



Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-150

BAKERS POND-BELL AVE 115 KV

0 MW Capacity / 0 MW Energy

July, 2019

Table of Contents

1	Introduction.....	4
2	Preface.....	4
3	General.....	5
3.1	Point of Interconnection	5
3.2	Cost Summary.....	5
4	Transmission Owner Scope of Work.....	6
5	Non-Direct Connection Cost Estimate.....	7
6	Schedule.....	8
7	Transmission Owner Analysis.....	8
7.1	Power Flow Analysis	8
7.2	Short Circuit Analysis.....	8
7.3	Stability Analysis.....	8
8	Interconnection Customer Requirements.....	8
8.1	System Protection.....	8
8.2	Compliance Issues and Interconnection Customer Requirements	9
8.3	Power Factor Requirements.....	9
9	Revenue Metering and SCADA Requirements.....	9
9.1	PJM Requirements	9
9.2	Dominion Requirements.....	9
10	Network Impacts.....	10
10.1	Generation Deliverability	12
10.2	Multiple Facility Contingency	12
10.3	Contribution to Previously Identified Overloads.....	12
10.4	Potential Congestion due to Local Energy Deliverability.....	12
10.5	System Reinforcements.....	14
10.6	Flow Gate Details.....	15
10.6.1	Contingency Descriptions	15
10.6.2	Index 1	17
10.6.3	Index 2	18
10.6.4	Index 3	20
10.6.5	Index 4	21

10.6.6	Index 5	22
10.6.7	Index 6	23
11	Affected Systems	25
11.1	LG&E.....	25
11.2	MISO	25
11.3	TVA.....	25
11.4	Duke Energy Progress.....	25
11.5	NYISO	25
12	Short Circuit.....	27
	Attachment 1	28

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 Virginia Electric and Power Company (VEPCO).

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.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

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 Sussex County, Virginia. Note that this project is located with the Interconnection Customer's AE1-085 project and will share the same property and connection point. The installed facilities will have a capability of 75 MW, but the IC is proposing to not increase the combined facility's (AE1-085 and AE2-150) MFO of 75MW with the AE2-150 project.

The conduct of light load analysis as required under the PJM planning process is not performed during the Generation Interconnection Feasibility Study phase of the PJM study process. Additional reinforcement requirements for this Interconnection Request may be defined during the conduct of the light load analysis which shall be performed following execution of the System Impact Study agreement.

Queue Number	AE2-150
Project Name	BAKERS POND-BELL AVE 115 KV
Interconnection Customer	
State	Virginia
County	Sussex
Transmission Owner	Dominion
MFO	75
MWE	0
MWC	0
Fuel	Storage
Basecase Study Year	2022

3.1 Point of Interconnection

AE2-150 will interconnect with the Dominion transmission system as an uprate to the AE1-085 which is a tap of the Bakers Pond to Bell Ave 2 115 kV line.

3.2 Cost Summary

The AE2-150 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ N/A

Description	Total Cost
Direct Connection Network Upgrade	\$ N/A
Non Direct Connection Network Upgrades	\$ N/A
Total Costs	\$ 0

In addition, the AE2-150 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$ 62,641,000

Cost allocations for these upgrades will be provided in the System Impact Study Report.

The Feasibility Study is used to make a preliminary determination of the type and scope of Attachment Facilities, Local Upgrades, and Network Upgrades that will be necessary to accommodate the Interconnection Request and to provide the Interconnection Customer a preliminary estimate of the time that will be required to construct any necessary facilities and upgrades and the Interconnection Customer’s cost responsibility. The System Impact Study provides refined and comprehensive estimates of cost responsibility and construction lead times for new facilities and system upgrades. Facilities Studies will include, commensurate with the degree of engineering specificity as provided in the Facilities Study Agreement, good faith estimates of the cost, determined in accordance with Section 217 of the Tariff,

- (a) to be charged to each affected New Service Customer for the Facilities and System Upgrades that are necessary to accommodate this queue project;
- (b) the time required to complete detailed design and construction of the facilities and upgrades; and
- (c) a description of any site-specific environmental issues or requirements that could reasonably be anticipated to affect the cost or time required to complete construction of such facilities and upgrades.

4 Transmission Owner Scope of Work

Dominion assessed the impact of the proposed Queue Project AE2-150 was evaluated as a 0.0 MW Capacity (0.0 MW energy) injection at the AE1-085 115 kV substation in the Dominion Transmission System, for compliance with NERC Reliability Criteria on Dominion Transmission System. The system was assessed using the summer 2022 AE2 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 Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For Dominion Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of the AE2-150 generation project to the Dominion Transmission System is detailed in the following sections. The associated one-line with the generation project attachment facilities and primary direct and non-direct connection are shown in Attachment 1.

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

5 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Rebuild 20.5 miles of 115 kV Line 106 from Bell Ave to AE1-085 Tap	\$ 26,650,000
Rebuild 0.97 miles of 115 kV Line 23 from Bell Ave 2 to Ivor with 636 ACSR.	\$ 1,261,000
Rebuild 9 miles of 115 kV Line 23 from AC2-079 to Ivor	\$ 11,700,000
Rebuild 2.59 miles of 115 kV Line 23 from Suffolk to Oak Ridge	\$ 3,380,000
Add additional 230/115 kV transformer at Prince George substation	\$ 6,000,000
Rebuild 10.5 miles of 115 kV Line 23 from Oak Ridge to AC2-079	\$ 13,650,000
Total Non-Direct Connection Facility Costs	\$ 62,641,000

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.

6 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.

7 Transmission Owner Analysis

7.1 Power Flow Analysis

PJM performed a power flow analysis of the transmission system using a 2022 summer peak load flow model and the results were verified by Dominion. Additionally, Dominion performed an analysis of its transmission system. At the Primary POI, the AE2-150 project contributes to overloads on the Dominion transmission system as shown in the "Network Impact – Option 1" section of the report. The estimated cost of system reinforcements necessary to mitigate these overloads is also provided.

7.2 Short Circuit Analysis

PJM performed a short circuit analysis and the results were verified by Dominion. The connection of AE2-150 project to the system does not result in any newly overdutied circuit breakers on the Dominion transmission system and does not have a significant fault current contribution to existing overdutied circuit breakers

7.3 Stability Analysis

PJM will complete a dynamic stability analysis, if necessary, as part of the System Impact Study. The results of this analysis will be reviewed by Dominion. Should stability concerns be identified in PJM's study, Dominion will develop appropriate system reinforcement(s) and included the estimated cost of any reinforcement(s) in Dominion's System Impact Study report.

8 Interconnection Customer Requirements

8.1 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.

8.2 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.

8.3 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.

9 Revenue Metering and SCADA Requirements

9.1 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.

9.2 Dominion 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>.

10 Network Impacts

The Queue Project AE2-150 was evaluated as a 0.0 MW (Capacity 0.0 MW) and 40 MW load uprate to the AE1-085 which is a tap of the Bakers Pond to Bell Ave 115 kV line in the Dominion area. Project AE2-150 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-150 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

10.1 Generation Deliverability

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

None

10.2 Multiple Facility Contingency

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

None

10.3 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	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
1886262	313879	3BELL AVE 2	DVP	938630	AE1-085 TAP	DVP	1	DVP_P4-2: 56372	breaker	136.0	111.02	119.16	DC	11.06
1886263	313879	3BELL AVE 2	DVP	938630	AE1-085 TAP	DVP	1	DVP_P4-2: 23872	breaker	136.0	107.03	115.33	DC	11.28
1887521	314269	6PRGEORG	DVP	314291	3PRGEORG	DVP	1	DVP_P7-1: LN 211-228	tower	219.8	149.58	151.92	DC	5.14
1885990	314528	3IVOR106	DVP	313879	3BELL AVE 2	DVP	1	DVP_P4-2: 1552	breaker	136.0	130.22	159.63	DC	40.0
1885991	314528	3IVOR106	DVP	313879	3BELL AVE 2	DVP	1	DVP_P4-5: L552	breaker	136.0	130.22	159.63	DC	40.0
1885992	314528	3IVOR106	DVP	313879	3BELL AVE 2	DVP	1	DVP_P4-5: POE L652	breaker	136.0	130.22	159.63	DC	40.0
1885949	314532	3OAKRI23	DVP	932590	AC2-079 TAP	DVP	1	DVP_P4-2: 1552	breaker	136.0	138.6	168.01	DC	40.0
1885950	314532	3OAKRI23	DVP	932590	AC2-079 TAP	DVP	1	DVP_P4-5: L652	breaker	136.0	138.6	168.01	DC	40.0
1885951	314532	3OAKRI23	DVP	932590	AC2-079 TAP	DVP	1	DVP_P4-5: L552	breaker	136.0	138.6	168.01	DC	40.0
1885927	314536	3SUFFOLK	DVP	314532	3OAKRI23	DVP	1	DVP_P4-5: POE L652	breaker	136.0	156.32	185.74	DC	40.0
1885928	314536	3SUFFOLK	DVP	314532	3OAKRI23	DVP	1	DVP_P4-2: 1552	breaker	136.0	156.32	185.74	DC	40.0
1885929	314536	3SUFFOLK	DVP	314532	3OAKRI23	DVP	1	DVP_P4-5: L552	breaker	136.0	156.32	185.74	DC	40.0
1885944	932590	AC2-079 TAP	DVP	314528	3IVOR106	DVP	1	DVP_P4-5: POE L652	breaker	136.0	138.6	168.01	DC	40.0
1885945	932590	AC2-079 TAP	DVP	314528	3IVOR106	DVP	1	DVP_P4-5: L552	breaker	136.0	138.6	168.01	DC	40.0
1885946	932590	AC2-079 TAP	DVP	314528	3IVOR106	DVP	1	DVP_P4-2: 1552	breaker	136.0	138.6	168.01	DC	40.0

10.4 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	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
1887140	313879	3BELL AVE 2	DVP	938630	AE1-085 TAP	DVP	1	DVP_P1-3: 8CARSON-TX#2	operation	110.92	124.34	134.35	DC	11.1
1887143	313879	3BELL AVE 2	DVP	938630	AE1-085 TAP	DVP	1	Base Case	operation	110.92	118.63	128.44	DC	10.88
1886676	314273	3BAKRS P	DVP	938630	AE1-085 TAP	DVP	1	DVP_P1-2: LN 23-B	operation	110.92	145.78	181.84	DC	40.0
1886681	314273	3BAKRS P	DVP	938630	AE1-085 TAP	DVP	1	Base Case	operation	110.92	79.44	105.69	DC	29.12
1886542	314280	3NEWBOHE	DVP	314273	3BAKRS P	DVP	1	DVP_P1-2: LN 23-B	operation	110.92	159.94	196.0	DC	40.0
1886547	314280	3NEWBOHE	DVP	314273	3BAKRS P	DVP	1	Base Case	operation	110.92	93.68	119.93	DC	29.12
1886516	314329	3POE	DVP	314280	3NEWBOHE	DVP	1	DVP_P1-2: LN 23-B	operation	110.92	169.94	206.0	DC	40.0
1886521	314329	3POE	DVP	314280	3NEWBOHE	DVP	1	Base Case	operation	110.92	103.6	129.85	DC	29.12
1886778	314528	3IVOR106	DVP	313879	3BELL AVE 2	DVP	1	DVP_P1-2: LN 106-B	operation	110.92	135.5	171.57	DC	40.0
1886682	314532	3OAKRI23	DVP	932590	AC2-079 TAP	DVP	1	DVP_P1-2: LN 106-B	operation	110.92	145.78	181.84	DC	40.0
1886535	314536	3SUFFOLK	DVP	314532	3OAKRI23	DVP	1	DVP_P1-2: LN 106-B	operation	110.92	167.51	203.57	DC	40.0
1886539	314536	3SUFFOLK	DVP	314532	3OAKRI23	DVP	1	Base Case	operation	110.92	97.4	107.21	DC	10.88
1886684	932590	AC2-079 TAP	DVP	314528	3IVOR106	DVP	1	DVP_P1-2: LN 106-B	operation	110.92	145.78	181.84	DC	40.0
1886688	932590	AC2-079 TAP	DVP	314528	3IVOR106	DVP	1	Base Case	operation	110.92	94.72	104.53	DC	10.88

10.5 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
1886262,1886263	1	3BELL AVE 2 115.0 kV - AE1-085 TAP 115.0 kV Ckt 1	dom-056 (143) : Rebuild 20.5 miles of 115 kV Line 106 from Bell Ave to AE1-085 Tap with 636 ACSR. Project Type : FAC Cost : \$26,650,000 Time Estimate : 36-40 Months	\$26,650,000
1885992,1885991,1885990	3	3IVOR106 115.0 kV - 3BELL AVE 2 115.0 kV Ckt 1	dom-031 (95) : Rebuild 0.97 miles of 115 kV Line 23 from Bell Ave 2 to Ivor with 636 ACSR. Project Type : FAC Cost : \$1,261,000 Time Estimate : 30-36 Months	\$1,261,000
1885944,1885945,1885946	6	AC2-079 TAP 115.0 kV - 3IVOR106 115.0 kV Ckt 1	dom-026 (88) : Rebuild 9 miles of 115 kV Line 23 from AC2-079 to Ivor with 636 ACSR. Project Type : FAC Cost : \$11,700,000 Time Estimate : 30-36 Months	\$11,700,000
1885927,1885928,1885929	5	3SUFFOLK 115.0 kV - 3OAKRI23 115.0 kV Ckt 1	dom-014 (72) : Rebuild 2.59 miles of 115 kV Line 23 from Suffolk to Oak Ridge with 636 ACSR. Project Type : FAC Cost : \$3,380,000 Time Estimate : 30-36 Months	\$3,380,000
1887521	2	6PRGEORG 230.0 kV - 3PRGEORG 115.0 kV Ckt 1	dom-086 (184) : Add additional 230/115 kV transformer at Prince George substation Project Type : CON Cost : \$6,000,000 Time Estimate : 16-18 Months	\$6,000,000
1885949,1885951,1885950	4	3OAKRI23 115.0 kV - AC2- 079 TAP 115.0 kV Ckt 1	dom-027 (89) : Rebuild 10.5 miles of 115 kV Line 23 from Oak Ridge to AC2-079 with 636 ACSR. Project Type : FAC Cost : \$13,650,000 Time Estimate : 30-36 Months	\$13,650,000
			TOTAL COST	\$62,641,000

10.6 Flow Gate Details

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

10.6.1 Contingency Descriptions

Contingency Name	Contingency Definition
DVP_P1-3: 8CARSON-TX#2	CONTINGENCY 'DVP_P1-3: 8CARSON-TX#2' OPEN BRANCH FROM BUS 314282 TO BUS 314902 CKT 1 /* 6CARSON 230.00 - 8CARSON 500.00 END
DVP_P7-1: LN 211-228	CONTINGENCY 'DVP_P7-1: LN 211-228' OPEN BRANCH FROM BUS 314287 TO BUS 314303 CKT 1 /* 6CHESTF B 230.00 - 6HOPEWLL 230.00 OPEN BRANCH FROM BUS 314286 TO BUS 314303 CKT 1 /* 6CHESTF A 230.00 - 6HOPEWLL 230.00 END
DVP_P4-2: 1552	CONTINGENCY 'DVP_P4-2: 1552' /* POE 115 KV OPEN BRANCH FROM BUS 939190 TO BUS 314329 CKT 1 /* AE1-149 TAP 115.00 - 3POE 115.00 OPEN BUS 314329 /* 3POE 115.00 KV OPEN BUS 314454 /* ISLAND: 3POE_1 115.00 END
DVP_P4-2: 23872	CONTINGENCY 'DVP_P4-2: 23872' /* CARSON 230 KV OPEN BRANCH FROM BUS 314282 TO BUS 314435 CKT 1 /* 6CARSON 230.00 - 6SAPONY 230.00 OPEN BRANCH FROM BUS 314435 TO BUS 940480 CKT 1 /* 6SAPONY 230.00 - AE2-033 TAP 230.00 /* CONTINGENCY LINE ADDED FOR AE2 BUILD OPEN BUS 314435 /* ISLAND: 6SAPONY 230.00 OPEN BRANCH FROM BUS 314282 TO BUS 314902 CKT 1 /* 6CARSON 230.00 - 8CARSON 500.00 OPEN BUS 314455 /* 6CARSO_1 230.00 KV END
DVP_P4-5: POE L652	CONTINGENCY 'DVP_P4-5: POE L652' /* POE 115 KV OPEN BRANCH FROM BUS 314263 TO BUS 314287 CKT 1 /* 6TYLER1 230.00 - 6CHESTF B 230.00 OPEN BRANCH FROM BUS 314263 TO BUS 314299 CKT 1 /* 6TYLER1 230.00 - 6HARROWG 230.00 OPEN BRANCH FROM BUS 314299 TO BUS 314331 CKT 1 /* 6HARROWG 230.00 - 6POE 230.00 OPEN BRANCH FROM BUS 314329 TO BUS 314331 CKT 2 /* 3POE 115.00 - 6POE 230.00 OPEN BUS 314263 /* ISLAND: 6TYLER1 230.00 OPEN BUS 314299 /* ISLAND: 6HARROWG 230.00 OPEN BUS 314329 /* 3POE 115.00 KV OPEN BUS 314454 /* ISLAND: 3POE_1 115.00 END

Contingency Name	Contingency Definition
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 23-B	CONTINGENCY 'DVP_P1-2: LN 23-B' OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGFORK 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 932590 TO BUS 314532 CKT 1 /* AC2-079 TAP 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BUS 314206 /* ISLAND: 3OAKRIDG 115.00 OPEN BUS 314261 /* ISLAND: 3OAKRI_1 115.00 OPEN BUS 314529 /* ISLAND: 3KINGFORK 115.00 OPEN BUS 314532 /* ISLAND: 3OAKRI23 115.00 END
DVP_P1-2: LN 106-B	CONTINGENCY 'DVP_P1-2: LN 106-B' OPEN BRANCH FROM BUS 938630 TO BUS 314273 CKT 1 /* AE1-085 TAP 115.00 - 3BAKRS P 115.00 OPEN BRANCH FROM BUS 314262 TO BUS 314280 CKT 1 /* 3NEWBO_1 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314273 TO BUS 314280 CKT 1 /* 3BAKRS P 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314280 TO BUS 314329 CKT 1 /* 3NEWBOHE 115.00 - 3POE 115.00 OPEN BUS 314262 /* ISLAND: 3NEWBO_1 115.00 OPEN BUS 314273 /* ISLAND: 3BAKRS P 115.00 OPEN BUS 314280 /* ISLAND: 3NEWBOHE 115.00 END
DVP_P4-5: L552	CONTINGENCY 'DVP_P4-5: L552' /* POE 115 KV OPEN BRANCH FROM BUS 314282 TO BUS 314331 CKT 1 /* 6CARSON 230.00 - 6POE 230.00 OPEN BRANCH FROM BUS 314329 TO BUS 314331 CKT 1 /* 3POE 115.00 - 6POE 230.00 OPEN BUS 314329 /* 3POE 115.00 KV OPEN BUS 314454 /* ISLAND: 3POE_1 115.00 END
Base Case	

10.6.2 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
1886262	313879	3BELL AVE 2	DVP	938630	AE1-085 TAP	DVP	1	DVP_P4-2: 56372	breaker	136.0	111.02	119.16	DC	11.06

Bus #	Bus	MW Impact
925061	AB2-161 C O1	8.55
925062	AB2-161 E O1	13.95
932591	AC2-079 C O1	8.31
932592	AC2-079 E O1	13.56
934571	AD1-082 C	19.49
934572	AD1-082 E	11.12
940061	AE1-248 C O1	40.5
940062	AE1-248 E O1	27.0
940652	AE2-052 BAT	0.6
941101	AE2-104 C O1	1.03
941102	AE2-104 E O1	1.63
941532	AE2-150 EBAT	11.06
CARR	CARR	0.02
CBM-S1	CBM-S1	0.44
CBM-S2	CBM-S2	0.52
CBM-W1	CBM-W1	0.43
CBM-W2	CBM-W2	2.88
CIN	CIN	0.19
CPLE	CPLE	0.27
G-007	G-007	0.08
IPL	IPL	0.12
LGEE	LGEE	0.06
MEC	MEC	0.44
MECS	MECS	0.17
O-066	O-066	0.51
RENSSELAER	RENSSELAER	0.02
WEC	WEC	0.05

10.6.3 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
1887521	314269	6PRGEORG	DVP	314291	3PRGEORG	DVP	1	DVP_P7-1: LN 211-228	tower	219.8	149.58	151.92	DC	5.14

Bus #	Bus	MW Impact
315073	1STONECA	10.78
315074	1HOPCGN1	13.0
315075	1HOPCGN2	12.83
315076	1HOPPOLC	1.82
315077	1HOPHCF1	2.84
315078	1HOPHCF2	2.84
315079	1HOPHCF3	2.84
315080	1HOPHCF4	4.31
315116	1SURRY 1	11.81
315120	1GRAVEL4	1.22
315122	1GRAVEL6	1.21
924811	AB2-134 C O1	1.62
924812	AB2-134 E O1	12.63
925331	AB2-190 C	22.15
925332	AB2-190 E	9.49
927221	AC1-216 C O1	10.15
927222	AC1-216 E O1	7.98
934011	AD1-025 C	17.44
934012	AD1-025 E	10.33
935161	AD1-151 C O1	17.8
935162	AD1-151 E O1	11.87
936041	AD2-007	1.85
936051	AD2-008 C	3.04
936052	AD2-008 E	6.61
939311	AE1-162 C	1.03
939312	AE1-162 E	0.68
940063	AE1-248 EBAT	5.79
940652	AE2-052 BAT	2.99
940891	AE2-078 C	1.37
940892	AE2-078 E	0.71
940901	AE2-079 C	1.37
940902	AE2-079 E	0.71
940911	AE2-080 C	1.37
940912	AE2-080 E	0.71
941532	AE2-150 EBAT	5.14
942551	AE2-270	29.68
BLUEG	BLUEG	0.66
CALDERWOOD	CALDERWOOD	0.05
CANNELTON	CANNELTON	0.04
CARR	CARR	0.07
CATAWBA	CATAWBA	0.01

Bus #	Bus	MW Impact
CHEOAH	CHEOAH	0.04
CHILHOWEE	CHILHOWEE	0.01
COFFEEN	COFFEEN	0.07
COTTONWOOD	COTTONWOOD	0.2
CPL	CPL	0.03
DUCKCREEK	DUCKCREEK	0.15
EDWARDS	EDWARDS	0.07
ELMERSMITH	ELMERSMITH	0.06
FARMERCITY	FARMERCITY	0.04
G-007	G-007	0.21
GIBSON	GIBSON	0.03
NEWTON	NEWTON	0.17
O-066	O-066	1.33
PRAIRIE	PRAIRIE	0.31
RENSELAER	RENSELAER	0.06
SANTEETLA	SANTEETLA	0.01
SMITHLAND	SMITHLAND	0.02
TATANKA	TATANKA	0.08
TILTON	TILTON	0.08
TRIMBLE	TRIMBLE	0.07
TVA	TVA	0.17
UNIONPOWER	UNIONPOWER	0.07

10.6.4 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
1885992	314528	3IVOR106	DVP	313879	3BELL AVE 2	DVP	1	DVP_P4-5: POE L652	breaker	136.0	130.22	159.63	DC	40.0

Bus #	Bus	MW Impact
940063	AE1-248 EBAT	150.0
941532	AE2-150 EBAT	40.0

10.6.5 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
1885951	314532	3OAKRI23	DVP	932590	AC2-079 TAP	DVP	1	DVP_P4-5: L552	breaker	136.0	138.6	168.01	DC	40.0

Bus #	Bus	MW Impact
940063	AE1-248 EBAT	150.0
941532	AE2-150 EBAT	40.0

10.6.6 Index 5

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
1885929	314536	3SUFFOLK	DVP	314532	3OAKRI23	DVP	1	DVP_P4-5: L552	breaker	136.0	156.32	185.74	DC	40.0

Bus #	Bus	MW Impact
940063	AE1-248 EBAT	150.0
941532	AE2-150 EBAT	40.0

10.6.7 Index 6

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
1885946	932590	AC2-079 TAP	DVP	314528	3IVOR106	DVP	1	DVP_P4-2: 1552	breaker	136.0	138.6	168.01	DC	40.0

Bus #	Bus	MW Impact
940063	AE1-248 EBAT	150.0
941532	AE2-150 EBAT	40.0

Affected Systems

11 Affected Systems

11.1 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

11.2 MISO

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

11.3 TVA

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

11.4 Duke Energy Progress

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

11.5 NYISO

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

Short Circuit

12 Short Circuit

The following Breakers are overduty: None

Attachment 1

System Configuration

