Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-216

BLUE JACKET-KIRBY 138 KV

90 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 ATSI.

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 a Solar generating facility located in Union County, Ohio. The installed facilities will have a total capability of 150 MW with 90 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is August 30, 2024. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-216
Project Name	BLUE JACKET-KIRBY 138 KV
State	Ohio
County	Union
Transmission Owner	ATSI
MFO	150
MWE	150
MWC	90
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

AF2-216 will interconnect with the ATSI transmission system. The interconnection of the project at the Primary POI will be accomplished by constructing a new 138 kV three (3) breaker ring bus substation and looping the Kirby (ATSI)-Blue Jacket (Dayton) 138 kV line into the new station. The new substation will be located approximately 5.1 miles from Kirby 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. The project will also require non-direct connection upgrades at Kirby and Blue Jacket substations.

5 Cost Summary

The AF2-216 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$285,000
Direct Connection Network Upgrade	$5,375,000
Non Direct Connection Network Upgrades (ATSI)	$1,760,000
Total Costs (ATSI)	$7,420,000

In addition, the AF2-216 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	$28,400,000

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 AF2-216 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.

6 Transmission Owner Scope of Work

AF2-216 will interconnect with the ATSI transmission system. The interconnection of the project at the Primary POI will be accomplished by constructing a new 138 kV three (3) breaker ring bus substation and looping the Kirby -Blue Jacket 138 kV line into the new station. The new substation will be located approximately 5.1 miles from Kirby 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. The project will also require non-direct connection upgrades at Kirby and Blue Jacket substations.

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 disconnect switch, dead-end structure, and associated facilities for generator lead line exit at interconnection substation.	$285,000
Total Attachment Facility Costs	**$285,000**

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 138 kV three breaker ring bus interconnection substation.	$5,375,000
Total Direct Connection Facility Costs	**$5,375,000**

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
Loop the Kirby - Blue Jacket 138 kV line into the new substation.	$880,000
Upgrade relaying at Kirby	$440,000
Upgrade relaying at Blue Jacket (Dayton)	$440,000
Total Non-Direct Connection Facility Costs	**$1,760,000**

7 Schedule

Based on the scope of work for the Attachment Facilities and the Direct and/or Non-Direct Connection facilities, it is expected to take a minimum of 24 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.

8 Transmission Owner Analysis

Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AF2-216 project did not contribute to any overloads on the FE Transmission System.

PJM performed a power flow analysis of the transmission system using a 2023 summer peak load flow model and the results were verified by Dayton. Additionally, Dayton performed an analysis of its underlying transmission <100 kV system. The following issues were found to be existing in the Dayton transmission system. This project does not currently have a financial responsibility towards these upgrades, but may get an allocation based on projects withdrawing from the queue. Allocations to upgrades are determined in the System Impact phase. The upgrades may need to be completed prior to initial operation of this facility.

Facility	Contingency Description	Existing Upgrade	Cost
253181 09NHOLLN 69 kV - 253201 09ROBINS 69 kV Ckt 1	Adkins – Beatty 345 kV	PJM Network Upgrade, N5456: From AC1-166, replace wave trap with 2000A wave trap. Project Cost: $56,000 Time Estimate: 20 weeks	$56,000
253099 09ATLNTA 69 kV - 253100 09ATLNTA 345 kV Ckt 1	Atlanta – New Holland 69 kV Robinson – New Holland 69 kV	Reinforcement Project, r190012: Add a second 250 MVA 345/69kV transformer. Project Cost: $5,000,000 Time Estimate: 24 months	$5,000,000
		TOTAL COST	

Note: Only the most severely overloaded conditions are listed above.

At the Primary POI, the AF2-216 project does not contribute to new overloads in the Dayton transmission system.

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 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.

9.2 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 AF2-216 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 AF2-216 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.

9.3 Power Factor Requirements

The IC shall design its 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.

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

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

10.2 Meteorological Data Reporting Requirements

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

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

10.3 Interconnected Transmission Owner 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

11 Summer Peak - Load Flow Analysis - Primary POI

The Queue Project AF2-216 was evaluated as a 150.0 MW (Capacity 90.0 MW) injection tapping the Kirby to Blue Jacket 138 kV line in the ATSI area. Project AF2-216 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-216 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
10064112 3	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	DAY-P1-2-OES-138-936T-A	single	179.0	81.15	109.66	DC	51.03
10064112 4	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	253101 09BLUJK 138 938700 AE1-092 TAP 138 1	single	179.0	81.15	109.66	DC	51.03
10064112 5	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	DAY_P1_OUTAGE_49A	single	179.0	78.81	107.32	DC	51.03

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)

None

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
10064111 8	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	DAY-P1-2-OES-138-936T-A	operation	179.0	126.35	173.87	DC	85.05
10064111 9	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	253101 09BLUJK 138 938700 AE1-092 TAP 138 1	operation	179.0	126.35	173.87	DC	85.05

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
100641121	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	Base Case	operation	152.0	109.73	155.73	DC	69.93
98784524	938700	AE1-092 TAP	138.0	ATSI	253101	09BLUJK	138.0	DAY	1	DAY-P1-2-OES-138-936T-B	operation	269.0	103.75	159.52	DC	150.0
100641165	959250	AF2-216 TAP	138.0	ATSI	238861	02KIRBY	138.0	ATSI	1	DAY-P1-2-OES-138-936T-A	operation	269.0	103.75	159.52	DC	150.0
100641166	959250	AF2-216 TAP	138.0	ATSI	238861	02KIRBY	138.0	ATSI	1	253101 09BLUJK 138 938700 AE1-092 TAP 138 1	operation	269.0	103.75	159.52	DC	150.0
100641168	959250	AF2-216 TAP	138.0	ATSI	238861	02KIRBY	138.0	ATSI	1	Base Case	operation	218.0	83.23	139.65	DC	122.99

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
100641123,100641124,100641125	1	02KIRBY 138.0 kV - 02CRISS 138.0 kV Ckt 1	**ATSI** **OES-005A (807) : Reconductor approx. 11.3 mi from Kirby to Crissinger with 556.5 ACSR or better** **Project Type : FAC** **Cost : $28,400,000** **Time Estimate : 48.0 Months**	$28,400,000
			TOTAL COST	**$28,400,000**

11.6 Flow Gate Details - Primary POI

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
100641124	238861	02KIRBY	ATSI	238640	02CRISS	ATSI	1	253101 09BLUJK 138 938700 AE1-092 TAP 138 1	single	179.0	81.15	109.66	DC	51.03

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
938701	AE1-092 C	54.6617	80/20	54.6617
946051	AF1-270	28.3515	80/20	28.3515
959251	AF2-216 C O1	51.0327	80/20	51.0327
960781	AF2-369 C O1	34.0218	80/20	34.0218
WEC	WEC	0.0369	Confirmed LTF	0.0369
LGEE	LGEE	0.1466	Confirmed LTF	0.1466
CPLE	CPLE	0.0873	Confirmed LTF	0.0873
CBM-W2	CBM-W2	1.4496	Confirmed LTF	1.4496
NY	NY	0.0525	Confirmed LTF	0.0525
TVA	TVA	0.2632	Confirmed LTF	0.2632
CBM-S2	CBM-S2	0.8786	Confirmed LTF	0.8786
CBM-S1	CBM-S1	1.7125	Confirmed LTF	1.7125
MEC	MEC	0.2225	Confirmed LTF	0.2225

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
AE1-092	Blue Jacket-Kirby 138 kV	Active
AF1-270	Blue Jacket-Kirby 138 kV	Active
AF2-216	Blue Jacket-Kirby 138 kV	Active
AF2-369	Kirby 138 kV	Active

11.8 Contingency Descriptions - Primary POI

Contingency Name	Contingency Definition
DAY_P1_OUTAGE_49A	CONTINGENCY 'DAY_P1_OUTAGE_49A' DISCONNECT BRANCH FROM BUS 253101 TO BUS 253009 CKT 1 DECREASE BUS 253009 SHUNT BY 100 PERCENT END
Base Case	
253101 09BLUJK 138 938700 AE1-092 TAP 138 1	CONTINGENCY '253101 09BLUJK 138 938700 AE1-092 TAP 138 1' OPEN BRANCH FROM BUS 253101 TO BUS 938700 CKT 1 END
DAY-P1-2-OES-138-936T-A	CONTINGENCY 'DAY-P1-2-OES-138-936T-A' /* BLUE JACKET-KIRBY 138KV LINE OUTAGE DISCONNECT BRANCH FROM BUS 253101 TO BUS 938700 CKT 1 /* 09BLUJK 138 AE1-092 TAP 138 DISCONNECT BUS 253101 /* 09BLUJK 138 END
DAY-P1-2-OES-138-936T-B	CONTINGENCY 'DAY-P1-2-OES-138-936T-B' /* BLUE JACKET-KIRBY 138KV LINE OUTAGE DISCONNECT BRANCH FROM BUS 959250 TO BUS 238861 CKT 1 /* AE1-092 TAP 138 02KIRBY 138 END

12 Short Circuit Analysis - Primary POI

PJM filed FERC waiver request (ER20-1392-000) which included a “waiver of the short circuit analyses to be performed for and included in the AF2 New Service Queue Interconnection Feasibility Study reports due by July 31, 2020”. This was accepted by the FERC. Short Circuit Analysis will be performed during the SIS phase.

13 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AF2-216 was evaluated as a 150.0 MW (Capacity 90.0 MW) injection at the Kirby 138 kV substation in the ATSI area. Project AF2-216 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-216 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

13.1 Generation Deliverability

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

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
10064112 3	23886 1	02KIRB Y	138. 0	ATSI	23864 0	02CRIS S	138. 0	ATSI	1	DAY-P1-2-OES-138-936T-A	singl e	179.0	81.15	109.66	DC	51.03
10064112 4	23886 1	02KIRB Y	138. 0	ATSI	23864 0	02CRIS S	138. 0	ATSI	1	253101 09BLUJK 138 938700 AE1-092 TAP 138 1	singl e	179.0	81.15	109.66	DC	51.03
10064112 5	23886 1	02KIRB Y	138. 0	ATSI	23864 0	02CRIS S	138. 0	ATSI	1	DAY_P1_OUTAGE_4 9A	singl e	179.0	78.81	107.32	DC	51.03

13.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
98784291	938700	AE1-092 TAP	138.0	ATSI	253101	09BLUJK	138.0	DAY	1	ATSI-P2-3-OES-138-035A	breaker	269.0	84.53	121.95	DC	100.67

13.3 Contribution to Previously Identified Overloads

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

None

13.4 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
10064111 8	23886 1	02KIRBY	138. 0	ATSI	23864 0	02CRISS	138. 0	ATSI	1	DAY-P1-2-OES-138-936T-A	operatio n	179.0	126.35	173.87	DC	85.05

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
100641119	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	25310109BLUJK 138 938700 AE1-092 TAP 138 1	operation	179.0	126.35	173.87	DC	85.05
100641121	238861	02KIRBY	138.0	ATSI	238640	02CRISS	138.0	ATSI	1	Base Case	operation	152.0	109.77	159.13	DC	75.03
100641362	239073	02ROBERT	138.0	ATSI	239308	02MR-ETH	138.0	ATSI	1	ATSI-P1-2-OES-138-009_FSA_B	operation	194.0	83.09	101.67	DC	36.05
151732989	958590	AF2-150 TAP	138.0	ATSI	238746	02GALION	138.0	ATSI	1	Base Case	operation	196.0	95.91	108.58	DC	24.83

13.5 Flow Gate Details - Secondary POI

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

13.5.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
100641124	238861	02KIRBY	ATSI	238640	02CRISS	ATSI	1	253101 09BLUJK 138 938700 AE1-092 TAP 138 1	single	179.0	81.15	109.66	DC	51.03

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
938701	AE1-092 C	54.6617	80/20	54.6617
946051	AF1-270	28.3515	80/20	28.3515
959251	AF2-216 C O2	51.0327	80/20	51.0327
960781	AF2-369 C O2	34.0218	80/20	34.0218
WEC	WEC	0.0369	Confirmed LTF	0.0369
LGEE	LGEE	0.1466	Confirmed LTF	0.1466
CPLE	CPLE	0.0873	Confirmed LTF	0.0873
CBM-W2	CBM-W2	1.4496	Confirmed LTF	1.4496
NY	NY	0.0525	Confirmed LTF	0.0525
TVA	TVA	0.2632	Confirmed LTF	0.2632
CBM-S2	CBM-S2	0.8786	Confirmed LTF	0.8786
CBM-S1	CBM-S1	1.7125	Confirmed LTF	1.7125
MEC	MEC	0.2225	Confirmed LTF	0.2225

13.5.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
98784291	938700	AE1-092 TAP	ATSI	253101	09BLUJK	DAY	1	ATSI-P2-3-OES-138-035A	breaker	269.0	84.53	121.95	DC	100.67

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
938701	AE1-092 C	71.3023	50/50	71.3023
938702	AE1-092 E	98.4474	50/50	98.4474
946051	AF1-270	36.9825	50/50	36.9825
959251	AF2-216 C O2	60.3990	50/50	60.3990
959252	AF2-216 E O2	40.2660	50/50	40.2660
960781	AF2-369 C O2	42.0018	50/50	42.0018
960782	AF2-369 E O2	28.0012	50/50	28.0012
NEWTON	NEWTON	0.0655	Confirmed LTF	0.0655
FARMERCITY	FARMERCITY	0.0029	Confirmed LTF	0.0029
G-007A	G-007A	0.0671	Confirmed LTF	0.0671
VFT	VFT	0.1806	Confirmed LTF	0.1806
CALDERWOOD	CALDERWOOD	0.0149	Confirmed LTF	0.0149
PRAIRIE	PRAIRIE	0.1395	Confirmed LTF	0.1395
CHEOAH	CHEOAH	0.0145	Confirmed LTF	0.0145
EDWARDS	EDWARDS	0.0189	Confirmed LTF	0.0189
TILTON	TILTON	0.0403	Confirmed LTF	0.0403
MADISON	MADISON	0.1875	Confirmed LTF	0.1875
GIBSON	GIBSON	0.0404	Confirmed LTF	0.0404
BLUEG	BLUEG	0.1389	Confirmed LTF	0.1389
TRIMBLE	TRIMBLE	0.0451	Confirmed LTF	0.0451
CATAWBA	CATAWBA	0.0042	Confirmed LTF	0.0042

13.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
253101 09BLUJK 138 938700 AE1-092 TAP 138 1	CONTINGENCY '253101 09BLUJK 138 938700 AE1-092 TAP 138 1' OPEN BRANCH FROM BUS 253101 TO BUS 938700 CKT 1 END
ATSI-P2-3-OES-138-035A	CONTINGENCY 'ATSI-P2-3-OES-138-035A' /* KIRBY B-18 FAILURE TO TRIP DISCONNECT BRANCH FROM BUS 238861 TO BUS 239218 CKT 1 /* 02KIRBY 138 02SSCIOT 138 DISCONNECT BRANCH FROM BUS 239134 TO BUS 239218 CKT 1 /* 02TANGY 138 02SSCIOT 138 DISCONNECT BRANCH FROM BUS 238861 TO BUS 238640 CKT 1 /* 02KIRBY 138 02CRISS 138 END
Base Case	
ATSI-P1-2-OES-138-009_FSA_B	CONTINGENCY 'ATSI-P1-2-OES-138-009_FSA_B' /* GALION - ROBERTS SOUTH 138KV LINE FAULT DISCONNECT BRANCH FROM BUS 238746 TO BUS 958590 CKT 1 /* 02GALION 138 02HAMIL+ 138 END
DAY_P1_OUTAGE_49A	CONTINGENCY 'DAY_P1_OUTAGE_49A' DISCONNECT BRANCH FROM BUS 253101 TO BUS 253009 CKT 1 DECREASE BUS 253009 SHUNT BY 100 PERCENT END
DAY-P1-2-OES-138-936T-A	CONTINGENCY 'DAY-P1-2-OES-138-936T-A' /* BLUE JACKET-KIRBY 138KV LINE OUTAGE DISCONNECT BRANCH FROM BUS 253101 TO BUS 938700 CKT 1 /* 09BLUJK 138 AE1-092 TAP 138 DISCONNECT BUS 253101 /* 09BLUJK 138 END

14 Affected Systems

14.1 NYISO

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

14.2 MISO

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