



Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-013

ARNOLD'S CORNER-DAHLGREN 230 KV

100 MW Capacity / 100 MW Energy

July 2020

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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 Dominion.

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.

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

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

3 General

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

Queue Number	AF2-013
Project Name	ARNOLD'S CORNER-DAHLGREN 230 KV
State	Virginia
County	King George
Transmission Owner	Dominion
MFO	100
MWE	100
MWC	100
Fuel	Storage
Basecase Study Year	2023

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

4 Point of Interconnection

AF2-013 will interconnect with the Dominion transmission system. The primary POI is a single line tap between Arnold's Corner 230 kV substation and Dahlgren 230 kV substation. The IC is responsible for securing right-of-way, permits and constructing the proposed attachment line from the storage facility site to the proposed new substation. Attachment 1 shows a one-line diagram of the proposed interconnection facilities. The IC may not install any facilities on Dominion's right-of-way without first obtaining the necessary approval from Dominion Energy.

There is no secondary point of interconnection specified for AF2-013.

5 Cost Summary

The AF2-013 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$ 10,400,000
Total System Network Upgrade Costs	\$125,112,000
Total Costs	\$135,512,000

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

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

6 Transmission Owner Scope of Work

Dominion assessed the impact of the proposed Queue Project AF2-013 was evaluated as a 100 MW Capacity (100.0 MW Energy) injection at a single line tap between Arnold's Corner 230 kV substation and Dahlgren 230 kV substation in the Dominion Transmission System, for compliance with NERC Reliability Criteria on Dominion Transmission System. The system was assessed using the summer 2023 AF2 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 Planning Event 3 and 6 Contingency Conditions (Loss of generator, transmission circuit, transformer, shunt device, or Single Pole of a DC line followed by the loss of a generator, transmission circuit, transformer, shunt device or single pole of a DC line) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For Dominion Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of the AF2-013 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.

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

Description	Total Cost
Attachment Facilities	\$ 2,100,000
Three breaker 230kV ring-bus substation	\$ 6,500,000
Re-arrange line and tie-in new substation	\$ 1,800,000
Total Physical Interconnection Costs	\$ 10,400,000

It is estimated to take 24-30 months to complete this work upon execution of an Interconnection Construction Service Agreement (ICSA). These preliminary cost estimates are based on typical engineering costs. A more detailed engineering cost estimates are normally done when the IC provides an exact site plan location for the generation substation during the Facility Study phase. See Attachment One.

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 2023 summer peak load flow model and the results were verified by Dominion. Additionally, Dominion performed an analysis of its transmission system and no further deficiencies were identified.

9 Interconnection Customer Requirements

9.1 System Protection

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

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

9.2 Compliance Issues and Interconnection Customer Requirements

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

1. The purchase and installation of a fully rated protection device (circuit breaker, circuit switcher, fuse) to protect the IC's GSU transformer(s).
2. The purchase and installation of the minimum required Dominion generation interconnection relaying and control facilities as described in the System Protection 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 Interconnected Transmission Owner 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 Summer Peak - Load Flow Analysis

The Queue Project AF2-013 was evaluated as a 100.0 MW (Capacity 100.0 MW) injection tapping the Arnold's Corner to Dahlgren 230 kV line in the Dominion area. Project AF2-013 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-013 was studied with a commercial probability of 53%. Potential network impacts were as follows:

11.1 Generation Deliverability

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

None

11.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
9707297	31388	3GREYSP	115.	DVP	31417	3HARMON	115.	DVP	1	DVP_P4-2: 2083T2090	breaker	169.0	94.87	105.71	DC	18.32

11.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
97866816	314134	6CRANES	230.0	DVP	314142	6STAFORD	230.0	DVP	1	DVP_P1-2: LN 2089	single	678.679992676	106.68	112.2	DC	38.37
97866818	314134	6CRANES	230.0	DVP	314142	6STAFORD	230.0	DVP	1	DVP_P1-2: LN 568	single	678.679992676	102.68	107.03	DC	29.79
97866791	314197	6LDYSMITH CT	230.0	DVP	314196	6LADYSMITH	230.0	DVP	1	3142226HANOVER 230 939750 AE1-206 TAP 2301	single	1151.5	119.61	122.32	DC	31.2
97866792	314197	6LDYSMITH CT	230.0	DVP	314196	6LADYSMITH	230.0	DVP	1	DVP_P1-2: LN 2032-B	single	1151.5	119.52	122.23	DC	31.2
97866888	314212	6FOUR RIVERS	230.0	DVP	939750	AE1-206 TAP	230.0	DVP	1	DVP_P1-2: LN 2089	single	1123.30004883	100.65	102.34	DC	19.0
97866621	314222	6HANOVER	230.0	DVP	314218	6ELMONT	230.0	DVP	1	DVP_P1-2: LN 2089	single	1123.30004883	118.25	119.94	DC	19.0
96810801	314903	8CHCKAHM	500.0	DVP	314908	8ELMONT	500.0	DVP	1	DVP_P1-2: LN 2083	single	2442.12011719	138.95	139.28	DC	28.58
97866579	939750	AE1-206 TAP	230.0	DVP	314222	6HANOVER	230.0	DVP	1	DVP_P1-2: LN 2089	single	1123.30004883	124.45	126.15	DC	19.0

11.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
97073282	313886	3GREYSPT	115.0	DVP	314174	3HARMONY	115.0	DVP	1	DVP_P1-2: LN 2083	operation	138.179992676	115.96	129.22	DC	18.32
97866812	314134	6CRANES	230.0	DVP	314142	6STAFORD	230.0	DVP	1	DVP_P1-2: LN 2089	operation	678.679992676	119.15	124.81	DC	38.37
97866923	314142	6STAFORD	230.0	DVP	314145	6AQUI_HARB_B	230.0	DVP	1	DVP_P1-2: LN 2089	operation	678.679992676	103.94	109.6	DC	38.37
97866962	314144	6AQUI_HARB_A	230.0	DVP	314105	6AQUIA	230.0	DVP	1	DVP_P1-2: LN 2089	operation	678.679992676	97.68	103.34	DC	38.37
97866696	314172	6DUNNSVL	230.0	DVP	314388	6LANEXA	230.0	DVP	1	DVP_P1-2: LN 2083	operation	362.839996338	107.05	129.52	DC	81.52

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
97866644	314182	6NORNECK	230.0	DVP	314172	6DUNNSVL	230.0	DVP	1	DVP_P1-2: LN 2083	operation	362.839996338	112.07	134.53	DC	81.52
97073277	314191	3WHITSTONE	115.0	DVP	313870	3RAPPHNCK	115.0	DVP	1	DVP_P1-2: LN 2083	operation	138.179992676	116.03	129.29	DC	18.32
97866789	314197	6LDYSMITHCT	230.0	DVP	314196	6LADYSMITH	230.0	DVP	1	3142226HANOVER 230 939750 AE1-206 TAP 230 1	operation	1151.5	122.45	123.67	DC	31.2
97866328	314209	6SKIFFCREEK	230.0	DVP	314386	6KINGS M	230.0	DVP	1	DVP_P1-2: LN 567	operation	441.799987793	235.49	235.98	DC	7.2
97866369	314296	6PENNIMAN	230.0	DVP	314415	6WALR209	230.0	DVP	1	DVP_P1-2: LN 567	operation	441.799987793	224.08	224.58	DC	7.2
97866349	314386	6KINGS M	230.0	DVP	314296	6PENNIMAN	230.0	DVP	1	DVP_P1-2: LN 567	operation	441.799987793	227.72	228.22	DC	7.2
97866801	314391	6LIGH209	230.0	DVP	314388	6LANEXA	230.0	DVP	1	DVP_P1-2: LN 567	operation	663.640014648	132.16	132.49	DC	7.2
97866437	314415	6WALR209	230.0	DVP	314391	6LIGH209	230.0	DVP	1	DVP_P1-2: LN 567	operation	441.799987793	208.96	209.46	DC	7.2
97073354	936590	AD2-074 TAP	115.0	DVP	314178	3LANCAST	115.0	DVP	1	DVP_P1-2: LN 2083	operation	203.979995728	105.03	114.01	DC	18.32

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
97866579	7	AE1-206 TAP 230.0 kV - 6HANOVER 230.0 kV Ckt 1	<p>DVP dom-253 (1352) : Rebuild 3.37 miles of 230 kV Line 2032 from AE1-206 Tap to Hanover with 2-768.2 ACSS 250C. Replace Line Switch at Hanover 230 kV Project Type : FAC Cost : \$5,305,000 Time Estimate : 30-36 Months</p>	\$5,305,000
97072977	1	3GREYSPT 115.0 kV - 3HARMONY 115.0 kV Ckt 1	<p>DVP dom-204 (1303) : Reconductor 4.1 miles of 115 kV Line 65 from Grey Spt to Harmony with 636 ACSR. Project Type : FAC Cost : \$2,460,000 Time Estimate : 30-36 Months</p>	\$2,460,000

ID	Idx	Facility	Upgrade Description	Cost
97866888	4	6FOUR RIVERS 230.0 kV - AE1- 206 TAP 230.0 kV Ckt 1	<u>DVP</u> dom-210 (1309) : Rebuild 2.4 miles of 230 kV Line 2032 from Four Rivers to AE1-206 Tap with 2-768 ACSS (@250 C). Replace Breaker, Wavetrap, Relay (Secondary CT) and Line Lead at Four River 230 kV. Replace Breaker at AE1-206 230 kV generation station. Project Type : FAC Cost : \$6,320,000 Time Estimate : 36-40 Months	\$6,320,000
97866791,9786 6792	3	6LDYSMITH CT 230.0 kV - 6LADYSMITH 230.0 kV Ckt 1	<u>DVP</u> b3027.1 (1062) : PJM baseline upgrade b3027.1: Add a 2nd 500/230 kV 840 MVA transformer at Dominions Ladysmith Substation. The baseline project has a projected in-service date of 06/01/2021. Project Type : CON Cost : \$0 b3027.2 (1063) : PJM Baseline Upgrade b3027.2. Re-conductor Line #2089 between Ladysmith and Ladysmith CT Substations to increase the line rating from 1047 MVA to 1225 MVA. The baseline project has a projected in-service date of 06/01/2021. Project Type : FAC Cost : \$0 dom-249 (1348) : Install a second 230 kV circuit of 3.94 miles from Ladysmith to Ladysmith CT (Line 2089) with a 2000/2000/2300 MVA conductor. Add Breakers at both stations. Project Type : CON Cost : \$8,310,000 Time Estimate : 30-36 Months	\$8,310,000
96810801	6	8CHCKAHM 500.0 kV - 8ELMONT 500.0 kV Ckt 1	<u>DVP</u> n6207 (1291): Rebuild 27.72 miles of 500 kV Line 557 from Chickahominy to Elmont with 3-1351.5 113C ACSR. Project Type : FAC Cost : \$85,932,000 Time Estimate : 48-60 Months	\$85,932,000
97866621	5	6HANOVER 230.0 kV - 6ELMONT 230.0 kV Ckt 1	<u>DVP</u> dom-250 (1349): Rebuild 3.19 miles of 230 kV Line 2032 from Hanover to Elmont with 2-768.2 ACSS 250C. Replace Line Switch, Wavetrap and Relay (Secondary CT) at Elmont 230 kV. Project Type : FAC Cost : \$5,355,000 Time Estimate : 30-36 Months	\$5,355,000
97866818,9786 6816	2	6CRANES 230.0 kV - 6STAFORD 230.0 kV Ckt 1	<u>DVP</u> n6131 (1261) : Rebuild 7.62 miles of 230 kV Line 2104 from Cranes Corner to Stafford with 2-636 ACSR. Project Type : FAC Cost : \$11,430,000 Time Estimate : 30-36 Months	\$11,430,000

ID	Idx	Facility	Upgrade Description	Cost
			TOTAL COST	\$125,112,000

11.6 Flow Gate Details

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

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
97072977	313886	3GREYSPT	DVP	314174	3HARMONY	DVP	1	DVP_P4-2: 2083T2090	breaker	169.0	94.87	105.71	DC	18.32

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314131	6ARNOLDS	0.2876	50/50	0.2876
314190	6WESTMOR	0.4171	50/50	0.4171
315033	1BIRCHWDA	7.5210	50/50	7.5210
315034	1NORNECKC1	1.1908	50/50	1.1908
315035	1NORNECKC2	1.1478	50/50	1.1478
925861	AC1-065 C	-1.4054	Adder	-1.65
926472	AC1-118 E	1.2458	50/50	1.2458
932831	AC2-110 C	-0.5621	Adder	-0.66
932832	AC2-110 E	-0.9172	Adder	-1.08
933271	AC2-138 C	1.3308	50/50	1.3308
933272	AC2-138 E	1.6635	50/50	1.6635
934191	AD1-046 C	5.6242	50/50	5.6242
934192	AD1-046 E	3.7556	50/50	3.7556
934392	AD1-063 E	-0.2914	Adder	-0.34
936242	AD2-030 E	-0.8015	Adder	-0.94
936301	AD2-039 C	-0.5621	Adder	-0.66
936302	AD2-039 E	-0.9172	Adder	-1.08
936341	AD2-044 C	0.4159	50/50	0.4159
936342	AD2-044 E	0.4713	50/50	0.4713
936581	AD2-073 C	2.4402	50/50	2.4402
936582	AD2-073 E	1.2091	50/50	1.2091
936591	AD2-074 C	16.3380	50/50	16.3380
936592	AD2-074 E	26.6568	50/50	26.6568
938031	AE1-004 C	-0.5621	Adder	-0.66
938961	AE1-124 C	2.4366	50/50	2.4366
938962	AE1-124 E	1.2274	50/50	1.2274
939241	AE1-155 C	40.1817	50/50	40.1817
939242	AE1-155 E	26.7878	50/50	26.7878
940552	AE2-041 BAT	2.2856	Merchant Transmission	2.2856
943472	AF1-018 BAT	2.2856	Merchant Transmission	2.2856
943741	AF1-042 C	8.5490	50/50	8.5490
943742	AF1-042 E	13.9483	50/50	13.9483
944491	AF1-114 C	7.6944	50/50	7.6944
944492	AF1-114 E	10.6256	50/50	10.6256
945831	AF1-248	0.5822	50/50	0.5822
957191	AF2-013	18.3200	50/50	18.3200
957971	AF2-091 C	2.6161	50/50	2.6161
957972	AF2-091 E	3.6127	50/50	3.6127
958261	AF2-120 C	16.7199	50/50	16.7199
958262	AF2-120 E	11.1466	50/50	11.1466
NEWTON	NEWTON	0.0365	Confirmed LTF	0.0365
FARMERCITY	FARMERCITY	0.0020	Confirmed LTF	0.0020

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CALDERWOOD	CALDERWOOD	0.0209	Confirmed LTF	0.0209
NY	NY	0.0116	Confirmed LTF	0.0116
PRAIRIE	PRAIRIE	0.0904	Confirmed LTF	0.0904
O-066	O-066	0.1344	Confirmed LTF	0.1344
CHEOAH	CHEOAH	0.0210	Confirmed LTF	0.0210
EDWARDS	EDWARDS	0.0116	Confirmed LTF	0.0116
TILTON	TILTON	0.0208	Confirmed LTF	0.0208
G-007	G-007	0.0208	Confirmed LTF	0.0208
GIBSON	GIBSON	0.0180	Confirmed LTF	0.0180
BLUEG	BLUEG	0.0573	Confirmed LTF	0.0573
TRIMBLE	TRIMBLE	0.0184	Confirmed LTF	0.0184
CATAWBA	CATAWBA	0.0182	Confirmed LTF	0.0182

11.6.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
97866816	314134	6CRANES	DVP	314142	6STAFORD	DVP	1	DVP_P1-2: LN 2089	single	678.68	106.68	112.2	DC	38.37

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314131	6ARNOLDS	0.6370	80/20	0.6370
314134	6CRANES	0.1912	80/20	0.1912
314190	6WESTMOR	0.6121	80/20	0.6121
315033	1BIRCHWDA	17.8016	80/20	17.8016
315034	1NORNECKC1	0.9125	80/20	0.9125
315035	1NORNECKC2	0.8796	80/20	0.8796
315037	1LDYSMT1	9.1591	80/20	9.1591
315038	1LDYSMT2	9.1530	80/20	9.1530
315039	1LDYSMT3	9.6864	80/20	9.6864
315040	1LDYSMT4	9.7046	80/20	9.7046
315041	1LDYSMT5	9.7349	80/20	9.7349
315043	1FOUR RIVERA	2.4320	80/20	2.4320
315044	1FOUR RIVERB	2.4320	80/20	2.4320
315045	1FOUR RIVERC	2.9836	80/20	2.9836
315046	1FOUR RIVERD	2.4320	80/20	2.4320
315047	1FOUR RIVERE	2.4320	80/20	2.4320
315048	1FOUR RIVERF	2.9836	80/20	2.9836
315050	1FOURRIVERG	4.3042	80/20	4.3042
315610	6AA1-145GAS	8.5245	80/20	8.5245
924061	AB2-050	0.5014	80/20	0.5014
925861	AC1-065 C	1.5489	Adder	1.82
926551	AC1-134	1.2536	80/20	1.2536
927041	AC1-191 C O1	4.2676	Adder	5.02
932831	AC2-110 C	0.6196	Adder	0.73
933011	AC2-125	5.2360	80/20	5.2360
933021	AC2-126	5.2712	80/20	5.2712
933271	AC2-138 C	1.0198	80/20	1.0198
934141	AD1-041 C	2.9826	80/20	2.9826
934191	AD1-046 C	9.3604	80/20	9.3604
934781	AD1-105 C	7.2066	80/20	7.2066
936241	AD2-030 C	0.2350	80/20	0.2350
936301	AD2-039 C	0.6196	Adder	0.73
936341	AD2-044 C	0.3187	80/20	0.3187
936581	AD2-073 C	3.2617	80/20	3.2617
936591	AD2-074 C	5.5866	80/20	5.5866
938031	AE1-004 C	0.6196	Adder	0.73
938961	AE1-124 C	4.0552	80/20	4.0552
939241	AE1-155 C	16.1242	80/20	16.1242
939261	AE1-157 C O1	22.6904	80/20	22.6904
939271	AE1-158 C O1	23.1570	80/20	23.1570
939611	AE1-191 C	5.9652	80/20	5.9652

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
939751	AE1-206 C O1	21.8093	80/20	21.8093
940231	AE2-005 C	0.6196	Adder	0.73
940551	AE2-041 O1	3.1586	Adder	3.72
942191	AE2-231 C O1	6.7835	80/20	6.7835
943431	AF1-014 C	0.5870	Adder	0.69
943471	AF1-018	3.1586	Adder	3.72
943601	AF1-031 C	9.6273	80/20	9.6273
943741	AF1-042 C	2.9232	80/20	2.9232
943991	AF1-067 C	4.7589	80/20	4.7589
944491	AF1-114 C	13.6773	80/20	13.6773
945831	AF1-248	0.4462	80/20	0.4462
946001	AF1-265	19.1310	80/20	19.1310
957191	AF2-013	38.3720	80/20	38.3720
957411	AF2-035 C	10.2780	80/20	10.2780
957551	AF2-049 C	10.0619	80/20	10.0619
957601	AF2-054 C	1.2415	80/20	1.2415
957971	AF2-091 C	4.6503	80/20	4.6503
958261	AF2-120 C	6.7094	80/20	6.7094
960091	AF2-300 C	3.0834	80/20	3.0834
WEC	WEC	0.1487	Confirmed LTF	0.1487
LGEE	LGEE	0.2978	Confirmed LTF	0.2978
CPL	CPL	1.6782	Confirmed LTF	1.6782
CBM-W2	CBM-W2	6.5111	Confirmed LTF	6.5111
NY	NY	0.7864	Confirmed LTF	0.7864
CBM-W1	CBM-W1	5.2917	Confirmed LTF	5.2917
TVA	TVA	1.4182	Confirmed LTF	1.4182
CBM-S2	CBM-S2	11.6294	Confirmed LTF	11.6294
CBM-S1	CBM-S1	7.8469	Confirmed LTF	7.8469
MADISON	MADISON	0.4092	Confirmed LTF	0.4092
MEC	MEC	0.9407	Confirmed LTF	0.9407

11.6.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
97866792	314197	6LDYSMITH CT	DVP	314196	6LADYSMITH	DVP	1	DVP_P1-2: LN 2032-B	single	1151.5	119.52	122.23	DC	31.2

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314131	6ARNOLDS	0.5248	80/20	0.5248
314134	6CRANES	0.1224	80/20	0.1224
314190	6WESTMOR	0.4460	80/20	0.4460
315008	1POSSM6A	1.8214	80/20	1.8214
315009	1POSSM6B	1.8214	80/20	1.8214
315010	1POSSM6S	2.8382	80/20	2.8382
315033	1BIRCHWDA	14.8778	80/20	14.8778
315034	1NORNECKC1	0.5972	80/20	0.5972
315035	1NORNECKC2	0.5756	80/20	0.5756
315037	1LDYSMT1	19.2744	80/20	19.2744
315038	1LDYSMT2	19.2617	80/20	19.2617
315039	1LDYSMT3	20.3842	80/20	20.3842
315040	1LDYSMT4	20.4225	80/20	20.4225
315041	1LDYSMT5	20.4863	80/20	20.4863
315043	1FOUR RIVERA	12.3729	80/20	12.3729
315044	1FOUR RIVERB	12.3729	80/20	12.3729
315045	1FOUR RIVERC	15.1791	80/20	15.1791
315046	1FOUR RIVERD	12.3729	80/20	12.3729
315047	1FOUR RIVERE	12.3729	80/20	12.3729
315048	1FOUR RIVERF	15.1791	80/20	15.1791
315050	1FOURRIVERG	2.0066	80/20	2.0066
315610	6AA1-145GAS	43.3689	80/20	43.3689
924061	AB2-050	2.5511	80/20	2.5511
926551	AC1-134	6.3778	80/20	6.3778
933011	AC2-125	11.0187	80/20	11.0187
933021	AC2-126	11.0927	80/20	11.0927
933271	AC2-138 C	0.6674	80/20	0.6674
934191	AD1-046 C	7.1322	80/20	7.1322
934781	AD1-105 C	3.7584	80/20	3.7584
936341	AD2-044 C	0.2086	80/20	0.2086
936581	AD2-073 C	2.2865	80/20	2.2865
936591	AD2-074 C	3.1840	80/20	3.1840
938961	AE1-124 C	3.0899	80/20	3.0899
939241	AE1-155 C	9.5533	80/20	9.5533
939261	AE1-157 C O1	57.5331	80/20	57.5331
939271	AE1-158 C O1	58.7163	80/20	58.7163
939751	AE1-206 C O1	126.4494	80/20	126.4494
942191	AE2-231 C O1	19.5225	80/20	19.5225
943601	AF1-031 C	5.0209	80/20	5.0209
943741	AF1-042 C	1.6661	80/20	1.6661
943991	AF1-067 C	2.4819	80/20	2.4819

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
944491	AF1-114 C	10.6382	80/20	10.6382
945831	AF1-248	0.2920	80/20	0.2920
946001	AF1-265	110.9205	80/20	110.9205
957191	AF2-013	31.1970	80/20	31.1970
957411	AF2-035 C	29.5796	80/20	29.5796
957551	AF2-049 C	25.5127	80/20	25.5127
957971	AF2-091 C	3.6170	80/20	3.6170
958261	AF2-120 C	3.9752	80/20	3.9752
960091	AF2-300 C	8.8739	80/20	8.8739
NEWTON	NEWTON	1.2378	Confirmed LTF	1.2378
FARMERCITY	FARMERCITY	0.0656	Confirmed LTF	0.0656
CALDERWOOD	CALDERWOOD	0.6550	Confirmed LTF	0.6550
NY	NY	0.1797	Confirmed LTF	0.1797
PRAIRIE	PRAIRIE	3.0454	Confirmed LTF	3.0454
CHEOAH	CHEOAH	0.6622	Confirmed LTF	0.6622
EDWARDS	EDWARDS	0.3955	Confirmed LTF	0.3955
TILTON	TILTON	0.7125	Confirmed LTF	0.7125
GIBSON	GIBSON	0.6246	Confirmed LTF	0.6246
BLUEG	BLUEG	1.9825	Confirmed LTF	1.9825
TRIMBLE	TRIMBLE	0.6344	Confirmed LTF	0.6344
CATAWBA	CATAWBA	0.5135	Confirmed LTF	0.5135

11.6.4 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
97866888	314212	6FOUR RIVERS	DVP	939750	AE1-206 TAP	DVP	1	DVP_P1-2: LN 2089	single	1123.3	100.65	102.34	DC	19.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314131	6ARNOLDS	0.3239	80/20	0.3239
314134	6CRANES	0.0786	80/20	0.0786
314190	6WESTMOR	0.2394	80/20	0.2394
315033	1BIRCHWDA	9.3126	80/20	9.3126
315034	1NORNECKC1	0.2739	80/20	0.2739
315035	1NORNECKC2	0.2640	80/20	0.2640
315037	1LDYSMT1	12.3681	80/20	12.3681
315038	1LDYSMT2	12.3599	80/20	12.3599
315039	1LDYSMT3	13.0802	80/20	13.0802
315040	1LDYSMT4	13.1047	80/20	13.1047
315041	1LDYSMT5	13.1457	80/20	13.1457
315043	1FOUR RIVERA	13.5244	80/20	13.5244
315044	1FOUR RIVERB	13.5244	80/20	13.5244
315045	1FOUR RIVERC	16.5918	80/20	16.5918
315046	1FOUR RIVERD	13.5244	80/20	13.5244
315047	1FOUR RIVERE	13.5244	80/20	13.5244
315048	1FOUR RIVERF	16.5918	80/20	16.5918
315610	6AA1-145GAS	47.4050	80/20	47.4050
924061	AB2-050	2.7885	80/20	2.7885
926551	AC1-134	6.9713	80/20	6.9713
933011	AC2-125	7.0705	80/20	7.0705
933021	AC2-126	7.1180	80/20	7.1180
933271	AC2-138 C	0.3060	80/20	0.3060
934191	AD1-046 C	4.0453	80/20	4.0453
936341	AD2-044 C	0.0956	80/20	0.0956
936581	AD2-073 C	1.1647	80/20	1.1647
938961	AE1-124 C	1.7525	80/20	1.7525
939261	AE1-157 C O1	44.4495	80/20	44.4495
939271	AE1-158 C O1	45.3636	80/20	45.3636
942191	AE2-231 C O1	16.5665	80/20	16.5665
944491	AF1-114 C	6.1782	80/20	6.1782
945831	AF1-248	0.1339	80/20	0.1339
957191	AF2-013	18.9980	80/20	18.9980
957411	AF2-035 C	25.1008	80/20	25.1008
957551	AF2-049 C	19.7109	80/20	19.7109
957971	AF2-091 C	2.1006	80/20	2.1006
960091	AF2-300 C	7.5302	80/20	7.5302
NEWTON	NEWTON	1.3926	Confirmed LTF	1.3926
FARMERCITY	FARMERCITY	0.0756	Confirmed LTF	0.0756
G-007A	G-007A	0.6497	Confirmed LTF	0.6497
VFT	VFT	1.7028	Confirmed LTF	1.7028

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CALDERWOOD	CALDERWOOD	0.8593	Confirmed LTF	0.8593
PRAIRIE	PRAIRIE	3.5335	Confirmed LTF	3.5335
CHEOAH	CHEOAH	0.8734	Confirmed LTF	0.8734
EDWARDS	EDWARDS	0.4354	Confirmed LTF	0.4354
TILTON	TILTON	0.7818	Confirmed LTF	0.7818
GIBSON	GIBSON	0.6940	Confirmed LTF	0.6940
BLUEG	BLUEG	2.1908	Confirmed LTF	2.1908
TRIMBLE	TRIMBLE	0.6990	Confirmed LTF	0.6990
CATAWBA	CATAWBA	0.7630	Confirmed LTF	0.7630

11.6.5 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
97866621	314222	6HANOVER	DVP	314218	6ELMONT	DVP	1	DVP_P1-2: LN 2089	single	1123.3	118.25	119.94	DC	19.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314131	6ARNOLDS	0.3239	80/20	0.3239
314134	6CRANES	0.0786	80/20	0.0786
314190	6WESTMOR	0.2394	80/20	0.2394
315033	1BIRCHWDA	9.3126	80/20	9.3126
315034	1NORNECKC1	0.2739	80/20	0.2739
315035	1NORNECKC2	0.2640	80/20	0.2640
315037	1LDYSMT1	12.3681	80/20	12.3681
315038	1LDYSMT2	12.3599	80/20	12.3599
315039	1LDYSMT3	13.0802	80/20	13.0802
315040	1LDYSMT4	13.1047	80/20	13.1047
315041	1LDYSMT5	13.1457	80/20	13.1457
315043	1FOUR RIVERA	13.5244	80/20	13.5244
315044	1FOUR RIVERB	13.5244	80/20	13.5244
315045	1FOUR RIVERC	16.5918	80/20	16.5918
315046	1FOUR RIVERD	13.5244	80/20	13.5244
315047	1FOUR RIVERE	13.5244	80/20	13.5244
315048	1FOUR RIVERF	16.5918	80/20	16.5918
315610	6AA1-145GAS	47.4050	80/20	47.4050
924061	AB2-050	2.7885	80/20	2.7885
926551	AC1-134	6.9713	80/20	6.9713
933011	AC2-125	7.0705	80/20	7.0705
933021	AC2-126	7.1180	80/20	7.1180
933271	AC2-138 C	0.3060	80/20	0.3060
934191	AD1-046 C	4.0453	80/20	4.0453
936341	AD2-044 C	0.0956	80/20	0.0956
936581	AD2-073 C	1.1647	80/20	1.1647
938961	AE1-124 C	1.7525	80/20	1.7525
939261	AE1-157 C O1	44.4495	80/20	44.4495
939271	AE1-158 C O1	45.3636	80/20	45.3636
939751	AE1-206 C O1	143.1526	80/20	143.1526
942191	AE2-231 C O1	16.5665	80/20	16.5665
944491	AF1-114 C	6.1782	80/20	6.1782
945831	AF1-248	0.1339	80/20	0.1339
946001	AF1-265	125.5725	80/20	125.5725
957191	AF2-013	18.9980	80/20	18.9980
957411	AF2-035 C	25.1008	80/20	25.1008
957551	AF2-049 C	19.7109	80/20	19.7109
957971	AF2-091 C	2.1006	80/20	2.1006
960091	AF2-300 C	7.5302	80/20	7.5302
NEWTON	NEWTON	1.3926	Confirmed LTF	1.3926
FARMERCITY	FARMERCITY	0.0756	Confirmed LTF	0.0756

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
G-007A	G-007A	0.6497	Confirmed LTF	0.6497
VFT	VFT	1.7028	Confirmed LTF	1.7028
CALDERWOOD	CALDERWOOD	0.8593	Confirmed LTF	0.8593
PRAIRIE	PRAIRIE	3.5335	Confirmed LTF	3.5335
CHEOAH	CHEOAH	0.8734	Confirmed LTF	0.8734
EDWARDS	EDWARDS	0.4354	Confirmed LTF	0.4354
TILTON	TILTON	0.7818	Confirmed LTF	0.7818
GIBSON	GIBSON	0.6940	Confirmed LTF	0.6940
BLUEG	BLUEG	2.1908	Confirmed LTF	2.1908
TRIMBLE	TRIMBLE	0.6990	Confirmed LTF	0.6990
CATAWBA	CATAWBA	0.7630	Confirmed LTF	0.7630

11.6.6 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
96810801	314903	8CHCKAHM	DVP	314908	8ELMONT	DVP	1	DVP_P1-2: LN 2083	single	2442.12	138.95	139.28	DC	28.58

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314131	6ARNOLDS	0.4485	80/20	0.4485
314184	3SHACKLE	0.8520	80/20	0.8520
314190	6WESTMOR	0.6508	80/20	0.6508
314375	6CORRCTN	0.6814	80/20	0.6814
314421	6WINCHST	0.2229	80/20	0.2229
315033	1BIRCHWDA	11.7298	80/20	11.7298
315034	1NORNECKC1	1.2265	80/20	1.2265
315035	1NORNECKC2	1.1821	80/20	1.1821
315060	1CHESTF5 (Deactivation : 31/05/2023)	59.7466	Adder	70.29
315074	1HOPCGN1 (Deactivation : 25/06/2019)	7.4885	Adder	8.81
315075	1HOPCGN2 (Deactivation : 25/06/2019)	7.3914	Adder	8.7
315092	1YORKTN3	39.8987	80/20	39.8987
315108	1ELIZAR1	4.9532	80/20	4.9532
315109	1ELIZAR2	4.8672	80/20	4.8672
315110	1ELIZAR3	5.0166	80/20	5.0166
315233	1SURRY 2	47.1080	80/20	47.1080
315294	1DOMTR10	11.0281	Adder	12.97
315611	6Z1-036WIND	7.8227	Adder	9.2
923801	AB2-015 C OP	9.1056	Adder	10.71
923831	AB2-022 C	2.7731	Adder	3.26
924241	AB2-068 OP	598.3064	80/20	598.3064
924501	AB2-099 C (Suspended)	0.5676	Adder	0.67
925061	AB2-161 C O1 (Suspended)	3.4732	Adder	4.09
925331	AB2-190 C	20.6413	Adder	24.28
925841	AC1-063	0.1053	80/20	0.1053
925861	AC1-065 C	5.2725	80/20	5.2725
926291	AC1-107 O1 (Suspended)	903.1040	80/20	903.1040
926661	AC1-147 C	2.8040	Adder	3.3
926751	AC1-161 C O1	48.2784	80/20	48.2784
926781	AC1-164 C	63.6125	80/20	63.6125
932041	AC2-012 C	12.6847	Adder	14.92
932581	AC2-078 C O1	3.6529	Adder	4.3
932591	AC2-079 C O1	6.2328	Adder	7.33
932831	AC2-110 C	2.1090	80/20	2.1090
933261	AC2-137 C	2.2563	Adder	2.65
933271	AC2-138 C	1.3706	80/20	1.3706
933291	AC2-141 C	48.2784	80/20	48.2784
933731	AC2-196 C	2.2243	Adder	2.62

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
933991	AD1-023 C	13.6112	Adder	16.01
934011	AD1-025 C	17.5778	Adder	20.68
934061	AD1-033 C	9.3409	Adder	10.99
934141	AD1-041 C	8.4072	80/20	8.4072
934191	AD1-046 C	8.7738	80/20	8.7738
934391	AD1-063 C	0.4429	80/20	0.4429
934521	AD1-076 C	57.1823	Adder	67.27
934571	AD1-082 C	7.9153	Adder	9.31
935111	AD1-144 C	2.1031	Adder	2.47
935161	AD1-151 C O1	16.5867	Adder	19.51
936041	AD2-007 C	0.8397	Adder	0.99
936051	AD2-008 C	3.0602	Adder	3.6
936151	AD2-021	0.2573	Adder	0.3
936241	AD2-030 C	0.6413	80/20	0.6413
936301	AD2-039 C	2.1090	80/20	2.1090
936341	AD2-044 C	0.4283	80/20	0.4283
936401	AD2-051 C O1	8.6813	Adder	10.21
936581	AD2-073 C	3.8073	80/20	3.8073
936591	AD2-074 C	9.3099	80/20	9.3099
936661	AD2-085 C	3.7306	Adder	4.39
937221	AD2-160 C O1	7.2128	Adder	8.49
937251	AD2-164 (Withdrawn : 06/30/2020)	7.6223	80/20	7.6223
937541	AD2-215 C	2.1247	Adder	2.5
938031	AE1-004 C	2.1090	80/20	2.1090
938171	AE1-026 C O1	32.9238	Adder	38.73
938221	AE1-035 C	2.2288	Adder	2.62
938531	AE1-072 C O1	21.4780	Adder	25.27
938631	AE1-085 C O1	8.1740	Adder	9.62
938771	AE1-103 C O1	3.8913	Adder	4.58
938961	AE1-124 C	3.8010	80/20	3.8010
939191	AE1-149 C O1	9.3682	Adder	11.02
939241	AE1-155 C	25.4817	80/20	25.4817
939311	AE1-162 C	2.5563	Adder	3.01
939411	AE1-173 C	89.2378	Adder	104.99
939421	AE1-174 C (Withdrawn : 06/16/2020)	0.5932	80/20	0.5932
939431	AE1-175 C	3.9450	80/20	3.9450
939611	AE1-191 C	16.8144	80/20	16.8144
940061	AE2-000BC O1	16.4521	Adder	19.36
940231	AE2-005 C	2.1090	80/20	2.1090
940251	AE2-007 O1	253.8982	80/20	253.8982
940471	AE2-031 C	13.2200	Adder	15.55
940491	AE2-034 C	7.8369	Adder	9.22
940551	AE2-041 O1	11.4128	80/20	11.4128
940641	AE2-051 C O1	15.6129	Adder	18.37
940651	AE2-052	3.1227	Adder	3.67
940891	AE2-078 C	2.8048	Adder	3.3
940901	AE2-079 C	2.8048	Adder	3.3
941031	AE2-094 C	31.3723	Adder	36.91
941101	AE2-104 C O1	3.9026	Adder	4.59
941281	AE2-122 C O1	35.3276	Adder	41.56
941291	AE2-123 C O1	36.3058	Adder	42.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941301	AE2-124 C O1	33.0116	Adder	38.84
941501	AE2-147 C	18.7318	Adder	22.04
941541	AE2-151 C	1.0487	Adder	1.23
941591	AE2-156 O1	26.2120	80/20	26.2120
942131	AE2-225 C	2.5826	Adder	3.04
942171	AE2-229 C	2.5826	Adder	3.04
942341	AE2-247 C	1.6153	Adder	1.9
942401	AE2-253 C	7.5867	Adder	8.93
942551	AE2-270	28.0207	Adder	32.97
942851	AE2-304 C	0.7359	Adder	0.87
942931	AE2-313 C	28.2407	Adder	33.22
943171	AE2-346 C	1.3623	Adder	1.6
943431	AF1-014 C	1.9980	80/20	1.9980
943461	AF1-017 C	1.4614	Adder	1.72
943471	AF1-018	11.4128	80/20	11.4128
943611	AF1-032 C	2.1092	Adder	2.48
943621	AF1-033 C	2.8048	Adder	3.3
943741	AF1-042 C	4.8714	80/20	4.8714
944011	AF1-069 C	10.2505	Adder	12.06
944491	AF1-114 C	12.0028	80/20	12.0028
944501	AF1-115 C O1	8.5418	Adder	10.05
944581	AF1-123 C O1	71.1764	80/20	71.1764
944591	AF1-124 C O1	71.1764	80/20	71.1764
944601	AF1-125 C O1	71.1764	80/20	71.1764
944631	AF1-128 O1	46.4952	Adder	54.7
944871	AF1-152 C	6.2439	Adder	7.35
945361	AF1-201 C O1	26.1207	80/20	26.1207
945711	AF1-236 C O1	85.7950	Adder	100.94
945831	AF1-248	0.5997	80/20	0.5997
957191	AF2-013	28.5750	80/20	28.5750
957491	AF2-043 C	1.3688	Adder	3.04
957521	AF2-046 C	8.6885	Adder	19.29
957531	AF2-047 C	9.8696	Adder	21.91
957601	AF2-054 C	3.3886	80/20	3.3886
957631	AF2-057	2.3589	Adder	5.24
957711	AF2-065 C	7.5740	Adder	16.81
957791	AF2-073 C (Withdrawn : 07/02/2020)	5.8594	Adder	13.01
957801	AF2-074 C (Withdrawn : 07/02/2020)	2.6042	Adder	5.78
957821	AF2-076 C O1	3.3732	Adder	7.49
957831	AF2-077 C	3.4645	80/20	3.4645
957871	AF2-081 C O1	6.4967	Adder	14.42
957971	AF2-091 C	4.0809	80/20	4.0809
958161	AF2-110 C	0.8527	Adder	1.89
958261	AF2-120 C	10.6031	80/20	10.6031
959511	AF2-242	3.9261	Adder	8.71
959731	AF2-264 C	1.1587	Adder	2.57
960101	AF2-301 C	1.7668	Adder	3.92
960361	AF2-327 C	1.4984	Adder	3.33
960831	AF2-374 C	0.6275	Adder	1.39
961091	AF2-400 C	0.2606	Adder	0.58
961111	AF2-402 C O1	0.6181	Adder	1.37

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
WEC	WEC	0.3326	Confirmed LTF	0.3326
LGEE	LGEE	0.6452	Confirmed LTF	0.6452
CPL	CPL	6.6640	Confirmed LTF	6.6640
CBM-W2	CBM-W2	18.4848	Confirmed LTF	18.4848
NY	NY	1.3681	Confirmed LTF	1.3681
CBM-W1	CBM-W1	11.6843	Confirmed LTF	11.6843
TVA	TVA	4.2462	Confirmed LTF	4.2462
CBM-S2	CBM-S2	43.1939	Confirmed LTF	43.1939
CBM-S1	CBM-S1	22.8251	Confirmed LTF	22.8251
MADISON	MADISON	1.6572	Confirmed LTF	1.6572
MEC	MEC	2.3803	Confirmed LTF	2.3803
AA2-074	AA2-074	4.5364	LTF	4.5364

11.6.7 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
97866579	939750	AE1-206 TAP	DVP	314222	6HANOVER	DVP	1	DVP_P1-2: LN 2089	single	1123.3	124.45	126.15	DC	19.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314131	6ARNOLDS	0.3239	80/20	0.3239
314134	6CRANES	0.0786	80/20	0.0786
314190	6WESTMOR	0.2394	80/20	0.2394
315033	1BIRCHWDA	9.3126	80/20	9.3126
315034	1NORNECKC1	0.2739	80/20	0.2739
315035	1NORNECKC2	0.2640	80/20	0.2640
315037	1LDYSMT1	12.3681	80/20	12.3681
315038	1LDYSMT2	12.3599	80/20	12.3599
315039	1LDYSMT3	13.0802	80/20	13.0802
315040	1LDYSMT4	13.1047	80/20	13.1047
315041	1LDYSMT5	13.1457	80/20	13.1457
315043	1FOUR RIVERA	13.5244	80/20	13.5244
315044	1FOUR RIVERB	13.5244	80/20	13.5244
315045	1FOUR RIVERC	16.5918	80/20	16.5918
315046	1FOUR RIVERD	13.5244	80/20	13.5244
315047	1FOUR RIVERE	13.5244	80/20	13.5244
315048	1FOUR RIVERF	16.5918	80/20	16.5918
315610	6AA1-145GAS	47.4050	80/20	47.4050
924061	AB2-050	2.7885	80/20	2.7885
926551	AC1-134	6.9713	80/20	6.9713
933011	AC2-125	7.0705	80/20	7.0705
933021	AC2-126	7.1180	80/20	7.1180
933271	AC2-138 C	0.3060	80/20	0.3060
934191	AD1-046 C	4.0453	80/20	4.0453
936341	AD2-044 C	0.0956	80/20	0.0956
936581	AD2-073 C	1.1647	80/20	1.1647
938961	AE1-124 C	1.7525	80/20	1.7525
939261	AE1-157 C O1	44.4495	80/20	44.4495
939271	AE1-158 C O1	45.3636	80/20	45.3636
939751	AE1-206 C O1	143.1526	80/20	143.1526
942191	AE2-231 C O1	16.5665	80/20	16.5665
944491	AF1-114 C	6.1782	80/20	6.1782
945831	AF1-248	0.1339	80/20	0.1339
946001	AF1-265	125.5725	80/20	125.5725
957191	AF2-013	18.9980	80/20	18.9980
957411	AF2-035 C	25.1008	80/20	25.1008
957551	AF2-049 C	19.7109	80/20	19.7109
957971	AF2-091 C	2.1006	80/20	2.1006
960091	AF2-300 C	7.5302	80/20	7.5302
NEWTON	NEWTON	1.3926	Confirmed LTF	1.3926
FARMERCITY	FARMERCITY	0.0756	Confirmed LTF	0.0756

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
G-007A	G-007A	0.6497	Confirmed LTF	0.6497
VFT	VFT	1.7028	Confirmed LTF	1.7028
CALDERWOOD	CALDERWOOD	0.8593	Confirmed LTF	0.8593
PRAIRIE	PRAIRIE	3.5335	Confirmed LTF	3.5335
CHEOAH	CHEOAH	0.8734	Confirmed LTF	0.8734
EDWARDS	EDWARDS	0.4354	Confirmed LTF	0.4354
TILTON	TILTON	0.7818	Confirmed LTF	0.7818
GIBSON	GIBSON	0.6940	Confirmed LTF	0.6940
BLUEG	BLUEG	2.1908	Confirmed LTF	2.1908
TRIMBLE	TRIMBLE	0.6990	Confirmed LTF	0.6990
CATAWBA	CATAWBA	0.7630	Confirmed LTF	0.7630

11.7 Queue Dependencies

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

Queue Number	Project Name	Status
AA1-145	Four Rivers 230kV	In Service
AA2-074	CPLP-PJM	Confirmed
AB2-015	Franklin 115kV	Engineering and Procurement
AB2-022	Elizabeth City 34.5kV	Engineering and Procurement
AB2-050	Four Rivers 230kV	In Service
AB2-068	Chickahominy 500kV	Engineering and Procurement
AB2-099	Ahoskie 34.5kV	Suspended
AB2-161	Waverly #2 DP 115kV	Suspended
AB2-190	Hopewell-Surry 230kV	Engineering and Procurement
AC1-063	Shackleford 34.5kV	In Service
AC1-065	Harmony Village-Shackleford 115kV	Engineering and Procurement
AC1-107	Chickahominy 500kV	Suspended
AC1-118	Westmoreland 34.5kV	In Service
AC1-134	Four Rivers 230kV	In Service
AC1-147	Grassfield 34.5kV	Engineering and Procurement
AC1-161	Septa 500kV	Active
AC1-164	Chickahominy 230kV	Engineering and Procurement
AC1-191	Elmont 115kV	Active
AC2-012	Grassfield-Great Bridge 115kV	Active
AC2-078	Disputanta-Waverly 115kV	Active
AC2-079	Ivor-Oakridge 115kV	Active
AC2-110	Harmony Village-Shackleford 115kV	Engineering and Procurement
AC2-125	Ladysmith 230 kV I	Engineering and Procurement
AC2-126	Ladysmith 230 kV II	Engineering and Procurement
AC2-137	Elko 34.5kV	Under Construction
AC2-138	Northern Neck 34.5kV	Under Construction
AC2-141	Septa 500kV	Active
AC2-196	Fentress 34.5kV	Engineering and Procurement
AD1-023	Cashie-Trowbridge 230 kV	Active
AD1-025	Hopewell-Surry 230 kV	Active
AD1-033	Fentress-Landstown 230 kV	Active
AD1-041	Harmony Village-Shackleford 115 kV	Active
AD1-046	Oak Grove 34.5 kV III	Engineering and Procurement
AD1-063	Harmony Village 34.5 kV	In Service
AD1-076	Trowbridge 230 kV	Active
AD1-082	Bakers Pond-Ivor 115kV	Active
AD1-105	Kings Dominion DP 115 kV	Active
AD1-144	Kings Fork 34.5 kV	Engineering and Procurement
AD1-151	Hopewell-Surry 230 kV	Active

Queue Number	Project Name	Status
AD2-007	Hopewell-Surry 230 kV	Active
AD2-008	Hopewell-Surry 230 kV	Active
AD2-021	Elko 34.5 kV	Under Construction
AD2-030	Wan 34.5 kV	In Service
AD2-039	Harmony Village-Shackleford 115 kV	Engineering and Procurement
AD2-044	Northern Neck 34.5 kV	Under Construction
AD2-051	Earleys – Northampton 230kV	Active
AD2-073	Sanders DP 230 kV	Active
AD2-074	Garner DP-Lancaster 115 kV	Active
AD2-085	Myrtle-Windsor DP 115kV	Active
AD2-160	Hickory-Moyock 230kV	Active
AD2-164	Peninsula 34.5kV	Withdrawn
AD2-215	Kings Fork 34.5 kV	Engineering and Procurement
AE1-004	Harmony Village-Shackleford 115 kV	Engineering and Procurement
AE1-026	Cashie 230 kV	Active
AE1-035	Earleys 230 kV	Engineering and Procurement
AE1-072	Shawboro-Sligo 230 kV	Active
AE1-085	Bakers Pond-Bell Ave 115 kV	Active
AE1-103	Holland-Union Camp 115 kV	Active
AE1-124	Oak Grove 34.5 kV	Engineering and Procurement
AE1-149	Disputanta-Poe 115 kV	Active
AE1-155	Garner-Northern Neck 115 kV	Active
AE1-157	Ladysmith CT-St. Johns 230 kV	Active
AE1-158	Ladysmith CT-St. Johns 230 kV	Active
AE1-162	Smithfield 34.5 kV	Engineering and Procurement
AE1-173	Carson-Suffolk 500 kV	Active
AE1-174	Light Foot 34.5 kV	Withdrawn
AE1-175	Light Foot 34.5 kV	Engineering and Procurement
AE1-191	Harmony Village-Shackleford 115 kV	Active
AE1-206	Four Rivers-Hanover 230 kV	Active
AE2-000B	N/A	N/A
AE2-005	Harmony Village-Shackleford 115 kV	Engineering and Procurement
AE2-007	Chesapeake 230 kV	Active
AE2-031	Carson-Rawlings 500 kV	Active
AE2-034	Mackeys 230 kV	Active
AE2-041	Harmony Village 230 kV	Active
AE2-051	Carson-Septa 500 kV	Active
AE2-052	Disputanta-Poe 115 kV	Active
AE2-078	Poolesville 34.5 kV	Engineering and Procurement
AE2-079	Poolesville 34.5 kV	Engineering and Procurement
AE2-094	Carson-Rogers Road 500 kV	Active
AE2-104	Suffolk 115 kV	Active
AE2-122	Birdneck-Landstown 230 kV	Active
AE2-123	Birdneck-Landstown 230 kV	Active
AE2-124	Landstown 230 kV	Active
AE2-147	Swamp 230 kV	Active
AE2-151	Earleys 34.5kV	Engineering and Procurement
AE2-156	Yadkin 115 kV	Active
AE2-225	Suffolk 34 kV	Engineering and Procurement
AE2-229	Suffolk 34 kV	Engineering and Procurement
AE2-231	St. Johns 115 kV	Active
AE2-247	Myrtle-Windsor 115 kV	Active

Queue Number	Project Name	Status
AE2-253	Hickory-Moyock 230 kV	Active
AE2-270	Hopewell-Surry 230 kV	Active
AE2-304	South Hertford 34 kV	Engineering and Procurement
AE2-313	Carson-Rawlings 500 kV	Active
AE2-346	Ahoskie 34.5 kV	Active
AF1-014	Harmony Village-Shackleford 115 kV	Active
AF1-017	Myrtle-Windsor 115 kV	Active
AF1-018	Harmony Village 230 kV	Active
AF1-031	Kings Dominion DP 115 kV	Active
AF1-032	Suffolk 34.5 kV	Engineering and Procurement
AF1-033	Poolesville 34 kV	Engineering and Procurement
AF1-042	Garner DP-Lancaster 115 kV	Active
AF1-067	Kings Dominion DP 115 kV	Active
AF1-069	Carson-Rogers Rd 500 kV	Active
AF1-114	Oak Grove-Dahlgren 230 kV	Active
AF1-115	Poolesville 230 kV	Active
AF1-123	Fentress 500 kV	Active
AF1-124	Fentress 500 kV	Active
AF1-125	Fentress 500 kV	Active
AF1-128	Chesterfield 230 kV	Active
AF1-152	Swamp 230 kV	Active
AF1-201	Hayes-Whitemarsh 115 kV	Active
AF1-236	Mackeys 230 kV	Active
AF1-248	Northern Neck 34.5 kV	Engineering and Procurement
AF1-265	Four Rivers-Hanover 230 kV	Active
AF2-013	Arnold's Corner-Dahlgren 230 kV	Active
AF2-035	St. Johns 115 kV	Active
AF2-043	Suffolk 34.5 kV	Active
AF2-046	Tunis-Mapleton 115 kV	Active
AF2-047	Creswell-Riders Creek 115 kV	Active
AF2-049	Ladysmith CT-St. Johns 230 kV	Active
AF2-054	Wan 34.5 kV	Active
AF2-057	Grassfield 34.5 kV	Active
AF2-065	Surry-Hopewell 230 kV	Active
AF2-073	Nucor Steel-Suffolk 230 kV	Withdrawn
AF2-074	Nucor Steel-Suffolk 230 kV	Withdrawn
AF2-076	Suffolk-Nucor Steel 230 kV	Active
AF2-077	White Marsh 34.5 kV	Active
AF2-081	Moyock 230 kV	Active
AF2-091	Oak Grove-Dahlgren 230 kV	Active
AF2-110	Suffolk 115 kV	Active
AF2-120	Garner-Northern Neck 115 kV	Active
AF2-242	Wharton 115 kV	Active
AF2-264	Tunis 34.5 kV	Active
AF2-300	St. Johns 115 kV	Active
AF2-301	Poolesville-Winchester 230 kV	Active
AF2-327	Wakefield 13 kV	Active
AF2-374	Woodland 34.5 kV	Active
AF2-400	Franklin 13.2 kV	Active
AF2-402	Ivor-Oak Ridge 115 kV	Active
Z1-036	WinFall-Chowan 230kV	Suspended

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-2: LN 567	CONTINGENCY 'DVP_P1-2: LN 567' OPEN BRANCH FROM BUS 314903 TO BUS 314924 CKT 1 /* 8CHCKAHM 500.00 - 8SURREY 500.00 END
DVP_P1-2: LN 568	CONTINGENCY 'DVP_P1-2: LN 568' OPEN BRANCH FROM BUS 314911 TO BUS 314922 CKT 1 /* 8LADYSMITH 500.00 - 8POSSUM 500.00 END
DVP_P1-2: LN 2032-B	CONTINGENCY 'DVP_P1-2: LN 2032-B' OPEN BRANCH FROM BUS 939750 TO BUS 314222 CKT 1 /* AE1-206 TAP 230.00 - 6HANOVER 230.00 OPEN BRANCH FROM BUS 314218 TO BUS 314222 CKT 1 /* 6ELMONT 230.00 - 6HANOVER 230.00 OPEN BUS 314222 /* ISLAND: 6HANOVER 230.00 END
DVP_P1-2: LN 2083	CONTINGENCY 'DVP_P1-2: LN 2083' OPEN BRANCH FROM BUS 314132 TO BUS 314163 CKT 1 /* 6BIRCHWD 230.00 - 6FINES 230.00 OPEN BRANCH FROM BUS 314137 TO BUS 314163 CKT 1 /* 6FREDBRG 230.00 - 6FINES 230.00 OPEN BUS 314163 /* ISLAND: 6FINES 230.00 END
DVP_P1-2: LN 2089	CONTINGENCY 'DVP_P1-2: LN 2089' OPEN BRANCH FROM BUS 314196 TO BUS 314197 CKT 1 /* 6LADYSMITH 230.00 - 6LDYSMITH CT230.00 END
314222 6HANOVER 230 939750 AE1-206 TAP 230 1	CONTINGENCY '314222 6HANOVER 230 939750 AE1-206 TAP 230 1' OPEN BRANCH FROM BUS 314222 TO BUS 939750 CKT 1 END

Contingency Name	Contingency Definition
DVP_P4-2: 2083T2090	CONTINGENCY 'DVP_P4-2: 2083T2090' /* FREDERICKSBURG 230 KV OPEN BRANCH FROM BUS 314132 TO BUS 314163 CKT 1 /* 6BIRCHWD 230.00 - 6FINES 230.00 OPEN BRANCH FROM BUS 314137 TO BUS 314163 CKT 1 /* 6FREDBRG 230.00 - 6FINES 230.00 OPEN BUS 314163 /* ISLAND: 6FINES 230.00 OPEN BRANCH FROM BUS 313837 TO BUS 314138 CKT 1 /* 6SUMMIT 230.00 - 6MINE RD 230.00 OPEN BRANCH FROM BUS 313837 TO BUS 314197 CKT 1 /* 6SUMMIT 230.00 - 6LDYSMITH CT230.00 OPEN BRANCH FROM BUS 314137 TO BUS 314138 CKT 1 /* 6FREDBRG 230.00 - 6MINE RD 230.00 OPEN BUS 313837 /* ISLAND: 6SUMMIT 230.00 OPEN BUS 314138 /* ISLAND: 6MINE RD 230.00 END

12 Short Circuit Analysis

Short circuit analysis will be run as part of the System Impact Study.

13 Affected Systems

None

Attachment 1: One Line Diagram