cost estimate)	$1,000,000
Total Cost Estimate (see notes below on cost estimate)	**$1,000,000**

Direct Connection Network Upgrades

Prior to the AF2-199 queue project, AF2-041 would build an Interconnection Substation in a breaker-and-a-half configuration and cut into 345kV line 15502 at 32. 2 miles from Nelson TSS 155. The generator lead for AF2-199 would be interconnected to this substation by expanding it.

The scope of work includes the installation of one 345 kV circuit breaker at this Interconnection Substation to create a line position for the IC's generator lead, as shown in the one-line diagram below. Please note that if the AF2-041 project withdraws from the New Services queue, the interconnection scope for AF2-199 would change.

The Interconnection Customer ("IC") is responsible for constructing all of the facilities on the IC side of the Point of Interconnection ("POI") outside of the substation.

The estimated cost for the Direct Connection Network upgrade is given below.

Scope of Work	Cost Estimate
Installation of one 345kV circuit breaker at the AF2-041 Interconnection TSS and relay/protection work	$4,000,000
Total Cost Estimate (see notes below on cost estimate)	**$4,000,000**

ComEd would take approximately 24-months to construct the substation and transmission line work after the ISA / ICSA are signed.

Non-Direct Connection Network Upgrades

None

Notes on Cost Estimate:

1) These estimates are Order-of-Magnitude estimates of the costs that ComEd would bill to the customer for this interconnection. These estimates are based on a one-line electrical diagram of the project and the information provided by the IC.

2) There were no site visits performed for these estimates. There may be costs related to specific site related issues that are not identified in these estimates. The site reviews will be performed during the Facilities Study or during detailed engineering.

3) These estimates are not a guarantee of the maximum amount payable by the IC and the actual costs of ComEd's work may differ significantly from these estimates. The IC will be responsible for paying actual costs of ComEd's work in accordance with Sections 212.1 and 217 of the PJM Open Access Transmission Tariff.

4) The IC is responsible for all engineering, procurement, testing and construction of all equipment on the IC's side of the POI.

5) These cost estimates do not include cost of acquiring right-of-way for the transmission line and purchasing any additional land, if needed, for the line terminations. The need and cost of acquiring property and associated legal costs will be investigated during Facilities Study for this project.

7 Schedule

See Sections 6 and 11.5.

8 Transmission Owner Analysis

See Section 6.

9 Interconnection Customer Requirements

The Interconnection Customer is responsible for all design and construction related activities on the Interconnection Customer's side of the Point of Interconnection.

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

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

10.2 Interconnected Transmission Owner Requirements

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

ComEd interconnection requirements can be found at https://www.pjm.com/planning/design-engineering/to-tech-standards/private-comed.aspx

To the extent that these Applicable Technical Requirements and Standards may conflict with the terms and conditions of the Tariff, the Tariff shall control.

11 Summer Peak - Load Flow Analysis - Primary POI

The Queue Project AF2-199 was evaluated as a 100.0 MW (Capacity 60.0 MW) injection tapping the Nelson to Electric Junction 345 kV line in the ComEd area. Project AF2-199 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-199 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96366597	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	Base Case	single	1334.0	99.49	101.52	DC	32.55

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
96366247	270730	ELECT JCT; B	345.0	CE	270812	LOMBARD ; B	345.0	CE	1	COMED_P4_120-45-L12002_	breaker	1479.0	108.42	109.43	DC	14.96
96366774	274768	LEE CO EC;BP	345.0	CE	270678	BYRON ; B	345.0	CE	1	COMED_P1-2_345-L15502_B-R-B	single	1726.0	104.92	106.27	DC	23.33
96366096	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	COMED_P4_006-45-BT3-4__	breaker	1656.0	123.76	127.35	DC	59.45

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
96366596	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	COMED_P1-2_345-L0627__B-R	single	1656.0	102.06	104.1	DC	35.67

11.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96366705	270730	ELECT JCT; B	345.0	CE	270812	LOMBARD ; B	345.0	CE	1	Base Case	operation	1201.0	113.36	114.56	DC	14.36
96366706	270730	ELECT JCT; B	345.0	CE	270812	LOMBARD ; B	345.0	CE	1	COMED_P2-1_111-L11120__	operation	1479.0	108.77	109.78	DC	14.81
96366773	274768	LEE CO EC;BP	345.0	CE	270678	BYRON ; B	345.0	CE	1	COMED_P1-2_345-L15502_B-R-B	operation	1726.0	109.3	110.32	DC	38.89
96366715	946160	AF1-281 TAP	345.0	CE	274768	LEE CO EC;BP	345.0	CE	1	COMED_P1-2_345-L15502_B-R-B	operation	1479.0	106.71	108.87	DC	39.26
96366591	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	Base Case	operation	1334.0	120.99	125.04	DC	54.25
96366592	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	COMED_P1-2_345-L0627__B-R	operation	1656.0	123.15	126.74	DC	59.45

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
96366247	2	ELECT JCT; B 345.0 kV - LOMBARD ; B 345.0 kV Ckt 1	CE_NUN_L11124 (845) : ComEd 345kV L11124 SSTE rating is 1568 MVA. The upgrade will be to re-conductor the line. A preliminary estimate is $14.6M with an estimated construction timeline of 30 months. Upon completion of the upgrade the ratings will be 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD). Project Type : FAC Cost : $14,600,000 Time Estimate : 30.0 Months	$14,600,000
96366596,96366597,96366096	1	AF2-041 TAP 345.0 kV - ELECT JCT; B 345.0 kV Ckt 1	CE_NUN_L15502_1 (910) : Replace station conductor at TSS111 Electric Junction. A preliminary estimate for the upgrade is $1.2M with an estimated construction timeline of 24 months. Upon completion of the upgrade the new ratings 1461/1656/1909/1912 MVA (SN/SLTE/SSTE/SLD). Project Type : FAC Cost : $1,200,000 Time Estimate : 24.0 Months CE_NUN_L15502_4 (916) : ComEd 345kV L15502 SSTE rating is 1837 MVA. The upgrade is to perform sag mitigation on a portion of the line section along with re-conductoring on a different section, upgrade station conductor at both line terminals, replace both line motor operated disconnect witches and line current transformers, upgrade line relay schemes at both terminals as well. A preliminary estimate for the upgrade is $10.5M with an estimated construction timeline of 36 months. Upon completion of the upgrades the rating will be 1683/2068/2367/2564 MVA (SN/SLTE/SSTE/SLD). Project Type : FAC Cost : $10,500,000 Time Estimate : 36.0 Months	$11,700,000
96366774	3	LEE CO EC;BP 345.0 kV - BYRON ; B 345.0 kV Ckt 1	CE_NUN_L0627 (920) : ComEd 345kV L0627 SSTE rating is 1837 MVA. The upgrade will be to re-conductor the line and upgrade station conductor at Byron Station. A preliminary estimate for the upgrade is $17.2M. The preliminary construction timeline is 24-30 months contingent upon outage coordination with Byron Nuclear Station. Note that the preliminary cost estimate does not include the potential for new transmission towers. This unknown will add to this estimate if required. Upon completion of the upgrades the new rating will be 1679/1904/1944/2088 MVA (SN/SLTE/SSTE/SLD). Project Type : FAC Cost : $17,200,000 Time Estimate : 24-30 Months	$17,200,000
			Total System Network Upgrade Costs	**$43,500,000**

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

11.6 Flow Gate Details - Primary POI

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of

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

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96366096	957470	AF2-041 TAP	CE	270730	ELECT JCT; B	CE	1	COMED_P4_006-45-BT3-4__	breaker	1656.0	123.76	127.35	DC	59.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274715	NELSON EC;1C	9.9439	50/50	9.9439
274716	NELSON EC;1S	7.2555	50/50	7.2555
274717	NELSON EC;2C	10.0207	50/50	10.0207
274718	NELSON EC;2S	7.3205	50/50	7.3205
274761	LEE CO EC;2U	4.6601	50/50	4.6601
274764	LEE CO EC;5U	4.6719	50/50	4.6719
274765	LEE CO EC;6U	4.6719	50/50	4.6719
274859	EASYR;U1 E	27.9407	Adder	32.87
274860	EASYR;U2 E	27.9407	Adder	32.87
293516	O-009 E1	17.3066	Adder	20.36
293517	O-009 E2	8.7904	Adder	10.34
293518	O-009 E3	9.6806	Adder	11.39
293715	O-029 E	18.5027	Adder	21.77
293716	O-029 E	10.1447	Adder	11.93
293717	O-029 E	9.3241	Adder	10.97
293771	O-035 E	4.9500	Adder	5.82
294401	BSHIL;1U E	8.1063	Adder	9.54
294410	BSHIL;2U E	8.1063	Adder	9.54
919221	AA1-146	9.2762	50/50	9.2762
919581	AA2-030	53.7772	50/50	53.7772
925581	AC1-033 C	1.3277	Adder	1.56
925582	AC1-033 E	8.8887	Adder	10.46
927201	AC1-214 C O1	1.5887	Adder	1.87
927202	AC1-214 E O1	5.0503	Adder	5.94
934051	AD1-031 C O1	2.6967	Adder	3.17
934052	AD1-031 E O1	4.3999	Adder	5.18
937531	AD2-214 C	9.0986	Adder	10.7

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
937532	AD2-214 E	6.0658	Adder	7.14
938861	AE1-114 C O1	4.1945	Adder	4.93
938862	AE1-114 E O1	14.3108	Adder	16.84
939051	AE1-134 1	4.1789	50/50	4.1789
939061	AE1-134 2	4.1789	50/50	4.1789
943401	AF1-011 C	2.3627	Adder	2.78
943402	AF1-011 E	3.9659	Adder	4.67
943411	AF1-012 C	44.9977	50/50	44.9977
943412	AF1-012 E	29.9985	50/50	29.9985
946151	AF1-280 C O1	46.9156	50/50	46.9156
946152	AF1-280 E O1	21.5743	50/50	21.5743
946161	AF1-281 C	1.0273	50/50	1.0273
946162	AF1-281 E	5.8216	50/50	5.8216
946321	AF1-296 C O1	7.6962	Adder	9.05
946322	AF1-296 E O1	36.0319	Adder	42.39
946531	AF1-317 C O1	8.5710	50/50	8.5710
950471	J438 C	3.3717	PJM External (MISO)	3.3717
950472	J438 E	13.4869	PJM External (MISO)	13.4869
951381	J504	5.7865	PJM External (MISO)	5.7865
951421	J514	3.4599	PJM External (MISO)	3.4599
951511	J530 C	5.5045	PJM External (MISO)	5.5045
951512	J530 E	22.0180	PJM External (MISO)	22.0180
954091	J873 C	3.3038	PJM External (MISO)	3.3038
954092	J873 E	17.8742	PJM External (MISO)	17.8742
954702	J844 E	14.1620	PJM External (MISO)	14.1620
954792	J952 E	6.7954	PJM External (MISO)	6.7954
954861	J959 C	2.2974	PJM External (MISO)	2.2974
954862	J959 E	12.4296	PJM External (MISO)	12.4296
954901	J963	1.4067	PJM External (MISO)	1.4067
955051	J981 C	3.8638	PJM External (MISO)	3.8638
955052	J981 E	20.9042	PJM External (MISO)	20.9042
955971	J1084	31.5210	PJM External (MISO)	31.5210
956411	J1131	16.9080	PJM External (MISO)	16.9080
956831	J1181 C	3.0077	PJM External (MISO)	3.0077
956832	J1181 E	16.2723	PJM External (MISO)	16.2723
957471	AF2-041 C	107.0010	50/50	107.0010
957472	AF2-041 E	71.3340	50/50	71.3340
957751	AF2-069 C	0.0975	Adder	0.22
957752	AF2-069 E	0.3146	Adder	0.7
957761	AF2-070 C	0.1374	Adder	0.3
957762	AF2-070 E	0.6670	Adder	1.48
958911	AF2-182	61.6410	50/50	61.6410
958921	AF2-183 C	10.9584	50/50	10.9584
958922	AF2-183 E	16.4376	50/50	16.4376
959081	AF2-199 C	35.6670	50/50	35.6670
959082	AF2-199 E	23.7780	50/50	23.7780
959091	AF2-200 C	71.3340	50/50	71.3340
959092	AF2-200 E	47.5560	50/50	47.5560
960551	AF2-346 C	19.2848	50/50	19.2848
960552	AF2-346 E	12.8565	50/50	12.8565
961011	AF2-392 C O1	4.3215	Adder	9.59
961012	AF2-392 E O1	20.2325	Adder	44.91

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
961021	AF2-393 O1	7.3662	Adder	16.35
961031	AF2-394 O1	4.9108	Adder	10.9
990901	L-005 E	10.9007	Adder	12.82
LGEE	LGEE	0.0434	Confirmed LTF	0.0434
CPLE	CPLE	0.2633	Confirmed LTF	0.2633
CBM-W2	CBM-W2	21.4005	Confirmed LTF	21.4005
NY	NY	0.1637	Confirmed LTF	0.1637
CBM-W1	CBM-W1	45.5989	Confirmed LTF	45.5989
TVA	TVA	2.5326	Confirmed LTF	2.5326
O-066	O-066	1.8077	Confirmed LTF	1.8077
CBM-S2	CBM-S2	3.4911	Confirmed LTF	3.4911
CBM-S1	CBM-S1	12.6692	Confirmed LTF	12.6692
G-007	G-007	0.2787	Confirmed LTF	0.2787
MADISON	MADISON	14.5414	Confirmed LTF	14.5414
MEC	MEC	18.1019	Confirmed LTF	18.1019
TRIMBLE	TRIMBLE	0.0134	Confirmed LTF	0.0134

11.6.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96366247	270730	ELECT JCT; B	CE	270812	LOMBARD ; B	CE	1	COMED_P4_120-45-L12002_	breaker	1479.0	108.42	109.43	DC	14.96

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274738	AURORA EC;3P	4.4431	50/50	4.4431
274740	AURORA EC;4P	4.4431	50/50	4.4431
274859	EASYR;U1 E	6.1396	Adder	7.22
274860	EASYR;U2 E	6.1396	Adder	7.22
274872	LEE DEKAL;1U	0.8480	50/50	0.8480
276167	Z1-106 E2	1.1201	50/50	1.1201
276168	Z1-106 E1	1.1269	50/50	1.1269
290051	GSG-6; E	7.2025	Adder	8.47
290108	LEEDK;1U E	20.4840	50/50	20.4840
292543	L-013 2	0.5603	50/50	0.5603
293516	O-009 E1	4.7280	Adder	5.56
293517	O-009 E2	2.4014	Adder	2.83
293518	O-009 E3	2.6446	Adder	3.11
293715	O-029 E	5.0547	Adder	5.95
293716	O-029 E	2.7714	Adder	3.26
293717	O-029 E	2.5472	Adder	3.0
294763	P-046 E	4.0535	Adder	4.77
919581	AA2-030	11.1244	Adder	13.09
926311	AC1-109 1	1.0101	Adder	1.19
926321	AC1-109 2	1.0101	Adder	1.19
926331	AC1-110 1	2.5419	50/50	2.5419
926341	AC1-110 2	2.5419	50/50	2.5419
926351	AC1-111 1	0.4794	Adder	0.56

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
926361	AC1-111 2	0.4794	Adder	0.56
926371	AC1-111 3	0.4794	Adder	0.56
926381	AC1-111 4	0.4794	Adder	0.56
926391	AC1-111 5	0.4794	Adder	0.56
926401	AC1-111 6	0.4794	Adder	0.56
926431	AC1-114	0.9328	Adder	1.1
927511	AC1-113 1	0.4662	Adder	0.55
927521	AC1-113 2	0.4662	Adder	0.55
930481	AB1-089	32.0331	Adder	37.69
932881	AC2-115 1	0.9325	Adder	1.1
932891	AC2-115 2	0.9325	Adder	1.1
932921	AC2-116	0.3265	Adder	0.38
933431	AC2-156 C O1	0.8012	50/50	0.8012
933432	AC2-156 E O1	1.3072	50/50	1.3072
933911	AD1-013 C	1.2826	Adder	1.51
933912	AD1-013 E	2.0488	Adder	2.41
934431	AD1-067 C	0.0904	Adder	0.11
934432	AD1-067 E	0.3803	Adder	0.45
934651	AD1-096 C	0.4180	Adder	0.49
934652	AD1-096 E	0.6819	Adder	0.8
934701	AD1-098 C O1	4.6998	Adder	5.53
934702	AD1-098 E O1	3.4313	Adder	4.04
934971	AD1-129 C	0.3299	Adder	0.39
934972	AD1-129 E	0.2199	Adder	0.26
937001	AD2-134 C	1.8828	Adder	2.22
937002	AD2-134 E	7.7781	Adder	9.15
937311	AD2-172 C	1.0640	Adder	1.25
937312	AD2-172 E	1.4694	Adder	1.73
937531	AD2-214 C	2.3475	Adder	2.76
937532	AD2-214 E	1.5650	Adder	1.84
938861	AE1-114 C O1	1.9363	Adder	2.28
938862	AE1-114 E O1	6.6062	Adder	7.77
939051	AE1-134 1	0.8644	Adder	1.02
939061	AE1-134 2	0.8644	Adder	1.02
940501	AE2-035 C	1.0640	Adder	1.25
940502	AE2-035 E	1.4694	Adder	1.73
941131	AE2-107 C	6.2100	50/50	6.2100
941132	AE2-107 E	4.1400	50/50	4.1400
943121	AE2-341 C	10.5831	50/50	10.5831
943122	AE2-341 E	5.1969	50/50	5.1969
943381	AF1-009 C	0.4066	Adder	0.48
943382	AF1-009 E	1.6262	Adder	1.91
943401	AF1-011 C	0.6455	Adder	0.76
943402	AF1-011 E	1.0834	Adder	1.27
943411	AF1-012 C	11.1258	50/50	11.1258
943412	AF1-012 E	7.4172	50/50	7.4172
943591	AF1-030 C O1	7.0379	50/50	7.0379
943592	AF1-030 E O1	3.4821	50/50	3.4821
943921	AF1-060	0.5239	Adder	0.62
944041	AF1-072	0.9553	Adder	1.12
945351	AF1-200 FTIR	171.5912	Merchant Transmission	171.5912
946151	AF1-280 C O1	9.0470	Adder	10.64

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
946152	AF1-280 E O1	4.1603	Adder	4.89
946161	AF1-281 C	0.1981	Adder	0.23
946162	AF1-281 E	1.1226	Adder	1.32
946321	AF1-296 C O1	1.9473	Adder	2.29
946322	AF1-296 E O1	9.1168	Adder	10.73
946501	AF1-314 C	1.8905	Adder	2.22
946502	AF1-314 E	8.8512	Adder	10.41
946531	AF1-317 C O1	2.1192	50/50	2.1192
946671	AF1-331	1.6657	Adder	1.96
955971	J1084	8.2515	PJM External (MISO)	8.2515
957333	AF2-027 BAT	1.4951	Merchant Transmission	1.4951
957471	AF2-041 C	26.9190	50/50	26.9190
957472	AF2-041 E	17.9460	50/50	17.9460
958911	AF2-182	6.2999	Adder	13.98
958921	AF2-183 C	1.1200	Adder	2.49
958922	AF2-183 E	1.6800	Adder	3.73
959081	AF2-199 C	8.9730	50/50	8.9730
959082	AF2-199 E	5.9820	50/50	5.9820
959091	AF2-200 C	17.9460	50/50	17.9460
959092	AF2-200 E	11.9640	50/50	11.9640
959101	AF2-201 C O1	1.3803	Adder	3.06
959102	AF2-201 E O1	3.9637	Adder	8.8
959761	AF2-267 C O1	0.9972	Adder	2.21
959762	AF2-267 E O1	4.6683	Adder	10.36
960381	AF2-329	5.4914	50/50	5.4914
960551	AF2-346 C	4.7682	50/50	4.7682
960552	AF2-346 E	3.1788	50/50	3.1788
960721	AF2-363 C O1	4.9201	50/50	4.9201
960722	AF2-363 E O1	3.2801	50/50	3.2801
960731	AF2-364 C O1	1.9076	Adder	4.23
960732	AF2-364 E O1	1.2717	Adder	2.82
960751	AF2-366 C O1	5.8830	50/50	5.8830
960752	AF2-366 E O1	3.9220	50/50	3.9220
961011	AF2-392 C O1	1.2421	Adder	2.76
961012	AF2-392 E O1	5.8154	Adder	12.91
961021	AF2-393 O1	2.1173	Adder	4.7
961031	AF2-394 O1	1.4115	Adder	3.13
CBM-W2	CBM-W2	4.3243	Confirmed LTF	4.3243
NY	NY	0.1156	Confirmed LTF	0.1156
CBM-W1	CBM-W1	4.5662	Confirmed LTF	4.5662
TVA	TVA	0.4522	Confirmed LTF	0.4522
O-066	O-066	1.3440	Confirmed LTF	1.3440
CBM-S2	CBM-S2	0.1272	Confirmed LTF	0.1272
CBM-S1	CBM-S1	2.0618	Confirmed LTF	2.0618
TILTON	TILTON	0.0101	Confirmed LTF	0.0101
G-007	G-007	0.2080	Confirmed LTF	0.2080
MADISON	MADISON	3.4615	Confirmed LTF	3.4615
MEC	MEC	4.2553	Confirmed LTF	4.2553
GIBSON	GIBSON	0.0289	Confirmed LTF	0.0289
BLUEG	BLUEG	0.2205	Confirmed LTF	0.2205
TRIMBLE	TRIMBLE	0.0762	Confirmed LTF	0.0762

11.6.3 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
96366774	274768	LEE CO EC;BP	CE	270678	BYRON ; B	CE	1	COMED_P1-2_345-L15502_B-R-B	single	1726.0	104.92	106.27	DC	23.33

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274662	QUAD CITI;1U	43.2174	80/20	43.2174
274663	QUAD CITI;2U	43.3023	80/20	43.3023
274699	CORDOVA ;1C	7.6046	80/20	7.6046
274700	CORDOVA ;2C	7.6046	80/20	7.6046
274701	CORDOVA ;1S	8.5552	80/20	8.5552
274715	NELSON EC;1C	11.2932	80/20	11.2932
274716	NELSON EC;1S	8.2401	80/20	8.2401
274717	NELSON EC;2C	11.3805	80/20	11.3805
274718	NELSON EC;2S	8.3139	80/20	8.3139
274760	LEE CO EC;1U	7.2036	80/20	7.2036
274761	LEE CO EC;2U	7.2036	80/20	7.2036
274762	LEE CO EC;3U	7.1032	80/20	7.1032
274763	LEE CO EC;4U	7.1306	80/20	7.1306
274764	LEE CO EC;5U	7.2219	80/20	7.2219
274765	LEE CO EC;6U	7.2219	80/20	7.2219
274766	LEE CO EC;7U	7.1123	80/20	7.1123
274767	LEE CO EC;8U	7.1123	80/20	7.1123
274848	CAMPGROVE;RU	0.6178	80/20	0.6178
274849	CRESCENT ;1U	0.1851	80/20	0.1851
274850	MENDOTA H;RU	0.0460	80/20	0.0460
274851	PROVIDENC;RU	0.2824	80/20	0.2824
274855	GSG-6 ;RU	0.1939	80/20	0.1939
274857	BIG SKY ;U1	2.1912	80/20	2.1912
274858	BIG SKY ;U2	2.1912	80/20	2.1912
274877	BISHOP HL;1U	0.4581	80/20	0.4581
274878	BISHOP HL;2U	0.4581	80/20	0.4581
276156	O-029 C	0.5200	80/20	0.5200
276157	O-029 C	0.5621	80/20	0.5621
276158	O-029 C	1.0259	80/20	1.0259
276160	W4-084	0.1503	80/20	0.1503
293513	O-009 C1	0.9603	80/20	0.9603
293514	O-009 C2	0.4872	80/20	0.4872
293515	O-009 C3	0.5387	80/20	0.5387
919221	AA1-146	10.5350	80/20	10.5350
919581	AA2-030	61.0746	80/20	61.0746
925581	AC1-033 C	1.7399	80/20	1.7399
926821	AC1-168 C O1	0.6720	80/20	0.6720
926841	AC1-171 C O1	0.7114	80/20	0.7114
927201	AC1-214 C O1	2.1018	80/20	2.1018
927531	AC1-185 1	0.5478	80/20	0.5478
927541	AC1-185 2	0.5478	80/20	0.5478

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
927551	AC1-185 3	0.5478	80/20	0.5478
927561	AC1-185 4	0.5478	80/20	0.5478
927571	AC1-185 5	0.5478	80/20	0.5478
927581	AC1-185 6	0.5478	80/20	0.5478
927591	AC1-185 7	0.5478	80/20	0.5478
927601	AC1-185 8	0.5478	80/20	0.5478
934051	AD1-031 C O1	3.5341	80/20	3.5341
934431	AD1-067 C	0.0565	80/20	0.0565
934701	AD1-098 C O1	3.5512	80/20	3.5512
937001	AD2-134 C	1.1752	80/20	1.1752
937531	AD2-214 C	11.7443	80/20	11.7443
938861	AE1-114 C O1	2.6330	80/20	2.6330
939051	AE1-134 1	4.7459	80/20	4.7459
939061	AE1-134 2	4.7459	80/20	4.7459
943381	AF1-009 C	0.3072	80/20	0.3072
943401	AF1-011 C	3.0417	80/20	3.0417
943411	AF1-012 C	40.8418	80/20	40.8418
946151	AF1-280 C O1	66.7039	80/20	66.7039
946161	AF1-281 C	1.4607	80/20	1.4607
946321	AF1-296 C O1	9.8913	80/20	9.8913
946531	AF1-317 C O1	7.7794	80/20	7.7794
946541	AF1-318 C O1	4.1957	80/20	4.1957
951381	J504	6.4395	PJM External (MISO)	6.4395
951421	J514	3.9054	PJM External (MISO)	3.9054
951511	J530 C	6.4260	PJM External (MISO)	6.4260
954901	J963	1.6344	PJM External (MISO)	1.6344
955051	J981 C	4.5702	PJM External (MISO)	4.5702
955971	J1084	37.1040	PJM External (MISO)	37.1040
956411	J1131	19.9460	PJM External (MISO)	19.9460
957471	AF2-041 C	70.0002	80/20	70.0002
957751	AF2-069 C	0.2434	80/20	0.2434
957761	AF2-070 C	0.3429	80/20	0.3429
958341	AF2-128 C O1	1.0223	80/20	1.0223
958911	AF2-182	87.6402	80/20	87.6402
958921	AF2-183 C	15.5805	80/20	15.5805
959081	AF2-199 C	23.3334	80/20	23.3334
959091	AF2-200 C	46.6668	80/20	46.6668
960551	AF2-346 C	17.5036	80/20	17.5036
961011	AF2-392 C O1	10.2478	80/20	10.2478
961021	AF2-393 O1	17.4678	80/20	17.4678
961031	AF2-394 O1	11.6452	80/20	11.6452
LGEE	LGEE	0.1940	Confirmed LTF	0.1940
CPLE	CPLE	0.4214	Confirmed LTF	0.4214
CBM-W2	CBM-W2	23.0139	Confirmed LTF	23.0139
NY	NY	0.0182	Confirmed LTF	0.0182
CBM-W1	CBM-W1	21.5797	Confirmed LTF	21.5797
TVA	TVA	2.8084	Confirmed LTF	2.8084
CBM-S2	CBM-S2	4.8263	Confirmed LTF	4.8263
CBM-S1	CBM-S1	14.4499	Confirmed LTF	14.4499
MADISON	MADISON	9.9228	Confirmed LTF	9.9228
MEC	MEC	17.6109	Confirmed LTF	17.6109

11.7 Queue Dependencies

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

Queue Number	Project Name	Status
AA1-146	Nelson	Active
AA2-030	Nelson	Active
AB1-089	Byron-Wayne 345kV #1	Active
AC1-033	Kewanee	Active
AC1-109	Aurora 345kV	Active
AC1-110	Aurora 138kV	Active
AC1-111	Aurora 138kV	Active
AC1-113	Rockford	Active
AC1-114	Rockford II	Active
AC1-168	Kewanee-Streator	Active
AC1-171	Powerton	Active
AC1-185	Lee County	Under Construction
AC1-214	Crescent Ridge	Engineering and Procurement
AC2-115	Rockford	Active
AC2-116	Rockford II	Active
AC2-156	Sandwich 34.5kV	Active
AD1-013	Twombly Road 138kV	Active
AD1-031	Kewanee 138 kV	Active
AD1-067	Mendota Hills	Active
AD1-096	Stillman Valley 34 kV	Active
AD1-098	Dixon-McGirr	Active
AD1-129	Belvidere 34 kV	Active
AD2-134	Shady Oaks	Active
AD2-172	Lena 138kV	Active
AD2-214	Rock Falls-Garden Plains	Active
AE1-114	Maryland-Lancaster 138 kV	Active
AE1-134	Nelson 345 kV	Active
AE2-035	Lena 138 kV	Active
AE2-107	Haumesser Road 138 kV	Active
AE2-341	Sandwich-Plano	Active
AF1-009	Dixon-McGirr	Active
AF1-011	Schauff Road	Active
AF1-012	Electric Junc-Nelson	Active
AF1-030	Plano-R 138 kV	Active
AF1-060	Lena 138 kV	Active
AF1-072	Rocky Road	Active
AF1-200	Plano 345 kV	Active
AF1-280	Nelson-Lee County	Active
AF1-281	Nelson-Lee County	Active
AF1-296	Garden Plain 138 kV	Active
AF1-314	Lena 138 kV	Active

Queue Number	Project Name	Status
AF1-317	Electric Jct-Nelson	Active
AF1-318	Crescent Ridge-Corbin	Active
AF1-331	Twombley Road	Active
AF2-027	Zion Energy Center 345 kV	Active
AF2-041	Nelson-Electric Junction 345 kV	Active
AF2-069	Crescent Ridge 138 kV	Active
AF2-070	Crescent Ridge 138 kV	Active
AF2-128	Crescent Ridge-Corbin 138 kV	Active
AF2-182	Nelson-Lee County 345 kV II	Active
AF2-183	Nelson-Lee County 345 kV	Active
AF2-199	Nelson-Electric Junction 345 kV	Active
AF2-200	Nelson-Electric Junction 345 kV	Active
AF2-201	Lena-Ecogrove 138 kV	Active
AF2-267	Lancaster 138 kV	Active
AF2-329	Sandwich-Plano 138 kV	Active
AF2-346	Electric Junction-Nelson 345 kV	Active
AF2-363	Glidden 138 kV	Active
AF2-364	Wayne Red 138 kV	Active
AF2-366	Glidden-Waterman 345 kV	Active
AF2-392	Nelson-Dixon 138 kV	Active
AF2-393	Nelson-Dixon 138 kV	Active
AF2-394	Nelson-Dixon 138 kV	Active
W4-084	Dixon 12kV	Deactivated
Z1-106	West Chicago 34kV	In Service
J1084	MISO	MISO
J1131	MISO	MISO
J1181	MISO	MISO
J438	MISO	MISO
J504	MISO	MISO
J514	MISO	MISO
J530	MISO	MISO
J844	MISO	MISO
J873	MISO	MISO
J952	MISO	MISO
J959	MISO	MISO
J963	MISO	MISO
J981	MISO	MISO

11.8 Contingency Descriptions - Primary POI

Contingency Name	Contingency Definition
COMED_P1-2_345-L15502_B-R-B	CONTINGENCY 'COMED_P1-2_345-L15502_B-R-B' TRIP BRANCH FROM BUS 957470 TO BUS 270730 CKT 1 / AF1-012 TAP 345 ELEC JUNC; B 345 END
COMED_P2-1_111-L11120__	CONTINGENCY 'COMED_P2-1_111-L11120__' TRIP BRANCH FROM BUS 270733 TO BUS 270747 CKT 1 / ELECT;3R 345 W407K;0T 345 END
COMED_P4_006-45-BT3-4__	CONTINGENCY 'COMED_P4_006-45-BT3-4__' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 REMOVE UNIT 1 FROM BUS 274656 / BYRON;1U 25 END
COMED_P1-2_345-L0627__B-R	CONTINGENCY 'COMED_P1-2_345-L0627__B-R' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 END
Base Case	
COMED_P4_120-45-L12002_	CONTINGENCY 'COMED_P4_120-45-L12002_' TRIP BRANCH FROM BUS 270813 TO BUS 270781 CKT 1 / LOMBA; R 345 ITASC; R 345 TRIP BRANCH FROM BUS 275191 TO BUS 270781 CKT 1 / ITASC;2M 138 ITASC; R 345 TRIP BRANCH FROM BUS 275191 TO BUS 271735 CKT 1 / ITASC;2M 138 ITASC; R 138 TRIP BRANCH FROM BUS 275191 TO BUS 275291 CKT 1 / ITASC;2M 138 ITASC;2C 34.5 CLOSE BRANCH FROM BUS 271734 TO BUS 271735 CKT 1 / ITASC; B 138 ITASC; R 138 TRIP BRANCH FROM BUS 270813 TO BUS 270753 CKT 1 / LOMBA; R 345 W407M;0T 345 TRIP BRANCH FROM BUS 270813 TO BUS 270809 CKT 1 / LOMBA; R 345 LISLE; R 345 DISCONNECT BUS 275198 / LOMBA;2M 138 END

12 Short Circuit Analysis - Primary POI

The following breakers are overdutied:

None

12.1 System Reinforcements - Short Circuit

None

13 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AF2-199 was evaluated as a 100.0 MW (Capacity 60.0 MW) injection tapping the Nelson to Electric Junction 345 kV line in the ComEd area. Project AF2-199 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-199 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

13.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96366597	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	Base Case	single	1334.0	99.48	101.51	DC	32.55

13.2 Multiple Facility Contingency

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

None

13.3 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
96366774	274768	LEE CO EC;BP	345.0	CE	270678	BYRON ; B	345.0	CE	1	COMED_P1-2_345-L15502_B-R-B	single	1726.0	104.92	106.27	DC	23.33
96366096	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	COMED_P4_006-45-BT3-4__	breaker	1656.0	123.76	127.35	DC	59.45
96366596	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	COMED_P1-2_345-L0627__B-R	single	1656.0	102.06	104.09	DC	35.67

13.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96366705	270730	ELECT JCT; B	345.0	CE	270812	LOMBARD ; B	345.0	CE	1	Base Case	operation	1201.0	113.36	114.56	DC	14.36
96366706	270730	ELECT JCT; B	345.0	CE	270812	LOMBARD ; B	345.0	CE	1	COMED_P2-1_111-L11120__	operation	1479.0	108.77	109.78	DC	14.81
96366773	274768	LEE CO EC;BP	345.0	CE	270678	BYRON ; B	345.0	CE	1	COMED_P1-2_345-L15502_B-R-B	operation	1726.0	109.3	110.32	DC	38.89
96366715	946160	AF1-281 TAP	345.0	CE	274768	LEE CO EC;BP	345.0	CE	1	COMED_P1-2_345-L15502_B-R-B	operation	1479.0	106.69	108.85	DC	39.26
96366591	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	Base Case	operation	1334.0	120.99	125.04	DC	54.25
96366592	957470	AF2-041 TAP	345.0	CE	270730	ELECT JCT; B	345.0	CE	1	COMED_P1-2_345-L0627__B-R	operation	1656.0	123.15	126.74	DC	59.45

13.5 Flow Gate Details - Secondary POI

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

13.5.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96366096	957470	AF2-041 TAP	CE	270730	ELECT JCT; B	CE	1	COMED_P4_006-45-BT3-4__	breaker	1656.0	123.76	127.35	DC	59.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274715	NELSON EC;1C	9.9439	50/50	9.9439
274716	NELSON EC;1S	7.2555	50/50	7.2555
274717	NELSON EC;2C	10.0207	50/50	10.0207
274718	NELSON EC;2S	7.3205	50/50	7.3205
274761	LEE CO EC;2U	4.6601	50/50	4.6601
274764	LEE CO EC;5U	4.6719	50/50	4.6719
274765	LEE CO EC;6U	4.6719	50/50	4.6719
274859	EASYR;U1 E	27.9407	Adder	32.87
274860	EASYR;U2 E	27.9407	Adder	32.87
293516	O-009 E1	17.3066	Adder	20.36
293517	O-009 E2	8.7904	Adder	10.34
293518	O-009 E3	9.6806	Adder	11.39
293715	O-029 E	18.5027	Adder	21.77
293716	O-029 E	10.1447	Adder	11.93
293717	O-029 E	9.3241	Adder	10.97
293771	O-035 E	4.9500	Adder	5.82
294401	BSHIL;1U E	8.1063	Adder	9.54
294410	BSHIL;2U E	8.1063	Adder	9.54
919221	AA1-146	9.2762	50/50	9.2762
919581	AA2-030	53.7772	50/50	53.7772
925581	AC1-033 C	1.3277	Adder	1.56
925582	AC1-033 E	8.8887	Adder	10.46
927201	AC1-214 C O1	1.5887	Adder	1.87
927202	AC1-214 E O1	5.0503	Adder	5.94
934051	AD1-031 C O1	2.6967	Adder	3.17
934052	AD1-031 E O1	4.3999	Adder	5.18
937531	AD2-214 C	9.0986	Adder	10.7
937532	AD2-214 E	6.0658	Adder	7.14
938861	AE1-114 C O1	4.1945	Adder	4.93
938862	AE1-114 E O1	14.3108	Adder	16.84
939051	AE1-134 1	4.1789	50/50	4.1789
939061	AE1-134 2	4.1789	50/50	4.1789
943401	AF1-011 C	2.3627	Adder	2.78
943402	AF1-011 E	3.9659	Adder	4.67
943411	AF1-012 C	44.9977	50/50	44.9977
943412	AF1-012 E	29.9985	50/50	29.9985
946151	AF1-280 C O1	46.9156	50/50	46.9156
946152	AF1-280 E O1	21.5743	50/50	21.5743
946161	AF1-281 C	1.0273	50/50	1.0273
946162	AF1-281 E	5.8216	50/50	5.8216
946321	AF1-296 C O1	7.6962	Adder	9.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
946322	AF1-296 E O1	36.0319	Adder	42.39
946531	AF1-317 C O1	8.5710	50/50	8.5710
950471	J438 C	3.3717	PJM External (MISO)	3.3717
950472	J438 E	13.4869	PJM External (MISO)	13.4869
951381	J504	5.7865	PJM External (MISO)	5.7865
951421	J514	3.4599	PJM External (MISO)	3.4599
951511	J530 C	5.5045	PJM External (MISO)	5.5045
951512	J530 E	22.0180	PJM External (MISO)	22.0180
954091	J873 C	3.3038	PJM External (MISO)	3.3038
954092	J873 E	17.8742	PJM External (MISO)	17.8742
954702	J844 E	14.1620	PJM External (MISO)	14.1620
954792	J952 E	6.7954	PJM External (MISO)	6.7954
954861	J959 C	2.2974	PJM External (MISO)	2.2974
954862	J959 E	12.4296	PJM External (MISO)	12.4296
954901	J963	1.4067	PJM External (MISO)	1.4067
955051	J981 C	3.8638	PJM External (MISO)	3.8638
955052	J981 E	20.9042	PJM External (MISO)	20.9042
955971	J1084	31.5210	PJM External (MISO)	31.5210
956411	J1131	16.9080	PJM External (MISO)	16.9080
956831	J1181 C	3.0077	PJM External (MISO)	3.0077
956832	J1181 E	16.2723	PJM External (MISO)	16.2723
957471	AF2-041 C	107.0010	50/50	107.0010
957472	AF2-041 E	71.3340	50/50	71.3340
957751	AF2-069 C	0.0975	Adder	0.22
957752	AF2-069 E	0.3146	Adder	0.7
957761	AF2-070 C	0.1374	Adder	0.3
957762	AF2-070 E	0.6670	Adder	1.48
958911	AF2-182	61.6410	50/50	61.6410
958921	AF2-183 C	10.9584	50/50	10.9584
958922	AF2-183 E	16.4376	50/50	16.4376
959081	AF2-199 C O2	35.6670	50/50	35.6670
959082	AF2-199 E O2	23.7780	50/50	23.7780
959091	AF2-200 C O2	71.3340	50/50	71.3340
959092	AF2-200 E O2	47.5560	50/50	47.5560
960551	AF2-346 C	19.2848	50/50	19.2848
960552	AF2-346 E	12.8565	50/50	12.8565
961011	AF2-392 C O2	4.1721	Adder	9.26
961012	AF2-392 E O2	19.5332	Adder	43.36
961021	AF2-393 O2	7.1116	Adder	15.79
961031	AF2-394 O2	4.7411	Adder	10.52
990901	L-005 E	10.9007	Adder	12.82
LGEE	LGEE	0.0434	Confirmed LTF	0.0434
CPLE	CPLE	0.2633	Confirmed LTF	0.2633
CBM-W2	CBM-W2	21.4005	Confirmed LTF	21.4005
NY	NY	0.1637	Confirmed LTF	0.1637
CBM-W1	CBM-W1	45.5989	Confirmed LTF	45.5989
TVA	TVA	2.5326	Confirmed LTF	2.5326
O-066	O-066	1.8077	Confirmed LTF	1.8077
CBM-S2	CBM-S2	3.4911	Confirmed LTF	3.4911
CBM-S1	CBM-S1	12.6692	Confirmed LTF	12.6692
G-007	G-007	0.2787	Confirmed LTF	0.2787
MADISON	MADISON	14.5414	Confirmed LTF	14.5414

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
MEC	MEC	18.1019	Confirmed LTF	18.1019
TRIMBLE	TRIMBLE	0.0134	Confirmed LTF	0.0134

13.5.2 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
96366774	274768	LEE CO EC;BP	CE	270678	BYRON ; B	CE	1	COMED_P1-2_345-L15502_B-R-B	single	1726.0	104.92	106.27	DC	23.33

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
274662	QUAD CITI;1U	43.2174	80/20	43.2174
274663	QUAD CITI;2U	43.3023	80/20	43.3023
274699	CORDOVA ;1C	7.6046	80/20	7.6046
274700	CORDOVA ;2C	7.6046	80/20	7.6046
274701	CORDOVA ;1S	8.5552	80/20	8.5552
274715	NELSON EC;1C	11.2932	80/20	11.2932
274716	NELSON EC;1S	8.2401	80/20	8.2401
274717	NELSON EC;2C	11.3805	80/20	11.3805
274718	NELSON EC;2S	8.3139	80/20	8.3139
274760	LEE CO EC;1U	7.2036	80/20	7.2036
274761	LEE CO EC;2U	7.2036	80/20	7.2036
274762	LEE CO EC;3U	7.1032	80/20	7.1032
274763	LEE CO EC;4U	7.1306	80/20	7.1306
274764	LEE CO EC;5U	7.2219	80/20	7.2219
274765	LEE CO EC;6U	7.2219	80/20	7.2219
274766	LEE CO EC;7U	7.1123	80/20	7.1123
274767	LEE CO EC;8U	7.1123	80/20	7.1123
274848	CAMPGROVE;RU	0.6178	80/20	0.6178
274849	CRESCENT ;1U	0.1851	80/20	0.1851
274850	MENDOTA H;RU	0.0460	80/20	0.0460
274851	PROVIDENC;RU	0.2824	80/20	0.2824
274855	GSG-6 ;RU	0.1939	80/20	0.1939
274857	BIG SKY ;U1	2.1912	80/20	2.1912
274858	BIG SKY ;U2	2.1912	80/20	2.1912
274877	BISHOP HL;1U	0.4581	80/20	0.4581
274878	BISHOP HL;2U	0.4581	80/20	0.4581
276156	O-029 C	0.5200	80/20	0.5200
276157	O-029 C	0.5621	80/20	0.5621
276158	O-029 C	1.0259	80/20	1.0259
276160	W4-084	0.1503	80/20	0.1503
293513	O-009 C1	0.9603	80/20	0.9603
293514	O-009 C2	0.4872	80/20	0.4872
293515	O-009 C3	0.5387	80/20	0.5387
919221	AA1-146	10.5350	80/20	10.5350
919581	AA2-030	61.0746	80/20	61.0746

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925581	AC1-033 C	1.7399	80/20	1.7399
926821	AC1-168 C O1	0.6720	80/20	0.6720
926841	AC1-171 C O1	0.7114	80/20	0.7114
927201	AC1-214 C O1	2.1018	80/20	2.1018
927531	AC1-185 1	0.5478	80/20	0.5478
927541	AC1-185 2	0.5478	80/20	0.5478
927551	AC1-185 3	0.5478	80/20	0.5478
927561	AC1-185 4	0.5478	80/20	0.5478
927571	AC1-185 5	0.5478	80/20	0.5478
927581	AC1-185 6	0.5478	80/20	0.5478
927591	AC1-185 7	0.5478	80/20	0.5478
927601	AC1-185 8	0.5478	80/20	0.5478
934051	AD1-031 C O1	3.5341	80/20	3.5341
934431	AD1-067 C	0.0565	80/20	0.0565
934701	AD1-098 C O1	3.5512	80/20	3.5512
937001	AD2-134 C	1.1752	80/20	1.1752
937531	AD2-214 C	11.7443	80/20	11.7443
938861	AE1-114 C O1	2.6330	80/20	2.6330
939051	AE1-134 1	4.7459	80/20	4.7459
939061	AE1-134 2	4.7459	80/20	4.7459
943381	AF1-009 C	0.3072	80/20	0.3072
943401	AF1-011 C	3.0417	80/20	3.0417
943411	AF1-012 C	40.8418	80/20	40.8418
946151	AF1-280 C O1	66.7039	80/20	66.7039
946161	AF1-281 C	1.4607	80/20	1.4607
946321	AF1-296 C O1	9.8913	80/20	9.8913
946531	AF1-317 C O1	7.7794	80/20	7.7794
946541	AF1-318 C O1	4.1957	80/20	4.1957
951381	J504	6.4395	PJM External (MISO)	6.4395
951421	J514	3.9054	PJM External (MISO)	3.9054
951511	J530 C	6.4260	PJM External (MISO)	6.4260
954901	J963	1.6344	PJM External (MISO)	1.6344
955051	J981 C	4.5702	PJM External (MISO)	4.5702
955971	J1084	37.1040	PJM External (MISO)	37.1040
956411	J1131	19.9460	PJM External (MISO)	19.9460
957471	AF2-041 C	70.0002	80/20	70.0002
957751	AF2-069 C	0.2434	80/20	0.2434
957761	AF2-070 C	0.3429	80/20	0.3429
958341	AF2-128 C O2	0.9958	80/20	0.9958
958911	AF2-182	87.6402	80/20	87.6402
958921	AF2-183 C	15.5805	80/20	15.5805
959081	AF2-199 C O2	23.3334	80/20	23.3334
959091	AF2-200 C O2	46.6668	80/20	46.6668
960551	AF2-346 C	17.5036	80/20	17.5036
961011	AF2-392 C O2	9.9106	80/20	9.9106
961021	AF2-393 O2	16.8930	80/20	16.8930
961031	AF2-394 O2	11.2620	80/20	11.2620
LGEE	LGEE	0.1940	Confirmed LTF	0.1940
CPLE	CPLE	0.4214	Confirmed LTF	0.4214
CBM-W2	CBM-W2	23.0139	Confirmed LTF	23.0139
NY	NY	0.0182	Confirmed LTF	0.0182
CBM-W1	CBM-W1	21.5797	Confirmed LTF	21.5797

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
TVA	TVA	2.8084	Confirmed LTF	2.8084
CBM-S2	CBM-S2	4.8263	Confirmed LTF	4.8263
CBM-S1	CBM-S1	14.4499	Confirmed LTF	14.4499
MADISON	MADISON	9.9228	Confirmed LTF	9.9228
MEC	MEC	17.6109	Confirmed LTF	17.6109

13.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
Base Case	
COMED_P1-2_345-L15502_B-R-B	CONTINGENCY 'COMED_P1-2_345-L15502_B-R-B' TRIP BRANCH FROM BUS 957470 TO BUS 270730 CKT 1 / AF1-012 TAP 345 ELEC JUNC; B 345 END
COMED_P2-1_111-L11120__	CONTINGENCY 'COMED_P2-1_111-L11120__' TRIP BRANCH FROM BUS 270733 TO BUS 270747 CKT 1 / ELECT;3R 345 W407K;0T 345 END
COMED_P1-2_345-L0627__B-R	CONTINGENCY 'COMED_P1-2_345-L0627__B-R' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 END
COMED_P4_006-45-BT3-4__	CONTINGENCY 'COMED_P4_006-45-BT3-4__' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 REMOVE UNIT 1 FROM BUS 274656 / BYRON;1U 25 END

14 Affected Systems

14.1 MISO

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