Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-402

IVOR-OAK RIDGE 115 KV

6.3 MW Capacity / 16.6 MW Energy

July 2020

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1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Dominion.

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 generating facility located in Southampton County, Virginia. The installed facilities will have a total capability of 16.6 MW with 6.3 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 30, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-402
Project Name	IVOR-OAK RIDGE 115 KV
State	Virginia
County	Southampton
Transmission Owner	Dominion
MFO	16.6
MWE	16.6
MWC	6.3
Fuel	Solar
Basecase Study Year	2023

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

4 Point of Interconnection

AF2-402 will interconnect with the Dominion transmission system. The primary POI is a single line tap between Ivor 115 kV substation and Oak Ridge 115 kV substation. The IC is responsible for securing right-of-way, permits and constructing the proposed attachment line from the storage facility site to the proposed new substation. Attachment 1 shows a one-line diagram of the proposed interconnection facilities. The IC may not install any facilities on Dominion's right-of-way without first obtaining the necessary approval from Dominion Energy.

AF2-402 selected the Bell Ave – Windsor DP 115kV line as the project's secondary Point of Interconnection. This report does not provide costs for the physical interconnection of the secondary point of interconnection. It was just analyzed for network impacts. Results are shown in the 'Summer Peak – Load Flow Analysis – Secondary Point of Interconnection' section of this report.

5 Cost Summary

The AF2-402 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$ 8,800,000
Total System Network Upgrade Costs	$ 63,185,000
Total Costs	**$ 71,985,000**

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.

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

6 Transmission Owner Scope of Work

Dominion assessed the impact of the proposed Queue Project AF2-402 was evaluated as a 6.3 MW Capacity (16.6 MW Energy) injection at a single line tap between Ivor 115 kV substation and Oak Ridge 115 kV substation in the Dominion Transmission System, for compliance with NERC Reliability Criteria on Dominion Transmission System. The system was assessed using the summer 2023 AF2 case provided to Dominion by PJM. When performing a generation analysis, Dominion's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). Dominion Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of Dominion's Planning Criteria and interconnection requirements can be found in the Company'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, in Planning Studies, NERC Planning Event 3 and 6 Contingency Conditions (Loss of generator, transmission circuit, transformer, shunt device, or Single Pole of a DC line followed by the loss of a generator, transmission circuit, transformer, shunt device or single pole of a DC line) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For Dominion 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 required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of the AF2-402 generation project to the Dominion Transmission System is detailed in the following sections. The associated one-line with the generation project attachment facilities and primary direct and non-direct connection are shown in Attachment 1.

Note that the ITO findings were made from a conceptual review of this project. A more detailed review of the connection facilities and their cost will be identified in a future study phases. Further note that the cost estimate data contained in this document should be considered high level estimates since it was produced without a detailed engineering review. The applicant will be responsible for the actual cost of construction. ITO herein reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any reinforcements to the transmission systems.

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

Description	Total Cost
Attachment Facilities	$ 1,700,000
New three-breaker ring-bus substation	$ 5,500,000
Re-arrange transmission line to cut-in new substation	$ 1,600,000
Total Physical Interconnection Costs	**$ 8,800,000**

7 Schedule

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

8 Transmission Owner Analysis

8.1 Power Flow Analysis

PJM performed a power flow analysis of the transmission system using a 2023 summer peak load flow model and the results were verified by Dominion. Additionally, Dominion performed an analysis of its transmission system and no further deficiencies were identified.

9 Interconnection Customer Requirements

9.1 System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in Dominion's "Dominion Energy Electric Transmission Generator Interconnection Requirements" documented in Dominion's Facility Interconnection Requirements "Exhibit C" located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access. Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

9.2 Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with Dominion's "Dominion's Facility Interconnection Requirements" document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated protection device (circuit breaker, circuit switcher, fuse) to protect the IC's GSU transformer(s).

2. The purchase and installation of the minimum required Dominion generation interconnection relaying and control facilities as described in the System Protection noted above. 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 Dominion Transmission System Control Center.

4. Compliance with the Dominion and PJM generator power factor and voltage control requirements.

The GSU(s) associated with the IC queue request shall meet the grounding requirements as noted in Dominion's "Dominion's Facility Interconnection Requirements" document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access.

The IC will also be required to meet all PJM, SERC, 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 SERC 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 Dominion 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 Dominion 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.

10.1.1 Meteorological Data Reporting Requirements

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

- Back Panel temperature (Fahrenheit)
- Irradiance (Watts/meter2)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

10.2 Interconnected Transmission Owner Requirements

See Section 3.4.6 “Metering and telecommunications” of Dominion’s “Dominion’s Facility Interconnection Requirements” document located at: https://www.dominionenergy.com/company/moving-energy/electric-transmission-access.

11 Summer Peak - Load Flow Analysis - Primary POI

The Queue Project AF2-402 was evaluated as a 16.6 MW (Capacity 6.3 MW) injection tapping the Oak Ridge to Ivor 115 kV line in the Dominion area. Project AF2-402 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-402 was studied with a commercial probability of 53%. Potential network impacts were as follows:

11.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587865	314532	3OAKRI23	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	Base Case	single	110.919998169	96.85	100.37	DC	3.91
97587891	961110	AF2-402 TAP	115.0	DVP	932590	AC2-079 TAP	115.0	DVP	1	Base Case	single	110.919998169	97.05	100.57	DC	3.91

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
97587876	313879	3BELL AVE 2	115.0	DVP	938630	AE1-085 TAP	115.0	DVP	1	314532 3OAKRI 23 115 932590 AC2-079 TAP 115 1	single	110.919998169	156.15	161.83	DC	6.3
97587877	313879	3BELL AVE 2	115.0	DVP	938630	AE1-085 TAP	115.0	DVP	1	DVP_P1-2: LN 23-B	single	110.919998169	156.15	161.83	DC	6.3
97587878	313879	3BELL AVE 2	115.0	DVP	938630	AE1-085 TAP	115.0	DVP	1	DVP_P1-2: LN 23-C	single	110.919998169	127.03	132.71	DC	6.3
97587850	314273	3BAKRS P	115.0	DVP	314280	3NEWBOHE	115.0	DVP	1	314532 3OAKRI 23 115 932590 AC2-079 TAP 115 1	single	110.919998169	186.98	192.66	DC	6.3
97587851	314273	3BAKRS P	115.0	DVP	314280	3NEWBOHE	115.0	DVP	1	DVP_P1-2: LN 23-B	single	110.919998169	186.98	192.66	DC	6.3
97587852	314273	3BAKRS P	115.0	DVP	314280	3NEWBOHE	115.0	DVP	1	DVP_P1-2: LN 23-C	single	110.919998169	157.86	163.54	DC	6.3
97587869	314280	3NEWBOHE	115.0	DVP	314329	3POE	115.0	DVP	1	DVP_P1-2: LN 23-B	single	110.919998169	176.97	182.65	DC	6.3
97587870	314280	3NEWBOHE	115.0	DVP	314329	3POE	115.0	DVP	1	314532 3OAKRI 23 115 932590 AC2-079 TAP 115 1	single	110.919998169	176.97	182.65	DC	6.3

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
97587871	314280	3NEWBOHE	115.0	DVP	314329	3POE	115.0	DVP	1	DVP_P1-2: LN 23-C	single	110.919998169	147.85	153.53	DC	6.3
97587798	314329	3POE	115.0	DVP	314291	3PRGEORG	115.0	DVP	1	DVP_P4-2: 23T44	breaker	301.0	100.33	102.48	DC	6.47
97587781	314528	3IVOR106	115.0	DVP	313879	3BELL AVE 2	115.0	DVP	1	DVP_P4-2: 23872	breaker	136.0	103.93	108.27	DC	6.23
97587782	314528	3IVOR106	115.0	DVP	313879	3BELL AVE 2	115.0	DVP	1	DVP_P4-2: 56372	breaker	136.0	103.26	107.67	DC	6.28
97587860	314532	3OAKRI23	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	DVP_P1-2: LN 106-B	single	110.919998169	179.41	185.09	DC	6.3
97587861	314532	3OAKRI23	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	3142733BAKRSP 115 938630 AE1-085 TAP 1151	single	110.919998169	179.41	185.09	DC	6.3
97587862	314532	3OAKRI23	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	DVP_P1-2: LN 106-A	single	110.919998169	134.33	140.01	DC	6.3
97587834	932590	AC2-079 TAP	115.0	DVP	314532	3OAKRI23	115.0	DVP	1	DVP_P1-2: LN 106-B	single	110.919998169	201.14	206.82	DC	6.3
97587835	932590	AC2-079 TAP	115.0	DVP	314532	3OAKRI23	115.0	DVP	1	3142733BAKRSP 115 938630 AE1-085 TAP 1151	single	110.919998169	201.14	206.82	DC	6.3
97587836	932590	AC2-079 TAP	115.0	DVP	314532	3OAKRI23	115.0	DVP	1	DVP_P1-2: LN 106-A	single	110.919998169	156.15	161.83	DC	6.3
97587839	932590	AC2-079 TAP	115.0	DVP	314532	3OAKRI23	115.0	DVP	1	Base Case	single	110.919998169	118.58	122.1	DC	3.91
97587843	938630	AE1-085 TAP	115.0	DVP	314273	3BAKRS P	115.0	DVP	1	DVP_P1-2: LN 23-B	single	110.919998169	201.14	206.82	DC	6.3
97587844	938630	AE1-085 TAP	115.0	DVP	314273	3BAKRS P	115.0	DVP	1	3145323OAKRI23 115 932590 AC2-079 TAP 1151	single	110.919998169	201.14	206.82	DC	6.3
97587845	938630	AE1-085 TAP	115.0	DVP	314273	3BAKRS P	115.0	DVP	1	DVP_P1-2: LN 23-C	single	110.919998169	172.02	177.7	DC	6.3
97587761	961110	AF2-402 TAP	115.0	DVP	314528	3IVOR106	115.0	DVP	1	DVP_P4-2: 23872	breaker	136.0	112.23	116.58	DC	6.23
97587762	961110	AF2-402 TAP	115.0	DVP	314528	3IVOR106	115.0	DVP	1	DVP_P4-2: 56372	breaker	136.0	111.64	116.05	DC	6.28
97587885	961110	AF2-402 TAP	115.0	DVP	932590	AC2-079 TAP	115.0	DVP	1	3142733BAKRSP 115 938630 AE1-085 TAP 1151	single	110.919998169	172.02	177.7	DC	6.3
97587886	961110	AF2-402 TAP	115.0	DVP	932590	AC2-079 TAP	115.0	DVP	1	DVP_P1-2: LN 106-B	single	110.919998169	172.02	177.7	DC	6.3
97587888	961110	AF2-402 TAP	115.0	DVP	932590	AC2-079 TAP	115.0	DVP	1	DVP_P1-2: LN 106-A	single	110.919998169	127.03	132.71	DC	6.3

11.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587873	313879	3BELL AVE 2	115.0	DVP	938630	AE1-085 TAP	115.0	DVP	1	DVP_P1-2: LN 23-B	operation	110.919998169	307.97	322.94	DC	16.6
97587874	313879	3BELL AVE 2	115.0	DVP	938630	AE1-085 TAP	115.0	DVP	1	3145323OAKRI23 115 932590 AC2-079 TAP 1151	operation	110.919998169	307.97	322.94	DC	16.6
97587879	313879	3BELL AVE 2	115.0	DVP	938630	AE1-085 TAP	115.0	DVP	1	Base Case	operation	110.919998169	126.03	131.72	DC	6.31
97587847	314273	3BAKRS P	115.0	DVP	314280	3NEWBOHE	115.0	DVP	1	3145323OAKRI23 115 932590 AC2-079 TAP 1151	operation	110.919998169	361.34	376.31	DC	16.6
97587848	314273	3BAKRS P	115.0	DVP	314280	3NEWBOHE	115.0	DVP	1	DVP_P1-2: LN 23-B	operation	110.919998169	361.34	376.31	DC	16.6
97587853	314273	3BAKRS P	115.0	DVP	314280	3NEWBOHE	115.0	DVP	1	Base Case	operation	110.919998169	150.02	155.7	DC	6.31
97587866	314280	3NEWBOHE	115.0	DVP	314329	3POE	115.0	DVP	1	DVP_P1-2: LN 23-B	operation	110.919998169	351.33	366.3	DC	16.6
97587867	314280	3NEWBOHE	115.0	DVP	314329	3POE	115.0	DVP	1	3145323OAKRI23 115 932590 AC2-079 TAP 1151	operation	110.919998169	351.33	366.3	DC	16.6
97587872	314280	3NEWBOHE	115.0	DVP	314329	3POE	115.0	DVP	1	Base Case	operation	110.919998169	140.01	145.7	DC	6.31
97588220	314329	3POE	115.0	DVP	314291	3PRGEORG	115.0	DVP	1	DVP_P1-2: LN 23-B	operation	246.279998779	101.89	104.33	DC	6.0
97588162	314528	3IVOR106	115.0	DVP	313879	3BELL AVE 2	115.0	DVP	1	DVP_P1-2: LN 15-A	operation	110.919998169	113.5	119.2	DC	6.32
97588167	314528	3IVOR106	115.0	DVP	313879	3BELL AVE 2	115.0	DVP	1	Base Case	operation	110.919998169	105.44	110.89	DC	6.31

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
97587854	314532	3OAKRI23	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	3142733BAKRSP 115 938630AE1-085 TAP 1151	operation	110.919998169	353.77	368.73	DC	16.6
97587855	314532	3OAKRI23	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	DVP_P1-2: LN 106-B	operation	110.919998169	353.77	368.73	DC	16.6
97587859	314532	3OAKRI23	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	Base Case	operation	110.919998169	195.73	205.01	DC	10.29
97587828	932590	AC2-079 TAP	115.0	DVP	314532	3OAKRI23	115.0	DVP	1	3142733BAKRSP 115 938630AE1-085 TAP 1151	operation	110.919998169	375.5	390.46	DC	16.6
97587829	932590	AC2-079 TAP	115.0	DVP	314532	3OAKRI23	115.0	DVP	1	DVP_P1-2: LN 106-B	operation	110.919998169	375.5	390.46	DC	16.6
97587833	932590	AC2-079 TAP	115.0	DVP	314532	3OAKRI23	115.0	DVP	1	Base Case	operation	110.919998169	217.46	226.74	DC	10.29
97587840	938630	AE1-085 TAP	115.0	DVP	314273	3BAKRS P	115.0	DVP	1	DVP_P1-2: LN 23-B	operation	110.919998169	375.5	390.46	DC	16.6
97587841	938630	AE1-085 TAP	115.0	DVP	314273	3BAKRS P	115.0	DVP	1	3145323OAKRI23 115 932590AC2-079 TAP 1151	operation	110.919998169	375.5	390.46	DC	16.6
97587846	938630	AE1-085 TAP	115.0	DVP	314273	3BAKRS P	115.0	DVP	1	Base Case	operation	110.919998169	164.26	169.95	DC	6.31
97587880	961110	AF2-402 TAP	115.0	DVP	932590	AC2-079 TAP	115.0	DVP	1	3142733BAKRSP 115 938630AE1-085 TAP 1151	operation	110.919998169	298.86	313.83	DC	16.6
97587881	961110	AF2-402 TAP	115.0	DVP	932590	AC2-079 TAP	115.0	DVP	1	DVP_P1-2: LN 106-B	operation	110.919998169	298.86	313.83	DC	16.6
97587887	961110	AF2-402 TAP	115.0	DVP	932590	AC2-079 TAP	115.0	DVP	1	Base Case	operation	110.919998169	165.4	174.67	DC	10.29
97588103	961110	AF2-402 TAP	115.0	DVP	314528	3IVOR106	115.0	DVP	1	DVP_P1-3: 8CARSON-TX#2	operation	110.919998169	127.64	133.07	DC	6.26
97588108	961110	AF2-402 TAP	115.0	DVP	314528	3IVOR106	115.0	DVP	1	Base Case	operation	110.919998169	115.62	121.08	DC	6.31

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
97587886,97587888,97587891,97587885	2	AF2-402 TAP 115.0 kV - AC2-079 TAP 115.0 kV Ckt 1	DVP dom-247 (1369) : Reconductor 7.7 miles of 115 kV line 65 from AF2-402 Tap to AC2-079 Tap with 636 ACSR. Replace Line Lead at Ivor 115 kV. Project Type : FAC Cost : $4,620,000 Time Estimate : 30-36 Months	$4,620,000
97587836,97587835,97587834,97587839	8	AC2-079 TAP 115.0 kV - 3OAKRI23 115.0 kV Ckt 1	DVP dom-186 (1260) : Reconductor 10.5 miles of 115 kV Line 23 from AC2-079 Tap to Oakridge with 636 ACSR Project Type : FAC Cost : $6,300,000 Time Estimate : 30-36 Months	$6,300,000
97587781,97587782	7	3IVOR106 115.0 kV - 3BELL AVE 2 115.0 kV Ckt 1	DVP n6171 (1303) : Rebuild 0.97 miles of 115 kV Line 23 from AC2-079 Tap to Ivor with 636 ACSR. Project Type : FAC Cost : $1,261,000 Time Estimate : 30-36 Months	$1,261,000
97587844,97587845,97587843	9	AE1-085 TAP 115.0 kV - 3BAKRS P 115.0 kV Ckt 1	DVP n6181 (1310) : Rebuild 8.4 miles of 115 kV Line 106 from AE1-085 Tap to Bakers Pond DP with 636 ACSR. Project Type : FAC Cost : $10,920,000 Time Estimate : 30-36 Months	$10,920,000
97587851,97587850,97587852	4	3BAKRS P 115.0 kV - 3NEWBOHE 115.0 kV Ckt 1	DVP n6205 (1313) : Rebuild 2.45 miles of Line 106 from Bakers Pond DP to New Bohemia DP with 636 ACSR. Project Type : FAC Cost : $3,185,000 Time Estimate : 30-36 Months	$3,185,000
97587878,97587877,97587876	3	3BELL AVE 2 115.0 kV - AE1-085 TAP 115.0 kV Ckt 1	DVP n6173 (1305) : Rebuild 20.5 miles of 115 kV Line 106 from Bell Ave to AE1-085 Tap with 636 ACSR. Project Type : FAC Cost : $26,650,000 Time Estimate : 36-40 Months	$26,650,000

ID	Idx	Facility	Upgrade Description	Cost
97587860,97587861,97587862,97587865	1	3OAKRI23 115.0 kV - 3SUFFOLK 115.0 kV Ckt 1	DVP dom-171 (1245) : Reconductor 2.5 miles of 115 kV Line 23 from Oakridge to Suffolk with 636 ACSR Project Type : FAC Cost : $1,500,000 Time Estimate : 30-36 Months	$1,500,000
97587869,97587871,97587870	5	3NEWBOHE 115.0 kV - 3POE 115.0 kV Ckt 1	DVP dom-059 (1148) : Rebuild 2.68 miles of Line 106 from New Bohemia DP to Poe with 636 ACSR. Project Type : FAC Cost : $3,484,000 Time Estimate : 30-36 Months	$3,484,000
97587762,97587761	10	AF2-402 TAP 115.0 kV - 3IVOR106 115.0 kV Ckt 1	DVP dom-246 (1368) : Reconductor 1.3 miles of 115 kV line 65 from AF2-402 Tap to Ivor with 636 ACSR. Replace Line Lead at Ivor 115 kV. Project Type : FAC Cost : $780,000 Time Estimate : 30-36 Months	$780,000
97587798	6	3POE 115.0 kV - 3PRGEORG 115.0 kV Ckt 1	DVP dom-043 (1132) : Rebuild 3.45 miles of 115 kV Line 121 from Poe to Prince George with 768 ACSS. Project Type : FAC Cost : $4,485,000 Time Estimate : 30-36 Months	$4,485,000
			TOTAL COST	$63,185,000

11.6 Flow Gate Details - Primary POI

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

11.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587861	314532	3OAKRI23	DVP	314536	3SUFFOLK	DVP	1	314273 3BAKRS P 115 938630 AE1-085 TAP 115 1	single	110.92	179.41	185.09	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**19.0000**	**80/20**	**19.0000**
932591	AC2-079 C O1	32.3000	80/20	32.3000
934571	AD1-082 C	43.3000	80/20	43.3000
938631	AE1-085 C O1	50.0000	80/20	50.0000
940061	AE2-000BC O1	90.0000	80/20	90.0000
961111	AF2-402 C O1	6.3000	80/20	6.3000

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
97587886	961110	AF2-402 TAP	DVP	932590	AC2-079 TAP	DVP	1	DVP_P1-2: LN 106-B	single	110.92	172.02	177.7	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**19.0000**	**80/20**	**19.0000**
934571	AD1-082 C	43.3000	80/20	43.3000
938631	AE1-085 C O1	50.0000	80/20	50.0000
940061	AE2-000BC O1	90.0000	80/20	90.0000
961111	AF2-402 C O1	6.3000	80/20	6.3000

11.6.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587877	313879	3BELL AVE 2	DVP	938630	AE1-085 TAP	DVP	1	DVP_P1-2: LN 23-B	single	110.92	156.15	161.83	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**19.0000**	**80/20**	**19.0000**
932591	AC2-079 C O1	32.3000	80/20	32.3000
934571	AD1-082 C	43.3000	80/20	43.3000
940061	AE2-000BC O1	90.0000	80/20	90.0000
961111	AF2-402 C O1	6.3000	80/20	6.3000

11.6.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587851	314273	3BAKRSP	DVP	314280	3NEWBOHE	DVP	1	DVP_P1-2: LN 23-B	single	110.92	186.98	192.66	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**19.0000**	**80/20**	**19.0000**
932591	AC2-079 C O1	32.3000	80/20	32.3000
934571	AD1-082 C	43.3000	80/20	43.3000
938631	AE1-085 C O1	50.0000	80/20	50.0000
940061	AE2-000BC O1	90.0000	80/20	90.0000
961111	AF2-402 C O1	6.3000	80/20	6.3000

11.6.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587870	314280	3NEWBOHE	DVP	314329	3POE	DVP	1	314532 3OAKRI23 115 932590 AC2-079 TAP 115 1	single	110.92	176.97	182.65	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**19.0000**	**80/20**	**19.0000**
932591	AC2-079 C O1	32.3000	80/20	32.3000
934571	AD1-082 C	43.3000	80/20	43.3000
938631	AE1-085 C O1	50.0000	80/20	50.0000
940061	AE2-000BC O1	90.0000	80/20	90.0000
961111	AF2-402 C O1	6.3000	80/20	6.3000

11.6.6 Index 6

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587798	314329	3POE	DVP	314291	3PRGEORG	DVP	1	DVP_P4-2: 23T44	breaker	301.0	100.33	102.48	DC	6.47

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**7.4089**	**50/50**	**7.4089**
925062	**AB2-161 E O1 (Suspended)**	**12.0881**	**50/50**	**12.0881**
932581	AC2-078 C O1	8.8906	50/50	8.8906
932582	AC2-078 E O1	14.5058	50/50	14.5058
932591	AC2-079 C O1	12.5951	50/50	12.5951
932592	AC2-079 E O1	20.5498	50/50	20.5498
934571	AD1-082 C	16.8844	50/50	16.8844
934572	AD1-082 E	9.6315	50/50	9.6315
936661	AD2-085 C	7.5570	50/50	7.5570
936662	AD2-085 E	12.3299	50/50	12.3299
938631	AE1-085 C O1	19.4970	50/50	19.4970
938632	AE1-085 E O1	9.7485	50/50	9.7485
939191	AE1-149 C O1	23.3964	50/50	23.3964
939192	AE1-149 E O1	15.5976	50/50	15.5976
940061	AE2-000BC O1	35.0946	50/50	35.0946
940062	AE2-000BE O1	23.3964	50/50	23.3964
940542	AE2-040 BAT	1.4537	Merchant Transmission	1.4537
940651	AE2-052	7.7988	50/50	7.7988
942341	AE2-247 C	3.2755	50/50	3.2755
942342	AE2-247 E	4.5233	50/50	4.5233
943461	AF1-017 C	2.9635	50/50	2.9635
943462	AF1-017 E	4.8353	50/50	4.8353
960361	**AF2-327 C (Withdrawn : 07/22/2020)**	**6.2390**	**50/50**	**6.2390**
960362	**AF2-327 E (Withdrawn : 07/22/2020)**	**1.5598**	**50/50**	**1.5598**
961111	AF2-402 C O1	2.4566	50/50	2.4566
961112	AF2-402 E O1	4.0164	50/50	4.0164
WEC	WEC	0.0353	Confirmed LTF	0.0353
LGEE	LGEE	0.0662	Confirmed LTF	0.0662
CPLE	CPLE	0.3122	Confirmed LTF	0.3122
CBM-W2	CBM-W2	1.3186	Confirmed LTF	1.3186
NY	NY	0.0221	Confirmed LTF	0.0221
CBM-W1	CBM-W1	1.3386	Confirmed LTF	1.3386
TVA	TVA	0.2688	Confirmed LTF	0.2688
O-066	O-066	0.3494	Confirmed LTF	0.3494
CBM-S2	CBM-S2	2.1328	Confirmed LTF	2.1328
CBM-S1	CBM-S1	1.5166	Confirmed LTF	1.5166
G-007	G-007	0.0541	Confirmed LTF	0.0541
MADISON	MADISON	0.0645	Confirmed LTF	0.0645

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
MEC	MEC	0.2066	Confirmed LTF	0.2066

11.6.7 Index 7

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587781	314528	3IVOR106	DVP	313879	3BELL AVE 2	DVP	1	DVP_P4-2: 23872	breaker	136.0	103.93	108.27	DC	6.23

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932591	AC2-079 C O1	8.2181	50/50	8.2181
932592	AC2-079 E O1	13.4085	50/50	13.4085
940063	AE2-000B BAT	88.4460	50/50	88.4460
940652	AE2-052 BAT	1.2584	Merchant Transmission	1.2584
941101	AE2-104 C O1	0.8109	Adder	0.95
941102	AE2-104 E O1	1.2891	Adder	1.52
941533	AE2-150 BAT	11.7304	50/50	11.7304
945711	AF1-236 C O1	0.2881	Adder	0.34
945712	AF1-236 E O1	0.4700	Adder	0.55
958161	AF2-110 C	0.1772	Adder	0.39
958162	AF2-110 E	0.2771	Adder	0.62
961111	AF2-402 C O1	2.3626	50/50	2.3626
961112	AF2-402 E O1	3.8627	50/50	3.8627
WEC	WEC	0.0249	Confirmed LTF	0.0249
LGEE	LGEE	0.0474	Confirmed LTF	0.0474
CPLE	CPLE	0.2897	Confirmed LTF	0.2897
CBM-W2	CBM-W2	1.0237	Confirmed LTF	1.0237
NY	NY	0.0354	Confirmed LTF	0.0354
CBM-W1	CBM-W1	0.9383	Confirmed LTF	0.9383
TVA	TVA	0.2156	Confirmed LTF	0.2156
O-066	O-066	0.4973	Confirmed LTF	0.4973
CBM-S2	CBM-S2	1.8843	Confirmed LTF	1.8843
CBM-S1	CBM-S1	1.2013	Confirmed LTF	1.2013
G-007	G-007	0.0780	Confirmed LTF	0.0780
MADISON	MADISON	0.0625	Confirmed LTF	0.0625
MEC	MEC	0.1525	Confirmed LTF	0.1525

11.6.8 Index 8

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587835	932590	AC2-079 TAP	DVP	314532	3OAKRI23	DVP	1	3142733BAKRSP 115 938630 AE1-085 TAP 115 1	single	110.92	201.14	206.82	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**19.0000**	**80/20**	**19.0000**
932591	AC2-079 C O1	32.3000	80/20	32.3000
934571	AD1-082 C	43.3000	80/20	43.3000
938631	AE1-085 C O1	50.0000	80/20	50.0000
940061	AE2-000BC O1	90.0000	80/20	90.0000
961111	AF2-402 C O1	6.3000	80/20	6.3000

11.6.9 Index 9

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587844	938630	AE1-085 TAP	DVP	314273	3BAKRS P	DVP	1	314532 3OAKRI23 115 932590 AC2-079 TAP 115 1	single	110.92	201.14	206.82	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**19.0000**	**80/20**	**19.0000**
932591	AC2-079 C O1	32.3000	80/20	32.3000
934571	AD1-082 C	43.3000	80/20	43.3000
938631	AE1-085 C O1	50.0000	80/20	50.0000
940061	AE2-000BC O1	90.0000	80/20	90.0000
961111	AF2-402 C O1	6.3000	80/20	6.3000

11.6.10 Index 10

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
97587762	961110	AF2-402 TAP	DVP	314528	3IVOR106	DVP	1	DVP_P4-2: 56372	breaker	136.0	111.64	116.05	DC	6.28

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932591	AC2-079 C O1	8.3105	50/50	8.3105
932592	AC2-079 E O1	13.5592	50/50	13.5592
940063	AE2-000B BAT	87.8895	50/50	87.8895
940652	AE2-052 BAT	1.1388	Merchant Transmission	1.1388
941101	AE2-104 C O1	0.8387	Adder	0.99
941102	AE2-104 E O1	1.3334	Adder	1.57
941533	AE2-150 BAT	11.5160	50/50	11.5160
945711	AF1-236 C O1	0.2653	Adder	0.31
945712	AF1-236 E O1	0.4328	Adder	0.51
958161	AF2-110 C	0.1832	Adder	0.41
958162	AF2-110 E	0.2866	Adder	0.64
961111	AF2-402 C O1	2.3848	50/50	2.3848
961112	AF2-402 E O1	3.8990	50/50	3.8990
WEC	WEC	0.0227	Confirmed LTF	0.0227
LGEE	LGEE	0.0428	Confirmed LTF	0.0428
CPLE	CPLE	0.2606	Confirmed LTF	0.2606
CBM-W2	CBM-W2	0.9500	Confirmed LTF	0.9500
NY	NY	0.0404	Confirmed LTF	0.0404
CBM-W1	CBM-W1	0.8382	Confirmed LTF	0.8382
TVA	TVA	0.2030	Confirmed LTF	0.2030
O-066	O-066	0.5645	Confirmed LTF	0.5645
CBM-S2	CBM-S2	1.7571	Confirmed LTF	1.7571
CBM-S1	CBM-S1	1.1246	Confirmed LTF	1.1246
G-007	G-007	0.0884	Confirmed LTF	0.0884
MADISON	MADISON	0.0605	Confirmed LTF	0.0605
MEC	MEC	0.1398	Confirmed LTF	0.1398

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
AB2-161	Waverly #2 DP 115kV	Suspended
AC2-078	Disputanta-Waverly 115kV	Active
AC2-079	Ivor-Oakridge 115kV	Active
AD1-082	Bakers Pond-Ivor 115kV	Active
AD2-085	Myrtle-Windsor DP 115kV	Active
AE1-085	Bakers Pond-Bell Ave 115 kV	Active
AE1-149	Disputanta-Poe 115 kV	Active
AE2-000B	N/A	N/A
AE2-040	Sapony 34.5 kV	Active
AE2-052	Disputanta-Poe 115 kV	Active
AE2-104	Suffolk 115 kV	Active
AE2-150	Bakers Pond-Bell Ave 115 kV	Active
AE2-247	Myrtle-Windsor 115 kV	Active
AF1-017	Myrtle-Windsor 115 kV	Active
AF1-236	Mackeys 230 kV	Active
AF2-110	Suffolk 115 kV	Active
AF2-327	Wakefield 13 kV	Withdrawn
AF2-402	Ivor-Oak Ridge 115 kV	Active

11.8 Contingency Descriptions - Primary POI

Contingency Name	Contingency Definition
DVP_P1-3: 8CARSON-TX#2	CONTINGENCY 'DVP_P1-3: 8CARSON-TX#2' OPEN BRANCH FROM BUS 314282 TO BUS 314902 CKT 1 /* 6CARSON 230.00 - 8CARSON 500.00 END

Contingency Name	Contingency Definition
DVP_P4-2: 23872	CONTINGENCY 'DVP_P4-2: 23872' /* CARSON 230 KV OPEN BRANCH FROM BUS 314282 TO BUS 314435 CKT 1 /* 6CARSON 230.00 - 6SAPONY 230.00 OPEN BRANCH FROM BUS 314435 TO BUS 940480 CKT 1 /* 6SAPONY 230.00 - AE2-033 TAP 230.00 OPEN BUS 314435 /* ISLAND: 6SAPONY 230.00 OPEN BUS 923852 /* ISLAND: AB2-025 E 230.00 OPEN BRANCH FROM BUS 314282 TO BUS 314902 CKT 1 /* 6CARSON 230.00 - 8CARSON 500.00 OPEN BUS 314455 /* 6CARSO_1 230.00 KV END
DVP_P4-2: 56372	CONTINGENCY 'DVP_P4-2: 56372' /* CARSON 500 KV OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 OPEN BRANCH FROM BUS 314282 TO BUS 314902 CKT 1 /* 6CARSON 230.00 - 8CARSON 500.00 END
314532 3OAKRI23 115 932590 AC2-079 TAP 115 1	CONTINGENCY '314532 3OAKRI23 115 932590 AC2-079 TAP 115 1' OPEN BRANCH FROM BUS 314532 TO BUS 932590 CKT 1 END
DVP_P1-2: LN 23-B	CONTINGENCY 'DVP_P1-2: LN 23-B' OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGFORK 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 932590 TO BUS 314532 CKT 1 /* AC2-079 TAP 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BUS 314206 /* ISLAND: 3OAKRIDG 115.00 OPEN BUS 314261 /* ISLAND: 3OAKRI_1 115.00 OPEN BUS 314529 /* ISLAND: 3KINGFORK 115.00 OPEN BUS 314532 /* ISLAND: 3OAKRI23 115.00 END
DVP_P1-2: LN 23-C	CONTINGENCY 'DVP_P1-2: LN 23-C' OPEN BRANCH FROM BUS 961110 TO BUS 932590 CKT 1 /* AF2-402 TAP 115.00 - AC2-079 TAP 115.00 END

Contingency Name	Contingency Definition
DVP_P1-2: LN 106-B	CONTINGENCY 'DVP_P1-2: LN 106-B' OPEN BRANCH FROM BUS 938630 TO BUS 314273 CKT 1 /* AE1-085 TAP 115.00 - 3BAKRS P 115.00 OPEN BRANCH FROM BUS 314262 TO BUS 314280 CKT 1 /* 3NEWBO_1 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314273 TO BUS 314280 CKT 1 /* 3BAKRS P 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314280 TO BUS 314329 CKT 1 /* 3NEWBOHE 115.00 - 3POE 115.00 OPEN BUS 314262 /* ISLAND: 3NEWBO_1 115.00 OPEN BUS 314273 /* ISLAND: 3BAKRS P 115.00 OPEN BUS 314280 /* ISLAND: 3NEWBOHE 115.00 END
DVP_P1-2: LN 106-A	CONTINGENCY 'DVP_P1-2: LN 106-A' OPEN BRANCH FROM BUS 313879 TO BUS 938630 CKT 1 /* 3BELL AVE 2 115.00 - AE1-085 TAP 115.00 END
Base Case	
DVP_P4-2: 23T44	CONTINGENCY 'DVP_P4-2: 23T44' /* SUFFOLK 115 KV OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGFORK 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 932590 TO BUS 314532 CKT 1 /* AC2-079 TAP 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BUS 314206 /* ISLAND: 3OAKRIDG 115.00 OPEN BUS 314261 /* ISLAND: 3OAKRI_1 115.00 OPEN BUS 314529 /* ISLAND: 3KINGFORK 115.00 OPEN BUS 314532 /* ISLAND: 3OAKRI23 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1 /* 3OAKRI44 115.00 - 3MYRTLE 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1 /* 3OAKRI44 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 314531 TO BUS 936660 CKT 1 /* 3MYRTLE 115.00 - AD2-085 TAP 115.00 OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1 /* 3SUFFOLK 115.00 - 3SUFFO_1 115.00 OPEN BUS 313803 /* ISLAND: 3OAKRI44 115.00 OPEN BUS 314531 /* ISLAND: 3MYRTLE 115.00 OPEN BUS 314823 /* ISLAND: 3SUFFO_1 115.00 END
314273 3BAKRS P 115 938630 AE1-085 TAP 115 1	CONTINGENCY '314273 3BAKRS P 115 938630 AE1-085 TAP 115 1' OPEN BRANCH FROM BUS 314273 TO BUS 938630 CKT 1 END

Contingency Name	Contingency Definition
DVP_P1-2: LN 15-A	CONTINGENCY 'DVP_P1-2: LN 15-A' OPEN BRANCH FROM BUS 939190 TO BUS 314329 CKT 1 /* AE1-149 TAP 115.00 - 3POE 115.00 END

12 Short Circuit Analysis - Primary POI

Short circuit analysis will be provided in the System Impact Study report.

13 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AF2-402 was evaluated as a 16.6 MW (Capacity 6.3 MW) injection tapping the Bell Ave to Windsor 115 kV line in the Dominion area. Project AF2-402 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-402 was studied with a commercial probability of 53%. Potential network impacts were as follows:

13.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587932	313803	3OAKRI44	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	DVP_P1-2: LN 15-A	single	110.919998169	95.73	101.41	DC	6.3
97587926	314531	3MYRTLE	115.0	DVP	313803	3OAKRI44	115.0	DVP	1	DVP_P1-2: LN 15-A	single	110.919998169	95.73	101.41	DC	6.3

13.2 Multiple Facility Contingency

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

None

13.3 Contribution to Previously Identified Overloads

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

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
97587798	314329	3POE	115.0	DVP	314291	3PRGEORG	115.0	DVP	1	DVP_P4-2: 23T44	breaker	301.0	100.33	102.48	DC	6.47
97587919	936660	AD2-085 TAP	115.0	DVP	314531	3MYRTLE	115.0	DVP	1	DVP_P1-2: LN 15-A	single	110.919998169	106.0	111.68	DC	6.3
97587913	939190	AE1-149 TAP	115.0	DVP	314329	3POE	115.0	DVP	1	3145313MYRTLE 115 936660 AD2-085 TAP 115 1	single	110.919998169	106.0	111.68	DC	6.3

13.4 Potential Congestion due to Local Energy Deliverability

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

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587927	313803	3OAKRI44	115.0	DVP	314536	3SUFFOLK	115.0	DVP	1	DVP_P1-2: LN 15-A	operation	110.919998169	219.08	234.04	DC	16.6
97588154	314292	3DISPUTN	115.0	DVP	939190	AE1-149 TAP	115.0	DVP	1	DVP_P1-2: LN 44-A	operation	110.919998169	121.17	136.13	DC	16.6
97588155	314292	3DISPUTN	115.0	DVP	939190	AE1-149 TAP	115.0	DVP	1	3145313MYRTLE 115 936660 AD2-085 TAP 115 1	operation	110.919998169	121.17	136.13	DC	16.6
97588220	314329	3POE	115.0	DVP	314291	3PRGEORG	115.0	DVP	1	DVP_P1-2: LN 23-B	operation	246.279998779	101.89	102.91	DC	2.52
97587921	314531	3MYRTLE	115.0	DVP	313803	3OAKRI44	115.0	DVP	1	DVP_P1-2: LN 15-A	operation	110.919998169	219.08	234.04	DC	16.6
97587969	314542	3WINDSOR	115.0	DVP	936660	AD2-085 TAP	115.0	DVP	1	DVP_P1-2: LN 15-A	operation	110.919998169	183.38	198.34	DC	16.6
97588147	932580	AC2-078 TAP	115.0	DVP	314292	3DISPUTN	115.0	DVP	1	DVP_P1-2: LN 44-A	operation	110.919998169	124.77	139.74	DC	16.6
97588148	932580	AC2-078 TAP	115.0	DVP	314292	3DISPUTN	115.0	DVP	1	3145313MYRTLE 115 936660 AD2-085 TAP 115 1	operation	110.919998169	124.77	139.74	DC	16.6
97587915	936660	AD2-085 TAP	115.0	DVP	314531	3MYRTLE	115.0	DVP	1	DVP_P1-2: LN 15-A	operation	110.919998169	229.35	244.32	DC	16.6
108136658	936660	AD2-085 TAP	115.0	DVP	314531	3MYRTLE	115.0	DVP	1	Base Case	operation	110.919998169	93.72	102.86	DC	10.14
97587910	939190	AE1-149 TAP	115.0	DVP	314329	3POE	115.0	DVP	1	3145313MYRTLE 115 936660 AD2-085 TAP 115 1	operation	110.919998169	229.35	244.32	DC	16.6
97587912	939190	AE1-149 TAP	115.0	DVP	314329	3POE	115.0	DVP	1	Base Case	operation	110.919998169	138.52	144.35	DC	6.46
150500300	961110	AF2-402 TAP	115.0	DVP	314542	3WINDSOR	115.0	DVP	1	DVP_P1-2: LN 15-A	operation	110.919998169	156.51	171.47	DC	16.6

13.5 Flow Gate Details - Secondary POI

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as

is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

13.5.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587932	313803	3OAKRI44	DVP	314536	3SUFFOLK	DVP	1	DVP_P1-2: LN 15-A	single	110.92	95.73	101.41	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932581	AC2-078 C O1	22.8000	80/20	22.8000
936661	AD2-085 C	19.3800	80/20	19.3800
939191	AE1-149 C O1	60.0000	80/20	60.0000
940651	AE2-052	20.0000	80/20	20.0000
942341	AE2-247 C	8.4000	80/20	8.4000
943461	AF1-017 C	7.6000	80/20	7.6000
960361	**AF2-327 C (Withdrawn : 07/22/2020)**	**16.0000**	**80/20**	**16.0000**
961111	AF2-402 C O2	6.3000	80/20	6.3000

13.5.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587926	314531	3MYRTLE	DVP	313803	3OAKRI44	DVP	1	DVP_P1-2: LN 15-A	single	110.92	95.73	101.41	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932581	AC2-078 C O1	22.8000	80/20	22.8000
936661	AD2-085 C	19.3800	80/20	19.3800
939191	AE1-149 C O1	60.0000	80/20	60.0000
940651	AE2-052	20.0000	80/20	20.0000
942341	AE2-247 C	8.4000	80/20	8.4000
943461	AF1-017 C	7.6000	80/20	7.6000
960361	**AF2-327 C (Withdrawn : 07/22/2020)**	**16.0000**	**80/20**	**16.0000**
961111	AF2-402 C O2	6.3000	80/20	6.3000

13.5.3 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
97587798	314329	3POE	DVP	314291	3PRGEORG	DVP	1	DVP_P4-2: 23T44	breaker	301.0	100.33	102.48	DC	6.47

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
925061	**AB2-161 C O1 (Suspended)**	**7.4089**	**50/50**	**7.4089**
925062	**AB2-161 E O1 (Suspended)**	**12.0881**	**50/50**	**12.0881**
932581	AC2-078 C O1	8.8906	50/50	8.8906
932582	AC2-078 E O1	14.5058	50/50	14.5058
932591	AC2-079 C O1	12.5951	50/50	12.5951
932592	AC2-079 E O1	20.5498	50/50	20.5498
934571	AD1-082 C	16.8844	50/50	16.8844
934572	AD1-082 E	9.6315	50/50	9.6315
936661	AD2-085 C	7.5570	50/50	7.5570
936662	AD2-085 E	12.3299	50/50	12.3299
938631	AE1-085 C O1	19.4970	50/50	19.4970
938632	AE1-085 E O1	9.7485	50/50	9.7485
939191	AE1-149 C O1	23.3964	50/50	23.3964
939192	AE1-149 E O1	15.5976	50/50	15.5976
940061	AE2-000BC O1	35.0946	50/50	35.0946
940062	AE2-000BE O1	23.3964	50/50	23.3964
940542	AE2-040 BAT	1.4537	Merchant Transmission	1.4537
940651	AE2-052	7.7988	50/50	7.7988
942341	AE2-247 C	3.2755	50/50	3.2755
942342	AE2-247 E	4.5233	50/50	4.5233
943461	AF1-017 C	2.9635	50/50	2.9635
943462	AF1-017 E	4.8353	50/50	4.8353
960361	**AF2-327 C (Withdrawn : 07/22/2020)**	**6.2390**	**50/50**	**6.2390**
960362	**AF2-327 E (Withdrawn : 07/22/2020)**	**1.5598**	**50/50**	**1.5598**
961111	AF2-402 C O2	2.4566	50/50	2.4566
961112	AF2-402 E O2	4.0164	50/50	4.0164
WEC	WEC	0.0353	Confirmed LTF	0.0353
LGEE	LGEE	0.0662	Confirmed LTF	0.0662
CPLE	CPLE	0.3122	Confirmed LTF	0.3122
CBM-W2	CBM-W2	1.3186	Confirmed LTF	1.3186
NY	NY	0.0221	Confirmed LTF	0.0221
CBM-W1	CBM-W1	1.3386	Confirmed LTF	1.3386
TVA	TVA	0.2688	Confirmed LTF	0.2688
O-066	O-066	0.3494	Confirmed LTF	0.3494
CBM-S2	CBM-S2	2.1328	Confirmed LTF	2.1328
CBM-S1	CBM-S1	1.5166	Confirmed LTF	1.5166
G-007	G-007	0.0541	Confirmed LTF	0.0541
MADISON	MADISON	0.0645	Confirmed LTF	0.0645

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
MEC	MEC	0.2066	Confirmed LTF	0.2066

13.5.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587919	936660	AD2-085 TAP	DVP	314531	3MYRTLE	DVP	1	DVP_P1-2: LN 15-A	single	110.92	106.0	111.68	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932581	AC2-078 C O1	22.8000	80/20	22.8000
936661	AD2-085 C	19.3800	80/20	19.3800
939191	AE1-149 C O1	60.0000	80/20	60.0000
940651	AE2-052	20.0000	80/20	20.0000
942341	AE2-247 C	8.4000	80/20	8.4000
943461	AF1-017 C	7.6000	80/20	7.6000
960361	**AF2-327 C (Withdrawn : 07/22/2020)**	**16.0000**	**80/20**	**16.0000**
961111	AF2-402 C O2	6.3000	80/20	6.3000

13.5.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
97587913	939190	AE1-149 TAP	DVP	314329	3POE	DVP	1	314531 3MYRTLE 115 936660 AD2-085 TAP 115 1	single	110.92	106.0	111.68	DC	6.3

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
932581	AC2-078 C O1	22.8000	80/20	22.8000
936661	AD2-085 C	19.3800	80/20	19.3800
939191	AE1-149 C O1	60.0000	80/20	60.0000
940651	AE2-052	20.0000	80/20	20.0000
942341	AE2-247 C	8.4000	80/20	8.4000
943461	AF1-017 C	7.6000	80/20	7.6000
960361	**AF2-327 C (Withdrawn : 07/22/2020)**	**16.0000**	**80/20**	**16.0000**
961111	AF2-402 C O2	6.3000	80/20	6.3000

13.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
314531 3MYRTLE 115 936660 AD2-085 TAP 115 1	CONTINGENCY '314531 3MYRTLE 115 936660 AD2-085 TAP 115 1' OPEN BRANCH FROM BUS 314531 TO BUS 936660 CKT 1 END
DVP_P1-2: LN 23-B	CONTINGENCY 'DVP_P1-2: LN 23-B' OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGFORK 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 932590 TO BUS 314532 CKT 1 /* AC2-079 TAP 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BUS 314206 /* ISLAND: 3OAKRIDG 115.00 OPEN BUS 314261 /* ISLAND: 3OAKRI_1 115.00 OPEN BUS 314529 /* ISLAND: 3KINGFORK 115.00 OPEN BUS 314532 /* ISLAND: 3OAKRI23 115.00 END
Base Case	
DVP_P4-2: 23T44	CONTINGENCY 'DVP_P4-2: 23T44' /* SUFFOLK 115 KV OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGFORK 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 932590 TO BUS 314532 CKT 1 /* AC2-079 TAP 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BUS 314206 /* ISLAND: 3OAKRIDG 115.00 OPEN BUS 314261 /* ISLAND: 3OAKRI_1 115.00 OPEN BUS 314529 /* ISLAND: 3KINGFORK 115.00 OPEN BUS 314532 /* ISLAND: 3OAKRI23 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1 /* 3OAKRI44 115.00 - 3MYRTLE 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1 /* 3OAKRI44 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 314531 TO BUS 936660 CKT 1 /* 3MYRTLE 115.00 - AD2-085 TAP 115.00 OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1 /* 3SUFFOLK 115.00 - 3SUFFO_1 115.00 OPEN BUS 313803 /* ISLAND: 3OAKRI44 115.00 OPEN BUS 314531 /* ISLAND: 3MYRTLE 115.00 OPEN BUS 314823 /* ISLAND: 3SUFFO_1 115.00 END

Contingency Name	Contingency Definition
DVP_P1-2: LN 44-A	CONTINGENCY 'DVP_P1-2: LN 44-A' OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1 /* 3OAKRI44 115.00 - 3MYRTLE 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1 /* 3OAKRI44 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 314531 TO BUS 936660 CKT 1 /* 3MYRTLE 115.00 - AD2-085 TAP 115.00 OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1 /* 3SUFFOLK 115.00 - 3SUFFO_1 115.00 OPEN BUS 313803 /* ISLAND: 3OAKRI44 115.00 OPEN BUS 314531 /* ISLAND: 3MYRTLE 115.00 OPEN BUS 314823 /* ISLAND: 3SUFFO_1 115.00 END
DVP_P1-2: LN 15-A	CONTINGENCY 'DVP_P1-2: LN 15-A' OPEN BRANCH FROM BUS 939190 TO BUS 314329 CKT 1 /* AE1-149 TAP 115.00 - 3POE 115.00 END

14 Affected Systems

14.1 TVA

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

14.2 Duke Energy Progress

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

Attachment 1: One Line Diagram