Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-065

SURRY-HOPEWELL 230 KV

76.5 MW Capacity / 150 MW Energy

July 2020

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1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Dominion.

2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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 an uprate to a planned Solar generating facility located in Surry, Virginia. This project is an increase to the Interconnection Customer's AE2-270 project, which will share the

same point of interconnection. The AF2-065 queue position is a 150 MW uprate (76.5 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 300 MW with 226.5 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this uprate project is October 21, 2021. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-065
Project Name	SURRY-HOPEWELL 230 KV
State	Virginia
County	Surry
Transmission Owner	Dominion
MFO	300
MWE	150
MWC	76.5
Fuel	Solar
Basecase Study Year	2023

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

4 Point of Interconnection

AF2-065 will interconnect with the Dominion transmission system as an uprate to AE2-270 which is tapping the Surry to Hopewell, Line 240, 230 kV line.

5 Cost Summary

AF2-065 will use the interconnection facilities being built to support the AE2-270 project.

The AF2-065 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$ 0
Total System Network Upgrade Costs	$ 48,445,000
Total Costs	**$ 48,445,000**

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

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

6 Transmission Owner Scope of Work

Dominion assessed the impact of the proposed Queue Project AF2-065 was evaluated as a 76.5 MW Capacity (150.0 MW Energy) injection at the new AE2-270 230 kV substation in the Dominion Transmission System, for compliance with NERC Reliability Criteria on Dominion Transmission System. The system was assessed using the summer 2023 AF2 case provided to Dominion by PJM. When performing a generation analysis, Dominion's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). Dominion Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of Dominion's Planning Criteria and interconnection requirements can be found in the Company's Facility Connection Requirements which are publicly available at: http://www.dominionenergy.com.

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

Note that the ITO findings were made from a conceptual review of this project and 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.

7 Schedule

The schedule for the required Network Impact Reinforcements will be more clearly identified in future study phases. The estimate elapsed time to complete each of the required reinforcements is identified in the "System Reinforcements" section of the report.

8 Transmission Owner Analysis

8.1 Power Flow Analysis

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

9 Interconnection Customer Requirements

9.1 System Protection

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

9.2 Compliance Issues and Interconnection Customer Requirements

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

1. The purchase and installation of a fully rated protection device (circuit breaker, circuit switcher, fuse) to protect the IC's GSU transformer(s).
2. The purchase and installation of the minimum required Dominion generation interconnection relaying and control facilities as described in the System Protection noted above. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.
3. The purchase and installation of supervisory control and data acquisition ("SCADA") equipment to provide information in a compatible format to the Dominion Transmission System Control Center.
4. Compliance with the Dominion and PJM generator power factor and voltage control requirements.

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

The IC will also be required to meet all PJM, SERC, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage and over and under frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and SERC audits. Failure to comply with

these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the Dominion system.

9.3 Power Factor Requirements

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

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

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

10.1.1 Meteorological Data Reporting Requirements

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

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

10.2 Interconnected Transmission Owner Requirements

See Section 3.4.6 “Metering and telecommunications” of Dominion’s “Dominion’s Facility Interconnection Requirements” document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access.

11 Summer Peak - Load Flow Analysis

The Queue Project AF2-065 was evaluated as a 150.0 MW (Capacity 76.5 MW) uprate to AE2-270 which is tapping the Surry to Hopewell, Line 240, 230 kV line in the Dominion area. Project AF2-065 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-065 was studied with a commercial probability of 53%. Potential network impacts were as follows:

11.1 Generation Deliverability

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

None

11.2 Multiple Facility Contingency

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

None

11.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97714828	313896	6COLONIAL TR	230.0	DVP	314303	6HOPEWLL	230.0	DVP	1	DVP_P4-2: 240T2041	breaker	830.0	114.17	118.26	DC	33.87
97714829	313896	6COLONIAL TR	230.0	DVP	314303	6HOPEWLL	230.0	DVP	1	DVP_P4-2: 240TAB2-190	breaker	830.0	104.57	108.66	DC	33.91
97714709	314287	6CHESTFB	230.0	DVP	314276	6BASIN	230.0	DVP	1	DVP_P4-2: 562T563	breaker	812.0	141.51	142.34	DC	14.92
97903809	314287	6CHESTFB	230.0	DVP	314276	6BASIN	230.0	DVP	1	DVP_P1-2: LN 563	single	663.640014648	145.57	146.76	DC	7.82
97903812	314287	6CHESTFB	230.0	DVP	314276	6BASIN	230.0	DVP	1	DVP_P1-2: LN 217	single	663.640014648	103.97	105.38	DC	9.34
97714610	314303	6HOPEWLL	230.0	DVP	314287	6CHESTFB	230.0	DVP	1	DVP_P4-2: 56372	breaker	549.0	193.75	200.34	DC	36.1
97714611	314303	6HOPEWLL	230.0	DVP	314287	6CHESTFB	230.0	DVP	1	DVP_P4-2: 228T268	breaker	549.0	175.5	186.06	DC	57.97
97714640	314303	6HOPEWLL	230.0	DVP	314286	6CHESTFA	230.0	DVP	1	DVP_P4-2: 211T2124	breaker	549.0	169.09	180.71	DC	63.75
97903734	314303	6HOPEWLL	230.0	DVP	314286	6CHESTFA	230.0	DVP	1	DVP_P1-2: LN 211	single	449.320007324	156.69	163.0	DC	28.56
97903738	314303	6HOPEWLL	230.0	DVP	314286	6CHESTFA	230.0	DVP	1	DVP_P1-2: LN 259	single	449.320007324	138.48	142.89	DC	19.8
97903742	314303	6HOPEWLL	230.0	DVP	314286	6CHESTFA	230.0	DVP	1	Base Case	single	449.320007324	114.54	118.55	DC	18.15
97903774	314303	6HOPEWLL	230.0	DVP	314287	6CHESTFB	230.0	DVP	1	DVP_P1-2: LN 228	single	449.320007324	153.16	157.5	DC	29.56
97903778	314303	6HOPEWLL	230.0	DVP	314287	6CHESTFB	230.0	DVP	1	DVP_P1-2: LN 208	single	449.320007324	134.96	139.49	DC	20.35
97903783	314303	6HOPEWLL	230.0	DVP	314287	6CHESTFB	230.0	DVP	1	Base Case	single	449.320007324	105.22	109.44	DC	18.97

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
97904157	313896	6COLONIAL TR	230.0	DVP	314303	6HOPEWLL	230.0	DVP	1	960130 AF2-304 TAP 230 942551 AE2-270 230 1	operation	678.679992676	120.79	125.8	DC	33.91
97904274	314225	6CHARCTY	230.0	DVP	314227	6LAKESIDE	230.0	DVP	1	DVP_P1-2: LN 563	operation	984.179992676	110.67	110.89	DC	15.01
97904211	314236	6NRTHEST	230.0	DVP	314218	6ELMONT	230.0	DVP	1	DVP_P1-2: LN 557	operation	678.679992676	121.51	121.66	DC	13.41
97903808	314287	6CHESTF B	230.0	DVP	314276	6BASIN	230.0	DVP	1	DVP_P1-2: LN 563	operation	663.640014648	172.33	172.73	DC	15.34
97904258	314287	6CHESTF B	230.0	DVP	314225	6CHARCTY	230.0	DVP	1	DVP_P1-2: LN 563	operation	984.179992676	114.33	114.55	DC	15.01
97903731	314303	6HOPEWLL	230.0	DVP	314286	6CHESTF A	230.0	DVP	1	DVP_P1-2: LN 211	operation	449.320007324	194.54	207.02	DC	56.0
97903737	314303	6HOPEWLL	230.0	DVP	314286	6CHESTF A	230.0	DVP	1	Base Case	operation	449.320007324	135.39	143.32	DC	35.59
97903772	314303	6HOPEWLL	230.0	DVP	314287	6CHESTF B	230.0	DVP	1	DVP_P1-2: LN 228	operation	449.320007324	184.1	197.01	DC	57.97
97903779	314303	6HOPEWLL	230.0	DVP	314287	6CHESTF B	230.0	DVP	1	Base Case	operation	449.320007324	120.58	128.86	DC	37.2
96838400	314905	8CHANCE	500.0	DVP	314900	8BRISTER	500.0	DVP	1	DVP_P1-2: LN 594	operation	2442.120117 19	144.6	144.63	DC	29.43
96838490	314908	8ELMONT	500.0	DVP	314911	8LADYSMITH	500.0	DVP	1	DVP_P1-2: LN 576	operation	4070.199951 17	118.95	118.96	DC	49.72
96838410	314911	8LADYSMITH	500.0	DVP	314922	8POSSUM	500.0	DVP	1	DVP_P1-2: LN 581	operation	2442.120117 19	140.48	140.51	DC	25.98
96838422	314911	8LADYSMITH	500.0	DVP	314905	8CHANCE	500.0	DVP	1	DVP_P1-2: LN 573	operation	2738.219970 7	130.61	130.64	DC	30.07
96838449	314927	8YADKIN	500.0	DVP	314928	8SUFFOLK	500.0	DVP	1	DVP_P1-2: LN 579	operation	2442.120117 19	125.91	126.35	DC	24.64

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
97903964	925330	AB2-190 TAP	230.0	DVP	314303	6HOPEWLL	230.0	DVP	2	DVP_P1-2: LN 2197	operation	678.679992676	134.86	145.99	DC	75.45
97904179	942550	AE2-270 TAP	230.0	DVP	960130	AF2-304 TAP	230.0	DVP	2	DVP_P1-2: LN 2197	operation	678.679992676	106.07	117.21	DC	75.45
97904187	960130	AF2-304 TAP	230.0	DVP	925330	AB2-190 TAP	230.0	DVP	2	DVP_P1-2: LN 2197	operation	678.679992676	106.07	117.21	DC	75.45

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
97714828,97714829	1	6COLONIAL TR 230.0 kV - 6HOPEWLL 230.0 kV Ckt 1	DVP dom-205 (1304) : Rebuild 1.63 miles of 230 kV Line 2197 from Hopewell to Colonial Trail with 2-636 ACSR. Project Type : FAC Cost : $2,445,000 Time Estimate : 30-36 Months	$2,445,000
97903734,97903742,97903738,97714640	4	6HOPEWLL 230.0 kV - 6CHESTF A 230.0 kV Ckt 1	DVP b2922 (1056) : PJM Baseline Upgrade b2922. Rebuild 8 of 11 miles of 230kV Lines #211 and #228 to current standard with a summer emergency rating of 1046 MVA for rebuilt section. Proposed conductor is 2-636 ACSR. The baseline project has a projected in-service date of 12/01/2020. Project Type : FAC Cost : $0 dom-074 (1140) : Rebuild 3 miles of 230 kV Line 228 from Hopewell to Chesterfield with 2-636 ACSR. Project Type : FAC Cost : $7,500,000 Time Estimate : 30-36 Months	$7,500,000
97714709,97903809,97903812	2	6CHESTF B 230.0 kV - 6BASIN 230.0 kV Ckt 1	DVP dom-012 (1078) : Rebuild 12.4 miles of 230 kV Line 259 from Chesterfield to Basin with 2-636 ACSR. Project Type : FAC Cost : $31,000,000 Time Estimate : 30-36 Months	$31,000,000

ID	Idx	Facility	Upgrade Description	Cost
97903778,97903774,97714611,97714610,97903783	3	6HOPEWLL 230.0 kV - 6CHESTF B 230.0 kV Ckt 1	DVP b2922 (1056) : PJM Baseline Upgrade b2922. Rebuild 8 of 11 miles of 230kV Lines #211 and #228 to current standard with a summer emergency rating of 1046 MVA for rebuilt section. Proposed conductor is 2-636 ACSR. The baseline project has a projected in-service date of 12/01/2020. Project Type : FAC Cost : $0 dom-075 (1141) : Rebuild 3 miles of 230 kV Line 211 from Hopewell to Chesterfield with 2-636 ACSR. Project Type : FAC Cost : $7,500,000 Time Estimate : 30-36 Months	$7,500,000
			TOTAL COST	$48,445,000

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
97714828	313896	6COLONIAL TR	DVP	314303	6HOPEWLL	DVP	1	DVP_P4-2: 240T2041	breaker	830.0	114.17	118.26	DC	33.87

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
315073	1STONECA	-4.9401	Adder	-5.81
315116	1SURRY 1	32.8978	50/50	32.8978
315117	1GRAVELC	1.1529	50/50	1.1529
315119	1GRAVEL3	3.3420	50/50	3.3420
315120	1GRAVEL4	3.3848	50/50	3.3848
315121	1GRAVEL5	3.3420	50/50	3.3420
315122	1GRAVEL6	3.3809	50/50	3.3809
901082	W1-029 E	9.5233	Adder	11.2
913392	Y1-086 E	0.6842	Adder	0.8
916192	Z1-068 E	0.6779	Adder	0.8
917122	Z2-027 E	0.3246	Adder	0.38
919152	AA1-139 E	2.0854	Adder	2.45
923831	AB2-022 C	0.7173	Adder	0.84
923832	AB2-022 E	0.3862	Adder	0.45
924811	AB2-134 C OP	6.2609	50/50	6.2609
924812	AB2-134 E OP	35.6897	50/50	35.6897
925331	AB2-190 C	25.2907	50/50	25.2907
925332	AB2-190 E	10.8389	50/50	10.8389
925522	AC1-027 E	0.4169	Adder	0.49
926661	AC1-147 C	0.8910	Adder	1.05
926662	AC1-147 E	0.5233	Adder	0.62
927221	AC1-216 C O1	4.7801	50/50	4.7801
927222	AC1-216 E O1	21.7879	50/50	21.7879
932041	AC2-012 C	4.0306	Adder	4.74
932042	AC2-012 E	6.5762	Adder	7.74
933731	AC2-196 C	0.5968	Adder	0.7
933732	AC2-196 E	0.3975	Adder	0.47
934011	AD1-025 C	47.6200	50/50	47.6200
934012	AD1-025 E	28.2080	50/50	28.2080
934061	AD1-033 C	2.5336	Adder	2.98
934062	AD1-033 E	1.6891	Adder	1.99
935111	AD1-144 C	0.7313	Adder	0.86
935112	AD1-144 E	0.3996	Adder	0.47
935161	AD1-151 C O1	20.3229	50/50	20.3229
935162	AD1-151 E O1	13.5486	50/50	13.5486
936041	AD2-007 C	2.2748	50/50	2.2748
936042	AD2-007 E	1.5671	50/50	1.5671
936051	AD2-008 C	8.2905	50/50	8.2905
936052	AD2-008 E	18.0471	50/50	18.0471
937221	AD2-160 C O1	1.9165	Adder	2.25
937222	AD2-160 E O1	1.0050	Adder	1.18

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
937251	AD2-164 (Withdrawn : 06/30/2020)	1.6250	Adder	1.91
937541	AD2-215 C	0.7389	Adder	0.87
937542	AD2-215 E	0.3921	Adder	0.46
938531	AE1-072 C O1	5.6597	Adder	6.66
938532	AE1-072 E O1	2.9504	Adder	3.47
939311	AE1-162 C	2.0568	50/50	2.0568
939312	AE1-162 E	1.3712	50/50	1.3712
940251	AE2-007 O1	66.4959	Adder	78.23
940891	AE2-078 C	2.6910	50/50	2.6910
940892	AE2-078 E	1.3862	50/50	1.3862
940901	AE2-079 C	2.6910	50/50	2.6910
940902	AE2-079 E	1.3862	50/50	1.3862
941281	AE2-122 C O1	10.1907	Adder	11.99
941282	AE2-122 E O1	41.1218	Adder	48.38
941291	AE2-123 C O1	10.4728	Adder	12.32
941292	AE2-123 E O1	40.8396	Adder	48.05
941301	AE2-124 C O1	9.4265	Adder	11.09
941302	AE2-124 E O1	41.3623	Adder	48.66
941501	AE2-147 C	4.7354	Adder	5.57
941502	AE2-147 E	3.1569	Adder	3.71
941591	AE2-156 O1	7.0023	Adder	8.24
942131	AE2-225 C	0.6740	Adder	0.79
942132	AE2-225 E	0.4493	Adder	0.53
942171	AE2-229 C	0.6740	Adder	0.79
942172	AE2-229 E	0.4493	Adder	0.53
942401	AE2-253 C	2.0158	Adder	2.37
942402	AE2-253 E	0.9056	Adder	1.07
942551	AE2-270	33.8715	50/50	33.8715
943611	AF1-032 C	0.5504	Adder	0.65
943612	AF1-032 E	0.2921	Adder	0.34
943621	AF1-033 C	2.6910	50/50	2.6910
943622	AF1-033 E	1.3862	50/50	1.3862
944501	AF1-115 C O1	8.1952	50/50	8.1952
944502	AF1-115 E O1	4.0364	50/50	4.0364
944581	AF1-123 C O1	14.1609	Adder	16.66
944582	AF1-123 E O1	32.4245	Adder	38.15
944591	AF1-124 C O1	14.1609	Adder	16.66
944592	AF1-124 E O1	32.4245	Adder	38.15
944601	AF1-125 C O1	14.1609	Adder	16.66
944602	AF1-125 E O1	32.4245	Adder	38.15
944871	AF1-152 C	1.5785	Adder	1.86
944872	AF1-152 E	1.0523	Adder	1.24
957491	AF2-043 C	0.3572	Adder	0.79
957492	AF2-043 E	0.2382	Adder	0.53
957631	AF2-057	0.7495	Adder	1.66
957711	AF2-065 C	17.2745	50/50	17.2745
957712	AF2-065 E	16.5970	50/50	16.5970
957821	AF2-076 C O1	0.8678	Adder	1.93
957822	AF2-076 E O1	0.5785	Adder	1.28
957871	AF2-081 C O1	1.7193	Adder	3.82
957872	AF2-081 E O1	0.7368	Adder	1.64
960101	AF2-301 C	2.4855	50/50	2.4855

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960102	AF2-301 E	1.6570	50/50	1.6570
960132	AF2-304 E O1	13.7744	50/50	13.7744
WEC	WEC	0.0047	Confirmed LTF	0.0047
LGEE	LGEE	0.0137	Confirmed LTF	0.0137
CPLE	CPLE	0.6906	Confirmed LTF	0.6906
CBM-W2	CBM-W2	1.2121	Confirmed LTF	1.2121
NY	NY	0.2218	Confirmed LTF	0.2218
CBM-W1	CBM-W1	0.0125	Confirmed LTF	0.0125
TVA	TVA	0.3290	Confirmed LTF	0.3290
O-066	O-066	2.8762	Confirmed LTF	2.8762
CBM-S2	CBM-S2	4.2310	Confirmed LTF	4.2310
CBM-S1	CBM-S1	1.6614	Confirmed LTF	1.6614
G-007	G-007	0.4472	Confirmed LTF	0.4472
MADISON	MADISON	0.1835	Confirmed LTF	0.1835
MEC	MEC	0.1017	Confirmed LTF	0.1017

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
97903809	314287	6CHESTF B	DVP	314276	6BASIN	DVP	1	DVP_P1-2: LN 563	single	663.64	145.57	146.76	DC	7.82

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
314314	3LOCKS	0.1996	80/20	0.1996
314435	6SAPONY	0.2851	80/20	0.2851
314572	3EMPORIA	0.0358	80/20	0.0358
314704	3LAWRENC	0.1386	80/20	0.1386
315065	**1CHESTF6 (Deactivation : 31/05/2023)**	**172.3323**	**80/20**	**172.3323**
315074	**1HOPCGN1 (Deactivation : 25/06/2019)**	**6.0570**	**80/20**	**6.0570**
315075	**1HOPCGN2 (Deactivation : 25/06/2019)**	**5.9785**	**80/20**	**5.9785**
315076	1HOPPOLC	1.1982	80/20	1.1982
315077	1HOPHCF1	1.8729	80/20	1.8729
315078	1HOPHCF2	1.8729	80/20	1.8729
315079	1HOPHCF3	1.8729	80/20	1.8729
315080	1HOPHCF4	2.8433	80/20	2.8433
315116	1SURRY 1	11.5720	80/20	11.5720
315117	1GRAVELC	0.4056	80/20	0.4056
315119	1GRAVEL3	1.1756	80/20	1.1756
315120	1GRAVEL4	1.1906	80/20	1.1906
315121	1GRAVEL5	1.1756	80/20	1.1756
315122	1GRAVEL6	1.1893	80/20	1.1893
315131	**1EDGECMA (Deactivation : 22/04/2019)**	**2.8338**	**Adder**	**3.33**
315132	**1EDGECMB (Deactivation : 22/04/2019)**	**2.8338**	**Adder**	**3.33**
315136	1ROSEMG1	0.9895	80/20	0.9895
315137	1ROSEMS1	0.6136	80/20	0.6136
315138	1ROSEMG2	0.4638	80/20	0.4638
315139	1GASTONA	1.4669	80/20	1.4669
315141	1GASTONB	1.4669	80/20	1.4669
315294	1DOMTR10	3.3467	Adder	3.94
315611	6Z1-036WIND	2.0089	Adder	2.36
922922	AB1-081 C OP	2.7246	Adder	3.21
923262	**AB1-132 C OP (Suspended)**	**6.4940**	**80/20**	**6.4940**
923572	AB1-173 C OP	1.0571	80/20	1.0571
923582	AB1-173AC OP	1.0571	80/20	1.0571
923801	AB2-015 C OP	2.8955	Adder	3.41
923831	AB2-022 C	0.6590	Adder	0.78
923911	AB2-031 C O1	1.0492	80/20	1.0492
923991	AB2-040 C O1	3.4452	80/20	3.4452
924501	**AB2-099 C (Suspended)**	**0.1944**	**Adder**	**0.23**

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
924511	AB2-100 C	1.1199	80/20	1.1199
924811	AB2-134 C OP	1.2696	80/20	1.2696
925051	**AB2-160 C O1 (Suspended)**	**3.5182**	**80/20**	**3.5182**
925061	**AB2-161 C O1 (Suspended)**	**1.9112**	**80/20**	**1.9112**
925171	AB2-174 C O1	0.5804	80/20	0.5804
925331	AB2-190 C	11.7746	80/20	11.7746
925591	AC1-034 C	2.0800	Adder	2.45
926071	AC1-086 C	9.5632	80/20	9.5632
926201	AC1-098 C	2.0227	Adder	2.38
926211	AC1-099 C	0.6778	Adder	0.8
926661	AC1-147 C	0.6442	Adder	0.76
927021	AC1-189 C	2.6158	Adder	3.08
927141	AC1-208 C	2.9977	Adder	3.53
927221	AC1-216 C O1	0.9693	80/20	0.9693
932041	AC2-012 C	2.9143	Adder	3.43
932581	AC2-078 C O1	3.0062	80/20	3.0062
932591	AC2-079 C O1	2.7949	80/20	2.7949
932631	AC2-084 C	2.8835	Adder	3.39
933731	AC2-196 C	0.4989	Adder	0.59
933991	AD1-023 C	4.1106	Adder	4.84
934011	AD1-025 C	9.6564	80/20	9.6564
934061	AD1-033 C	2.0984	Adder	2.47
934331	AD1-057 C O1	3.4483	Adder	4.06
934521	AD1-076 C	16.8055	Adder	19.77
934571	AD1-082 C	4.3555	80/20	4.3555
935111	AD1-144 C	0.5087	Adder	0.6
935161	AD1-151 C O1	9.4617	80/20	9.4617
936041	AD2-007 C	0.4613	80/20	0.4613
936051	AD2-008 C	1.6812	80/20	1.6812
936401	AD2-051 C O1	2.8621	Adder	3.37
936661	AD2-085 C	1.6895	80/20	1.6895
937221	AD2-160 C O1	1.6435	Adder	1.93
937541	AD2-215 C	0.5140	Adder	0.6
938171	AE1-026 C O1	10.1013	Adder	11.88
938221	AE1-035 C	0.7278	Adder	0.86
938491	AE1-068 C O1	17.2211	Adder	20.26
938501	AE1-069 C O1	13.4662	Adder	15.84
938531	AE1-072 C O1	4.9590	Adder	5.83
938561	AE1-075 C	-0.6270	Adder	-0.74
938631	AE1-085 C O1	6.3665	80/20	6.3665
938771	AE1-103 C O1	1.2161	Adder	1.43
939191	AE1-149 C O1	8.2500	80/20	8.2500
939311	AE1-162 C	0.8644	80/20	0.8644
939411	AE1-173 C	25.4102	Adder	29.89
940061	AE2-000BC O1	9.0531	80/20	9.0531
940251	AE2-007 O1	49.1584	Adder	57.83
940431	AE2-027 C O1	3.4915	Adder	4.11
940471	AE2-031 C	9.3547	Adder	11.01
940481	AE2-033 C	10.3934	80/20	10.3934
940491	AE2-034 C	2.1870	Adder	2.57
940541	AE2-040 O1	1.8170	80/20	1.8170

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
940571	AE2-044 C	1.3623	Adder	1.6
940641	AE2-051 C O1	4.8715	Adder	5.73
940651	AE2-052	2.7500	80/20	2.7500
940891	AE2-078 C	0.9794	80/20	0.9794
940901	AE2-079 C	0.9794	80/20	0.9794
941031	AE2-094 C	11.2928	Adder	13.29
941101	AE2-104 C O1	1.0955	Adder	1.29
941281	AE2-122 C O1	8.0148	Adder	9.43
941291	AE2-123 C O1	8.2367	Adder	9.69
941301	AE2-124 C O1	7.4801	Adder	8.8
941501	AE2-147 C	4.6160	Adder	5.43
941541	AE2-151 C	0.3580	Adder	0.42
941591	AE2-156 O1	5.0991	Adder	6.0
942001	AE2-212 C	2.5328	80/20	2.5328
942131	AE2-225 C	0.6193	Adder	0.73
942161	AE2-228 C	2.9165	80/20	2.9165
942171	AE2-229 C	0.6193	Adder	0.73
942341	AE2-247 C	0.7346	80/20	0.7346
942371	AE2-250 C O1	6.2494	80/20	6.2494
942401	AE2-253 C	1.7287	Adder	2.03
942471	AE2-260 C O1	8.2162	80/20	8.2162
942551	AE2-270	15.3405	80/20	15.3405
942851	AE2-304 C	0.1849	Adder	0.22
942931	AE2-313 C	10.1289	Adder	11.92
943171	AE2-346 C	0.4667	Adder	0.55
943461	AF1-017 C	0.6646	80/20	0.6646
943611	AF1-032 C	0.5058	Adder	0.6
943621	AF1-033 C	0.9794	80/20	0.9794
943911	AF1-059	5.3269	Adder	6.27
944011	AF1-069 C	3.6898	Adder	4.34
944141	AF1-082	0.8758	Adder	1.03
944501	AF1-115 C O1	2.9828	80/20	2.9828
944581	AF1-123 C O1	12.9513	Adder	15.24
944591	AF1-124 C O1	12.9513	Adder	15.24
944601	AF1-125 C O1	12.9513	Adder	15.24
944871	AF1-152 C	1.5387	Adder	1.81
945711	AF1-236 C O1	23.9422	Adder	28.17
946011	AF1-266	8.7001	80/20	8.7001
946261	AF1-291 C	2.9432	80/20	2.9432
946281	AF1-292 C	0.7554	80/20	0.7554
957491	AF2-043 C	0.3283	Adder	0.73
957521	AF2-046 C	3.0020	Adder	6.66
957531	AF2-047 C	2.7542	Adder	6.11
957631	AF2-057	0.5420	Adder	1.2
957711	AF2-065 C	7.8237	80/20	7.8237
957791	**AF2-073 C (Withdrawn : 07/02/2020)**	**1.5240**	**Adder**	**3.38**
957801	**AF2-074 C (Withdrawn : 07/02/2020)**	**0.6773**	**Adder**	**1.5**
957821	AF2-076 C O1	0.8233	Adder	1.83
957861	AF2-080 C	1.2592	Adder	2.8
957871	AF2-081 C O1	1.4900	Adder	3.31
958141	AF2-108	3.0601	80/20	3.0601

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
958161	AF2-110 C	0.2394	Adder	0.53
959231	AF2-214 C	1.5601	Adder	3.46
959511	AF2-242	1.2762	Adder	2.83
959651	AF2-256 C	0.7291	80/20	0.7291
959661	AF2-257 C	0.7358	80/20	0.7358
959671	AF2-258 C	0.6332	80/20	0.6332
959681	AF2-259 C	2.6229	80/20	2.6229
959731	AF2-264 C	0.3985	Adder	0.88
960081	AF2-299 C	1.2732	80/20	1.2732
960101	AF2-301 C	0.4400	Adder	0.98
960331	AF2-324 C O1	1.2637	Adder	2.81
960351	AF2-326 C	0.4122	Adder	0.91
960361	AF2-327 C	1.7446	80/20	1.7446
960831	AF2-374 C	0.2266	Adder	0.5
961091	AF2-400 C	0.0829	Adder	0.18
961111	AF2-402 C O1	0.6137	80/20	0.6137
WEC	WEC	0.1962	Confirmed LTF	0.1962
LGEE	LGEE	0.3742	Confirmed LTF	0.3742
CPLE	CPLE	2.5011	Confirmed LTF	2.5011
CBM-W2	CBM-W2	8.6241	Confirmed LTF	8.6241
NY	NY	0.4352	Confirmed LTF	0.4352
CBM-W1	CBM-W1	7.2058	Confirmed LTF	7.2058
TVA	TVA	1.8648	Confirmed LTF	1.8648
CBM-S2	CBM-S2	16.6637	Confirmed LTF	16.6637
CBM-S1	CBM-S1	10.2836	Confirmed LTF	10.2836
MADISON	MADISON	0.5867	Confirmed LTF	0.5867
MEC	MEC	1.2410	Confirmed LTF	1.2410
AA2-074	AA2-074	1.7042	LTF	1.7042

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
97714610	314303	6HOPEWLL	DVP	314287	6CHESTF B	DVP	1	DVP_P4-2: 56372	breaker	549.0	193.75	200.34	DC	36.1

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
315060	**1CHESTF5 (Deactivation : 31/05/2023)**	**37.5742**	**Adder**	**44.2**
315073	1STONECA	13.1251	50/50	13.1251
315074	**1HOPCGN1 (Deactivation : 25/06/2019)**	**15.8253**	**50/50**	**15.8253**
315075	**1HOPCGN2 (Deactivation : 25/06/2019)**	**15.6203**	**50/50**	**15.6203**
315076	1HOPPOLC	3.1307	50/50	3.1307
315077	1HOPHCF1	4.8935	50/50	4.8935
315078	1HOPHCF2	4.8935	50/50	4.8935
315079	1HOPHCF3	4.8935	50/50	4.8935
315080	1HOPHCF4	7.4287	50/50	7.4287
315116	1SURRY 1	23.2824	50/50	23.2824
315120	1GRAVEL4	2.3955	50/50	2.3955
315122	1GRAVEL6	2.3927	50/50	2.3927
916192	Z1-068 E	0.6279	Adder	0.74
919152	AA1-139 E	1.9477	Adder	2.29
924811	AB2-134 C OP	2.9915	50/50	2.9915
924812	AB2-134 E OP	17.0527	50/50	17.0527
925331	AB2-190 C	28.0896	50/50	28.0896
925332	AB2-190 E	12.0384	50/50	12.0384
925522	AC1-027 E	0.3850	Adder	0.45
926661	AC1-147 C	0.8045	Adder	0.95
926662	AC1-147 E	0.4725	Adder	0.56
927221	AC1-216 C O1	2.2840	50/50	2.2840
927222	AC1-216 E O1	10.4104	50/50	10.4104
932041	AC2-012 C	3.6396	Adder	4.28
932042	AC2-012 E	5.9382	Adder	6.99
933731	AC2-196 C	0.5668	Adder	0.67
933732	AC2-196 E	0.3775	Adder	0.44
934011	AD1-025 C	22.7531	50/50	22.7531
934012	AD1-025 E	13.4779	50/50	13.4779
934061	AD1-033 C	2.3976	Adder	2.82
934062	AD1-033 E	1.5984	Adder	1.88
935111	AD1-144 C	0.6248	Adder	0.74
935112	AD1-144 E	0.3414	Adder	0.4
935161	AD1-151 C O1	22.5720	50/50	22.5720
935162	AD1-151 E O1	15.0480	50/50	15.0480
936041	AD2-007 C	1.0869	50/50	1.0869
936042	AD2-007 E	0.7488	50/50	0.7488
936051	AD2-008 C	3.9613	50/50	3.9613
936052	AD2-008 E	8.6230	50/50	8.6230

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
936762	AD2-097 E	-4.6231	Adder	-5.44
937221	AD2-160 C O1	1.7988	Adder	2.12
937222	AD2-160 E O1	0.9433	Adder	1.11
937251	**AD2-164 (Withdrawn : 06/30/2020)**	**1.6949**	**Adder**	**1.99**
937541	AD2-215 C	0.6312	Adder	0.74
937542	AD2-215 E	0.3349	Adder	0.39
939311	AE1-162 C	1.3014	Adder	1.53
939312	AE1-162 E	0.8676	Adder	1.02
940251	AE2-007 O1	60.7387	Adder	71.46
940542	AE2-040 BAT	1.5771	Merchant Transmission	1.5771
940891	AE2-078 C	1.6591	Adder	1.95
940892	AE2-078 E	0.8547	Adder	1.01
940901	AE2-079 C	1.6591	Adder	1.95
940902	AE2-079 E	0.8547	Adder	1.01
941281	AE2-122 C O1	9.4573	Adder	11.13
941282	AE2-122 E O1	38.1623	Adder	44.9
941291	AE2-123 C O1	9.7191	Adder	11.43
941292	AE2-123 E O1	37.9004	Adder	44.59
941301	AE2-124 C O1	8.7739	Adder	10.32
941302	AE2-124 E O1	38.4988	Adder	45.29
941591	AE2-156 O1	6.3521	Adder	7.47
942151	AE2-227 C	0.7603	Adder	0.89
942152	AE2-227 E	0.5069	Adder	0.6
942401	AE2-253 C	1.8920	Adder	2.23
942402	AE2-253 E	0.8501	Adder	1.0
942551	AE2-270	36.1035	50/50	36.1035
943621	AF1-033 C	1.6591	Adder	1.95
943622	AF1-033 E	0.8547	Adder	1.01
944501	AF1-115 C O1	5.0527	Adder	5.94
944502	AF1-115 E O1	2.4887	Adder	2.93
944581	AF1-123 C O1	14.3997	Adder	16.94
944582	AF1-123 E O1	32.9712	Adder	38.79
944591	AF1-124 C O1	14.3997	Adder	16.94
944592	AF1-124 E O1	32.9712	Adder	38.79
944601	AF1-125 C O1	14.3997	Adder	16.94
944602	AF1-125 E O1	32.9712	Adder	38.79
944631	AF1-128 O1	29.2405	Adder	34.4
946012	AF1-266 BAT	9.4801	Merchant Transmission	9.4801
957631	AF2-057	0.6768	Adder	1.5
957711	AF2-065 C	18.4128	50/50	18.4128
957712	AF2-065 E	17.6907	50/50	17.6907
957871	AF2-081 C O1	1.6058	Adder	3.56
957872	AF2-081 E O1	0.6882	Adder	1.53
958142	AF2-108 BAT	1.3579	50/50	1.3579
959641	AF2-255 C	0.1007	Adder	0.22
959642	AF2-255 E	0.0672	Adder	0.15
960101	AF2-301 C	0.8591	Adder	1.91
960102	AF2-301 E	0.5727	Adder	1.27
960132	AF2-304 E O1	14.7791	50/50	14.7791
LGEE	LGEE	0.0068	Confirmed LTF	0.0068
CPLE	CPLE	0.7111	Confirmed LTF	0.7111
CBM-W2	CBM-W2	1.3186	Confirmed LTF	1.3186

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
NY	NY	0.2959	Confirmed LTF	0.2959
TVA	TVA	0.3724	Confirmed LTF	0.3724
O-066	O-066	3.8304	Confirmed LTF	3.8304
CBM-S2	CBM-S2	4.7338	Confirmed LTF	4.7338
CBM-S1	CBM-S1	1.8659	Confirmed LTF	1.8659
TILTON	TILTON	0.0013	Confirmed LTF	0.0013
G-007	G-007	0.5959	Confirmed LTF	0.5959
MADISON	MADISON	0.2197	Confirmed LTF	0.2197
MEC	MEC	0.0953	Confirmed LTF	0.0953

11.6.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97714640	314303	6HOPEWLL	DVP	314286	6CHESTFA	DVP	1	DVP_P4-2: 211T2124	breaker	549.0	169.09	180.71	DC	63.75

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
315073	1STONECA	24.1256	50/50	24.1256
315074	**1HOPCGN1 (Deactivation : 25/06/2019)**	**29.0889**	**50/50**	**29.0889**
315075	**1HOPCGN2 (Deactivation : 25/06/2019)**	**28.7119**	**50/50**	**28.7119**
315076	1HOPPOLC	5.7546	50/50	5.7546
315077	1HOPHCF1	8.9949	50/50	8.9949
315078	1HOPHCF2	8.9949	50/50	8.9949
315079	1HOPHCF3	8.9949	50/50	8.9949
315080	1HOPHCF4	13.6549	50/50	13.6549
315116	1SURRY 1	38.2271	50/50	38.2271
315120	1GRAVEL4	3.9331	50/50	3.9331
315122	1GRAVEL6	3.9286	50/50	3.9286
924811	AB2-134 C OP	5.2848	50/50	5.2848
924812	AB2-134 E OP	30.1257	50/50	30.1257
925331	AB2-190 C	49.8770	50/50	49.8770
925332	AB2-190 E	21.3758	50/50	21.3758
926661	AC1-147 C	1.0430	Adder	1.23
926662	AC1-147 E	0.6126	Adder	0.72
927221	AC1-216 C O1	4.0349	50/50	4.0349
927222	AC1-216 E O1	18.3912	50/50	18.3912
932041	AC2-012 C	4.7185	Adder	5.55
932042	AC2-012 E	7.6987	Adder	9.06
934011	AD1-025 C	40.1961	50/50	40.1961
934012	AD1-025 E	23.8104	50/50	23.8104
935111	AD1-144 C	0.8595	Adder	1.01
935112	AD1-144 E	0.4696	Adder	0.55
935161	AD1-151 C O1	40.0797	50/50	40.0797
935162	AD1-151 E O1	26.7198	50/50	26.7198
936041	AD2-007 C	1.9202	50/50	1.9202
936042	AD2-007 E	1.3228	50/50	1.3228
936051	AD2-008 C	6.9980	50/50	6.9980
936052	AD2-008 E	15.2335	50/50	15.2335
937541	AD2-215 C	0.8684	Adder	1.02
937542	AD2-215 E	0.4608	Adder	0.54
939311	AE1-162 C	2.0341	Adder	2.39
939312	AE1-162 E	1.3561	Adder	1.6
940251	AE2-007 O1	77.8376	Adder	91.57
940891	AE2-078 C	2.6455	Adder	3.11
940892	AE2-078 E	1.3628	Adder	1.6
940901	AE2-079 C	2.6455	Adder	3.11
940902	AE2-079 E	1.3628	Adder	1.6

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941591	AE2-156 O1	8.1966	Adder	9.64
942551	AE2-270	63.7515	50/50	63.7515
943621	AF1-033 C	2.6455	Adder	3.11
943622	AF1-033 E	1.3628	Adder	1.6
944501	AF1-115 C O1	8.0566	Adder	9.48
944502	AF1-115 E O1	3.9682	Adder	4.67
957631	AF2-057	0.8775	Adder	1.95
957711	AF2-065 C	32.5133	50/50	32.5133
957712	AF2-065 E	31.2382	50/50	31.2382
960101	AF2-301 C	1.2807	Adder	2.84
960102	AF2-301 E	0.8538	Adder	1.9
960132	AF2-304 E O1	26.1202	50/50	26.1202
LGEE	LGEE	0.0029	Confirmed LTF	0.0029
CPLE	CPLE	1.0478	Confirmed LTF	1.0478
CBM-W2	CBM-W2	1.6298	Confirmed LTF	1.6298
NY	NY	0.3650	Confirmed LTF	0.3650
TVA	TVA	0.4676	Confirmed LTF	0.4676
O-066	O-066	4.7242	Confirmed LTF	4.7242
EDWARDS	EDWARDS	0.0007	Confirmed LTF	0.0007
CBM-S2	CBM-S2	6.3869	Confirmed LTF	6.3869
CBM-S1	CBM-S1	2.3260	Confirmed LTF	2.3260
TILTON	TILTON	0.0076	Confirmed LTF	0.0076
G-007	G-007	0.7332	Confirmed LTF	0.7332
MADISON	MADISON	0.2843	Confirmed LTF	0.2843
MEC	MEC	0.1081	Confirmed LTF	0.1081
BLUEG	BLUEG	0.0069	Confirmed LTF	0.0069
TRIMBLE	TRIMBLE	0.0056	Confirmed LTF	0.0056

11.7 Queue Dependencies

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

Queue Number	Project Name	Status
AA1-139	Hickory-Shawboro 230kV	In Service
AA2-074	CPLE-PJM	Confirmed
AB1-081	Anaconda-Mayo Dunbar 115kV	Under Construction
AB1-132	Thelma 230kV	Suspended
AB1-173	Brink-Trego 115kV	Engineering and Procurement
AB1-173A	Brink-Trego 115kV	Engineering and Procurement
AB2-015	Franklin 115kV	Engineering and Procurement
AB2-022	Elizabeth City 34.5kV	Engineering and Procurement
AB2-031	Brink-Trego 115kV	Engineering and Procurement
AB2-040	Brink 115kV	Engineering and Procurement
AB2-099	Ahoskie 34.5kV	Suspended
AB2-100	Clubhouse-Lakeview 230kV	Under Construction
AB2-134	Hopewell-Surry 230kV	In Service
AB2-160	Reams 115kV	Suspended
AB2-161	Waverly #2 DP 115kV	Suspended
AB2-174	Emporia-Trego 115kV	Under Construction
AB2-190	Hopewell-Surry 230kV	Engineering and Procurement
AC1-027	Pendleton 34.5kV	In Service
AC1-034	Heartsease DP - Mayo Dunbar 115kV	Active
AC1-086	Thelma 230kV	Active
AC1-098	Dawson-South Justice 115kV	Engineering and Procurement
AC1-099	Dawson-South Justice 115kV	Engineering and Procurement
AC1-147	Grassfield 34.5kV	Engineering and Procurement
AC1-189	Chinquapin-Everetts 230kV	Active
AC1-208	Cox-Whitakers 115kV	Active
AC1-216	Hopewell-Surry 230kV	Under Construction
AC2-012	Grassfield-Great Bridge 115kV	Active
AC2-078	Disputanta-Waverly 115kV	Active
AC2-079	Ivor-Oakridge 115kV	Active
AC2-084	Dawson-South Justice 115kV	Active
AC2-196	Fentress 34.5kV	Engineering and Procurement
AD1-023	Cashie-Trowbridge 230 kV	Active
AD1-025	Hopewell-Surry 230 kV	Active
AD1-033	Fentress-Landstown 230 kV	Active
AD1-057	Hornertown-Hathaway 230 kV	Active
AD1-076	Trowbridge 230 kV	Active
AD1-082	Bakers Pond-Ivor 115kV	Active
AD1-144	Kings Fork 34.5 kV	Engineering and Procurement
AD1-151	Hopewell-Surry 230 kV	Active

Queue Number	Project Name	Status
AD2-007	Hopewell-Surry 230 kV	Active
AD2-008	Hopewell-Surry 230 kV	Active
AD2-051	Earleys – Northampton 230kV	Active
AD2-085	Myrtle-Windsor DP 115kV	Active
AD2-097	Spruance NUG 230kV	In Service
AD2-160	Hickory-Moyock 230kV	Active
AD2-164	Peninsula 34.5kV	Withdrawn
AD2-215	Kings Fork 34.5 kV	Engineering and Procurement
AE1-026	Cashie 230 kV	Active
AE1-035	Earleys 230 kV	Engineering and Procurement
AE1-068	Carson-Rogers Rd 500 kV	Active
AE1-069	Carson-Rogers Road 500 kV	Active
AE1-072	Shawboro-Sligo 230 kV	Active
AE1-075	Powhatan 34.5 kV	Engineering and Procurement
AE1-085	Bakers Pond-Bell Ave 115 kV	Active
AE1-103	Holland-Union Camp 115 kV	Active
AE1-149	Disputanta-Poe 115 kV	Active
AE1-162	Smithfield 34.5 kV	Engineering and Procurement
AE1-173	Carson-Suffolk 500 kV	Active
AE2-000B	N/A	N/A
AE2-007	Chesapeake 230 kV	Active
AE2-027	Harrowgate-Locks 115kV	Active
AE2-031	Carson-Rawlings 500 kV	Active
AE2-033	Clubhouse-Sappony 230 kV	Active
AE2-034	Mackeys 230 kV	Active
AE2-040	Sapony 34.5 kV	Active
AE2-044	Anaconda-Dunbar 115 kV	Active
AE2-051	Carson-Septa 500 kV	Active
AE2-052	Disputanta-Poe 115 kV	Active
AE2-078	Poolesville 34.5 kV	Engineering and Procurement
AE2-079	Poolesville 34.5 kV	Engineering and Procurement
AE2-094	Carson-Rogers Road 500 kV	Active
AE2-104	Suffolk 115 kV	Active
AE2-122	Birdneck-Landstown 230 kV	Active
AE2-123	Birdneck-Landstown 230 kV	Active
AE2-124	Landstown 230 kV	Active
AE2-147	Swamp 230 kV	Active
AE2-151	Earleys 34.5kV	Engineering and Procurement
AE2-156	Yadkin 115 kV	Active
AE2-212	Harrowgate 34 kV	Active
AE2-225	Suffolk 34 kV	Engineering and Procurement
AE2-227	Iron Bridge 34 kV	Active
AE2-228	Tyler 34 kv	Active
AE2-229	Suffolk 34 kV	Engineering and Procurement
AE2-247	Myrtle-Windsor 115 kV	Active
AE2-250	Purdy Sw.-Reams 115 kV	Active
AE2-253	Hickory-Moyock 230 kV	Active
AE2-260	Clubhouse 230 kV	Active
AE2-270	Hopewell-Surry 230 kV	Active
AE2-304	South Hertford 34 kV	Engineering and Procurement
AE2-313	Carson-Rawlings 500 kV	Active
AE2-346	Ahoskie 34.5 kV	Active

Queue Number	Project Name	Status
AF1-017	Myrtle-Windsor 115 kV	Active
AF1-032	Suffolk 34.5 kV	Engineering and Procurement
AF1-033	Poolesville 34 kV	Engineering and Procurement
AF1-059	Brodnax-South Hill 115 kV	Active
AF1-069	Carson-Rogers Rd 500 kV	Active
AF1-082	Heartsease-Mayo Dunbar DP	Active
AF1-115	Poolesville 230 kV	Active
AF1-123	Fentress 500 kV	Active
AF1-124	Fentress 500 kV	Active
AF1-125	Fentress 500 kV	Active
AF1-128	Chesterfield 230 kV	Active
AF1-152	Swamp 230 kV	Active
AF1-236	Mackeys 230 kV	Active
AF1-266	Clubhouse-Sapony 230 kV	Active
AF1-291	Tyler 34.5 kV	Engineering and Procurement
AF1-292	Fields Crossroads 34.5 kV	Active
AF2-043	Suffolk 34.5 kV	Active
AF2-046	Tunis-Mapleton 115 kV	Active
AF2-047	Creswell-Riders Creek 115 kV	Active
AF2-057	Grassfield 34.5 kV	Active
AF2-065	Surry-Hopewell 230 kV	Active
AF2-073	Nucor Steel-Suffolk 230 kV	Withdrawn
AF2-074	Nucor Steel-Suffolk 230 kV	Withdrawn
AF2-076	Suffolk-Nucor Steel 230 kV	Active
AF2-080	Chinquapin-Everetts 230 kV	Active
AF2-081	Moyock 230 kV	Active
AF2-108	Locks 34.5 kV	Active
AF2-110	Suffolk 115 kV	Active
AF2-214	Heartsease DP-Anaconda 115 kV	Active
AF2-242	Wharton 115 kV	Active
AF2-255	Iron Bridge 34.5 kV	Active
AF2-256	Tyler 34.5 kV	Active
AF2-257	Tyler 34.5 kV	Active
AF2-258	Harrowgate 34.5 kV	Active
AF2-259	Locks 34.5 kV	Active
AF2-264	Tunis 34.5 kV	Active
AF2-299	Fields 34.5 kV	Active
AF2-301	Poolesville-Winchester 230 kV	Active
AF2-304	Surry-Hopewell 230 kV	Active
AF2-324	Edgecombe 230 kV	Active
AF2-326	Edgecombe 13 kV	Active
AF2-327	Wakefield 13 kV	Active
AF2-374	Woodland 34.5 kV	Active
AF2-400	Franklin 13.2 kV	Active
AF2-402	Ivor-Oak Ridge 115 kV	Active
W1-029	Winfall 230kV	In Service
Y1-086	Morgans Corner	In Service
Z1-036	WinFall-Chowan 230kV	Suspended
Z1-068	Birdneck 34.5kV	Under Construction
Z2-027	Pasquotank 34.5kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-2: LN 579	CONTINGENCY 'DVP_P1-2: LN 579' OPEN BRANCH FROM BUS 314923 TO BUS 314927 CKT 1 /* 8SEPTA 500.00 - 8YADKIN 500.00 END
DVP_P4-2: 211T2124	CONTINGENCY 'DVP_P4-2: 211T2124' /* HOPEWELL 230 KV OPEN BRANCH FROM BUS 314287 TO BUS 314303 CKT 1 /* 6CHESTF B 230.00 - 6HOPEWLL 230.00 OPEN BRANCH FROM BUS 314269 TO BUS 314291 CKT 1 /* 6PRGEORG 230.00 - 3PRGEORG 115.00 OPEN BRANCH FROM BUS 314269 TO BUS 314303 CKT 1 /* 6PRGEORG 230.00 - 6HOPEWLL 230.00 OPEN BUS 314269 /* ISLAND: 6PRGEORG 230.00 END
DVP_P1-2: LN 208	CONTINGENCY 'DVP_P1-2: LN 208' OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHESTF A 230.00 - 6IRON208 230.00 OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00 OPEN BUS 314309 /* ISLAND: 6IRON208 230.00 END
DVP_P1-2: LN 228	CONTINGENCY 'DVP_P1-2: LN 228' OPEN BRANCH FROM BUS 314286 TO BUS 314303 CKT 1 /* 6CHESTF A 230.00 - 6HOPEWLL 230.00 END
DVP_P4-2: 240TAB2-190	CONTINGENCY 'DVP_P4-2: 240TAB2-190' /* AB2-190 TAP 230 KV OPEN BRANCH FROM BUS 314303 TO BUS 925330 CKT 2 /* 6HOPEWLL 230.00 - AB2-190 TAP 230.00 OPEN BUS 925331 /* AB2-190 C 230.00 KV OPEN BUS 925332 /* ISLAND: AB2-190 E 230.00 END
DVP_P1-2: LN 217	CONTINGENCY 'DVP_P1-2: LN 217' OPEN BRANCH FROM BUS 314225 TO BUS 314227 CKT 1 /* 6CHARCTY 230.00 - 6LAKESIDE 230.00 OPEN BRANCH FROM BUS 314225 TO BUS 314287 CKT 1 /* 6CHARCTY 230.00 - 6CHESTF B 230.00 OPEN BUS 314225 /* ISLAND: 6CHARCTY 230.00 END

Contingency Name	Contingency Definition
DVP_P1-2: LN 573	CONTINGENCY 'DVP_P1-2: LN 573' OPEN BRANCH FROM BUS 314918 TO BUS 314934 CKT 1 /* 8NO ANNA 500.00 - 8SPOTSYL 500.00 END
DVP_P4-2: 228T268	CONTINGENCY 'DVP_P4-2: 228T268' /* HOPEWELL 230 KV OPEN BRANCH FROM BUS 314286 TO BUS 314303 CKT 1 /* 6CHESTF A 230.00 - 6HOPEWLL 230.00 OPEN BRANCH FROM BUS 314303 TO BUS 315074 CKT 1 /* 6HOPEWLL 230.00 - 1HOPCGN1 13.800 OPEN BRANCH FROM BUS 314303 TO BUS 315075 CKT 1 /* 6HOPEWLL 230.00 - 1HOPCGN2 13.800 OPEN BUS 315074 /* ISLAND: 1HOPCGN1 13.800 OPEN BUS 315075 /* ISLAND: 1HOPCGN2 13.800 END
DVP_P1-2: LN 594	CONTINGENCY 'DVP_P1-2: LN 594' OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00 END
DVP_P4-2: 56372	CONTINGENCY 'DVP_P4-2: 56372' /* CARSON 500 KV OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 OPEN BRANCH FROM BUS 314282 TO BUS 314902 CKT 1 /* 6CARSON 230.00 - 8CARSON 500.00 END
DVP_P1-2: LN 576	CONTINGENCY 'DVP_P1-2: LN 576' OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /* 8MDLTHAN 500.00 - 8NO ANNA 500.00 END
DVP_P1-2: LN 557	CONTINGENCY 'DVP_P1-2: LN 557' OPEN BRANCH FROM BUS 314214 TO BUS 314903 CKT 1 /* 6CHCKAHM 230.00 - 8CHCKAHM 500.00 OPEN BRANCH FROM BUS 314903 TO BUS 314908 CKT 1 /* 8CHCKAHM 500.00 - 8ELMONT 500.00 END
DVP_P1-2: LN 211	CONTINGENCY 'DVP_P1-2: LN 211' OPEN BRANCH FROM BUS 314287 TO BUS 314303 CKT 1 /* 6CHESTF B 230.00 - 6HOPEWLL 230.00 END

Contingency Name	Contingency Definition
DVP_P4-2: 562T563	CONTINGENCY 'DVP_P4-2: 562T563' /* CARSON 500 KV OPEN BRANCH FROM BUS 314902 TO BUS 940640 CKT 1 /* 8CARSON 500.00 - AE2-051 TAP 500.00 OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
DVP_P1-2: LN 259	CONTINGENCY 'DVP_P1-2: LN 259' OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHESTF B 230.00 END
960130 AF2-304 TAP 230 942551 AE2-270 230 1	CONTINGENCY '960130 AF2-304 TAP 230 942551 AE2-270 230 1' OPEN BRANCH FROM BUS 960130 TO BUS 942550 CKT 2 END
DVP_P1-2: LN 581	CONTINGENCY 'DVP_P1-2: LN 581' OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE 115.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE 500.00 - 8LADYSMITH 500.00 END
Base Case	
DVP_P4-2: 240T2041	CONTINGENCY 'DVP_P4-2: 240T2041' /* HOPEWELL 230 KV OPEN BRANCH FROM BUS 314303 TO BUS 925330 CKT 2 /* 6HOPEWLL 230.00 - AB2-190 TAP 230.00 OPEN BUS 315077 /* 1HOPHCF1 13.800 KV OPEN BUS 315078 /* 1HOPHCF2 13.800 KV OPEN BUS 315079 /* 1HOPHCF3 13.800 KV OPEN BUS 315080 /* 1HOPHCF4 13.800 KV END
DVP_P1-2: LN 2197	CONTINGENCY 'DVP_P1-2: LN 2197' OPEN BRANCH FROM BUS 313896 TO BUS 314303 CKT 1 /* 6COLONIAL TR230.00 - 6HOPEWLL 230.00 END
DVP_P1-2: LN 563	CONTINGENCY 'DVP_P1-2: LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END

12 Short Circuit Analysis

Short circuit analysis will be provided in the System Impact Study report.

13 Affected Systems

13.1 TVA

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

13.2 Duke Energy Progress

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

Attachment 1: One Line Diagram