



Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-258

CHASE CITY 115 KV

14.1 MW Capacity / 0 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 approximate cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

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

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

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

Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

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

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Orange County, Virginia. This project is an increase to the Interconnection Customer's AB2-043 project, which will share the same property and point of interconnection. The AE2-258 queue position is a 14.1 MW capacity-only uprate to the previous project. The total installed facilities will have a capability of 49.9 MW with 33 MW of this output being recognized by PJM as capacity.

Queue Number	AE2-258
Project Name	CHASE CITY 115 KV
Interconnection Customer	
State	Virginia
County	Mecklenburg
Transmission Owner	Dominion
MFO	49.9
MWE	0
MWC	14.1
Fuel	Solar
Basecase Study Year	2022

3.1 Point of Interconnection

AE2-258 is an uprate to the AB2-043 queue position which will interconnect with the Dominion transmission system at the Chase City 115 kV substation.

3.2 Cost Summary

The AE2-258 project will be responsible for the following costs:

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

Description	Total Cost
Total Costs	\$ 0

In addition, the AE2-258 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$ 29,768,000

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 AE2-258 was evaluated as a 14.1 MW Capacity (0.0 MW energy) injection at the Chase City 115 kV 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 AE2-258 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 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
Rebuild the Danville-East Danville 138kV circuit	\$ 9,000,000
Add additional 230/115 kV transformer at Clubhouse substation	\$ 6,000,000
Rebuild 4.7 miles of 115 kV Line 45 from Kerr Dam to GW King Tap	\$ 6,123,000
Rebuild 6.65 miles of 115 kV Line 151 from Plywood to Sedge Hill	\$ 8,645,000
Total Non-Direct Connection Facility Costs	\$ 29,768,000

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.

6 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.

7 Transmission Owner Analysis

7.1 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 AE2-253 project contributes to overloads on the Dominion transmission system as shown in the “Network Impact” section of the report. The estimated cost of system reinforcements necessary to mitigate these overloads is also provided.

7.2 Short Circuit Analysis

PJM performed a short circuit analysis and the results were verified by Dominion. The connection of AE2-253 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

7.3 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.

8 Interconnection Customer Requirements

8.1 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.

8.2 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.

8.3 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.

9 Revenue Metering and SCADA Requirements

9.1 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.

9.1.1 Meteorological Data Reporting Requirement

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

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

9.2 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>.

10 Network Impacts

The Queue Project AE2-258 was evaluated as a Capacity-only 14.1 MW uprate to the AB2-043 queue position which is an injection at the Chase City 115 kV substation in the Dominion area. Project AE2-258 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-258 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

10.1 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
7298700	242631	05EDAN 1	AEP	242620	05DANVL2	AEP	1	AEP_P1-2_#8677	single	402.0	99.82	100.01	DC	0.78
8056064	313825	3PLYWOOD	DVP	314696	3SEEDGE HILL	DVP	1	DVP_P1-2: LN 45	single	141.0	99.43	100.66	DC	1.73
8055045	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	Base Case	single	176.81	90.37	91.4	DC	1.82

10.2 Multiple Facility Contingency

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

None

10.3 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
8055040	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-2: LN 130-A	single	182.64	123.28	124.39	DC	2.02
8055041	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-3: 6CAROLNA-TX#4	single	182.64	119.65	120.83	DC	2.15
8055700	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 296-B	single	199.0	120.23	121.31	DC	2.15
8055701	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 6002_FSA	single	199.0	120.63	121.63	DC	1.99
8055702	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 570	single	199.0	120.63	121.63	DC	1.99
8055703	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 570_FSA	single	199.0	120.63	121.63	DC	1.99
8055705	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	Base Case	single	199.0	108.6	109.61	DC	2.0

10.4 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
8056061	313825	3PLYWOOD	DVP	314696	3SEEDGE HILL	DVP	1	DVP_P1-2: LN 33-B	operation	141.0	114.79	116.23	DC	2.21
8055034	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-2: LN 130-A	operation	182.64	184.31	185.41	DC	2.02
8055039	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	Base Case	operation	176.81	141.03	142.06	DC	1.82
8055354	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	DVP_P1-2: LN 235-A-A	operation	182.64	139.9	141.49	DC	2.9
8055361	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	2	Base Case	operation	176.81	75.31	76.35	DC	1.83
8055618	314691	3FARMVIL	DVP	314692	6FARMVIL	DVP	1	DVP_P1-3: 6FARMVIL-TX#5	operation	198.06	116.07	117.55	DC	2.92
8055863	314696	3SEEDGE HILL	DVP	314697	6SEEDGE HILL	DVP	1	DVP_P1-3: 6SEEDGE HILL-TX#2	operation	226.73	98.84	100.19	DC	3.05
8056045	314696	3SEEDGE HILL	DVP	314697	6SEEDGE HILL	DVP	2	DVP_P1-3: 6SEEDGE HILL-TX#1	operation	256.06	87.25	88.43	DC	3.04
8055694	314702	3KERR	DVP	304102	3GW KING TAP	CPL	1	DVP_P1-2: LN 296-B	operation	199.0	143.38	143.87	DC	2.15
8055699	314702	3KERR	DVP	304102	3GW KING TAP	CPL	1	Base Case	operation	199.0	129.55	130.01	DC	2.0
8056256	314707	3MORAN	DVP	314691	3FARMVIL	DVP	1	DVP_P1-2: LN 84	operation	203.98	98.26	99.4	DC	2.33

10.5 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
7298700	1	05EDAN 1 138.0 kV - 05DANVL2 138.0 kV Ckt 1	<u>AEP</u> n6124 (75) : PJM Network Upgrade n6124. Increasing the Danville - East Danville 138 kV circuit summer rating to 572/572/572 MVA will require a rebuild of the line. The network project has a projected in-service date of 06/01/2021. Project Type : FAC Cost : \$9,000,000 Time Estimate : Months	\$9,000,000
8055045,8055041, 8055040	3	3CLUBHSE 115.0 kV - 6CLUBHSE 230.0 kV Ckt 1	<u>DVP</u> dom-010 (386) : Add additional 230/115 kV transformer at Clubhouse substation. Project Type : CON Cost : \$6,000,000 Time Estimate : 16-18 Months	\$6,000,000
8055705,8055702,8055703,8055700,8055701	5	3KERR 115.0 kV - 3GW KING TAP 115.0 kV Ckt 1	<u>CPLE</u> NonPJM Area (322) : 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 <u>DVP</u> dom-002 (372) : 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	\$6,123,000
8056064	2	3PLYWOOD 115.0 kV - 3SEEDGE HILL 115.0 kV Ckt 1	<u>DVP</u> dom-080 (496) : Rebuild 6.65 miles of 115 kV Line 151 from Plywood to Sedge Hill with 636 ACSR. Project Type : FAC Cost : \$8,645,000 Time Estimate : 30-36 Months	\$8,645,000
			TOTAL COST	\$29,768,000

10.6 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.

10.6.1 Contingency Descriptions

10.6.2 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
7298700	242631	05EDAN 1	AEP	242620	05DANVL2	AEP	1	AEP_P1- 2_#8677	single	402.0	99.82	100.01	DC	0.78

Bus #	Bus	MW Impact
315126	1ROARAP2	0.3
315131	1EDGECSMA	3.48
315132	1EDGECSMB	3.48
315136	1ROSEMG1	0.48
315137	1ROSEMS1	0.3
315138	1ROSEMG2	0.23
315150	1BUGGS 1	4.08
315151	1BUGGS 2	4.08
315153	1CLOVER1	2.77
315154	1CLOVER2	2.74
315158	1KERR 1	0.1
315159	1KERR 2	0.39
315160	1KERR 3	0.39
315161	1KERR 4	0.39
315162	1KERR 5	0.39
315163	1KERR 6	0.39
315164	1KERR 7	0.39
315266	1PLYWOOD A	0.34
917341	Z2-044 C	0.06
917511	Z2-088 C OP1	0.37
918531	AA1-067 C	0.07
919701	AA2-057 C	2.49
920591	AA2-165 C	0.04
924021	AB2-043 C O1	0.13
924151	AB2-059 C O1	0.48
924161	AB2-060 C O1	0.36
924301	AB2-077 C O1	0.08
924311	AB2-078 C O1	0.08
924321	AB2-079 C O1	0.08
924401	AB2-089 C	0.78
924491	AB2-098 C	0.18
925591	AC1-034 C	2.56
925781	AC1-054 C O1	2.58
926051	AC1-083 C O1	4.21
926201	AC1-098 C	1.99
926211	AC1-099 C	0.67
926271	AC1-105 C O1	2.08
927021	AC1-189 C	2.83
927141	AC1-208 C	2.98
927251	AC1-221 C	1.41
927261	AC1-222 C	1.36
930401	AB1-081 C O1	0.41

Bus #	Bus	MW Impact
932631	AC2-084 C	2.83
932761	AC2-100 C	3.23
933941	AD1-017 C	0.84
934231	AD1-050 C	1.71
934311	AD1-055 C	0.94
934331	AD1-057 C O1	3.37
934341	AD1-058 C	3.52
934611	AD1-087 C O1	2.92
934991	AD1-131 C	1.16
935171	AD1-152 C O1	2.9
936161	AD2-022 C O1	10.28
936171	AD2-023 C O1	5.91
936261	AD2-033 C	3.95
936331	AD2-043 C	1.76
936361	AD2-046 C O1	3.27
936481	AD2-063 C O1	4.76
936531	AD2-068 C	1.85
936701	AD2-089 C	2.55
937481	AD2-202 C O1	0.8
939181	AE1-148 C O1	3.21
940081	AE1-250 C	14.56
940571	AE2-044 C	1.68
940661	AE2-053	1.2
941951	AE2-207	1.08
942451	AE2-258	0.78
AA2-074	AA2-074	2.97
BLUEG	BLUEG	5.47
CANNELTON	CANNELTON	0.26
CBM-N	CBM-N	0.1
CBM-S2	CBM-S2	6.35
COFFEEN	COFFEEN	0.42
CPL	CPL	4.36
DUCKCREEK	DUCKCREEK	0.99
EDWARDS	EDWARDS	0.47
ELMERSMITH	ELMERSMITH	0.43
FARMERCITY	FARMERCITY	0.21
G-007A	G-007A	0.64
GIBSON	GIBSON	0.2
NEWTON	NEWTON	1.15
NYISO	NYISO	0.41
PRAIRIE	PRAIRIE	1.53
SMITHLAND	SMITHLAND	0.08
TATANKA	TATANKA	0.45
TILTON	TILTON	0.61
TRIMBLE	TRIMBLE	0.62
VFT	VFT	1.69

10.6.3 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
8056064	313825	3PLYWOOD	DVP	314696	3SEEDGE HILL	DVP	1	DVP_P1-2: LN 45	single	141.0	99.43	100.66	DC	1.73

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
RENSELAER	RENSELAER	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

10.6.4 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
8055040	314562	3CLUBHSE	DVP	314563	6CLUBHSE	DVP	1	DVP_P1-2: LN 130-A	single	182.64	123.28	124.39	DC	2.02

Bus #	Bus	MW Impact
923911	AB2-031 C O1	10.6581
923991	AB2-040 C O1	4.2644
925171	AB2-174 C O1	33.406
931231	AB1-173 C	1.3084
931241	AB1-173AC	1.3084
934201	AD1-047 C	38.1782
937571	AD2-169 C	47.7228
314704	3LAWRENC	0.8828
942711	AE2-287 C O1	42.7939
924021	AB2-043 C O1	0.3296
942451	AE2-258	2.0181
924161	AB2-060 C O1	0.9358
924301	AB2-077 C O1	0.2008
924311	AB2-078 C O1	0.2008
924321	AB2-079 C O1	0.2008
936481	AD2-063 C O1	11.8314
936261	AD2-033 C	9.2414
925611	AC1-036 C	0.0783
940241	AE2-006	0.3271
939371	AE1-168 C	8.6211
315150	1BUGGS 1	6.3825
315151	1BUGGS 2	6.3825
939181	AE1-148 C O1	4.948
940661	AE2-053	1.8418
936361	AD2-046 C O1	4.8482
314429	3JTRSVLE	0.1457
925831	AC1-062	0.0198
315158	1KERR 1	0.1248
315159	1KERR 2	0.5088
315160	1KERR 3	0.5012
315161	1KERR 4	0.5012
315162	1KERR 5	0.5012
315163	1KERR 6	0.5012
315164	1KERR 7	0.5012
935221	AD1-157 C	0.0851
935231	AD1-160 C	0.5124
938371	AE1-056 C	3.012
924401	AB2-089 C	0.8707
934231	AD1-050 C	1.9194
926271	AC1-105 C O1	2.0331
925781	AC1-054 C O1	2.6095

Bus #	Bus	MW Impact
942461	AE2-259 C O1	3.18
315266	1PLYWOOD A	0.283
CPLE	CPLE	0.1541
CBM-S2	CBM-S2	0.3624
CBM-S1	CBM-S1	0.425
CBM-W2	CBM-W2	2.806
MEC	MEC	0.4666
LGEE	LGEE	0.0681
RENSSELAER	RENSSELAER	0.0279
CARR	CARR	0.0349
CIN	CIN	0.2278
IPL	IPL	0.1449
WEC	WEC	0.0598
CBM-W1	CBM-W1	0.4864
MECS	MECS	0.217

10.6.5 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
8055702	314702	3KERR	DVP	304102	3GW KING TAP	CPLE	1	DVP_P1-2: LN 570	single	199.0	120.63	121.63	DC	1.99

Bus #	Bus	MW Impact
315158	1KERR 1	0.3953
315159	1KERR 2	1.6117
315160	1KERR 3	1.5874
315161	1KERR 4	1.5874
315162	1KERR 5	1.5874
315163	1KERR 6	1.5874
315164	1KERR 7	1.5874
936361	AD2-046 C O1	12.7816
939181	AE1-148 C O1	12.3039
940661	AE2-053	4.5798
924401	AB2-089 C	2.9022
934231	AD1-050 C	6.3979
925781	AC1-054 C O1	9.0291
315150	1BUGGS 1	11.0814
315151	1BUGGS 2	11.0814
924301	AB2-077 C O1	0.2095
924311	AB2-078 C O1	0.2095
924321	AB2-079 C O1	0.2095
924021	AB2-043 C O1	0.3249
942451	AE2-258	1.9889
924161	AB2-060 C O1	0.9236
936481	AD2-063 C O1	11.6982
936261	AD2-033 C	9.1845
925611	AC1-036 C	0.078
940241	AE2-006	0.3256
939371	AE1-168 C	8.6562
314429	3JTRSVLE	0.1472
925831	AC1-062	0.02
942711	AE2-287 C O1	6.6604
935221	AD1-157 C	0.0865
935231	AD1-160 C	0.5205
938371	AE1-056 C	3.0602
314704	3LAWRENC	0.1138
315266	1PLYWOOD A	0.3647
315126	1ROARAP2	0.3854
315128	1ROARAP4	0.3707
937571	AD2-169 C	3.5064
926271	AC1-105 C O1	1.9684
923911	AB2-031 C O1	0.7617
923991	AB2-040 C O1	0.3047
931231	AB1-173 C	0.0935

Bus #	Bus	MW Impact
931241	AB1-173AC	0.0935
934201	AD1-047 C	2.7283
942461	AE2-259 C O1	3.3294
925171	AB2-174 C O1	2.326
919691	AA2-053 C	0.3476
920671	AA2-174 C	0.0159
HAMLET	HAMLET	1.3766
CATAWBA	CATAWBA	0.7108
SANTEETLA	SANTEETLA	0.1982
CHEOAH	CHEOAH	0.6672
CALDERWOOD	CALDERWOOD	0.7142
CHILHOWEE	CHILHOWEE	0.2313
UNIONPOWER	UNIONPOWER	0.9936
TVA	TVA	1.9915
COTTONWOOD	COTTONWOOD	2.3709
SMITHLAND	SMITHLAND	0.1947
PRAIRIE	PRAIRIE	2.1878
FARMERCITY	FARMERCITY	0.2902
ELMERSMITH	ELMERSMITH	0.4142
TATANKA	TATANKA	0.4908
CANNELTON	CANNELTON	0.2342
COFFEEN	COFFEEN	0.4017
NEWTON	NEWTON	1.0438
DUCKCREEK	DUCKCREEK	0.8233
GIBSON	GIBSON	0.148
EDWARDS	EDWARDS	0.3675
TILTON	TILTON	0.4334
BLUEG	BLUEG	3.4319
TRIMBLE	TRIMBLE	0.3768
G-007A	G-007A	0.3428
VFT	VFT	0.903
CBM-N	CBM-N	0.0631
NYISO	NYISO	0.2737

Affected Systems

11 Affected Systems

11.1 LG&E

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

11.2 MISO

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

11.3 TVA

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

11.4 Duke Energy Progress

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

11.5 NYISO

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

Short Circuit

12 Short Circuit

The following Breakers are overduty: None

Attachment 1

System Configuration

