Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-037

LOUISA-NORTH ANNA 230 KV

56.4 MW Capacity / 94 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.

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.

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 Louisa County, Virginia. The installed facilities will have a total capability of 94 MW with 56.4 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is July 01, 2021. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-037
Project Name	LOUISA-NORTH ANNA 230 KV
State	Virginia
County	Louisa
Transmission Owner	Dominion
MFO	94
MWE	94
MWC	56.4
Fuel	Solar
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

AF2-037 will interconnect with the Dominion transmission system. The primary POI is a single line tap between Louisa 230 kV substation and North Anna 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 AF2-037.

5 Cost Summary

The AF2-037 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$ 10,400,000
Total System Network Upgrade Costs	$ 161,350,000
Total Costs	**$ 171,750,000**

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 AF2-037 was evaluated as a 56.4 MW Capacity (94.0 MW Energy) injection at a single line tap between Louisa 230 kV substation and North Anna 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 AE2-037 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 system.

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

Description	Total Cost
Attachment Facilities	$ 2,100,000
New three breaker 230kV ring-bus substation	$ 6,500,000
Cut-in the new 230kV 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.

10.1.1 Meteorological Data Reporting Requirements

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

- Back Panel temperature (Fahrenheit)
- Irradiance (Watts/meter2)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

10.2 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 AF2-037 was evaluated as a 94.0 MW (Capacity 56.4 MW) injection tapping the Louisa to North Anna 230 kV line in the Dominion area. Project AF2-037 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-037 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)

None

11.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
96822699	314918	8NO ANNA	500.0	DVP	314911	8LADYSMITH	500.0	DVP	1	DVP_P4-2: SPOTSH1T594	breaker	3938.0	107.0	107.64	DC	46.3
96822700	314918	8NO ANNA	500.0	DVP	314911	8LADYSMITH	500.0	DVP	1	DVP_P4-2: H1T594	breaker	3938.0	102.85	103.44	DC	46.13
96822709	314918	8NO ANNA	500.0	DVP	314934	8SPOTSYL	500.0	DVP	1	DVP_P4-2: 568T575	breaker	3938.0	104.26	104.53	DC	39.93
96822689	314934	8SPOTSYL	500.0	DVP	314916	8MORRSVL	500.0	DVP	1	DVP_P4-2: 568T575	breaker	3938.0	110.87	111.25	DC	39.47
97882815	957430	AF2-037 TAP	230.0	DVP	314232	6NO ANNA	230.0	DVP	1	DVP_P1-2: LN2088	single	749.179992676	112.86	120.35	DC	56.18

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
96822871	314918	8NO ANNA	500.0	DVP	314911	8LADYSMITH	500.0	DVP	1	DVP_P1-2: LN 594	operation	3218.56005859	125.13	125.85	DC	45.84
96822881	314918	8NO ANNA	500.0	DVP	314934	8SPOTSYL	500.0	DVP	1	DVP_P1-2: LN 575	operation	3218.56005859	121.67	122.05	DC	39.59
96822854	314934	8SPOTSYL	500.0	DVP	314916	8MORRSVL	500.0	DVP	1	DVP_P1-2: LN 575	operation	3218.56005859	128.68	129.16	DC	39.07
97882814	957430	AF2-037 TAP	230.0	DVP	314232	6NO ANNA	230.0	DVP	1	DVP_P1-2: LN 2088	operation	749.179992676	127.62	140.11	DC	93.63

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
97882815	4	AF2-037 TAP 230.0 kV - 6NO ANNA 230.0 kV Ckt 1	**DVP** **dom-241 (1340) : Rebuild 9.6 miles of 230 kV Line 255 from AF2-037 Tap to North Anna with 2-795 ACSR. Upgrade Relay and Wavetrap at North Anna.** **Project Type : FAC** **Cost : $14,720,000** **Time Estimate : 36-40 Months**	$14,720,000
96822699,96822700	1	8NO ANNA 500.0 kV - 8LADYSMITH 500.0 kV Ckt 1	**DVP** **dom-044 (1110) : Rebuild 14.53 miles of 500 kV Line 575 from North Anna to Ladysmith with 3-1351.5 113C ACSR.** **Project Type : FAC** **Cost : $45,043,000** **Time Estimate : 48-60 Months**	$45,043,000
96822689	3	8SPOTSYL 500.0 kV - 8MORRSVL 500.0 kV Ckt 1	**DVP** **n6160 (1275) : Rebuild 18.75 miles of 500 kV Line 594 from Spotsylvania to Morrisvile with 3-1351.5 113C ACSR.** **Project Type : FAC** **Cost : $58,125,000** **Time Estimate : 48-60 Months**	$58,125,000
96822709	2	8NO ANNA 500.0 kV - 8SPOTSYL 500.0 kV Ckt 1	**DVP** **n6132 (1262) : Rebuild 14.02 miles of 500 kV Line 573 from North Anna to Spotsylvania with 3-1351.5 113C ACSR.** **Project Type : FAC** **Cost : $43,462,000** **Time Estimate : 48-60 Months**	$43,462,000
			TOTAL COST	**$161,350,000**

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
96822699	314918	8NO ANNA	DVP	314911	8LADYSMITH	DVP	1	DVP_P4-2: SPOTS H1T594	breaker	3938.0	107.0	107.64	DC	46.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
315172	1LOISA A	3.0227	50/50	3.0227
315173	1LOISA B	3.0383	50/50	3.0383
315174	1LOISA C	3.0383	50/50	3.0383
315175	1LOISA D	3.0383	50/50	3.0383
315176	1LOISA E	6.1943	50/50	6.1943
315177	1S ANNAG1	2.1798	50/50	2.1798
315178	1S ANNAS1	1.1202	50/50	1.1202
315179	1S ANNAG2	2.1798	50/50	2.1798
315180	1S ANNAS2	1.1202	50/50	1.1202
315225	1N ANNA1	112.9205	50/50	112.9205
315226	1N ANNA2	112.9681	50/50	112.9681
916192	Z1-068 E	1.2230	Adder	1.44
919152	AA1-139 E	4.1980	Adder	4.94
923852	AB2-025 E	0.7720	Adder	0.91
923862	AB2-026 E	0.9279	Adder	1.09
924032	AB2-045 E	0.7329	Adder	0.86
924512	AB2-100 E	3.9200	Adder	4.61
925021	AB2-158 C	4.2970	50/50	4.2970
925022	AB2-158 E	11.1079	50/50	11.1079
925522	AC1-027 E	0.7450	Adder	0.88
926731	AC1-158 C	41.3662	50/50	41.3662
926732	AC1-158 E	105.2418	50/50	105.2418
926751	AC1-161 C O1	19.8271	Adder	23.33
926752	AC1-161 E O1	8.4636	Adder	9.96
932511	AC2-071 C	1.5472	Adder	1.82
932512	AC2-071 E	0.7794	Adder	0.92
933291	AC2-141 C	19.8271	Adder	23.33
933292	AC2-141 E	8.4636	Adder	9.96
933501	AC2-165 C	8.1551	Adder	9.59
933502	AC2-165 E	6.1378	Adder	7.22
933731	AC2-196 C	1.1701	Adder	1.38
933732	AC2-196 E	0.7793	Adder	0.92
934061	AD1-033 C	4.9112	Adder	5.78
934062	AD1-033 E	3.2742	Adder	3.85
934611	AD1-087 C O1	6.1734	Adder	7.26
934612	AD1-087 E O1	2.9014	Adder	3.41
934621	AD1-088 C	9.0028	Adder	10.59
934622	AD1-088 E	4.2366	Adder	4.98
935171	AD1-152 C O1	6.1351	Adder	7.22
935172	AD1-152 E O1	4.0901	Adder	4.81
935221	AD1-157 C	1.0477	Adder	1.23

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
935222	AD1-157 E	0.6985	Adder	0.82
937221	AD2-160 C O1	3.8285	Adder	4.5
937222	AD2-160 E O1	2.0076	Adder	2.36
937481	AD2-202 C O1	1.6360	Adder	1.92
937482	AD2-202 E O1	0.9203	Adder	1.08
938371	AE1-056 C	4.5169	Adder	5.31
938372	AE1-056 E	2.4680	Adder	2.9
938491	AE1-068 C O1	52.5339	Adder	61.8
938492	AE1-068 E O1	29.0151	Adder	34.14
938501	AE1-069 C O1	41.1017	Adder	48.35
938502	AE1-069 E O1	23.4982	Adder	27.64
938531	AE1-072 C O1	11.4862	Adder	13.51
938532	AE1-072 E O1	5.9877	Adder	7.04
938551	AE1-074 C	1.7273	Adder	2.03
938552	AE1-074 E	0.8701	Adder	1.02
938561	AE1-075 C	1.8110	Adder	2.13
938562	AE1-075 E	0.8830	Adder	1.04
939231	AE1-154 C	4.0838	50/50	4.0838
939232	AE1-154 E	2.8587	50/50	2.8587
939411	AE1-173 C	72.6036	Adder	85.42
939412	AE1-173 E	48.4024	Adder	56.94
940251	AE2-007 O1	112.4138	Adder	132.25
940471	AE2-031 C	28.7059	Adder	33.77
940472	AE2-031 E	19.1373	Adder	22.51
940481	AE2-033 C	11.0154	Adder	12.96
940482	AE2-033 E	7.4261	Adder	8.74
940641	AE2-051 C O1	14.6337	Adder	17.22
940642	AE2-051 E O1	9.7558	Adder	11.48
941031	AE2-094 C	34.4174	Adder	40.49
941032	AE2-094 E	15.4147	Adder	18.13
941281	AE2-122 C O1	18.5147	Adder	21.78
941282	AE2-122 E O1	74.7113	Adder	87.9
941291	AE2-123 C O1	19.0274	Adder	22.39
941292	AE2-123 E O1	74.1987	Adder	87.29
941301	AE2-124 C O1	17.3130	Adder	20.37
941302	AE2-124 E O1	75.9674	Adder	89.37
941591	AE2-156 O1	9.9797	Adder	11.74
941791	AE2-182 C	1.4626	Adder	1.72
941792	AE2-182 E	0.6809	Adder	0.8
942401	AE2-253 C	4.0269	Adder	4.74
942402	AE2-253 E	1.8092	Adder	2.13
942461	AE2-259 C O1	7.0839	Adder	8.33
942462	AE2-259 E O1	4.7226	Adder	5.56
942471	AE2-260 C O1	9.8786	Adder	11.62
942472	AE2-260 E O1	14.0115	Adder	16.48
942931	AE2-313 C	31.0816	Adder	36.57
942932	AE2-313 E	20.7210	Adder	24.38
944011	AF1-069 C	11.2454	Adder	13.23
944012	AF1-069 E	4.3686	Adder	5.14
944111	AF1-079 C	7.7592	50/50	7.7592
944112	AF1-079 E	10.5362	50/50	10.5362
944581	AF1-123 C O1	31.6620	Adder	37.25

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
944582	AF1-123 E O1	72.4970	Adder	85.29
944591	AF1-124 C O1	31.6620	Adder	37.25
944592	AF1-124 E O1	72.4970	Adder	85.29
944601	AF1-125 C O1	31.6620	Adder	37.25
944602	AF1-125 E O1	72.4970	Adder	85.29
945811	AF1-246 C O1	6.1304	Adder	7.21
945812	AF1-246 E O1	8.4658	Adder	9.96
946011	AF1-266	9.2208	Adder	10.85
946281	AF1-292 C	1.0392	Adder	1.22
946282	AF1-292 E	0.7006	Adder	0.82
946371	AF1-301 C	31.5088	50/50	31.5088
946372	AF1-301 E	21.1441	50/50	21.1441
957431	AF2-037 C	27.7776	50/50	27.7776
957432	AF2-037 E	18.5184	50/50	18.5184
957481	AF2-042 C O1	23.1106	Adder	51.3
957482	AF2-042 E O1	15.4071	Adder	34.2
957691	AF2-063 C	44.3259	50/50	44.3259
957692	AF2-063 E	29.5506	50/50	29.5506
957871	AF2-081 C O1	3.4610	Adder	7.68
957872	AF2-081 E O1	1.4833	Adder	3.29
957911	AF2-085	1.8504	Adder	4.11
958501	AF2-144 C	0.8091	Adder	1.8
958502	AF2-144 E	0.5394	Adder	1.2
959531	AF2-244 C	0.7456	Adder	1.66
959532	AF2-244 E	0.4442	Adder	0.99
959751	AF2-266 O1	3.6650	Adder	8.14
960081	AF2-299 C	0.9283	Adder	2.06
960082	AF2-299 E	0.6189	Adder	1.37
WEC	WEC	0.5393	Confirmed LTF	0.5393
LGEE	LGEE	1.0663	Confirmed LTF	1.0663
CPLE	CPLE	6.9087	Confirmed LTF	6.9087
CBM-W2	CBM-W2	24.7666	Confirmed LTF	24.7666
NY	NY	2.3585	Confirmed LTF	2.3585
CBM-W1	CBM-W1	19.2404	Confirmed LTF	19.2404
TVA	TVA	5.4544	Confirmed LTF	5.4544
O-066	O-066	32.1350	Confirmed LTF	32.1350
CBM-S2	CBM-S2	47.3844	Confirmed LTF	47.3844
CBM-S1	CBM-S1	29.9819	Confirmed LTF	29.9819
G-007	G-007	5.0086	Confirmed LTF	5.0086
MADISON	MADISON	1.7196	Confirmed LTF	1.7196
MEC	MEC	3.4910	Confirmed LTF	3.4910
AA2-074	AA2-074	4.7065	LTF	4.7065

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
96822709	314918	8NO ANNA	DVP	314934	8SPOTSYL	DVP	1	DVP_P4-2: 568T575	breaker	3938.0	104.26	104.53	DC	39.93

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314333	6POWHATN	0.4724	50/50	0.4724
314435	6SAPONY	0.4358	50/50	0.4358
314947	8GREENSVILLE	59.8290	50/50	59.8290
315102	1BRUNSWICKG1	9.8259	50/50	9.8259
315103	1BRUNSWICKG2	9.8259	50/50	9.8259
315104	1BRUNSWICKG3	9.8259	50/50	9.8259
315105	1BRUNSWICKS1	20.4134	50/50	20.4134
315153	1CLOVER1	14.0157	50/50	14.0157
315154	1CLOVER2	13.8761	50/50	13.8761
315177	1S ANNAG1	1.7647	50/50	1.7647
315178	1S ANNAS1	0.9069	50/50	0.9069
315179	1S ANNAG2	1.7647	50/50	1.7647
315180	1S ANNAS2	0.9069	50/50	0.9069
315225	1N ANNA1	99.0627	50/50	99.0627
315226	1N ANNA2	99.1044	50/50	99.1044
916192	Z1-068 E	1.6042	Adder	1.89
923852	AB2-025 E	1.1351	50/50	1.1351
923862	AB2-026 E	1.2305	50/50	1.2305
925021	AB2-158 C	3.6613	50/50	3.6613
925022	AB2-158 E	9.4645	50/50	9.4645
925522	AC1-027 E	0.9775	Adder	1.15
926751	AC1-161 C O1	26.0220	Adder	30.61
926752	AC1-161 E O1	11.1081	Adder	13.07
933291	AC2-141 C	26.0220	Adder	30.61
933292	AC2-141 E	11.1081	Adder	13.07
933501	AC2-165 C	10.8015	50/50	10.8015
933502	AC2-165 E	8.1296	50/50	8.1296
933731	AC2-196 C	1.5305	Adder	1.8
933732	AC2-196 E	1.0193	Adder	1.2
934061	AD1-033 C	6.4264	Adder	7.56
934062	AD1-033 E	4.2842	Adder	5.04
938491	AE1-068 C O1	69.1742	50/50	69.1742
938492	AE1-068 E O1	38.2058	50/50	38.2058
938501	AE1-069 C O1	54.1551	50/50	54.1551
938502	AE1-069 E O1	30.9609	50/50	30.9609
938551	AE1-074 C	2.5946	50/50	2.5946
938552	AE1-074 E	1.3070	50/50	1.3070
938561	AE1-075 C	2.4015	50/50	2.4015
938562	AE1-075 E	1.1710	50/50	1.1710
939231	AE1-154 C	3.4796	50/50	3.4796
939232	AE1-154 E	2.4357	50/50	2.4357

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
939411	AE1-173 C	100.2288	50/50	100.2288
939412	AE1-173 E	66.8192	50/50	66.8192
940251	AE2-007 O1	83.0815	Adder	97.74
940471	AE2-031 C	37.7650	50/50	37.7650
940472	AE2-031 E	25.1766	50/50	25.1766
940481	AE2-033 C	13.7577	Adder	16.19
940482	AE2-033 E	9.2749	Adder	10.91
940641	AE2-051 C O1	19.6506	50/50	19.6506
940642	AE2-051 E O1	13.1004	50/50	13.1004
941031	AE2-094 C	45.2628	50/50	45.2628
941032	AE2-094 E	20.2722	50/50	20.2722
941281	AE2-122 C O1	24.2793	Adder	28.56
941282	AE2-122 E O1	97.9728	Adder	115.26
941291	AE2-123 C O1	24.9516	Adder	29.35
941292	AE2-123 E O1	97.3005	Adder	114.47
941301	AE2-124 C O1	22.6953	Adder	26.7
941302	AE2-124 E O1	99.5840	Adder	117.16
942931	AE2-313 C	40.8903	50/50	40.8903
942932	AE2-313 E	27.2602	50/50	27.2602
944011	AF1-069 C	14.7891	50/50	14.7891
944012	AF1-069 E	5.7452	50/50	5.7452
944111	AF1-079 C	6.6112	50/50	6.6112
944112	AF1-079 E	8.9774	50/50	8.9774
944581	AF1-123 C O1	41.2754	Adder	48.56
944582	AF1-123 E O1	94.5091	Adder	111.19
944591	AF1-124 C O1	41.2754	Adder	48.56
944592	AF1-124 E O1	94.5091	Adder	111.19
944601	AF1-125 C O1	41.2754	Adder	48.56
944602	AF1-125 E O1	94.5091	Adder	111.19
945811	AF1-246 C O1	8.1278	50/50	8.1278
945812	AF1-246 E O1	11.2242	50/50	11.2242
946011	AF1-266	11.5163	Adder	13.55
946371	AF1-301 C	26.8759	50/50	26.8759
946372	AF1-301 E	18.0351	50/50	18.0351
957431	AF2-037 C	23.9610	50/50	23.9610
957432	AF2-037 E	15.9740	50/50	15.9740
957481	AF2-042 C O1	57.8310	50/50	57.8310
957482	AF2-042 E O1	38.5540	50/50	38.5540
957691	AF2-063 C	38.2356	50/50	38.2356
957692	AF2-063 E	25.4904	50/50	25.4904
957911	AF2-085	4.6470	50/50	4.6470
958501	AF2-144 C	2.0244	50/50	2.0244
958502	AF2-144 E	1.3496	50/50	1.3496
959531	AF2-244 C	1.8656	50/50	1.8656
959532	AF2-244 E	1.1114	50/50	1.1114
959751	AF2-266 O1	9.2020	50/50	9.2020
WEC	WEC	0.7195	Confirmed LTF	0.7195
LGEE	LGEE	1.4217	Confirmed LTF	1.4217
CPLE	CPLE	8.1761	Confirmed LTF	8.1761
CBM-W2	CBM-W2	31.3923	Confirmed LTF	31.3923
NY	NY	2.6738	Confirmed LTF	2.6738
CBM-W1	CBM-W1	25.8957	Confirmed LTF	25.8957

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
TVA	TVA	6.8166	Confirmed LTF	6.8166
O-066	O-066	36.4426	Confirmed LTF	36.4426
CBM-S2	CBM-S2	56.6729	Confirmed LTF	56.6729
CBM-S1	CBM-S1	37.7180	Confirmed LTF	37.7180
G-007	G-007	5.6784	Confirmed LTF	5.6784
MADISON	MADISON	2.0079	Confirmed LTF	2.0079
MEC	MEC	4.5414	Confirmed LTF	4.5414
AA2-074	AA2-074	5.5719	LTF	5.5719

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
96822689	314934	8SPOTSYL	DVP	314916	8MORRSVL	DVP	1	DVP_P4-2: 568T575	breaker	3938.0	110.87	111.25	DC	39.47

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314947	8GREENSVILLE	58.5019	50/50	58.5019
315102	1BRUNSWICKG1	9.6086	50/50	9.6086
315103	1BRUNSWICKG2	9.6086	50/50	9.6086
315104	1BRUNSWICKG3	9.6086	50/50	9.6086
315105	1BRUNSWICKS1	19.9618	50/50	19.9618
315175	1LOISA D	2.7184	50/50	2.7184
315176	1LOISA E	5.5421	50/50	5.5421
315177	1S ANNAG1	1.9400	50/50	1.9400
315178	1S ANNAS1	0.9970	50/50	0.9970
315179	1S ANNAG2	1.9400	50/50	1.9400
315180	1S ANNAS2	0.9970	50/50	0.9970
315225	1N ANNA1	95.1099	50/50	95.1099
315226	1N ANNA2	95.1500	50/50	95.1500
916192	Z1-068 E	1.5820	Adder	1.86
923852	AB2-025 E	0.9493	Adder	1.12
923862	AB2-026 E	1.0341	Adder	1.22
925021	AB2-158 C	3.6957	50/50	3.6957
925022	AB2-158 E	9.5535	50/50	9.5535
926001	**AC1-076 C (Suspended)**	**6.8168**	**50/50**	**6.8168**
926002	**AC1-076 E (Suspended)**	**11.0845**	**50/50**	**11.0845**
926481	AC1-120 C O1	6.1443	Adder	7.23
926482	AC1-120 E O1	3.1652	Adder	3.72
926501	AC1-121 C O1	2.1102	Adder	2.48
926502	AC1-121 E O1	0.9930	Adder	1.17
926731	AC1-158 C	41.2847	50/50	41.2847
926732	AC1-158 E	105.0344	50/50	105.0344
926751	AC1-161 C O1	25.6603	Adder	30.19
926752	AC1-161 E O1	10.9537	Adder	12.89
933291	AC2-141 C	25.6603	Adder	30.19
933292	AC2-141 E	10.9537	Adder	12.89
933501	AC2-165 C	9.1028	Adder	10.71
933502	AC2-165 E	6.8510	Adder	8.06
933731	AC2-196 C	1.5090	Adder	1.78
933732	AC2-196 E	1.0050	Adder	1.18
934061	AD1-033 C	6.3364	Adder	7.45
934062	AD1-033 E	4.2243	Adder	4.97
938491	AE1-068 C O1	67.6346	50/50	67.6346
938492	AE1-068 E O1	37.3554	50/50	37.3554
938501	AE1-069 C O1	52.9538	50/50	52.9538
938502	AE1-069 E O1	30.2742	50/50	30.2742
938551	AE1-074 C	2.1752	Adder	2.56

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
938552	AE1-074 E	1.0958	Adder	1.29
938561	AE1-075 C	2.0182	Adder	2.37
938562	AE1-075 E	0.9841	Adder	1.16
939231	AE1-154 C	3.5123	50/50	3.5123
939232	AE1-154 E	2.4586	50/50	2.4586
939411	AE1-173 C	98.2512	50/50	98.2512
939412	AE1-173 E	65.5008	50/50	65.5008
940251	AE2-007 O1	106.3298	Adder	125.09
940471	AE2-031 C	36.9280	50/50	36.9280
940472	AE2-031 E	24.6187	50/50	24.6187
940481	AE2-033 C	13.5368	Adder	15.93
940482	AE2-033 E	9.1259	Adder	10.74
940641	AE2-051 C O1	19.2321	50/50	19.2321
940642	AE2-051 E O1	12.8214	50/50	12.8214
941031	AE2-094 C	44.2496	50/50	44.2496
941032	AE2-094 E	19.8184	50/50	19.8184
941281	AE2-122 C O1	23.9430	Adder	28.17
941282	AE2-122 E O1	96.6157	Adder	113.67
941291	AE2-123 C O1	24.6060	Adder	28.95
941292	AE2-123 E O1	95.9527	Adder	112.89
941301	AE2-124 C O1	22.3797	Adder	26.33
941302	AE2-124 E O1	98.1994	Adder	115.53
941381	**AE2-134 (Suspended)**	**4.6973**	**50/50**	**4.6973**
942931	AE2-313 C	39.9841	50/50	39.9841
942932	AE2-313 E	26.6561	50/50	26.6561
944011	AF1-069 C	14.4580	50/50	14.4580
944012	AF1-069 E	5.6166	50/50	5.6166
944111	AF1-079 C	6.6734	50/50	6.6734
944112	AF1-079 E	9.0617	50/50	9.0617
944581	AF1-123 C O1	40.6910	Adder	47.87
944582	AF1-123 E O1	93.1710	Adder	109.61
944591	AF1-124 C O1	40.6910	Adder	47.87
944592	AF1-124 E O1	93.1710	Adder	109.61
944601	AF1-125 C O1	40.6910	Adder	47.87
944602	AF1-125 E O1	93.1710	Adder	109.61
945811	AF1-246 C O1	6.7709	Adder	7.97
945812	AF1-246 E O1	9.3502	Adder	11.0
946011	AF1-266	11.3314	Adder	13.33
946371	AF1-301 C	27.0780	50/50	27.0780
946372	AF1-301 E	18.1708	50/50	18.1708
957431	AF2-037 C	23.6835	50/50	23.6835
957432	AF2-037 E	15.7890	50/50	15.7890
957481	AF2-042 C O1	25.5339	Adder	56.68
957482	AF2-042 E O1	17.0226	Adder	37.79
957691	AF2-063 C	37.7928	50/50	37.7928
957692	AF2-063 E	25.1952	50/50	25.1952
957911	AF2-085	4.5552	50/50	4.5552
958501	AF2-144 C	0.9017	Adder	2.0
958502	AF2-144 E	0.6011	Adder	1.33
959531	AF2-244 C	0.8310	Adder	1.84
959532	AF2-244 E	0.4950	Adder	1.1
959751	AF2-266 O1	4.0673	Adder	9.03

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
WEC	WEC	0.6713	Confirmed LTF	0.6713
LGEE	LGEE	1.3367	Confirmed LTF	1.3367
CPLE	CPLE	8.0075	Confirmed LTF	8.0075
CBM-W2	CBM-W2	30.0819	Confirmed LTF	30.0819
NY	NY	2.7838	Confirmed LTF	2.7838
CBM-W1	CBM-W1	23.9692	Confirmed LTF	23.9692
TVA	TVA	6.5870	Confirmed LTF	6.5870
O-066	O-066	37.7933	Confirmed LTF	37.7933
CBM-S2	CBM-S2	55.4071	Confirmed LTF	55.4071
CBM-S1	CBM-S1	36.3463	Confirmed LTF	36.3463
G-007	G-007	5.8874	Confirmed LTF	5.8874
MADISON	MADISON	1.9918	Confirmed LTF	1.9918
MEC	MEC	4.2951	Confirmed LTF	4.2951
AA2-074	AA2-074	5.4563	LTF	5.4563

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
97882815	957430	AF2-037 TAP	DVP	314232	6NO ANNA	DVP	1	DVP_P1-2: LN 2088	single	749.18	112.86	120.35	DC	56.18

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
315172	1LOISA A	13.2469	80/20	13.2469
315173	1LOISA B	13.3156	80/20	13.3156
315174	1LOISA C	13.3156	80/20	13.3156
315175	1LOISA D	13.3156	80/20	13.3156
315176	1LOISA E	27.1466	80/20	27.1466
315177	1S ANNAG1	8.9729	80/20	8.9729
315178	1S ANNAS1	4.6111	80/20	4.6111
315179	1S ANNAG2	8.9729	80/20	8.9729
315180	1S ANNAS2	4.6111	80/20	4.6111
925021	AB2-158 C	10.4806	80/20	10.4806
939231	AE1-154 C	9.9606	80/20	9.9606
944111	AF1-079 C	18.9251	80/20	18.9251
946371	AF1-301 C	75.7006	80/20	75.7006
957431	AF2-037 C	56.1778	80/20	56.1778
957691	AF2-063 C	89.6454	80/20	89.6454
NEWTON	NEWTON	0.4234	Confirmed LTF	0.4234
FARMERCITY	FARMERCITY	0.0221	Confirmed LTF	0.0221
CALDERWOOD	CALDERWOOD	0.1958	Confirmed LTF	0.1958
NY	NY	0.2201	Confirmed LTF	0.2201
PRAIRIE	PRAIRIE	1.0177	Confirmed LTF	1.0177
CHEOAH	CHEOAH	0.1972	Confirmed LTF	0.1972
EDWARDS	EDWARDS	0.1379	Confirmed LTF	0.1379
TILTON	TILTON	0.2482	Confirmed LTF	0.2482
GIBSON	GIBSON	0.2151	Confirmed LTF	0.2151
BLUEG	BLUEG	0.6840	Confirmed LTF	0.6840
TRIMBLE	TRIMBLE	0.2193	Confirmed LTF	0.2193
CATAWBA	CATAWBA	0.1379	Confirmed LTF	0.1379

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
AA1-139	Hickory-Shawboro 230kV	In Service
AA2-074	CPLE-PJM	Confirmed
AB2-025	Sapony 34.5kV	In Service
AB2-026	Powhatan 34.5kV	In Service
AB2-045	Buckingham 34.5kV	In Service
AB2-100	Clubhouse-Lakeview 230kV	Under Construction
AB2-158	Louisa-South Anna 230kV	Under Construction
AC1-027	Pendleton 34.5kV	In Service
AC1-076	Locust Grove-Paytes 115kV	Suspended
AC1-120	Mitchell-Mountain Run 115kV	Engineering and Procurement
AC1-121	Mitchell-Mountain Run 115kV	Engineering and Procurement
AC1-158	Spotsylvania 500kV	Under Construction
AC1-161	Septa 500kV	Active
AC2-071	Buckingham 35kV	Engineering and Procurement
AC2-141	Septa 500kV	Active
AC2-165	Bremo-Powhatan 230kV	Active
AC2-196	Fentress 34.5kV	Engineering and Procurement
AD1-033	Fentress-Landstown 230 kV	Active
AD1-087	Clover-Sedge Hill 230 kV	Active
AD1-088	Briery-Clover 230 kV	Active
AD1-152	Clover-Sedge Hill 230 kV	Active
AD1-157	South Creek 34.5 kV	Engineering and Procurement
AD2-160	Hickory-Moyock 230kV	Active
AD2-202	Clover-Sedge Hill 230kV	Active
AE1-056	Red House-South Creek 115 kV	Active
AE1-068	Carson-Rogers Rd 500 kV	Active
AE1-069	Carson-Rogers Road 500 kV	Active
AE1-072	Shawboro-Sligo 230 kV	Active
AE1-074	Winterpock 34.5 kV	Engineering and Procurement
AE1-075	Powhatan 34.5 kV	Engineering and Procurement
AE1-154	Louisa-South Anna 230 kV	Engineering and Procurement
AE1-173	Carson-Suffolk 500 kV	Active
AE2-007	Chesapeake 230 kV	Active
AE2-031	Carson-Rawlings 500 kV	Active
AE2-033	Clubhouse-Sappony 230 kV	Active
AE2-051	Carson-Septa 500 kV	Active
AE2-094	Carson-Rogers Road 500 kV	Active
AE2-122	Birdneck-Landstown 230 kV	Active
AE2-123	Birdneck-Landstown 230 kV	Active

Queue Number	Project Name	Status
AE2-124	Landstown 230 kV	Active
AE2-134	Locust Grove-Paytes 115 kV	Suspended
AE2-156	Yadkin 115 kV	Active
AE2-182	Briery-Clover 230 kV	Active
AE2-253	Hickory-Moyock 230 kV	Active
AE2-259	Curdsville-Willis Mtn 115 kV	Active
AE2-260	Clubhouse 230 kV	Active
AE2-313	Carson-Rawlings 500 kV	Active
AF1-069	Carson-Rogers Rd 500 kV	Active
AF1-079	Louisa-South Anna 230 kV	Active
AF1-123	Fentress 500 kV	Active
AF1-124	Fentress 500 kV	Active
AF1-125	Fentress 500 kV	Active
AF1-246	Clover-Rawlings 500 kV	Active
AF1-266	Clubhouse-Sapony 230 kV	Active
AF1-292	Fields Crossroads 34.5 kV	Active
AF1-301	Louisa-South Anna 230 kV	Active
AF2-037	Louisa-North Anna 230 kV	Active
AF2-042	Clover 500 kV	Active
AF2-063	Louisa-North Anna 230 kV	Active
AF2-081	Moyock 230 kV	Active
AF2-085	Midlothian 34.5 kV	Active
AF2-144	Powhatan 34.5 kV	Active
AF2-244	Powhatan 34.5 kV	Active
AF2-266	Clover 230 kV	Active
AF2-299	Fields 34.5 kV	Active
Z1-068	Birdneck 34.5kV	Under Construction

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-2: LN 594	CONTINGENCY 'DVP_P1-2: LN 594' OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00 END
DVP_P1-2: LN 575	CONTINGENCY 'DVP_P1-2: LN 575' OPEN BRANCH FROM BUS 314911 TO BUS 314918 CKT 1 /* 8LADYSMITH 500.00 - 8NO ANNA 500.00 END
DVP_P4-2: H1T594	CONTINGENCY 'DVP_P4-2: H1T594' /* MORRISVILLE 500 KV OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00 OPEN BRANCH FROM BUS 314063 TO BUS 314916 CKT 1 /* 6MORRSVL 230.00 - 8MORRSVL 500.00 OPEN BUS 314897 /* 8MORRS_1 500.00 KV END

Contingency Name	Contingency Definition
DVP_P1-2: LN 2088	CONTINGENCY 'DVP_P1-2: LN 2088' OPEN BRANCH FROM BUS 314745 TO BUS 314758 CKT 1 /* 6LOISACT 230.00 - 6GORDNVL 230.00 END
DVP_P4-2: 568T575	CONTINGENCY 'DVP_P4-2: 568T575' /* LADYSMITH 500 KV OPEN BRANCH FROM BUS 314911 TO BUS 314922 CKT 1 /* 8LADYSMITH 500.00 - 8POSSUM 500.00 OPEN BRANCH FROM BUS 314911 TO BUS 314918 CKT 1 /* 8LADYSMITH 500.00 - 8NO ANNA 500.00 END
DVP_P4-2: SPOTS H1T594	CONTINGENCY 'DVP_P4-2: SPOTS H1T594' /* SPOTSYLVANIA 500 KV OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00 OPEN BRANCH FROM BUS 314755 TO BUS 314934 CKT 1 /* 3SPOTSYL 115.00 - 8SPOTSYL 500.00 END

12 Short Circuit Analysis

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

13 Affected Systems

13.1 TVA

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

13.2 Duke Energy Progress

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

Attachment 1: One Line Diagram