



Generation Interconnection

Feasibility Study Report

for

Queue Project AE2-316

BROOKVILLE-SQUAB HOLLOW 138 KV

41.22 MW Capacity / 100 MW Energy

July, 2019

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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 Pennsylvania Electric Company (PENELEC).

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.

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 Solar generating facility located in Jefferson County, Pennsylvania. The installed facilities will have a total capability of 100 MW with 41.22 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 12/31/2020. This study does not imply a Transmission Owner (TO) commitment to this in-service date.

Queue Number	AE2-316
Project Name	BROOKVILLE-SQUAB HOLLOW 138 KV
Interconnection Customer	
State	PA
County	Jefferson
Transmission Owner	PENELEC
MFO	100
MWE	100
MWC	41.22
Fuel	Solar
Basecase Study Year	2022

3.1 Point of Interconnection

Primary POI

The interconnection of the project at the Primary POI will be accomplished by constructing a new 138 kV three breaker ring bus substation and looping the Squab Hollow – Brookville 138 kV line into the new station. The new substation will be located approximately 22.2 miles from Squab Hollow substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection switching station and the associated facilities. The IC will also be responsible for the rough grade of the property and an access road to the proposed three breaker ring bus site.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AE2-316 generation project to connect to the FirstEnergy (“FE”) transmission system. Attachment 2 provides the proposed location for the point of interconnection. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE transmission system’s direct connection facilities.

3.2 Cost Summary

The AE2-316 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$493,390
Direct Connection Network Upgrade	\$4,920,210
Non Direct Connection Network Upgrades	\$239,000
Total Costs	\$5,652,600

In addition, the AE2-316 project may be responsible for a contribution to the following costs:

Description	Total Cost
System Upgrades	\$119,210,000

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

The costs provided above exclude the Contribution in Aid of Construction (“CIAC”) Federal Income Tax Gross Up charge. If, at a future date, it is determined that the CIAC Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

The required Attachment Facilities and Direct and Non-Direct Connection work for the interconnection of the AE2-316 generation project to the FE Transmission System is detailed in the following sections. The associated one-line with the generation project Attachment Facilities and the Primary Direct and Non-Direct Connection facilities are shown in Attachment 1.

4 Transmission Owner Scope of Work

The interconnection of the project at the Primary POI will be accomplished by constructing a new 138 kV three breaker ring bus substation and looping the Squab Hollow – Brookville 138 kV line into the new station. The new substation will be located approximately 22.2 miles from Squab Hollow substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection switching station and the associated facilities. The IC will also be responsible for the rough grade of the property and an access road to the proposed three breaker ring bus site.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AE2-316 generation project to connect to the FirstEnergy (“FE”) transmission system. Attachment 2 provides the proposed location for the point of interconnection. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE transmission system’s direct connection facilities.

5 Attachment Facilities

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

Description	Total Cost
Install Dead-End Structure, Foundations and Disconnect Switch for AE2-316	\$493,390
Total Attachment Facility Costs	\$493,390

6 Direct Connection Cost Estimate

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

Description	Total Cost
Construct 3 Breaker 138 kV Ringbus for AE2-316 Interconnection	\$4,440,510
Loop the Squab Hollow – Brookville 138 kV Line into the AE2-316 Ring Bus	\$479,700
Total Direct Connection Facility Costs	\$4,920,210

7 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
Install Wideband Wavetrap for AE2-316 at Squab Hollow Substation	\$66,800
Install Wideband Wavetrap for AE2-316 at Armstrong Substation	\$66,800
Install 2 – Wideband Wavetraps for AE2-316 at Brookville Substation	\$105,400
Total Non-Direct Connection Facility Costs	\$239,000

8 System Reinforcements Cost Estimate

Facility	Upgrade Description	Cost
01GAR RN 138.0 kV - 01COLMBGPN 138.0 kV Ckt 1	WP-0006 (177) : Reconductor 4/0 Cu Line Project Type : FAC Cost : \$20,150,000 Time Estimate : 22.0 Months	\$20,150,000
26WARREN 230.0 kV - 26ERIE S TIE 230.0 kV Ckt 1	PN-0012 (800) : Upgrade 1033 ASCR bus conductor at Glade and Warren substations Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months	\$130,000
AE2-113 TAP 115.0 kV - 26FARM VLY 115.0 kV Ckt 1	PN-0007 (793) : Reconductor line with high temperature conductor (5.55 miles - 336 ACSS; 6.79 miles 636 ACSS). Project Type : FAC Cost : \$22,100,000 Time Estimate : 20.0 Months	\$22,100,000
01KISSNG 138.0 kV - 01KARNSC 138.0 kV Ckt 1	WP-0008 (183) : Replace 556 Line Condcutor Project Type : FAC Cost : \$13,000,000 Time Estimate : 9.0 Months	\$13,000,000
01KITTAN 138.0 kV - 01AL&D6T 138.0 kV Ckt 1	WP-0009 (184) : Reconductor 4/0 Cu Line Project Type : FAC Cost : \$15,600,000 Time Estimate : 20.0 Months WP-0009a (185) : Replace line drops into All Dam 6 Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months	\$15,730,000

Facility	Upgrade Description	Cost
01AL&D6T 138.0 kV - 01AL 4J 138.0 kV Ckt 1	<p> WP-0001 (169) : Reconductor 7.3 miles of 4/0 Cu Line Conductor Project Type : FAC Cost : \$13,000,000 Time Estimate : 20.0 Months </p> <p> WP-0001a (170) : Replace 4/0 Line Exit Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months </p>	\$13,130,000

Facility	Upgrade Description	Cost
<p>01KARNSC 138.0 kV - 01BUTLER 138.0 kV Ckt 1</p>	<p>WP-0007 (178) : Reconductor 336 ACSR Line Project Type : FAC Cost : \$26,000,000 Time Estimate : 30.0 Months</p> <p>WP-0007a (179) : Replace line and bus side disconnect switches at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>WP-0007b (180) : Replace Bus Side Disconnect Switches at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>WP-0007c (181) : Replace Wavetrap at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>WP-0007d (182) : Replace Wavetrap Leads at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>b3083 (250) : Replace substation conductor at Butler (138 kV) Replace substation conductor and line trap at Karns City (138 kV). The baseline project has an projected in-service date of 06/01/2021. Project Type : FAC Cost : \$0 Time Estimate : N/A Months</p>	<p>\$26,520,000</p>

Facility	Upgrade Description	Cost
01COLMBGPN 138.0 kV - 01KISKIV 138.0 kV Ckt 1	<p> WP-0004 (174) : Reconductor 4/0 Cu Line Project Type : FAC Cost : \$7,800,000 Time Estimate : 18.0 Months </p> <p> WP-0004a (175) : Replace KD-4 Project Type : FAC Cost : \$325,000 Time Estimate : 12.0 Months </p> <p> WP-0004b (176) : Replace KD-41 Line Relays Project Type : FAC Cost : \$325,000 Time Estimate : 12.0 Months </p>	\$8,450,000
	TOTAL COST	\$119,210,000

9 Schedule

Based on the scope of work for the Attachment Facilities and the Direct and Non-Direct Connection facilities, it is expected to take a minimum of **19 months** after the signing of an Interconnection Construction Service Agreement to complete the installation. This includes the requirement for the IC to make a preliminary payment that compensates FE for the first three months of the engineering design work that is related to the construction of the interconnection substation. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined direct connection and network upgrades, and that all transmission system outages will be allowed when requested.

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.

10 Transmission Owner Analysis

10.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AE2-316 project did not contribute to any overloads on the FE transmission <100 kV system.

11 Interconnection Customer Requirements

11.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in FE's "Requirements for Transmission Connected Facilities" document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>.

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.

11.2 Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with FE's "Requirements for Transmission Connected Facilities" document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated 138 kV circuit breaker to protect the AE2-316 generator lead line. A single circuit breaker must be used to protect this line; if the project has several GSU transformers, the individual GSU transformer breakers cannot be used to protect this line.
2. The purchase and installation of the minimum required FE generation interconnection relaying and control facilities. 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 FE Transmission System Control Center.
4. Compliance with the FE and PJM generator power factor and voltage control requirements.
5. The execution of a back-up service agreement to serve the customer load supplied from the AE2-316 generation project metering point when the units are out-of-service. This assumes the intent of the IC is to net the generation with the load.

The IC will also be required to meet all PJM, ReliabilityFirst, 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 ReliabilityFirst 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 FE system.

11.3 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 FE transmission system.

12 Revenue Metering and SCADA Requirements

12.1 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.

12.2 FE Requirements

The IC will be required to comply with all FE revenue metering requirements for generation interconnection customers which can be found in FE's "Requirements for Transmission Connected Facilities" document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>

13 Network Impacts

The Queue Project AE2-316 was evaluated as a 100.0 MW (Capacity 41.2 MW) injection tapping the Brookville to Squab Hollow 138kV line in the PENELEC area. Project AE2-316 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-316 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

14 Generation Deliverability

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

None

15 Multiple Facility Contingency

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

None

16 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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
7425200	200811	26WARREN	PENELEC	200918	26ERIE S TIE	PENELEC	1	PN-P2-3-PN-345-003A	breaker	621.0	105.46	106.04	DC	7.93
7425954	235139	01AL&D6T	AP	235138	01AL 4J	AP	1	PN-P1-2-PN-345-107T	single	151.0	109.76	112.07	DC	3.47
7425955	235139	01AL&D6T	AP	235138	01AL 4J	AP	1	ATSI-P1-2-CEI-345-700T	single	151.0	109.76	112.07	DC	3.47
7425646	235197	01KARNSC	AP	235152	01BUTLER	AP	1	PN-P1-2-PN-345-107T	single	179.0	132.4	134.88	DC	4.42
7425647	235197	01KARNSC	AP	235152	01BUTLER	AP	1	ATSI-P1-2-CEI-345-700T	single	179.0	132.4	134.88	DC	4.42
7425650	235197	01KARNSC	AP	235152	01BUTLER	AP	1	PJM_P1_APS_B_G692	single	179.0	103.56	105.61	DC	3.66
7426031	235203	01KISSNG	AP	235197	01KARNSC	AP	1	ATSI-P1-2-CEI-345-700T	single	268.0	106.04	107.78	DC	4.65
7426032	235203	01KISSNG	AP	235197	01KARNSC	AP	1	PN-P1-2-PN-345-107T	single	268.0	106.04	107.78	DC	4.65
7426102	235204	01KITTAN	AP	235139	01AL&D6T	AP	1	ATSI-P1-2-CEI-345-700T	single	151.0	101.16	103.46	DC	3.48
7426103	235204	01KITTAN	AP	235139	01AL&D6T	AP	1	PN-P1-2-PN-345-107T	single	151.0	101.16	103.46	DC	3.48
7425702	235240	01COLMBGN	AP	235202	01KISKIV	AP	1	PN-P1-2-PN-345-107T	single	151.0	126.86	129.64	DC	4.19
7425703	235240	01COLMBGN	AP	235202	01KISKIV	AP	1	ATSI-P1-2-CEI-345-700T	single	151.0	126.86	129.64	DC	4.19
7425627	235282	01GAR RN	AP	235240	01COLMBGN	AP	1	ATSI-P1-2-CEI-345-700T	single	151.0	135.07	137.85	DC	4.19
7425628	235282	01GAR RN	AP	235240	01COLMBGN	AP	1	PN-P1-2-PN-345-107T	single	151.0	135.07	137.85	DC	4.19
7425196	941190	AE2-113 TAP	PENELEC	200668	26FARM VLY	PENELEC	1	PN-P2-3-PN-230-8M_SUM_WIN	breaker	160.0	104.72	106.54	DC	6.47

17 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
7425802	200599	26ERIE W	PENELEC	238547	02AT	ATSI	1	Base Case	operation	1560.0	122.21	122.75	DC	18.86
7425804	200599	26ERIE W	PENELEC	238547	02AT	ATSI	1	235104 01CABOT 500 239280 02CRNBRY 500 1	operation	1900.0	109.38	109.84	DC	19.85
7425648	235197	01KARNSC	AP	235152	01BUTLER	AP	1	PN-P1-2- PN-345- 107T	operation	179.0	98.36	104.36	DC	10.72
7425649	235197	01KARNSC	AP	235152	01BUTLER	AP	1	ATSI-P1-2- CEI-345- 700T	operation	179.0	98.36	104.36	DC	10.72
8982250	238547	02AT	ATSI	239036	02PERRY	ATSI	1	Base Case	operation	1534.0	100.58	101.06	DC	16.4

18 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
7425627,7425628	7	01GAR RN 138.0 kV - 01COLMBGPN 138.0 kV Ckt 1	WP-0006 (177) : Reconductor 4/0 Cu Line Project Type : FAC Cost : \$20,150,000 Time Estimate : 22.0 Months	\$20,150,000
7425200	1	26WARREN 230.0 kV - 26ERIE S TIE 230.0 kV Ckt 1	PN-0012 (800) : Upgrade 1033 ASCR bus conductor at Glade and Warren substations Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months	\$130,000
7425196	8	AE2-113 TAP 115.0 kV - 26FARM VLY 115.0 kV Ckt 1	PN-0007 (793) : Reconductor line with high temperature conductor (5.55 miles - 336 ACSS; 6.79 miles 636 ACSS). Project Type : FAC Cost : \$22,100,000 Time Estimate : 20.0 Months	\$22,100,000
7426031,7426032	4	01KISSNG 138.0 kV - 01KARNSC 138.0 kV Ckt 1	WP-0008 (183) : Replace 556 Line Conductor Project Type : FAC Cost : \$13,000,000 Time Estimate : 9.0 Months	\$13,000,000
7426103,7426102	5	01KITTAN 138.0 kV - 01AL&D6T 138.0 kV Ckt 1	WP-0009 (184) : Reconductor 4/0 Cu Line Project Type : FAC Cost : \$15,600,000 Time Estimate : 20.0 Months WP-0009a (185) : Replace line drops into All Dam 6 Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months	\$15,730,000
7425955,7425954	2	01AL&D6T 138.0 kV - 01AL 4J 138.0 kV Ckt 1	WP-0001 (169) : Reconductor 7.3 miles of 4/0 Cu Line Conductor Project Type : FAC Cost : \$13,000,000 Time Estimate : 20.0 Months WP-0001a (170) : Replace 4/0 Line Exit Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months	\$13,130,000

ID	Index	Facility	Upgrade Description	Cost
7425647,7425646,7425650	3	01KARNSC 138.0 kV - 01BUTLER 138.0 kV Ckt 1	<p>WP-0007 (178) : Reconductor 336 ACSR Line Project Type : FAC Cost : \$26,000,000 Time Estimate : 30.0 Months</p> <p>WP-0007a (179) : Replace line and bus side disconnect switches at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>WP-0007b (180) : Replace Bus Side Disconnect Switches at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>WP-0007c (181) : Replace Wavetrap at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>WP-0007d (182) : Replace Wavetrap Leads at Butler Project Type : FAC Cost : \$130,000 Time Estimate : 9.0 Months</p> <p>b3083 (250) : Replace substation conductor at Butler (138 kV) Replace substation conductor and line trap at Karns City (138 kV). The baseline project has an projected in-service date of 06/01/2021. Project Type : FAC Cost : \$0 Time Estimate : N/A Months</p>	\$26,520,000
7425702,7425703	6	01COLMBGPN 138.0 kV - 01KISKIV 138.0 kV Ckt 1	<p>WP-0004 (174) : Reconductor 4/0 Cu Line Project Type : FAC Cost : \$7,800,000 Time Estimate : 18.0 Months</p> <p>WP-0004a (175) : Replace KD-4 Project Type : FAC Cost : \$325,000 Time Estimate : 12.0 Months</p> <p>WP-0004b (176) : Replace KD-41 Line Relays Project Type : FAC Cost : \$325,000 Time Estimate : 12.0 Months</p>	\$8,450,000
			TOTAL COST	\$119,210,000

19 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.

19.1 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
7425200	200811	26WARREN	PENELEC	200918	26ERIE S TIE	PENELEC	1	PN-P2-3-PN-345-003A	breaker	621.0	105.46	106.04	DC	7.93

Bus #	Bus	MW Impact
200642	26SENECA#1	7.63
200643	26SENECA#2	8.12
200644	26SENECA#3	0.61
200649	26PENNTech	0.71
200894	26K02	2.99
201201	26WRREN CT	2.23
236828	01GRAYMONT	0.29
290086	Q-036 E	2.39
914101	Y2-055	9.33
915952	Y3-092 FTWR	51.58
915953	Y3-092 NFTWR	51.58
916202	Z1-069 E	4.25
919491	AA2-000	35.13
923821	AB2-019	2.89
925512	AC1-025 E	0.11
930411	AB1-082	2.08
930511	AB1-092	1.29
931092	AB1-160 E	1.22
932571	AC2-077	1.46
936421	AD2-055	2.66
936991	AD2-133 C	1.08
936992	AD2-133 E	4.92
939171	AE1-147 C	0.89
939172	AE1-147 E	0.59
940201	AE2-001 C	0.89
940202	AE2-001 E	0.59
940681	AE2-055 C	0.85
940682	AE2-055 E	0.56
940861	AE2-074 C O1	1.58
940862	AE2-074 E O1	2.08
941191	AE2-113 C O1	8.24
941192	AE2-113 E O1	8.87
941251	AE2-119 C	1.02
941252	AE2-119 E	0.68
941261	AE2-120 C	0.88
941262	AE2-120 E	0.59
941271	AE2-121 C	0.47
941272	AE2-121 E	0.32
941321	AE2-126 C	1.31
941322	AE2-126 E	0.88

Bus #	Bus	MW Impact
941331	AE2-129 C	0.86
941332	AE2-129 E	0.57
941351	AE2-131 C	0.86
941352	AE2-131 E	0.57
941491	AE2-146 C	6.58
941492	AE2-146 E	9.28
942351	AE2-248 C	0.69
942352	AE2-248 E	0.46
942491	AE2-262 C	4.23
942492	AE2-262 E	2.84
942501	AE2-263 C	3.98
942502	AE2-263 E	2.66
942813	AE2-299 BAT	17.61
942961	AE2-316 C	3.27
942962	AE2-316 E	4.66
BLUEG	BLUEG	5.17
CALDERWOOD	CALDERWOOD	0.45
CANNELTON	CANNELTON	0.31
CATAWBA	CATAWBA	0.24
CBM-N	CBM-N	1.01
CHEOAH	CHEOAH	0.41
CHILHOWEE	CHILHOWEE	0.15
COFFEEN	COFFEEN	0.55
COTTONWOOD	COTTONWOOD	1.91
DUCKCREEK	DUCKCREEK	1.24
EDWARDS	EDWARDS	0.57
ELMERSMITH	ELMERSMITH	0.53
FARMERCITY	FARMERCITY	0.36
G-007A	G-007A	2.38
GIBSON	GIBSON	0.22
HAMLET	HAMLET	0.35
NEWTON	NEWTON	1.44
NYISO	NYISO	4.33
PRAIRIE	PRAIRIE	2.61
SANTEETLA	SANTEETLA	0.12
SMITHLAND	SMITHLAND	0.2
TATANKA	TATANKA	0.66
TILTON	TILTON	0.68
TRIMBLE	TRIMBLE	0.57
TVA	TVA	1.55
UNIONPOWER	UNIONPOWER	0.68
VFT	VFT	6.5

19.2 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
7425955	235139	01AL&D6T	AP	235138	01AL 4J	AP	1	ATSI-P1-2-CEI-345-700T	single	151.0	109.76	112.07	DC	3.47

Bus #	Bus	MW Impact
200608	26PINEY #1	0.32
200642	26SENECA#1	1.48
200643	26SENECA#2	1.57
200644	26SENECA#3	0.12
200662	26SCRUB GR	0.78
200828	26HNSMLK 1	0.49
200829	26HNSMLK 2	0.49
200830	26HNSMLK 3	0.49
200831	26HNSMLK 4	0.49
200832	26HNSMLK 5	0.49
200849	26LAKVU GN	0.04
201201	26WRREN CT	0.38
235030	01MHNG-T155	0.13
235134	01AL&D6	0.75
903643	W3-099 C OP1	0.75
914101	Y2-055	1.59
915951	Y3-092 FTIR	62.98
935191	AD1-154	1.25
938951	AE1-123	1.46
939291	AE1-160 C	0.91
939381	AE1-169 C O1	3.72
942811	AE2-299 C	1.83
942961	AE2-316 C	3.47
943151	AE2-344 C O1	4.43
BLUEG	BLUEG	2.55
CALDERWOOD	CALDERWOOD	0.24
CANNELTON	CANNELTON	0.15
CATAWBA	CATAWBA	0.14
CBM-N	CBM-N	1.32
CHEOAH	CHEOAH	0.22
CHILHOWEE	CHILHOWEE	0.08
COFFEEN	COFFEEN	0.27
COTTONWOOD	COTTONWOOD	0.98
DUCKCREEK	DUCKCREEK	0.59
EDWARDS	EDWARDS	0.27
ELMERSMITH	ELMERSMITH	0.26
FARMERCITY	FARMERCITY	0.17
G-007A	G-007A	1.47
GIBSON	GIBSON	0.11
HAMLET	HAMLET	0.21

Bus #	Bus	MW Impact
NEWTON	NEWTON	0.7
NYISO	NYISO	5.74
PRAIRIE	PRAIRIE	1.28
SANTEETLA	SANTEETLA	0.07
SMITHLAND	SMITHLAND	0.1
TATANKA	TATANKA	0.32
TILTON	TILTON	0.32
TRIMBLE	TRIMBLE	0.28
TVA	TVA	0.81
UNIONPOWER	UNIONPOWER	0.36
VFT	VFT	4.07

19.3 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
7425647	235197	01KARNSC	AP	235152	01BUTLER	AP	1	ATSI-P1-2-CEI-345-700T	single	179.0	132.4	134.88	DC	4.42

Bus #	Bus	MW Impact
200608	26PINEY #1	0.63
200642	26SENECA#1	2.06
200643	26SENECA#2	2.2
200644	26SENECA#3	0.17
200662	26SCRUB GR	1.32
200805	26COLVER13	7.31
200828	26HNSMLK 1	0.62
200829	26HNSMLK 2	0.62
200830	26HNSMLK 3	0.62
200831	26HNSMLK 4	0.62
200832	26HNSMLK 5	0.62
200849	26LAKVU GN	0.05
201201	26WRREN CT	0.53
235030	01MHNG-T155	0.14
903643	W3-099 C OP1	1.03
914101	Y2-055	2.21
915951	Y3-092 FTIR	85.82
919491	AA2-000	26.52
930411	AB1-082	1.22
930511	AB1-092	0.97
932571	AC2-077	1.12
935191	AD1-154	2.38
936421	AD2-055	2.0
936991	AD2-133 C	0.92
938951	AE1-123	2.87
939171	AE1-147 C	0.62
939291	AE1-160 C	1.54
939381	AE1-169 C O1	6.35
940201	AE2-001 C	0.62
940861	AE2-074 C O1	0.93
941191	AE2-113 C O1	4.25
941251	AE2-119 C	0.75
941261	AE2-120 C	0.62
941271	AE2-121 C	0.33
941321	AE2-126 C	0.8
941331	AE2-129 C	0.67
941351	AE2-131 C	0.67
941491	AE2-146 C	4.43
942351	AE2-248 C	0.48
942491	AE2-262 C	2.91

Bus #	Bus	MW Impact
942501	AE2-263 C	2.74
942811	AE2-299 C	2.52
942961	AE2-316 C	4.42
943151	AE2-344 C O1	6.23
BLUEG	BLUEG	3.44
CALDERWOOD	CALDERWOOD	0.32
CANNELTON	CANNELTON	0.21
CATAWBA	CATAWBA	0.18
CBM-N	CBM-N	1.7
CHEOAH	CHEOAH	0.29
CHILHOWEE	CHILHOWEE	0.11
COFFEEN	COFFEEN	0.36
COTTONWOOD	COTTONWOOD	1.31
DUCKCREEK	DUCKCREEK	0.8
EDWARDS	EDWARDS	0.37
ELMERSMITH	ELMERSMITH	0.35
FARMERCITY	FARMERCITY	0.24
G-007A	G-007A	1.67
GIBSON	GIBSON	0.14
HAMLET	HAMLET	0.27
NEWTON	NEWTON	0.94
NYISO	NYISO	7.42
PRAIRIE	PRAIRIE	1.73
SANTEETLA	SANTEETLA	0.09
SMITHLAND	SMITHLAND	0.13
TATANKA	TATANKA	0.43
TILTON	TILTON	0.44
TRIMBLE	TRIMBLE	0.38
TVA	TVA	1.08
UNIONPOWER	UNIONPOWER	0.47
VFT	VFT	4.64

19.4 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
7426032	235203	01KISSNG	AP	235197	01KARNSC	AP	1	PN-P1-2-PN-345-107T	single	268.0	106.04	107.78	DC	4.65

Bus #	Bus	MW Impact
200608	26PINEY #1	0.66
200642	26SENECA#1	2.17
200643	26SENECA#2	2.32
200644	26SENECA#3	0.17
200662	26SCRUB GR	1.39
200805	26COLVER13	7.71
200828	26HNSMLK 1	0.65
200829	26HNSMLK 2	0.65
200830	26HNSMLK 3	0.65
200831	26HNSMLK 4	0.65
200832	26HNSMLK 5	0.65
200849	26LAKVU GN	0.05
201201	26WRREN CT	0.56
903643	W3-099 C OP1	1.09
914101	Y2-055	2.33
915951	Y3-092 FTIR	90.39
919491	AA2-000	27.96
930411	AB1-082	1.29
930511	AB1-092	1.03
932571	AC2-077	1.18
935191	AD1-154	2.51
936421	AD2-055	2.11
936991	AD2-133 C	0.97
938951	AE1-123	3.02
939171	AE1-147 C	0.65
939291	AE1-160 C	1.62
939381	AE1-169 C O1	6.69
940201	AE2-001 C	0.65
940681	AE2-055 C	0.63
940861	AE2-074 C O1	0.98
941191	AE2-113 C O1	4.48
941251	AE2-119 C	0.79
941261	AE2-120 C	0.65
941271	AE2-121 C	0.35
941321	AE2-126 C	0.84
941331	AE2-129 C	0.71
941351	AE2-131 C	0.71
941491	AE2-146 C	4.67
942351	AE2-248 C	0.51
942491	AE2-262 C	3.07

Bus #	Bus	MW Impact
942501	AE2-263 C	2.89
942811	AE2-299 C	2.66
942961	AE2-316 C	4.65
943151	AE2-344 C O1	6.56
BLUEG	BLUEG	3.7
CALDERWOOD	CALDERWOOD	0.35
CANNELTON	CANNELTON	0.22
CATAWBA	CATAWBA	0.19
CBM-N	CBM-N	1.8
CHEOAH	CHEOAH	0.32
CHILHOWEE	CHILHOWEE	0.11
COFFEEN	COFFEEN	0.39
COTTONWOOD	COTTONWOOD	1.41
DUCKCREEK	DUCKCREEK	0.86
EDWARDS	EDWARDS	0.39
ELMERSMITH	ELMERSMITH	0.38
FARMERCITY	FARMERCITY	0.25
G-007A	G-007A	1.8
GIBSON	GIBSON	0.15
HAMLET	HAMLET	0.29
NEWTON	NEWTON	1.01
NYISO	NYISO	7.87
PRAIRIE	PRAIRIE	1.85
SANTEETLA	SANTEETLA	0.09
SMITHLAND	SMITHLAND	0.14
TATANKA	TATANKA	0.46
TILTON	TILTON	0.47
TRIMBLE	TRIMBLE	0.41
TVA	TVA	1.16
UNIONPOWER	UNIONPOWER	0.51
VFT	VFT	5.0

19.5 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
7426103	235204	01KITTAN	AP	235139	01AL&D6T	AP	1	PN-P1-2-PN-345-107T	single	151.0	101.16	103.46	DC	3.48

Bus #	Bus	MW Impact
200608	26PINEY #1	0.32
200642	26SENECA#1	1.48
200643	26SENECA#2	1.58
200644	26SENECA#3	0.12
200662	26SCRUB GR	0.78
200828	26HNSMLK 1	0.49
200829	26HNSMLK 2	0.49
200830	26HNSMLK 3	0.49
200831	26HNSMLK 4	0.49
200832	26HNSMLK 5	0.49
200849	26LAKVU GN	0.04
201201	26WRREN CT	0.38
235030	01MHNG-T155	0.13
903643	W3-099 C OP1	0.75
914101	Y2-055	1.59
915951	Y3-092 FTIR	63.05
935191	AD1-154	1.25
938951	AE1-123	1.46
939291	AE1-160 C	0.91
939381	AE1-169 C O1	3.72
942811	AE2-299 C	1.83
942961	AE2-316 C	3.48
943151	AE2-344 C O1	4.43
BLUEG	BLUEG	2.51
CALDERWOOD	CALDERWOOD	0.24
CANNELTON	CANNELTON	0.15
CATAWBA	CATAWBA	0.14
CBM-N	CBM-N	1.32
CHEOAH	CHEOAH	0.22
CHILHOWEE	CHILHOWEE	0.08
COFFEEN	COFFEEN	0.26
COTTONWOOD	COTTONWOOD	0.97
DUCKCREEK	DUCKCREEK	0.58
EDWARDS	EDWARDS	0.26
ELMERSMITH	ELMERSMITH	0.26
FARMERCITY	FARMERCITY	0.17
G-007A	G-007A	1.49
GIBSON	GIBSON	0.1
HAMLET	HAMLET	0.21
NEWTON	NEWTON	0.69

Bus #	Bus	MW Impact
NYISO	NYISO	5.77
PRAIRIE	PRAIRIE	1.26
SANTEETLA	SANTEETLA	0.06
SMITHLAND	SMITHLAND	0.1
TATANKA	TATANKA	0.31
TILTON	TILTON	0.32
TRIMBLE	TRIMBLE	0.28
TVA	TVA	0.8
UNIONPOWER	UNIONPOWER	0.35
VFT	VFT	4.12

19.6 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
7425703	235240	01COLMBGPN	AP	235202	01KISKIV	AP	1	ATSI-P1-2-CEI-345-700T	single	151.0	126.86	129.64	DC	4.19

Bus #	Bus	MW Impact
200608	26PINEY #1	0.38
200642	26SENECA#1	1.73
200643	26SENECA#2	1.84
200644	26SENECA#3	0.14
200662	26SCRUB GR	0.92
200828	26HNSMLK 1	0.58
200829	26HNSMLK 2	0.58
200830	26HNSMLK 3	0.58
200831	26HNSMLK 4	0.58
200832	26HNSMLK 5	0.58
200849	26LAKVU GN	0.04
201201	26WRREN CT	0.45
235030	01MHNG-T155	0.15
235134	01AL&D6	0.27
903643	W3-099 C OP1	0.88
914101	Y2-055	1.86
915951	Y3-092 FTIR	74.81
930411	AB1-082	1.04
935191	AD1-154	1.43
938951	AE1-123	1.74
939291	AE1-160 C	1.09
939381	AE1-169 C O1	4.42
940861	AE2-074 C O1	0.79
941191	AE2-113 C O1	3.53
941321	AE2-126 C	0.63
942811	AE2-299 C	2.16
942961	AE2-316 C	4.19
943151	AE2-344 C O1	5.25
BLUEG	BLUEG	2.71
CALDERWOOD	CALDERWOOD	0.26
CANNELTON	CANNELTON	0.16
CATAWBA	CATAWBA	0.15
CBM-N	CBM-N	1.46
CHEOAH	CHEOAH	0.24
CHILHOWEE	CHILHOWEE	0.09
COFFEEN	COFFEEN	0.28
COTTONWOOD	COTTONWOOD	1.05
DUCKCREEK	DUCKCREEK	0.62
EDWARDS	EDWARDS	0.28
ELMERSMITH	ELMERSMITH	0.28

Bus #	Bus	MW Impact
FARMERCITY	FARMERCITY	0.18
G-007A	G-007A	1.44
GIBSON	GIBSON	0.11
HAMLET	HAMLET	0.23
NEWTON	NEWTON	0.74
NYISO	NYISO	6.37
PRAIRIE	PRAIRIE	1.36
SANTEETLA	SANTEETLA	0.07
SMITHLAND	SMITHLAND	0.11
TATANKA	TATANKA	0.34
TILTON	TILTON	0.34
TRIMBLE	TRIMBLE	0.3
TVA	TVA	0.86
UNIONPOWER	UNIONPOWER	0.38
VFT	VFT	3.99

19.7 Index 7

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
7425628	235282	01GAR RN	AP	235240	01COLMBGPN	AP	1	PN-P1-2-PN-345-107T	single	151.0	135.07	137.85	DC	4.19

Bus #	Bus	MW Impact
200608	26PINEY #1	0.38
200642	26SENECA#1	1.73
200643	26SENECA#2	1.84
200644	26SENECA#3	0.14
200662	26SCRUB GR	0.92
200828	26HNSMLK 1	0.58
200829	26HNSMLK 2	0.58
200830	26HNSMLK 3	0.58
200831	26HNSMLK 4	0.58
200832	26HNSMLK 5	0.58
200849	26LAKVU GN	0.04
201201	26WRREN CT	0.45
235030	01MHNG-T155	0.15
235134	01AL&D6	0.27
903643	W3-099 C OP1	0.88
914101	Y2-055	1.86
915951	Y3-092 FTIR	74.81
930411	AB1-082	1.04
935191	AD1-154	1.43
938951	AE1-123	1.74
939291	AE1-160 C	1.09
939381	AE1-169 C O1	4.42
940861	AE2-074 C O1	0.79
941191	AE2-113 C O1	3.53
941321	AE2-126 C	0.63
942811	AE2-299 C	2.16
942961	AE2-316 C	4.19
943151	AE2-344 C O1	5.25
BLUEG	BLUEG	2.71
CALDERWOOD	CALDERWOOD	0.26
CANNELTON	CANNELTON	0.16
CATAWBA	CATAWBA	0.15
CBM-N	CBM-N	1.46
CHEOAH	CHEOAH	0.24
CHILHOWEE	CHILHOWEE	0.09
COFFEEN	COFFEEN	0.28
COTTONWOOD	COTTONWOOD	1.05
DUCKCREEK	DUCKCREEK	0.62
EDWARDS	EDWARDS	0.28
ELMERSMITH	ELMERSMITH	0.28

Bus #	Bus	MW Impact
FARMERCITY	FARMERCITY	0.18
G-007A	G-007A	1.44
GIBSON	GIBSON	0.11
HAMLET	HAMLET	0.23
NEWTON	NEWTON	0.74
NYISO	NYISO	6.37
PRAIRIE	PRAIRIE	1.36
SANTEETLA	SANTEETLA	0.07
SMITHLAND	SMITHLAND	0.11
TATANKA	TATANKA	0.34
TILTON	TILTON	0.34
TRIMBLE	TRIMBLE	0.3
TVA	TVA	0.86
UNIONPOWER	UNIONPOWER	0.38
VFT	VFT	3.99

19.8 Index 8

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
7425196	941190	AE2-113 TAP	PENELEC	200668	26FARM VLY	PENELEC	1	PN-P2-3-PN-230-8M_SUM_WIN	breaker	160.0	104.72	106.54	DC	6.47

Bus #	Bus	MW Impact
200649	26PENNTech	1.29
236828	01GRAYMONT	0.26
290086	Q-036 E	2.13
919491	AA2-000	27.18
925512	AC1-025 E	0.09
930511	AB1-092	1.0
936421	AD2-055	2.05
936991	AD2-133 C	0.96
936992	AD2-133 E	4.37
939171	AE1-147 C	0.77
939172	AE1-147 E	0.52
940201	AE2-001 C	0.77
940202	AE2-001 E	0.51
940681	AE2-055 C	0.73
940682	AE2-055 E	0.49
941191	AE2-113 C O1	35.95
941192	AE2-113 E O1	38.71
941251	AE2-119 C	1.08
941252	AE2-119 E	0.72
941261	AE2-120 C	0.77
941262	AE2-120 E	0.51
941271	AE2-121 C	0.41
941272	AE2-121 E	0.28
941321	AE2-126 C	1.96
941322	AE2-126 E	1.31
941331	AE2-129 C	0.84
941332	AE2-129 E	0.56
941351	AE2-131 C	0.84
941352	AE2-131 E	0.56
942351	AE2-248 C	0.6
942352	AE2-248 E	0.4
942491	AE2-262 C	3.74
942492	AE2-262 E	2.51
942501	AE2-263 C	3.52
942502	AE2-263 E	2.35
942961	AE2-316 C	2.67
942962	AE2-316 E	3.81
BLUEG	BLUEG	0.96
CALDERWOOD	CALDERWOOD	0.08
CANNELTON	CANNELTON	0.06
CARR	CARR	0.27

Bus #	Bus	MW Impact
CATAWBA	CATAWBA	0.04
CHEOAH	CHEOAH	0.07
CHILHOWEE	CHILHOWEE	0.03
COFFEEN	COFFEEN	0.1
COTTONWOOD	COTTONWOOD	0.35
DUCKCREEK	DUCKCREEK	0.23
EDWARDS	EDWARDS	0.11
ELMERSMITH	ELMERSMITH	0.1
FARMERCITY	FARMERCITY	0.07
G-007A	G-007A	0.58
GIBSON	GIBSON	0.04
HAMLET	HAMLET	0.06
NEWTON	NEWTON	0.27
PRAIRIE	PRAIRIE	0.48
RENSELAER	RENSELAER	0.2
SANTEETLA	SANTEETLA	0.02
SMITHLAND	SMITHLAND	0.04
TATANKA	TATANKA	0.12
TILTON	TILTON	0.13
TRIMBLE	TRIMBLE	0.11
TVA	TVA	0.28
UNIONPOWER	UNIONPOWER	0.12
VFT	VFT	1.55

Affected Systems

20 Affected Systems

20.1 LG&E

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

20.2 MISO

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

20.3 TVA

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

20.4 Duke Energy Progress

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

20.5 NYISO

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

21 Contingency Descriptions

Contingency Name	Contingency Definition
PN-P2-3-PN-345-003A	CONTINGENCY 'PN-P2-3-PN-345-003A' /* WAYNE 345KV STUCK BREAKER DISCONNECT BUS 200595 /* 26WAYNE 345 END
PN-P2-3-PN-230-8M_SUM_WIN	CONTINGENCY 'PN-P2-3-PN-230-8M_SUM_WIN' /* GLADE STUCK BREAKER B42 (FOREST/SENECA) DISCONNECT BRANCH FROM BUS 200581 TO BUS 200593 CKT 1 /* 26FOREST 230 26GLADE 230 DISCONNECT BRANCH FROM BUS 200593 TO BUS 200594 CKT 1 /* 26GLADE 230 26SENECA 230 DISCONNECT BRANCH FROM BUS 200594 TO BUS 200642 CKT 1 /* 26SENECA 230 26SENECA#1 14 DISCONNECT BRANCH FROM BUS 200594 TO BUS 200643 CKT 1 /* 26SENECA 230 26SENECA#2 14 DISCONNECT BRANCH FROM BUS 200594 TO BUS 200644 CKT 1 /* 26SENECA 230 26SENECA#3 14 REMOVE MACHINE 1G FROM BUS 200642 /* 26SENECA#1 14 REMOVE MACHINE 2G FROM BUS 200643 /* 26SENECA#2 14 REMOVE MACHINE 3 FROM BUS 200644 /* 26SENECA#3 14 END
ATSI-P1-2-CEI-345-700T	CONTINGENCY 'ATSI-P1-2-CEI-345-700T' /* PN/ATSI ERIE WEST - ASHTABULA - PERRY 345KV DISCONNECT BRANCH FROM BUS 239036 TO BUS 238547 CKT 1 /* 02PERRY 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BRANCH FROM BUS 239082 TO BUS 238544 CKT 8 /* 02S8-ATT 345 02ASH_3 138 DISCONNECT BRANCH FROM BUS 238547 TO BUS 200599 CKT 1 /* 02AT 345 26ERIE W 345 END
235104 01CABOT 500 239280 02CRNBRY 500 1	CONTINGENCY '235104 01CABOT 500 239280 02CRNBRY 500 1' / 8388 OPEN BRANCH FROM BUS 235104 TO BUS 239280 CKT 1 / 235104 01CABOT 500 239280 02CRNBRY 500 1 END
PJM_P1_APS_B_G692	CONTINGENCY 'PJM_P1_APS_B_G692' / 200011 KEYSTONE 500 235104 01CABOT 500 1 OPEN BRANCH FROM BUS 200011 TO BUS 235104 CKT 1 END
Base Case	
PN-P1-2-PN-345-107T	CONTINGENCY 'PN-P1-2-PN-345-107T' /* ERIE WEST - ASHTABULA - PERRY 345KV DISCONNECT BRANCH FROM BUS 200599 TO BUS 238547 CKT 1 /* 26ERIE W 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239036 CKT 1 /* 02AT 345 02PERRY 345 DISCONNECT BUS 238547 /* 02AT 345 END

Short Circuit

22 Short Circuit

The following Breakers are overduty:

None

23 Attachment 1 – One Line

24 Attachment 2 – Project Location