



Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-537

BARTERBROOK-STUARTS DRAFT 115 KV

32 MW Capacity / 75 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 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 Augusta County, Virginia. The installed facilities will have a total capability of 75 MW with 32 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is October 01, 2024. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-537
Project Name	BARTERBROOK-STUARTS DRAFT 115 KV
State	Virginia
County	Augusta
Transmission Owner	Dominion
MFO	75
MWE	75
MWC	32
Fuel	Storage
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

AG1-537 "Barterbrook-Stuarts Draft 115 kV" will interconnect with the Dominion transmission system. The primary POI is a direct connect to the new substation to be constructed for the AE1-084 project.

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.

Costs provided are contingent on the AE1-084 project being built. Should the AE1-084 project withdraw from the Interconnection Queue, the AG1-537 project will assume the Attachment, Direct Connection, and Non-Direct Connection costs identified in the AE1-084 study report for connection to the Dominion system.

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

5 Cost Summary

The AG1-537 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$ 2,700,000
Total System Network Upgrade Costs	\$27,493,000 ¹
Total Costs	\$30,193,000

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 causes and/or 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

AG1-537 "Barterbrook-Stuarts Draft 115 kV" will interconnect with the Dominion transmission system. The primary POI is a direct connect to the new substation to be constructed for the AE1-084 project.

To accommodate the proposed Project, Dominion Energy will add one new 115 kV breaker to the AE1-084 substation to allow for the proposed interconnection. Dominion will install one span of overhead 115 kV line to the point of interconnection ("POI") including 115 kV interconnection metering.

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.

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

Description	Total Cost
Attachment Facilities	\$1,700,000
New 115 kV Breaker	\$1,000,000
Total Physical Interconnection Costs	\$2,700,000

7 Schedule

It is estimated to take 18-30 months to complete this work upon execution of an Interconnection Construction Service Agreement (ICSA).

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.

8 Transmission Owner Analysis

Dominion assessed the impact of the proposed AG1-537 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.

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 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 AG1-537 was evaluated as a 75.0 MW (Capacity 32.0 MW) injection as an uprate to AE1-084 which is tapping the Barterbrook to Stuarts Draft 115 kV line in the Dominion area. Project AG1-537 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-537 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)

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
169287810	314759	6HOLLY MD	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P1-2: LN 553	single	550.840026855	99.6	100.36	DC	4.19

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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
164139361	932850	AC2-112 TAP	115.0	DVP	314811	3STDD DP	115.0	DVP	1	DVP_P2-2: DOOMS B1	bus	270.0	72.74	100.52	DC	75.0

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
167009421	941010	AE2-092 TAP	115.0	DVP	314774	3SHERWOOD	115.0	DVP	1	DVP_P7-1: LN 5-2028-C	tower	208.0	108.45	109.72	DC	5.0

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
169287786	314734	6CASHSCORNER	230.0	DVP	314759	6HOLLYMD	230.0	DVP	1	DVP_P1-2: LN 255-E	operation	550.840026855	103.58	104.22	DC	6.66
169287791	314734	6CASHSCORNER	230.0	DVP	314758	6GORDNVL	230.0	DVP	1	DVP_P1-2: LN 553	operation	550.840026855	102.1	103.88	DC	9.82
169502141	314744	3BREMO	115.0	DVP	313708	3FORK UNION	115.0	DVP	1	DVP_P1-2: LN 2193	operation	414.540008545	109.48	110.19	DC	5.53
169501908	314747	6BREMO	230.0	DVP	314744	3BREMO	115.0	DVP	1	DVP_P1-2: LN 2193	operation	269.779998779	190.5	191.36	DC	4.35
169502097	314749	6CHARLVL	230.0	DVP	314772	6PROFFIT	230.0	DVP	1	DVP_P1-2: LN 553	operation	550.840026855	115.83	117.62	DC	9.82
169287801	314758	6GORDNVL	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P1-2: LN 255-E	operation	550.840026855	101.57	102.21	DC	6.66
169287809	314759	6HOLLYMD	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P1-2: LN 553	operation	550.840026855	99.46	101.24	DC	9.82
169502179	314763	3KIDDSTO	115.0	DVP	941010	AE2-092 TAP	115.0	DVP	1	314765 6MTEAGLE 230 966790 AG1-550 TAP 230 1	operation	169.199996948	101.69	103.26	DC	5.0
169502140	314811	3STD DP	115.0	DVP	314819	3WAYNSBO	115.0	DVP	1	DVP_P1-2: LN 117-B	operation	220.899993896	78.95	112.9	DC	75.0
169808237	932850	AC2-112 TAP	115.0	DVP	314811	3STD DP	115.0	DVP	1	DVP_P1-2: LN 117-B	operation	220.899993896	85.42	119.38	DC	75.0
169808145	941010	AE2-092 TAP	115.0	DVP	314774	3SHERWOD	115.0	DVP	1	314765 6MTEAGLE 230 966790 AG1-550 TAP 230 1	operation	169.199996948	131.66	133.23	DC	5.0

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
164139361	2	AC2-112 TAP 115.0 kV - 3ST D DP 115.0 kV Ckt 1	<u>DVP</u> dom-388 (1946) : Reconductor 1.28 miles of 115 kV Line 117 from AC2-112 to Stuarts Draft D.P. with 636 ACSR 150 C Project Type : FAC Cost : \$768,000 Time Estimate : 30-36 Months	\$768,000
169287810	1	6HOLLYMD 230.0 kV - 6CASHSCORNER 230.0 kV Ckt 1	<u>DVP</u> dom-366 (1924) : Rebuild 4.27 miles of 230 kV Line 2135 from Hollymead to Cashes Corner D.P. with 2-636 ACSR 150 C Project Type : FAC Cost : \$10,675,000 Time Estimate : 30-36 Months	\$10,675,000
167009421	3	AE2-092 TAP 115.0 kV - 3SHERWOD 115.0 kV Ckt 1	<u>DVP</u> n6378 (1617) : Rebuild 6.42 miles of 115 kV Line 91 from AE2-092 Tap to Sherwood with 2-636 ACSR. Project Type : FAC Cost : \$16,050,000 Time Estimate : 30-36 Months	\$16,050,000
			TOTAL COST	\$27,493,000

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
169287810	314759	6HOLLYMD	DVP	314734	6CASHSCORNER	DVP	1	DVP_P1-2: LN 553	single	550.84	99.6	100.36	DC	4.19

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235034	01SHY_Z2-039	0.0089	80/20	0.0089
235035	01NHY_Z2-039	0.0145	80/20	0.0145
237092	AD1-085_C	0.1375	80/20	0.1375
313738	3CUSHAW	0.0822	80/20	0.0822
314677	6BUCKING	0.1994	80/20	0.1994
314859	4WSTVACO	3.8378	80/20	3.8378
315186	1LOWMORA	0.3753	80/20	0.3753
315188	1LOWMORC	0.3767	80/20	0.3767
315191	1BEARGRDN G1	3.5688	80/20	3.5688
315192	1BEARGRDN G2	3.5688	80/20	3.5688
315193	1BEARGRDN S1	4.6151	80/20	4.6151
315201	1BATH 1A	6.3455	80/20	6.3455
315202	1BATH 2B	6.3455	80/20	6.3455
315203	1BATH 3C	6.3493	80/20	6.3493
315204	1BATH 4D	6.3480	80/20	6.3480
315205	1BATH 5E	6.3556	80/20	6.3556
315206	1BATH 6F	6.3683	80/20	6.3683
315216	1CUNINGA	2.6813	80/20	2.6813
315217	1CUNINGB	2.6813	80/20	2.6813
315218	1CUNINGC	2.6813	80/20	2.6813
315219	1CUNINGD	5.9974	80/20	5.9974
315616	AA1-038 C	7.2579	80/20	7.2579
316152	AE1-098 C	0.1342	80/20	0.1342
316154	AE1-099 C	0.1342	80/20	0.1342
926001	AC1-076 C	-2.4492	Adder	-2.88
926451	AC1-116 C	0.1552	80/20	0.1552
926481	AC1-120 C O1	-5.1375	Adder	-6.04
926501	AC1-121 C O1	-1.7644	Adder	-2.08
926611	AC1-143 C O1	-3.6922	Adder	-4.34
932511	AC2-071 C (Withdrawn : 01/22/2021)	0.1965	80/20	0.1965
932541	AC2-074 C (Withdrawn : 01/22/2021)	0.1044	80/20	0.1044
932854	AC2-112 C	13.4979	80/20	13.4979
933501	AC2-165 C	3.1316	80/20	3.1316
935221	AD1-157 C	0.0718	80/20	0.0718
938371	AE1-056 C	1.9617	80/20	1.9617
938625	AE1-084 C	6.5460	80/20	6.5460
938821	AE1-108 C O1	9.1873	80/20	9.1873
939231	AE1-154 C	-1.7982	Adder	-2.12
940451	AE2-029 C	3.0342	80/20	3.0342
941011	AE2-092 C	10.1248	80/20	10.1248

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
942461	AE2-259 C O1	3.6732	80/20	3.6732
943571	AF1-028 O1	16.3520	80/20	16.3520
944071	AF1-075 C O1	4.3944	80/20	4.3944
946291	AF1-293 C O1	13.0557	80/20	13.0557
946591	AF1-323 C	3.0769	80/20	3.0769
958131	AF2-107 C	2.0472	80/20	2.0472
960111	AF2-302 C	1.1189	80/20	1.1189
961061	AF2-397 C	11.8318	80/20	11.8318
961101	AF2-401 C	-0.3764	Adder	-0.44
961801	AG1-022 C	1.1189	80/20	1.1189
962741	AG1-123 C O1	2.2471	80/20	2.2471
962881	AG1-137 C	3.9340	80/20	3.9340
963021	AG1-151 O1	8.1760	80/20	8.1760
963461	AG1-195	14.1540	80/20	14.1540
963471	AG1-196 O1	17.9835	80/20	17.9835
963631	AG1-214 C	0.8133	80/20	0.8133
964231	AG1-284 C O1	5.0064	80/20	5.0064
964621	AG1-325 C O1	3.4039	80/20	3.4039
964831	AG1-346 C	0.7638	80/20	0.7638
965531	AG1-421 C	12.9156	80/20	12.9156
965541	AG1-422	5.3815	80/20	5.3815
965581	AG1-426	2.0016	80/20	2.0016
965641	AG1-432 C O1	7.3464	80/20	7.3464
965831	AG1-451	1.2244	80/20	1.2244
966251	AG1-494 C	1.0572	80/20	1.0572
966671	AG1-537 C	4.1894	80/20	4.1894
966791	AG1-550 O1	6.2366	80/20	6.2366
966851	AG1-556	9.4770	80/20	9.4770
966861	AG1-557 C O1 (Withdrawn : 12/14/2020)	0.7346	80/20	0.7346
WEC	WEC	0.5582	Confirmed LTF	0.5582
LGEE	LGEE	1.1806	Confirmed LTF	1.1806
CPLE	CPLE	0.7262	Confirmed LTF	0.7262
CBM-W2	CBM-W2	16.5222	Confirmed LTF	16.5222
NY	NY	0.6299	Confirmed LTF	0.6299
TVA	TVA	2.6782	Confirmed LTF	2.6782
SIGE	SIGE	0.3493	Confirmed LTF	0.3493
CBM-S2	CBM-S2	15.7435	Confirmed LTF	15.7435
CBM-S1	CBM-S1	0.7247	Confirmed LTF	0.7247
MEC	MEC	2.8618	Confirmed LTF	2.8618
LAGN	LAGN	3.2428	Confirmed LTF	3.2428
CBM-W1	CBM-W1	24.0163	Confirmed LTF	24.0163

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
164139361	932850	AC2-112 TAP	DVP	314811	3ST D DP	DVP	1	DVP_P2-2: DOOMS B1	bus	270.0	72.74	100.52	DC	75.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932854	AC2-112 C	103.1000	50/50	103.1000
932855	AC2-112 E	46.9000	50/50	46.9000
938625	AE1-084 C	50.0000	50/50	50.0000
938626	AE1-084 E	33.0000	50/50	33.0000
964621	AG1-325 C O1	26.0000	50/50	26.0000
964622	AG1-325 E O1	24.0000	50/50	24.0000
966671	AG1-537 C	32.0000	50/50	32.0000
966672	AG1-537 E	43.0000	50/50	43.0000

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
167009421	941010	AE2-092 TAP	DVP	314774	3SHERWOD	DVP	1	DVP_P7-1: LN 5-2028-C	tower	208.0	108.45	109.72	DC	5.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
923862	AB2-026 E	0.2706	Adder	0.32
924032	AB2-045 E	0.4315	Adder	0.51
932512	AC2-071 E (Withdrawn : 01/22/2021)	0.4589	Adder	0.54
932854	AC2-112 C	-5.8435	Adder	-6.87
933501	AC2-165 C	2.8847	Adder	3.39
933502	AC2-165 E	2.1711	Adder	2.55
938562	AE1-075 E	0.2575	Adder	0.3
938821	AE1-108 C O1	10.9435	50/50	10.9435
938822	AE1-108 E O1	4.9115	50/50	4.9115
941011	AE2-092 C	30.5466	50/50	30.5466
941012	AE2-092 E	20.3644	50/50	20.3644
942461	AE2-259 C O1	2.8835	Adder	3.39
942462	AE2-259 E O1	1.9224	Adder	2.26
946291	AF1-293 C O1	26.9341	50/50	26.9341
946292	AF1-293 E O1	4.8452	50/50	4.8452
946591	AF1-323 C	3.4901	50/50	3.4901
946592	AF1-323 E	2.3267	50/50	2.3267
958501	AF2-144 C	0.4451	Adder	0.52
958502	AF2-144 E	0.2967	Adder	0.35
959531	AF2-244 C (Withdrawn : 01/06/2021)	0.4102	Adder	0.48
959532	AF2-244 E (Withdrawn : 01/06/2021)	0.2444	Adder	0.29
960111	AF2-302 C	1.2691	50/50	1.2691
960112	AF2-302 E	0.8461	50/50	0.8461
961061	AF2-397 C	7.9412	50/50	7.9412
961062	AF2-397 E	5.2941	50/50	5.2941
961801	AG1-022 C	1.2691	50/50	1.2691
961802	AG1-022 E	0.8461	50/50	0.8461
964231	AG1-284 C O1	7.0333	50/50	7.0333
964232	AG1-284 E O1	4.6889	50/50	4.6889
964623	AG1-325 BAT	1.7670	Merchant Transmission	1.7670
965581	AG1-426	2.3842	50/50	2.3842
965641	AG1-432 C O1	3.0566	Adder	6.78
965642	AG1-432 E O1	2.0377	Adder	4.52
965831	AG1-451	0.5094	Adder	1.13
966673	AG1-537 BAT	2.6505	Merchant Transmission	2.6505
966791	AG1-550 O1	3.5634	50/50	3.5634
966861	AG1-557 C O1 (Withdrawn : 12/14/2020)	0.3057	Adder	0.68

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
966862	AG1-557 E O1 (Withdrawn : 12/14/2020)	0.2038	Adder	0.45
WEC	WEC	0.0019	Confirmed LTF	0.0019
LGEE	LGEE	0.0057	Confirmed LTF	0.0057
CPL	CPL	0.5678	Confirmed LTF	0.5678
CBM-W2	CBM-W2	1.0304	Confirmed LTF	1.0304
NY	NY	0.0758	Confirmed LTF	0.0758
TVA	TVA	0.2506	Confirmed LTF	0.2506
O-066	O-066	0.8749	Confirmed LTF	0.8749
SIGE	SIGE	0.0162	Confirmed LTF	0.0162
CBM-S2	CBM-S2	6.1387	Confirmed LTF	6.1387
CBM-S1	CBM-S1	0.0562	Confirmed LTF	0.0562
G-007	G-007	0.1355	Confirmed LTF	0.1355
MEC	MEC	0.0699	Confirmed LTF	0.0699
LAGN	LAGN	0.3133	Confirmed LTF	0.3133

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
AA1-038	Lexington-Low Moor 230kV	Engineering and Procurement
AB2-026	Powhatan 34.5kV	In Service
AB2-045	Buckingham 34.5kV	In Service
AC1-076	Locust Grove-Paytes 115kV	Engineering and Procurement
AC1-116	Mount Eagle 34.5kV	Engineering and Procurement
AC1-120	Mitchell-Mountain Run 115kV	Engineering and Procurement
AC1-121	Mitchell-Mountain Run 115kV	Engineering and Procurement
AC1-143	Brandy-Remington 115kV	Engineering and Procurement
AC2-071	Buckingham 35kV	Withdrawn
AC2-074	Mt. Jackson 35kV	Withdrawn
AC2-112	Stuarts Draft-Waynesboro 115kV	Engineering and Procurement
AC2-165	Bremo-Powhatan 230kV	Engineering and Procurement
AD1-085	North Shenandoah-Stanley 34.5 kV	Engineering and Procurement
AD1-157	South Creek 34.5 kV	Engineering and Procurement
AE1-056	Red House-South Creek 115 kV	Active
AE1-075	Powhatan 34.5 kV	Engineering and Procurement
AE1-084	Barterbrook-Stuarts Draft 115 kV	Active
AE1-098	Endless Caverns 34.5 kV	Engineering and Procurement
AE1-099	Endless Caverns 34.kV	Engineering and Procurement
AE1-108	Bremo-Scottsville 138 kV	Active
AE1-154	Louisa-South Anna 230 kV	Engineering and Procurement
AE2-029	Grottoes-Merck 115kV	Active
AE2-092	Kidds Store-Sherwood 115 kV	Active
AE2-259	Curdsville-Willis Mtn 115 kV	Active
AF1-028	Endless Caverns 115 kV	Active
AF1-075	Harrisburg-Endless Caverns 230 kV	Active
AF1-293	Kidds Store-Fort Union 115 kV	Active
AF1-323	Scottsville-Colleen 138 kV	Active
AF2-107	Clifford 138 kV	Active
AF2-144	Powhatan 34.5 kV	Active
AF2-244	Powhatan 34.5 kV	Withdrawn
AF2-302	Scottsville-Colleen 138 kV	Active
AF2-397	Fork Union-Mt. Eagle 230 kV	Active
AF2-401	Culpeper 34.5 kV	Engineering and Procurement
AG1-022	Scottsville-Colleen 138 kV	Active
AG1-123	Amherst-Riverville138 kV	Active
AG1-137	Harrisonburg 230 kV	Active
AG1-151	Endless Caverns 115 kV	Active
AG1-195	Valley 230 kV	Active

Queue Number	Project Name	Status
AG1-196	Grottoes-Dooms 230 kV	Active
AG1-214	Grottoes 12.5 kV	Active
AG1-284	Bremo-Cunningham DP 115 kV	Active
AG1-325	Barterbrook-Stuarts Draft 115 kV	Active
AG1-346	Mount Jackson DP 115 kV	Active
AG1-421	Lexington-Dooms 230 kV	Active
AG1-422	Lexington-Dooms 230 kV	Active
AG1-426	Bremo-Scottsville 138 kV	Active
AG1-432	Curdsville DP-Willis Mt. 115 kV	Active
AG1-451	Curdsville DP-Willis Mt. 115 kV	Active
AG1-494	Boxwood-Riverville 138 kV	Active
AG1-537	Barterbrook-Stuarts Draft 115 kV	Active
AG1-550	Mount Eagle-Fork Union 230 kV	Active
AG1-556	Lexington 115 kV	Active
AG1-557	Curdsville DP 115 kV	Withdrawn
Z2-039	PF Hydro	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-2: LN 553	CONTINGENCY 'DVP_P1-2: LN 553' OPEN BRANCH FROM BUS 314908 TO BUS 314910 CKT 1 /* 8ELMONT 500.00 - 8CUNNINGHAM 500.00 END
DVP_P1-2: LN 117-B	CONTINGENCY 'DVP_P1-2: LN 117-B' OPEN BRANCH FROM BUS 964620 TO BUS 938620 CKT 1 /* AG1-325 TAP 115.00 - AE1-084 TAP 115.00 END
DVP_P1-2: LN 255-E	CONTINGENCY 'DVP_P1-2: LN 255-E' OPEN BRANCH FROM BUS 961810 TO BUS 314232 CKT 1 /* AG1-023 TAP 230.00 - 6LOUISA 230.00 END
DVP_P1-2: LN 2193	CONTINGENCY 'DVP_P1-2: LN 2193' OPEN BRANCH FROM BUS 313707 TO BUS 313867 CKT 1 /* 6FORK UNION 230.00 - 6BREMODIST 230.00 OPEN BRANCH FROM BUS 313867 TO BUS 314747 CKT 1 /* 6BREMODIST 230.00 - 6BREMO 230.00 OPEN BUS 313867 /* ISLAND: 6BREMODIST 230.00 END
DVP_P2-2: DOOMS B1	CONTINGENCY 'DVP_P2-2: DOOMS B1' /* DOOMS 115 KV OPEN BRANCH FROM BUS 314793 TO BUS 314801 CKT 1 /* 3DOOMS 115.00 - 3FISHERV 115.00 OPEN BRANCH FROM BUS 314793 TO BUS 314819 CKT 2 /* 3DOOMS 115.00 - 3WAYNSBO 115.00 OPEN BRANCH FROM BUS 314793 TO BUS 314794 CKT 2 /* 3DOOMS 115.00 - 6DOOMS 230.00 END
DVP_P7-1: LN 5-2028-C	CONTINGENCY 'DVP_P7-1: LN 5-2028-C' /* . OPEN BRANCH FROM BUS 314744 TO BUS 314754 CKT 1 /* 3BREMO 115.00 - 3CUNNING 115.00 OPEN BUS 314754 /* ISLAND: 3CUNNING 115.00 OPEN BRANCH FROM BUS 966790 TO BUS 314765 CKT 1 /* AG1-550 TAP 230.00 - 6MTEAGLE 230.00 OPEN BRANCH FROM BUS 314749 TO BUS 314765 CKT 1 /* 6CHARLVL 230.00 - 6MTEAGLE 230.00 OPEN BUS 314765 /* ISLAND: 6MTEAGLE 230.00 OPEN BUS 926451 /* ISLAND: AC1-116 C 230.00 OPEN BUS 926452 /* ISLAND: AC1-116 E 230.00 END

Contingency Name	Contingency Definition
314765 6MTEAGLE 230 966790 AG1-550 TAP 230 1	CONTINGENCY '314765 6MTEAGLE 230 966790 AG1-550 TAP 230 1' OPEN BRANCH FROM BUS 314765 TO BUS 966790 CKT 1 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).