REVISED
Generation Interconnection
System Impact Study Report for
PJM Generation Interconnection Request
Queue Position AC2-141

Septa 500kV
168.2 MW Capacity / 240 MW Energy

July 2021

Introduction

This System Impact Study (SIS) has been prepared in accordance with the PJM Open Access Transmission Tariff, Section 205, as well as the System Impact Study Agreement between sPower Development Company, LLC, the Interconnection Customer (IC) and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company (VEPCO).

Revision since May 2018 Report

This revision incorporates the re-tool analysis performed in June 2021. Results were re-tooled based on updated queue information. Please see Network Impacts section for revised results.

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 IC. As a requirement for interconnection, the IC 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 IC 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 IC 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.

General

The IC has proposed an uprate to a planned solar generating facility to be located in Isle of Wight County, VA. The project is an increase to the IC's AC1-161 project, which will share the same point of interconnection. The AC2-141 queue position is a 240 MW uprate (168.2 MW Capacity uprate) to the previous project. The total installed facilities will have a capability of 480 MW with 316.76 MW of this output being recognized by PJM as capacity. The customer's original proposed in-service date for this project is 10/01/2019. This commercial operation date will be updated in the final ISA agreement. **This study does not imply an ITO commitment to this in-service date.**

Point of Interconnection

AC2-141 will interconnect with the ITO transmission system at Septa 500kV substation

Cost Summary

The AC2-141 interconnection request will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$0
Direct Connection Network Upgrades	$0
Non Direct Connection Network Upgrades	$0
Allocation for New System Upgrades	$0
Contribution for Previously Identified Upgrades	$0 [1]
Total Costs	**$0**

[1] AC2-141 needs Network Upgrade n5483 (Replace wave traps at Ladysmith and Elmont Substations for Ladysmith-Elmont 500 kV line #574 to increase ratings to 2913 MVA (normal), 2913 MVA (emergency) and 3351 (load dump)) before going into Commercial Operation. This upgrade has been identified in the AC1-161 ISA. That ISA will be superseded with a new ISA including both AC1-161 and AC2-141. If the customer desires to go into service prior to the n5483 upgrade being complete, they will need an interim deliverability study for each year until the upgrade is in-service.

Transmission Owner Scope of Work

Attachment Facilities

The existing AC1-161 scope of work is sufficient to accommodate this queue request from an Attachment Facilities and substation expansion perspective. The single line is shown below in Attachment 1.

New System Reinforcements

PJM OATT 217.3 outlines cost responsibility for Network Upgrades and as the minimum amount of Network Upgrades required to resolve a single reliability criteria violation will not meet or exceed $5,000,000 such costs shall be allocated to those Interconnection Requests in the New Services Queue that contribute to the need for such upgrades. Such allocations shall be made in proportion to each Interconnection Request's megawatt contribution to the need for these upgrades subject to the rules for minimum cost allocation thresholds in the PJM Manuals. For the purpose of applying the $5,000,000 threshold, each reliability criteria violation shall be considered separately.

Interconnection Customer Requirements

ITO's Facility Interconnection Requirements as posted on PJM's website
http://www.pjm.com/~/media/planning/plan-standards/private-dominion/facility-connection-requirements1.ashx

An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

Voltage Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for voltages and times as specified for the Eastern Interconnection in Attachment 1 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low voltage conditions, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Frequency Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for frequencies and times as specified in Attachment 2 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low frequency condition, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Reactive Power - The Generation Interconnection Customer shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging measured at the generator's terminals.

Meteorological Data Reporting Requirement - The solar generation facility shall, at a minimum, be required to provide the Transmission Provider with site-specific meteorological data including:

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

Revenue Metering and SCADA Requirements

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 Sections 24.1 and 24.2.

Interconnected Transmission Owner Requirements

Metering and SCADA/Communication equipment must meet the requirements outlined in section 3.1.6 Metering and Telecommunications of ITO's Facility Connection Requirement NERC Standard FAC-001 which is publically available at www.dominionenergy.com.

Network Impacts

The Queue Project AC2-141 was evaluated as a 240.0 MW (Capacity 168.2 MW) injection at Septa 500kV substation in the VAP area. Project AC2-141 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-141 was studied with a commercial probability of 100%. Potential network impacts were as follows:

PJM assessed the impact of the proposed Queue Project as an injection into the ITO, for compliance with NERC Reliability Criteria. The system was assessed using the summer 2021 RTEP case. When performing analysis, ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under single contingency (normal and stressed system conditions). A full listing of the ITO's Planning Criteria and interconnection requirements can be found in the ITO's Facility Connection Requirements which are publicly available at: http://www.dominionenergy.com.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically NERC Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For ITO Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating. The results of these studies are discussed in more detail below.

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
LN 557	CONTINGENCY 'LN 557' OPEN BRANCH FROM BUS 314214 TO BUS 314903 CKT 1 /* 6CHCKAHM 230.00 - 8CHCKAHM 500.00 OPEN BRANCH FROM BUS 314903 TO BUS 314908 CKT 1 /* 8CHCKAHM 500.00 - 8ELMONT 500.00 END
LN 563	CONTINGENCY 'LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
LN 573	CONTINGENCY 'LN 573' OPEN BRANCH FROM BUS 314918 TO BUS 314934 CKT 1 /* 8NO ANNA 500.00 - 8SPOTSYL 500.00 END
LN 574	CONTINGENCY 'LN 574' OPEN BRANCH FROM BUS 314908 TO BUS 314911 CKT 1 /* 8ELMONT 500.00 - 8LDYSMTH 500.00 END
LN 576	CONTINGENCY 'LN 576' OPEN BRANCH FROM BUS 314322 TO BUS 314914 CKT 1 /* 6MDLTHAN 230.00 - 8MDLTHAN 500.00 OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /* 8MDLTHAN 500.00 - 8NO ANNA 500.00 END
LN 581	CONTINGENCY 'LN 581' OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE 115.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE 500.00 - 8LDYSMTH 500.00 END
LN 594	CONTINGENCY 'LN 594' OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00 END

Summer Peak Analysis – 2020

Generator Deliverability

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

Overload Number	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
1	N-1	LN 594	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	AC	98.55	99.66	ER	2442	31.85	1

Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

Multiple Facility Contingency

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

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Contributions to previously identified circuit breakers found to be over-duty:

None

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)

Overload Number	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
2	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	AC	113	114.88	ER	2442	53.77	2
3	N-1	LN 563	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	AC	100.51	102.44	ER	2442	46.63	

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

None

Stability and Reactive Power Requirement for Low Voltage Ride Through

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

No mitigations were found to be required. See Appendix 3 for Stability Study Executive Summary.

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.

Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

Overload Number	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
4	N-1	LN 557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	AC	100.01	103.16	ER	2442	74.96	
5	N-1	LN 576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	AC	97.02	100.53	ER	2442	85.21	
6	N-1	LN 594	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	AC	111.67	113.25	ER	2442	45.45	
7	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	AC	132.58	135.25	ER	2442	76.72	
8	N-1	LN 573	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	AC	100.55	101.98	ER	2738	46.14	
9	N-1	LN 594	DVP - DVP	8LDYSMTH-8POSSUM 500 kV line	314911	314922	1	AC	104.69	106.07	ER	2442	39.58	
10	N-1	LN 574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	AC	105.9	108.76	ER	2442	68.66	
11	N-1	LN 581	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	AC	98.08	99.62	ER	3219	48.89	

Light Load Analysis in 2020

Not required

System Reinforcements

Short Circuit
(Summary form of Cost allocation for breakers will be inserted here if any)

None

Stability and Reactive Power Requirement
(Results of the dynamic studies should be inserted here)

None required. See Appendix 3 for Stability Study Executive Summary.

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements
(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

None

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost	AC2-141 Allocation
# 2,3	8ELMONT - 8LDYSMTH 500 kV line	Replace wave traps at both Ladysmith and Elmont substations for the Ladysmith – Elmont 500kV line #574 to increase ratings to 2913 MVA (normal), 2913 MVA (emergency), and 3351 MVA (load dump). **Queue Project AC2-141 presently does not receive cost allocation for the Network Upgrade. As changes in the interconnection process occur, such as projects withdrawing from the queue, AC2-141 could get cost allocation towards this Network Upgrade.** **Although Queue Project AC2-141 may not have cost responsibility for this upgrade, Queue Project AC2-141 may need this upgrade in service to be deliverable to the PJM system. If Queue Project AC2- 141 comes into service prior to completion of the upgrade, an interim study will be required.**	N5483	$700,000	**$0**
				Total New Network Upgrades	**$0**

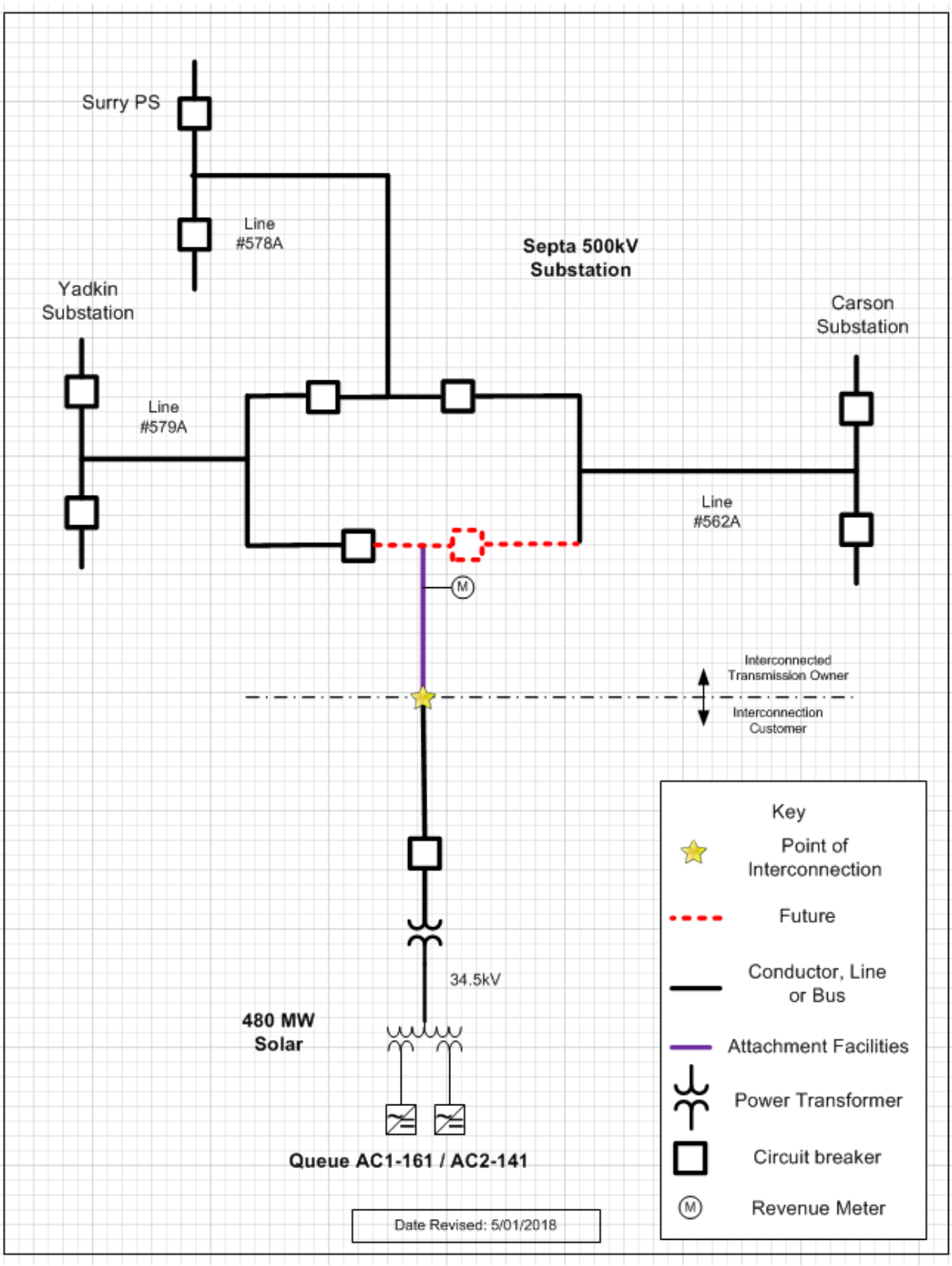
Affected System Analysis & Mitigation

Duke Energy:

None identified

Attachment 1.

System Configuration



Appendices

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the Appendices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the Appendices. 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 and appendices sections are full contributions, whereas the loading percentages reported in the body of the report, take into consideration the commercial probability of each project as well as the ramping impact of "Adder" contributions.

Appendix 1

(DVP - DVP) The 8CHANCE-8BRISTER 500 kV line (from bus 314905 to bus 314900 ckt 1) loads from 98.55% to 99.66% (AC power flow) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 594'. This project contributes approximately 31.85 MW to the thermal violation.

CONTINGENCY 'LN 594'
OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00
END

Bus Number	Bus Name	Full Contribution	Project Status
315053	1BELMED1	3.32	
315054	1BELMED2	3.32	
315055	1BELMED3	2.76	
315060	1CHESTF5	11.78	
315061	1CHESTG7	4.62	
315067	1DARBY 1	3.02	
315068	1DARBY 2	3.03	
315069	1DARBY 3	3.07	
315070	1DARBY 4	3.07	
315043	1FRIVERA	4.08	
315044	1FRIVERB	3.15	
315045	1FRIVERC	4.08	
315046	1FRIVERD	3.15	
315047	1FRIVERE	3.15	
315048	1FRIVERF	4.08	
315225	1N ANNA1	45.95	
315226	1N ANNA2	45.24	
315083	1SPRUNCA	2.03	
315084	1SPRUNCB	2.03	
315085	1SPRUNCC	1.51	
315086	1SPRUNCD	1.51	
314309	6IRON208	0.46	
314236	6NRTHEST	0.22	
314251	6S PUMP	1.05	
932041	AC2-012 C O1	10.67	EP
932501	AC2-070 C	1.83	W
932581	AC2-078 C O1	4.27	W
932591	AC2-079 C O1	5.96	EP
932631	AC2-084 C	6.15	Active
932831	AC2-110 C	1.42	EP

933011	AC2-125	2.88	IS
933021	AC2-126	2.9	IS
933061	AC2-130	2.57	IS
933261	AC2-137 C	2.24	UC-ISP
933271	AC2-138 C	0.78	IS
933291	AC2-141 C O1	31.85	Active
933501	AC2-165 C	8.94	Suspended
933731	AC2-196 C	1.86	W
315074	CIR_AB2-152	10.38	
297087	V2-040	0.14	IS
921162	AA1-063AC	8.2	W
921292	AA1-083	0.71	IS
921622	AA1-145	12.15	IS
921752	AA2-053 C	8.31	IS
921762	AA2-057 C	6.5	IS
921982	AA2-088 C	6.37	IS
922442	AA2-165 C	0.89	IS
922512	AA2-174 C	0.38	IS
922532	AA2-178 C	9.59	IS
922682	AB1-027 C	2.78	IS
923262	AB1-132 C OP	13.41	EP
923572	AB1-173 C OP	2.16	UC
923582	AB1-173AC OP	2.16	UC
923801	AB2-015 C OP	8.64	EP
923831	AB2-022 C	2.37	UC
923841	AB2-024 C	2.63	IS
923851	AB2-025 C	2.46	IS
923861	AB2-026 C	2.32	IS
923911	AB2-031 C OP	2.15	UC
923991	AB2-040 C OP	7.05	EP
924061	AB2-050	3.99	IS
924501	AB2-099 C	0.57	Suspended
924511	AB2-100 C	11.28	UC-ISP
924811	AB2-134 C OP	13.69	IS
925051	AB2-160 C OP	5.78	EP
925061	AB2-161 C OP	3.53	EP
925171	AB2-174 C O1	6.76	IS
925331	AB2-190 C	21.33	UC
926261	AC1-027 C	2.09	IS

926591	AC1-060	0.08	IS
926601	AC1-061	0.04	IS
926621	AC1-063	0.41	IS
926641	AC1-065 C	3.56	EP
926751	AC1-076 C	4.71	EP
926851	AC1-086 C	19.75	Active
926981	AC1-099 C	7.68	Suspended
927061	AC1-107 OP	324.83	EP
927181	AC1-112 C	2.16	IS
927251	AC1-118 C	1.98	IS
927411	AC1-134	9.97	IS
927561	AC1-147 C	2.36	UC
927681	AC1-158 C	88.23	UC-ISP
927711	AC1-161 C OP	31.85	EP
927741	AC1-164 C OP	43.23	
927991	AC1-189 C	7.91	Active
928011	AC1-191 C OP	10.2	Active
928191	AC1-208 C O1	8.39	Suspended
928271	AC1-216 C OP	10.45	UC-ISP

Appendix 2

(DVP - DVP) The 8ELMONT-8LDYSMTH 500 kV line (from bus 314908 to bus 314911 ckt 1) loads from 113.0% to 114.88% (AC power flow) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 576'. This project contributes approximately 53.77 MW to the thermal violation.

CONTINGENCY 'LN 576'
OPEN BRANCH FROM BUS 314322 TO BUS 314914 CKT 1 /* 6MDLTHAN 230.00 - 8MDLTHAN 500.00
OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /* 8MDLTHAN 500.00 - 8NO ANNA 500.00
END

Bus Number	Bus Name	Full Contribution	Project Status
315054	1BELMED2	5.49	
315058	1CHESTF3	5.82	
315059	1CHESTF4	9.44	
315060	1CHESTF5	20.01	
315061	1CHESTG7	7.84	
315063	1CHESTG8	7.78	
315062	1CHESTS7	3.56	
315064	1CHESTS8	3.98	
315067	1DARBY 1	5.11	
315068	1DARBY 2	5.12	
315069	1DARBY 3	5.18	
315070	1DARBY 4	5.18	
315233	1SURRY 2	50.11	
315092	1YORKTN3	45.91	
314309	6IRON208	0.77	
314236	6NRTHEST	0.37	
314251	6S PUMP	1.72	
314421	6WINCHST	0.26	
932041	AC2-012 C O1	17.9	EP
932501	AC2-070 C	3.14	W
932581	AC2-078 C O1	7.07	W
932591	AC2-079 C O1	9.94	EP
932631	AC2-084 C	10.2	Active
932831	AC2-110 C	2.32	EP
933061	AC2-130	4.37	IS
933261	AC2-137 C	3.85	UC-ISP
933291	AC2-141 C O1	53.77	Active

933731	AC2-196 C	3.13	W
315074	CIR_AB2-152	17.42	
297087	V2-040	0.24	IS
921162	AA1-063AC	13.57	W
921752	AA2-053 C	13.73	IS
921762	AA2-057 C	10.78	IS
921982	AA2-088 C	10.58	IS
922442	AA2-165 C	1.47	IS
922512	AA2-174 C	0.63	IS
922532	AA2-178 C	16.03	IS
922682	AB1-027 C	4.78	IS
923262	AB1-132 C OP	22.13	EP
923572	AB1-173 C OP	3.56	UC
923582	AB1-173AC OP	3.56	UC
923801	AB2-015 C OP	14.39	EP
923831	AB2-022 C	3.97	UC
923841	AB2-024 C	4.39	IS
923851	AB2-025 C	4.01	IS
923861	AB2-026 C	3.53	IS
923911	AB2-031 C OP	3.53	UC
923991	AB2-040 C OP	11.59	EP
924061	AB2-050	4.81	IS
924501	AB2-099 C	0.95	Suspended
924511	AB2-100 C	18.46	UC-ISP
924811	AB2-134 C OP	23	IS
925051	AB2-160 C OP	9.56	EP
925061	AB2-161 C OP	5.87	EP
925171	AB2-174 C O1	11.09	IS
925331	AB2-190 C	35.85	UC
926261	AC1-027 C	3.51	IS
926531	AC1-054 C OP	10.55	UC
926591	AC1-060	0.13	IS
926601	AC1-061	0.06	IS
926621	AC1-063	0.67	IS
926641	AC1-065 C	5.8	EP
926851	AC1-086 C	32.59	Active
926981	AC1-099 C	12.74	Suspended
927061	AC1-107 OP	626.83	EP

927181	AC1-112 C	3.72	IS
927411	AC1-134	12.02	IS
927561	AC1-147 C	3.96	UC
927711	AC1-161 C OP	53.77	EP
927741	AC1-164 C OP	75.23	
927991	AC1-189 C	13.18	Active
928011	AC1-191 C OP	16.38	Active
928191	AC1-208 C O1	13.91	Suspended
928271	AC1-216 C OP	17.56	UC-ISP

Appendix 3: Stability Study Results

Generator Interconnection Request AC2-141 is for a 240 MW Maximum Facility Output (MFO) solar generating facility. AC2-141 consists of 120 x Power Electronics 2.2 MW solar inverters, with a Point of Interconnection (POI) at the existing Septa 500 kV substation in the DVP transmission system, Isle of Wight county, Virginia.

This report describes the dynamic simulation analysis of AC2-141 as part of the overall system impact study.

The load flow scenarios for the analysis were based on the RTEP 2020 Peak Load case, modified to include applicable queue projects. AC2-141 was set to maximum power output and 1.05 p.u. terminal voltage.

AC2-141 was tested for compliance with NERC, PJM, Transmission Owner and other applicable criteria. 65 contingencies were studied, each with at least a 20 second simulation time period. Studied scenarios included:

a) Steady state operation (30 second simulation);

b) Three-phase faults with normal clearing time;

c) Single-phase faults with stuck breaker;

No relevant bus, tower or High Speed Reclosing (HSR) contingencies were identified.

For all simulations, the queue project under study along with the rest of the PJM system were required to maintain synchronism and with all states returning to an acceptable new condition following the disturbance.

For the 65 fault contingencies tested on the 2020 peak load case:

a) AC2-141 is able to ride through the faults (except for faults where protective action trips a generator(s)),

b) The system with AC2-141 included is transiently stable and post-contingency oscillations are positively damped with a damping margin of at least 3% for interarea modes and 4% for local modes.

c) Following fault clearing, all bus voltages recover to a minimum of 0.7 per unit after 2.5 seconds (except where protective action isolates that bus).

d) No transmission element trips, other than those either directly connected or designed to trip as a consequence of that fault.

No mitigations were found to be required.