



**Generation Interconnection
Feasibility Study Report
for
Queue Project AG1-556
LEXINGTON 115 KV
100 MW Capacity / 100 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.

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

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

3 General

The Interconnection Customer (IC), has proposed a Storage generating facility located in Rockbridge County, Virginia. The installed facilities will have a total capability of 100 MW with 100 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 01, 2024. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-556
Project Name	LEXINGTON 115 KV
State	Virginia
County	Rockbridge
Transmission Owner	Dominion
MFO	100
MWE	100
MWC	100
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

4.1 Primary Point of Interconnection

AG1-556 "Lexington 115 kV" will interconnect with the Dominion transmission system. The primary POI is a direct connect to the Lexington 115 kV substation.

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

The IC requested that a secondary POI be reviewed for network impacts.

The secondary POI for AG1-556 is a direct connect to the Lexington 500 kV substation.

This report does not provide costs for the interconnection of the secondary POI. The secondary POI was analyzed for network impacts. Network impact results are shown in the Summer Peak - Load Flow Analysis – Secondary Point of Interconnection section of this report.

5 Cost Summary

The AG1-556 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$ 3,700,000
Total System Network Upgrade Costs	\$64,550,000 ¹
Total Costs	\$68,250,000

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

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of AG1-556 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 are given in the table below:

Description	Total Cost
<i>Attachment Facilities</i>	\$1,700,000
<i>New Breakers</i>	\$2,000,000
Total Physical Interconnection Costs	\$3,700,000

AG1-556 "Lexington 115 kV" will interconnect with the Dominion transmission system. The primary POI is a direct connect to the Lexington 115 kV substation.

To accommodate the proposed Project, Dominion Energy will add two new 115 kV breakers to the existing Lexington 115 kV 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.

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.

The estimated schedule for the required Network Impact Reinforcements is identified in the “System Reinforcements” 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.

8 Transmission Owner Analysis

Dominion assessed the impact of the proposed AG1-556 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).
1. 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.
2. 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.
3. 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 - Primary POI

The Queue Project AG1-556 was evaluated as a 100.0 MW (Capacity 100.0 MW) injection at the Lexington 115 kV substation in the Dominion area. Project AG1-556 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-556 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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
169295071	314759	6HOLLYMD	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P1-2: LN550	single	550.840026855	98.32	100.19	DC	10.32

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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
169295051	314734	6CASHSCORNER	230.0	DVP	314758	6GORDNVL	230.0	DVP	1	DVP_P1-2: LN553	single	550.840026855	103.19	104.91	DC	9.48
169295053	314734	6CASHSCORNER	230.0	DVP	314758	6GORDNVL	230.0	DVP	1	DVP_P1-2: LN550	single	550.840026855	100.03	101.9	DC	10.32
169509153	314749	6CHARLVL	230.0	DVP	314772	6PROFFIT	230.0	DVP	1	DVP_P1-2: LN553	single	550.840026855	117.86	119.58	DC	9.48
169509155	314749	6CHARLVL	230.0	DVP	314772	6PROFFIT	230.0	DVP	1	DVP_P1-2: LN550	single	550.840026855	114.69	116.57	DC	10.32
169295069	314759	6HOLLYMD	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P1-2: LN553	single	550.840026855	101.49	103.21	DC	9.48

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
169295050	314734	6CASHSCORNER	230.0	DVP	314758	6GORDNVL	230.0	DVP	1	DVP_P1-2:LN 553	operation	550.840026855	107.38	108.16	DC	9.48
169509152	314749	6CHARLVL	230.0	DVP	314772	6PROFFIT	230.0	DVP	1	DVP_P1-2:LN 553	operation	550.840026855	121.12	121.9	DC	9.48
169295068	314759	6HOLLYMD	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P1-2:LN 553	operation	550.840026855	104.75	105.52	DC	9.48

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
169295051,169 295053	2	6CASHSCORNER 230.0 kV - 6GORDNVL 230.0 kV Ckt 1	<u>DVP</u> dom-358 (1889) : Rebuild 12.83 miles of 230 kV Line 2135 from Cashes Corner D.P. to Gordonsville with 2-636 ACSR 150 C. Project Type : FAC Cost : \$32,075,000 Time Estimate : 36-40 Months	\$32,075,000
169295069,169 295071	1	6HOLLYMD 230.0 kV - 6CASHSCORNER 230.0 kV Ckt 1	<u>DVP</u> dom-366 (1897) : 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
169509155,169 509153	3	6CHARLVL 230.0 kV - 6PROFFIT 230.0 kV Ckt 1	<u>DVP</u> dom-365 (1896) : Rebuild 8.72 miles of 230 kV Line 2054 from Charlottesville to Profit D.P. with 2-636 ACSR 150 C Project Type : FAC Cost : \$21,800,000 Time Estimate : 36-40 Months	\$21,800,000
			TOTAL COST	\$64,550,000

11.6 Flow Gate Details - Primary POI

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
169295069	314759	6HOLLYMD	DVP	314734	6CASHSCORNER	DVP	1	DVP_P1-2: LN 553	single	550.84	101.49	103.21	DC	9.48

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
169295051	314734	6CASHSCORNER	DVP	314758	6GORDNVL	DVP	1	DVP_P1-2: LN 553	single	550.84	103.19	104.91	DC	9.48

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
966501	AG1-519 C	7.7580	80/20	7.7580
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
CPL	CPL	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

11.6.3 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
169509153	314749	6CHARLV	DVP	314772	6PROFFIT	DVP	1	DVP_P1-2: LN 553	single	550.84	117.86	119.58	DC	9.48

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
CPL	CPL	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

11.7 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
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
AE1-084	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
AF2-302	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
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

Queue Number	Project Name	Status
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
AG1-519	Cash's Corner 230 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 - Primary POI

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 - 8CUNINGHAM 500.00 END
DVP_P1-2: LN 550	CONTINGENCY 'DVP_P1-2: LN 550' OPEN BRANCH FROM BUS 314917 TO BUS 314926 CKT 1 /* 8MT STM 500.00 - 8VALLEY 500.00 END

12 Short Circuit Analysis - Primary POI

The following Breakers are overdutied

None.

12.1 System Reinforcements - Short Circuit

None.

13 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AG1-556 was evaluated as a 100.0 MW (Capacity 100.0 MW) injection at the Lexington 500 kV substation in the Dominion area. Project AG1-556 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-556 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

13.1 Generation Deliverability

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

None

13.2 Multiple Facility Contingency

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

None

13.3 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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADI NG %	POST PROJE CT LOADI NG %	AC D C	MW IMPA CT
169295051	314734	6CASHSCORNER	230.0	DVP	314758	6GORDNVL	230.0	DVP	1	DVP_P 1-2: LN 553	single	550.840026855	103.67	105.12	DC	7.99
169509153	314749	6CHARLVL	230.0	DVP	314772	6PROFFIT	230.0	DVP	1	DVP_P 1-2: LN 553	single	550.840026855	118.35	119.8	DC	7.99
169295069	314759	6HOLLYMD	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P 1-2: LN 553	single	550.840026855	101.98	103.43	DC	7.99
174349461	314803	6GROTOES	230.0	DVP	314806	6HARSNBG	230.0	DVP	1	DVP_P 4-2: 548T5 49	breaker	549.0	105.4	106.0	DC	7.27

13.4 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
169295050	314734	6CASHSCORNER	230.0	DVP	314758	6GORDNVL	230.0	DVP	1	DVP_P1-2:LN 553	operation	550.840026855	106.7	107.35	DC	7.99
169509152	314749	6CHARLVL	230.0	DVP	314772	6PROFFIT	230.0	DVP	1	DVP_P1-2:LN 553	operation	550.840026855	120.44	121.09	DC	7.99
169295068	314759	6HOLLYMD	230.0	DVP	314734	6CASHSCORNER	230.0	DVP	1	DVP_P1-2:LN 553	operation	550.840026855	104.06	104.72	DC	7.99

13.5 Flow Gate Details - Secondary POI

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".

13.5.1 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
169295051	314734	6CASHSCORNER	DVP	314758	6GORDNVL	DVP	1	DVP_P1-2: LN 553	single	550.84	103.67	105.12	DC	7.99

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
962751	AG1-124 C O2	2.9527	80/20	2.9527
962881	AG1-137 C	3.9340	80/20	3.9340
963021	AG1-151 O2	9.1470	80/20	9.1470
963271	AG1-176 C O2	5.1577	80/20	5.1577
963461	AG1-195	14.1525	80/20	14.1525
963471	AG1-196 O2	16.0515	80/20	16.0515
963631	AG1-214 C	0.8133	80/20	0.8133
964231	AG1-284 C O2	4.9207	80/20	4.9207
964621	AG1-325 C O2	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 O2	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
966501	AG1-519 C	7.7580	80/20	7.7580
966671	AG1-537 C	4.1894	80/20	4.1894
966791	AG1-550 O2	4.1006	80/20	4.1006
966851	AG1-556 O2	7.9890	80/20	7.9890
966861	AG1-557 C O2 (Withdrawn : 12/14/2020)	1.0343	80/20	1.0343
WEC	WEC	0.5582	Confirmed LTF	0.5582
LGEE	LGEE	1.1806	Confirmed LTF	1.1806
CPL	CPL	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

13.5.2 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
169509153	314749	6CHARLV	DVP	314772	6PROFFIT	DVP	1	DVP_P1-2: LN 553	single	550.84	118.35	119.8	DC	7.99

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
962751	AG1-124 C O2	2.9527	80/20	2.9527
962881	AG1-137 C	3.9340	80/20	3.9340
963021	AG1-151 O2	9.1470	80/20	9.1470
963271	AG1-176 C O2	5.1577	80/20	5.1577
963461	AG1-195	14.1525	80/20	14.1525
963471	AG1-196 O2	16.0515	80/20	16.0515
963631	AG1-214 C	0.8133	80/20	0.8133
964231	AG1-284 C O2	4.9207	80/20	4.9207
964621	AG1-325 C O2	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 O2	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 O2	4.1006	80/20	4.1006
966851	AG1-556 O2	7.9890	80/20	7.9890
966861	AG1-557 C O2 (Withdrawn : 12/14/2020)	1.0343	80/20	1.0343
WEC	WEC	0.5582	Confirmed LTF	0.5582
LGEE	LGEE	1.1806	Confirmed LTF	1.1806
CPL	CPL	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

13.5.3 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
169295069	314759	6HOLLYMD	DVP	314734	6CASHSCORNER	DVP	1	DVP_P1-2: LN 553	single	550.84	101.98	103.43	DC	7.99

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
962751	AG1-124 C O2	2.9527	80/20	2.9527
962881	AG1-137 C	3.9340	80/20	3.9340
963021	AG1-151 O2	9.1470	80/20	9.1470
963271	AG1-176 C O2	5.1577	80/20	5.1577
963461	AG1-195	14.1525	80/20	14.1525
963471	AG1-196 O2	16.0515	80/20	16.0515
963631	AG1-214 C	0.8133	80/20	0.8133
964231	AG1-284 C O2	4.9207	80/20	4.9207
964621	AG1-325 C O2	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 O2	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 O2	4.1006	80/20	4.1006
966851	AG1-556 O2	7.9890	80/20	7.9890
966861	AG1-557 C O2 (Withdrawn : 12/14/2020)	1.0343	80/20	1.0343
WEC	WEC	0.5582	Confirmed LTF	0.5582
LGEE	LGEE	1.1806	Confirmed LTF	1.1806
CPL	CPL	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

13.5.4 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
174349461	314803	6GROTOES	DVP	314806	6HARSNBG	DVP	1	DVP_P4-2: 548T549	breaker	549.0	105.4	106.0	DC	7.27

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314859	4WSTVACO	3.0074	Adder	3.54
314860	4E MILL	3.7128	Adder	4.37
315616	AA1-038 C	5.6867	Adder	6.69
918232	AA1-038 E	4.9517	Adder	5.83
924032	AB2-045 E	0.2969	Adder	0.35
926452	AC1-116 E	0.5672	Adder	0.67
932512	AC2-071 E (Withdrawn : 01/22/2021)	0.3158	Adder	0.37
932854	AC2-112 C	8.5900	Adder	10.11
932855	AC2-112 E	3.9076	Adder	4.6
938625	AE1-084 C	4.1659	Adder	4.9
938626	AE1-084 E	2.7495	Adder	3.23
938821	AE1-108 C O1	4.5101	Adder	5.31
938822	AE1-108 E O1	2.0242	Adder	2.38
940451	AE2-029 C	5.5125	50/50	5.5125
940452	AE2-029 E	3.6750	50/50	3.6750
941011	AE2-092 C	5.2053	Adder	6.12
941012	AE2-092 E	3.4702	Adder	4.08
943572	AF1-028 BAT	41.0580	50/50	41.0580
946291	AF1-293 C O1	6.3411	Adder	7.46
946292	AF1-293 E O1	1.1407	Adder	1.34
946591	AF1-323 C	1.5489	Adder	1.82
946592	AF1-323 E	1.0326	Adder	1.21
960111	AF2-302 C	0.5632	Adder	0.66
960112	AF2-302 E	0.3755	Adder	0.44
961061	AF2-397 C	4.7206	Adder	5.55
961062	AF2-397 E	3.1470	Adder	3.7
961801	AG1-022 C	0.2985	Adder	0.66
961802	AG1-022 E	0.1990	Adder	0.44
962883	AG1-137 BAT	30.0790	50/50	30.0790
963022	AG1-151 BAT	26.1220	50/50	26.1220
963462	AG1-195 BAT	31.0035	50/50	31.0035
963471	AG1-196 O2	37.1310	50/50	37.1310
963631	AG1-214 C	1.8813	50/50	1.8813
963632	AG1-214 E	2.8220	50/50	2.8220
964231	AG1-284 C O2	1.2155	Adder	2.7
964232	AG1-284 E O2	0.8103	Adder	1.8
964621	AG1-325 C O2	1.1481	Adder	2.55
964622	AG1-325 E O2	1.0598	Adder	2.35
965531	AG1-421 C	12.0072	50/50	12.0072
965532	AG1-421 E	8.0048	50/50	8.0048
965541	AG1-422	5.0030	50/50	5.0030

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
965581	AG1-426	0.5208	Adder	1.16
966671	AG1-537 C	1.4131	Adder	3.14
966672	AG1-537 E	1.8988	Adder	4.21
966791	AG1-550 O2	1.0129	Adder	2.25
966851	AG1-556 O2	3.2733	Adder	7.27
966861	AG1-557 C O2 (Withdrawn : 12/14/2020)	0.2879	Adder	0.64
966862	AG1-557 E O2 (Withdrawn : 12/14/2020)	0.1919	Adder	0.43
WEC	WEC	0.1956	Confirmed LTF	0.1956
LGEE	LGEE	0.4750	Confirmed LTF	0.4750
CPL	CPL	1.6830	Confirmed LTF	1.6830
CBM-W2	CBM-W2	9.6768	Confirmed LTF	9.6768
NY	NY	0.6072	Confirmed LTF	0.6072
TVA	TVA	1.9362	Confirmed LTF	1.9362
O-066	O-066	7.2953	Confirmed LTF	7.2953
SIGE	SIGE	0.1956	Confirmed LTF	0.1956
CBM-S2	CBM-S2	23.3021	Confirmed LTF	23.3021
CBM-S1	CBM-S1	0.4826	Confirmed LTF	0.4826
G-007	G-007	1.1350	Confirmed LTF	1.1350
MEC	MEC	1.2474	Confirmed LTF	1.2474
LAGN	LAGN	2.2890	Confirmed LTF	2.2890
CBM-W1	CBM-W1	7.4306	Confirmed LTF	7.4306

13.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
DVP_P1-2: LN 553	CONTINGENCY 'DVP_P1-2: LN 553' / 579 OPEN BRANCH FROM BUS 314908 TO BUS 314910 CKT 1 / 314908 8ELMONT 500 314910 8CUNINGHAM 500 1 END
DVP_P4-2: 548T549	CONTINGENCY 'DVP_P4-2: 548T549' / 1316 OPEN BRANCH FROM BUS 314901 TO BUS 314926 CKT 1 / 314901 8BATH CO 500 314926 8VALLEY 500 1 OPEN BRANCH FROM BUS 314907 TO BUS 314926 CKT 1 / 314907 8DOOMS 500 314926 8VALLEY 500 1 END

14 Affected Systems

14.1 TVA

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

14.2 Duke Energy Progress

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

15 Attachment 1: One Line Diagram