Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-288

LAKE OF THE WOODS DP-WILDERNESS DP 115 KV

96.59 MW Capacity / 150 MW Energy

January 2021

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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.

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 Solar generating facility located in Orange County, Virginia. The installed facilities will have a total capability of 150 MW with 96.59 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 30, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-288
Project Name	LAKE OF THE WOODS DP-WILDERNESS DP 115 KV
State	Virginia
County	Orange
Transmission Owner	Dominion
MFO	150
MWE	150
MWC	96.59
Fuel	Solar
Basecase Study Year	2024

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

4 Point of Interconnection

4.1 Primary Point of Interconnection

AG1-288 "Lake of the Woods DP-Wilderness DP 115 kV" will interconnect with the Dominion transmission system. The primary POI will be a newly constructed 115 kV station located on the line between the Lake of the Woods DP substation and Wilderness DP substation. AG1-288 will interconnect to the line via single breaker.

The IC is responsible for securing right-of-way, permits, and constructing the proposed attachment line from the generating facility site to the Point of Interconnection. The IC may not install any facilities on Dominion's right-of-way without first obtaining the necessary approval from Dominion Energy.

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

4.2 Secondary Point of Interconnection

There is no secondary point of interconnection specified for AG1-288.

5 Cost Summary

The AG1-288 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$ 4,800,000
Total System Network Upgrade Costs	$458,125,000[1]
Total Costs	**$462,925,000**

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 2016-36, 2016-25 I.R.B. (6/20/2016). 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.

[1] This project currently contributes to overloads of the Transmission System (see Summer Peak Load Flow Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase. The results may vary with queue customers withdrawing from the queue and other generators deactivating over time. If a customer is the first to cause the need for a project (causes loading to exceed 100% of rating), then the customer is responsible. If a customer contributes to a facility that is already overloaded by a prior queue, then they may receive cost allocation.

6 Transmission Owner Scope of Work

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of AG1-288 to the Dominion Transmission System is detailed in the following sections. The associated one-line showing the generation project attachment facilities and primary direct and non-direct connection is shown in Attachment 1.

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

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

Description	**Total Cost**
Attachment Facilities	$1,700,000
115 kV Single Breaker Station	$1,500,000
Re-arrange line and tie-in new substation	$1,600,000
Total Physical Interconnection Costs	**$4,800,000**

AG1-288 "Lake of the Woods DP-Wilderness DP 115 kV" will interconnect with the Dominion transmission system. The primary POI will be a newly constructed 115 kV station located on the line between the Lake of the Woods DP substation and Wilderness DP substation. AG1-288 will interconnect to the line via single breaker.

It is estimated to take **18-30 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.

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 estimated schedule for the Attachment Facilities, Direct Connection and Non-Direct Connection work is identified in the "Transmission Owner Scope of Work" section of this report.

If the customer is ultimately responsible for network upgrades, then the schedule for those upgrades will be refined in future study phases. The customer would need to wait for those upgrades to be completed prior to commercial operation unless determined deliverable by an interim deliverability study. The elapsed time to complete any network upgrades is provided in the System Reinforcements table of this report[1].

8 Transmission Owner Analysis

Dominion assessed the impact of the proposed AG1-288 for compliance with NERC Reliability Criteria on the Dominion Transmission System. The system was assessed using the summer 2024 AG1 case provided to Dominion by PJM.

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

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically, in Planning Studies, NERC Planning Event 3 and 6 Contingency Conditions (Loss of generator, transmission circuit, transformer, shunt device, or Single Pole of a DC line followed by the loss of a generator, transmission circuit, transformer, shunt device or single pole of a DC line) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For Dominion Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

8.1 Power Flow Analysis

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

8.2 Short Circuit Analysis

No impacts.

8.3 Stability Analysis

To be performed in the Facilities Study phase.

9 Interconnection Customer Requirements

9.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in Dominion's "Dominion Energy Electric Transmission Generator Interconnection Requirements" documented in Dominion's Facility Interconnection Requirements "Exhibit C" located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access. Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

9.2 Compliance Issues and Interconnection Customer Requirements

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

1. The purchase and installation of a fully rated protection device (circuit breaker, circuit switcher, fuse) to protect the IC's GSU transformer(s).

2. The purchase and installation of the minimum required Dominion generation interconnection relaying and control facilities as described in the System Protection section noted above. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.

3. The purchase and installation of supervisory control and data acquisition ("SCADA") equipment to provide information in a compatible format to the Dominion Transmission System Control Center.

4. Compliance with the Dominion and PJM generator power factor and voltage control requirements.

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

The IC will also be required to meet all PJM, SERC, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage and over and under frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and SERC audits. Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the Dominion system.

9.3 Power Factor Requirements

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

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

10.2 Meteorological Data Reporting Requirements

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

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

10.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

http://www.pjm.com/planning/design-engineering/to-tech-standards/

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-288 was evaluated as a 150 MW (Capacity 96.59 MW) injection tapping the Lake of Woods to Wilderness 115 kV line in the Dominion area. Project AG1-288 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-288 was studied with a commercial probability of 53.0 %. 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
16369163 4	31493 4	8SPOTSY L	500. 0	DVP	31491 6	8MORRSV L	500. 0	DVP	1	DVP_P1 -2: LN 552	singl e	3218.5600585 9	135.12	135.24	DC	32.64
16369163 7	31493 4	8SPOTSY L	500. 0	DVP	31491 6	8MORRSV L	500. 0	DVP	1	DVP_P1 -2: LN 575-B	singl e	3218.5600585 9	121.94	122.97	DC	33.18

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
16369163 0	31493 4	8SPOTSY L	500. 0	DVP	31491 6	8MORRS VL	500. 0	DVP	1	DVP_P 1-2: LN 575-A	operatio n	3218.560058 59	146.94	147.29	DC	33.18

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
163691637,163691634	1	8SPOTSYL 500.0 kV - 8MORRSVL 500.0 kV Ckt 1	DVP dom-183 (1361) : Build new 500 kV Line from Rawlings to Morrisville Substation 110 miles Project Type : CON Cost : $400,000,000 Time Estimate : 60-72 Months n6160 (1403) : 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	$458,125,000
			TOTAL COST	$458,125,000[1]

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
163691634	314934	8SPOTSYL	DVP	314916	8MORRSVL	DVP	1	DVP_P1-2: LN 552	single	3218.56	135.12	135.24	DC	32.64

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314236	6NRTHEST	0.2014	80/20	0.2014
314250	6ROCKVILLE	0.3709	80/20	0.3709
314309	6IRON208	0.4858	80/20	0.4858
314314	3LOCKS	0.3245	80/20	0.3245
315058	**1CHESTF3 (Deactivation : 13/12/2018)**	**17.4462**	**Adder**	**20.52**
315059	**1CHESTF4 (Deactivation : 13/12/2018)**	**28.2804**	**Adder**	**33.27**
315060	**1CHESTF5 (Deactivation : 31/05/2023)**	**60.9577**	**Adder**	**71.71**
315065	**1CHESTF6 (Deactivation : 31/05/2023)**	**139.8920**	**80/20**	**139.8920**
315074	**1HOPCGN1 (Deactivation : 25/06/2019)**	**0.0175**	**Adder**	**0.02**
315075	**1HOPCGN2 (Deactivation : 25/06/2019)**	**0.0175**	**Adder**	**0.02**
315083	**1SPRUNCA (Deactivation : 12/01/2021)**	**12.2861**	**80/20**	**12.2861**
315084	**1SPRUNCB (Deactivation : 12/01/2021)**	**12.2861**	**80/20**	**12.2861**
315098	1CHESPKA	0.4831	80/20	0.4831
315099	**1CHESPKB (Deactivation : 31/05/2019)**	**3.3492**	**80/20**	**3.3492**
315108	1ELIZAR1	3.5490	80/20	3.5490
315109	1ELIZAR2	3.4874	80/20	3.4874
315110	1ELIZAR3	3.5944	80/20	3.5944
315225	1N ANNA1	54.3957	80/20	54.3957
315226	1N ANNA2	54.4186	80/20	54.4186
315233	1SURRY 2	27.4780	80/20	27.4780
316083	**AB2-161 C (Suspended)**	**3.3028**	**Adder**	**3.89**
316108	**AB2-160 C (Suspended)**	**6.2536**	**80/20**	**6.2536**
316112	**AB2-068 CT1 (Withdrawn : 01/11/2021)**	**44.4426**	**Adder**	**52.29**
316113	**AB2-068 CT2 (Withdrawn : 01/11/2021)**	**44.4426**	**Adder**	**52.29**
316114	**AB2-068 ST (Withdrawn : 01/11/2021)**	**76.9921**	**Adder**	**90.58**
316132	AB2-190 C	19.5312	Adder	22.98
316134	AC1-107 G1	92.1388	Adder	108.4
316135	AC1-107 G2	92.1388	Adder	108.4
316136	AC1-107 G3	92.1561	Adder	108.42
925021	AB2-158 C	2.0085	80/20	2.0085

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
926001	AC1-076 C	6.0766	80/20	6.0766
926661	AC1-147 C	0.4085	80/20	0.4085
926737	AC1-158 C1	14.5872	80/20	14.5872
926738	AC1-158 C2	14.5872	80/20	14.5872
926754	AC1-161 C	34.9772	80/20	34.9772
932044	AC2-012 C	11.7141	80/20	11.7141
932581	AC2-078 C O1	3.9651	Adder	4.66
932591	AC2-079 C O1	5.5811	Adder	6.57
933294	AC2-141 C	34.9772	80/20	34.9772
934014	AD1-025 C	16.4224	Adder	19.32
934061	AD1-033 C	7.3196	Adder	8.61
934575	AD1-082 C	7.5270	Adder	8.86
935164	AD1-151 C	15.6947	Adder	18.46
936041	AD2-007 C	0.7845	Adder	0.92
936051	AD2-008 C	2.8591	Adder	3.36
936761	AD2-097 C	2.3301	80/20	2.3301
937221	AD2-160 C O1	5.6867	Adder	6.69
938494	AE1-068_C1	27.9735	Adder	32.91
938497	AE1-068_C2	27.9735	Adder	32.91
938504	AE1-069_C1	21.3189	Adder	25.08
938507	AE1-069_C2	22.9869	Adder	27.04
938551	AE1-074 C	0.4570	80/20	0.4570
938634	AE1-085 C	8.6985	Adder	10.23
939195	AE1-149 C	10.4565	Adder	12.3
939231	AE1-154 C	2.0870	80/20	2.0870
939414	AE1-173_C1	35.5051	80/20	35.5051
939415	AE1-173_C2	30.4330	80/20	30.4330
939416	AE1-173_C3	35.5051	80/20	35.5051
939431	AE1-175 C	2.3014	Adder	2.71
940061	AE2-000BC O1	10.4229	Adder	12.26
940251	**AE2-007 O1 (Withdrawn : 12/11/2020)**	**198.9482**	**80/20**	**198.9482**
940431	AE2-027 C O1	14.7982	80/20	14.7982
940471	AE2-031 C	35.9101	80/20	35.9101
940641	AE2-051 C O1	19.2096	80/20	19.2096
940651	AE2-052	3.4855	Adder	4.1
940891	AE2-078 C	2.2968	Adder	2.7
940901	AE2-079 C	2.2968	Adder	2.7
941031	AE2-094 C	43.0189	80/20	43.0189
941281	AE2-122 C O1	27.7126	Adder	32.6
941291	AE2-123 C O1	28.4800	Adder	33.51
941301	AE2-124 C O1	25.8951	Adder	30.46
941381	**AE2-134 (Suspended)**	**4.1872**	**80/20**	**4.1872**
941591	AE2-156 O1	20.5580	80/20	20.5580
942001	AE2-212 C	2.4740	80/20	2.4740
942151	AE2-227 C	2.4800	80/20	2.4800
942161	AE2-228 C	2.4752	80/20	2.4752
942371	AE2-250 C O1	11.1083	80/20	11.1083
942401	AE2-253 C	5.9814	Adder	7.04
942551	AE2-270	26.1541	Adder	30.77
942931	AE2-313 C	38.8349	80/20	38.8349
943621	AF1-033 C	2.2968	Adder	2.7

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
944011	AF1-069 C	14.0559	80/20	14.0559
944111	AF1-079 C	3.9653	80/20	3.9653
944581	AF1-123 C O1	55.1157	80/20	55.1157
944591	AF1-124 C O1	55.1157	80/20	55.1157
944601	AF1-125 C O1	55.1157	80/20	55.1157
944631	AF1-128 O1	53.4512	Adder	62.88
944641	AF1-129	117.3847	80/20	117.3847
946261	AF1-291 C	2.4751	80/20	2.4751
946371	AF1-301 C	16.2047	80/20	16.2047
957431	AF2-037 C	14.4361	80/20	14.4361
957631	AF2-057	4.1102	80/20	4.1102
957691	AF2-063 C	23.0364	80/20	23.0364
957711	AF2-065 C	13.3386	Adder	15.69
957871	AF2-081 C	9.6890	Adder	11.4
957911	AF2-085	4.5132	80/20	4.5132
958141	AF2-108	2.0607	80/20	2.0607
959641	AF2-255 C	0.6200	80/20	0.6200
959651	AF2-256 C	0.6188	80/20	0.6188
959661	AF2-257 C	0.6188	80/20	0.6188
959671	AF2-258 C	0.6185	80/20	0.6185
959681	AF2-259 C	3.0911	80/20	3.0911
961611	AG1-000B C	8.2150	Adder	18.24
961711	AG1-011	14.7836	Adder	32.82
961811	AG1-023 C	4.0631	80/20	4.0631
962191	AG1-064 C	1.6663	80/20	1.6663
962201	AG1-065 C	1.6663	80/20	1.6663
962271	AG1-075 C O1	19.1722	80/20	19.1722
962321	**AG1-081 C (Withdrawn : 01/15/2021)**	**1.1067**	**Adder**	**2.46**
962841	AG1-133 C O1	28.6623	80/20	28.6623
962961	AG1-145 C	1.1005	Adder	2.44
963221	AG1-171 C	1.1091	Adder	2.46
963231	AG1-172 C	1.1091	Adder	2.46
963241	AG1-173 C	1.1091	Adder	2.46
963251	AG1-174 C	1.1091	Adder	2.46
963261	AG1-175 C	1.1091	Adder	2.46
963291	AG1-178 C O1	69.2025	80/20	69.2025
963351	AG1-184 O1	37.2825	80/20	37.2825
963821	AG1-235 C O1	12.4378	Adder	27.61
964271	AG1-288 C	32.6436	80/20	32.6436
964281	AG1-289	18.0504	80/20	18.0504
964421	AG1-305 C O1	18.1220	80/20	18.1220
964951	AG1-359 O1	13.8529	Adder	30.75
965001	AG1-364 C O1	8.2228	80/20	8.2228
965181	AG1-383 C	1.4224	Adder	3.16
965811	AG1-449	25.1784	80/20	25.1784
966611	AG1-531 C	3.3154	Adder	7.36
966731	AG1-544 C	3.6006	Adder	7.99
966741	AG1-545 C	1.2003	Adder	2.66
WEC	WEC	0.6801	Confirmed LTF	0.6801
LGEE	LGEE	1.4941	Confirmed LTF	1.4941
CPLE	CPLE	8.4200	Confirmed LTF	8.4200

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CBM-W2	CBM-W2	34.2541	Confirmed LTF	34.2541
NY	NY	2.8767	Confirmed LTF	2.8767
TVA	TVA	6.7732	Confirmed LTF	6.7732
SIGE	SIGE	0.8682	Confirmed LTF	0.8682
CBM-S2	CBM-S2	102.2389	Confirmed LTF	102.2389
CBM-S1	CBM-S1	1.6686	Confirmed LTF	1.6686
MEC	MEC	4.3539	Confirmed LTF	4.3539
LAGN	LAGN	8.2845	Confirmed LTF	8.2845
AA2-074	AA2-074	5.5593	LTF	5.5593
CBM-W1	CBM-W1	26.9324	Confirmed LTF	26.9324

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
AA2-074	CPLE-PJM	Confirmed
AB2-068	Chickahominy 500kV	Withdrawn
AB2-158	Louisa-South Anna 230kV	Under Construction
AB2-160	Reams 115kV	Suspended
AB2-161	Waverly #2 DP 115kV	Suspended
AB2-190	Hopewell-Surry 230kV	Engineering and Procurement
AC1-076	Locust Grove-Paytes 115kV	Engineering and Procurement
AC1-107	Chickahominy 500kV	Engineering and Procurement
AC1-147	Grassfield 34.5kV	Engineering and Procurement
AC1-158	Spotsylvania 500kV	Partially in Service - Under Construction
AC1-161	Septa 500kV	Engineering and Procurement
AC2-012	Grassfield-Great Bridge 115kV	Active
AC2-078	Disputanta-Waverly 115kV	Engineering and Procurement
AC2-079	Ivor-Oak Ridge 115kV	Engineering and Procurement
AC2-141	Septa 500kV	Active
AD1-025	Hopewell-Surry 230 kV	Active
AD1-033	Fentress-Landstown 230 kV	Engineering and Procurement
AD1-082	Bakers Pond-Ivor 115kV	Engineering and Procurement
AD1-151	Hopewell-Surry 230 kV	Active
AD2-007	Hopewell-Surry 230 kV	Active
AD2-008	Hopewell-Surry 230 kV	Active
AD2-097	Spruance NUG 230kV	In Service
AD2-160	Hickory-Moyock 230kV	Active
AE1-068	Carson-Rogers Rd 500 kV	Active
AE1-069	Carson-Rogers Road 500 kV	Active
AE1-074	Winterpock 34.5 kV	Engineering and Procurement
AE1-085	Bakers Pond-Bell Ave 115 kV	Active
AE1-149	Disputanta-Poe 115 kV	Active
AE1-154	Louisa-South Anna 230 kV	Engineering and Procurement
AE1-173	Carson-Suffolk 500 kV	Active
AE1-175	Light Foot 34.5 kV	Engineering and Procurement
AE2-000B	N/A	N/A
AE2-007	Chesapeake 230 kV	Withdrawn
AE2-027	Harrowgate-Locks 115kV	Active
AE2-031	Carson-Rawlings 500 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

Queue Number	Project Name	Status
AE2-094	Carson-Rogers Road 500 kV	Active
AE2-122	Birdneck-Landstown 230 kV	Active
AE2-123	Birdneck-Landstown 230 kV	Active
AE2-124	Landstown 230 kV	Active
AE2-134	Locust Grove-Paytes 115 kV	Suspended
AE2-156	Yadkin 115 kV	Active
AE2-212	Harrowgate 34 kV	Active
AE2-227	Iron Bridge 34 kV	Engineering and Procurement
AE2-228	Tyler 34 kv	Engineering and Procurement
AE2-250	Purdy Sw.-Reams 115 kV	Active
AE2-253	Hickory-Moyock 230 kV	Active
AE2-270	Hopewell-Surry 230 kV	Active
AE2-313	Carson-Rawlings 500 kV	Active
AF1-033	Poolesville 34 kV	Engineering and Procurement
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
AF1-128	Chesterfield 230 kV	Active
AF1-129	Chesterfield 230 kV	Active
AF1-291	Tyler 34.5 kV	Engineering and Procurement
AF1-301	Louisa-South Anna 230 kV	Active
AF2-037	Louisa-North Anna 230 kV	Active
AF2-057	Grassfield 34.5 kV	Active
AF2-063	Louisa-North Anna 230 kV	Active
AF2-065	Surry-Hopewell 230 kV	Active
AF2-081	Moyock 230 kV	Active
AF2-085	Midlothian 34.5 kV	Engineering and Procurement
AF2-108	Locks 34.5 kV	Active
AF2-255	Iron Bridge 34.5 kV	Engineering and Procurement
AF2-256	Tyler 34.5 kV	Engineering and Procurement
AF2-257	Tyler 34.5 kV	Active
AF2-258	Harrowgate 34.5 kV	Active
AF2-259	Locks 34.5 kV	Active
AG1-000B	N/A	N/A
AG1-011	Colonial Trial 230 kV	Active
AG1-023	North Anna-Louisa 230 kV	Active
AG1-064	Plaza 34.5 kV	Active
AG1-065	Plaza 34.5 kV	Active
AG1-075	Purdy-Sapony 115 kV	Active
AG1-081	Poolesville 34.5 kV	Withdrawn
AG1-133	North Anna-Ladysmith 500 kV	Active
AG1-145	Lightfoot 34.5 kV	Active
AG1-171	Hopewell-Surry 230kV	Active
AG1-172	Hopewell-Surry 230 kV	Active
AG1-173	Hopewell-Surry 230 kV	Active
AG1-174	Hopewell-Surry 230 kV	Active
AG1-175	Hopewell-Surry 230 kV	Active
AG1-178	Carson-Septa 500 kV	Active
AG1-184	Carson-Septa 500 kV	Active
AG1-235	Fentress-Sligo 230 kV	Active

Queue Number	Project Name	Status
AG1-288	Lake of the Woods DP-Wilderness DP 115 kV	Active
AG1-289	Lake of the Woods DP-Wilderness DP 115 kV	Active
AG1-305	Louisa-North Anna 230 kV	Active
AG1-359	Fentress 230 kV	Active
AG1-364	Deep Creek 115 kV	Active
AG1-383	Hickory 34.5 kV	Active
AG1-449	Rawlings-Carson 500 kV	Active
AG1-531	Poolesville-Winchester 230 kV	Active
AG1-544	Bakers Pond DP 115 kV	Active
AG1-545	W. Quaker Rd-Disputanta 34.5 kV	Active

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-2: LN 575-A	CONTINGENCY 'DVP_P1-2: LN 575-A' OPEN BRANCH FROM BUS 314911 TO BUS 962840 CKT 1 /* 8LADYSMITH 500.00 - AG1-133 TAP 500.00 END
DVP_P1-2: LN 552	CONTINGENCY 'DVP_P1-2: LN 552' OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 1 /* 3CHANCE 115.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314900 TO BUS 314905 CKT 1 /* 8BRISTER 500.00 - 8CHANCE 500.00 END
DVP_P1-2: LN 575-B	CONTINGENCY 'DVP_P1-2: LN 575-B' OPEN BRANCH FROM BUS 962840 TO BUS 314918 CKT 1 /* AG1-133 TAP 500.00 - 8NO ANNA 500.00 END

12 Short Circuit Analysis

The following Breakers are overdutied:

None

12.1 System Reinforcements - Short Circuit

None

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).

14 Attachment 1: One Line Diagram