Generation Interconnection

System Impact Study Report

for

Queue Project AG1-348

PEQUEST RIVER-WASHINGTON 34.5 KV

8.316 MW Capacity / 19.8 MW Energy

August 2021

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1 Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 205, as well as the System Impact 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 System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. 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 System Impact Study is performed.

The System Impact 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.

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.

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Warren County, New Jersey. The installed facilities will have a total capability of 19.8 MW with 8.316 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 17, 2021. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-348
Project Name	PEQUEST RIVER-WASHINGTON 34.5 KV
State	New Jersey
County	Warren
Transmission Owner	JCPL
MFO	19.8
MWE	19.8
MWC	8.316
Fuel	Solar
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

AG1-348 will interconnect with the JCPL on distribution system tapping the Furnace Brook to Washington 34.5 kV line. AG1-348 will interconnect with the JCPL system by tapping the Pequest River - Washington 34.5 kV Line (circuit name) with a three-switch tap and constructing a one span 34.5 kV line extension. The transmission line tap will be located approximately 1.7 miles from Pequest River Substation and 6.1 miles from Washington 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 AG1-348 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.

5 Cost Summary

The AG1-348 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$1,943,174.41
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	$1,141,125.00
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	$0
Allocation towards System Network Upgrade Costs (TO Identified)*	$0
Total Costs	**$3,084,299.41**

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

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 88-129. 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.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start

with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

6 Transmission Owner Scope of Work

The interconnection of the project at the Primary POI will be accomplished system by tapping the Pequest River - Washington 34.5 kV Line with a three-switch tap and constructing a one span 34.5 kV line extension. The transmission line tap will be located approximately 1.7 miles from Pequest River Substation and 6.1 miles from Washington 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 total physical interconnection costs is given in the table below:

Description	Total Cost
Tap the Pequest River-Washington 34.5 kV Line approximately 1.7 miles from Pequest River and 6.1 miles from Washington to the customer facility and build a single span to point of interconnection with customer.	$1,645,527.69
Review relay settings. @ Washington	$35,114.33
Customer Substation Review. @ AG1-348	$44,581.65
Review relay settings.@ Pequest River	$35,114.33
Attachment Facilities - Tap the Pequest River-Washington 34.5 kV Line approximately 1.7 miles from Pequest River and 6.1 miles from Washington to the customer facility and build a single span to point of interconnection with customer.	$182,836.41
Total Physical Interconnection Costs	**$1,943,174.41**

7 Schedule

Based on the scope of work for the interconnection facilities, it is expected to take a minimum of **34 months** after the signing of an Interconnection Construction Service Agreement (or "Interconnection Agreement" if non-FERC) and construction kickoff call to complete the installation of the physical connection work. 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 interconnection work, and that all system outages will be allowed when requested.

The schedule for any required Network Impact Reinforcements will be more clearly identified in future study phases. The estimated time to complete each of the required reinforcements is identified in the "System Reinforcements" section of the report.

8 Transmission Owner Analysis

8.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AG1-348 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.

The IC has requested a non-standard GSU transformer winding configuration. This transformer is in violation of section 14.2.6 of FE's "Requirements for Transmission Connected Facilities" document and will not be accepted. The GSU transformer must have a grounded wye connection on the high (utility) side and a delta connection on the low (generator) side. The Customer one line diagram shows a transformer with a grounded wye winding on the low side.

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 34.5 kV circuit breaker to protect the AG1-348 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 AG1-348 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 Analysis

The Queue Project AG1-348 was evaluated as a 19.8 MW (Capacity 8.32 MW) injection tapping the Furnace Brook to Washington 34.5 kV line in the JCPL area. Project AG1-348 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-348 was studied with a commercial probability of 100.0 %. 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	CKT ID	CONTNAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
183338540	206230	28FLANDERS	115.0	JCP&L	206254	28WWHARTN	115.0	JCP&L	1	JC-P2-3-JCN-230-706	breaker	218.0	99.1	100.43	DC	2.89

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	CONTNAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
165999380	206246	28PEQUEST	115.0	JCP&L	206713	28DRKTN TP	115.0	JCP&L	1	JC-P2-3-JCN-230-706	breaker	245.0	101.94	103.35	DC	3.45
166601485	206258	28STNY BRK	115.0	JCP&L	206256	28WHIPPANY	115.0	JCP&L	1	JC-P7-1-JCN-230-14T	tower	185.0	104.8	105.66	AC	1.86

11.4 Steady-State Voltage Requirements

None.

11.5 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
183515782	206230	28FLANDERS	115.0	JCP&L	206254	28W WHARTN	115.0	JCP&L	1	JC-P1-3-JCN-230-001	operation	218.0	95.95	97.26	DC	2.87
167687311	206236	28GILBERT	230.0	JCP&L	208091	SFLD	230.0	METED	1	PL:20:P12:000096	operation	801.0	99.78	100.15	AC	4.06
183337214	206246	28PEQUEST	115.0	JCP&L	206713	28DRKTN TP	115.0	JCP&L	1	JC-P1-3-JCN-230-001	operation	245.0	99.04	100.45	DC	3.44

11.6 System Reinforcements

<table>
<tr><th>ID</th><th>Idx</th><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AG1-348</th><th>Upgrade Number</th></tr>
<tr><td>183338540</td><td>1</td><td>28FLANDERS 115.0 kV - 28W WHARTN 115.0 kV Ckt 1</td><td><u>JCP&L</u>
Project Id: n7598 (JC-AG1-S-0002)
Description: Replace existing sections of SPS AL 1.0 sub conductor circular at West Wharton with a conductor able to meet or exceed 220 MVA STE.
Project Type : FAC
Total Cost : $1,141,125
Time Estimate : 12.0 Months
Ratings : 181.0/223.0/223.0

<table><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost $</th></tr><tr><td>AG1-348</td><td>2.89</td><td>100%</td><td>$1,141,125</td></tr></table>
Note: Project AG1-348 is the driver for this reinforcement.</td><td>$1,141,125</td><td>$1,141,125</td><td>n7598</td></tr>
<tr><td>165999380</td><td>2</td><td>28PEQUEST 115.0 kV - 28DRKTN TP 115.0 kV Ckt 1</td><td><u>JCP&L</u>
Project Id: n7599 (JC-AG1-S-0004)
Description: Reconductor (1) section of 4/0 CU sub conductor circular at Drakes town with a conductor able to meet or exceed 254 MVA STE. Reconductor 14.18 miles of 556.5 ACSR 26/7 transmission line from Belvedere Tap to Drakes town with 795 ACSR or a conductor able to meet or exceed 254 MVA STE. Replace (1) 5 A thermal relay at Pequest River.
Project Type : FAC
Total Cost : $49,629,540
Time Estimate : 66.0 Months
Ratings : 232.0/282.0/282.0

Per PJM cost allocation rules, Queue Project AG1-348 presently does not receive cost allocation for this upgrade.

Note 1: As changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, Queue Project AG1-348 could receive cost allocation.

Note 2: Although Queue Project AG1-348 may not have cost responsibility for this upgrade, Queue Project AG1-348 may need this upgrade in-service to be deliverable to the PJM system. If Queue Project AG1-348 comes into service prior to completion of the upgrade, Queue Project AG1-348 will need an interim study.</td><td>$49,629,540</td><td>$0</td><td>n7599</td></tr>
</table>

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AG1-348	Upgrade Number
166601485	3	**28STNY BRK 115.0 kV - 28WHIPPANY 115.0 kV Ckt 1**	**JCP&L** **Project Id: n7600 (JC-AG1-S-0005)** **Description: Replace (1) 800 A Generic wave trap at Whippany.** **Project Type : FAC** **Total Cost : $ 134,250** **Time Estimate : 12.0 Months** **Ratings : 205.0/205.0/205.0** **Per PJM cost allocation rules, Queue Project AG1-348 presently does not receive cost allocation for this upgrade.** **Note 1: As changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, Queue Project AG1-348 could receive cost allocation.** **Note 2: Although Queue Project AG1-348 may not have cost responsibility for this upgrade, Queue Project AG1-348 may need this upgrade in-service to be deliverable to the PJM system. If Queue Project AG1-348 comes into service prior to completion of the upgrade, Queue Project AG1-348 will need an interim study.**	$134,250	$0	n7600
			TOTAL COST	**$50,904,915**	**$1,141,125**	

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

11.7 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".

11.7.1 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
183338540	206230	28FLANDERS	JCP&L	206254	28W WHARTN	JCP&L	1	JC-P2-3-JCN-230-706	breaker	218.0	99.1	100.43	DC	2.89

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
206345	28N27_Y2-018	0.29	80|50	0.29
206671	28HOFFMAN	0.83	80|50	0.83
206679	28M&M S721	1.39	80|50	1.39
206742	**28SUX_V3-011 (Deactivation : 26/04/2020)**	**-0.24**	**Adder**	**-0.28**
206747	28DSM_X3-029	1.85	80|50	1.85
207411	AA2-060 BAT	0.83	80|50	0.83
207414	AA2-061 BAT	1.11	80|50	1.11
290131	U2-059E	0.06	Adder	0.07
902062	W1-127E	0.08	Adder	0.09
903632	W3-044 E OP1	0.08	Adder	0.09
903962	W3-077 E	0.49	Adder	0.58
905442	W4-046 E	0.38	Adder	0.45
905602	W4-073 E	0.46	Adder	0.54
924142	AB2-058 E	0.34	Adder	0.4
940441	AE2-028 C	0.02	Adder	0.02
940442	AE2-028 E	0.02	Adder	0.02
942253	AE2-237 BAT	38.24	80|50	38.24
943483	AF1-019 BAT	1.79	Adder	2.11
944681	AF1-133 C	1.99	80|50	1.99
944682	AF1-133 E	1.33	80|50	1.33
946561	AF1-320 C O1	6.32	80|50	6.32
946562	AF1-320 E O1	4.21	80|50	4.21
946613	AF1-325 BAT	4.65	80|50	4.65
946642	AF1-328 E O1	1.03	Adder	1.21
958441	AF2-138 C	2.72	80|50	2.72
958442	AF2-138 E	3.76	80|50	3.76
960631	**AF2-354 C (Suspended)**	**0.3**	**Adder**	**0.35**
960632	**AF2-354 E (Suspended)**	**0.41**	**Adder**	**0.48**
961512	AF2-442 NFTW	29.66	80|50	29.66
961522	AF2-443 NFTW	30.02	80|50	30.02
962171	AG1-062 C	0.46	Adder	0.54
962172	AG1-062 E	0.31	Adder	0.36
964851	AG1-348 C	1.21	80|50	1.21
964852	AG1-348 E	1.67	80|50	1.67
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.0078	Confirmed LTF	0.0078
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0077	LTF/CBM	0.0077

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	0.1879	LTF/CBM	0.1879
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	0.3063	LTF/CBM	0.3063
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.1852	LTF/CBM	0.1852
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.0116	Confirmed LTF	0.0116
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	0.7011	LTF/CMTX NF	0.7011
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.0354	Confirmed LTF	0.0354
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0134	Confirmed LTF	0.0134
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	0.0338	Confirmed LTF	0.0338
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.2177	Confirmed LTF	0.2177
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	6.8051	LTF/CMTX NF	6.8051
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0022	Confirmed LTF	0.0022
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.0282	Confirmed LTF	0.0282
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	0.0068	Confirmed LTF	0.0068

11.7.2 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
165999380	206246	28PEQUEST	JCP&L	206713	28DRKTN TP	JCP&L	1	JC-P2-3-JCN-230-706	breaker	245.0	101.94	103.35	DC	3.45

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
204651	27PORT CT	0.58	80|50	0.58
206345	28N27_Y2-018	0.34	80|50	0.34
206671	28HOFFMAN	1.02	80|50	1.02
206679	28M&M S721	-0.78	Adder	-0.92
206742	**28SUX_V3-011 (Deactivation : 26/04/2020)**	**-0.2**	**Adder**	**-0.24**
206747	28DSM_X3-029	2.27	80|50	2.27
207402	28AA2-082 E	0.91	Adder	1.07
207411	AA2-060 BAT	0.67	80|50	0.67
207414	AA2-061 BAT	0.9	80|50	0.9
207438	AD2-070 E	0.21	Adder	0.25
290131	U2-059E	0.07	Adder	0.08
902062	W1-127E	0.1	Adder	0.12
903632	W3-044 E OP1	0.07	Adder	0.08
903962	W3-077 E	0.52	Adder	0.61
905442	W4-046 E	0.27	Adder	0.32
905602	W4-073 E	0.55	Adder	0.65
905762	W4-097 E	0.08	Adder	0.09
924142	AB2-058 E	0.36	Adder	0.42
940012	AE1-243 E	1.01	Adder	1.19
940441	AE2-028 C	0.02	Adder	0.02
940442	AE2-028 E	0.02	Adder	0.02
942253	AE2-237 BAT	28.53	80|50	28.53
943483	AF1-019 BAT	1.49	Adder	1.75
943551	AF1-026	0.1	Adder	0.12
944681	AF1-133 C	2.45	80|50	2.45
944682	AF1-133 E	1.63	80|50	1.63
945221	AF1-187	0.03	80|50	0.03
945921	AF1-257	0.01	Adder	0.01
946561	AF1-320 C O1	7.96	80|50	7.96
946562	AF1-320 E O1	5.3	80|50	5.3
946613	AF1-325 BAT	3.67	80|50	3.67
958451	AF2-139 C	0.18	Adder	0.21
958452	AF2-139 E	0.25	Adder	0.29
960631	**AF2-354 C (Suspended)**	**0.28**	**Adder**	**0.33**
960632	**AF2-354 E (Suspended)**	**0.39**	**Adder**	**0.46**
961512	AF2-442 NFTW	22.15	80|50	22.15
961522	AF2-443 NFTW	22.39	80|50	22.39
964851	AG1-348 C	1.45	80|50	1.45
964852	AG1-348 E	2.0	80|50	2.0

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.008	Confirmed LTF	0.008
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0078	LTF/CBM	0.0078
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	0.1915	LTF/CBM	0.1915
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	0.3092	LTF/CBM	0.3092
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.1875	LTF/CBM	0.1875
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.0119	Confirmed LTF	0.0119
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	0.7191	LTF/CMTX NF	0.7191
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.0359	Confirmed LTF	0.0359
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0135	Confirmed LTF	0.0135
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	0.0341	Confirmed LTF	0.0341
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.2217	Confirmed LTF	0.2217
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	6.8633	LTF/CMTX NF	6.8633
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0023	Confirmed LTF	0.0023
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.0286	Confirmed LTF	0.0286
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	0.0069	Confirmed LTF	0.0069

11.7.3 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
166601485	206258	28STNY BRK	JCP&L	206256	28WHIPPANY	JCP&L	1	JC-P7-1-JCN-230-14T	tower	185.0	104.8	105.66	AC	1.86

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
206345	28N27_Y2-018	0.15	Adder	0.18
206638	28PEAPACK	0.19	Adder	0.22
206671	28HOFFMAN	0.42	Adder	0.49
206679	28M&M S721	1.23	80|50	1.23
206742	**28SUX_V3-011 (Deactivation : 26/04/2020)**	**0.26**	**80|50**	**0.26**
206746	28WNG_W3-110	0.07	80|50	0.07
206747	28DSM_X3-029	0.95	Adder	1.12
206762	28FRD_X1-012	0.07	80|50	0.07
206763	28BVR_Y1-020	0.12	80|50	0.12
207412	28AA2-060 E	0.76	80|50	0.76
207413	28AA2-061 E	1.01	80|50	1.01
207440	AE1-081 E O1	0.11	Adder	0.13
903632	W3-044 E OP1	0.07	Adder	0.08
903672	W3-106 E	0.89	80|50	0.89
903682	W3-110 E	0.73	80|50	0.73
903962	W3-077 E	0.45	Adder	0.53
905442	W4-046 E	0.41	Adder	0.48
905542	W4-064 E	0.08	Adder	0.09
907012	X1-012 E	0.7	80|50	0.7
924142	AB2-058 E	0.31	Adder	0.36
933582	AC2-175 E	0.13	Adder	0.15
940441	AE2-028 C	0.02	Adder	0.02
940442	AE2-028 E	0.02	Adder	0.02
942251	AE2-237 C	5.68	80|50	5.68
942252	AE2-237 E	22.74	80|50	22.74
943482	AF1-019 E	1.54	Adder	1.81
944681	AF1-133 C	1.02	Adder	1.2
944682	AF1-133 E	0.68	Adder	0.8
946561	AF1-320 C O1	3.15	Adder	3.71
946562	AF1-320 E O1	2.1	Adder	2.47
946612	AF1-325 E	3.88	80|50	3.88
946642	AF1-328 E O1	1.59	Adder	1.87
958441	AF2-138 C	1.56	80|50	1.56
958442	AF2-138 E	2.16	80|50	2.16
960631	**AF2-354 C (Suspended)**	**0.29**	**Adder**	**0.34**
960632	**AF2-354 E (Suspended)**	**0.4**	**Adder**	**0.47**
961511	AF2-442 NFTI	22.1	80|50	22.1
961521	AF2-443 NFTI	22.31	80|50	22.31
962171	AG1-062 C	0.71	Adder	0.84

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
962172	AG1-062 E	0.48	Adder	0.56
963421	AG1-191 C	0.49	Adder	0.58
963422	AG1-191 E	0.67	Adder	0.79
964851	AG1-348 C	0.66	Adder	0.78
964852	AG1-348 E	0.92	Adder	1.08
LTFEXP_AA2-074	LTFEXP_AA2-074->LTFIMP_AA2-074	0.0156	Confirmed LTF	0.0156
LTFEXP_CBM-S1	LTFEXP_CBM-S1->LTFIMP_CBM-S1	0.0161	LTF/CBM	0.0161
LTFEXP_CBM-S2	LTFEXP_CBM-S2->LTFIMP_CBM-S2	0.3824	LTF/CBM	0.3824
LTFEXP_CBM-W1	LTFEXP_CBM-W1->LTFIMP_CBM-W1	0.6494	LTF/CBM	0.6494
LTFEXP_CBM-W2	LTFEXP_CBM-W2->LTFIMP_CBM-W2	0.3882	LTF/CBM	0.3882
LTFEXP_CPLE	LTFEXP_CPLE->LTFIMP_CPLE	0.0234	Confirmed LTF	0.0234
LTFEXP_G-007	LTFEXP_G-007->LTFIMP_G-007	1.57	LTF/CMTX NF	1.57
LTFEXP_LAGN	LTFEXP_LAGN->LTFIMP_LAGN	0.0739	Confirmed LTF	0.0739
LTFEXP_LGEE	LTFEXP_LGEE->LTFIMP_LGEE	0.0282	Confirmed LTF	0.0282
LTFEXP_MEC	LTFEXP_MEC->LTFIMP_MEC	0.0712	Confirmed LTF	0.0712
LTFEXP_NY	LTFEXP_NY->LTFIMP_NY	0.4774	Confirmed LTF	0.4774
LTFEXP_O-066	LTFEXP_O-066->LTFIMP_O-066	15.2179	LTF/CMTX NF	15.2179
LTFEXP_SIGE	LTFEXP_SIGE->LTFIMP_SIGE	0.0047	Confirmed LTF	0.0047
LTFEXP_TVA	LTFEXP_TVA->LTFIMP_TVA	0.0587	Confirmed LTF	0.0587
LTFEXP_WEC	LTFEXP_WEC->LTFIMP_WEC	0.0144	Confirmed LTF	0.0144

11.8 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
AA2-060	Branchville-Sussex #1 34kV	Engineering and Procurement
AA2-061	Branchville-Sussex #2 34.5kV	Engineering and Procurement
AA2-074	CPLE-PJM	Confirmed
AA2-082	Alpha 34.5kV	In Service
AB2-058	Stewartsville 34.5kV	In Service
AC2-175	Berkshire Solar 12 kV	Under Construction
AD2-070	Gilbert-Morris Park 34.5kV	In Service
AE1-081	Landing 12.47 kV	In Service
AE1-243	Warren Glen Storage 34.5 kV	Active
AE2-028	Broadway 12.47 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
AF1-187	Portland 3 & 4 115 kV	Partially in Service - Under Construction
AF1-257	Hawks 2 12 kV	Active
AF1-320	Merrill Creek 115 kV	Active
AF1-325	Sparta-Woodruff's Gap 34.5 kV	Active
AF1-328	Hackettstown-Pohatcong 34.5 kV	Active
AF2-138	Flanders-West Wharton 34.5 kV	Active
AF2-139	Gilbert-Warren Glen 34.5 kV	Active
AF2-354	Washington 34.5 kV II	Suspended
AF2-442	Vernon 115 kV	Active
AF2-443	Vernon 115 kV	Active
AG1-062	Flanders-Pohatcong Mountain 34.5 kV	Active
AG1-191	Chester-Pohatcong Mountain 34.5 kV	Active
AG1-348	Pequest River-Washington 34.5 kV	Active
U2-059	Foul Rift 13kV	In Service
V3-011	Sussex 12.47kV	In Service
W1-127	Phillipsburg 12.47kV	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

Queue Number	Project Name	Status
X3-029	Belvidere	In Service
Y1-020	Sussex 34kV	In Service
Y2-018	Pequest River 34.5kV	In Service

11.9 Contingency Descriptions

Contingency Name	Contingency Definition
JC-P7-1-JCN-230-14T	CONTINGENCY 'JC-P7-1-JCN-230-14T' /* PORTLAND-GREYSTONE & GREYSTONE-W.WHARTON 230 KV S1007 E1045 DISCONNECT BRANCH FROM BUS 206241 TO BUS 204510 CKT 1 /* 28GRYSTN Q 230 27PORTLAND 230 REMOVE LOAD 3 FROM BUS 206241 /* 28GRYSTN Q 230 DISCONNECT BRANCH FROM BUS 206240 TO BUS 206255 CKT 1 /* 28GRYSTN J 230 28W WHRTN 230 DISCONNECT BRANCH FROM BUS 206255 TO BUS 206203 CKT 4 /* 28W WHRTN 230 28W WHRTN 35 END
JC-P2-3-JCN-230-706	CONTINGENCY 'JC-P2-3-JCN-230-706' /* WEST WHARTON 230 BRKR 1A3 - A2001 WW1 WW3 (WW BKR 1A3) DISCONNECT BRANCH FROM BUS 206255 TO BUS 206377 CKT ZL /* 28W WHRTN 230 28DOTWHART 230 A2001 DISCONNECT BRANCH FROM BUS 206377 TO BUS 206374 CKT 1 /* 28DOTWHART 230 28ELASTMLD 230 A2001 DISCONNECT BRANCH FROM BUS 206374 TO BUS 206247 CKT 1 /* 28ELASTMLD 230 28POHATCNG 230 A2001 DISCONNECT BRANCH FROM BUS 206255 TO BUS 206254 CKT 3 /* 28W WHRTN 230 28W WHRTN 115 W WHRTN #3 DISCONNECT BRANCH FROM BUS 206255 TO BUS 206203 CKT 1 /* 28W WHRTN 230 28W WHRTN 35 W WHRTN #1 /* SET PRECONTRATING 650 BRANCH FROM BUS 206228 TO BUS 206255 CKT 1 /* 28CHESTER 230 28W WHRTN 230 RATEA DERATE H2034 /* SET POSTCONTRATING 813 BRANCH FROM BUS 206228 TO BUS 206255 CKT 1/* 28CHESTER 230 28W WHRTN 230 RATEB DERATE H2034 END
JC-P2-3-JCN-230-701	CONTINGENCY 'JC-P2-3-JCN-230-701' /* WEST WHARTON 230 BRKR AH - A2001 H2034 WW2 CH4 (WW BKR AH) DISCONNECT BRANCH FROM BUS 206255 TO BUS 206377 CKT ZL /* 28W WHRTN 230 28DOTWHART 230 A2001 DISCONNECT BRANCH FROM BUS 206377 TO BUS 206374 CKT 1 /* 28DOTWHART 230 28ELASTMLD 230 A2001 DISCONNECT BRANCH FROM BUS 206374 TO BUS 206247 CKT 1 /* 28ELASTMLD 230 28POHATCNG 230 A2001 DISCONNECT BRANCH FROM BUS 206255 TO BUS 206228 CKT 1 /* 28W WHRTN 230 28CHESTER 230 H2034 DISCONNECT BRANCH FROM BUS 206228 TO BUS 206212 CKT 4 /* 28CHESTER 230 28CHESTER 35 CHESTER #4 DISCONNECT BRANCH FROM BUS 206255 TO BUS 206203 CKT 2 /* 28W WHRTN 230 28W WHRTN 35 W WHRTN #2 END

Contingency Name	Contingency Definition
JC-P1-3-JCN-230-001	CONTINGENCY 'JC-P1-3-JCN-230-001' /* WEST WHARTON 230/115 BK 3 & 230/34.5 BK 1 DISCONNECT BRANCH FROM BUS 206255 TO BUS 206254 CKT 3 /* 28W WHRTN 230 28W WHARTN 115 DISCONNECT BRANCH FROM BUS 206255 TO BUS 206203 CKT 1 /* 28W WHRTN 230 28W WHRTN 35 /* SET PRECONTRATING 678 BRANCH FROM BUS 206377 TO BUS 206255 CKT ZL/* 28DOTWWHART 230.00 - 28W WHRTN 230.00 RATEA DERATE A2001 /* SET POSTCONTRATING 813 BRANCH FROM BUS 206377 TO BUS 206255 CKT ZL/* 28DOTWWHART 230.00 - 28W WHRTN 230.00 RATEB DERATE A2001 END
JC-P7-1-JCN-230-17T	CONTINGENCY 'JC-P7-1-JCN-230-17T' /* PORTLAND-GREYSTONE & KITTATINNY-POHATCONG 230 KV S1007 L2012 DISCONNECT BRANCH FROM BUS 204510 TO BUS 206241 CKT 1 /* 27PORTLAND 230 28GRYSTN Q 230 REMOVE LOAD 3 FROM BUS 206241 /* 28GRYSTN Q 230 DISCONNECT BRANCH FROM BUS 206242 TO BUS 206247 CKT 1 /* 28KITATINY 230 28POHATCNG 230 DISCONNECT BRANCH FROM BUS 206247 TO BUS 206219 CKT 1 /* 28POHATCNG 230 28POHATCNG 35 END
JC-P7-1-JCN-230-13	CONTINGENCY 'JC-P7-1-JCN-230-13' /* POHATCONG-W.WHARTON & CHESTER-W.WHARTON 230 KV L2012 H2034 DISCONNECT BRANCH FROM BUS 206374 TO BUS 206377 CKT 1 /* 28ELASTMLD 230 28DOTWHART 230 DISCONNECT BRANCH FROM BUS 206377 TO BUS 206255 CKT ZL /* 28DOTWHART 230 28W WHRTN 230 REMOVE LOAD C FROM BUS 206374 /* 28ELASTMLD 230 REMOVE LOAD C FROM BUS 206377 /* 28DOTWHART 230 DISCONNECT BRANCH FROM BUS 206247 TO BUS 206374 CKT 1 /* 28POHATCNG 230 28ELASTMLD 230 DISCONNECT BRANCH FROM BUS 206228 TO BUS 206255 CKT 1 /* 28CHESTER 230 28W WHRTN 230 DISCONNECT BRANCH FROM BUS 206228 TO BUS 206212 CKT 4 /* 28CHESTER 230 28CHESTER 35 DISCONNECT BRANCH FROM BUS 206203 TO BUS 206255 CKT 2 /* 28W WHRTN 35 28W WHRTN 230 /* SET PRECONTRATING 678 BRANCH FROM BUS 206377 TO BUS 206255 CKT ZL/* 28DOTWHART 230 28W WHRTN 230 RATEA DERATE A2001 /* SET POSTCONTRATING 813 BRANCH FROM BUS 206377 TO BUS 206255 CKT ZL/* 28DOTWHART 230 28W WHRTN 230 RATEB DERATE A2001 END
PL:20:P12:000096	CONTINGENCY 'PL:20:P12:000096' /* HOSE-STCI 500KV LINE DISCONNECT BRANCH FROM BUS 200008 TO BUS 200043 CKT 1 /* HOSENSAK-STEELCTY 500 END

12 Light Load Analysis

Light load is not required for solar projects.

13 Short Circuit Analysis

The following Breakers are overdutied:

None.

13.1 System Reinforcements - Short Circuit

None.

14 Stability and Reactive Power

(Summary of the VAR requirements based upon the results of the dynamic studies)

Stability analysis is not required for this project.

15 Affected Systems

15.1 NYISO

No impacts.

16 Attachment 1: One Line Diagram