Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-053

KERR DAM-RIDGE ROAD 115 KV

20 MW Capacity / 20 MW Energy

July, 2019

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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 Virginia Electric and Power Company (VEPCO).

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.

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

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

3 General

The Interconnection Customer (IC), has proposed a Storage generating facility located in Mecklenburg County, Virginia. The installed facilities will have a total capability of 20 MW with 20 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 09/15/2021. This study does not imply a TO commitment to this in-service date.

Queue Number	AE2-053
Project Name	KERR DAM-RIDGE ROAD 115 KV
Interconnection Customer	
State	Virgina
County	Mecklenburg
Transmission Owner	Dominion
MFO	20
MWE	20
MWC	20
Fuel	Storage
Basecase Study Year	2022

3.1 Primary Point of Interconnection

AE2-053 will interconnect with the Dominion transmission system at the AE1-148 switching station which is a tap of the Kerr Dam to Ridge Road 115 kV line. This aligns with the AE1-148 project's primary point of interconnection.

3.2 Secondary Point of Interconnection

AE2-053 will interconnect with the Dominion transmission system at the AE1-148 switching station which is a tap of the Boydton DP - Kerr Dam 115 kV line. This aligns with the AE1-148 project's secondary point of interconnection.

3.3 Cost Summary

The AE2-053 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$ N/A
Direct Connection Network Upgrade	$ N/A

Description	Total Cost
Non Direct Connection Network Upgrades	$
Total Costs	$ 0

In addition, the AE2-053 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	**$30,423,000**

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

The Feasibility Study is used to make a preliminary determination of the type and scope of Attachment Facilities, Local Upgrades, and Network Upgrades that will be necessary to accommodate the Interconnection Request and to provide the Interconnection Customer a preliminary estimate of the time that will be required to construct any necessary facilities and upgrades and the Interconnection Customer's cost responsibility. The System Impact Study provides refined and comprehensive estimates of cost responsibility and construction lead times for new facilities and system upgrades. Facilities Studies will include, commensurate with the degree of engineering specificity as provided in the Facilities Study Agreement, good faith estimates of the cost, determined in accordance with Section 217 of the Tariff,

(a) to be charged to each affected New Service Customer for the Facilities and System Upgrades that are necessary to accommodate this queue project;

(b) the time required to complete detailed design and construction of the facilities and upgrades; and

(c) a description of any site-specific environmental issues or requirements that could reasonably be anticipated to affect the cost or time required to complete construction of such facilities and upgrades.

4 Transmission Owner Scope of Work

Dominion assessed the impact of the proposed Queue Project AE2-053 was evaluated as a 20.0 MW Capacity (20.0 MW energy) injection at the AE1-148 substation in the Dominion Transmission System, for compliance with NERC Reliability Criteria on Dominion Transmission System. The system was assessed using the summer 2022 AE2 case provided to Dominion by PJM. When performing a generation analysis, Dominion's main analysis will be load flow study results under single contingency (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 Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) 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.

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of the AE2-053 generation project to the Dominion Transmission System is detailed in the following sections. The associated one-line with the generation project attachment facilities and primary direct and non-direct connection are shown in Attachment 1.

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 phases. 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.

5 Attachment Facilities and Direct Connection Cost Estimates

AE2-053 will utilize the interconnection of the AE1-148 project.

6 Non-Direct Connection Cost Estimate

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

Description	Total Cost
Add additional 230/115 kV transformer at Clubhouse substation.\	$6,000,000
Add additional 230/115 kV transformer at Carolina substation.	$18,000,000
For DEV portion, rebuild 4.7 miles of 115 kV Line 45 from Kerr Dam to GW King Tap	$6,123,000
Replace Wavetraps at Milothian and North Anna 500kV substations	$300,000
Total Non-Direct Connection Facility Costs	**$30,423,000**

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

8 Transmission Owner Analysis

8.1 Power Flow Analysis

PJM performed a power flow analysis of the transmission system using a 2022 summer peak load flow model and the results were verified by Dominion. Additionally, Dominion performed an analysis of its transmission system. At the Primary POI, the AE2-053 project contributes to overloads on the Dominion transmission system as shown in the "Network Impact – Primary Point of Interconnection" section of the report. The estimated cost of system reinforcements necessary to mitigate these overloads is also provided. At the Secondary POI, the AE2-053 project contributes to overloads on the Dominion transmission system as shown in the "Network Impacts – Secondary Point of Interconnection" section of the report. Cost estimates are not provided for the secondary POI.

8.2 Short Circuit Analysis

PJM performed a short circuit analysis and the results were verified by Dominion. The connection of AE2-053 project to the system does not result in any newly overdutied circuit breakers on the Dominion transmission system and does not have a significant fault current contribution to existing overdutied circuit breakers

8.3 Stability Analysis

PJM will complete a dynamic stability analysis, if necessary, as part of the System Impact Study. The results of this analysis will be reviewed by Dominion. Should stability concerns be identified in PJM's study, Dominion will develop appropriate system reinforcement(s) and included the estimated cost of any reinforcement(s) in Dominion's System Impact Study report.

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 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 Dominion Requirements

See Section 3.4.6 “Metering and Telecommunications” of Dominion’s “Dominion’s Facility Interconnection Requirements” document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access.

11 Network Impacts – Primary Point of Interconnection

The Queue Project AE2-053 was evaluated as a 20.0 MW (Capacity 20.0 MW) injection at the AE1-148 switching station which is a tap of the Kerr Dam to Ridge Road 115 kV line in the Dominion area. Project AE2-053 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-053 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

11.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1715604	313825	3PLYWOOD	DVP	314696	3SEDGE HILL	DVP	1	DVP_P1-2: LN 45	single	141.0	97.24	99.43	DC	3.1
7817093	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	Base Case	single	176.81	89.18	90.37	DC	2.11
7817418	314563	6CLUBHSE	DVP	940480	AE2-033 TAP	DVP	1	DVP_P1-2: LN 2060	single	598.78	99.59	100.1	DC	3.1
7817419	314563	6CLUBHSE	DVP	940480	AE2-033 TAP	DVP	1	DVP_P1-2: LN 2012	single	598.78	99.53	100.04	DC	3.1
7817407	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-2: LN 235-A-A	single	182.64	87.59	89.18	DC	2.9
7817408	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-3: 6FARMVIL-TX#4	single	182.64	73.21	74.85	DC	2.99
7817221	314914	8MDLTHAN	DVP	314918	8NO ANNA	DVP	1	DVP_P1-2: LN 570	single	2442.12	99.97	100.03	DC	3.37
7817222	314914	8MDLTHAN	DVP	314918	8NO ANNA	DVP	1	DVP_P1-2: LN 6002_FSA	single	2442.12	99.96	100.03	DC	3.37

11.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1714718	314266	6NORTHAMPTON	DVP	314569	6EARLEYS	DVP	1	DVP_P4-2: 23872	breaker	658.0	99.86	100.0	DC	1.98
7579436	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	1	DVP_P4-2: H2T2068	breaker	264.5	87.11	88.22	DC	2.92
7579477	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P4-2: 3202	breaker	279.1	83.84	85.06	DC	3.4
7579478	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P4-2: H1T2068	breaker	279.1	82.34	83.39	DC	2.92

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	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
1714366	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P4-2: 102952	breaker	288.6	145.78	146.27	DC	3.12
1715153	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P1-2: LN 1029-A	single	239.89	108.12	109.26	DC	2.75
7817432	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P1-3: 6CLUBHSE-TX#1	single	239.89	105.8	107.26	DC	3.49
1714205	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P4-6: CAROLIN T122	breaker	208.6	199.16	200.43	DC	2.63
1714206	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P4-2: 2202	breaker	208.6	194.67	195.79	DC	2.32

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
1714898	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-2: LN 130-A	single	182.64	122.27	123.28	DC	1.84
1714899	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-3: 6CAROLNA-TX#4	single	182.64	118.11	119.65	DC	2.81
1714639	314563	6CLUBHSE	DVP	314562	3CLUBHSE	DVP	1	DVP_P4-2: 239T2141	breaker	208.6	108.26	109.4	DC	2.38
1714299	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P4-6: CAROLIN T122	breaker	199.0	154.67	157.92	DC	6.45
1714300	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P4-2: 2202	breaker	199.0	145.65	148.5	DC	5.64
1715306	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 296-B	single	199.0	117.89	120.28	DC	4.76
1715309	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	Base Case	single	199.0	106.33	108.65	DC	4.62
1715804	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P7-1: LN 22-90-A	tower	199.0	159.8	163.03	DC	6.42
1715805	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P7-1: LN 22-90-B	tower	199.0	148.3	151.54	DC	6.42
7817749	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 6002_FSA	single	199.0	118.42	120.72	DC	4.58

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	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
1715601	313825	3PLYWOOD	DVP	314696	3SEDGE HILL	DVP	1	DVP_P1-2: LN 33-B	operation	141.0	112.78	114.79	DC	3.06
1715152	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	Base Case	operation	226.54	122.01	122.52	DC	2.58
7817426	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P1-3: 6CLUBHSE-TX#1	operation	239.89	161.63	162.28	DC	3.49
1714897	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	Base Case	operation	176.81	139.83	141.02	DC	2.11
7817402	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-2: LN 235-A-A	operation	182.64	138.23	139.82	DC	2.9
7817409	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	Base Case	operation	176.81	74.79	75.25	DC	1.8
7817666	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	1	DVP_P1-3: 6FARMVIL-TX#5	operation	198.06	114.61	116.05	DC	2.87
1715729	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	1	DVP_P1-3: 6SEDGE HILL-TX#2	operation	226.73	93.71	95.22	DC	3.41
7818093	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P1-3: 6SEDGE HILL-TX#1	operation	256.06	82.71	84.04	DC	3.4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1715299	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 296-B	operation	199.0	141.03	143.42	DC	4.76
1715303	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	Base Case	operation	199.0	127.27	129.6	DC	4.62
1715730	314707	3MORAN	DVP	314691	3FARMVIL	DVP	1	DVP_P1-2: LN 84	operation	203.98	97.06	98.18	DC	2.29

11.5 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
7817407,7817408	4	3FARMVIL 115.0 kV - 6FARMVIL 230.0 kV Ckt 2	No Reinforcement Needed. Not a valid violation	$0
7579478,7579477	8	3SEDGE HILL 115.0 kV - 6SEDGE HILL 230.0 kV Ckt 2	No Reinforcement Needed. Not a valid violation	$0
1714639	10	6CLUBHSE 230.0 kV - 3CLUBHSE 115.0 kV Ckt 1	dom-010 (67) : Add additional 230/115 kV transformer at Clubhouse substation. Project Type : CON Cost : $6,000,000 Time Estimate : 16-18 Months	$6,000,000
7817093,1714205,1714206,1714899,1714898	2	3CLUBHSE 115.0 kV - 6CLUBHSE 230.0 kV Ckt 1		
1714718	6	6NORTHAMPTON 230.0 kV - 6EARLEYS 230.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	$0
1714366,7817432,1715153	9	3CAROLNA 115.0 kV - 6CAROLNA 230.0 kV Ckt 1	dom-020 (81) : Add additional 230/115 kV transformer at Carolina substation. Project Type : CON Cost : $6,000,000 Time Estimate : 16-18 Months	$18,000,000
1714299,7817749,1715805,1714300,1715804,1715309,1715306	11	3KERR 115.0 kV - 3GW KING TAP 115.0 kV Ckt 1	DVP dom-002 (53) : For DEV portion, rebuild 4.7 miles of 115 kV Line 45 from Kerr Dam to GW King Tap with 768 ACSS. Project Type : FAC Cost : $6,123,000 Time Estimate : 30-36 Months CPLE NonPJMArea (170) : The external (i.e. Non-PJM) Transmission Owner, CPLE, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : $0 Time Estimate : N/A Months	$6,123,000
7817221,7817222	5	8MDLTHAN 500.0 kV - 8NO ANNA 500.0 kV Ckt 1	dom-024 (86) : Replace Wavetraps at Milothian and North Anna 500kV substations Project Type : FAC Cost : $300,000 Time Estimate : 16-18 Months	$300,000
7817419,7817418	3	6CLUBHSE 230.0 kV - AE2-033 TAP 230.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	$0
7579436	7	3SEDGE HILL 115.0 kV - 6SEDGE HILL 230.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	$0
1715604	1	3PLYWOOD 115.0 kV - 3SEDGE HILL 115.0 kV Ckt 1	No Reinforcement Needed. Not a valid violation	$0
			TOTAL COST	$30,423,000

If “No Reinforcement Needed. Not a valid violation” was provided as the Upgrade Description for a facility in the System Reinforcements table then that facility met one of the following conditions:

a. The loading on the facility at your queue position was less than 100%; therefore, the facility is not yet overloaded, but may be overloaded by end of the AE2 queue.
b. The TO reviewed their ratings on the facility and determined that the current rating was greater than the rating in PJM’s model. This new rating was greater than the loading at your queue position making the violation invalid.
c. The TO reviewed the contingency and determined that contingency was not valid; therefore the violation is invalid. Any contingency corrections will be assessed and corrected in the AE2 impact study phase.

11.6 Flow Gate Details

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

11.6.1 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-2: LN 1029-A	CONTINGENCY 'DVP_P1-2: LN 1029-A' OPEN BRANCH FROM BUS 314562 TO BUS 314570 CKT 1 /* 3CLUBHSE 115.00 - 3METCATP 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314572 CKT 1 /* 3METCATP 115.00 - 3EMPORIA 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314588 CKT 1 /* 3METCATP 115.00 - 3METCALF 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 925170 CKT 1 /* 3EMPORIA 115.00 - AB2-174 TAP 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 314863 CKT 1 /* 3EMPORIA 115.00 - 3EMPOR_1 115.00 OPEN BUS 314570 /* ISLAND: 3METCATP 115.00 OPEN BUS 314572 /* ISLAND: 3EMPORIA 115.00 OPEN BUS 314588 /* ISLAND: 3METCALF 115.00 OPEN BUS 314863 /* ISLAND: 3EMPOR_1 115.00 END
DVP_P1-2: LN 2012	CONTINGENCY 'DVP_P1-2: LN 2012' OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /* 6NORTHAMPTON230.00 - 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 END

Contingency Name	Contingency Definition
DVP_P1-3: 6CAROLNA-TX#4	CONTINGENCY 'DVP_P1-3: 6CAROLNA-TX#4' OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END
DVP_P1-2: LN 130-A	CONTINGENCY 'DVP_P1-2: LN 130-A' OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314595 TO BUS 314600 CKT 1 /* 3PL HILL 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314600 TO BUS 937570 CKT 1 /* 3PLHITP 115.00 - AD2-169 TAP 115.00 OPEN BUS 314595 /* ISLAND: 3PL HILL 115.00 OPEN BUS 314600 /* ISLAND: 3PLHITP 115.00 END
DVP_P1-2: LN 235-A-A	CONTINGENCY 'DVP_P1-2: LN 235-A-A' OPEN BRANCH FROM BUS 313802 TO BUS 314268 CKT 1 /* 6PRINCE EDW 230.00 - 6BRIERY 230.00 OPEN BRANCH FROM BUS 313802 TO BUS 314692 CKT 1 /* 6PRINCE EDW 230.00 - 6FARMVIL 230.00 OPEN BRANCH FROM BUS 314268 TO BUS 943050 CKT 1 /* 6BRIERY 230.00 - AE2-328 TAP 230.00 OPEN BRANCH FROM BUS 314691 TO BUS 314692 CKT 1 /* 3FARMVIL 115.00 - 6FARMVIL 230.00 OPEN BUS 313802 /* ISLAND: 6PRINCE EDW 230.00 OPEN BUS 314268 /* ISLAND: 6BRIERY 230.00 END
DVP_P1-2: LN 33-B	CONTINGENCY 'DVP_P1-2: LN 33-B' OPEN BRANCH FROM BUS 926270 TO BUS 314696 CKT 1 /* AC1-105 TAP 115.00 - 3SEDGE HILL 115.00 END
DVP_P1-2: LN 45	CONTINGENCY 'DVP_P1-2: LN 45' OPEN BUS 304099 /* ISLAND: 3WARREN TAP 115.00 OPEN BUS 304100 /* ISLAND: 3HEND
DVP_P1-3: 6SEDGE HILL-TX#1	CONTINGENCY 'DVP_P1-3: 6SEDGE HILL-TX#1' OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 1 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END
DVP_P1-3: 6SEDGE HILL-TX#2	CONTINGENCY 'DVP_P1-3: 6SEDGE HILL-TX#2' OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 2 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END
DVP_P4-2: H1T2068	CONTINGENCY 'DVP_P4-2: H1T2068' /* SEDGE HILL 230 KV OPEN BRANCH FROM BUS 934610 TO BUS 314697 CKT 1 /* AD1-087 TAP 230.00 - 6SEDGE HILL 230.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 1 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END

Contingency Name	Contingency Definition
DVP_P1-2: LN 6002_FSA	CONTINGENCY 'DVP_P1-2: LN 6002_FSA' OPEN BRANCH FROM BUS 314935 TO BUS 918500 CKT 1 /* 8HERITAGE 500.00 - AA1-064 TAP 500.00 END
DVP_P4-2: 2202	CONTINGENCY 'DVP_P4-2: 2202' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* 3EATON F 115.00 - AC1-054 TAP 115.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BUS 314571 /* ISLAND: 3EATON F 115.00 OPEN BRANCH FROM BUS 313722 TO BUS 314559 CKT 1 /* 3OCCONEECHEE115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314559 CKT Z1 /* 3CAROL56_1 115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END
DVP_P4-2: 23872	CONTINGENCY 'DVP_P4-2: 23872' /* CARSON 230 KV OPEN BRANCH FROM BUS 314282 TO BUS 314435 CKT 1 /* 6CARSON 230.00 - 6SAPONY 230.00 OPEN BRANCH FROM BUS 314435 TO BUS 940480 CKT 1 /* 6SAPONY 230.00 - AE2-033 TAP 230.00 /* CONTINGENCY LINE ADDED FOR AE2 BUILD OPEN BUS 314435 /* ISLAND: 6SAPONY 230.00 OPEN BRANCH FROM BUS 314282 TO BUS 314902 CKT 1 /* 6CARSON 230.00 - 8CARSON 500.00 OPEN BUS 314455 /* 6CARSO_1 230.00 KV END
DVP_P4-6: CAROLIN T122	CONTINGENCY 'DVP_P4-6: CAROLIN T122' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 314559 TO BUS 315126 CKT 1 /* 3CAROLNA 115.00 - 1ROARAP2 14.400 OPEN BRANCH FROM BUS 314559 TO BUS 315128 CKT 1 /* 3CAROLNA 115.00 - 1ROARAP4 14.400 OPEN BUS 315126 /* ISLAND: 1ROARAP2 14.400 OPEN BUS 315128 /* ISLAND: 1ROARAP4 14.400 OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 313722 TO BUS 314559 CKT 1 /* 3OCCONEECHEE115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314559 CKT Z1 /* 3CAROL56_1 115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314578 CKT 1 /* 3CAROLNA 115.00 - 3HORNRTN 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1 /* 3CAROLNA 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 OPEN BUS 314559 /* 3CAROLNA 115.00 KV END
DVP_P1-2: LN 296-B	CONTINGENCY 'DVP_P1-2: LN 296-B' OPEN BRANCH FROM BUS 927250 TO BUS 314697 CKT 1 /* AC1-221 TAP T230.00 - 6SEDGE HILL 230.00 END

Contingency Name	Contingency Definition
DVP_P1-2: LN 84	CONTINGENCY 'DVP_P1-2: LN 84' OPEN BRANCH FROM BUS 314521 TO BUS 314713 CKT 1 /* 3PAMPL_1 115.00 - 3PAMPLIN 115.00 OPEN BRANCH FROM BUS 314691 TO BUS 314726 CKT 1 /* 3FARMVIL 115.00 - 3WILLIS 115.00 OPEN BRANCH FROM BUS 314713 TO BUS 314726 CKT 1 /* 3PAMPLIN 115.00 - 3WILLIS 115.00 OPEN BUS 314521 /* ISLAND: 3PAMPL_1 115.00 OPEN BUS 314726 /* ISLAND: 3WILLIS 115.00 END
DVP_P1-2: LN 570	CONTINGENCY 'DVP_P1-2: LN 570' OPEN BRANCH FROM BUS 304183 TO BUS 918500 CKT 1 /* 8WAKE 500 TT500.00 - AA1-064 TAP 500.00 OPEN BRANCH FROM BUS 314935 TO BUS 918500 CKT 1 /* 8HERITAGE 500.00 - AA1-064 TAP 500.00 OPEN BUS 918500 /* ISLAND: AA1-064 TAP 500.00 END
DVP_P7-1: LN 22-90-A	CONTINGENCY 'DVP_P7-1: LN 22-90-A' OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* 3EATON F 115.00 - AC1-054 TAP 115.00 OPEN BUS 314571 /* ISLAND: 3EATON F 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314584 CKT 1 /* 3FIVEFORKSDP115.00 - 3LITTLTN 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314673 CKT 1 /* 3FIVEFORKSDP115.00 - 3PALMERSPRNG115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1 /* 3CAROLNA 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314584 TO BUS 314585 CKT 1 /* 3LITTLTN 115.00 - 3L GASTN 115.00 OPEN BUS 314265 /* ISLAND: 3FIVEFORKSDP115.00 OPEN BUS 314584 /* ISLAND: 3LITTLTN 115.00 OPEN BUS 314585 /* ISLAND: 3L GASTN 115.00 END
DVP_P7-1: LN 22-90-B	CONTINGENCY 'DVP_P7-1: LN 22-90-B' OPEN BRANCH FROM BUS 925780 TO BUS 314702 CKT 1 /* AC1-054 TAP 115.00 - 3KERR 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314584 CKT 1 /* 3FIVEFORKSDP115.00 - 3LITTLTN 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314673 CKT 1 /* 3FIVEFORKSDP115.00 - 3PALMERSPRNG115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1 /* 3CAROLNA 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314584 TO BUS 314585 CKT 1 /* 3LITTLTN 115.00 - 3L GASTN 115.00 OPEN BUS 314265 /* ISLAND: 3FIVEFORKSDP115.00 OPEN BUS 314584 /* ISLAND: 3LITTLTN 115.00 OPEN BUS 314585 /* ISLAND: 3L GASTN 115.00 END
DVP_P1-3: 6FARMVIL-TX#4	CONTINGENCY 'DVP_P1-3: 6FARMVIL-TX#4' OPEN BRANCH FROM BUS 314691 TO BUS 314692 CKT 1 /* 3FARMVIL 115.00 - 6FARMVIL 230.00 END

Contingency Name	Contingency Definition
DVP_P1-3: 6FARMVIL-TX#5	CONTINGENCY 'DVP_P1-3: 6FARMVIL-TX#5' OPEN BRANCH FROM BUS 314691 TO BUS 314692 CKT 2 /* 3FARMVIL 115.00 - 6FARMVIL 230.00 END
DVP_P4-2: 102952	CONTINGENCY 'DVP_P4-2: 102952' /* CLUBHOUSE 115 KV OPEN BRANCH FROM BUS 314312 TO BUS 314325 CKT 1 /* 3JARRATT 115.00 - 3PURDYSW 115.00 OPEN BRANCH FROM BUS 314325 TO BUS 314562 CKT 1 /* 3PURDYSW 115.00 - 3CLUBHSE 115.00 OPEN BUS 314312 /* ISLAND: 3JARRATT 115.00 OPEN BUS 314325 /* ISLAND: 3PURDYSW 115.00 OPEN BRANCH FROM BUS 314562 TO BUS 314570 CKT 1 /* 3CLUBHSE 115.00 - 3METCATP 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314572 CKT 1 /* 3METCATP 115.00 - 3EMPORIA 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314588 CKT 1 /* 3METCATP 115.00 - 3METCALF 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 925170 CKT 1 /* 3EMPORIA 115.00 - AB2-174 TAP 115.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 314572 TO BUS 314863 CKT 1 /* 3EMPORIA 115.00 - 3EMPOR_1 115.00 OPEN BUS 314570 /* ISLAND: 3METCATP 115.00 OPEN BUS 314572 /* ISLAND: 3EMPORIA 115.00 OPEN BUS 314588 /* ISLAND: 3METCALF 115.00 OPEN BUS 314863 /* ISLAND: 3EMPOR_1 115.00 OPEN BRANCH FROM BUS 314562 TO BUS 314565 CKT Z1 /* 3CLUBHSE 115.00 - 3CLUBHSE71 115.00 OPEN BRANCH FROM BUS 314562 TO BUS 314563 CKT 1 /* 3CLUBHSE 115.00 - 6CLUBHSE 230.00 OPEN BUS 314562 /* 3CLUBHSE 115.00 KV END
DVP_P4-2: 239T2141	CONTINGENCY 'DVP_P4-2: 239T2141' /* LAKEVIEW 230 KV OPEN BRANCH FROM BUS 314579 TO BUS 314583 CKT 1 /* 6HORNRTN 230.00 - 6LAKEVEW 230.00 OPEN BRANCH FROM BUS 314561 TO BUS 314583 CKT 1 /* 6CAROLNA 230.00 - 6LAKEVEW 230.00 END
Base Case	
DVP_P1-2: LN 2060	CONTINGENCY 'DVP_P1-2: LN 2060' OPEN BRANCH FROM BUS 314561 TO BUS 314599 CKT 1 /* 6CAROLNA 230.00 - 6ROA VAL 230.00 END
DVP_P4-2: H2T2068	CONTINGENCY 'DVP_P4-2: H2T2068' /* SEDGE HILL 230 KV OPEN BRANCH FROM BUS 934610 TO BUS 314697 CKT 1 /* AD1-087 TAP 230.00 - 6SEDGE HILL 230.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 2 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END

Contingency Name	Contingency Definition
DVP_P1-3: 6CLUBHSE-TX#1	CONTINGENCY 'DVP_P1-3: 6CLUBHSE-TX#1' OPEN BRANCH FROM BUS 314562 TO BUS 314563 CKT 1 /* 3CLUBHSE 115.00 - 6CLUBHSE 230.00 END
DVP_P4-2: 3202	CONTINGENCY 'DVP_P4-2: 3202' /* SEDGE HILL 115 KV OPEN BRANCH FROM BUS 313852 TO BUS 314716 CKT 1 /* 3WELCOTAP 115.00 - 3REEDY C 115.00 OPEN BRANCH FROM BUS 313852 TO BUS 314718 CKT 1 /* 3WELCOTAP 115.00 - 3S BOSTN 115.00 OPEN BRANCH FROM BUS 313852 TO BUS 314724 CKT 1 /* 3WELCOTAP 115.00 - 3WELCO 115.00 OPEN BRANCH FROM BUS 314696 TO BUS 314717 CKT 1 /* 3SEDGE HILL 115.00 - 3SINAI 115.00 OPEN BRANCH FROM BUS 314717 TO BUS 314718 CKT 1 /* 3SINAI 115.00 - 3S BOSTN 115.00 OPEN BUS 313852 /* ISLAND: 3WELCOTAP 115.00 OPEN BUS 314717 /* ISLAND: 3SINAI 115.00 OPEN BUS 314718 /* ISLAND: 3S BOSTN 115.00 OPEN BUS 314724 /* ISLAND: 3WELCO 115.00 OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 1 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END

11.6.2 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
1715604	313825	3PLYWOOD	DVP	314696	3SEDGE HILL	DVP	1	DVP_P1-2: LN 45	single	141.0	97.24	99.43	DC	3.1

Bus #	Bus	MW Impact
314429	3JTRSVLE	0.12
314704	3LAWRENC	0.09
315150	1BUGGS 1	22.56
315151	1BUGGS 2	22.56
315158	1KERR 1	0.26
315159	1KERR 2	1.05
315160	1KERR 3	1.03
315161	1KERR 4	1.03
315162	1KERR 5	1.03
315163	1KERR 6	1.03
315164	1KERR 7	1.03
315266	1PLYWOOD A	4.37
924021	AB2-043 C O1	0.28
924161	AB2-060 C O1	0.8
924301	AB2-077 C O1	0.21
924311	AB2-078 C O1	0.21
924321	AB2-079 C O1	0.21
924401	AB2-089 C	1.89
925611	AC1-036 C	0.07
925781	AC1-054 C O1	5.9
925831	AC1-062	0.02
934231	AD1-050 C	4.17
935221	AD1-157 C	0.07
935231	AD1-160 C	0.41
936261	AD2-033 C	7.81
936361	AD2-046 C O1	8.55
936481	AD2-063 C O1	10.07
938371	AE1-056 C	2.44
939181	AE1-148 C O1	8.32
939371	AE1-168 C	7.14
940241	AE2-006	0.28
940661	AE2-053	3.1
942451	AE2-258	1.73
942711	AE2-287 C O1	5.55
BLUEG	BLUEG	1.05
CALDERWOOD	CALDERWOOD	0.15
CANNELTON	CANNELTON	0.07
CARR	CARR	0.01
CATAWBA	CATAWBA	0.12
CHEOAH	CHEOAH	0.14
CHILHOWEE	CHILHOWEE	0.05
COFFEEN	COFFEEN	0.11

Bus #	Bus	MW Impact
COTTONWOOD	COTTONWOOD	0.53
DUCKCREEK	DUCKCREEK	0.24
EDWARDS	EDWARDS	0.11
ELMERSMITH	ELMERSMITH	0.12
FARMERCITY	FARMERCITY	0.08
GIBSON	GIBSON	0.04
HAMLET	HAMLET	0.18
NEWTON	NEWTON	0.29
PRAIRIE	PRAIRIE	0.58
RENSSELAER	RENSSELAER	0.01
SANTEETLA	SANTEETLA	0.04
SMITHLAND	SMITHLAND	0.05
TATANKA	TATANKA	0.13
TILTON	TILTON	0.13
TRIMBLE	TRIMBLE	0.12
TVA	TVA	0.45
UNIONPOWER	UNIONPOWER	0.21

11.6.3 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
1714205	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P4-6: CAROLINT122	breaker	208.6	199.16	200.43	DC	2.63

Bus #	Bus	MW Impact
314572	3EMPORIA	1.98
314704	3LAWRENC	0.89
315150	1BUGGS 1	8.31
315151	1BUGGS 2	8.31
315158	1KERR 1	0.19
315159	1KERR 2	0.79
315160	1KERR 3	0.78
315161	1KERR 4	0.78
315162	1KERR 5	0.78
315163	1KERR 6	0.78
315164	1KERR 7	0.78
923911	AB2-031 C O1	10.64
923912	AB2-031 E O1	5.24
923991	AB2-040 C O1	4.26
923992	AB2-040 E O1	28.58
924021	AB2-043 C O1	0.38
924022	AB2-043 E O1	5.17
924161	AB2-060 C O1	1.09
924162	AB2-060 E O1	4.21
924301	AB2-077 C O1	0.24
924302	AB2-077 E O1	1.29
924311	AB2-078 C O1	0.24
924312	AB2-078 E O1	1.29
924321	AB2-079 C O1	0.24
924322	AB2-079 E O1	1.29
924401	AB2-089 C	1.61
924402	AB2-089 E	0.83
925171	AB2-174 C O1	33.34
925172	AB2-174 E O1	30.17
925611	AC1-036 C	0.09
925612	AC1-036 E	0.68
925781	AC1-054 C O1	5.43
925782	AC1-054 E O1	2.5
931231	AB1-173 C	1.31
931232	AB1-173 E	5.0
931241	AB1-173AC	1.31
931242	AB1-173AE	5.0
934201	AD1-047 C	38.11
934202	AD1-047 E	25.4
934231	AD1-050 C	3.55
934232	AD1-050 E	1.94

Bus #	Bus	MW Impact
936261	AD2-033 C	10.76
936262	AD2-033 E	7.18
936361	AD2-046 C O1	7.05
936362	AD2-046 E O1	3.24
936481	AD2-063 C O1	13.78
936482	AD2-063 E O1	9.19
937571	AD2-169 C	47.63
937572	AD2-169 E	31.75
939181	AE1-148 C O1	7.07
939182	AE1-148 E O1	4.71
939371	AE1-168 C	10.05
939372	AE1-168 E	6.7
940241	AE2-006	0.38
940661	AE2-053	2.63
942451	AE2-258	2.35
942711	AE2-287 C O1	43.41
942712	AE2-287 E O1	28.94
CARR	CARR	0.04
CBM-S1	CBM-S1	0.53
CBM-S2	CBM-S2	0.43
CBM-W1	CBM-W1	0.63
CBM-W2	CBM-W2	3.49
CIN	CIN	0.29
CPLE	CPLE	0.17
G-007	G-007	0.13
IPL	IPL	0.18
LGEE	LGEE	0.09
MEC	MEC	0.59
MECS	MECS	0.29
O-066	O-066	0.85
RENSSELAER	RENSSELAER	0.03
WEC	WEC	0.08

11.6.4 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
7817419	314563	6CLUBHSE	DVP	940480	AE2-033 TAP	DVP	1	DVP_P1-2: LN 2012	single	598.78	99.53	100.04	DC	3.1

Bus #	Bus	MW Impact
314589	3MURPHYS	0.06
314704	3LAWRENC	0.53
315126	1ROARAP2	1.72
315128	1ROARAP4	1.65
315131	1EDGECMA	9.96
315132	1EDGECMB	9.96
315136	1ROSEMG1	3.51
315137	1ROSEMS1	2.18
315138	1ROSEMG2	1.64
315139	1GASTONA	5.27
315141	1GASTONB	5.27
315150	1BUGGS 1	8.83
315151	1BUGGS 2	8.83
315158	1KERR 1	0.25
315159	1KERR 2	1.01
315160	1KERR 3	1.0
315161	1KERR 4	1.0
315162	1KERR 5	1.0
315163	1KERR 6	1.0
315164	1KERR 7	1.0
917331	Z2-043 C	0.24
917341	Z2-044 C	0.18
918491	AA1-063AC OP	1.34
918561	AA1-072 C	0.04
919691	AA2-053 C	1.57
919701	AA2-057 C	8.1
920041	AA2-088 C OP	0.69
920591	AA2-165 C	0.13
920671	AA2-174 C	0.07
923911	AB2-031 C O1	5.06
923991	AB2-040 C O1	2.02
924021	AB2-043 C O1	0.33
924151	AB2-059 C O1	1.34
924161	AB2-060 C O1	0.94
924301	AB2-077 C O1	0.21
924311	AB2-078 C O1	0.21
924321	AB2-079 C O1	0.21
924401	AB2-089 C	2.34
924501	AB2-099 C	0.43
924511	AB2-100 C	37.64
925171	AB2-174 C O1	16.71

Bus #	Bus	MW Impact
925591	AC1-034 C	7.13
925781	AC1-054 C O1	8.4
926071	AC1-086 C	48.6
926201	AC1-098 C	6.81
926211	AC1-099 C	2.28
927021	AC1-189 C	5.75
927141	AC1-208 C	11.43
930401	AB1-081 C O1	1.14
930861	AB1-132 C O1	4.02
931231	AB1-173 C	0.62
931241	AB1-173AC	0.62
932631	AC2-084 C	9.71
934201	AD1-047 C	18.13
934231	AD1-050 C	5.15
934331	AD1-057 C O1	16.45
936261	AD2-033 C	9.21
936361	AD2-046 C O1	8.49
936401	AD2-051 C O1	6.03
936481	AD2-063 C O1	11.86
936701	AD2-089 C	6.38
936711	AD2-090 C O1	5.07
937571	AD2-169 C	21.34
939071	AE1-135 C O1	69.94
939181	AE1-148 C O1	8.33
940241	AE2-006	0.32
940521	AE2-037 C O1	5.85
940571	AE2-044 C	4.67
940661	AE2-053	3.1
941541	AE2-151 C	0.75
941951	AE2-207	3.02
942451	AE2-258	2.03
942471	AE2-260 C O1	48.2
942711	AE2-287 C O1	26.13
943171	AE2-346 C	1.28
AA2-074	AA2-074	2.06
CARR	CARR	0.21
CBM-S1	CBM-S1	4.71
CBM-S2	CBM-S2	5.51
CBM-W1	CBM-W1	4.78
CBM-W2	CBM-W2	30.8
CIN	CIN	2.16
CPLE	CPLE	3.03
IPL	IPL	1.35
LGEE	LGEE	0.63
MEC	MEC	4.78
MECS	MECS	2.03
RENSSELAER	RENSSELAER	0.16
WEC	WEC	0.58

11.6.5 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7817407	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-2: LN 235-A-A	single	182.64	87.59	89.18	DC	2.9

Bus #	Bus	MW Impact
314429	3JTRSVLE	0.8
314704	3LAWRENC	0.15
315150	1BUGGS 1	9.74
315151	1BUGGS 2	9.74
315158	1KERR 1	0.2
315159	1KERR 2	0.83
315160	1KERR 3	0.82
315161	1KERR 4	0.82
315162	1KERR 5	0.82
315163	1KERR 6	0.82
315164	1KERR 7	0.82
315266	1PLYWOOD A	0.45
923911	AB2-031 C O1	0.73
923991	AB2-040 C O1	0.29
924021	AB2-043 C O1	0.47
924161	AB2-060 C O1	1.42
924301	AB2-077 C O1	0.29
924311	AB2-078 C O1	0.29
924321	AB2-079 C O1	0.29
924401	AB2-089 C	1.53
925171	AB2-174 C O1	2.32
925611	AC1-036 C	0.24
925781	AC1-054 C O1	4.85
925831	AC1-062	0.11
926271	AC1-105 C O1	3.12
927261	AC1-222 C	1.31
931231	AB1-173 C	0.09
931241	AB1-173AC	0.09
934201	AD1-047 C	2.6
934231	AD1-050 C	3.38
934311	AD1-055 C	0.91
935221	AD1-157 C	0.55
935231	AD1-160 C	3.31
936261	AD2-033 C	24.72
936331	AD2-043 C	1.7
936361	AD2-046 C O1	7.7
936481	AD2-063 C O1	23.29
937571	AD2-169 C	3.18
938371	AE1-056 C	19.49
939181	AE1-148 C O1	7.79
939371	AE1-168 C	37.77

Bus #	Bus	MW Impact
940241	AE2-006	1.0
940661	AE2-053	2.9
942451	AE2-258	2.9
942461	AE2-259 C O1	36.82
942711	AE2-287 C O1	8.88
CARR	CARR	0.08
CBM-S1	CBM-S1	1.63
CBM-S2	CBM-S2	2.21
CBM-W1	CBM-W1	1.33
CBM-W2	CBM-W2	10.3
CIN	CIN	0.61
CPLE	CPLE	1.19
IPL	IPL	0.38
LGEE	LGEE	0.18
MEC	MEC	1.47
MECS	MECS	0.46
RENSSELAER	RENSSELAER	0.06
WEC	WEC	0.16

11.6.6 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7817222	314914	8MDLTHAN	DVP	314918	8NO ANNA	DVP	1	DVP_P1-2: LN 6002_FSA	single	2442.12	99.96	100.03	DC	3.37

Bus #	Bus	MW Impact
314507	3THOMPSN	0.32
314638	6ELIZ CT	0.21
314639	6TANGLEW	0.38
314643	3O INLET	0.41
315053	1BELMED1	18.39
315054	1BELMED2	18.39
315055	1BELMED3	15.26
315058	1CHESTF3	17.69
315059	1CHESTF4	28.68
315074	1HOPCGN1	8.85
315075	1HOPCGN2	8.73
315083	1SPRUNCA	12.22
315084	1SPRUNCB	12.22
315085	1SPRUNCC	9.06
315086	1SPRUNCD	9.06
315090	1YORKTN1	31.62
315091	1YORKTN2	32.82
315098	1CHESPKA	0.42
315099	1CHESPKB	1.04
315102	1BRUNSWICKG1	9.91
315103	1BRUNSWICKG2	9.91
315104	1BRUNSWICKG3	9.91
315105	1BRUNSWICKS1	20.6
315108	1ELIZAR1	3.06
315109	1ELIZAR2	3.01
315110	1ELIZAR3	3.1
315116	1SURRY 1	21.61
315150	1BUGGS 1	11.7
315151	1BUGGS 2	11.7
315153	1CLOVER1	12.64
315154	1CLOVER2	12.47
315233	1SURRY 2	21.98
315260	1GOSPORTA	0.33
315261	1GOSPORTB	0.42
315262	1GOSPORTC	0.36
901081	W1-029 C	1.04
916041	Z1-036 C	1.02
916191	Z1-068 C	0.04
916301	Z1-086 C	59.9
919151	AA1-139 C	2.33
919701	AA2-057 C	7.32

Bus #	Bus	MW Impact
923801	AB2-015 C O1	10.42
923831	AB2-022 C	0.35
923851	AB2-025 C	0.39
923861	AB2-026 C	0.39
923911	AB2-031 C O1	2.61
924401	AB2-089 C	2.24
924491	AB2-098 C	0.61
924501	AB2-099 C	0.67
924511	AB2-100 C	14.03
925051	AB2-160 C O1	6.24
925061	AB2-161 C O1	4.17
925171	AB2-174 C O1	8.24
925331	AB2-190 C	22.46
925521	AC1-027 C	0.31
925781	AC1-054 C O1	7.65
926071	AC1-086 C	23.56
926201	AC1-098 C	6.62
926211	AC1-099 C	2.22
926271	AC1-105 C O1	5.81
926661	AC1-147 C	0.35
926751	AC1-161 C O1	39.57
927021	AC1-189 C	9.09
927141	AC1-208 C	9.67
927221	AC1-216 C O1	11.07
932041	AC2-012 C	13.07
932581	AC2-078 C O1	4.94
932591	AC2-079 C O1	7.14
932631	AC2-084 C	9.44
933061	AC2-130	2.29
933291	AC2-141 C	39.57
933501	AC2-165 C	12.43
933731	AC2-196 C	0.28
933991	AD1-023 C	15.28
934011	AD1-025 C	19.03
934061	AD1-033 C	9.66
934201	AD1-047 C	9.34
934231	AD1-050 C	4.95
934331	AD1-057 C O1	10.52
934521	AD1-076 C	63.75
934571	AD1-082 C	9.5
934611	AD1-087 C O1	10.07
934621	AD1-088 C	16.0
935111	AD1-144 C	0.26
935161	AD1-151 C O1	18.05
935171	AD1-152 C O1	10.01
935211	AD1-156 C	0.32
935231	AD1-160 C	1.13
936041	AD2-007	2.02
936051	AD2-008 C	3.31
936261	AD2-033 C	13.43
936361	AD2-046 C O1	9.19
936391	AD2-049 C	2.07

Bus #	Bus	MW Impact
936401	AD2-051 C O1	9.92
936481	AD2-063 C O1	15.5
936661	AD2-085 C	4.28
936711	AD2-090 C O1	8.59
937221	AD2-160 C O1	7.48
937251	AD2-164	5.38
937481	AD2-202 C O1	2.77
937541	AD2-215 C	2.17
937571	AD2-169 C	11.57
938171	AE1-026 C1 O	32.4
938172	AE1-026 C2 O	4.69
938181	AE1-027 C	3.0
938191	AE1-028 C	1.74
938221	AE1-035 C	2.55
938371	AE1-056 C	6.67
938491	AE1-068 C O1	97.47
938501	AE1-069 C O1	76.75
938531	AE1-072 C O1	22.34
938551	AE1-074 C	3.25
938561	AE1-075 C	2.84
938631	AE1-085 C O1	13.27
938661	AE1-088	1.98
938771	AE1-103 C O1	4.42
939071	AE1-135 C O1	25.4
939181	AE1-148 C O1	9.07
939191	AE1-149 C O1	12.95
939311	AE1-162 C	2.61
939371	AE1-168 C	15.48
939411	AE1-173 C	133.97
939421	AE1-174 C	0.19
939431	AE1-175 C	2.43
940061	AE1-248 C O1	19.74
940071	AE1-249 C	8.24
940241	AE2-006	0.5
940251	AE2-007	222.37
940431	AE2-027 C O1	13.98
940471	AE2-031 C O1	46.41
940481	AE2-033 C	20.26
940491	AE2-034 C	10.02
940521	AE2-037 C O1	9.07
940541	AE2-040	4.09
940641	AE2-051 C O1	26.6
940651	AE2-052	4.34
940661	AE2-053	3.37
940891	AE2-078 C	2.75
940901	AE2-079 C	2.75
940911	AE2-080 C	2.75
941031	AE2-094 C	63.11
941101	AE2-104 C O1	4.39
941281	AE2-122 C O1	36.49
941291	AE2-123 C O1	37.5
941301	AE2-124 C O1	34.1

Bus #	Bus	MW Impact
941501	AE2-147 C	19.77
941541	AE2-151 C	1.23
941591	AE2-156	22.98
941601	AE2-157 C O1	13.1
941791	AE2-182 C	2.89
942001	AE2-212 C	2.48
942131	AE2-225 C	2.71
942151	AE2-227 C O1	2.48
942161	AE2-228 C O1	2.48
942171	AE2-229 C	2.71
942211	AE2-233 C	20.62
942341	AE2-247 C	1.86
942371	AE2-250 C O1	11.09
942401	AE2-253 C	7.87
942451	AE2-258	2.43
942461	AE2-259 C O1	10.31
942471	AE2-260 C O1	17.51
942551	AE2-270	30.11
942711	AE2-287 C O1	14.81
942851	AE2-304 C	0.78
942921	AE2-311 C O1	67.08
942931	AE2-313 C	56.52
943051	AE2-328 C	13.04
943171	AE2-346 C	2.01
AA2-074	AA2-074	4.79
CARR	CARR	1.31
CBM-S1	CBM-S1	11.35
CBM-S2	CBM-S2	13.56
CBM-W1	CBM-W1	9.41
CBM-W2	CBM-W2	71.66
CIN	CIN	4.54
CPLE	CPLE	7.05
IPL	IPL	2.82
LGEE	LGEE	1.34
MEC	MEC	10.46
MECS	MECS	2.97
RENSSELAER	RENSSELAER	1.03
WEC	WEC	1.18

11.6.7 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1714718	314266	6NORTHAMPTON	DVP	314569	6EARLEYS	DVP	1	DVP_P4-2: 23872	breaker	658.0	99.86	100.0	DC	1.98

Bus #	Bus	MW Impact
314554	3BTLEBRO	0.45
314572	3EMPORIA	0.63
314578	3HORNRTN	3.69
314623	3WITAKRS	0.77
314704	3LAWRENC	0.3
315126	1ROARAP2	1.21
315131	1EDGECMA	5.63
315132	1EDGECMB	5.63
315136	1ROSEMG1	3.06
315137	1ROSEMS1	1.9
315138	1ROSEMG2	1.43
315139	1GASTONA	4.69
315141	1GASTONB	4.69
315150	1BUGGS 1	5.53
315151	1BUGGS 2	5.53
917342	Z2-044 E	0.33
918492	AA1-063AE OP	2.19
919692	AA2-053 E	3.14
919701	AA2-057 C	4.16
919702	AA2-057 E	2.08
920592	AA2-165 E	0.27
920672	AA2-174 E	0.36
923911	AB2-031 C O1	3.11
923912	AB2-031 E O1	1.53
923991	AB2-040 C O1	1.24
923992	AB2-040 E O1	8.35
924022	AB2-043 E O1	2.74
924152	AB2-059 E O1	3.09
924162	AB2-060 E O1	2.23
924302	AB2-077 E O1	0.7
924312	AB2-078 E O1	0.7
924322	AB2-079 E O1	0.7
924401	AB2-089 C	1.54
924402	AB2-089 E	0.79
924511	AB2-100 C	21.44
924512	AB2-100 E	10.56
925171	AB2-174 C O1	10.03
925172	AB2-174 E O1	9.08
925591	AC1-034 C	3.88
925592	AC1-034 E	2.93
925612	AC1-036 E	0.36
925781	AC1-054 C O1	5.59

Bus #	Bus	MW Impact
925782	AC1-054 E O1	2.57
926071	AC1-086 C	43.26
926072	AC1-086 E	19.69
926201	AC1-098 C	2.47
926202	AC1-098 E	1.47
926211	AC1-099 C	0.83
926212	AC1-099 E	0.49
927141	AC1-208 C	6.05
927142	AC1-208 E	2.69
930402	AB1-081 E O1	2.18
930861	AB1-132 C O1	3.58
930862	AB1-132 E O1	12.59
931231	AB1-173 C	0.38
931232	AB1-173 E	1.46
931241	AB1-173AC	0.38
931242	AB1-173AE	1.46
932631	AC2-084 C	3.52
932632	AC2-084 E	1.74
934201	AD1-047 C	11.13
934202	AD1-047 E	7.42
934231	AD1-050 C	3.39
934232	AD1-050 E	1.85
934331	AD1-057 C O1	12.73
934332	AD1-057 E O1	6.79
936261	AD2-033 C	5.69
936262	AD2-033 E	3.79
936361	AD2-046 C O1	5.42
936362	AD2-046 E O1	2.49
936481	AD2-063 C O1	7.3
936482	AD2-063 E O1	4.87
937571	AD2-169 C	13.45
937572	AD2-169 E	8.97
938174	AE1-026 CBAT	1.52
938175	AE1-026 EBAT	6.08
938661	AE1-088	0.92
939071	AE1-135 C O1	37.95
939072	AE1-135 E O1	25.3
939181	AE1-148 C O1	5.31
939182	AE1-148 E O1	3.54
940241	AE2-006	0.2
940481	AE2-033 C	28.14
940482	AE2-033 E	18.97
940571	AE2-044 C	2.54
940572	AE2-044 E	1.09
940661	AE2-053	1.98
941951	AE2-207	1.64
942451	AE2-258	1.25
942471	AE2-260 C O1	26.15
942472	AE2-260 E O1	37.09
942711	AE2-287 C O1	15.09
942712	AE2-287 E O1	10.06
CARR	CARR	0.09

Bus #	Bus	MW Impact
CBM-S1	CBM-S1	1.68
CBM-S2	CBM-S2	1.87
CBM-W1	CBM-W1	1.69
CBM-W2	CBM-W2	10.92
CIN	CIN	0.77
CPLE	CPLE	0.94
G-007	G-007	0.31
IPL	IPL	0.48
LGEE	LGEE	0.22
MEC	MEC	1.7
MECS	MECS	0.7
O-066	O-066	1.98
RENSSELAER	RENSSELAER	0.07
WEC	WEC	0.2

11.6.8 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7579436	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	1	DVP_P4-2: H2T2068	breaker	264.5	87.11	88.22	DC	2.92

Bus #	Bus	MW Impact
315150	1BUGGS 1	16.56
315151	1BUGGS 2	16.56
315156	1HALLBR1	1.0
315165	1HURT 1	5.69
315166	1HURT 2	5.69
315266	1PLYWOOD A	2.43
924021	AB2-043 C O1	0.44
924022	AB2-043 E O1	5.94
924161	AB2-060 C O1	1.25
924162	AB2-060 E O1	4.84
924301	AB2-077 C O1	0.29
924302	AB2-077 E O1	1.58
924311	AB2-078 C O1	0.29
924312	AB2-078 E O1	1.58
924321	AB2-079 C O1	0.29
924322	AB2-079 E O1	1.58
924401	AB2-089 C	1.56
924402	AB2-089 E	0.8
925611	AC1-036 C	0.1
925612	AC1-036 E	0.78
925661	AC1-042 C	1.79
925662	AC1-042 E	2.92
925781	AC1-054 C O1	4.84
925782	AC1-054 E O1	2.23
925991	AC1-075 C	12.59
925992	AC1-075 E	7.13
926021	AC1-080 C	4.21
926022	AC1-080 E	2.37
926271	AC1-105 C O1	14.84
926272	AC1-105 E O1	7.39
926641	AC1-145 C	2.13
926642	AC1-145 E	3.48
927261	AC1-222 C	10.59
927262	AC1-222 E	10.08
934231	AD1-050 C	3.43
934232	AD1-050 E	1.88
934311	AD1-055 C	7.35
934312	AD1-055 E	1.9
935222	AD1-157 E	0.63
935231	AD1-160 C	0.69
935232	AD1-160 E	0.95

Bus #	Bus	MW Impact
936261	AD2-033 C	12.4
936262	AD2-033 E	8.26
936331	AD2-043 C	13.72
936332	AD2-043 E	16.24
936361	AD2-046 C O1	7.81
936362	AD2-046 E O1	3.59
936481	AD2-063 C O1	15.84
936482	AD2-063 E O1	10.56
938371	AE1-056 C	4.05
938372	AE1-056 E	2.21
939181	AE1-148 C O1	7.86
939182	AE1-148 E O1	5.24
939371	AE1-168 C	11.58
939372	AE1-168 E	7.72
939941	AE1-230 C1	0.81
939942	AE1-230 E1	0.54
939943	AE1-230 E2	0.48
940241	AE2-006	0.44
940661	AE2-053	2.92
941801	AE2-185 C	5.05
941802	AE2-185 E	1.68
941821	AE2-187 C	5.05
941822	AE2-187 E	1.68
942331	AE2-246	1.57
942451	AE2-258	2.7
942461	AE2-259 C O1	4.29
942462	AE2-259 E O1	2.86
942671	AE2-283 C	4.45
942672	AE2-283 E	2.34
942711	AE2-287 C O1	7.77
942712	AE2-287 E O1	5.18
942751	AE2-291 C O1	16.62
942752	AE2-291 E O1	11.08
942761	AE2-292 C O1	20.69
942762	AE2-292 E O1	13.79
BLUEG	BLUEG	2.18
CALDERWOOD	CALDERWOOD	0.66
CANNELTON	CANNELTON	0.16
CATAWBA	CATAWBA	0.78
CBM-N	CBM-N	0.03
CHEOAH	CHEOAH	0.62
CHILHOWEE	CHILHOWEE	0.21
COFFEEN	COFFEEN	0.29
COTTONWOOD	COTTONWOOD	2.09
DUCKCREEK	DUCKCREEK	0.57
EDWARDS	EDWARDS	0.25
ELMERSMITH	ELMERSMITH	0.3
FARMERCITY	FARMERCITY	0.22
G-007A	G-007A	0.16
GIBSON	GIBSON	0.1
HAMLET	HAMLET	1.48
NEWTON	NEWTON	0.74

Bus #	Bus	MW Impact
NYISO	NYISO	0.13
PRAIRIE	PRAIRIE	1.67
SANTEETLA	SANTEETLA	0.19
SMITHLAND	SMITHLAND	0.16
TATANKA	TATANKA	0.36
TILTON	TILTON	0.29
TRIMBLE	TRIMBLE	0.24
TVA	TVA	1.73
UNIONPOWER	UNIONPOWER	0.93
VFT	VFT	0.43

11.6.9 Index 8

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7579477	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P4-2: 3202	breaker	279.1	83.84	85.06	DC	3.4

Bus #	Bus	MW Impact
315150	1BUGGS 1	18.94
315151	1BUGGS 2	18.94
315156	1HALLBR1	1.2
315165	1HURT 1	6.78
315166	1HURT 2	6.78
315266	1PLYWOOD A	2.78
924021	AB2-043 C O1	0.5
924022	AB2-043 E O1	6.68
924161	AB2-060 C O1	1.41
924162	AB2-060 E O1	5.44
924301	AB2-077 C O1	0.33
924302	AB2-077 E O1	1.78
924311	AB2-078 C O1	0.33
924312	AB2-078 E O1	1.78
924321	AB2-079 C O1	0.33
924322	AB2-079 E O1	1.78
924401	AB2-089 C	1.83
924402	AB2-089 E	0.94
925611	AC1-036 C	0.11
925612	AC1-036 E	0.84
925661	AC1-042 C	2.17
925662	AC1-042 E	3.54
925781	AC1-054 C O1	5.69
925782	AC1-054 E O1	2.62
925991	AC1-075 C	14.49
925992	AC1-075 E	8.21
926021	AC1-080 C	4.84
926022	AC1-080 E	2.72
926271	AC1-105 C O1	16.91
926272	AC1-105 E O1	8.42
926641	AC1-145 C	2.58
926642	AC1-145 E	4.21
927261	AC1-222 C	12.1
927262	AC1-222 E	11.52
934231	AD1-050 C	4.03
934232	AD1-050 E	2.2
934311	AD1-055 C	8.4
934312	AD1-055 E	2.17
935222	AD1-157 E	0.61
935231	AD1-160 C	0.67
935232	AD1-160 E	0.92
936261	AD2-033 C	13.5

Bus #	Bus	MW Impact
936262	AD2-033 E	9.0
936331	AD2-043 C	15.68
936332	AD2-043 E	18.56
936361	AD2-046 C O1	9.1
936362	AD2-046 E O1	4.18
936481	AD2-063 C O1	17.58
936482	AD2-063 E O1	11.72
938371	AE1-056 C	3.94
938372	AE1-056 E	2.15
939181	AE1-148 C O1	9.12
939182	AE1-148 E O1	6.08
939371	AE1-168 C	12.01
939372	AE1-168 E	8.01
939941	AE1-230 C1	0.98
939942	AE1-230 E1	0.65
939943	AE1-230 E2	0.58
940241	AE2-006	0.47
940661	AE2-053	3.4
941801	AE2-185 C	6.11
941802	AE2-185 E	2.04
941821	AE2-187 C	6.11
941822	AE2-187 E	2.04
942331	AE2-246	1.89
942451	AE2-258	3.04
942671	AE2-283 C	5.38
942672	AE2-283 E	2.82
942711	AE2-287 C O1	8.68
942712	AE2-287 E O1	5.79
942751	AE2-291 C O1	19.23
942752	AE2-291 E O1	12.82
942761	AE2-292 C O1	23.95
942762	AE2-292 E O1	15.97
CALDERWOOD	CALDERWOOD	0.15
CARR	CARR	0.03
CATAWBA	CATAWBA	0.3
CBM-W1	CBM-W1	0.38
CHEOAH	CHEOAH	0.14
CHILHOWEE	CHILHOWEE	0.05
CIN	CIN	0.21
COTTONWOOD	COTTONWOOD	0.39
FARMERCITY	FARMERCITY	0.0
G-007	G-007	0.12
HAMLET	HAMLET	0.67
IPL	IPL	0.14
LGEE	LGEE	0.07
MEC	MEC	0.07
MECS	MECS	0.37
O-066	O-066	0.73
PRAIRIE	PRAIRIE	0.02
RENSSELAER	RENSSELAER	0.02
SANTEETLA	SANTEETLA	0.04
SMITHLAND	SMITHLAND	0.01

Bus #	Bus	MW Impact
TVA	TVA	0.29
UNIONPOWER	UNIONPOWER	0.23
WEC	WEC	0.05

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1714366	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P4-2: 102952	breaker	288.6	145.78	146.27	DC	3.12

Bus #	Bus	MW Impact
314539	3UNCAMP	1.77
314541	3WATKINS	0.62
314578	3HORNRTN	8.18
314582	3KELFORD	2.17
314589	3MURPHYS	0.07
314603	3SCOT NK	2.68
314617	3TUNIS	0.64
315126	1ROARAP2	2.72
315128	1ROARAP4	2.61
315150	1BUGGS 1	7.88
315151	1BUGGS 2	7.88
315159	1KERR 2	1.08
315162	1KERR 5	1.07
315163	1KERR 6	1.07
315164	1KERR 7	1.07
900672	V4-068 E	0.31
907092	X1-038 E	4.43
917332	Z2-043 E	0.62
918491	AA1-063AC OP	1.84
918492	AA1-063AE OP	7.14
918562	AA1-072 E	0.1
919691	AA2-053 C	2.33
919692	AA2-053 E	8.21
919701	AA2-057 C	4.74
919702	AA2-057 E	2.37
920041	AA2-088 C OP	0.99
920042	AA2-088 E OP	13.29
920592	AA2-165 E	0.31
920671	AA2-174 C	0.11
920672	AA2-174 E	0.95
923801	AB2-015 C O1	7.16
923802	AB2-015 E O1	5.87
923911	AB2-031 C O1	6.01
923912	AB2-031 E O1	2.96
923991	AB2-040 C O1	2.41
923992	AB2-040 E O1	16.16
924022	AB2-043 E O1	3.26
924162	AB2-060 E O1	2.66
924302	AB2-077 E O1	0.85
924312	AB2-078 E O1	0.85
924322	AB2-079 E O1	0.85

Bus #	Bus	MW Impact
924401	AB2-089 C	2.81
924402	AB2-089 E	1.45
924501	AB2-099 C	0.34
924502	AB2-099 E	0.15
925171	AB2-174 C O1	18.85
925172	AB2-174 E O1	17.06
925612	AC1-036 E	0.43
925781	AC1-054 C O1	10.61
925782	AC1-054 E O1	4.89
926201	AC1-098 C	5.78
926202	AC1-098 E	3.44
926211	AC1-099 C	1.94
926212	AC1-099 E	1.14
927141	AC1-208 C	11.25
927142	AC1-208 E	5.0
931231	AB1-173 C	0.74
931232	AB1-173 E	2.83
931241	AB1-173AC	0.74
931242	AB1-173AE	2.83
932631	AC2-084 C	8.24
932632	AC2-084 E	4.06
934201	AD1-047 C	21.54
934202	AD1-047 E	14.36
934231	AD1-050 C	6.19
934232	AD1-050 E	3.38
936261	AD2-033 C	6.8
936262	AD2-033 E	4.53
936361	AD2-046 C O1	8.68
936362	AD2-046 E O1	3.99
936481	AD2-063 C O1	8.7
936482	AD2-063 E O1	5.8
936711	AD2-090 C O1	7.38
936712	AD2-090 E O1	4.92
937571	AD2-169 C	26.93
937572	AD2-169 E	17.95
938771	AE1-103 C O1	2.66
938772	AE1-103 E O1	3.67
939181	AE1-148 C O1	8.39
939182	AE1-148 E O1	5.59
940241	AE2-006	0.24
940521	AE2-037 C O1	3.88
940522	AE2-037 E O1	1.87
940661	AE2-053	3.12
942451	AE2-258	1.48
942711	AE2-287 C O1	8.21
942712	AE2-287 E O1	5.47
943171	AE2-346 C	1.03
943172	AE2-346 E	0.44
CARR	CARR	0.04
CBM-S1	CBM-S1	0.34
CBM-S2	CBM-S2	0.31
CBM-W1	CBM-W1	0.34

Bus #	Bus	MW Impact
CBM-W2	CBM-W2	2.17
CIN	CIN	0.16
CPLE	CPLE	0.12
G-007	G-007	0.14
IPL	IPL	0.1
LGEE	LGEE	0.05
MEC	MEC	0.34
MECS	MECS	0.13
O-066	O-066	0.9
RENSSELAER	RENSSELAER	0.03
WEC	WEC	0.04

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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
1714639	314563	6CLUBHSE	DVP	314562	3CLUBHSE	DVP	1	DVP_P4-2: 239T2141	breaker	208.6	108.26	109.4	DC	2.38

Bus #	Bus	MW Impact
315139	1GASTONA	2.86
315141	1GASTONB	2.86
923851	AB2-025 C	0.2
923852	AB2-025 E	0.75
924511	AB2-100 C	14.29
924512	AB2-100 E	7.04
926071	AC1-086 C	26.38
926072	AC1-086 E	12.01
930861	AB1-132 C O1	2.18
930862	AB1-132 E O1	7.68
934233	AD1-050 BAT	5.54
939071	AE1-135 C O1	25.59
939072	AE1-135 E O1	17.06
940481	AE2-033 C	11.96
940482	AE2-033 E	8.07
940541	AE2-040	2.14
940662	AE2-053 BAT	2.38
942471	AE2-260 C O1	17.64
942472	AE2-260 E O1	25.01
BLUEG	BLUEG	1.94
CALDERWOOD	CALDERWOOD	0.41
CANNELTON	CANNELTON	0.13
CATAWBA	CATAWBA	0.4
CBM-N	CBM-N	0.15
CHEOAH	CHEOAH	0.39
CHILHOWEE	CHILHOWEE	0.13
COFFEEN	COFFEEN	0.23
COTTONWOOD	COTTONWOOD	1.37
DUCKCREEK	DUCKCREEK	0.46
EDWARDS	EDWARDS	0.21
ELMERSMITH	ELMERSMITH	0.24
FARMERCITY	FARMERCITY	0.16
G-007A	G-007A	0.58
GIBSON	GIBSON	0.08
HAMLET	HAMLET	0.78
NEWTON	NEWTON	0.59
NYISO	NYISO	0.63
PRAIRIE	PRAIRIE	1.25
SANTEETLA	SANTEETLA	0.11
SMITHLAND	SMITHLAND	0.11
TATANKA	TATANKA	0.28

Bus #	Bus	MW Impact
TILTON	TILTON	0.24
TRIMBLE	TRIMBLE	0.21
TVA	TVA	1.15
UNIONPOWER	UNIONPOWER	0.57
VFT	VFT	1.54

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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
1715804	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P7-1: LN 22-90-A	tower	199.0	159.8	163.03	DC	6.42

Bus #	Bus	MW Impact
315150	1BUGGS 1	15.54
315151	1BUGGS 2	15.54
315158	1KERR 1	0.56
315159	1KERR 2	2.26
315160	1KERR 3	2.23
315161	1KERR 4	2.23
315162	1KERR 5	2.23
315163	1KERR 6	2.23
315164	1KERR 7	2.23
924022	AB2-043 E O1	6.02
924162	AB2-060 E O1	4.91
924302	AB2-077 E O1	1.58
924312	AB2-078 E O1	1.58
924322	AB2-079 E O1	1.58
924401	AB2-089 C	4.63
924402	AB2-089 E	2.38
925612	AC1-036 E	0.79
925781	AC1-054 C O1	15.59
925782	AC1-054 E O1	7.18
926271	AC1-105 C O1	2.87
926272	AC1-105 E O1	1.43
934231	AD1-050 C	10.2
934232	AD1-050 E	5.57
935222	AD1-157 E	0.64
935231	AD1-160 C	0.7
935232	AD1-160 E	0.97
936261	AD2-033 C	12.59
936262	AD2-033 E	8.39
936361	AD2-046 C O1	17.92
936362	AD2-046 E O1	8.24
936481	AD2-063 C O1	16.07
936482	AD2-063 E O1	10.71
938371	AE1-056 C	4.14
938372	AE1-056 E	2.26
939181	AE1-148 C O1	17.24
939182	AE1-148 E O1	11.49
939371	AE1-168 C	11.8
939372	AE1-168 E	7.86
940241	AE2-006	0.45
940661	AE2-053	6.42
942451	AE2-258	2.74

Bus #	Bus	MW Impact
942461	AE2-259 C O1	4.43
942462	AE2-259 E O1	2.95
942711	AE2-287 C O1	7.4
942712	AE2-287 E O1	4.94
BLUEG	BLUEG	1.99
CALDERWOOD	CALDERWOOD	0.42
CANNELTON	CANNELTON	0.14
CATAWBA	CATAWBA	0.43
CBM-N	CBM-N	0.0
CHEOAH	CHEOAH	0.39
CHILHOWEE	CHILHOWEE	0.14
COFFEEN	COFFEEN	0.23
COTTONWOOD	COTTONWOOD	1.4
DUCKCREEK	DUCKCREEK	0.48
EDWARDS	EDWARDS	0.21
ELMERSMITH	ELMERSMITH	0.24
FARMERCITY	FARMERCITY	0.17
G-007A	G-007A	0.08
GIBSON	GIBSON	0.09
HAMLET	HAMLET	0.82
NEWTON	NEWTON	0.61
NYISO	NYISO	0.01
PRAIRIE	PRAIRIE	1.28
SANTEETLA	SANTEETLA	0.12
SMITHLAND	SMITHLAND	0.11
TATANKA	TATANKA	0.29
TILTON	TILTON	0.25
TRIMBLE	TRIMBLE	0.22
TVA	TVA	1.17
UNIONPOWER	UNIONPOWER	0.59
VFT	VFT	0.21

Short Circuit

11.7 Short Circuit

The following Breakers are overduty: None

12 Network Impacts – Secondary Point of Interconnection

The Queue Project AE2-053 was evaluated as a 20 MW (Capacity 20 MW) injection tapping the Boydton DP to Kerr Dam 115 kV line in the Dominion area. Project AE2-053 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-053 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

12.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1715604	313825	3PLYWOOD	DVP	314696	3SEDGE HILL	DVP	1	DVP_P1-2: LN 45	single	141.0	97.31	99.51	DC	3.1
7818113	313825	3PLYWOOD	DVP	314696	3SEDGE HILL	DVP	1	DVP_P1-2: LN 33-B	single	141.0	89.23	91.4	DC	3.06
7817093	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	Base Case	single	176.81	89.18	90.37	DC	2.11
7817407	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-2: LN 235-A-A	single	182.64	87.59	89.18	DC	2.89
7817408	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-3: 6FARMVIL-TX#4	single	182.64	73.21	74.84	DC	2.98
1715053	940480	AE2-033 TAP	DVP	314435	6SAPONY	DVP	1	Base Case	single	598.78	99.57	100.03	DC	2.77

12.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7579436	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	1	DVP_P4-2: H2T2068	breaker	264.5	87.07	88.18	DC	2.92
7579477	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P4-2: 3202	breaker	279.1	83.8	85.02	DC	3.39
7579478	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P4-2: H1T2068	breaker	279.1	82.31	83.35	DC	2.91

12.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	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
1715153	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P1-2: LN 1029-A	single	239.89	106.46	107.61	DC	2.76
7817432	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P1-3: 6CLUBHSE-TX#1	single	239.89	104.38	105.83	DC	3.49
1714205	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P4-6: CAROLINT122	breaker	208.6	199.16	200.42	DC	2.63
1714206	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P4-2: 2202	breaker	208.6	194.67	195.79	DC	2.32
1714898	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-2: LN 130-A	single	182.64	122.27	123.28	DC	1.84
1714899	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-3: 6CAROLNA-TX#4	single	182.64	118.11	119.65	DC	2.81
1714639	314563	6CLUBHSE	DVP	314562	3CLUBHSE	DVP	1	DVP_P4-2: 239T2141	breaker	208.6	107.24	108.38	DC	2.38

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
1714299	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P4-6: CAROLIN T122	breaker	199.0	154.67	157.93	DC	6.46
1714300	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P4-2: 2202	breaker	199.0	145.66	148.5	DC	5.65
1715304	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 570	single	199.0	118.37	120.68	DC	4.59
1715308	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 22-A	single	199.0	112.81	115.44	DC	5.24
1715309	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	Base Case	single	199.0	106.28	108.61	DC	4.63
1715804	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P7-1: LN 22-90-A	tower	199.0	159.8	163.04	DC	6.43
1715805	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P7-1: LN 22-90-B	tower	199.0	148.3	151.54	DC	6.43
7817749	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 6002_FSA	single	199.0	118.37	120.68	DC	4.59
7817751	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 570_FSA	single	199.0	118.37	120.68	DC	4.59

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.

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

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1715601	313825	3PLYWOOD	DVP	314696	3SEDGE HILL	DVP	1	DVP_P1-2: LN 33-B	operation	141.0	112.86	114.86	DC	3.06
1715152	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	Base Case	operation	226.54	121.15	121.67	DC	2.59
7817426	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P1-3: 6CLUBHSE-TX#1	operation	239.89	161.63	162.28	DC	3.49
1714897	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	Base Case	operation	176.81	139.49	140.68	DC	2.11
7817402	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-2: LN 235-A-A	operation	182.64	138.23	139.81	DC	2.89
7817409	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	Base Case	operation	176.81	74.79	75.25	DC	1.8
7817666	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	1	DVP_P1-3: 6FARMVIL-TX#5	operation	198.06	114.61	116.05	DC	2.86
1715729	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	1	DVP_P1-3: 6SEDGE HILL-TX#2	operation	226.73	93.67	95.17	DC	3.4
7818093	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P1-3: 6SEDGE HILL-TX#1	operation	256.06	82.67	84.0	DC	3.39
1715300	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 570	operation	199.0	139.17	141.49	DC	4.59

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
1715303	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	Base Case	operation	199.0	127.22	129.56	DC	4.63
7817743	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 6002_FSA	operation	199.0	139.17	141.49	DC	4.59
7817744	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 570_FSA	operation	199.0	139.17	141.49	DC	4.59
1715730	314707	3MORAN	DVP	314691	3FARMVIL	DVP	1	DVP_P1-2: LN 84	operation	203.98	97.06	98.18	DC	2.28

12.5 Flow Gate Details

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

12.5.1 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-2: LN 1029-A	CONTINGENCY 'DVP_P1-2: LN 1029-A' OPEN BRANCH FROM BUS 314562 TO BUS 314570 CKT 1 /* 3CLUBHSE 115.00 - 3METCATP 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314572 CKT 1 /* 3METCATP 115.00 - 3EMPORIA 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314588 CKT 1 /* 3METCATP 115.00 - 3METCALF 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 925170 CKT 1 /* 3EMPORIA 115.00 - AB2-174 TAP 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 314863 CKT 1 /* 3EMPORIA 115.00 - 3EMPOR_1 115.00 OPEN BUS 314570 /* ISLAND: 3METCATP 115.00 OPEN BUS 314572 /* ISLAND: 3EMPORIA 115.00 OPEN BUS 314588 /* ISLAND: 3METCALF 115.00 OPEN BUS 314863 /* ISLAND: 3EMPOR_1 115.00 END
DVP_P1-3: 6CAROLNA-TX#4	CONTINGENCY 'DVP_P1-3: 6CAROLNA-TX#4' OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END
DVP_P1-2: LN 130-A	CONTINGENCY 'DVP_P1-2: LN 130-A' OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314595 TO BUS 314600 CKT 1 /* 3PL HILL 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314600 TO BUS 937570 CKT 1 /* 3PLHITP 115.00 - AD2-169 TAP 115.00 OPEN BUS 314595 /* ISLAND: 3PL HILL 115.00 OPEN BUS 314600 /* ISLAND: 3PLHITP 115.00 END

Contingency Name	Contingency Definition
DVP_P1-2: LN 235-A-A	CONTINGENCY 'DVP_P1-2: LN 235-A-A' OPEN BRANCH FROM BUS 313802 TO BUS 314268 CKT 1 /* 6PRINCE EDW 230.00 - 6BRIERY 230.00 OPEN BRANCH FROM BUS 313802 TO BUS 314692 CKT 1 /* 6PRINCE EDW 230.00 - 6FARMVIL 230.00 OPEN BRANCH FROM BUS 314268 TO BUS 943050 CKT 1 /* 6BRIERY 230.00 - AE2-328 TAP 230.00 OPEN BRANCH FROM BUS 314691 TO BUS 314692 CKT 1 /* 3FARMVIL 115.00 - 6FARMVIL 230.00 OPEN BUS 313802 /* ISLAND: 6PRINCE EDW 230.00 OPEN BUS 314268 /* ISLAND: 6BRIERY 230.00 END
DVP_P1-2: LN 33-B	CONTINGENCY 'DVP_P1-2: LN 33-B' OPEN BRANCH FROM BUS 926270 TO BUS 314696 CKT 1 /* AC1-105 TAP 115.00 - 3SEDGE HILL 115.00 END
DVP_P1-2: LN 570_FSA	CONTINGENCY 'DVP_P1-2: LN 570_FSA' OPEN BRANCH FROM BUS 304183 TO BUS 918500 CKT 1 /* 8WAKE 500 TT500.00 - AA1-064 TAP 500.00 END
DVP_P1-2: LN 45	CONTINGENCY 'DVP_P1-2: LN 45' OPEN BUS 304099 /* ISLAND: 3WARREN TAP 115.00 OPEN BUS 304100 /* ISLAND: 3HEND
DVP_P1-3: 6SEDGE HILL-TX#1	CONTINGENCY 'DVP_P1-3: 6SEDGE HILL-TX#1' OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 1 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END
DVP_P1-3: 6SEDGE HILL-TX#2	CONTINGENCY 'DVP_P1-3: 6SEDGE HILL-TX#2' OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 2 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END
DVP_P4-2: H1T2068	CONTINGENCY 'DVP_P4-2: H1T2068' /* SEDGE HILL 230 KV OPEN BRANCH FROM BUS 934610 TO BUS 314697 CKT 1 /* AD1-087 TAP 230.00 - 6SEDGE HILL 230.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 1 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END
DVP_P1-2: LN 6002_FSA	CONTINGENCY 'DVP_P1-2: LN 6002_FSA' OPEN BRANCH FROM BUS 314935 TO BUS 918500 CKT 1 /* 8HERITAGE 500.00 - AA1-064 TAP 500.00 END

Contingency Name	Contingency Definition
DVP_P4-2: 2202	CONTINGENCY 'DVP_P4-2: 2202' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* 3EATON F 115.00 - AC1-054 TAP 115.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BUS 314571 /* ISLAND: 3EATON F 115.00 OPEN BRANCH FROM BUS 313722 TO BUS 314559 CKT 1 /* 3OCCONEECHEE115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314559 CKT Z1 /* 3CAROL56_1 115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END
DVP_P4-6: CAROLIN T122	CONTINGENCY 'DVP_P4-6: CAROLIN T122' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 314559 TO BUS 315126 CKT 1 /* 3CAROLNA 115.00 - 1ROARAP2 14.400 OPEN BRANCH FROM BUS 314559 TO BUS 315128 CKT 1 /* 3CAROLNA 115.00 - 1ROARAP4 14.400 OPEN BUS 315126 /* ISLAND: 1ROARAP2 14.400 OPEN BUS 315128 /* ISLAND: 1ROARAP4 14.400 OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 313722 TO BUS 314559 CKT 1 /* 3OCCONEECHEE115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314559 CKT Z1 /* 3CAROL56_1 115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314578 CKT 1 /* 3CAROLNA 115.00 - 3HORNRTN 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1 /* 3CAROLNA 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 OPEN BUS 314559 /* 3CAROLNA 115.00 KV END
DVP_P1-2: LN 84	CONTINGENCY 'DVP_P1-2: LN 84' OPEN BRANCH FROM BUS 314521 TO BUS 314713 CKT 1 /* 3PAMPL_1 115.00 - 3PAMPLIN 115.00 OPEN BRANCH FROM BUS 314691 TO BUS 314726 CKT 1 /* 3FARMVIL 115.00 - 3WILLIS 115.00 OPEN BRANCH FROM BUS 314713 TO BUS 314726 CKT 1 /* 3PAMPLIN 115.00 - 3WILLIS 115.00 OPEN BUS 314521 /* ISLAND: 3PAMPL_1 115.00 OPEN BUS 314726 /* ISLAND: 3WILLIS 115.00 END
DVP_P1-2: LN 570	CONTINGENCY 'DVP_P1-2: LN 570' OPEN BRANCH FROM BUS 304183 TO BUS 918500 CKT 1 /* 8WAKE 500 TT500.00 - AA1-064 TAP 500.00 OPEN BRANCH FROM BUS 314935 TO BUS 918500 CKT 1 /* 8HERITAGE 500.00 - AA1-064 TAP 500.00 OPEN BUS 918500 /* ISLAND: AA1-064 TAP 500.00 END

Contingency Name	Contingency Definition
DVP_P7-1: LN 22-90-A	CONTINGENCY 'DVP_P7-1: LN 22-90-A' OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* 3EATON F 115.00 - AC1-054 TAP 115.00 OPEN BUS 314571 /* ISLAND: 3EATON F 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314584 CKT 1 /* 3FIVEFORKSDP115.00 - 3LITTLTN 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314673 CKT 1 /* 3FIVEFORKSDP115.00 - 3PALMERSPRNG115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1 /* 3CAROLNA 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314584 TO BUS 314585 CKT 1 /* 3LITTLTN 115.00 - 3L GASTN 115.00 OPEN BUS 314265 /* ISLAND: 3FIVEFORKSDP115.00 OPEN BUS 314584 /* ISLAND: 3LITTLTN 115.00 OPEN BUS 314585 /* ISLAND: 3L GASTN 115.00 END
DVP_P7-1: LN 22-90-B	CONTINGENCY 'DVP_P7-1: LN 22-90-B' OPEN BRANCH FROM BUS 925780 TO BUS 314702 CKT 1 /* AC1-054 TAP 115.00 - 3KERR 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314584 CKT 1 /* 3FIVEFORKSDP115.00 - 3LITTLTN 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314673 CKT 1 /* 3FIVEFORKSDP115.00 - 3PALMERSPRNG115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1 /* 3CAROLNA 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314584 TO BUS 314585 CKT 1 /* 3LITTLTN 115.00 - 3L GASTN 115.00 OPEN BUS 314265 /* ISLAND: 3FIVEFORKSDP115.00 OPEN BUS 314584 /* ISLAND: 3LITTLTN 115.00 OPEN BUS 314585 /* ISLAND: 3L GASTN 115.00 END
DVP_P1-3: 6FARMVIL-TX#4	CONTINGENCY 'DVP_P1-3: 6FARMVIL-TX#4' OPEN BRANCH FROM BUS 314691 TO BUS 314692 CKT 1 /* 3FARMVIL 115.00 - 6FARMVIL 230.00 END
DVP_P1-3: 6FARMVIL-TX#5	CONTINGENCY 'DVP_P1-3: 6FARMVIL-TX#5' OPEN BRANCH FROM BUS 314691 TO BUS 314692 CKT 2 /* 3FARMVIL 115.00 - 6FARMVIL 230.00 END
DVP_P4-2: 239T2141	CONTINGENCY 'DVP_P4-2: 239T2141' /* LAKEVIEW 230 KV OPEN BRANCH FROM BUS 314579 TO BUS 314583 CKT 1 /* 6HORNRTN 230.00 - 6LAKEVEW 230.00 OPEN BRANCH FROM BUS 314561 TO BUS 314583 CKT 1 /* 6CAROLNA 230.00 - 6LAKEVEW 230.00 END
Base Case	

Contingency Name	Contingency Definition
DVP_P1-2: LN 22-A	CONTINGENCY 'DVP_P1-2: LN 22-A' OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* 3EATON F 115.00 - AC1-054 TAP 115.00 OPEN BUS 314571 /* ISLAND: 3EATON F 115.00 END
DVP_P4-2: H2T2068	CONTINGENCY 'DVP_P4-2: H2T2068' /* SEDGE HILL 230 KV OPEN BRANCH FROM BUS 934610 TO BUS 314697 CKT 1 /* AD1-087 TAP 230.00 - 6SEDGE HILL 230.00 /* CONTINGENCY LINE ADDED FOR AE1 BUILD OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 2 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END
DVP_P1-3: 6CLUBHSE-TX#1	CONTINGENCY 'DVP_P1-3: 6CLUBHSE-TX#1' OPEN BRANCH FROM BUS 314562 TO BUS 314563 CKT 1 /* 3CLUBHSE 115.00 - 6CLUBHSE 230.00 END
DVP_P4-2: 3202	CONTINGENCY 'DVP_P4-2: 3202' /* SEDGE HILL 115 KV OPEN BRANCH FROM BUS 313852 TO BUS 314716 CKT 1 /* 3WELCOTAP 115.00 - 3REEDY C 115.00 OPEN BRANCH FROM BUS 313852 TO BUS 314718 CKT 1 /* 3WELCOTAP 115.00 - 3S BOSTN 115.00 OPEN BRANCH FROM BUS 313852 TO BUS 314724 CKT 1 /* 3WELCOTAP 115.00 - 3WELCO 115.00 OPEN BRANCH FROM BUS 314696 TO BUS 314717 CKT 1 /* 3SEDGE HILL 115.00 - 3SINAI 115.00 OPEN BRANCH FROM BUS 314717 TO BUS 314718 CKT 1 /* 3SINAI 115.00 - 3S BOSTN 115.00 OPEN BUS 313852 /* ISLAND: 3WELCOTAP 115.00 OPEN BUS 314717 /* ISLAND: 3SINAI 115.00 OPEN BUS 314718 /* ISLAND: 3S BOSTN 115.00 OPEN BUS 314724 /* ISLAND: 3WELCO 115.00 OPEN BRANCH FROM BUS 314696 TO BUS 314697 CKT 1 /* 3SEDGE HILL 115.00 - 6SEDGE HILL 230.00 END

12.5.2 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
1715604	313825	3PLYWOOD	DVP	314696	3SEDGE HILL	DVP	1	DVP_P1-2: LN 45	single	141.0	97.31	99.51	DC	3.1

Bus #	Bus	MW Impact
314429	3JTRSVLE	0.12
314704	3LAWRENC	0.09
315150	1BUGGS 1	22.56
315151	1BUGGS 2	22.56
315158	1KERR 1	0.26
315159	1KERR 2	1.05
315160	1KERR 3	1.03
315161	1KERR 4	1.03
315162	1KERR 5	1.03
315163	1KERR 6	1.03
315164	1KERR 7	1.03
315266	1PLYWOOD A	4.37
924021	AB2-043 C O1	0.28
924161	AB2-060 C O1	0.8
924301	AB2-077 C O1	0.21
924311	AB2-078 C O1	0.21
924321	AB2-079 C O1	0.21
924401	AB2-089 C	1.89
925611	AC1-036 C	0.07
925781	AC1-054 C O1	5.9
925831	AC1-062	0.02
934231	AD1-050 C	4.17
935221	AD1-157 C	0.07
935231	AD1-160 C	0.41
936261	AD2-033 C	7.81
936361	AD2-046 C O1	8.55
936481	AD2-063 C O1	10.07
938371	AE1-056 C	2.44
939181	AE1-148 C O1	8.32
939371	AE1-168 C	7.14
940241	AE2-006	0.28
940661	AE2-053	3.1
942451	AE2-258	1.73
942711	AE2-287 C O2	5.64
BLUEG	BLUEG	1.05
CALDERWOOD	CALDERWOOD	0.15
CANNELTON	CANNELTON	0.07
CARR	CARR	0.01
CATAWBA	CATAWBA	0.12
CHEOAH	CHEOAH	0.14
CHILHOWEE	CHILHOWEE	0.05
COFFEEN	COFFEEN	0.11

Bus #	Bus	MW Impact
COTTONWOOD	COTTONWOOD	0.53
DUCKCREEK	DUCKCREEK	0.24
EDWARDS	EDWARDS	0.11
ELMERSMITH	ELMERSMITH	0.12
FARMERCITY	FARMERCITY	0.08
GIBSON	GIBSON	0.04
HAMLET	HAMLET	0.18
NEWTON	NEWTON	0.29
PRAIRIE	PRAIRIE	0.58
RENSSELAER	RENSSELAER	0.01
SANTEETLA	SANTEETLA	0.04
SMITHLAND	SMITHLAND	0.05
TATANKA	TATANKA	0.13
TILTON	TILTON	0.13
TRIMBLE	TRIMBLE	0.12
TVA	TVA	0.45
UNIONPOWER	UNIONPOWER	0.21

12.5.3 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
1714205	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P4-6: CAROLINT122	breaker	208.6	199.16	200.42	DC	2.63

Bus #	Bus	MW Impact
314572	3EMPORIA	1.98
314704	3LAWRENC	0.89
315150	1BUGGS 1	8.31
315151	1BUGGS 2	8.31
315158	1KERR 1	0.19
315159	1KERR 2	0.79
315160	1KERR 3	0.78
315161	1KERR 4	0.78
315162	1KERR 5	0.78
315163	1KERR 6	0.78
315164	1KERR 7	0.78
923911	AB2-031 C O1	10.64
923912	AB2-031 E O1	5.24
923991	AB2-040 C O1	4.26
923992	AB2-040 E O1	28.58
924021	AB2-043 C O1	0.38
924022	AB2-043 E O1	5.17
924161	AB2-060 C O1	1.09
924162	AB2-060 E O1	4.21
924301	AB2-077 C O1	0.24
924302	AB2-077 E O1	1.29
924311	AB2-078 C O1	0.24
924312	AB2-078 E O1	1.29
924321	AB2-079 C O1	0.24
924322	AB2-079 E O1	1.29
924401	AB2-089 C	1.61
924402	AB2-089 E	0.83
925171	AB2-174 C O1	33.34
925172	AB2-174 E O1	30.17
925611	AC1-036 C	0.09
925612	AC1-036 E	0.68
925781	AC1-054 C O1	5.43
925782	AC1-054 E O1	2.5
931231	AB1-173 C	1.31
931232	AB1-173 E	5.0
931241	AB1-173AC	1.31
931242	AB1-173AE	5.0
934201	AD1-047 C	38.11
934202	AD1-047 E	25.4
934231	AD1-050 C	3.55
934232	AD1-050 E	1.94

Bus #	Bus	MW Impact
936261	AD2-033 C	10.76
936262	AD2-033 E	7.18
936361	AD2-046 C O1	7.05
936362	AD2-046 E O1	3.24
936481	AD2-063 C O1	13.78
936482	AD2-063 E O1	9.19
937571	AD2-169 C	47.63
937572	AD2-169 E	31.75
939181	AE1-148 C O1	7.07
939182	AE1-148 E O1	4.71
939371	AE1-168 C	10.05
939372	AE1-168 E	6.7
940241	AE2-006	0.38
940661	AE2-053	2.63
942371	AE2-250 C O2	42.87
942372	AE2-250 E O2	22.63
942451	AE2-258	2.35
942711	AE2-287 C O2	42.75
942712	AE2-287 E O2	28.5
CARR	CARR	0.04
CBM-S1	CBM-S1	0.53
CBM-S2	CBM-S2	0.43
CBM-W1	CBM-W1	0.63
CBM-W2	CBM-W2	3.49
CIN	CIN	0.29
CPLE	CPLE	0.17
G-007	G-007	0.13
IPL	IPL	0.18
LGEE	LGEE	0.09
MEC	MEC	0.59
MECS	MECS	0.29
O-066	O-066	0.85
RENSSELAER	RENSSELAER	0.03
WEC	WEC	0.08

12.5.4 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
7817407	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-2: LN 235-A-A	single	182.64	87.59	89.18	DC	2.89

Bus #	Bus	MW Impact
314429	3JTRSVLE	0.8
314704	3LAWRENC	0.15
315150	1BUGGS 1	9.74
315151	1BUGGS 2	9.74
315158	1KERR 1	0.2
315159	1KERR 2	0.83
315160	1KERR 3	0.82
315161	1KERR 4	0.82
315162	1KERR 5	0.82
315163	1KERR 6	0.82
315164	1KERR 7	0.82
315266	1PLYWOOD A	0.45
923911	AB2-031 C O1	0.73
923991	AB2-040 C O1	0.29
924021	AB2-043 C O1	0.47
924161	AB2-060 C O1	1.42
924301	AB2-077 C O1	0.29
924311	AB2-078 C O1	0.29
924321	AB2-079 C O1	0.29
924401	AB2-089 C	1.53
925171	AB2-174 C O1	2.32
925611	AC1-036 C	0.24
925781	AC1-054 C O1	4.85
925831	AC1-062	0.11
926271	AC1-105 C O1	3.12
927261	AC1-222 C	1.31
931231	AB1-173 C	0.09
931241	AB1-173AC	0.09
934201	AD1-047 C	2.6
934231	AD1-050 C	3.38
934311	AD1-055 C	0.91
935221	AD1-157 C	0.55
935231	AD1-160 C	3.31
936261	AD2-033 C	24.72
936331	AD2-043 C	1.7
936361	AD2-046 C O1	7.7
936481	AD2-063 C O1	23.29
937571	AD2-169 C	3.18
938371	AE1-056 C	19.49
939181	AE1-148 C O1	7.79
939371	AE1-168 C	37.77

Bus #	Bus	MW Impact
940241	AE2-006	1.0
940661	AE2-053	2.89
942371	AE2-250 C O2	3.12
942451	AE2-258	2.9
942461	AE2-259 C O2	36.82
942711	AE2-287 C O2	9.04
CARR	CARR	0.08
CBM-S1	CBM-S1	1.63
CBM-S2	CBM-S2	2.21
CBM-W1	CBM-W1	1.33
CBM-W2	CBM-W2	10.3
CIN	CIN	0.61
CPLE	CPLE	1.19
IPL	IPL	0.38
LGEE	LGEE	0.18
MEC	MEC	1.47
MECS	MECS	0.46
RENSSELAER	RENSSELAER	0.06
WEC	WEC	0.16

12.5.5 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1715053	940480	AE2-033 TAP	DVP	314435	6SAPONY	DVP	1	Base Case	single	598.78	99.57	100.03	DC	2.77

Bus #	Bus	MW Impact
314589	3MURPHYS	0.06
314704	3LAWRENC	0.48
315126	1ROARAP2	1.49
315128	1ROARAP4	1.44
315131	1EDGECMA	9.14
315132	1EDGECMB	9.14
315136	1ROSEMG1	2.85
315137	1ROSEMS1	1.77
315138	1ROSEMG2	1.33
315139	1GASTONA	4.23
315141	1GASTONB	4.23
315150	1BUGGS 1	7.91
315151	1BUGGS 2	7.91
315158	1KERR 1	0.22
315159	1KERR 2	0.9
315160	1KERR 3	0.89
315161	1KERR 4	0.89
315162	1KERR 5	0.89
315163	1KERR 6	0.89
315164	1KERR 7	0.89
917331	Z2-043 C	0.28
917341	Z2-044 C	0.17
917511	Z2-088 C OP1	0.93
918491	AA1-063AC OP	1.3
918511	AA1-065 C OP	0.88
918531	AA1-067 C	0.16
918561	AA1-072 C	0.04
919691	AA2-053 C	1.44
919701	AA2-057 C	7.57
920041	AA2-088 C OP	0.67
920591	AA2-165 C	0.13
920671	AA2-174 C	0.07
923911	AB2-031 C O1	4.56
923991	AB2-040 C O1	1.82
924021	AB2-043 C O1	0.3
924151	AB2-059 C O1	1.24
924161	AB2-060 C O1	0.85
924301	AB2-077 C O1	0.19
924311	AB2-078 C O1	0.19
924321	AB2-079 C O1	0.19
924401	AB2-089 C	2.07
924491	AB2-098 C	0.44

Bus #	Bus	MW Impact
924501	AB2-099 C	0.53
924511	AB2-100 C	34.46
925171	AB2-174 C O1	15.12
925591	AC1-034 C	6.59
925781	AC1-054 C O1	7.41
926071	AC1-086 C	39.07
926201	AC1-098 C	6.73
926211	AC1-099 C	2.25
927021	AC1-189 C	7.06
927141	AC1-208 C	10.63
930401	AB1-081 C O1	1.05
930861	AB1-132 C O1	3.23
931231	AB1-173 C	0.56
931241	AB1-173AC	0.56
932631	AC2-084 C	9.59
933991	AD1-023 C	8.18
934201	AD1-047 C	16.32
934231	AD1-050 C	4.56
934331	AD1-057 C O1	13.9
936261	AD2-033 C	8.28
936361	AD2-046 C O1	7.57
936401	AD2-051 C O1	7.99
936481	AD2-063 C O1	10.67
936531	AD2-068 C	3.46
936701	AD2-089 C	6.56
936711	AD2-090 C O1	5.0
937571	AD2-169 C	19.09
938171	AE1-026 C1 O	18.47
938172	AE1-026 C2 O	2.67
938221	AE1-035 C	1.81
938661	AE1-088	1.16
939071	AE1-135 C O1	64.7
939181	AE1-148 C O1	7.43
940241	AE2-006	0.29
940481	AE2-033 C	63.11
940521	AE2-037 C O2	6.28
940571	AE2-044 C	4.32
940661	AE2-053	2.77
941541	AE2-151 C	0.99
941951	AE2-207	2.79
942371	AE2-250 C O2	22.3
942451	AE2-258	1.83
942471	AE2-260 C O2	44.28
942711	AE2-287 C O2	23.55
943171	AE2-346 C	1.6
AA2-074	AA2-074	2.07
CARR	CARR	0.2
CBM-S1	CBM-S1	4.68
CBM-S2	CBM-S2	5.49
CBM-W1	CBM-W1	4.74
CBM-W2	CBM-W2	30.54
CIN	CIN	2.14

Bus #	Bus	MW Impact
CPLE	CPLE	3.05
IPL	IPL	1.34
LGEE	LGEE	0.62
MEC	MEC	4.74
MECS	MECS	2.01
RENSSELAER	RENSSELAER	0.16
WEC	WEC	0.57

12.5.6 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7579436	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	1	DVP_P4-2: H2T2068	breaker	264.5	87.07	88.18	DC	2.92

Bus #	Bus	MW Impact
315150	1BUGGS 1	16.56
315151	1BUGGS 2	16.56
315156	1HALLBR1	1.0
315165	1HURT 1	5.69
315166	1HURT 2	5.69
315266	1PLYWOOD A	2.43
924021	AB2-043 C O1	0.44
924022	AB2-043 E O1	5.94
924161	AB2-060 C O1	1.25
924162	AB2-060 E O1	4.84
924301	AB2-077 C O1	0.29
924302	AB2-077 E O1	1.58
924311	AB2-078 C O1	0.29
924312	AB2-078 E O1	1.58
924321	AB2-079 C O1	0.29
924322	AB2-079 E O1	1.58
924401	AB2-089 C	1.56
924402	AB2-089 E	0.8
925611	AC1-036 C	0.1
925612	AC1-036 E	0.78
925661	AC1-042 C	1.79
925662	AC1-042 E	2.92
925781	AC1-054 C O1	4.84
925782	AC1-054 E O1	2.23
925991	AC1-075 C	12.59
925992	AC1-075 E	7.13
926021	AC1-080 C	4.21
926022	AC1-080 E	2.37
926271	AC1-105 C O1	14.84
926272	AC1-105 E O1	7.39
926641	AC1-145 C	2.13
926642	AC1-145 E	3.48
927261	AC1-222 C	10.59
927262	AC1-222 E	10.08
934231	AD1-050 C	3.43
934232	AD1-050 E	1.88
934311	AD1-055 C	7.35
934312	AD1-055 E	1.9
935222	AD1-157 E	0.63
935231	AD1-160 C	0.69
935232	AD1-160 E	0.95

Bus #	Bus	MW Impact
936261	AD2-033 C	12.4
936262	AD2-033 E	8.26
936331	AD2-043 C	13.72
936332	AD2-043 E	16.24
936361	AD2-046 C O1	7.81
936362	AD2-046 E O1	3.59
936481	AD2-063 C O1	15.84
936482	AD2-063 E O1	10.56
938371	AE1-056 C	4.05
938372	AE1-056 E	2.21
939181	AE1-148 C O1	7.86
939182	AE1-148 E O1	5.24
939371	AE1-168 C	11.58
939372	AE1-168 E	7.72
939941	AE1-230 C1	0.81
939942	AE1-230 E1	0.54
939943	AE1-230 E2	0.48
940241	AE2-006	0.44
940661	AE2-053	2.92
941801	AE2-185 C	5.05
941802	AE2-185 E	1.68
941821	AE2-187 C	5.05
941822	AE2-187 E	1.68
942331	AE2-246	1.57
942451	AE2-258	2.7
942461	AE2-259 C O2	4.29
942462	AE2-259 E O2	2.86
942671	AE2-283 C	4.45
942672	AE2-283 E	2.34
942711	AE2-287 C O2	7.93
942712	AE2-287 E O2	5.28
942751	AE2-291 C O2	15.87
942752	AE2-291 E O2	10.58
942761	AE2-292 C O2	21.81
942762	AE2-292 E O2	14.54
BLUEG	BLUEG	2.18
CALDERWOOD	CALDERWOOD	0.66
CANNELTON	CANNELTON	0.16
CATAWBA	CATAWBA	0.78
CBM-N	CBM-N	0.03
CHEOAH	CHEOAH	0.62
CHILHOWEE	CHILHOWEE	0.21
COFFEEN	COFFEEN	0.29
COTTONWOOD	COTTONWOOD	2.09
DUCKCREEK	DUCKCREEK	0.57
EDWARDS	EDWARDS	0.25
ELMERSMITH	ELMERSMITH	0.3
FARMERCITY	FARMERCITY	0.22
G-007A	G-007A	0.16
GIBSON	GIBSON	0.1
HAMLET	HAMLET	1.48
NEWTON	NEWTON	0.74

Bus #	Bus	MW Impact
NYISO	NYISO	0.14
PRAIRIE	PRAIRIE	1.67
SANTEETLA	SANTEETLA	0.19
SMITHLAND	SMITHLAND	0.16
TATANKA	TATANKA	0.36
TILTON	TILTON	0.29
TRIMBLE	TRIMBLE	0.24
TVA	TVA	1.73
UNIONPOWER	UNIONPOWER	0.93
VFT	VFT	0.43

12.5.7 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
7579477	314696	3SEDGE HILL	DVP	314697	6SEDGE HILL	DVP	2	DVP_P4-2: 3202	breaker	279.1	83.8	85.02	DC	3.39

Bus #	Bus	MW Impact
315150	1BUGGS 1	18.94
315151	1BUGGS 2	18.94
315156	1HALLBR1	1.2
315165	1HURT 1	6.78
315166	1HURT 2	6.78
315266	1PLYWOOD A	2.78
924021	AB2-043 C O1	0.5
924022	AB2-043 E O1	6.68
924161	AB2-060 C O1	1.41
924162	AB2-060 E O1	5.44
924301	AB2-077 C O1	0.33
924302	AB2-077 E O1	1.78
924311	AB2-078 C O1	0.33
924312	AB2-078 E O1	1.78
924321	AB2-079 C O1	0.33
924322	AB2-079 E O1	1.78
924401	AB2-089 C	1.83
924402	AB2-089 E	0.94
925611	AC1-036 C	0.11
925612	AC1-036 E	0.84
925661	AC1-042 C	2.17
925662	AC1-042 E	3.54
925781	AC1-054 C O1	5.69
925782	AC1-054 E O1	2.62
925991	AC1-075 C	14.49
925992	AC1-075 E	8.21
926021	AC1-080 C	4.84
926022	AC1-080 E	2.72
926271	AC1-105 C O1	16.91
926272	AC1-105 E O1	8.42
926641	AC1-145 C	2.58
926642	AC1-145 E	4.21
927261	AC1-222 C	12.1
927262	AC1-222 E	11.52
934231	AD1-050 C	4.03
934232	AD1-050 E	2.2
934311	AD1-055 C	8.4
934312	AD1-055 E	2.17
935222	AD1-157 E	0.61
935231	AD1-160 C	0.67
935232	AD1-160 E	0.92
936261	AD2-033 C	13.5

Bus #	Bus	MW Impact
936262	AD2-033 E	9.0
936331	AD2-043 C	15.68
936332	AD2-043 E	18.56
936361	AD2-046 C O1	9.1
936362	AD2-046 E O1	4.18
936481	AD2-063 C O1	17.58
936482	AD2-063 E O1	11.72
938371	AE1-056 C	3.94
938372	AE1-056 E	2.15
939181	AE1-148 C O1	9.12
939182	AE1-148 E O1	6.08
939371	AE1-168 C	12.01
939372	AE1-168 E	8.01
939941	AE1-230 C1	0.98
939942	AE1-230 E1	0.65
939943	AE1-230 E2	0.58
940241	AE2-006	0.47
940661	AE2-053	3.39
941801	AE2-185 C	6.11
941802	AE2-185 E	2.04
941821	AE2-187 C	6.11
941822	AE2-187 E	2.04
942331	AE2-246	1.89
942451	AE2-258	3.04
942671	AE2-283 C	5.38
942672	AE2-283 E	2.82
942711	AE2-287 C O2	8.86
942712	AE2-287 E O2	5.91
942751	AE2-291 C O2	18.4
942752	AE2-291 E O2	12.26
942761	AE2-292 C O2	25.2
942762	AE2-292 E O2	16.8
CALDERWOOD	CALDERWOOD	0.15
CARR	CARR	0.03
CATAWBA	CATAWBA	0.3
CBM-W1	CBM-W1	0.38
CHEOAH	CHEOAH	0.14
CHILHOWEE	CHILHOWEE	0.05
CIN	CIN	0.21
COTTONWOOD	COTTONWOOD	0.39
FARMERCITY	FARMERCITY	0.0
G-007	G-007	0.12
HAMLET	HAMLET	0.67
IPL	IPL	0.14
LGEE	LGEE	0.07
MEC	MEC	0.07
MECS	MECS	0.37
O-066	O-066	0.73
PRAIRIE	PRAIRIE	0.02
RENSSELAER	RENSSELAER	0.02
SANTEETLA	SANTEETLA	0.04
SMITHLAND	SMITHLAND	0.01

Bus #	Bus	MW Impact
TVA	TVA	0.29
UNIONPOWER	UNIONPOWER	0.23
WEC	WEC	0.05

12.5.8 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1715153	314559	3CAROLNA	DVP	314561	6CAROLNA	DVP	1	DVP_P1-2: LN 1029-A	single	239.89	106.46	107.61	DC	2.76

Bus #	Bus	MW Impact
314589	3MURPHYS	0.07
315115	1S HAMPT1	1.04
315126	1ROARAP2	2.72
315128	1ROARAP4	2.62
315150	1BUGGS 1	6.59
315151	1BUGGS 2	6.59
315158	1KERR 1	0.24
315159	1KERR 2	0.98
315160	1KERR 3	0.97
315161	1KERR 4	0.97
315162	1KERR 5	0.97
315163	1KERR 6	0.97
315164	1KERR 7	0.97
917331	Z2-043 C	0.18
917341	Z2-044 C	0.06
918491	AA1-063AC OP	1.85
918561	AA1-072 C	0.03
919691	AA2-053 C	2.33
919701	AA2-057 C	4.8
920041	AA2-088 C OP	1.0
920591	AA2-165 C	0.08
920671	AA2-174 C	0.11
923801	AB2-015 C O1	7.22
923911	AB2-031 C O1	6.02
923991	AB2-040 C O1	2.41
924021	AB2-043 C O1	0.18
924161	AB2-060 C O1	0.5
924301	AB2-077 C O1	0.11
924311	AB2-078 C O1	0.11
924321	AB2-079 C O1	0.11
924401	AB2-089 C	2.63
924501	AB2-099 C	0.35
925171	AB2-174 C O1	18.86
925611	AC1-036 C	0.04
925781	AC1-054 C O1	10.08
926201	AC1-098 C	5.83
926211	AC1-099 C	1.95
927141	AC1-208 C	11.31
931231	AB1-173 C	0.74
931241	AB1-173AC	0.74
932631	AC2-084 C	8.31

Bus #	Bus	MW Impact
934201	AD1-047 C	21.55
934231	AD1-050 C	5.8
936261	AD2-033 C	4.93
936361	AD2-046 C O1	7.71
936401	AD2-051 C O1	3.91
936481	AD2-063 C O1	6.31
936711	AD2-090 C O1	7.43
937571	AD2-169 C	26.94
938771	AE1-103 C O1	2.68
939181	AE1-148 C O1	7.39
939371	AE1-168 C	4.6
940241	AE2-006	0.17
940661	AE2-053	2.76
941541	AE2-151 C	0.48
942451	AE2-258	1.08
943171	AE2-346 C	1.05
CARR	CARR	0.04
CBM-S1	CBM-S1	0.24
CBM-S2	CBM-S2	0.23
CBM-W1	CBM-W1	0.2
CBM-W2	CBM-W2	1.46
CIN	CIN	0.1
CPLE	CPLE	0.09
IPL	IPL	0.06
LGEE	LGEE	0.03
MEC	MEC	0.22
MECS	MECS	0.06
RENSSELAER	RENSSELAER	0.03
WEC	WEC	0.03

12.5.9 Index 8

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1714639	314563	6CLUBHSE	DVP	314562	3CLUBHSE	DVP	1	DVP_P4-2: 239T2141	breaker	208.6	107.24	108.38	DC	2.38

Bus #	Bus	MW Impact
315139	1GASTONA	2.86
315141	1GASTONB	2.86
923851	AB2-025 C	0.2
923852	AB2-025 E	0.75
924511	AB2-100 C	14.29
924512	AB2-100 E	7.04
926071	AC1-086 C	26.38
926072	AC1-086 E	12.01
930861	AB1-132 C O1	2.18
930862	AB1-132 E O1	7.68
934233	AD1-050 BAT	5.54
939071	AE1-135 C O1	25.59
939072	AE1-135 E O1	17.06
940481	AE2-033 C	11.96
940482	AE2-033 E	8.07
940662	AE2-053 BAT	2.38
942471	AE2-260 C O2	17.64
942472	AE2-260 E O2	25.01
BLUEG	BLUEG	1.94
CALDERWOOD	CALDERWOOD	0.41
CANNELTON	CANNELTON	0.13
CATAWBA	CATAWBA	0.4
CBM-N	CBM-N	0.15
CHEOAH	CHEOAH	0.39
CHILHOWEE	CHILHOWEE	0.13
COFFEEN	COFFEEN	0.23
COTTONWOOD	COTTONWOOD	1.37
DUCKCREEK	DUCKCREEK	0.46
EDWARDS	EDWARDS	0.21
ELMERSMITH	ELMERSMITH	0.24
FARMERCITY	FARMERCITY	0.16
G-007A	G-007A	0.58
GIBSON	GIBSON	0.08
HAMLET	HAMLET	0.78
NEWTON	NEWTON	0.59
NYISO	NYISO	0.63
PRAIRIE	PRAIRIE	1.25
SANTEETLA	SANTEETLA	0.11
SMITHLAND	SMITHLAND	0.11
TATANKA	TATANKA	0.28
TILTON	TILTON	0.24

Bus #	Bus	MW Impact
TRIMBLE	TRIMBLE	0.21
TVA	TVA	1.15
UNIONPOWER	UNIONPOWER	0.57
VFT	VFT	1.54

12.5.10 Index 9

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1715804	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P7-1: LN 22-90-A	tower	199.0	159.8	163.04	DC	6.43

Bus #	Bus	MW Impact
315150	1BUGGS 1	15.54
315151	1BUGGS 2	15.54
315158	1KERR 1	0.56
315159	1KERR 2	2.26
315160	1KERR 3	2.23
315161	1KERR 4	2.23
315162	1KERR 5	2.23
315163	1KERR 6	2.23
315164	1KERR 7	2.23
924022	AB2-043 E O1	6.02
924162	AB2-060 E O1	4.91
924302	AB2-077 E O1	1.58
924312	AB2-078 E O1	1.58
924322	AB2-079 E O1	1.58
924401	AB2-089 C	4.63
924402	AB2-089 E	2.38
925612	AC1-036 E	0.79
925781	AC1-054 C O1	15.59
925782	AC1-054 E O1	7.18
926271	AC1-105 C O1	2.87
926272	AC1-105 E O1	1.43
934231	AD1-050 C	10.2
934232	AD1-050 E	5.57
935222	AD1-157 E	0.64
935231	AD1-160 C	0.7
935232	AD1-160 E	0.97
936261	AD2-033 C	12.59
936262	AD2-033 E	8.39
936361	AD2-046 C O1	17.92
936362	AD2-046 E O1	8.24
936481	AD2-063 C O1	16.07
936482	AD2-063 E O1	10.71
938371	AE1-056 C	4.14
938372	AE1-056 E	2.26
939181	AE1-148 C O1	17.24
939182	AE1-148 E O1	11.49
939371	AE1-168 C	11.8
939372	AE1-168 E	7.86
940241	AE2-006	0.45
940661	AE2-053	6.43
942451	AE2-258	2.74

Bus #	Bus	MW Impact
942461	AE2-259 C O2	4.43
942462	AE2-259 E O2	2.95
942711	AE2-287 C O2	7.58
942712	AE2-287 E O2	5.05
BLUEG	BLUEG	1.99
CALDERWOOD	CALDERWOOD	0.42
CANNELTON	CANNELTON	0.14
CATAWBA	CATAWBA	0.43
CBM-N	CBM-N	0.0
CHEOAH	CHEOAH	0.39
CHILHOWEE	CHILHOWEE	0.14
COFFEEN	COFFEEN	0.23
COTTONWOOD	COTTONWOOD	1.4
DUCKCREEK	DUCKCREEK	0.48
EDWARDS	EDWARDS	0.21
ELMERSMITH	ELMERSMITH	0.24
FARMERCITY	FARMERCITY	0.17
G-007A	G-007A	0.08
GIBSON	GIBSON	0.09
HAMLET	HAMLET	0.82
NEWTON	NEWTON	0.61
NYISO	NYISO	0.01
PRAIRIE	PRAIRIE	1.28
SANTEETLA	SANTEETLA	0.12
SMITHLAND	SMITHLAND	0.11
TATANKA	TATANKA	0.29
TILTON	TILTON	0.25
TRIMBLE	TRIMBLE	0.22
TVA	TVA	1.17
UNIONPOWER	UNIONPOWER	0.59
VFT	VFT	0.21

Short Circuit

12.6 Short Circuit

The following Breakers are overduty: None

Affected Systems

13 Affected Systems

13.1 LG&E

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

13.2 MISO

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

13.3 TVA

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

13.4 Duke Energy Progress

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

13.5 NYISO

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

Attachment 1

System Configuration