



**Generation Interconnection
System Impact Study Report
for
Queue Project AG1-037
AHOSKIE 34.5 KV
3 MW Capacity / 5 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 Dominion.

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.

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.

3 General

The Interconnection Customer (IC), has proposed a Solar/Storage generating facility located in Hertford County, North Carolina. The installed facilities will have a total capability of 5 MW with 3 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2021. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-037
Project Name	AHOSKIE 34.5 KV
State	North Carolina
County	Hertford
Transmission Owner	Dominion
MFO	5
MWE	5
MWC	3
Fuel	Solar
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

AG1-037 “Ahoskie 34.5 kV” will interconnect with the Dominion Energy North Carolina distribution system (Ahoskie 34.5kv circuit #329) which interconnects with the Dominion transmission system at the Ahoskie 115 kV substation.

Attachment 1 shows a one-line diagram of the proposed interconnection facilities.

5 Cost Summary

The AG1-037 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$To be provided in the two-party IA with ITO
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	\$0
Allocation towards System Network Upgrade Costs (PJM Identified – Light Load)*	\$0
Total Costs	\$0 + \$To be provided in the two-party IA with ITO

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

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 required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of AG1-037 to the Dominion Transmission System is detailed in the following sections. The associated one-line showing the generation project attachment facilities and primary direct and non-direct connection is shown in Attachment 1.

Note that the ITO findings were made from a conceptual review of this project. A more detailed review of the connection facilities and their cost will be identified in a future study phase. Further note that the cost estimate data contained in this document should be considered high level estimates since it was produced without a detailed engineering review. The applicant will be responsible for the actual cost of construction. ITO herein reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any reinforcements to the transmission systems.

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

Description	Total Cost
Total Physical Interconnection Costs	\$To be provided in the two-party IA with ITO

Remote Terminal Work: During the Facilities Study, ITO's System Protection Engineering Department will review transmission line protection as well as anti-islanding required to accommodate the new generation and interconnection substation. System Protection Engineering will determine the minimal acceptable protection requirements to reliably interconnect the proposed generating facility with the transmission system. The review is based on maintaining system reliability by reviewing ITO's protection requirements with the known transmission system configuration which includes generating facilities in the area. This review may determine that transmission line protection and communication upgrades are required at remote substations.

7 Schedule

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

Dominion assessed the impact of the proposed AG1-037 for compliance with NERC Reliability Criteria on the Dominion Transmission System. The system was assessed using the summer 2024 AG1 case provided to Dominion by PJM.

When performing a generation analysis, Dominion's main analysis includes load flow study results following a single contingency event for both normal and stressed system conditions. Dominion Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of Dominion's Planning Criteria and interconnection requirements can be found in the Company's Facility Connection Requirements which are publicly available at:
<http://www.dominionenergy.com>.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically, in Planning Studies, NERC Planning Event 3 and 6 Contingency Conditions (Loss of generator, transmission circuit, transformer, shunt device, or Single Pole of a DC line followed by the loss of a generator, transmission circuit, transformer, shunt device or single pole of a DC line) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For Dominion Planning Criteria the re-dispatch of generating units for these

contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

8.1 Power Flow Analysis

PJM performed a power flow analysis of the transmission system using a 2024 summer peak load flow model and the results were verified by Dominion. Additionally, Dominion performed an analysis of its transmission system and no further deficiencies were identified.

9 Interconnection Customer Requirements

9.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in Dominion’s “Dominion Energy Electric Transmission Generator Interconnection Requirements” documented in Dominion’s Facility Interconnection Requirements “Exhibit C” located at:

<https://www.dominionenergy.com/company/moving-energy/electric-transmission-access>. Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

9.2 Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with Dominion’s “Dominion’s Facility Interconnection Requirements” document located at: <https://www.dominionenergy.com/company/moving-energy/electric-transmission-access>. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated protection device (circuit breaker, circuit switcher, fuse) to protect the IC’s GSU transformer(s).
2. The purchase and installation of the minimum required Dominion generation interconnection relaying and control facilities as described in the System Protection section noted above. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.
3. The purchase and installation of supervisory control and data acquisition (“SCADA”) equipment to provide information in a compatible format to the Dominion Transmission System Control Center.
4. Compliance with the Dominion and PJM generator power factor and voltage control requirements.

The GSU(s) associated with the IC queue request shall meet the grounding requirements as noted in Dominion’s “Dominion’s Facility Interconnection Requirements” document located at: <https://www.dominionenergy.com/company/moving-energy/electric-transmission-access>.

The IC will also be required to meet all PJM, SERC, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage

and over and under frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and SERC audits. Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the Dominion system.

9.3 Power Factor Requirements

The IC shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the Dominion transmission system.

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

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter²) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) - (Accepted, not required)
- Wind direction (decimal degrees from true north) - (Accepted, not required)

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 AG1-037 was evaluated as a 5.0 MW (Capacity 3.00 MW) injection at the Ahoskie 115 kV substation in the Dominion area. Project AG1-037 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-037 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)

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
168910100	314563	6CLUBHSE	230.0	DVP	940480	AE2-033 TAP	230.0	DVP	1	Base Case	single	678.7	99.98	100.04	AC	0.45

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
184620546	314551	3AHOSKIE	115.0	DVP	314568	3EARLEYS	115.0	DVP	1	DVP_P1-2: LN 68-B	single	141.0	109.35	110.99	AC	2.49
173776200	314568	3EARLEYS	115.0	DVP	314569	6EARLEYS	230.0	DVP	2	DVP_P4-2: 201262	breaker	208.0	144.25	145.05	AC	2.52
173776244	314568	3EARLEYS	115.0	DVP	314569	6EARLEYS	230.0	DVP	1	DVP_P4-2: 217162	breaker	231.7	104.54	105.6	AC	2.59
184323522	314568	3EARLEYS	115.0	DVP	314569	6EARLEYS	230.0	DVP	2	DVP_P4-2: WT2171	breaker	208.0	116.31	117.49	AC	2.59

11.4 Steady-State Voltage Requirements

To be determined

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 LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPAC T
168909988	314551	3AHOSKIE	115.0	DVP	314568	3EARLEYS	115.0	DVP	1	Base Case	operation	141.0	102.88	105.59	AC	3.95
183771906	314551	3AHOSKIE	115.0	DVP	314568	3EARLEYS	115.0	DVP	1	DVP_P1-2: LN 68-B	operation	141.0	187.63	190.29	AC	4.15
168910073	314568	3EARLEYS	115.0	DVP	314569	6EARLEYS	230.0	DVP	2	DVP_P1-3: 6EARLEYS-TX#3	operation	175.8	135.54	136.94	AC	2.59
168910117	314568	3EARLEYS	115.0	DVP	314569	6EARLEYS	230.0	DVP	1	DVP_P1-3: 6EARLEYS-TX#4	operation	202.5	117.81	119.03	AC	2.59

11.6 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AG1-037	Upgrade Number								
168909987,184620546	1	3AHOSKIE 115.0 kV - 3EARLEYS 115.0 kV Ckt 1	<u>DVP</u> ProjectId : n7540 (dom-313) Description : Reconductor 6.81 miles of 115 kV Line 136 from Earleys to Ahoskie with 768.2 ACSS 250 C. Replace Wave Trap, Relay (CT and Secondary CT) at Earleys terminal. Replace Line Switch and Line Lead at Ahoskie terminal. Type : FAC Total Cost : \$4,676,000 Time Estimate : 30-36 Months Ratings : 303.0/303.0/332.0 <table><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost \$</th></tr><tr><td>AG1-027</td><td>29.36</td><td>100.00%</td><td>\$4,676,000</td></tr></table> Queue Project AG1-037 presently does not receive cost allocation for this upgrade. Note 1: as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc., Queue Project AG1-037 could receive cost allocation. Note 2: Although Queue Project AG1-037 may not have cost responsibility for this upgrade, Queue Project AF2-037 may need this upgrade in-service to be deliverable to the PJM system. If Queue Project AG1-037 comes into service prior to completion of the upgrade, Queue Project AG1-037 will need an interim study.	Queue	MW	Cost %	Cost \$	AG1-027	29.36	100.00%	\$4,676,000	\$4,676,000	\$0	n7540
Queue	MW	Cost %	Cost \$											
AG1-027	29.36	100.00%	\$4,676,000											

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AG1-037	Upgrade Number																				
184323522,173776200	3	3EARLEYS 115.0 kV - 6EARLEYS 230.0 kV Ckt 2	DVP ProjectId : n7541 (dom-016) Description : Add additional 230/115 kV transformer at Earleys substation. Type : CON Total Cost : \$6,000,000 Time Estimate : 16-18 Months Ratings : 276.0/292.0/328.0 Queue Project AG1-037 presently does not receive cost allocation for this upgrade.	\$6,000,000	\$0	n7541																				
173776244	4	3EARLEYS 115.0 kV - 6EARLEYS 230.0 kV Ckt 1	Note 1: as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc., Queue Project AG1-037 could receive cost allocation. Note 2: Although Queue Project AG1-037 may not have cost responsibility for this upgrade, Queue Project AF2-037 may need this upgrade in-service to be deliverable to the PJM system. If Queue Project AG1-037 comes into service prior to completion of the upgrade, Queue Project AG1-037 will need an interim study.																							
168910100	2	6CLUBHSE 230.0 kV - AE2-033 TAP 230.0 kV Ckt 1	DVP ProjectId : n6872 (dom-047) Description : Rebuild 14.28 miles of 230 kV Line 238 from Clubhouse to AE2-033 Tap with 2-795 150C ACSR. Type : FAC Total Cost : \$21,420,000 Time Estimate : 30-36 Months Ratings : 1225.0/1225.0/1409.0 <table><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost \$</th></tr><tr><td>AF1-236</td><td>3.14</td><td>10.14%</td><td>\$2,171,740</td></tr><tr><td>AF2-222</td><td>10.55</td><td>34.07%</td><td>\$7,296,771</td></tr><tr><td>AF2-324</td><td>8.82</td><td>28.48%</td><td>\$6,100,239</td></tr><tr><td>AG1-030</td><td>8.46</td><td>27.32%</td><td>\$5,851,250</td></tr></table> Queue Project AG1-037 presently does not receive cost allocation for this upgrade. Note 1: as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc., Queue Project AG1-037 could receive cost allocation. Note 2: Although Queue Project AG1-037 may not have cost responsibility for this upgrade, Queue Project AF2-037 may need this upgrade in-service to be deliverable to the PJM system. If Queue Project AG1-037 comes into service prior to completion of the upgrade, Queue Project AG1-037 will need an interim study.	Queue	MW	Cost %	Cost \$	AF1-236	3.14	10.14%	\$2,171,740	AF2-222	10.55	34.07%	\$7,296,771	AF2-324	8.82	28.48%	\$6,100,239	AG1-030	8.46	27.32%	\$5,851,250	\$21,420,000	\$0	N6872
Queue	MW	Cost %	Cost \$																							
AF1-236	3.14	10.14%	\$2,171,740																							
AF2-222	10.55	34.07%	\$7,296,771																							
AF2-324	8.82	28.48%	\$6,100,239																							
AG1-030	8.46	27.32%	\$5,851,250																							
			TOTAL COST	\$32,096,000	\$0																					

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
184620546	314551	3AHOSKIE	DVP	314568	3EARLEYS	DVP	1	DVP_P1-2: LN 68-B	single	141.0	109.35	110.99	AC	2.49

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314589	3MURPHYS	0.28	80 50	0.28
315115	1S HAMPT1	3.12	80 50	3.12
315126	1ROARAP2	0.47	80 50	0.47
315128	1ROARAP4	0.45	80 50	0.45
315607	3AA1-063SOLA	1.47	80 50	1.47
315608	3AA2-088SOLA	2.23	80 50	2.23
316103	AB2-015 C	17.88	80 50	17.88
316140	AB2-099 C (Suspended)	2.91	80 50	2.91
938771	AE1-103 C	7.51	80 50	7.51

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943171	AE2-346 C	6.98	80 50	6.98
957521	AF2-046 C	58.92	80 50	58.92
961091	AF2-400 C	0.97	80 50	0.97
961851	AG1-027 C	29.36	80 50	29.36
961941	AG1-037 C	2.49	80 50	2.49
962331	AG1-082 C	9.97	80 50	9.97
962341	AG1-083 C	9.97	80 50	9.97
964801	AG1-343 C	13.58	80 50	13.58
965291	AG1-394 C	4.29	80 50	4.29
966811	AG1-552 C	0.72	80 50	0.72
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.0091	Confirmed LTF	0.0091
LTFEXP_AC1-056	LTFEXP_AC1-056->LTFIMP_AC1-056	0.0039	Confirmed LTF	0.0039
LTFEXP_BlueG	LTFEXP_BlueG->LTFIMP_BlueG	0.0088	Confirmed LTF	0.0088
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0008	LTF/CBM	0.0008
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	0.2072	LTF/CBM	0.2072
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.0138	Confirmed LTF	0.0138
LTFEXP_GIBSON	LTFEXP_GIBSON->LTFIMP_GIBSON	0.0027	Confirmed LTF	0.0027
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.0047	Confirmed LTF	0.0047
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.0022	Confirmed LTF	0.0022
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.0221	Confirmed LTF	0.0221
LTFEXP_PRAIRIE	LTFEXP_PRAIRIE->LTFIMP_PRAIRIE	0.0061	Confirmed LTF	0.0061
LTFEXP_TRIMBLE	LTFEXP_TRIMBLE->LTFIMP_TRIMBLE	0.0029	Confirmed LTF	0.0029
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.0049	Confirmed LTF	0.0049
314589	3MURPHYS	0.28	80 50	0.28
315115	1S HAMPT1	3.12	80 50	3.12
315126	1ROARAP2	0.47	80 50	0.47
315128	1ROARAP4	0.45	80 50	0.45
315607	3AA1-063SOLA	1.47	80 50	1.47
315608	3AA2-088SOLA	2.23	80 50	2.23
316103	AB2-015 C	17.88	80 50	17.88
316140	AB2-099 C (Suspended)	2.91	80 50	2.91
938771	AE1-103 C	7.51	80 50	7.51
943171	AE2-346 C	6.98	80 50	6.98
957521	AF2-046 C	58.92	80 50	58.92
961091	AF2-400 C	0.97	80 50	0.97
961851	AG1-027 C	29.36	80 50	29.36
961941	AG1-037 C	2.49	80 50	2.49
962331	AG1-082 C	9.97	80 50	9.97
962341	AG1-083 C	9.97	80 50	9.97
964801	AG1-343 C	13.58	80 50	13.58
965291	AG1-394 C	4.29	80 50	4.29

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
966811	AG1-552 C	0.72	80 50	0.72
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.0091	Confirmed LTF	0.0091
LTFEXP_AC1-056	LTFEXP_AC1-056->LTFIMP_AC1-056	0.0039	Confirmed LTF	0.0039
LTFEXP_BlueG	LTFEXP_BlueG->LTFIMP_BlueG	0.0088	Confirmed LTF	0.0088
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0008	LTF/CBM	0.0008
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	0.2072	LTF/CBM	0.2072
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.0138	Confirmed LTF	0.0138
LTFEXP_GIBSON	LTFEXP_GIBSON->LTFIMP_GIBSON	0.0027	Confirmed LTF	0.0027
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.0047	Confirmed LTF	0.0047
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.0022	Confirmed LTF	0.0022
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.0221	Confirmed LTF	0.0221
LTFEXP_PRAIRIE	LTFEXP_PRAIRIE->LTFIMP_PRAIRIE	0.0061	Confirmed LTF	0.0061
LTFEXP_TRIMBLE	LTFEXP_TRIMBLE->LTFIMP_TRIMBLE	0.0029	Confirmed LTF	0.0029
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.0049	Confirmed LTF	0.0049

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
168910100	314563	6CLUBHSE	DVP	940480	AE2-033 TAP	DVP	1	Base Case	single	678.7	99.98	100.04	AC	0.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
313506	AB1-173 C OP	13.76	80 50	13.76
313527	AB2-043 C	0.4	80 50	0.4
313719	3CHESTNUT	1.25	80 50	1.25
314572	3EMPORIA	0.98	80 50	0.98
314582	3KELFORD	0.36	80 50	0.36
314589	3MURPHYS	0.08	80 50	0.08
314623	3WITAKRS	0.22	80 50	0.22
314704	3LAWRENC	0.6	80 50	0.6
315115	1S HAMPT1	0.92	80 50	0.92
315126	1ROARAP2	2.04	80 50	2.04
315128	1ROARAP4	1.95	80 50	1.95
315131	1EDGECEMA (Deactivation : 22/04/2019)	8.86	80 50	8.86
315132	1EDGECEMB (Deactivation : 22/04/2019)	8.86	80 50	8.86
315136	1ROSEMG1	3.73	80 50	3.73
315137	1ROSEMS1	2.31	80 50	2.31
315138	1ROSEMG2	1.75	80 50	1.75
315139	1GASTONA	5.72	80 50	5.72
315141	1GASTONB	5.72	80 50	5.72
315158	1KERR 1	0.34	80 50	0.34
315159	1KERR 2	0.96	80 50	0.96
315160	1KERR 3	0.96	80 50	0.96
315161	1KERR 4	0.96	80 50	0.96
315162	1KERR 5	0.96	80 50	0.96
315163	1KERR 6	0.96	80 50	0.96
315164	1KERR 7	0.96	80 50	0.96
315293	1DOMTR9	3.43	Adder	4.04
315294	1DOMTR10	4.2	Adder	4.94
315601	1CONETOE2SOL	1.19	80 50	1.19
315602	1HOLLOMANSOL	1.19	80 50	1.19
315606	3AA2-053SOLA	2.07	80 50	2.07
315607	3AA1-063SOLA	1.75	80 50	1.75
315608	3AA2-088SOLA	0.9	80 50	0.9
316020	AB2-059 C OP	1.64	80 50	1.64
316087	AB2-174 C	2.48	80 50	2.48
316096	AB2-100 C1	2.83	80 50	2.83
316098	AB2-100 C2	2.83	80 50	2.83
316103	AB2-015 C	4.04	Adder	4.75
316129	AC1-054 C	8.35	80 50	8.35
316131	AB2-060 C	1.13	80 50	1.13
316140	AB2-099 C (Suspended)	0.53	80 50	0.53

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
920591	AA2-165 C	0.17	80 50	0.17
922922	AB1-081 C OP	1.39	80 50	1.39
923262	AB1-132 C OP	26.61	80 50	26.61
923991	AB2-040 C O1	14.99	80 50	14.99
924301	AB2-077 C O1	1.53	80 50	1.53
924311	AB2-078 C O1	1.53	80 50	1.53
924321	AB2-079 C O1	1.53	80 50	1.53
925121	AB2-169 C	0.68	80 50	0.68
925591	AC1-034 C	6.47	80 50	6.47
925611	AC1-036 C	0.14	80 50	0.14
926070	AC1-086 C	39.19	80 50	39.19
926201	AC1-098 C (Suspended)	6.67	80 50	6.67
926211	AC1-099 C (Suspended)	2.23	80 50	2.23
927024	AC1-189 C	7.01	80 50	7.01
927145	AC1-208 C (Suspended)	10.58	80 50	10.58
932631	AC2-084 C	9.51	80 50	9.51
933991	AD1-023 C	8.07	80 50	8.07
934331	AD1-057 C O1	13.79	80 50	13.79
934521	AD1-076 C	25.27	Adder	29.73
936265	AD2-033 C	8.24	80 50	8.24
936361	AD2-046 C O1	7.56	80 50	7.56
936401	AD2-051 C O1	7.35	80 50	7.35
936485	AD2-063 C	10.62	80 50	10.62
938221	AE1-035 C	0.3	80 50	0.3
939181	AE1-148 C	7.43	80 50	7.43
940571	AE2-044 C	4.24	80 50	4.24
940661	AE2-053 O1	2.75	80 50	2.75
942451	AE2-258	1.82	80 50	1.82
942471	AE2-260 C O1	44.64	80 50	44.64
943171	AE2-346 C	1.27	80 50	1.27
943911	AF1-059	25.43	80 50	25.43
944141	AF1-082	2.72	80 50	2.72
946281	AF1-292 C	3.68	80 50	3.68
957521	AF2-046 C	15.07	80 50	15.07
957861	AF2-080 C	6.37	80 50	6.37
959311	AF2-222 C	8.22	Adder	9.67
960081	AF2-299 C	6.2	80 50	6.2
961091	AF2-400 C	0.22	Adder	0.26
961671	AG1-007 C	0.84	80 50	0.84
961941	AG1-037 C	0.45	80 50	0.45
962331	AG1-082 C	1.82	80 50	1.82
962341	AG1-083 C	1.82	80 50	1.82
962351	AG1-084 C	1.59	80 50	1.59
962361	AG1-085 C	1.59	80 50	1.59
963301	AG1-179 C	10.3	80 50	10.3
963311	AG1-180	5.02	80 50	5.02
963321	AG1-181 C O1	10.55	80 50	10.55
963361	AG1-185 O1	5.11	80 50	5.11
964111	AG1-272 C	1.55	80 50	1.55
964121	AG1-273 C	1.55	80 50	1.55
964131	AG1-274 C	1.55	80 50	1.55
964241	AG1-285 C O1	9.09	80 50	9.09

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
964501	AG1-313 C O1	5.82	80 50	5.82
964801	AG1-343 C	5.27	80 50	5.27
965191	AG1-384 C	1.55	80 50	1.55
965291	AG1-394 C	1.81	80 50	1.81
965451	AG1-413 C O1	10.69	80 50	10.69
965591	AG1-427 C	8.58	80 50	8.58
965601	AG1-428 C O2	8.6	80 50	8.6
965691	AG1-437 C O1	6.76	80 50	6.76
965701	AG1-438 C O1	6.76	80 50	6.76
965711	AG1-439 C O1	20.49	80 50	20.49
965721	AG1-440 C	7.07	80 50	7.07
965731	AG1-441 C	7.07	80 50	7.07
965741	AG1-442 O1	3.95	80 50	3.95
965751	AG1-443 O1	3.95	80 50	3.95
965761	AG1-444 O1	10.93	80 50	10.93
965771	AG1-445	4.09	80 50	4.09
965781	AG1-446	4.09	80 50	4.09
966621	AG1-532 C	3.35	80 50	3.35
966801	AG1-551 C	1.62	80 50	1.62
966811	AG1-552 C	3.12	80 50	3.12
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	1.9889	Confirmed LTF	1.9889
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.5347	LTF/CBM	0.5347
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	33.1138	LTF/CBM	33.1138
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	11.0476	LTF/CBM	11.0476
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	11.3984	LTF/CBM	11.3984
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	3.0114	Confirmed LTF	3.0114
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	2.6628	Confirmed LTF	2.6628
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.1401	Confirmed LTF	0.1401
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.5406	Confirmed LTF	0.5406
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	1.5678	Confirmed LTF	1.5678
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.3303	Confirmed LTF	0.3303
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0963	Confirmed LTF	0.0963
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	2.1398	Confirmed LTF	2.1398
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	0.2633	Confirmed LTF	0.2633
313506	AB1-173 C OP	13.76	80 50	13.76
313527	AB2-043 C	0.4	80 50	0.4
313719	3CHESTNUT	1.25	80 50	1.25
314572	3EMPORIA	0.98	80 50	0.98
314582	3KELFORD	0.36	80 50	0.36
314589	3MURPHYS	0.08	80 50	0.08

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314623	3WITAKRS	0.22	80 50	0.22
314704	3LAWRENC	0.6	80 50	0.6
315115	1S HAMPT1	0.92	80 50	0.92
315126	1ROARAP2	2.04	80 50	2.04
315128	1ROARAP4	1.95	80 50	1.95
315131	1EDGECEMA (Deactivation : 22/04/2019)	8.86	80 50	8.86
315132	1EDGECEMB (Deactivation : 22/04/2019)	8.86	80 50	8.86
315136	1ROSEMG1	3.73	80 50	3.73
315137	1ROSEMS1	2.31	80 50	2.31
315138	1ROSEMG2	1.75	80 50	1.75
315139	1GASTONA	5.72	80 50	5.72
315141	1GASTONB	5.72	80 50	5.72
315158	1KERR 1	0.34	80 50	0.34
315159	1KERR 2	0.96	80 50	0.96
315160	1KERR 3	0.96	80 50	0.96
315161	1KERR 4	0.96	80 50	0.96
315162	1KERR 5	0.96	80 50	0.96
315163	1KERR 6	0.96	80 50	0.96
315164	1KERR 7	0.96	80 50	0.96
315293	1DOMTR9	3.43	Adder	4.04
315294	1DOMTR10	4.2	Adder	4.94
315601	1CONETOE2SOL	1.19	80 50	1.19
315602	1HOLLOMANSOL	1.19	80 50	1.19
315606	3AA2-053SOLA	2.07	80 50	2.07
315607	3AA1-063SOLA	1.75	80 50	1.75
315608	3AA2-088SOLA	0.9	80 50	0.9
316020	AB2-059 C OP	1.64	80 50	1.64
316087	AB2-174 C	2.48	80 50	2.48
316096	AB2-100 C1	2.83	80 50	2.83
316098	AB2-100 C2	2.83	80 50	2.83
316103	AB2-015 C	4.04	Adder	4.75
316129	AC1-054 C	8.35	80 50	8.35
316131	AB2-060 C	1.13	80 50	1.13
316140	AB2-099 C (Suspended)	0.53	80 50	0.53
920591	AA2-165 C	0.17	80 50	0.17
922922	AB1-081 C OP	1.39	80 50	1.39
923262	AB1-132 C OP	26.61	80 50	26.61
923991	AB2-040 C O1	14.99	80 50	14.99
924301	AB2-077 C O1	1.53	80 50	1.53
924311	AB2-078 C O1	1.53	80 50	1.53
924321	AB2-079 C O1	1.53	80 50	1.53
925121	AB2-169 C	0.68	80 50	0.68
925591	AC1-034 C	6.47	80 50	6.47
925611	AC1-036 C	0.14	80 50	0.14
926070	AC1-086 C	39.19	80 50	39.19
926201	AC1-098 C (Suspended)	6.67	80 50	6.67
926211	AC1-099 C (Suspended)	2.23	80 50	2.23
927024	AC1-189 C	7.01	80 50	7.01
927145	AC1-208 C (Suspended)	10.58	80 50	10.58
932631	AC2-084 C	9.51	80 50	9.51
933991	AD1-023 C	8.07	80 50	8.07

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
934331	AD1-057 C O1	13.79	80 50	13.79
934521	AD1-076 C	25.27	Adder	29.73
936265	AD2-033 C	8.24	80 50	8.24
936361	AD2-046 C O1	7.56	80 50	7.56
936401	AD2-051 C O1	7.35	80 50	7.35
936485	AD2-063 C	10.62	80 50	10.62
938221	AE1-035 C	0.3	80 50	0.3
939181	AE1-148 C	7.43	80 50	7.43
940571	AE2-044 C	4.24	80 50	4.24
940661	AE2-053 O1	2.75	80 50	2.75
942451	AE2-258	1.82	80 50	1.82
942471	AE2-260 C O1	44.64	80 50	44.64
943171	AE2-346 C	1.27	80 50	1.27
943911	AF1-059	25.43	80 50	25.43
944141	AF1-082	2.72	80 50	2.72
946281	AF1-292 C	3.68	80 50	3.68
957521	AF2-046 C	15.07	80 50	15.07
957861	AF2-080 C	6.37	80 50	6.37
959311	AF2-222 C	8.22	Adder	9.67
960081	AF2-299 C	6.2	80 50	6.2
961091	AF2-400 C	0.22	Adder	0.26
961671	AG1-007 C	0.84	80 50	0.84
961941	AG1-037 C	0.45	80 50	0.45
962331	AG1-082 C	1.82	80 50	1.82
962341	AG1-083 C	1.82	80 50	1.82
962351	AG1-084 C	1.59	80 50	1.59
962361	AG1-085 C	1.59	80 50	1.59
963301	AG1-179 C	10.3	80 50	10.3
963311	AG1-180	5.02	80 50	5.02
963321	AG1-181 C O1	10.55	80 50	10.55
963361	AG1-185 O1	5.11	80 50	5.11
964111	AG1-272 C	1.55	80 50	1.55
964121	AG1-273 C	1.55	80 50	1.55
964131	AG1-274 C	1.55	80 50	1.55
964241	AG1-285 C O1	9.09	80 50	9.09
964501	AG1-313 C O1	5.82	80 50	5.82
964801	AG1-343 C	5.27	80 50	5.27
965191	AG1-384 C	1.55	80 50	1.55
965291	AG1-394 C	1.81	80 50	1.81
965451	AG1-413 C O1	10.69	80 50	10.69
965591	AG1-427 C	8.58	80 50	8.58
965601	AG1-428 C O2	8.6	80 50	8.6
965691	AG1-437 C O1	6.76	80 50	6.76
965701	AG1-438 C O1	6.76	80 50	6.76
965711	AG1-439 C O1	20.49	80 50	20.49
965721	AG1-440 C	7.07	80 50	7.07
965731	AG1-441 C	7.07	80 50	7.07
965741	AG1-442 O1	3.95	80 50	3.95
965751	AG1-443 O1	3.95	80 50	3.95
965761	AG1-444 O1	10.93	80 50	10.93
965771	AG1-445	4.09	80 50	4.09
965781	AG1-446	4.09	80 50	4.09

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
966621	AG1-532 C	3.35	80 50	3.35
966801	AG1-551 C	1.62	80 50	1.62
966811	AG1-552 C	3.12	80 50	3.12
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	1.9889	Confirmed LTF	1.9889
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.5347	LTF/CBM	0.5347
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	33.1138	LTF/CBM	33.1138
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	11.0476	LTF/CBM	11.0476
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	11.3984	LTF/CBM	11.3984
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	3.0114	Confirmed LTF	3.0114
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	2.6628	Confirmed LTF	2.6628
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.1401	Confirmed LTF	0.1401
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.5406	Confirmed LTF	0.5406
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	1.5678	Confirmed LTF	1.5678
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.3303	Confirmed LTF	0.3303
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0963	Confirmed LTF	0.0963
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	2.1398	Confirmed LTF	2.1398
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	0.2633	Confirmed LTF	0.2633

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
173776200	314568	3EARLEYS	DVP	314569	6EARLEYS	DVP	2	DVP_P4-2: 201262	breaker	208.0	144.25	145.05	AC	2.52

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
313506	AB1-173 C OP	3.21	Adder	3.78
313719	3CHESTNUT	0.86	80 50	0.86
314539	3UNCAMP	3.54	80 50	3.54
314541	3WATKINS	0.51	80 50	0.51
314572	3EMPORIA	0.15	Adder	0.18
314582	3KELFORD	1.01	80 50	1.01
314589	3MURPHYS	0.16	80 50	0.16
315115	1S HAMPT1	1.15	80 50	1.15
315126	1ROARAP2	1.09	80 50	1.09
315128	1ROARAP4	1.04	80 50	1.04
315293	1DOMTR9	-2.56	Adder	-3.01
315294	1DOMTR10	-3.14	Adder	-3.69
315606	3AA2-053SOLA	1.88	80 50	1.88
315607	3AA1-063SOLA	1.3	80 50	1.3
315608	3AA2-088SOLA	1.15	80 50	1.15
316088	AB2-174 E	2.77	Adder	3.26
316103	AB2-015 C	5.83	80 50	5.83
316104	AB2-015 E	4.78	80 50	4.78
316129	AC1-054 C	3.34	Adder	3.93
316140	AB2-099 C (Suspended)	1.76	80 50	1.76
316141	AB2-099 E (Suspended)	0.76	80 50	0.76
900672	V4-068 E	0.55	80 50	0.55
917332	Z2-043 E	2.89	80 50	2.89
917342	Z2-044 E	0.25	Adder	0.29
918492	AA1-063AE OP	3.74	80 50	3.74
919692	AA2-053 E OP	4.71	80 50	4.71
919702	AA2-057 E OP	2.47	80 50	2.47
920042	AA2-088 E OP	11.43	80 50	11.43
920591	AA2-165 C	0.12	80 50	0.12
920592	AA2-165 E	0.34	80 50	0.34
923573	AB1-173 E OP	0.5	Adder	0.59
923991	AB2-040 C O1	3.5	Adder	4.12
923992	AB2-040 E O1	2.86	Adder	3.36
925785	AC1-054 E	1.54	Adder	1.81
926201	AC1-098 C (Suspended)	9.37	80 50	9.37
926202	AC1-098 E (Suspended)	5.58	80 50	5.58
926211	AC1-099 C (Suspended)	3.14	80 50	3.14
926212	AC1-099 E (Suspended)	1.84	80 50	1.84
927145	AC1-208 C (Suspended)	9.0	80 50	9.0
927146	AC1-208 E (Suspended)	3.98	80 50	3.98
932631	AC2-084 C	13.36	80 50	13.36

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932632	AC2-084 E	6.58	80 50	6.58
938771	AE1-103 C	1.49	Adder	1.75
938772	AE1-103 E	2.06	Adder	2.42
943171	AE2-346 C	4.23	80 50	4.23
943172	AE2-346 E	1.81	80 50	1.81
957521	AF2-046 C	34.55	80 50	34.55
957522	AF2-046 E	17.38	80 50	17.38
961091	AF2-400 C	0.31	80 50	0.31
961092	AF2-400 E	0.52	80 50	0.52
961941	AG1-037 C	1.51	80 50	1.51
961942	AG1-037 E	1.01	80 50	1.01
962331	AG1-082 C	6.05	80 50	6.05
962332	AG1-082 E	4.03	80 50	4.03
962341	AG1-083 C	6.05	80 50	6.05
962342	AG1-083 E	4.03	80 50	4.03
962351	AG1-084 C	5.96	80 50	5.96
962352	AG1-084 E	3.97	80 50	3.97
962361	AG1-085 C	5.96	80 50	5.96
962362	AG1-085 E	3.97	80 50	3.97
964501	AG1-313 C O1	8.23	80 50	8.23
964502	AG1-313 E O1	5.49	80 50	5.49
964801	AG1-343 C	7.47	80 50	7.47
964802	AG1-343 E	5.87	80 50	5.87
965291	AG1-394 C	2.32	80 50	2.32
965292	AG1-394 E	1.55	80 50	1.55
965742	AG1-442 BAT	3.5	80 50	3.5
965752	AG1-443 BAT	3.5	80 50	3.5
966811	AG1-552 C	1.66	80 50	1.66
966812	AG1-552 E	0.71	80 50	0.71
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.0965	Confirmed LTF	0.0965
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.037	LTF/CBM	0.037
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	2.0547	LTF/CBM	2.0547
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	0.7447	LTF/CBM	0.7447
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.7772	LTF/CBM	0.7772
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.1461	Confirmed LTF	0.1461
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	0.0945	LTF/CMTX NF	0.0945
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.1797	Confirmed LTF	0.1797
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.0105	Confirmed LTF	0.0105
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0386	Confirmed LTF	0.0386
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	0.1076	Confirmed LTF	0.1076
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.0437	Confirmed LTF	0.0437

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	0.6017	LTF/CMTX NF	0.6017
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0068	Confirmed LTF	0.0068
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.1474	Confirmed LTF	0.1474
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	0.0181	Confirmed LTF	0.0181

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
173776244	314568	3EARLEYS	DVP	314569	6EARLEYS	DVP	1	DVP_P4-2: 217162	breaker	231.7	104.54	105.6	AC	2.59

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
313506	AB1-173 C OP	2.41	Adder	2.84
313719	3CHESTNUT	0.79	80 50	0.79
314539	3UNCAMP	3.56	80 50	3.56
314541	3WATKINS	0.51	80 50	0.51
314582	3KELFORD	1.03	80 50	1.03
314589	3MURPHYS	0.17	80 50	0.17
315115	1S HAMPT1	1.14	80 50	1.14
315126	1ROARAP2	0.89	80 50	0.89
315128	1ROARAP4	0.85	80 50	0.85
315606	3AA2-053SOLA	1.74	80 50	1.74
315607	3AA1-063SOLA	1.17	80 50	1.17
315608	3AA2-088SOLA	1.13	80 50	1.13
316103	AB2-015 C	5.81	80 50	5.81
316104	AB2-015 E	4.77	80 50	4.77
316129	AC1-054 C	2.72	Adder	3.2
316140	AB2-099 C (Suspended)	1.81	80 50	1.81
316141	AB2-099 E (Suspended)	0.78	80 50	0.78
900672	V4-068 E	0.55	80 50	0.55
917332	Z2-043 E	2.96	80 50	2.96
917342	Z2-044 E	0.22	Adder	0.26
918492	AA1-063AE OP	3.36	80 50	3.36
919692	AA2-053 E OP	4.35	80 50	4.35
919702	AA2-057 E OP	2.28	80 50	2.28
920042	AA2-088 E OP	11.19	80 50	11.19
920591	AA2-165 C	0.11	80 50	0.11
920592	AA2-165 E	0.31	80 50	0.31
923573	AB1-173 E OP	0.38	Adder	0.45
923991	AB2-040 C O1	2.63	Adder	3.09
923992	AB2-040 E O1	2.15	Adder	2.53
925785	AC1-054 E	1.25	Adder	1.47
926201	AC1-098 C (Suspended)	9.24	80 50	9.24
926202	AC1-098 E (Suspended)	5.51	80 50	5.51
926211	AC1-099 C (Suspended)	3.1	80 50	3.1
926212	AC1-099 E (Suspended)	1.82	80 50	1.82
927145	AC1-208 C (Suspended)	8.42	80 50	8.42
927146	AC1-208 E (Suspended)	3.72	80 50	3.72
932631	AC2-084 C	13.18	80 50	13.18
932632	AC2-084 E	6.49	80 50	6.49
938771	AE1-103 C	1.52	Adder	1.79
938772	AE1-103 E	2.1	Adder	2.47
943171	AE2-346 C	4.35	80 50	4.35

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943172	AE2-346 E	1.87	80 50	1.87
957521	AF2-046 C	35.03	80 50	35.03
957522	AF2-046 E	17.62	80 50	17.62
961091	AF2-400 C	0.31	80 50	0.31
961092	AF2-400 E	0.51	80 50	0.51
961941	AG1-037 C	1.55	80 50	1.55
961942	AG1-037 E	1.04	80 50	1.04
962331	AG1-082 C	6.22	80 50	6.22
962332	AG1-082 E	4.14	80 50	4.14
962341	AG1-083 C	6.22	80 50	6.22
962342	AG1-083 E	4.14	80 50	4.14
962351	AG1-084 C	6.15	80 50	6.15
962352	AG1-084 E	4.1	80 50	4.1
962361	AG1-085 C	6.15	80 50	6.15
962362	AG1-085 E	4.1	80 50	4.1
964501	AG1-313 C O1	8.02	80 50	8.02
964502	AG1-313 E O1	5.35	80 50	5.35
964801	AG1-343 C	7.36	80 50	7.36
964802	AG1-343 E	5.78	80 50	5.78
965291	AG1-394 C	2.27	80 50	2.27
965292	AG1-394 E	1.51	80 50	1.51
965742	AG1-442 BAT	2.36	Adder	2.78
965752	AG1-443 BAT	2.36	Adder	2.78
966811	AG1-552 C	1.36	80 50	1.36
966812	AG1-552 E	0.58	80 50	0.58
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.064	Confirmed LTF	0.064
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0237	LTF/CBM	0.0237
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	1.3624	LTF/CBM	1.3624
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	0.4445	LTF/CBM	0.4445
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.4922	LTF/CBM	0.4922
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.0969	Confirmed LTF	0.0969
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	0.0734	LTF/CMTX NF	0.0734
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.1153	Confirmed LTF	0.1153
LTFEXP_LGE-0012019	LTFEXP_LGE-0012019->LTFIMP_LGE-0012019	0.0073	Confirmed LTF	0.0073
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0237	Confirmed LTF	0.0237
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	0.0665	Confirmed LTF	0.0665
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.0343	Confirmed LTF	0.0343
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	0.4674	LTF/CMTX NF	0.4674
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0042	Confirmed LTF	0.0042
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.0949	Confirmed LTF	0.0949

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	0.0109	Confirmed LTF	0.0109

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
AA1-063	Huntsville (Cabin Creek) 69kV	Withdrawn
AA1-063A	Carolina–Seaboard 115kV	In Service
AA2-053	Carolina-Jackson 115kV	In Service
AA2-057	Hornertown-Whitakers 115kV	In Service
AA2-074	CPLP-PJM	Confirmed
AA2-088	Boykins-Handsome 115kV	In Service
AA2-165	Hornertown-Whitakers 115kV	In Service
AB1-081	Anaconda-Mayo Dunbar 115kV	In Service
AB1-132	Thelma 230kV	Engineering and Procurement
AB1-173	Brink-Trego 115kV	Engineering and Procurement
AB2-015	Franklin 115kV	Engineering and Procurement
AB2-040	Brink 115kV	Engineering and Procurement
AB2-043	Chase City 115kV	In Service
AB2-059	Benson-Dunbar 115kV	In Service
AB2-060	Chase City-Lunenburg 115kV	In Service
AB2-077	Buggs Island-Chase City 115kV	Engineering and Procurement
AB2-078	Buggs Island-Chase City 115kV	Engineering and Procurement
AB2-079	Buggs Island-Chase City 115kV	Engineering and Procurement
AB2-099	Ahoskie 34.5kV	Suspended
AB2-100	Clubhouse-Lakeview 230kV	Partially in Service - Under Construction
AB2-169	Pantago-Five Points 115kV	Partially in Service - Under Construction
AB2-174	Emporia-Trego 115kV	In Service
AC1-034	Heartsease DP - Mayo Dunbar 115kV	Engineering and Procurement
AC1-036	Twittys Creek 34.5kV	In Service
AC1-054	Kerr Dam–Eatons Ferry 115 kV	Under Construction
AC1-056	PJM-AMIL	Confirmed
AC1-086	Thelma 230kV	Active
AC1-098	Dawson-South Justice 115kV	Suspended
AC1-099	Dawson-South Justice 115kV	Suspended
AC1-189	Chinquapin-Everetts 230kV	Active
AC1-208	Cox-Whitakers 115kV	Suspended
AC2-084	Dawson-South Justice 115kV	Active
AD1-023	Cashie-Trowbridge 230 kV	Active
AD1-057	Hornertown-Hathaway 230 kV	Active

Queue Number	Project Name	Status
AD1-076	Trowbridge 230 kV	Active
AD2-033	Chase City-Lunenburg 115 kV	Active
AD2-046	Boydton DP-Kerr Dam 115 kV	Active
AD2-051	Earleys – Northampton 230kV	Active
AD2-063	Central-Chase City 115kV	Active
AE1-035	Earleys 230 kV	Partially in Service - Under Construction
AE1-103	Holland-Union Camp 115 kV	
AE1-148	Kerr Dam-Ridge Rd 115 kV	Active
AE2-044	Anaconda-Dunbar 115 kV	Active
AE2-053	Kerr Dam-Ridge Road 115 kV	Active
AE2-258	Chase City 115 kV	Active
AE2-260	Clubhouse 230 kV	Active
AE2-346	Ahoskie 34.5 kV	Active
AF1-059	Brodnax-South Hill 115 kV	Active
AF1-082	Heartsease-Mayo Dunbar DP	Active
AF1-292	Fields 34.5kV	Active
AF2-046	Tunis-Mapleton 115 kV	Active
AF2-080	Chinquapin-Everetts 230 kV	Active
AF2-222	Madisonville DP-Twitty's Creek 115 kV	Active
AF2-299	Fields 34.5 kV	Active
AF2-400	Franklin 13.2 kV	Engineering and Procurement
AG1-007	Tar River 12.5 kV	
AG1-027	Suffolk-Holland 115 kV	Active
AG1-037	Ahoskie 34.5 kV	Active
AG1-082	Ahoskie 34.5 kV	Active
AG1-083	Ahoskie 34.5 kV	Active
AG1-084	Earlys 34.5 kV	Active
AG1-085	Earlys 34.5	Active
AG1-179	Brunswick-Gasburg 69 kV	Active
AG1-180	Brunswick-Gasburg 69 kV	Active
AG1-181	Pamplin-Chase City 115 kV	Active
AG1-185	Pamplin-Chase City 115 kV	Active
AG1-272	Twitty's Creek 115 kV	Active
AG1-273	Twitty's Creek 115 kV	Active
AG1-274	Twitty's Creek 115 kV	Active
AG1-285	Chase City-Central 115 kV	Active
AG1-313	Jackson DP-Occoneechee 115 kV	Active
AG1-343	Boykins-Murphy 115 kV	Active
AG1-384	Twitty's Creek 115 kV	Active
AG1-394	Boykins 34.5 kV	Active
AG1-413	South Hill-Bordnax 115 kV	Active
AG1-427	Chase City-Drakes Branch 115 kV	Active
AG1-428	Danieltown DP-Brunswick 69 kV	Active
AG1-437	Cashie-Earleys 230 kV	Active
AG1-438	Cashie-Earleys 230 kV	Active
AG1-439	Chinquapin 230 kV	Active
AG1-440	Palmer Springs 115 kV	Active
AG1-441	Palmer Springs 115 kV	Active
AG1-442	Cashie-Earleys 230 kV	Active
AG1-443	Cashie-Earleys 230 kV	Active
AG1-444	Chinquapin 230 kV	Active
AG1-445	Palmer Spring 115 kV	Active

Queue Number	Project Name	Status
AG1-446	Palmer Springs 115 kV	Active
AG1-532	Fields 34.5 kV	Active
AG1-551	Parmelee 12.5 kV	Active
AG1-552	Carolina 13.2 kV	Active
V4-068	Murphy's 34.5kV	In Service
Z2-043	Kelford 34.5kV	In Service
Z2-044	Whitakers 34.5kV	In Service

11.9 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-3: 6EARLEYS-TX#3	CONTINGENCY 'DVP_P1-3: 6EARLEYS-TX#3' OPEN BRANCH FROM BUS 314568 TO BUS 314569 CKT 1 /* 3EARLEYS 115.00 - 6EARLEYS 230.00 END
DVP_P1-2: LN 108-A	CONTINGENCY 'DVP_P1-2: LN 108-A' OPEN BRANCH FROM BUS 314558 TO BUS 964800 CKT 1 /* 3BOYKINS 115.00 - AG1- 343 TAP 115.00 END
DVP_P4-2: 201262	CONTINGENCY 'DVP_P4-2: 201262' /* EARLEYS 230 KV /* OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /* 6NORTHAMPTON230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 936400 TO BUS 314569 CKT 1 /* AD2-051 TAP 230.00 - 6EARLEYS 230.00 /* OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 6NORTHAMPTON230.00 - 6ROA VAL 230.00 /* OPEN BUS 314266 /* ISLAND: 6NORTHAMPTON230.00 OPEN BRANCH FROM BUS 314568 TO BUS 314569 CKT 1 /* 3EARLEYS 115.00 - 6EARLEYS 230.00 END
DVP_P1-3: 6EARLEYS-TX#4	CONTINGENCY 'DVP_P1-3: 6EARLEYS-TX#4' OPEN BRANCH FROM BUS 314568 TO BUS 314569 CKT 2 /* 3EARLEYS 115.00 - 6EARLEYS 230.00 END

Contingency Name	Contingency Definition
DVP_P4-2: WT2171	CONTINGENCY 'DVP_P4-2: WT2171' /* EARLEYS 230 KV OPEN BRANCH FROM BUS 313709 TO BUS 313710 CKT 1 /* 6HOLLOMAN 230.00 - 1HOLLOMAN 34.500 OPEN BRANCH FROM BUS 313709 TO BUS 313710 CKT 2 /* 6HOLLOMAN 230.00 - 1HOLLOMAN 34.500 OPEN BRANCH FROM BUS 313709 TO BUS 314569 CKT Z1 /* 6HOLLOMAN 230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 313710 TO BUS 315602 CKT 1 /* 1HOLLOMAN 34.500 - 1HOLLOMAN 34.500 OPEN BUS 313709 /* ISLAND: 6HOLLOMAN 230.00 OPEN BUS 313710 /* ISLAND: 1HOLLOMAN 34.500 OPEN BUS 315602 /* ISLAND: 1HOLLOMAN 34.500 OPEN BUS 918512 /* ISLAND: 1HOLLOMAN 34.500 OPEN BRANCH FROM BUS 314568 TO BUS 314569 CKT 1 /* 3EARLEYS 115.00 - 6EARLEYS 230.00 END
DVP_P1-2: LN 68-B	CONTINGENCY 'DVP_P1-2: LN 68-B' OPEN BRANCH FROM BUS 961850 TO BUS 314536 CKT 1 /* 3COPELD DP 115.00 - 3SUFFOLK 115.00 END
Base Case	
DVP_P4-2: 217162	CONTINGENCY 'DVP_P4-2: 217162' /* EARLEYS 230 KV OPEN BRANCH FROM BUS 313709 TO BUS 313710 CKT 1 /* 6HOLLOMAN 230.00 - 1HOLLOMAN 34.500 OPEN BRANCH FROM BUS 313709 TO BUS 313710 CKT 2 /* 6HOLLOMAN 230.00 - 1HOLLOMAN 34.500 OPEN BRANCH FROM BUS 313709 TO BUS 314569 CKT Z1 /* 6HOLLOMAN 230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 313710 TO BUS 315602 CKT 1 /* 1HOLLOMAN 34.500 - 1HOLLOMAN 34.500 OPEN BUS 313709 /* ISLAND: 6HOLLOMAN 230.00 OPEN BUS 313710 /* ISLAND: 1HOLLOMAN 34.500 OPEN BUS 315602 /* ISLAND: 1HOLLOMAN 34.500 OPEN BUS 918512 /* ISLAND: 1HOLLOMAN 34.500 OPEN BRANCH FROM BUS 314568 TO BUS 314569 CKT 2 /* 3EARLEYS 115.00 - 6EARLEYS 230.00 END

12 Light Load Analysis

The Queue Project AG1-037 was evaluated as a 1.6 MW injection at the Ahoskie 115 kV substation in the Dominion area. Project AG1-037 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-037 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)

None

12.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies)

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)

None

12.4 Potential Congestion due to Local Energy Deliverability

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

None

12.5 System Reinforcements

None

13 Short Circuit Analysis

Short Circuit Analysis to be completed as part of the Facilities Study Phase due to impact from System Reinforcement n7541.

13.1 System Reinforcements - Short Circuit

To be determined as part of Facilities Study Phase..

14 Stability and Reactive Power

PJM does not require a Stability Analysis for this project.

15 Affected Systems

15.1 Duke Energy Progress

This project has been identified by PJM as having greater than 3% DFAX contribution to flow gates in the Duke Energy Progress area. Duke Energy Progress is evaluating the need for affected system study. Results will be provided in the Facilities phase. (Reference PJM Manual 14A Section 4.2.4 for Affected System Coordination.)

15.2 Carolina Power and Light (CPL)

This project has been identified by PJM as having greater than 3% DFAX contribution to flow gates in the Carolina Power and Light (CPL) area. Carolina Power and Light (CPL) area is evaluating the need for affected system study. Results will be provided in the Facilities phase. (Reference PJM Manual 14A Section 4.2.4 for Affected System Coordination.)

16 Attachment 1: One Line Diagram

