



**Generation Interconnection
Feasibility Study Report
for
Queue Project AG1-099
WESTERNPORT 34.5 KV
20 MW Capacity / 20 MW Energy**

January 2021

Table of Contents

1	Introduction.....	4
2	Preface.....	4
3	General.....	5
4	Point of Interconnection.....	6
4.1	Primary POI.....	6
4.2	Secondary POI.....	6
5	Cost Summary.....	7
6	Transmission Owner Scope of Work.....	8
7	Schedule.....	9
8	Transmission Owner Analysis.....	10
8.1	Transmission Owner Identified Network Impacts to Distribution Facilities.....	10
8.2	Transmission Owner Identified Network Impacts to Sub-Regional Facilities.....	10
8.3	System Reinforcements on Distribution Facilities.....	10
8.4	System Reinforcements on Sub-Regional Facilities.....	10
9	Interconnection Customer Requirements.....	11
9.1	System Protection.....	11
9.2	Compliance Issues and Interconnection Customer Requirements.....	11
9.3	Power Factor Requirements.....	12
10	Revenue Metering and SCADA Requirements.....	12
10.1	PJM Requirements.....	12
10.2	Meteorological Data Reporting Requirements.....	12
10.3	Interconnected Transmission Owner Requirements.....	12
11	Summer Peak - Load Flow Analysis – Primary POI.....	13
11.1	Generation Deliverability.....	14
11.2	Multiple Facility Contingency.....	14
11.3	Contribution to Previously Identified Overloads.....	14
11.4	Potential Congestion due to Local Energy Deliverability.....	15
11.5	System Reinforcements - Summer Peak Load Flow - Primary POI.....	16
11.6	Flow Gate Details.....	18
11.6.1	Index 1.....	19
11.6.2	Index 2.....	21

11.6.3	Index 3	24
11.6.4	Index 4	26
11.6.5	Index 5	28
11.6.6	Index 6	30
11.6.7	Index 7	32
11.6.8	Index 8	34
11.6.9	Index 9	37
11.7	Queue Dependencies	39
11.8	Contingency Descriptions.....	41
12	Short Circuit Analysis.....	44
12.1	System Reinforcements - Short Circuit.....	44
13	Summer Peak - Load Flow Analysis – Secondary POI.....	44
14	Affected Systems	45
14.1	NYISO	45
14.2	MISO	45
15	Attachment 1: One Line Diagram	46

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 APS.

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.

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; Storage generating facility located in Garrett County, Maryland. The installed facilities will have a total capability of 20 MW with 20 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is April 30, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-099
Project Name	WESTERNPORT 34.5 KV
State	Maryland
County	Garrett
Transmission Owner	APS
MFO	20
MWE	20
MWC	20
Fuel	Solar; Storage
Basecase Study Year	2024

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

4 Point of Interconnection

4.1 Primary POI

AG1-099 will interconnect with the APS system by tapping the Westernport LM 34.5 kV Line and constructing a one span 34.5 kV line extension. The transmission line tap will be located approximately 1.9 miles from Westernport substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated Attachment facilities.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AG1-099 generation project to connect to the FirstEnergy (“FE”) transmission system. 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.

4.2 Secondary POI

The AG1-099 customer identified a secondary POI on the Westernport to UPRC Tap 34.5 kV line outside and adjacent to the Westernport Substation. The Transmission Owner does not provide physical connection costs for the secondary POI in the Feasibility Study. If the Secondary POI is selected, then FirstEnergy will provide the physical interconnection scope and cost in the System Impact phase.

Note that PJM did miss studying the network impacts for the specific secondary POI chosen. However, given the proximity to the primary POI, the results are not expected to differ significantly. If the secondary POI is selected, the network impacts will be analyzed in more detail in the System Impact phase.

5 Cost Summary

The AG1-099 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$ 1,587,000
Total System Network Upgrade Costs (TO Identified)	\$ 14,347,200 ¹
Total System Network Upgrade Costs (PJM Identified)	\$181,800,360 ²
Total Costs	\$197,734,560

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 2016-36, 2016-25 I.R.B. (6/20/2016). If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

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

¹ This project currently causes overloads of the TO system (see Transmission Owner Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase.

² This project currently causes and contributes to overloads of the Transmission System (see Summer Peak Load Flow Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase. The results may vary with queue customers withdrawing from the queue and other generators deactivating over time. If a customer is the first to cause the need for a project (causes loading to exceed 100% of rating), then the customer is responsible. If a customer contributes to a facility that is already overloaded by a prior queue, then they may receive cost allocation.

6 Transmission Owner Scope of Work

The interconnection of the project at the Primary POI will be accomplished by tapping the Westernport LM 34.5 kV line and constructing a one span 34.5 kV line extension. The transmission line tap will be located approximately 1.9 miles from Westernport substation. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct both the new interconnection line tap and the associated Attachment facilities.

The project will also require non-direct connection upgrades at the Westernport substation.

The total physical interconnection costs is given in the table below:

Description	Total Cost
Construct a one span 34.5 kV tap into the interconnection customer's substation.	\$520,000
Install FE owned 34.5 kV metering in the interconnection customer's substation.	\$105,000
Construct a tap and install 2-34.5 kV switches on the Westernport LM 34.5 kV line.	\$449,000
Upgrade relaying at Westernport 34.5 kV.	\$513,000
Total Physical Interconnection Costs	\$1,587,000

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 and construction kickoff call to complete the installation. 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.

If the customer is ultimately responsible for any network upgrades, then the schedule for those upgrades will be refined in future study phases.

8 Transmission Owner Analysis³

8.1 Transmission Owner Identified Network Impacts to Distribution Facilities

Potential TO identified network impacts to Transmission Owner distribution facilities were as follows:

Idx	Overloaded Element	Contingency	Rating [MVA]	Loading Before %	Loading After %	Contribution [MW]
13	237750 01UPRC T 34.5 237440 01KEYSER 34.5 1	237366 01CARLOS 34.5 942900 AE2-309 TAP 34.5 1[OP]	26	35.00	111.92	20
14	237558 01WESTERNP 34.5 237750 01UPRC T 34.5 1	237366 01CARLOS 34.5 942900 AE2-309 TAP 34.5 1[OP]	26	39.23	116.15	20
15	942900 AE2-309 TAP 34.5 237366 01CARLOS 34.5 1	237440 01KEYSER 34.5 237750 01UPRC T 34.5 1[OP]	26	37.31	114.23	20
16	942900 AE2-309 TAP 34.5 237366 01CARLOS 34.5 1	237558 01WESTERNP 34.5 237750 01UPRC T 34.5 1[OP]	26	42.69	119.62	20

8.2 Transmission Owner Identified Network Impacts to Sub-Regional Facilities

Potential TO identified network impacts to Transmission Owner Sub-Regional facilities were as follows:

None

8.3 System Reinforcements on Distribution Facilities

Idx	Facility	Upgrade ID	Upgrade Description	Cost
15,16	Carlos Junction - Lonaconing LW1 34.5 kV (942900 AE2-309 TAP 34.5 237366 01CARLOS 34.5 1)	PE-AG1-F-0018	Reconductor existing section of transmission line with a conductor able to meet or exceed 32 MVA STE. Time Estimate: 24 Cost: \$256,200	\$256,200
14	Keyser - Westernport WK 34.5 kV (237558 01WESTERNP 34.5 237750 01UPRC T 34.5 1)	PE-AG1-F-0016	Replace (2) 10 A relay thermals and (3) 10 A meter thermals at Western Port. Time Estimate: 12 Cost: \$512,400	\$512,400
13	Keyser - Westernport WK 34.5 kV (237750 01UPRC T 34.5 237440 01KEYSER 34.5 1)	PE-AG1-F-0017	Reconductor 5.3 miles of line conductor at Keyser and UPRC with a conductor able to meet or exceed 30 MVA STE. Time Estimate: 36 Cost: \$13,578,600	\$13,578,600
			TOTAL COST	\$14,347,200¹

8.4 System Reinforcements on Sub-Regional Facilities

Idx	Facility	Upgrade ID	Upgrade Description	Cost
			TOTAL COST	\$0

³ For TO Distribution Facilities that need upgrades, the TO has applied their cost allocation rules. For TO Sub-Regional Facilities in need of upgrades, PJM Cost Allocation Criteria has been applied.

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.

All new generator only and new generator plus load facilities must be isolated from the FE transmission System by a Power Transformer. Section 14.2.6 of FE's "Requirements for Transmission Connected Facilities" document specifies the winding configurations of the transformer connecting to a non-effectively grounded portion of the FE Transmission system shall be determined by FE on a case-by-case basis.

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 [PRI POI VOLTAGE] kV circuit breaker to protect the AG1-099 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 AG1-099 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 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.

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:

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter²) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) - (Accepted, not required)
- Wind direction (decimal degrees from true north) - (Accepted, not required)

10.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

<http://www.pjm.com/planning/design-engineering/to-tech-standards/>

11 Summer Peak - Load Flow Analysis – Primary POI

The Queue Project AG1-099 was evaluated as a 20.0 MW (Capacity 20.0 MW) injection at the Westernport 34.5 kV Substation in the APS area. Project AG1-099 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-099 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)

None

11.2 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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
167285320	235490	01MORGAN	138.0	AP	235453	01CHERYR	138.0	AP	1	AP-P2-3-PE-500-014	breaker	229.0	99.57	100.69	DC	2.57
167285321	235490	01MORGAN	138.0	AP	235453	01CHERYR	138.0	AP	1	AP-P2-3-PE-500-016	breaker	229.0	99.48	100.6	DC	2.57

11.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
167285111	235449	01CARLOS	138.0	AP	237310	01DANSMTN	138.0	AP	1	FE-P2-3-MP-138-161	breaker	182.0	116.94	117.41	DC	1.93
167285112	235449	01CARLOS	138.0	AP	237310	01DANSMTN	138.0	AP	1	FE-P2-3-MP-138-160	breaker	182.0	116.93	117.4	DC	1.93
167285148	235471	01GORE	138.0	AP	235512	01STONEW	138.0	AP	1	AP-P2-3-PE-500-014	breaker	191.0	120.63	122.12	DC	2.83
167285149	235471	01GORE	138.0	AP	235512	01STONEW	138.0	AP	1	AP-P2-3-PE-500-016	breaker	191.0	120.53	122.01	DC	2.83
167285290	235479	01JUNCTN	138.0	AP	235467	01FRNCHM	138.0	AP	1	AP-P2-3-PE-500-014	breaker	206.0	102.2	103.54	DC	2.77
167285291	235479	01JUNCTN	138.0	AP	235467	01FRNCHM	138.0	AP	1	AP-P2-3-PE-500-016	breaker	206.0	102.1	103.44	DC	2.77
167285296	235484	01MESSCK	138.0	AP	235490	01MORGAN	138.0	AP	1	AP-P2-3-PE-500-014	breaker	268.0	102.61	103.62	DC	2.71
167285297	235484	01MESSCK	138.0	AP	235490	01MORGAN	138.0	AP	1	AP-P2-3-PE-500-016	breaker	268.0	102.5	103.51	DC	2.71
165507573	235504	01RIDGLY	138.0	AP	235593	01HAMPS2	138.0	AP	1	AP-P7-1-PE-138-014	tower	182.0	105.57	107.31	DC	3.17
167285232	235504	01RIDGLY	138.0	AP	235484	01MESSCK	138.0	AP	1	AP-P2-3-PE-500-014	breaker	268.0	108.69	109.71	DC	2.71
167285233	235504	01RIDGLY	138.0	AP	235484	01MESSCK	138.0	AP	1	AP-P2-3-PE-500-016	breaker	268.0	108.58	109.59	DC	2.71

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
165507266	237310	01DANSMTN	138.0	AP	235504	01RIDGLY	138.0	AP	1	FE-P2-2-MP-138-101_NON-A	bus	182.0	122.84	123.32	DC	1.93
167285034	237310	01DANSMTN	138.0	AP	235504	01RIDGLY	138.0	AP	1	FE-P2-3-MP-138-160	breaker	182.0	148.75	149.23	DC	1.93
167054263	937190	AD2-157 TAP	138.0	AP	235471	01GORE	138.0	AP	1	AP-P2-3-PE-500-014	breaker	250.0	102.2	103.34	DC	2.83
167054264	937190	AD2-157 TAP	138.0	AP	235471	01GORE	138.0	AP	1	AP-P2-3-PE-500-016	breaker	250.0	102.16	103.3	DC	2.83

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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
167826079	235469	01GARRET	138.0	AP	934440	AD1-068 TAP	138.0	AP	1	PN-P1-2-PN-115-068-A	operation	191.0	122.59	123.06	DC	1.99
167826080	235469	01GARRET	138.0	AP	934440	AD1-068 TAP	138.0	AP	1	PN-P1-3-PN-115-025-A	operation	191.0	122.59	123.06	DC	1.99
167826259	235471	01GORE	138.0	AP	235512	01STONE W	138.0	AP	1	AP-P1-2-PE-500-001	operation	191.0	115.98	117.06	DC	2.07
167826384	235479	01JUNCTN	138.0	AP	235467	01FRNCH M	138.0	AP	1	AP-P1-2-PE-500-001	operation	206.0	99.83	100.81	DC	2.02
167826140	237310	01DANSMTN	138.0	AP	235504	01RIDGLY	138.0	AP	1	FE-P1-2-MP-138-160_NO N	operation	182.0	122.04	122.52	DC	1.97

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
167285149,167 285148	3	01GORE 138.0 kV - 01STONEW 138.0 kV Ckt 1	<p><u>APS</u> PE-AG1-F-0001 (629) :</p> <p>1) Replace (1) 5 A thermal relay at Stonewall. 2) Replace (1) 800 A WEST wave trap at Gore. 3) Replace (1) 800 A WEST wave trap at Stonewall.</p> <p>Project Type : FAC Cost : \$1,024,800 Time Estimate : 12.0 Months</p>	\$1,024,800
167285112,167 285111	2	01CARLOS 138.0 kV - 01DANSMTN 138.0 kV Ckt 1	<p><u>APS</u> n4655 (610) : Reconfigure Albright 138 kV SS to breaker-and-a-half layout</p> <p>Project Type : CON Cost : \$20,701,800 Time Estimate : 30.0 Months</p>	\$20,701,800
167285034,165 507266	8	01DANSMTN 138.0 kV - 01RIDGLY 138.0 kV Ckt 1		
167285233,167 285232	7	01RIDGLY 138.0 kV - 01MESSCK 138.0 kV Ckt 1	<p><u>APS</u> PE-AG1-F-0006 (635) :</p> <p>1) Reconductor 3.49 miles of 556.5 ACSR 26/7 transmission line from Messick Road to Ridgeley with 795 ACSR "Drake" or higher to meet or exceed 295 MVA STE. 2) Replace (1) 8 A thermal relay at Messick Road. 3) Replace (1) 10 A thermal relay at Messick Road. 4) Replace (2) 10 A thermal meters at Messick Road.</p> <p>Project Type : FAC Cost : \$9,709,980 Time Estimate : 36.0 Months</p>	\$9,709,980
165507573	6	01RIDGLY 138.0 kV - 01HAMPS2 138.0 kV Ckt 1	<p><u>APS</u> PE-AG1-F-0007 (636) :</p> <p>1) Reconductor (2) existing sections of 350 CU subconductor circular at Ridgeley with a conductor able to meet or exceed 198 MVA STE or higher. 2) Reconductor 29.76 miles of 336.4 ACSR 26/7 transmission line from Hampshire to Ridgeley with 556.5 ACSR "Dove" or a conductor able to meet or exceed 198 MVA STE. 3) Reconductor (1) existing section of 336.4 ACSR 26/7 transmission line from Hampshire to Ridgeley with 556.5 ACSR "Dove" or a conductor able to meet or exceed 198 MVA STE.</p> <p>Project Type : FAC Cost : \$76,501,320 Time Estimate : 60.0 Months</p>	\$76,501,320
167285291,167 285290	4	01JUNCTN 138.0 kV - 01FRNCHM 138.0 kV Ckt 1	<p><u>APS</u> PE-AG1-F-0002 (630) : Replace (1) 600 A disconnect switch at Junction.</p> <p>Project Type : FAC Cost : \$256,200 Time Estimate : 12.0 Months</p>	\$256,200

ID	Idx	Facility	Upgrade Description	Cost
167285321,167 285320	1	01MORGAN 138.0 kV - 01CHERYR 138.0 kV Ckt 1	<u>APS</u> PE-AG1-F-0005 (634) : 1) Replace (1) 800 A TRENCH wave trap at Morgan (APS). 2) Replace (2) 8 A thermal relays at Cherry Run. 3) Replace (1) 8 A thermal relay at Morgan (APS). Project Type : FAC Cost : \$1,665,300 Time Estimate : 12.0 Months	\$1,665,300
167285297,167 285296	5	01MESSCK 138.0 kV - 01MORGAN 138.0 kV Ckt 1	<u>APS</u> PE-AG1-F-0004 (633) : 1) Replace (1) 800 A GE wave trap at Morgan (APS). 2) Replace (1) 8 A thermal relay at Messick Road. 3) Replace (1) 8 A thermal relay at Morgan (APS). 4) Reconductor 27.23 miles of 556.5 ACSR 26/7 transmission line from Messick Road to Morgan (APS) with 795 ACSR "Drake" or higher to meet or exceed 280 MVA STE. 5) Reconductor (1) existing section of 556.5 ACSR 26/7 transmission line at Morgan (APS) with 795 ACSR "Drake" or higher to meet or exceed 280 MVA STE. Project Type : FAC Cost : \$71,684,760 Time Estimate : 60.0 Months	\$71,684,760
167054264,167 054263	9	AD2-157 TAP 138.0 kV - 01GORE 138.0 kV Ckt 1	<u>APS</u> PE-AG1-F-0010 (639) : 1) Reconductor (2) existing sections of 556.5 ACSR 26/7 subconductor circular at Gore with 795 ACSR "Drake" or equivalent to meet or exceed 261 MVA STE. 2) Reconductor (2) existing sections of 556.5 ACSR 26/7 subconductor circular at Hampshire with 795 ACSR "Drake" or equivalent to meet or exceed 261 MVA STE. Project Type : FAC Cost : \$256,200 Time Estimate : 12.0 Months	\$256,200
			TOTAL COST	\$181,800,360²

11.6 Flow Gate Details

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

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
167285321	235490	01MORGAN	AP	235453	01CHERYR	AP	1	AP-P2-3-PE-500-016	breaker	229.0	99.48	100.6	DC	2.57

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235013	01AB1-065 C	0.4997	50/50	0.4997
235098	U2-073A E	18.8036	50/50	18.8036
235099	U2-073B E	8.2438	50/50	8.2438
235520	01WVACO_S38	6.2724	50/50	6.2724
235526	01WR_AA1-100	2.0473	50/50	2.0473
235530	01TR_U2-073A	0.6618	50/50	0.6618
235531	01TR_U2-073B	0.3833	50/50	0.3833
236001	01WARRIOR RN	5.2855	50/50	5.2855
237084	AD1-018 E (Suspended)	1.9842	50/50	1.9842
237089	AD1-018 C (Suspended)	1.2162	50/50	1.2162
237312	01DANS_S-014	0.3656	50/50	0.3656
237319	01FMR_U2-030	0.1811	50/50	0.1811
237507	01CROSSCHOOL	0.1784	50/50	0.1784
290229	S-014 E	9.2686	50/50	9.2686
292401	K-028 E	3.0807	Adder	3.62
885642	T-016 E	1.2617	Adder	1.48
929522	U2-030 E	7.6807	50/50	7.6807
930262	AB1-065 E (Suspended)	0.8289	50/50	0.8289
934443	AD1-068 C	0.6522	Adder	0.77
934445	AD1-068 E	3.7848	Adder	4.45
934933	AD1-125 C1	0.6074	Adder	0.71
934934	AD1-125 C2	0.0776	Adder	0.09
934935	AD1-125 E1	3.5246	Adder	4.15
934936	AD1-125 E2	0.4504	Adder	0.53
937361	AD2-180 C O1	0.8675	Adder	1.02
937362	AD2-180 E O1	5.4606	Adder	6.42
938801	AE1-106 C	2.6700	Adder	3.14
938802	AE1-106 E	1.8373	Adder	2.16
938831	AE1-109 C	0.4123	Adder	0.49
938832	AE1-109 E	0.5356	Adder	0.63
940461	AE2-030 C	1.3061	50/50	1.3061
940462	AE2-030 E	1.8036	50/50	1.8036
942731	AE2-289 C	1.9046	50/50	1.9046
942732	AE2-289 E	11.0522	50/50	11.0522
942901	AE2-309 C	2.5970	50/50	2.5970
942902	AE2-309 E	0.4957	50/50	0.4957
943301	AF1-001 C	0.4651	Adder	0.55
943302	AF1-001 E	0.5188	Adder	0.61
945011	AF1-166 C	-0.4265	Adder	-0.5
959241	AF2-215 C	-0.1703	Adder	-0.2
959843	AF2-275 BAT	0.0784	Merchant Transmission	0.0784

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959853	AF2-276 BAT	0.0784	Merchant Transmission	0.0784
960191	AF2-310 O1	2.4378	50/50	2.4378
960651	AF2-356 C	9.2463	Adder	10.88
960652	AF2-356 E	6.1642	Adder	7.25
962501	AG1-099	2.5690	50/50	2.5690
963801	AG1-233 C O1	0.9360	Adder	2.08
963802	AG1-233 E O1	0.6240	Adder	1.39
966463	AG1-515 BAT	0.2785	Merchant Transmission	0.2785
WEC	WEC	0.1257	Confirmed LTF	0.1257
LGEE	LGEE	0.2457	Confirmed LTF	0.2457
CPL	CPL	0.0198	Confirmed LTF	0.0198
CBM-W2	CBM-W2	3.0016	Confirmed LTF	3.0016
NY	NY	0.1985	Confirmed LTF	0.1985
TVA	TVA	0.4144	Confirmed LTF	0.4144
O-066	O-066	3.8428	Confirmed LTF	3.8428
SIGE	SIGE	0.1003	Confirmed LTF	0.1003
CBM-S2	CBM-S2	1.2006	Confirmed LTF	1.2006
CBM-S1	CBM-S1	0.1189	Confirmed LTF	0.1189
G-007	G-007	0.6122	Confirmed LTF	0.6122
MEC	MEC	0.5991	Confirmed LTF	0.5991
LAGN	LAGN	0.5268	Confirmed LTF	0.5268
CBM-W1	CBM-W1	5.6921	Confirmed LTF	5.6921

11.6.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
167285112	235449	01CARLOS	AP	237310	01DANSMTN	AP	1	FE-P2-3-MP-138-160	breaker	182.0	116.93	117.4	DC	1.93

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUUGH	0.3755	50/50	0.3755
200834	26SW_E13_K22	0.0197	50/50	0.0197
200835	26ARN_Z1-066	1.8458	50/50	1.8458
200840	26DEEPCRK1	0.8682	50/50	0.8682
200841	26DEEPCRK2	0.8770	50/50	0.8770
200864	K-013 E	1.4729	Adder	1.73
200889	26STNY CRK	0.1474	50/50	0.1474
200890	26BF_G21_K23	0.1857	50/50	0.1857
200891	26CSLMN_L13	0.2148	50/50	0.2148
200892	26LOOKOUT	0.2293	50/50	0.2293
202225	26SCI_S29B	0.0395	50/50	0.0395
202652	26RGH_Y1-033	0.2719	50/50	0.2719
203915	26BF_Z2-108	4.1531	50/50	4.1531
235532	AA1-100 BAT	1.0857	Merchant Transmission	1.0857
237084	AD1-018 E (Suspended)	2.1204	50/50	2.1204
237089	AD1-018 C (Suspended)	1.2996	50/50	1.2996
292350	K-023	7.5910	50/50	7.5910
292542	L-013 1	7.3834	50/50	7.3834
293432	R-040 E	0.4153	50/50	0.4153
293902	O-048 E	6.6450	50/50	6.6450
294903	P-060 E	4.6171	50/50	4.6171
913142	Y1-033 E OP1	11.7274	50/50	11.7274
934443	AD1-068 C	7.1635	50/50	7.1635
934445	AD1-068 E	41.5677	50/50	41.5677
938351	AE1-053	2.3073	50/50	2.3073
938881	AE1-116	0.6258	50/50	0.6258
938993	AE1-128 C	4.6304	Adder	5.45
938994	AE1-128 E	3.0869	Adder	3.63
942361	AE2-249 C	0.5209	Adder	0.61
942362	AE2-249 E	0.3473	Adder	0.41
942901	AE2-309 C	3.2938	50/50	3.2938
942902	AE2-309 E	0.6287	50/50	0.6287
943301	AF1-001 C	3.9599	50/50	3.9599
943302	AF1-001 E	4.4168	50/50	4.4168
943711	AF1-039 C O1	3.1025	50/50	3.1025
943712	AF1-039 E O1	2.0683	50/50	2.0683
944781	AF1-143 C	13.8438	50/50	13.8438
944782	AF1-143 E	7.3834	50/50	7.3834
945671	AF1-232 C (Withdrawn : 01/19/2021)	12.4956	50/50	12.4956

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945672	AF1-232 E (Withdrawn : 01/19/2021)	6.7284	50/50	6.7284
946571	AF1-321 C O1	0.7599	Adder	0.89
946572	AF1-321 E O1	0.5066	Adder	0.6
957001	AF2-001 C O1	0.7599	Adder	0.89
957002	AF2-001 E O1	0.5066	Adder	0.6
957011	AF2-002 C O1	0.3800	Adder	0.45
957012	AF2-002 E O1	0.2533	Adder	0.3
957981	AF2-092 C	0.4315	Adder	0.51
957982	AF2-092 E	0.2877	Adder	0.34
958101	AF2-104 C (Withdrawn : 12/08/2020)	0.3338	50/50	0.3338
958102	AF2-104 E (Withdrawn : 12/08/2020)	0.2225	50/50	0.2225
958471	AF2-141	1.8458	50/50	1.8458
959792	AF2-270 E	0.2393	Adder	0.28
960192	AF2-310 BAT	1.2876	Merchant Transmission	1.2876
960451	AF2-336 C	0.7192	Adder	0.85
960452	AF2-336 E	0.4795	Adder	0.56
960461	AF2-337 C	0.7192	Adder	0.85
960462	AF2-337 E	0.4795	Adder	0.56
960471	AF2-338 C	0.7192	Adder	0.85
960472	AF2-338 E	0.4795	Adder	0.56
960481	AF2-339 C	0.7192	Adder	0.85
960482	AF2-339 E	0.4795	Adder	0.56
960901	AF2-381 C	5.2190	Adder	6.14
960902	AF2-381 E	2.7465	Adder	3.23
961911	AG1-033 C	0.0880	Adder	0.2
961912	AG1-033 E	0.0495	Adder	0.11
961981	AG1-041 C	0.2165	Adder	0.48
961982	AG1-041 E	0.1444	Adder	0.32
962292	AG1-077 E	0.4676	50/50	0.4676
962501	AG1-099	0.8690	Adder	1.93
962641	AG1-113	0.5007	50/50	0.5007
962651	AG1-114	2.3073	50/50	2.3073
963541	AG1-203 C	0.7598	50/50	0.7598
963542	AG1-203 E	0.4091	50/50	0.4091
963561	AG1-205 C	1.4997	50/50	1.4997
963562	AG1-205 E	0.8076	50/50	0.8076
963881	AG1-241 C	0.1788	Adder	0.4
963882	AG1-241 E	0.0963	Adder	0.21
964911	AG1-355 C	1.0425	Adder	2.31
964912	AG1-355 E	0.6950	Adder	1.54
964921	AG1-356 C	2.6784	50/50	2.6784
964922	AG1-356 E	1.7856	50/50	1.7856
965881	AG1-457 C	6.4528	50/50	6.4528
965882	AG1-457 E	4.3019	50/50	4.3019
966512	AG1-520 E	0.1342	Adder	0.3
G-007A	G-007A	0.5994	Confirmed LTF	0.5994
VFT	VFT	1.6770	Confirmed LTF	1.6770
CALDERWOOD	CALDERWOOD	0.1088	Confirmed LTF	0.1088
PRAIRIE	PRAIRIE	0.4288	Confirmed LTF	0.4288
CHEOAH	CHEOAH	0.1106	Confirmed LTF	0.1106

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CBM-N	CBM-N	0.3372	Confirmed LTF	0.3372
COTTONWOOD	COTTONWOOD	0.4095	Confirmed LTF	0.4095
HAMLET	HAMLET	0.1681	Confirmed LTF	0.1681
GIBSON	GIBSON	0.0835	Confirmed LTF	0.0835
BLUEG	BLUEG	0.2691	Confirmed LTF	0.2691
TRIMBLE	TRIMBLE	0.0857	Confirmed LTF	0.0857
CATAWBA	CATAWBA	0.0941	Confirmed LTF	0.0941

11.6.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
167285149	235471	01GORE	AP	235512	01STONEW	AP	1	AP-P2-3-PE-500-016	breaker	191.0	120.53	122.01	DC	2.83

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235013	01AB1-065 C	0.2295	Adder	0.27
235091	U2-061_E	2.9399	Adder	3.46
235098	U2-073A E	7.4043	Adder	8.71
235099	U2-073B E	3.2462	Adder	3.82
235520	01WVACO_S38	8.3712	50/50	8.3712
235526	01WR_AA1-100	0.7532	Adder	0.89
235627	K19 E	2.6410	Adder	3.11
235854	01KL_K28_T16	0.3850	50/50	0.3850
237084	AD1-018 E (Suspended)	1.2404	50/50	1.2404
237089	AD1-018 C (Suspended)	0.7602	50/50	0.7602
237507	01CROSSCHOOL	0.2383	50/50	0.2383
290229	S-014 E	3.6914	Adder	4.34
292401	K-028 E	8.2192	50/50	8.2192
885642	T-016 E	3.3662	50/50	3.3662
920072	AA2-103 E	1.3937	Adder	1.64
929522	U2-030 E	3.1787	Adder	3.74
930262	AB1-065 E (Suspended)	0.3807	Adder	0.45
934443	AD1-068 C	0.6311	Adder	0.74
934445	AD1-068 E	3.6624	Adder	4.31
934933	AD1-125 C1	2.5596	50/50	2.5596
934934	AD1-125 C2	0.3269	50/50	0.3269
934935	AD1-125 E1	14.8517	50/50	14.8517
934936	AD1-125 E2	1.8978	50/50	1.8978
937191	AD2-157 C O1	23.9908	50/50	23.9908
937192	AD2-157 E O1	33.1302	50/50	33.1302
937361	AD2-180 C O1	2.7423	50/50	2.7423
937362	AD2-180 E O1	17.2612	50/50	17.2612
938341	AE1-052	0.6968	Adder	0.82
938831	AE1-109 C	3.8598	50/50	3.8598
938832	AE1-109 E	5.0134	50/50	5.0134
940461	AE2-030 C	0.4981	Adder	0.59
940462	AE2-030 E	0.6878	Adder	0.81
942731	AE2-289 C	0.7500	Adder	0.88
942732	AE2-289 E	4.3520	Adder	5.12
942901	AE2-309 C	1.7298	50/50	1.7298
942902	AE2-309 E	0.3302	50/50	0.3302
943301	AF1-001 C	0.3415	Adder	0.4
943302	AF1-001 E	0.3809	Adder	0.45
958181	AF2-112 C O1	0.7559	Adder	0.89
958182	AF2-112 E O1	0.3713	Adder	0.44
960191	AF2-310 O1	1.1196	Adder	1.32

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960651	AF2-356 C	14.3592	50/50	14.3592
960652	AF2-356 E	9.5728	50/50	9.5728
962501	AG1-099	2.8294	50/50	2.8294
962521	AG1-101 C	0.2355	Adder	0.52
962522	AG1-101 E	0.1160	Adder	0.26
962631	AG1-112	0.3693	Adder	0.82
963801	AG1-233 C O1	0.7272	Adder	1.61
963802	AG1-233 E O1	0.4848	Adder	1.08
WEC	WEC	0.0945	Confirmed LTF	0.0945
LGEE	LGEE	0.1803	Confirmed LTF	0.1803
CBM-W2	CBM-W2	1.9174	Confirmed LTF	1.9174
NY	NY	0.0708	Confirmed LTF	0.0708
TVA	TVA	0.2240	Confirmed LTF	0.2240
O-066	O-066	2.0392	Confirmed LTF	2.0392
SIGE	SIGE	0.0611	Confirmed LTF	0.0611
CBM-S1	CBM-S1	0.0695	Confirmed LTF	0.0695
G-007	G-007	0.3297	Confirmed LTF	0.3297
HAMLET	HAMLET	0.0739	Confirmed LTF	0.0739
MEC	MEC	0.4290	Confirmed LTF	0.4290
LAGN	LAGN	0.2940	Confirmed LTF	0.2940
CATAWBA	CATAWBA	0.0168	Confirmed LTF	0.0168
CBM-W1	CBM-W1	4.3883	Confirmed LTF	4.3883

11.6.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
167285291	235479	01JUNCTN	AP	235467	01FRNCHM	AP	1	AP-P2-3-PE-500-016	breaker	206.0	102.1	103.44	DC	2.77

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235013	01AB1-065 C	0.2239	Adder	0.26
235091	U2-061_E	2.8119	Adder	3.31
235098	U2-073A E	7.2316	Adder	8.51
235099	U2-073B E	3.1705	Adder	3.73
235520	01WVACO_S38	8.1798	50/50	8.1798
235526	01WR_AA1-100	0.7361	Adder	0.87
235627	K19 E	2.5208	Adder	2.97
235854	01KL_K28_T16	0.3759	50/50	0.3759
237084	AD1-018 E (Suspended)	1.0303	Adder	1.21
237089	AD1-018 C (Suspended)	0.6315	Adder	0.74
237507	01CROSSCHOOL	0.2329	50/50	0.2329
290229	S-014 E	3.6052	Adder	4.24
292401	K-028 E	8.0247	50/50	8.0247
885642	T-016 E	3.2866	50/50	3.2866
920072	AA2-103 E	1.3302	Adder	1.56
929522	U2-030 E	3.1032	Adder	3.65
930262	AB1-065 E (Suspended)	0.3713	Adder	0.44
934443	AD1-068 C	0.6139	Adder	0.72
934445	AD1-068 E	3.5620	Adder	4.19
934933	AD1-125 C1	2.3975	50/50	2.3975
934934	AD1-125 C2	0.3062	50/50	0.3062
934935	AD1-125 E1	13.9114	50/50	13.9114
934936	AD1-125 E2	1.7777	50/50	1.7777
937361	AD2-180 C O1	2.6802	50/50	2.6802
937362	AD2-180 E O1	16.8701	50/50	16.8701
938341	AE1-052	0.6651	Adder	0.78
940461	AE2-030 C	0.4865	Adder	0.57
940462	AE2-030 E	0.6719	Adder	0.79
942731	AE2-289 C	0.7325	Adder	0.86
942732	AE2-289 E	4.2505	Adder	5.0
942901	AE2-309 C	1.6905	50/50	1.6905
942902	AE2-309 E	0.3227	50/50	0.3227
943301	AF1-001 C	0.3325	Adder	0.39
943302	AF1-001 E	0.3709	Adder	0.44
958181	AF2-112 C O1	0.7273	Adder	0.86
958182	AF2-112 E O1	0.3573	Adder	0.42
960191	AF2-310 O1	1.0921	Adder	1.28
960651	AF2-356 C	14.0208	50/50	14.0208
960652	AF2-356 E	9.3472	50/50	9.3472
962501	AG1-099	2.7658	50/50	2.7658
962521	AG1-101 C	0.2266	Adder	0.5

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
962522	AG1-101 E	0.1116	Adder	0.25
962631	AG1-112	0.3525	Adder	0.78
963801	AG1-233 C O1	0.7079	Adder	1.57
963802	AG1-233 E O1	0.4719	Adder	1.05
WEC	WEC	0.0917	Confirmed LTF	0.0917
LGEE	LGEE	0.1747	Confirmed LTF	0.1747
CBM-W2	CBM-W2	1.8547	Confirmed LTF	1.8547
NY	NY	0.0680	Confirmed LTF	0.0680
TVA	TVA	0.2170	Confirmed LTF	0.2170
O-066	O-066	1.9786	Confirmed LTF	1.9786
SIGE	SIGE	0.0592	Confirmed LTF	0.0592
CBM-S1	CBM-S1	0.0673	Confirmed LTF	0.0673
G-007	G-007	0.3192	Confirmed LTF	0.3192
HAMLET	HAMLET	0.0722	Confirmed LTF	0.0722
MEC	MEC	0.4147	Confirmed LTF	0.4147
LAGN	LAGN	0.2835	Confirmed LTF	0.2835
CATAWBA	CATAWBA	0.0164	Confirmed LTF	0.0164
CBM-W1	CBM-W1	4.2481	Confirmed LTF	4.2481

11.6.5 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
167285297	235484	01MESSCK	AP	235490	01MORGAN	AP	1	AP-P2-3-PE-500-016	breaker	268.0	102.5	103.51	DC	2.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235013	01AB1-065 C	0.5273	50/50	0.5273
235098	U2-073A E	19.8392	50/50	19.8392
235099	U2-073B E	8.6978	50/50	8.6978
235520	01WVACO_S38	6.6150	50/50	6.6150
235526	01WR_AA1-100	2.1601	50/50	2.1601
235530	01TR_U2-073A	0.6983	50/50	0.6983
235531	01TR_U2-073B	0.4044	50/50	0.4044
236001	01WARRIOR RN	5.5766	50/50	5.5766
237084	AD1-018 E (Suspended)	2.0934	50/50	2.0934
237089	AD1-018 C (Suspended)	1.2830	50/50	1.2830
237312	01DANS_S-014	0.3857	50/50	0.3857
237319	01FMR_U2-030	0.1910	50/50	0.1910
237507	01CROSSCHOOL	0.1882	50/50	0.1882
290229	S-014 E	9.7787	50/50	9.7787
292401	K-028 E	3.2476	Adder	3.82
885642	T-016 E	1.3301	Adder	1.56
913142	Y1-033 E OP1	1.4542	Adder	1.71
929522	U2-030 E	8.1035	50/50	8.1035
930262	AB1-065 E (Suspended)	0.8745	50/50	0.8745
934443	AD1-068 C	0.6879	Adder	0.81
934445	AD1-068 E	3.9918	Adder	4.7
934933	AD1-125 C1	0.6399	Adder	0.75
934934	AD1-125 C2	0.0817	Adder	0.1
934935	AD1-125 E1	3.7129	Adder	4.37
934936	AD1-125 E2	0.4744	Adder	0.56
937361	AD2-180 C O1	0.9143	Adder	1.08
937362	AD2-180 E O1	5.7550	Adder	6.77
938801	AE1-106 C	2.8164	Adder	3.31
938802	AE1-106 E	1.9381	Adder	2.28
938831	AE1-109 C	0.4334	Adder	0.51
938832	AE1-109 E	0.5629	Adder	0.66
939591	AE1-188 C	-0.5560	Adder	-0.65
940461	AE2-030 C	1.3780	50/50	1.3780
940462	AE2-030 E	1.9030	50/50	1.9030
942731	AE2-289 C	2.0095	50/50	2.0095
942732	AE2-289 E	11.6609	50/50	11.6609
942901	AE2-309 C	2.7396	50/50	2.7396
942902	AE2-309 E	0.5229	50/50	0.5229
943301	AF1-001 C	0.4906	Adder	0.58
943302	AF1-001 E	0.5472	Adder	0.64
943711	AF1-039 C O1	0.3847	Adder	0.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943712	AF1-039 E O1	0.2565	Adder	0.3
945011	AF1-166 C	-0.4641	Adder	-0.55
945591	AF1-224 C	-0.3486	Adder	-0.41
959241	AF2-215 C	-0.1869	Adder	-0.22
959843	AF2-275 BAT	0.0853	Merchant Transmission	0.0853
959853	AF2-276 BAT	0.0853	Merchant Transmission	0.0853
960191	AF2-310 O1	2.5720	50/50	2.5720
960651	AF2-356 C	9.7512	Adder	11.47
960652	AF2-356 E	6.5008	Adder	7.65
962501	AG1-099	2.7094	50/50	2.7094
963801	AG1-233 C O1	0.9874	Adder	2.19
963802	AG1-233 E O1	0.6583	Adder	1.46
966463	AG1-515 BAT	0.3031	Merchant Transmission	0.3031
WEC	WEC	0.1326	Confirmed LTF	0.1326
LGEE	LGEE	0.2595	Confirmed LTF	0.2595
CPL	CPL	0.0212	Confirmed LTF	0.0212
CBM-W2	CBM-W2	3.1718	Confirmed LTF	3.1718
NY	NY	0.2101	Confirmed LTF	0.2101
TVA	TVA	0.4368	Confirmed LTF	0.4368
O-066	O-066	4.0649	Confirmed LTF	4.0649
SIGE	SIGE	0.1059	Confirmed LTF	0.1059
CBM-S2	CBM-S2	1.2841	Confirmed LTF	1.2841
CBM-S1	CBM-S1	0.1254	Confirmed LTF	0.1254
G-007	G-007	0.6468	Confirmed LTF	0.6468
MEC	MEC	0.6324	Confirmed LTF	0.6324
LAGN	LAGN	0.5547	Confirmed LTF	0.5547
CBM-W1	CBM-W1	6.0006	Confirmed LTF	6.0006

11.6.6 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
165507573	235504	01RIDGLY	AP	235593	01HAMPS2	AP	1	AP-P7-1-PE-138-014	tower	182.0	105.57	107.31	DC	3.17

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200840	26DEEPCRK1	0.1703	50/50	0.1703
200841	26DEEPCRK2	0.1721	50/50	0.1721
235013	01AB1-065 C	0.7827	50/50	0.7827
235098	U2-073A E	30.6585	50/50	30.6585
235099	U2-073B E	13.4412	50/50	13.4412
235526	01WR_AA1-100	3.3899	50/50	3.3899
235530	01TR_U2-073A	1.0790	50/50	1.0790
235531	01TR_U2-073B	0.6249	50/50	0.6249
236001	01WARRIOR RN	8.7516	50/50	8.7516
237084	AD1-018 E (Suspended)	2.8723	50/50	2.8723
237089	AD1-018 C (Suspended)	1.7605	50/50	1.7605
237312	01DANS_S-014	0.5943	50/50	0.5943
237319	01FMR_U2-030	0.2917	50/50	0.2917
290229	S-014 E	15.0685	50/50	15.0685
913142	Y1-033 E OP1	1.9846	Adder	2.33
929522	U2-030 E	12.3714	50/50	12.3714
930262	AB1-065 E (Suspended)	1.2981	50/50	1.2981
934443	AD1-068 C	0.7999	Adder	0.94
934445	AD1-068 E	4.6415	Adder	5.46
938801	AE1-106 C	3.4293	Adder	4.03
938802	AE1-106 E	2.3598	Adder	2.78
940461	AE2-030 C	2.1455	50/50	2.1455
940462	AE2-030 E	2.9628	50/50	2.9628
942731	AE2-289 C	3.1055	50/50	3.1055
942732	AE2-289 E	18.0201	50/50	18.0201
942901	AE2-309 C	3.6812	50/50	3.6812
942902	AE2-309 E	0.7027	50/50	0.7027
943301	AF1-001 C	0.7753	50/50	0.7753
943302	AF1-001 E	0.8647	50/50	0.8647
943711	AF1-039 C O1	0.5250	Adder	0.62
943712	AF1-039 E O1	0.3500	Adder	0.41
960191	AF2-310 O1	3.8180	50/50	3.8180
962501	AG1-099	3.1692	50/50	3.1692
963801	AG1-233 C O1	1.2812	Adder	2.84
963802	AG1-233 E O1	0.8541	Adder	1.9
WEC	WEC	0.0334	Confirmed LTF	0.0334
LGEE	LGEE	0.0553	Confirmed LTF	0.0553
CALDERWOOD	CALDERWOOD	0.0462	Confirmed LTF	0.0462
CBM-W2	CBM-W2	0.1434	Confirmed LTF	0.1434
O-066	O-066	0.4442	Confirmed LTF	0.4442
SIGE	SIGE	0.0154	Confirmed LTF	0.0154

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CHEOAH	CHEOAH	0.0490	Confirmed LTF	0.0490
COTTONWOOD	COTTONWOOD	0.0672	Confirmed LTF	0.0672
G-007	G-007	0.0798	Confirmed LTF	0.0798
HAMLET	HAMLET	0.1848	Confirmed LTF	0.1848
MEC	MEC	0.1176	Confirmed LTF	0.1176
CATAWBA	CATAWBA	0.0864	Confirmed LTF	0.0864
CBM-W1	CBM-W1	1.7385	Confirmed LTF	1.7385

11.6.7 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
167285233	235504	01RIDGLY	AP	235484	01MESSCK	AP	1	AP-P2-3-PE-500-016	breaker	268.0	108.58	109.59	DC	2.71

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235013	01AB1-065 C	0.5273	50/50	0.5273
235098	U2-073A E	19.8392	50/50	19.8392
235099	U2-073B E	8.6978	50/50	8.6978
235520	01WVACO_S38	6.6150	50/50	6.6150
235526	01WR_AA1-100	2.1601	50/50	2.1601
235530	01TR_U2-073A	0.6983	50/50	0.6983
235531	01TR_U2-073B	0.4044	50/50	0.4044
236001	01WARRIOR RN	5.5766	50/50	5.5766
237084	AD1-018 E (Suspended)	2.0934	50/50	2.0934
237089	AD1-018 C (Suspended)	1.2830	50/50	1.2830
237312	01DANS_S-014	0.3857	50/50	0.3857
237319	01FMR_U2-030	0.1910	50/50	0.1910
237507	01CROSSCHOOL	0.1882	50/50	0.1882
290229	S-014 E	9.7787	50/50	9.7787
292401	K-028 E	3.2476	Adder	3.82
885642	T-016 E	1.3301	Adder	1.56
913142	Y1-033 E OP1	1.4542	Adder	1.71
929522	U2-030 E	8.1035	50/50	8.1035
930262	AB1-065 E (Suspended)	0.8745	50/50	0.8745
934443	AD1-068 C	0.6879	Adder	0.81
934445	AD1-068 E	3.9918	Adder	4.7
934933	AD1-125 C1	0.6399	Adder	0.75
934934	AD1-125 C2	0.0817	Adder	0.1
934935	AD1-125 E1	3.7129	Adder	4.37
934936	AD1-125 E2	0.4744	Adder	0.56
937361	AD2-180 C O1	0.9143	Adder	1.08
937362	AD2-180 E O1	5.7550	Adder	6.77
938801	AE1-106 C	2.8164	Adder	3.31
938802	AE1-106 E	1.9381	Adder	2.28
938831	AE1-109 C	0.4334	Adder	0.51
938832	AE1-109 E	0.5629	Adder	0.66
939591	AE1-188 C	-0.5560	Adder	-0.65
940461	AE2-030 C	1.3780	50/50	1.3780
940462	AE2-030 E	1.9030	50/50	1.9030
942731	AE2-289 C	2.0095	50/50	2.0095
942732	AE2-289 E	11.6609	50/50	11.6609
942901	AE2-309 C	2.7396	50/50	2.7396
942902	AE2-309 E	0.5229	50/50	0.5229
943301	AF1-001 C	0.4906	Adder	0.58
943302	AF1-001 E	0.5472	Adder	0.64
943711	AF1-039 C O1	0.3847	Adder	0.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
943712	AF1-039 E O1	0.2565	Adder	0.3
945011	AF1-166 C	-0.4641	Adder	-0.55
945591	AF1-224 C	-0.3486	Adder	-0.41
959241	AF2-215 C	-0.1869	Adder	-0.22
959843	AF2-275 BAT	0.0853	Merchant Transmission	0.0853
959853	AF2-276 BAT	0.0853	Merchant Transmission	0.0853
960191	AF2-310 O1	2.5720	50/50	2.5720
960651	AF2-356 C	9.7512	Adder	11.47
960652	AF2-356 E	6.5008	Adder	7.65
962501	AG1-099	2.7094	50/50	2.7094
963801	AG1-233 C O1	0.9874	Adder	2.19
963802	AG1-233 E O1	0.6583	Adder	1.46
966463	AG1-515 BAT	0.3031	Merchant Transmission	0.3031
WEC	WEC	0.1326	Confirmed LTF	0.1326
LGEE	LGEE	0.2595	Confirmed LTF	0.2595
CPL	CPL	0.0212	Confirmed LTF	0.0212
CBM-W2	CBM-W2	3.1718	Confirmed LTF	3.1718
NY	NY	0.2101	Confirmed LTF	0.2101
TVA	TVA	0.4368	Confirmed LTF	0.4368
O-066	O-066	4.0649	Confirmed LTF	4.0649
SIGE	SIGE	0.1059	Confirmed LTF	0.1059
CBM-S2	CBM-S2	1.2841	Confirmed LTF	1.2841
CBM-S1	CBM-S1	0.1254	Confirmed LTF	0.1254
G-007	G-007	0.6468	Confirmed LTF	0.6468
MEC	MEC	0.6324	Confirmed LTF	0.6324
LAGN	LAGN	0.5547	Confirmed LTF	0.5547
CBM-W1	CBM-W1	6.0006	Confirmed LTF	6.0006

11.6.8 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
167285034	237310	01DANSMTN	AP	235504	01RIDGLY	AP	1	FE-P2-3-MP-138-160	breaker	182.0	148.75	149.23	DC	1.93

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200813	26YOUGH	0.3754	50/50	0.3754
200834	26SW_E13_K22	0.0197	50/50	0.0197
200835	26ARN_Z1-066	1.8452	50/50	1.8452
200840	26DEEPCRK1	0.8681	50/50	0.8681
200841	26DEEPCRK2	0.8769	50/50	0.8769
200864	K-013 E	1.4715	Adder	1.73
200889	26STNY CRK	0.1473	50/50	0.1473
200890	26BF_G21_K23	0.1856	50/50	0.1856
200891	26CSLMN_L13	0.2147	50/50	0.2147
200892	26LOOKOUT	0.2293	50/50	0.2293
202225	26SCI_S29B	0.0395	50/50	0.0395
202652	26RGH_Y1-033	0.2719	50/50	0.2719
203915	26BF_Z2-108	4.1517	50/50	4.1517
235532	AA1-100 BAT	1.0865	Merchant Transmission	1.0865
237084	AD1-018 E (Suspended)	2.1195	50/50	2.1195
237089	AD1-018 C (Suspended)	1.2991	50/50	1.2991
237312	01DANS_S-014	1.8203	50/50	1.8203
290229	S-014 E	46.1502	50/50	46.1502
292350	K-023	7.5884	50/50	7.5884
292542	L-013 1	7.3808	50/50	7.3808
293432	R-040 E	0.4152	50/50	0.4152
293902	O-048 E	6.6427	50/50	6.6427
294903	P-060 E	4.6141	50/50	4.6141
913142	Y1-033 E OP1	11.7250	50/50	11.7250
934443	AD1-068 C	7.1625	50/50	7.1625
934445	AD1-068 E	41.5623	50/50	41.5623
938351	AE1-053	2.3065	50/50	2.3065
938881	AE1-116	0.6255	50/50	0.6255
938993	AE1-128 C	4.6261	Adder	5.44
938994	AE1-128 E	3.0841	Adder	3.63
942361	AE2-249 C	0.5204	Adder	0.61
942362	AE2-249 E	0.3470	Adder	0.41
942901	AE2-309 C	3.2927	50/50	3.2927
942902	AE2-309 E	0.6285	50/50	0.6285
943301	AF1-001 C	3.9594	50/50	3.9594
943302	AF1-001 E	4.4163	50/50	4.4163
943711	AF1-039 C O1	3.1019	50/50	3.1019
943712	AF1-039 E O1	2.0679	50/50	2.0679
944781	AF1-143 C	13.8390	50/50	13.8390
944782	AF1-143 E	7.3808	50/50	7.3808
945671	AF1-232 C (Withdrawn : 01/19/2021)	12.4873	50/50	12.4873

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945672	AF1-232 E (Withdrawn : 01/19/2021)	6.7239	50/50	6.7239
946571	AF1-321 C O1	0.7591	Adder	0.89
946572	AF1-321 E O1	0.5061	Adder	0.6
957001	AF2-001 C O1	0.7591	Adder	0.89
957002	AF2-001 E O1	0.5061	Adder	0.6
957011	AF2-002 C O1	0.3795	Adder	0.45
957012	AF2-002 E O1	0.2530	Adder	0.3
957981	AF2-092 C	0.4311	Adder	0.51
957982	AF2-092 E	0.2874	Adder	0.34
958101	AF2-104 C (Withdrawn : 12/08/2020)	0.3336	50/50	0.3336
958102	AF2-104 E (Withdrawn : 12/08/2020)	0.2224	50/50	0.2224
958471	AF2-141	1.8452	50/50	1.8452
959792	AF2-270 E	0.2391	Adder	0.28
960451	AF2-336 C	0.7185	Adder	0.85
960452	AF2-336 E	0.4790	Adder	0.56
960461	AF2-337 C	0.7185	Adder	0.85
960462	AF2-337 E	0.4790	Adder	0.56
960471	AF2-338 C	0.7185	Adder	0.85
960472	AF2-338 E	0.4790	Adder	0.56
960481	AF2-339 C	0.7185	Adder	0.85
960482	AF2-339 E	0.4790	Adder	0.56
960901	AF2-381 C	5.2142	Adder	6.13
960902	AF2-381 E	2.7440	Adder	3.23
962292	AG1-077 E	0.4673	50/50	0.4673
962501	AG1-099	0.8683	Adder	1.93
962641	AG1-113	0.5004	50/50	0.5004
962651	AG1-114	2.3065	50/50	2.3065
963541	AG1-203 C	0.7594	50/50	0.7594
963542	AG1-203 E	0.4089	50/50	0.4089
963561	AG1-205 C	1.4992	50/50	1.4992
963562	AG1-205 E	0.8073	50/50	0.8073
964911	AG1-355 C	1.0414	Adder	2.31
964912	AG1-355 E	0.6943	Adder	1.54
964921	AG1-356 C	2.6769	50/50	2.6769
964922	AG1-356 E	1.7846	50/50	1.7846
965881	AG1-457 C	6.4505	50/50	6.4505
965882	AG1-457 E	4.3003	50/50	4.3003
966512	AG1-520 E	0.1341	Adder	0.3
G-007A	G-007A	0.5802	Confirmed LTF	0.5802
VFT	VFT	1.6254	Confirmed LTF	1.6254
CALDERWOOD	CALDERWOOD	0.1128	Confirmed LTF	0.1128
PRAIRIE	PRAIRIE	0.4494	Confirmed LTF	0.4494
CHEOAH	CHEOAH	0.1146	Confirmed LTF	0.1146
CBM-N	CBM-N	0.3276	Confirmed LTF	0.3276
COTTONWOOD	COTTONWOOD	0.4263	Confirmed LTF	0.4263
HAMLET	HAMLET	0.1727	Confirmed LTF	0.1727
GIBSON	GIBSON	0.0879	Confirmed LTF	0.0879
BLUEG	BLUEG	0.2830	Confirmed LTF	0.2830
TRIMBLE	TRIMBLE	0.0902	Confirmed LTF	0.0902
CATAWBA	CATAWBA	0.0969	Confirmed LTF	0.0969

11.6.9 Index 9

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
167054264	937190	AD2-157 TAP	AP	235471	01GORE	AP	1	AP-P2-3-PE-500-016	breaker	250.0	102.16	103.3	DC	2.83

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235013	01AB1-065 C	0.2295	Adder	0.27
235091	U2-061_E	2.9399	Adder	3.46
235098	U2-073A E	7.4043	Adder	8.71
235099	U2-073B E	3.2462	Adder	3.82
235520	01WVACO_S38	8.3712	50/50	8.3712
235526	01WR_AA1-100	0.7532	Adder	0.89
235627	K19 E	2.6410	Adder	3.11
235854	01KL_K28_T16	0.3850	50/50	0.3850
237084	AD1-018 E (Suspended)	1.2404	50/50	1.2404
237089	AD1-018 C (Suspended)	0.7602	50/50	0.7602
237507	01CROSSCHOOL	0.2383	50/50	0.2383
290229	S-014 E	3.6914	Adder	4.34
292401	K-028 E	8.2192	50/50	8.2192
885642	T-016 E	3.3662	50/50	3.3662
920072	AA2-103 E	1.3937	Adder	1.64
929522	U2-030 E	3.1787	Adder	3.74
930262	AB1-065 E (Suspended)	0.3807	Adder	0.45
934443	AD1-068 C	0.6311	Adder	0.74
934445	AD1-068 E	3.6624	Adder	4.31
934933	AD1-125 C1	2.5596	50/50	2.5596
934934	AD1-125 C2	0.3269	50/50	0.3269
934935	AD1-125 E1	14.8517	50/50	14.8517
934936	AD1-125 E2	1.8978	50/50	1.8978
937191	AD2-157 C O1	23.9908	50/50	23.9908
937192	AD2-157 E O1	33.1302	50/50	33.1302
937361	AD2-180 C O1	2.7423	50/50	2.7423
937362	AD2-180 E O1	17.2612	50/50	17.2612
938341	AE1-052	0.6968	Adder	0.82
938831	AE1-109 C	3.8598	50/50	3.8598
938832	AE1-109 E	5.0134	50/50	5.0134
940461	AE2-030 C	0.4981	Adder	0.59
940462	AE2-030 E	0.6878	Adder	0.81
942731	AE2-289 C	0.7500	Adder	0.88
942732	AE2-289 E	4.3520	Adder	5.12
942901	AE2-309 C	1.7298	50/50	1.7298
942902	AE2-309 E	0.3302	50/50	0.3302
943301	AF1-001 C	0.3415	Adder	0.4
943302	AF1-001 E	0.3809	Adder	0.45
958181	AF2-112 C O1	0.7559	Adder	0.89
958182	AF2-112 E O1	0.3713	Adder	0.44
960191	AF2-310 O1	1.1196	Adder	1.32

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960651	AF2-356 C	14.3592	50/50	14.3592
960652	AF2-356 E	9.5728	50/50	9.5728
962501	AG1-099	2.8294	50/50	2.8294
962521	AG1-101 C	0.2355	Adder	0.52
962522	AG1-101 E	0.1160	Adder	0.26
962631	AG1-112	0.3693	Adder	0.82
963801	AG1-233 C O1	0.7272	Adder	1.61
963802	AG1-233 E O1	0.4848	Adder	1.08
WEC	WEC	0.0945	Confirmed LTF	0.0945
LGEE	LGEE	0.1803	Confirmed LTF	0.1803
CBM-W2	CBM-W2	1.9174	Confirmed LTF	1.9174
NY	NY	0.0708	Confirmed LTF	0.0708
TVA	TVA	0.2240	Confirmed LTF	0.2240
O-066	O-066	2.0392	Confirmed LTF	2.0392
SIGE	SIGE	0.0611	Confirmed LTF	0.0611
CBM-S1	CBM-S1	0.0695	Confirmed LTF	0.0695
G-007	G-007	0.3297	Confirmed LTF	0.3297
HAMLET	HAMLET	0.0739	Confirmed LTF	0.0739
MEC	MEC	0.4290	Confirmed LTF	0.4290
LAGN	LAGN	0.2940	Confirmed LTF	0.2940
CATAWBA	CATAWBA	0.0168	Confirmed LTF	0.0168
CBM-W1	CBM-W1	4.3883	Confirmed LTF	4.3883

11.7 Queue Dependencies

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

Queue Number	Project Name	Status
AA1-100	Warrior Run 138kV	In Service
AA2-103	Backbone Mountain 138kV	Engineering and Procurement
AB1-065	Jennings-Hoyes 34.5kV	Suspended
AD1-018	Carlos Jct - Plaza 34 kV	Suspended
AD1-068	Albright-Garrett 138 kV	Active
AD1-125	Baker 138 kV	Active
AD2-157	Hampshire-Gore 138kV	Active
AD2-180	Elk Garden-Parr Run 138kV	Engineering and Procurement
AE1-052	William 138 kV	Active
AE1-053	Meyersdale North	Active
AE1-106	Lake Lynn-Hazleton 138 kV	Active
AE1-109	Frenchs Mill 34 kV	Active
AE1-116	Somerset Windpower 23 kV	Active
AE1-128	Bedford North-Wills Mounain 115 kV	Active
AE1-188	Fayetteville 34.5 kV	Engineering and Procurement
AE2-030	Frostburg 138kV	Active
AE2-249	Bedford North-Pennsylvania Hollow 23 kV	Engineering and Procurement
AE2-289	Frostburg 138 kV	Active
AE2-309	Carlos Junction-Lonaconing 34.5 kV	Active
AF1-001	Thayerville 34.5 kV	Engineering and Procurement
AF1-039	Listonburg-Highpoint 24.9 kV	Active
AF1-143	Lick Run 115 kV	Active
AF1-166	Target-Chambers No.5 34.5 kV	Engineering and Procurement
AF1-224	Fayetteville 34.5 kV	Engineering and Procurement
AF1-232	Allegheny-Somerset 115 kV	Withdrawn
AF1-321	Hooversville 115 kV I	Active
AF2-001	Hooversville 115 kV II	Active
AF2-002	Hooversville 115 kV III	Active
AF2-092	Snake Spring-Bedford Area 23 kV	Active
AF2-104	Somerset 23 kV	Withdrawn
AF2-112	Oakland-Gorman 69 kV	Active
AF2-141	Lick Run 115 kV	Active
AF2-215	Saint Thomas-LeMasters Junction 34.5 kV	Engineering and Procurement
AF2-270	Bedford South RCB-Bedford Area 23 kV	Engineering and Procurement
AF2-275	Guilford 12.47 kV	Active
AF2-276	Guilford 12.47 kV	Active
AF2-310	Jennings-Hoyes Road 34.5 kV	Active
AF2-336	Snake Spring 115 kV I	Active
AF2-337	Snake Spring 115 kV II	Active

Queue Number	Project Name	Status
AF2-338	Snake Spring 115 kV III	Active
AF2-339	Snake Spring 115 kV IV	Active
AF2-356	Albright-Mt. Zion 138 kV	Active
AF2-381	Bedford North-Central City West 115 kV	Active
AG1-033	Scalp Level 23 kV	Active
AG1-041	Osterburg-Bedford North 23 kV	Active
AG1-077	Allegheny Tunnel 23 kV	Active
AG1-099	Westernport 34.5 kV	Active
AG1-101	Oakland-Gorman 69 kV	Active
AG1-112	William 138 kV	Active
AG1-113	Somerset Windpower 22.86 kV	Active
AG1-114	Meyersdale North 115 kV	Active
AG1-203	Reels Corner 23 kV	Active
AG1-205	Rockwood 23 kV	Active
AG1-233	Hazleton 138 kV	Active
AG1-241	Scalp Level 23 kV	Active
AG1-355	Scalp Level-Hooversville 115 kV	Active
AG1-356	Somerset-Allegheny 115 kV	Active
AG1-457	Somerset-Rockwood 115 kV	Active
AG1-515	Guilford 138 kV	Active
AG1-520	Hooversville-Rockingham 23 kV	Active
U2-030	Four Mile Ridge Wind 138kV	In Service
U2-061	Garrett County	In Service
U2-073A	N/A	N/A
U2-073B	N/A	N/A
Y1-033	Penn Mar-Rock Wood 115kV	In Service
Z1-066	Arnold 34.5kV	In Service
Z2-108	Meyersdale North 115kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
FE-P2-2-MP-138-101_NON-A	CONTINGENCY 'FE-P2-2-MP-138-101_NON-A' /* ALBRIGHT-138-SOUTH DISCONNECT BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 /* 01ALBRIG 138 01DENVER 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 /* 01ALBRIG 138 01SNOW T 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 /* 01ALBRIG 138 AD1- 068 TAP 138 DISCONNECT BRANCH FROM BUS 934440 TO BUS 235469 CKT 1 /* AD1-068 TAP 138 01GARRET 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 960650 CKT 1 /* 01ALBRIG 138 AF2- 356 TAP 138 DISCONNECT BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 /* 01ALBRIG 138 01 106 J 138 END
AP-P7-1-PE-138-014	CONTINGENCY 'AP-P7-1-PE-138-014' /* 111 DISCONNECT BRANCH FROM BUS 235454 TO BUS 235558 CKT 1 /* 01CUMBRL 138 01SHORTG 138 DISCONNECT BRANCH FROM BUS 235484 TO BUS 235504 CKT 1 /* 01MESSCK 138 01RIDGLY 138 END
AP-P2-3-PE-500-016	CONTINGENCY "'AP-P2-3-PE-500-016'" / 183 OPEN BRANCH FROM BUS 235101 TO BUS 235103 CKT 1 / 235101 01BEDNGT 500 235103 01BLACKO 500 1 OPEN BRANCH FROM BUS 235103 TO BUS 235130 CKT 1 / 235103 01BLACKO 500 235130 01BO_SVC 23.0 1 OPEN BRANCH FROM BUS 235446 TO BUS 235103 CKT 3 / 235446 01BLACKO 138 235103 01BLACKO 500 3 DECREASE BUS 235103 SHUNT BY 100.00 PERCENT /* 235103 01BLACKO 500 END
PN-P1-2-PN-115-068-A	CONTINGENCY 'PN-P1-2-PN-115-068-A' /* ROCKWOOD - SOMERSET 115KV DISCONNECT BRANCH FROM BUS 200744 TO BUS 965880 CKT 1 /* 26SOMERST 115 AG1-457 TAP 115 END
AP-P2-3-PE-500-014	CONTINGENCY "'AP-P2-3-PE-500-014'" / 181 OPEN BRANCH FROM BUS 235103 TO BUS 964990 CKT 1 / 235103 01BLACKO 500 964990 AG1-363 TAP 500 1 OPEN BRANCH FROM BUS 235446 TO BUS 235103 CKT 3 / 235446 01BLACKO 138 235103 01BLACKO 500 3 OPEN BRANCH FROM BUS 235103 TO BUS 235130 CKT 1 / 235103 01BLACKO 500 235130 01BO_SVC 23.0 1 DECREASE BUS 235103 SHUNT BY 100.00 PERCENT /* 235103 01BLACKO 500 END

Contingency Name	Contingency Definition
FE-P1-2-MP-138-160_NON	CONTINGENCY 'FE-P1-2-MP-138-160_NON' /* ALBRIGHT - AD1-068 -GARRETT 138KV DISCONNECT BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 /* 01ALBRIG 138 AD1- 068 TAP 138 DISCONNECT BRANCH FROM BUS 934440 TO BUS 235469 CKT 1 /* AD1-068 TAP 138 01GARRET 138 END
PN-P1-3-PN-115-025-A	CONTINGENCY 'PN-P1-3-PN-115-025-A' /* SOMERSET #1 XFMR FAULT DISCONNECT BRANCH FROM BUS 200744 TO BUS 200774 CKT 1 /* 26SOMERST 115 26SOMRSET1 23 DISCONNECT BRANCH FROM BUS 200744 TO BUS 965880 CKT 1 /* 26SOMERST 115 AG1-457 TAP 115 DISCONNECT BRANCH FROM BUS 200744 TO BUS 202637 CKT 1 /* 26SOMERST 115 26PRIDE 115 DISCONNECT BRANCH FROM BUS 202637 TO BUS 964920 CKT 1 /* 26PRIDE 115 AF1- 232 TAP 115 DISCONNECT BRANCH FROM BUS 200744 TO BUS 200743 CKT 1 /* 26SOMERST 115 26HOOVERSV 115 END
FE-P2-3-MP-138-161	CONTINGENCY "'FE-P2-3-MP-138-161'" / 145 OPEN BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 / 235120 01ALBRIG 138 235320 01DENVER 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 / 235120 01ALBRIG 138 235305 01 106 J 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 / 235120 01ALBRIG 138 934440 AD1-068 TAP 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 / 235120 01ALBRIG 138 235402 01SNOW T 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 960650 CKT 1 / 235120 01ALBRIG 138 960650 AF2-356 TAP 138 1 OPEN BRANCH FROM BUS 235492 TO BUS 235518 CKT 1 / 235492 01MTZION 138 235518 01WESTVA 138 1 END

Contingency Name	Contingency Definition
FE-P2-3-MP-138-160	CONTINGENCY "'FE-P2-3-MP-138-160"' / 144 OPEN BRANCH FROM BUS 235120 TO BUS 960650 CKT 1 / 235120 01ALBRIG 138 960650 AF2-356 TAP 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 235305 CKT 1 / 235120 01ALBRIG 138 235305 01 106 J 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 235320 CKT 1 / 235120 01ALBRIG 138 235320 01DENVER 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 934440 CKT 1 / 235120 01ALBRIG 138 934440 AD1-068 TAP 138 1 OPEN BRANCH FROM BUS 235120 TO BUS 235402 CKT 1 / 235120 01ALBRIG 138 235402 01SNOW T 138 1 OPEN BRANCH FROM BUS 235402 TO BUS 235403 CKT 1 / 235402 01SNOW T 138 235403 01SNWYCK 138 1 OPEN BRANCH FROM BUS 235402 TO BUS 235497 CKT 1 / 235402 01SNOW T 138 235497 01OAKPRK 138 1 OPEN BRANCH FROM BUS 235403 TO BUS 237273 CKT 1 / 235403 01SNWYCK 138 237273 01SNOW C 66.0 1 END
AP-P1-2-PE-500-001	CONTINGENCY 'AP-P1-2-PE-500-001' /* BEDINGTON - BLACK OAK 500KV DISCONNECT BRANCH FROM BUS 235101 TO BUS 235103 CKT 1 /* 01BEDNGT 500 01BLACKO 500 END

12 Short Circuit Analysis

The following Breakers are overdutied:

None

12.1 System Reinforcements - Short Circuit

None

13 Summer Peak - Load Flow Analysis – Secondary POI

Note that PJM did miss studying the network impacts for the specific secondary POI chosen. However, given the proximity to the primary POI, the results are not expected to differ significantly. If the secondary POI is selected, the network impacts will be analyzed in more detail in the System Impact phase.

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).

15 Attachment 1: One Line Diagram