Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-487

GILBERT 230 KV

20 MW Capacity / 20 MW Energy

January 2021

Table of Contents

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 JCPL.

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 Hunterdon County, New Jersey. 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 June 01, 2024. This study does not imply a TO commitment to this in-service date.

Queue Number	**AG1-487**
Project Name	GILBERT 230 KV
State	New Jersey
County	Hunterdon
Transmission Owner	JCPL
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 Point of Interconnection

AG1-487 will interconnect with the JCPL system by constructing a new direct connection to the Gilbert 230 kV 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.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AG1-487 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 Point of Interconnection

There is no secondary point of interconnection specified for AG1-487.

5 Cost Summary

The AG1-487 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$3,065,000
Total System Network Upgrade Costs	$94,407,662[1]
Total Costs	$97,472,662

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 and/or 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 constructing a new direct connection to the Gilbert 230 kV 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.

The project will also require non-direct connection upgrades at Gilbert substations.

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

Description	Total Cost
Install disconnect switch, dead-end structure, and associated facilities for generator lead line exit at interconnection substation.	$375,000
Expand bus at Gilbert 230 kV and install (1) new breaker and associated equipment	$2,690,000
Total Physical Interconnection Costs	**$3,065,000**

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 **18 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.

If the customer is ultimately responsible for network upgrades, then the schedule for those upgrades will be refined in future study phases. The customer would need to wait for those upgrades to be completed prior to commercial operation unless determined deliverable by an interim deliverability study. The elapsed time to complete any network upgrades is provided in the System Reinforcements table of this report.

8 Transmission Owner Analysis

8.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AG1-487 project did not contribute to any overloads on the FE transmission <100 kV system.

9 Interconnection Customer Requirements

9.1 System Protection

The IC must design it's 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 230 kV circuit breaker to protect the AG1-487 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 AG1-487 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

The Queue Project AG1-487 was evaluated as a 20 MW (Capacity 20 MW) injection at the Gilbert 230 kV substation in the JCPL area. Project AG1-487 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-487 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)

None

11.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
16514044 7	206236	28GILBERT	230.0	JCP&L	208091	SFLD	230.0	PPL	1	JC-P7-1-JCN-230-2	tower	801.0	112.7	113.71	DC	9.19
16514054 2	208091	SFLD	230.0	PPL	204686	27HOSNSACK	230.0	METED	1	JC-P7-1-JCN-230-2	tower	801.0	100.06	101.07	DC	9.19

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.

None

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
165140542	2	**SFLD 230.0 kV - 27HOSNSACK 230.0 kV Ckt 1**	PPL: **R-PL-0020 (2337) : Break the SUSQ-WESC 500kV line at Siegfried substation. Build a new 500kV yard with one 500/230kV Transformer at Siegfried substation.** **Project Type : CON** **Cost : $40,300,000** **Time Estimate : 48.0 Months**	$40,300,000
165140447	1	**28GILBERT 230.0 kV - SFLD 230.0 kV Ckt 1**	JCP&L: **JCP&L-AG1-F-0001 (2117) : External Rating: PPL to provide estimates on Springfield upgrades to meet or exceed 911 MVA STE.** **Reconductor (1) section of 1590 ACSR 45/7 MTDL at Gilbert with 1590 ACSS or equivalent to meet or exceed 911 MVA STE.** **Reconductor (2) sections of 1590 ACSR 45/7 subconductor circular at Gilbert wwith 1590 ACSS or equivalent to meet or exceed 911 MVA STE.** **Reconductor 11.32 miles of 1590 ACSR 45/7 transmission line from Gilbert to Springfield with 1590 ACSS or equivalent to meet or exceed 911 MVA STE.** **Project Type : FAC** **Cost : $53,357,662** **Time Estimate : 60.0 Months** **R-PL-0012 (2330) : Rebuild PPLs ~0.33 miles SFLD-GBRT 230kV line.** **Project Type : FAC** **Cost : $750,000** **Time Estimate : 24.0 Months**	$54,107,662
			TOTAL COST	**$94,407,662**

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
165140447	206236	28GILBERT	JCP&L	208091	SFLD	PPL	1	JC-P7-1-JCN-230-2	tower	801.0	112.7	113.71	DC	9.19

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
206330	28GILCT9	11.0185	50/50	11.0185
206340	28GIL 4&5	5.7185	50/50	5.7185
206341	28GIL 8	6.5241	50/50	6.5241
206342	28GIL 6&7	5.8353	50/50	5.8353
206345	28N27_Y2-018	0.2373	Adder	0.28
206671	28HOFFMAN	0.6315	Adder	0.74
206679	28M&M S721	0.9160	Adder	1.08
206719	28W4-073	0.2704	50/50	0.2704
206741	28FR_U2-059	0.0336	50/50	0.0336
206742	**28SUX_V3-011 (Deactivation : 26/04/2020)**	**0.1609**	**Adder**	**0.19**
206747	28DSM_X3-029	1.4082	Adder	1.66
206751	28HRM_W1-127	0.0479	50/50	0.0479
206757	28RH_W2-091	0.1222	50/50	0.1222
206759	28HOL_W4-097	0.0497	50/50	0.0497
207402	28AA2-082 E	4.9567	50/50	4.9567
207408	W3-077 C	0.1935	50/50	0.1935
207412	28AA2-060 E	0.4842	Adder	0.57
207413	28AA2-061 E	0.6457	Adder	0.76
207437	AD2-070 C	0.1549	50/50	0.1549
207438	AD2-070 E	1.2061	50/50	1.2061
207440	AE1-081 E O1	0.0968	Adder	0.11
208905	LMBE CT1	6.7901	50/50	6.7901
208906	LMBE CT2	6.7901	50/50	6.7901
208908	LMBE ST1	8.1413	50/50	8.1413
208909	MACR G3	28.8578	50/50	28.8578
208910	MACR G4	28.8578	50/50	28.8578
208943	HARW CT	1.7826	Adder	2.1
208946	MACR CT	2.1078	50/50	2.1078
209006	**NEPC IPP (Deactivation : 24/10/2018)**	**1.5728**	**Adder**	**1.85**
209028	**N31 IPP (Deactivation : 31/08/2019)**	**0.5948**	**Adder**	**0.7**
211369	W1-111 BAT	0.0066	Adder	0.01
211375	BEAC	1.3107	Adder	1.54
290131	U2-059E	0.3299	50/50	0.3299
902062	W1-127E	0.5056	50/50	0.5056
902292	W2-016E	1.3370	Adder	1.57
903632	W3-044 E OP1	0.1418	Adder	0.17
903672	W3-106 E	0.4911	Adder	0.58
903682	W3-110 E	0.3656	Adder	0.43

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
903962	W3-077 E	2.0012	50/50	2.0012
905442	W4-046 E	0.6976	Adder	0.82
905542	W4-064 E	0.1631	Adder	0.19
905602	W4-073 E	2.8120	50/50	2.8120
905762	W4-097 E	0.4873	50/50	0.4873
907012	X1-012 E	0.5060	Adder	0.6
921662	AA2-017 C (Suspended)	1.3565	Adder	1.6
921663	AA2-017 E (Suspended)	9.1110	Adder	10.72
924141	AB2-058 C	0.1222	50/50	0.1222
924142	AB2-058 E	1.3772	50/50	1.3772
933322	AC2-144 E (Suspended)	0.0244	Adder	0.03
933582	AC2-175 E	0.1156	Adder	0.14
935071	AD1-143 C1 (Suspended)	0.6978	Adder	0.82
935072	AD1-143 E1 (Suspended)	4.1822	Adder	4.92
935081	AD1-143 C2 (Suspended)	0.0244	Adder	0.03
935082	AD1-143 E2 (Suspended)	0.5856	Adder	0.69
935091	AD1-143 C3 (Suspended)	0.6978	Adder	0.82
935092	AD1-143 E3 (Suspended)	4.1822	Adder	4.92
935101	AD1-143 C4 (Suspended)	0.0244	Adder	0.03
935102	AD1-143 E4 (Suspended)	0.5856	Adder	0.69
937563	AD2-077 BAT	22.9200	Merchant Transmission	22.9200
938392	AE1-058_GEN1	17.6639	Adder	20.78
938393	AE1-058_GEN2	17.6639	Adder	20.78
938412	AE1-060 E	1.8937	Adder	2.23
939521	AE1-181 C	1.7694	Adder	2.08
939522	AE1-181 E	1.1796	Adder	1.39
940012	AE1-243 E	5.5394	50/50	5.5394
940441	AE2-028 C	0.0620	Adder	0.07
940442	AE2-028 E	0.0543	Adder	0.06
940592	AE2-046 E	1.7039	Adder	2.0
941751	AE2-175 C	5.4839	Adder	6.45
941752	AE2-175 E	3.6560	Adder	4.3
942251	AE2-237 C	1.5756	Adder	1.85
942252	AE2-237 E	6.3025	Adder	7.41
943482	AF1-019 E	1.6638	Adder	1.96
943551	AF1-026	0.5507	50/50	0.5507
944681	AF1-133 C	1.5155	Adder	1.78
944682	AF1-133 E	1.0103	Adder	1.19
945301	AF1-195	0.0725	50/50	0.0725
945311	AF1-196 1	0.2900	50/50	0.2900
945321	AF1-196 2	0.7612	50/50	0.7612
945921	AF1-257	0.0573	50/50	0.0573
946561	AF1-320 C O1	6.0033	Adder	7.06
946562	AF1-320 E O1	4.0022	Adder	4.71
946612	AF1-325 E	1.5200	Adder	1.79
946622	AF1-326 E (Withdrawn : 12/03/2020)	1.9239	Adder	2.26
946632	AF1-327 E (Withdrawn : 12/03/2020)	1.7682	Adder	2.08
946642	AF1-328 E O1	1.8265	Adder	2.15
957363	AF2-030 BAT	2.4536	Merchant Transmission	2.4536
958441	AF2-138 C	0.6884	Adder	0.81
958442	AF2-138 E	0.9507	Adder	1.12

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
958451	AF2-139 C	1.0378	50/50	1.0378
958452	AF2-139 E	1.4304	50/50	1.4304
959361	AF2-227 C	5.9921	Adder	7.05
959362	AF2-227 E	3.9947	Adder	4.7
959813	AF2-272 BAT	0.1640	Merchant Transmission	0.1640
959863	AF2-277 BAT	0.3622	50/50	0.3622
959903	AF2-281 BAT	0.1806	Merchant Transmission	0.1806
960631	AF2-354 C	0.5460	Adder	0.64
960632	AF2-354 E	0.7541	Adder	0.89
961301	AF2-421 C	0.7864	Adder	0.93
961302	AF2-421 E	0.5243	Adder	0.62
961373	AF2-428 BAT	0.1904	Merchant Transmission	0.1904
961383	AF2-429 BAT	0.1740	Merchant Transmission	0.1740
961393	AF2-430 BAT	0.1807	Merchant Transmission	0.1807
961403	AF2-431 BAT	0.1449	Merchant Transmission	0.1449
961511	AF2-442 NFTI	7.2845	Merchant Transmission	7.2845
961521	AF2-443 NFTI	7.2761	Merchant Transmission	7.2761
962171	AG1-062 C	0.4356	Adder	0.97
962172	AG1-062 E	0.2904	Adder	0.64
962662	AG1-115 BAT	6.0738	Merchant Transmission	6.0738
963082	AG1-157 E	0.2986	Adder	0.66
963151	AG1-164 C	0.4168	Adder	0.93
963152	AG1-164 E	0.2779	Adder	0.62
963161	AG1-165 C	0.4168	Adder	0.93
963162	AG1-165 E	0.2779	Adder	0.62
963421	AG1-191 C	0.2362	Adder	0.52
963422	AG1-191 E	0.3262	Adder	0.72
964071	AG1-262 C	8.6076	50/50	8.6076
964072	AG1-262 E	12.9114	50/50	12.9114
964091	AG1-267 C	0.6688	Adder	1.48
964092	AG1-267 E	1.0031	Adder	2.23
964161	AG1-277 C	1.1115	Adder	2.47
964162	AG1-277 E	0.2779	Adder	0.62
964171	AG1-278 C	0.5349	Adder	1.19
964172	AG1-278 E	0.1598	Adder	0.35
964181	AG1-279 C	0.5349	Adder	1.19
964182	AG1-279 E	0.1598	Adder	0.35
964221	AG1-283 C O1	1.0426	Adder	2.31
964222	AG1-283 E O1	0.6950	Adder	1.54
964851	AG1-348 C	0.5489	Adder	1.22
964852	AG1-348 E	0.7574	Adder	1.68
966111	AG1-480 C	1.1543	Adder	2.56
966112	AG1-480 E	0.0496	Adder	0.11
966181	AG1-487	9.1894	50/50	9.1894
966261	AG1-495 C	1.7221	50/50	1.7221
966262	AG1-495 E	2.3781	50/50	2.3781
966291	AG1-498 C	0.3053	Adder	0.68
966292	AG1-498 E	0.4208	Adder	0.93
966411	AG1-510 C O1	0.7214	Adder	1.6
966412	AG1-510 E O1	0.4810	Adder	1.07
966421	AG1-511 C O1	1.8875	Adder	4.19
966422	AG1-511 E O1	1.2583	Adder	2.79

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
G-007A	G-007A	6.1016	Confirmed LTF	6.1016
VFT	VFT	22.3041	Confirmed LTF	22.3041
CALDERWOOD	CALDERWOOD	0.4299	Confirmed LTF	0.4299
PRAIRIE	PRAIRIE	2.1491	Confirmed LTF	2.1491
CHEOAH	CHEOAH	0.4334	Confirmed LTF	0.4334
CBM-N	CBM-N	3.6840	Confirmed LTF	3.6840
COTTONWOOD	COTTONWOOD	1.7871	Confirmed LTF	1.7871
HAMLET	HAMLET	0.5290	Confirmed LTF	0.5290
GIBSON	GIBSON	0.4499	Confirmed LTF	0.4499
BLUEG	BLUEG	1.4305	Confirmed LTF	1.4305
TRIMBLE	TRIMBLE	0.4586	Confirmed LTF	0.4586
CATAWBA	CATAWBA	0.3147	Confirmed LTF	0.3147

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
165140542	208091	SFLD	PPL	204686	27HOSNSACK	METED	1	JC-P7-1-JCN-230-2	tower	801.0	100.06	101.07	DC	9.19

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
206330	28GILCT9	11.0185	50/50	11.0185
206340	28GIL 4&5	5.7185	50/50	5.7185
206341	28GIL 8	6.5241	50/50	6.5241
206342	28GIL 6&7	5.8353	50/50	5.8353
206345	28N27_Y2-018	0.2373	Adder	0.28
206671	28HOFFMAN	0.6315	Adder	0.74
206679	28M&M S721	0.9160	Adder	1.08
206719	28W4-073	0.2704	50/50	0.2704
206741	28FR_U2-059	0.0336	50/50	0.0336
206742	**28SUX_V3-011 (Deactivation : 26/04/2020)**	**0.1609**	**Adder**	**0.19**
206747	28DSM_X3-029	1.4082	Adder	1.66
206751	28HRM_W1-127	0.0479	50/50	0.0479
206757	28RH_W2-091	0.1222	50/50	0.1222
206759	28HOL_W4-097	0.0497	50/50	0.0497
207402	28AA2-082 E	4.9567	50/50	4.9567
207408	W3-077 C	0.1935	50/50	0.1935
207412	28AA2-060 E	0.4842	Adder	0.57
207413	28AA2-061 E	0.6457	Adder	0.76
207437	AD2-070 C	0.1549	50/50	0.1549
207438	AD2-070 E	1.2061	50/50	1.2061
207440	AE1-081 E O1	0.0968	Adder	0.11
208905	LMBE CT1	6.7901	50/50	6.7901
208906	LMBE CT2	6.7901	50/50	6.7901
208908	LMBE ST1	8.1413	50/50	8.1413
208909	MACR G3	28.8578	50/50	28.8578
208910	MACR G4	28.8578	50/50	28.8578
208943	HARW CT	1.7826	Adder	2.1
208946	MACR CT	2.1078	50/50	2.1078
209006	**NEPC IPP (Deactivation : 24/10/2018)**	**1.5728**	**Adder**	**1.85**
209028	**N31 IPP (Deactivation : 31/08/2019)**	**0.5948**	**Adder**	**0.7**
211369	W1-111 BAT	0.0066	Adder	0.01
211375	BEAC	1.3107	Adder	1.54
290131	U2-059E	0.3299	50/50	0.3299
902062	W1-127E	0.5056	50/50	0.5056
902292	W2-016E	1.3370	Adder	1.57
903632	W3-044 E OP1	0.1418	Adder	0.17
903672	W3-106 E	0.4911	Adder	0.58
903682	W3-110 E	0.3656	Adder	0.43

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
903962	W3-077 E	2.0012	50/50	2.0012
905442	W4-046 E	0.6976	Adder	0.82
905542	W4-064 E	0.1631	Adder	0.19
905602	W4-073 E	2.8120	50/50	2.8120
905762	W4-097 E	0.4873	50/50	0.4873
907012	X1-012 E	0.5060	Adder	0.6
921662	AA2-017 C (Suspended)	1.3565	Adder	1.6
921663	AA2-017 E (Suspended)	9.1110	Adder	10.72
924141	AB2-058 C	0.1222	50/50	0.1222
924142	AB2-058 E	1.3772	50/50	1.3772
933322	AC2-144 E (Suspended)	0.0244	Adder	0.03
933582	AC2-175 E	0.1156	Adder	0.14
935071	AD1-143 C1 (Suspended)	0.6978	Adder	0.82
935072	AD1-143 E1 (Suspended)	4.1822	Adder	4.92
935081	AD1-143 C2 (Suspended)	0.0244	Adder	0.03
935082	AD1-143 E2 (Suspended)	0.5856	Adder	0.69
935091	AD1-143 C3 (Suspended)	0.6978	Adder	0.82
935092	AD1-143 E3 (Suspended)	4.1822	Adder	4.92
935101	AD1-143 C4 (Suspended)	0.0244	Adder	0.03
935102	AD1-143 E4 (Suspended)	0.5856	Adder	0.69
937563	AD2-077 BAT	22.9200	Merchant Transmission	22.9200
938392	AE1-058_GEN1	17.6639	Adder	20.78
938393	AE1-058_GEN2	17.6639	Adder	20.78
938412	AE1-060 E	1.8937	Adder	2.23
939521	AE1-181 C	1.7694	Adder	2.08
939522	AE1-181 E	1.1796	Adder	1.39
940012	AE1-243 E	5.5394	50/50	5.5394
940441	AE2-028 C	0.0620	Adder	0.07
940442	AE2-028 E	0.0543	Adder	0.06
940592	AE2-046 E	1.7039	Adder	2.0
941751	AE2-175 C	5.4839	Adder	6.45
941752	AE2-175 E	3.6560	Adder	4.3
942251	AE2-237 C	1.5756	Adder	1.85
942252	AE2-237 E	6.3025	Adder	7.41
943482	AF1-019 E	1.6638	Adder	1.96
943551	AF1-026	0.5507	50/50	0.5507
944681	AF1-133 C	1.5155	Adder	1.78
944682	AF1-133 E	1.0103	Adder	1.19
945301	AF1-195	0.0725	50/50	0.0725
945311	AF1-196 1	0.2900	50/50	0.2900
945321	AF1-196 2	0.7612	50/50	0.7612
945921	AF1-257	0.0573	50/50	0.0573
946561	AF1-320 C O1	6.0033	Adder	7.06
946562	AF1-320 E O1	4.0022	Adder	4.71
946612	AF1-325 E	1.5200	Adder	1.79
946622	AF1-326 E (Withdrawn : 12/03/2020)	1.9239	Adder	2.26
946632	AF1-327 E (Withdrawn : 12/03/2020)	1.7682	Adder	2.08
946642	AF1-328 E O1	1.8265	Adder	2.15
957363	AF2-030 BAT	2.4536	Merchant Transmission	2.4536
958441	AF2-138 C	0.6884	Adder	0.81
958442	AF2-138 E	0.9507	Adder	1.12

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
958451	AF2-139 C	1.0378	50/50	1.0378
958452	AF2-139 E	1.4304	50/50	1.4304
959361	AF2-227 C	5.9921	Adder	7.05
959362	AF2-227 E	3.9947	Adder	4.7
959813	AF2-272 BAT	0.1640	Merchant Transmission	0.1640
959862	AF2-277 E	1.5171	50/50	1.5171
959903	AF2-281 BAT	0.1806	Merchant Transmission	0.1806
960631	AF2-354 C	0.5460	Adder	0.64
960632	AF2-354 E	0.7541	Adder	0.89
961301	AF2-421 C	0.7864	Adder	0.93
961302	AF2-421 E	0.5243	Adder	0.62
961373	AF2-428 BAT	0.1904	Merchant Transmission	0.1904
961383	AF2-429 BAT	0.1740	Merchant Transmission	0.1740
961393	AF2-430 BAT	0.1807	Merchant Transmission	0.1807
961403	AF2-431 BAT	0.1449	Merchant Transmission	0.1449
961511	AF2-442 NFTI	7.2845	Merchant Transmission	7.2845
961521	AF2-443 NFTI	7.2761	Merchant Transmission	7.2761
962171	AG1-062 C	0.4356	Adder	0.97
962172	AG1-062 E	0.2904	Adder	0.64
962662	AG1-115 BAT	6.0738	Merchant Transmission	6.0738
963082	AG1-157 E	0.2986	Adder	0.66
963151	AG1-164 C	0.4168	Adder	0.93
963152	AG1-164 E	0.2779	Adder	0.62
963161	AG1-165 C	0.4168	Adder	0.93
963162	AG1-165 E	0.2779	Adder	0.62
963421	AG1-191 C	0.2362	Adder	0.52
963422	AG1-191 E	0.3262	Adder	0.72
964071	AG1-262 C	8.6076	50/50	8.6076
964072	AG1-262 E	12.9114	50/50	12.9114
964091	AG1-267 C	0.6688	Adder	1.48
964092	AG1-267 E	1.0031	Adder	2.23
964161	AG1-277 C	1.1115	Adder	2.47
964162	AG1-277 E	0.2779	Adder	0.62
964171	AG1-278 C	0.5349	Adder	1.19
964172	AG1-278 E	0.1598	Adder	0.35
964181	AG1-279 C	0.5349	Adder	1.19
964182	AG1-279 E	0.1598	Adder	0.35
964221	AG1-283 C O1	1.0426	Adder	2.31
964222	AG1-283 E O1	0.6950	Adder	1.54
964851	AG1-348 C	0.5489	Adder	1.22
964852	AG1-348 E	0.7574	Adder	1.68
966111	AG1-480 C	1.1543	Adder	2.56
966112	AG1-480 E	0.0496	Adder	0.11
966181	AG1-487	9.1894	50/50	9.1894
966261	AG1-495 C	1.7221	50/50	1.7221
966262	AG1-495 E	2.3781	50/50	2.3781
966291	AG1-498 C	0.3053	Adder	0.68
966292	AG1-498 E	0.4208	Adder	0.93
966411	AG1-510 C O1	0.7214	Adder	1.6
966412	AG1-510 E O1	0.4810	Adder	1.07
966421	AG1-511 C O1	1.8875	Adder	4.19
966422	AG1-511 E O1	1.2583	Adder	2.79

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
G-007A	G-007A	6.1016	Confirmed LTF	6.1016
VFT	VFT	22.3041	Confirmed LTF	22.3041
CALDERWOOD	CALDERWOOD	0.4299	Confirmed LTF	0.4299
PRAIRIE	PRAIRIE	2.1491	Confirmed LTF	2.1491
CHEOAH	CHEOAH	0.4334	Confirmed LTF	0.4334
CBM-N	CBM-N	3.6840	Confirmed LTF	3.6840
COTTONWOOD	COTTONWOOD	1.7871	Confirmed LTF	1.7871
HAMLET	HAMLET	0.5290	Confirmed LTF	0.5290
GIBSON	GIBSON	0.4499	Confirmed LTF	0.4499
BLUEG	BLUEG	1.4305	Confirmed LTF	1.4305
TRIMBLE	TRIMBLE	0.4586	Confirmed LTF	0.4586
CATAWBA	CATAWBA	0.3147	Confirmed LTF	0.3147

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
AA2-017	East Palmerton-Acahela 69kV	Suspended
AA2-060	Branchville-Sussex #1 34kV	Engineering and Procurement
AA2-061	Branchville-Sussex #2 34.5kV	Engineering and Procurement
AA2-082	Alpha 34.5kV	In Service
AB2-058	Stewartsville 34.5kV	In Service
AC2-144	Newburgh 12.47kV	Suspended
AC2-175	Berkshire Solar 12 kV	Engineering and Procurement
AD1-143	Hauto-Siegfried 69 kV	Suspended
AD2-070	Gilbert-Morris Park 34.5kV	In Service
AD2-077	Buxmont 69 kV	Active
AE1-058	Frackville-Siegfried 230 kV	Active
AE1-060	Kittatinny-Newton 34.5 kV	Active
AE1-081	Landing 12.47 kV	In Service
AE1-181	St. Johns-Freeland 69 kV	Active
AE1-243	Warren Glen Storage 34.5 kV	Active
AE2-028	Broadway 12.47 kV	Active
AE2-046	Harwood-East Hazelton 69 kV	Active
AE2-175	Jackson-Long Pond 69 kV	Active
AE2-237	Vernon-Sugar Loaf #2 115 kV	Active
AF1-019	Branchville-Holiday Lakes 34.5 kV	Active
AF1-026	Edge Road Battery Storage (CIRs)	In Service
AF1-133	Pequest River-Richmond 34.5 kV	Engineering and Procurement
AF1-195	Gilbert CT9 230 kV	In Service
AF1-196	Gilbert CT 5-6-7 230 kV	In Service
AF1-257	Hawks 2 12 kV	Active
AF1-320	Merrill Creek 115 kV	Active
AF1-325	Sparta-Woodruff's Gap 34.5 kV	Active
AF1-326	Pohatcong-Newburgh 34.5 kV	Withdrawn
AF1-327	Pohatcong-Newburgh 34.5 kV	Withdrawn
AF1-328	Hackettstown-Pohatcong 34.5 kV	Active
AF2-030	Ontelaunee 230 kV	Active
AF2-138	Flanders-West Wharton 34.5 kV	Active
AF2-139	Gilbert-Warren Glen 34.5 kV	Active
AF2-227	Martins Creek–Cherry Hill 69 kV	Active
AF2-272	Bernville 13.2 kV	Engineering and Procurement
AF2-277	Richland 12.47 kV	Engineering and Procurement
AF2-281	Lynnville 13.2 kV	Engineering and Procurement
AF2-354	Washington 34.5 kV II	Engineering and Procurement
AF2-421	East Hazelton-Weatherly Tap 69	Active

Queue Number	Project Name	Status
AF2-428	West Boyertown 13.2 kV	Engineering and Procurement
AF2-429	South Hamburg 34.5 kV	Engineering and Procurement
AF2-430	Moselem 13.2 kV	Engineering and Procurement
AF2-431	Baldy 13.2 kV	Engineering and Procurement
AF2-442	Vernon 115 kV	Active
AF2-443	Vernon 115 kV	Active
AG1-062	Flanders-Pohatcong Mountain 34.5 kV	Active
AG1-115	Buxmont 69 kV	Active
AG1-157	Macungie-Emmaus Tie 69 kV	Active
AG1-164	East Hazelton-Weatherly Tap 69 kV	Active
AG1-165	East Hazelton-Weatherly Tap 69 kV	Active
AG1-191	Chester-Pohatcong Mountain 34.5 kV	Active
AG1-262	Lower Mount Bethel 230 kV	Active
AG1-267	Martins Creek 69 kV	Active
AG1-277	Salem-Beacon Power 69 kV	Active
AG1-278	Salem-Beacon Power 69 kV	Active
AG1-279	Salem-Beacon Power 69 kV	Active
AG1-283	Effort Mountain-Gilbert 138 kV	Active
AG1-348	Pequest River 34.5 kV	Active
AG1-480	Shawnee 34.5 kV	Active
AG1-487	Gilbert 230 kV	Active
AG1-495	Gilbert-Rocktown 34.5 kV	Active
AG1-498	Mount Bethel 12.47 kV	Active
AG1-510	Kittatinny-Blairstown 34.5 kV	Active
AG1-511	Kittatinny 230 kV	Active
U2-059	Foul Rift 13kV	In Service
V3-011	Sussex 12.47kV	In Service
W1-111	Harwood-Berwick 69kV	In Service
W1-127	Phillipsburg 12.47kV	In Service
W2-016	Frenchtown 34.5kV	In Service
W2-091	Broadway-Stewartsville 34.5kV	In Service
W3-044	Washington 34.5kV	In Service
W3-077	Broadway-Stewartsville 34.5kV	In Service
W3-106	Sussex-Wykertown 34.5kV	In Service
W3-110	Sussex	In Service
W4-046	Washington-Mobile Chemical 34.5kV	In Service
W4-064	N. Newton 12kV	In Service
W4-073	Phillipsburg 34.5kV	In Service
W4-097	Hawks 12.5kV	In Service
X1-012	Branchville-Sussex 34.5kV	In Service
X3-029	Belvidere	In Service
Y2-018	Pequest River 34.5kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
JC-P7-1-JCN-230-2	CONTINGENCY 'JC-P7-1-JCN-230-2' /* GILBERT-GLEN GARDNER & GILBERT-MORRISTOWN 230 KV V1036 C2003 DISCONNECT BRANCH FROM BUS 206236 TO BUS 206233 CKT 1 /* 28GILBERT 230 28G GARDNR 230 DISCONNECT BRANCH FROM BUS 206236 TO BUS 206375 CKT 1 /* 28GILBERT 230 28TEWKSBRY 230 DISCONNECT BRANCH FROM BUS 206375 TO BUS 206243 CKT 1 /* 28TEWKSBRY 230 28MO-TOWN 230 END

12 Short Circuit Analysis

The following Breakers are overdutied:

None.

12.1 System Reinforcements - Short Circuit

None.

13 Affected Systems

13.1 NYISO

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

14 Attachment 1: One Line Diagram