

From: Graff, Kenneth
Sent: Wednesday, August 24, 2016 9:45 AM
To: Frank Depew
Cc: Mittan, Jeannette; Gritmon, Marcie M.; 'Amber.Young@pepcoholdings.com'; 'Stephen.Zelvis@pepcoholdings.com'; 'Peter.Caroselli@pepcoholdings.com'; Wolfe, Arthur; 'konrad.endres@pepcoholdings.com'; James Crawford
Subject: PJM queue project AB2-133 "Chestertown-Church 69 kV" Feasibility Study Report and System Impact Study Agreement
Attachments: AB2-133 Chestertown-Church 69 kV Feasibility Study Report.pdf; AB2-133 Chestertown-Church 69 kV System Impact Study Agreement.pdf

Dear Mr. DePew:

Please acknowledge receipt of this e-mail.

Re: PJM Queue Position AB2-133, "Chestertown-Church 69 kV" Feasibility Study Report and System Impact Study Agreement

Enclosed is a report documenting the results of the PJM queue project AB2-133, "Chestertown-Church 69 kV" Feasibility Study. The results of this study are predicated on a year 2020 transmission system and based on PJM's best assumptions at the present time for load growth and for connection of proposed new generation additions. Feasibility Studies are performed to determine the facilities required for interconnection and to define the cost and timing for construction of direct connection facilities and transmission network upgrades required for the reliable interconnection of a generation project to the transmission system.

The direct connection facilities, network upgrades costs, and associated timing described in the enclosed report is based upon estimates given to PJM by Delmarva Power and Light Company (DPL). The costs, if any, are your responsibility as the Interconnection Customer.

Pursuant to section 204.3 of the PJM Tariff, attached is a System Impact Study Agreement for your consideration. The Agreement must be executed and in PJM's possession within thirty (30) days (**by close of business on September 26, 2016**) in order to maintain the project's position in the queue. Please note that a deposit of **\$37,500** (\$500/MW) is required to accompany the signed Agreement.

Please ensure that all requirements of Section 204 of the PJM Tariff are completed when returning the System Impact Study Agreement including specifying the Point of Interconnection if more than one option was provided in the Feasibility Study Report.

In order to initiate the System Impact Study, please provide the information requested on this link: <http://www.pjm.com/planning/rtep-development/expansion-plan-process/form-impact-study-data.aspx> and submit it electronically. This information must be returned by **September 26, 2016** in order to maintain this project's queue position.

Two copies of the executed System Impact Study Agreement (with original signatures) must be returned with the required study deposit to:

Jeannette Mittan
PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403
Phone: (610) 666-3158
FAX: (610) 666-4779

Costs for the Feasibility Study are being tabulated and you will receive an invoice in the near future. If you desire to discuss the Feasibility Study Report or the System Impact Study Agreement in more detail, please

call me at (610) 666-4566 or email me at Kenneth.Graff@pjm.com. A meeting or teleconference will be arranged at your convenience.

The following information is provided for wire transfers: Bank: PNC Bank, NA, New Jersey; ABA Number: 031-207-607; Account Number: 8013589826. Please e-mail Jeannette Mittan at Jeannette.Mittan@pjm.com with the project's name, queue number, date and amount of wire.

Sincerely,

Ken Graff
PJM Interconnection LLC
Interconnection Projects
610-666-4566

***Generation Interconnection
Feasibility Study Report***

For

***PJM Generation Interconnection Request
Queue Position AB2-133***

“Chestertown-Church 69 kV”

August 2016

Preface

The intent of the Feasibility 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.

Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The Interconnection Customer may be 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

Urban Grid Holding's LLC, the Interconnection Customer (IC), has proposed a 75 MW (32 MWC) solar generating facility to be located in Kent County, Maryland. PJM studied the AB2-133 project at both a Primary and Secondary Point of Interconnection. The study results are provided below. The planned in-service date, as requested by the IC during the project kick-off call, is May 1, 2018. It is not likely that this date can be attained due to the need for remaining studies and construction schedules.

Point(s) of Interconnection

The Interconnection Customer requested a Primary and Secondary Point of Interconnection (POI) be evaluated for the AB2-133 project. Both POIs are at the 69 kV transmission level.

Primary Point of Interconnection

PJM studied the AB2-133 project into the Delmarva Power and Light Company (DPL) system as a direct connection into the Chestertown 69 kV Substation and evaluated it for compliance with reliability criteria for summer peak conditions in 2020.

Transmission Owner Scope of Attachment Facilities Work

Substation Interconnection Estimate

Scope: Build a new 5th position onto the 69 kV 4 position ring bus at Chestertown Substation. The new position will be connected to a generator. The project will require the addition of a 69 kV

breaker, 3 69 kV disconnect switches, 3 CT/VT combination units, and substation bus. The 69 kV ring bus will extend out to the west of the existing yard, and the substation will be expanded to the west by 40 feet. The 6727 line terminal (to future McCleans Substation, currently to Lynch Substation), will need to be rebuilt (see Attachment 1).

Estimate: \$1,767,000

Construction Time: 24 months

Major Equipment Included in Estimate:

- Power Circuit Breaker, 69 kV, 2000A, 40kA, 3 cycle Qty. 1
- Disconnect Switch, 69 kV, 2000A, Manual Wormgear, Arcing Horns Qty. 4
- CT/VT Combination Units, 69 kV Qty. 3
- Disconnect Switch Stand, High, 69 kV, Steel Qty. 4
- Disconnect Switch Stand, Low, 69 kV, Steel Qty. 2
- CT/VT Stand, Single Phase, Low, 69 kV, Steel Qty. 3
- CVT Stand, Single Phase, Low, 69 kV, Steel Qty. 3
- Relay Panel, Transmission Line, FL/BU (20”) Qty. 1
- Control Panel, 69 kV Circuit Breaker (10”) Qty. 1
- Bus Support Structure, 3 phase, 69 kV, Steel Qty. 3
- Take-off structure, 69 kV Qty. 1

Estimate Assumptions:

- Substation is capable of being expanded 40 feet to the west.
- Completion of the 4 breaker 69 kV ring bus at Chestertown Substation prior to start of the project.

Required Relaying and Communications

New protection relays are required for the new terminal. An SEL-487 will be required for primary protection and an SEL-387 will be required for back-up protection. One 20” relay panel for each line terminal will be required for front line and back-up protection.

An SEL-451 relay on a 20” breaker control panel will be required for the control and operation of each new 138 kV circuit breaker.

The project will require re-wiring and adjustment of existing relay schemes to accommodate the new 69 kV terminal.

The cost of the required relay and communications is included in the Substation Interconnection Estimate.

Metering

Three phase 69 kV revenue metering points will need to be established. DPL will purchase and install all metering instrument transformers as well as construct a metering structure. The secondary wiring connections at the instrument transformers will be completed by DPL’s metering technicians.

The metering control cable and meter cabinets will be supplied and installed by DPL. DPL will install conduit for the control cable between the instrument transformers and the metering enclosure. The location of the metering enclosure will be determined in the construction phase. DPL will provide both the Primary and the Backup meters. DPL's meter technicians will program and install the Primary & Backup solid state multi-function meters for each new metering position. Each meter will be equipped with load profile, telemetry, and DNP outputs. The IC will be provided with one meter DNP output for each meter. DPL will own the metering equipment for the interconnection point, unless the IC asserts its right to install, own, and operate the metering system.

The Interconnection Customer will be required to make provisions for a voice quality phone line within approximately 3 feet of each Company metering position to facilitate remote interrogation and data collection.

It is the IC's responsibility to send the data that PJM and DPL requires directly to PJM. The IC will grant permission for PJM to send DPL the following telemetry that the IC sends to PJM: real time MW, MVAR, volts, amperes, generator status, and interval MWH and MVARH.

The estimate for DPL to design, purchase, and install metering as specified in the aforementioned scope for metering is included in the Substation Interconnection Estimate.

Interconnection Customer Scope of Work

The Interconnection Customer is responsible for all design and construction related to activities on their side of the Point of Interconnection. Site preparation, including grading and an access road, as necessary, is assumed to be by the IC. Route selection, line design, and right-of-way acquisition of the direct connect facilities is not included in this report, and is the responsibility of the IC. The IC is also required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff.

DPL Interconnection Customer Scope of Direct Connection Work Requirements

- DPL requires that an IC circuit breaker is located within 500 feet of Chestertown substation to facilitate the relay protection scheme between DPL and the IC at the Point of Interconnection (POI).

Special Operating Requirements

1. DPL will require the capability to remotely disconnect the generator from the grid by communication from its System Operations facility. Such disconnection may be facilitated by a generator breaker, or other method depending upon the specific circumstances and the evaluation by DPL.
2. DPL reserves the right to charge the Interconnection Customer operation and maintenance expenses to maintain the Interconnection Customer attachment facilities, including metering and telecommunications facilities, owned by DPL.

Summer Peak Analysis - 2020

Transmission Network Impacts

Potential transmission network impacts are as follows:

Generator Deliverability

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

1. (DP&L - DP&L) The MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) loads from 82.8% to 116.46% (DC power flow) of its emergency rating (95 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

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

2. (DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 96.34% to 146.31% (DC power flow) of its emergency rating (64 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

Please refer to Appendix 2 for a table containing the generators having contribution to this flowgate.

3. (DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 86.41% to 120.79% (DC power flow) of its emergency rating (93 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

Please refer to Appendix 3 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)

4. (DP&L - DP&L) The TOWNSEND-MIDLTNTTP 138 kV line (from bus 232107 to bus 232106 ckt 1) loads from 54.96% to 64.53% (DC power flow) of its emergency rating (348 MVA) for the tower line contingency outage of 'DBL_4NC'. This project contributes approximately 33.29 MW to the thermal violation.

```
CONTINGENCY 'DBL_4NC'                               /* RED LION-CEDAR CREEK
230;RED LION-CARTANZA 230
OPEN LINE FROM BUS 231004 TO BUS 232002 CKT 1
OPEN LINE FROM BUS 231004 TO BUS 232003 CKT 1
END
```

Please refer to Appendix 4 for a table containing the generators having contribution to this flowgate.

5. (DP&L - DP&L) The AB2-135 TAP-NMEREDTH 69 kV line (from bus 924820 to bus 232812 ckt 1) loads from 54.29% to 71.83% (DC power flow) of its emergency rating (93 MVA) for the line fault with failed breaker contingency outage of 'DP65_A'. This project contributes approximately 16.31 MW to the thermal violation.

```
CONTINGENCY 'DP65_A'                               /*CHURCH BUS BREAKER /*
ADDED DEC_ 22 2009
DISCONNECT BRANCH FROM BUS 232100 TO BUS 923320 CKT 1      /*CHURCH
AB1-141 TAP 138
DISCONNECT BRANCH FROM BUS 232801 TO BUS 923950 CKT 1      /*CHURCH
AB2-036 TAP 138 138
END
```

Please refer to Appendix 6 for a table containing the generators having contribution to this flowgate.

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)

None

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)

1. To mitigate the (DP&L) MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) overload will require reinforcements to increase the emergency rating of the Massey to Massey REA Tap 69 kV line. Reinforcements will include rebuilding of the circuit including the installation of new poles. The estimate to perform this work is **\$1,137,000** and will take **18 months** to complete.
2. To mitigate the (DP&L) MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) overload will require reinforcements to increase the emergency rating of the Church to Massey REA Tap 69 kV line. Reinforcements will include rebuilding of the circuit including the installation of new poles. The estimate to perform this work is **\$9,530,000** and will take **36 months** to complete.
3. To mitigate the (DP&L) Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) overload will require reinforcements to increase the emergency rating of the Y3-033 to Massey 69 kV line. Reinforcements will include rebuilding of the circuit including the installation of new poles. The estimate to perform this work is **\$8,187,000** and will take **24 months** to complete.
4. To mitigate the (DP&L) TOWNSEND-MIDLTNTP 138 kV line (from bus 232107 to bus 232106 ckt 1) overload will require reinforcements to increase the emergency rating of the Townsend to Middletown Tap 138 kV line. Reinforcements will include rebuilding a short section of the circuit including the installation of new poles and the re-mounting of 138 kV disconnect switches. The estimate to perform this work is **\$800,000** and will take **18 months** to complete.
5. To mitigate the (DP&L) AB2-135 TAP-NMEREDTH 69 kV line (from bus 924820 to bus 232812 ckt 1) overload will require reinforcements to increase the emergency rating of the AB2-135 to New Meredith 69 kV line. Reinforcements include rebuilding of the circuit including the installation of new poles and a new disconnect switch. The estimate to perform this work is **\$8,674,000** and will take **3 years** to complete.

Note: Queue project AB2-133 is not expected to have cost responsibility for this network upgrade due to cost allocation rules.

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)

None

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

To be performed during later study phases.

Short Circuit

No issues identified.

Stability and Reactive Power Requirement

To be performed during later study phases.

Light Load Analysis - 2020

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

Delivery of Energy Portion of Interconnection Request

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.

1. (DP&L - DP&L) The MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) loads from 84.9% to 163.8% (DC power flow) of its emergency rating (95 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 74.95 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

2. (DP&L - DP&L) The MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) loads from 67.55% to 93.41% (DC power flow) of its normal rating (95 MVA) for **non-contingency** condition. This project contributes approximately 24.57 MW to the thermal violation.
3. (DP&L - DP&L) The CHESTRTN-MCCLEANS 69 kV line (from bus 232202 to bus 232211 ckt 1) loads from 43.13% to 113.13% (DC power flow) of its emergency rating (48 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 75.0 MW to the thermal violation.

CONTINGENCY 'CKT 6773'

DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

4. (DP&L - DP&L) The CHESTRTN-CLOUGH 69 kV line (from bus 232202 to bus 232811 ckt 1) loads from 22.76% to 92.73% (DC power flow) of its normal rating (72 MVA) for **non-contingency** condition. This project contributes approximately 50.38 MW to the thermal violation.
5. (DP&L - DP&L) The OIL_CITY-STEEL138 138 kV line (from bus 232801 to bus 232103 ckt 1) loads from 68.84% to 88.55% (DC power flow) of its emergency rating (159 MVA) for the single line contingency outage of 'CKT 13808'. This project contributes approximately 31.34 MW to the thermal violation.

CONTINGENCY 'CKT 13808'
DISCONNECT BUS 232106
MIDDLETOWN - TOWNSEND 138
DISCONNECT BUS 232804
END

/MOUNT PLEASANT -

/MIDDLETOWN 138

6. (DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 99.46% to 216.57% (DC power flow) of its emergency rating (64 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 74.95 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

7. (DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 73.7% to 112.1% (DC power flow) of its normal rating (64 MVA) for **non-contingency** condition. This project contributes approximately 24.57 MW to the thermal violation.
8. (DP&L - DP&L) The CLOUGH-CHURC_69 69 kV line (from bus 232811 to bus 232203 ckt 1) loads from 15.62% to 86.57% (DC power flow) of its normal rating (71 MVA) for **non-contingency** condition. This project contributes approximately 50.38 MW to the thermal violation.
9. (DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 86.41% to 167.0% (DC power flow) of its emergency rating (93 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 74.95 MW to the thermal violation.

CONTINGENCY 'CKT 6773'

DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

10. (DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 79.96% to 109.93% (DC power flow) of its normal rating (82 MVA) for **non-contingency** condition. This project contributes approximately 24.57 MW to the thermal violation.
11. (DP&L - DP&L) The AB2-036 TAP-OIL_CITY 138 kV line (from bus 923950 to bus 232801 ckt 1) loads from 70.73% to 90.44% (**DC power flow**) of its emergency rating (159 MVA) for the single line contingency outage of 'CKT 13808'. This project contributes approximately 31.34 MW to the thermal violation.

CONTINGENCY 'CKT 13808'
DISCONNECT BUS 232106
MIDDLETOWN - TOWNSEND 138
DISCONNECT BUS 232804
END

/MOUNT PLEASANT -

/MIDDLETOWN 138

Delmarva Power and Light Costs

Cost estimates will further be refined as a part of the Impact Study and Facilities Study for this project. The Interconnection Customer will be responsible for all costs incurred by DPL in connection with the AB2-133 project. Such costs may include, but are not limited to, any transmission system assets currently in DPL's rate base that are prematurely retired due to the AB2-133 project. PJM shall work with DPL to identify these retirement costs and any additional expenses. DPL reserves the right to reassess issues presented in this document and, upon appropriate justification, submit additional costs related to the AB2-133 project.

Secondary Point of Interconnection

PJM studied the AB2-133 project into the Delmarva Power and Light Company (DPL) system at a tap of the Chestertown-Clough 69 kV circuit and evaluated it for compliance with reliability criteria for summer peak conditions in 2020.

Summer Peak Analysis - 2020

Transmission Network Impacts

Potential transmission network impacts are as follows:

Generator Deliverability

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

1. (DP&L - DP&L) The MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) loads from 82.8% to 116.46% (DC power flow) of its emergency rating (95 MVA) for the single

line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

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

2. (DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 96.34% to 146.31% (DC power flow) of its emergency rating (64 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

Please refer to Appendix 2 for a table containing the generators having contribution to this flowgate.

3. (DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 86.41% to 120.79% (DC power flow) of its emergency rating (93 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

Please refer to Appendix 3 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)

4. (DP&L - DP&L) The AB2-135 TAP-NMEREDTH 69 kV line (from bus 924820 to bus 232812 ckt 1) loads from 54.29% to 71.83% (DC power flow) of its emergency rating (93 MVA) for the line fault with failed breaker contingency outage of 'DP65_A'. This project contributes approximately 16.31 MW to the thermal violation.

CONTINGENCY 'DP65_A' / *CHURCH BUS BREAKER / *
 ADDED DEC_22 2009
 DISCONNECT BRANCH FROM BUS 232100 TO BUS 923320 CKT 1 / *CHURCH
 AB1-141 TAP 138
 DISCONNECT BRANCH FROM BUS 232801 TO BUS 923950 CKT 1 / *CHURCH
 AB2-036 TAP 138 138
 END

Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

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)

None

Delivery of Energy Portion of Interconnection Request

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.

1. (DP&L - DP&L) The MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) loads from 84.9% to 163.8% (DC power flow) of its emergency rating (95 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 74.95 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
 DISCONNECT BUS 232811 / CHURCH - CLOUGH -
 CHESTERTOWN 69
 END

2. (DP&L - DP&L) The CHESTRTN-MCCLEANS 69 kV line (from bus 232202 to bus 232211 ckt 1) loads from 43.13% to 113.13% (DC power flow) of its emergency rating (48 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 75.0 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
 DISCONNECT BUS 232811 / CHURCH - CLOUGH -
 CHESTERTOWN 69
 END

3. (DP&L - DP&L) The OIL_CITY-STEEL138 138 kV line (from bus 232801 to bus 232103 ckt 1) loads from 72.68% to 92.39% (DC power flow) of its emergency rating (159 MVA) for the single line contingency outage of 'CKT 13833'. This project contributes approximately 31.34 MW to the thermal violation.

CONTINGENCY 'CKT 13833'

OPEN LINE FROM BUS 232100 TO BUS 232107 CIRCUIT 1 /CHURCH -
TOWNSEND 138
END

4. (DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 99.46% to 216.57% (DC power flow) of its emergency rating (64 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 74.95 MW to the thermal violation.

CONTINGENCY 'CKT 6773'

DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

5. (DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 73.7% to 93.86% (DC power flow) of its normal rating (64 MVA) for non-contingency condition. This project contributes approximately 12.9 MW to the thermal violation.

6. (DP&L - DP&L) The CLOUGH-CHURC_69 69 kV line (from bus 232811 to bus 232203 ckt 1) loads from 15.62% to 103.01% (DC power flow) of its normal rating (71 MVA) for non-contingency condition. This project contributes approximately 62.05 MW to the thermal violation.

7. (DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 86.41% to 167.0% (DC power flow) of its emergency rating (93 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 74.95 MW to the thermal violation.

CONTINGENCY 'CKT 6773'

DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

8. (DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 79.96% to 95.7% (DC power flow) of its normal rating (82 MVA) for non-contingency condition. This project contributes approximately 12.9 MW to the thermal violation.

9. (DP&L - DP&L) The AB2-036 TAP-OIL_CITY 138 kV line (from bus 923950 to bus 232801 ckt 1) loads from 74.63% to 94.34% (DC power flow) of its emergency rating (159 MVA) for the single

line contingency outage of 'CKT 13833'. This project contributes approximately 31.34 MW to the thermal violation.

CONTINGENCY 'CKT 13833'

OPEN LINE FROM BUS 232100 TO BUS 232107 CIRCUIT 1 /CHURCH -
TOWNSEND 138
END

10. (DP&L - DP&L) The AB2-133 TAP-CHESTRTN 69 kV line (from bus 924800 to bus 232202 ckt 1) loads from .0% to 104.17% (DC power flow) of its emergency rating (72 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 75.0 MW to the thermal violation.

CONTINGENCY 'CKT 6773'

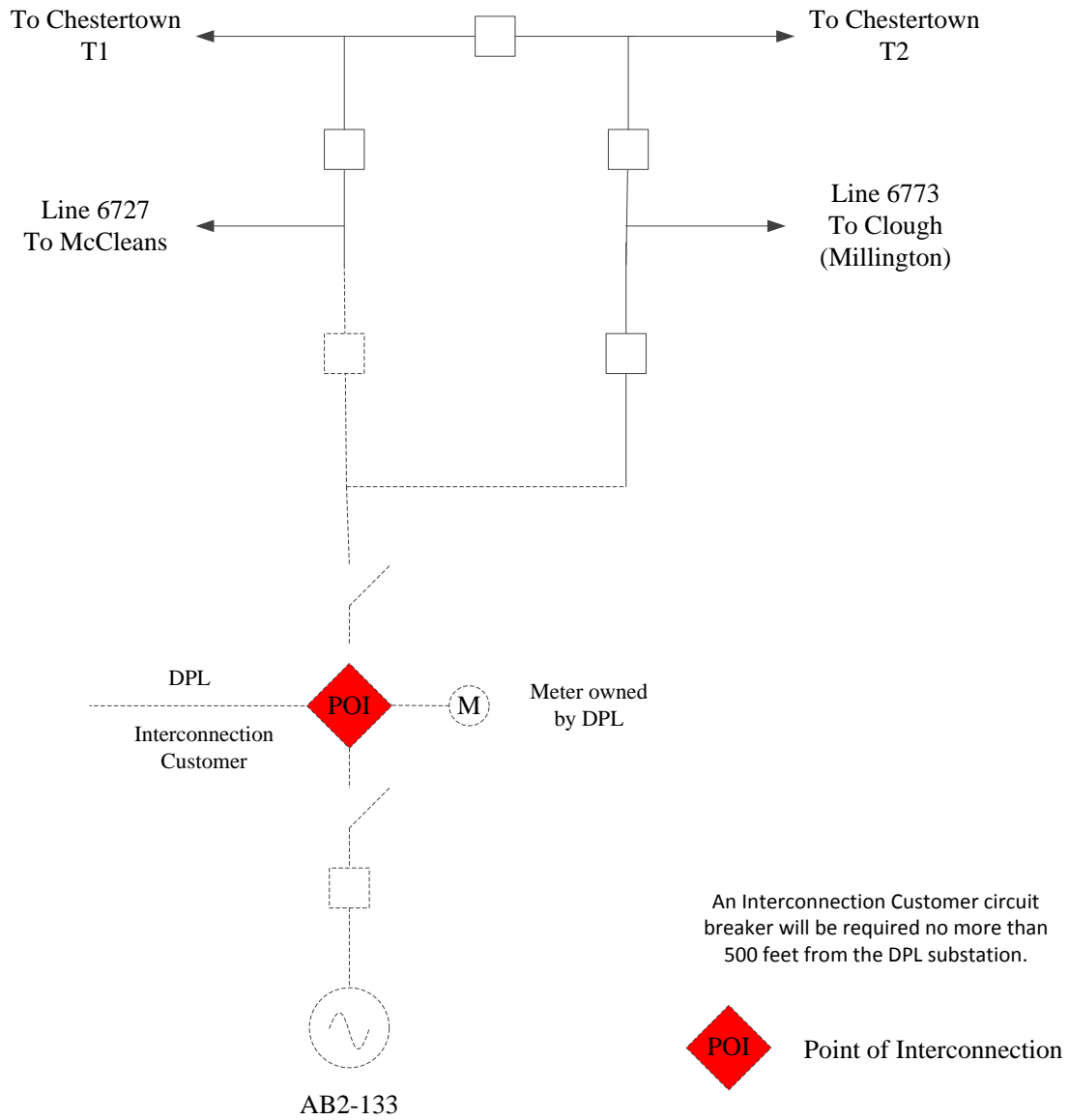
DISCONNECT BUS 232811 / CHURCH - CLOUGH -
CHESTERTOWN 69
END

11. (DP&L - DP&L) The AB2-133 TAP-CLOUGH 69 kV line (from bus 924800 to bus 232811 ckt 1) loads from 22.76% to 108.94% (DC power flow) of its normal rating (72 MVA) for non-contingency condition. This project contributes approximately 62.05 MW to the thermal violation.

Attachment 1

AB2-133

Chestertown 69 kV Chestertown Substation



Appendices

(Primary Point of Interconnection)

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. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

Appendix 1

(DP&L - DP&L) The MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) loads from 82.8% to 116.46% (DC power flow) of its emergency rating (95 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
915751	Y3-033	3.28
915752	Y3-033	21.98
921442	AA1-110 C	4.
924801	AB2-133 C OP	31.98
924891	AB2-143 C OP	7.6

Appendix 2

(DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 96.34% to 146.31% (DC power flow) of its emergency rating (64 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
915751	Y3-033	3.28

915752	Y3-033	21.98
921442	AA1-110 C	4.
924801	AB2-133 C OP	31.98
924891	AB2-143 C OP	7.6

Appendix 3

(DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 86.41% to 120.79% (DC power flow) of its emergency rating (93 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
915751	Y3-033	3.28
915752	Y3-033	21.98
924801	AB2-133 C OP	31.98
924891	AB2-143 C OP	7.6

Appendix 4

(DP&L - DP&L) The TOWNSEND-MIDLTNTP 138 kV line (from bus 232107 to bus 232106 ckt 1) loads from 54.96% to 64.53% (DC power flow) of its emergency rating (348 MVA) for the tower line contingency outage of 'DBL_4NC'. This project contributes approximately 33.29 MW to the thermal violation.

CONTINGENCY 'DBL_4NC'
230;RED LION-CARTANZA 230
OPEN LINE FROM BUS 231004 TO BUS 232002 CKT 1
OPEN LINE FROM BUS 231004 TO BUS 232003 CKT 1
END

/* RED LION-CEDAR CREEK

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
232900	DEMECSMY	2.15
232851	DUP-SFR1	0.41
232902	EASTMUNI	3.4
232923	MR1	3.36
232924	MR2	3.36
232910	NRG_G1	2.43
232911	NRG_G2	2.43
292089	T-011	0.17

297076	V2-028 C	0.09
297077	V2-028 E	0.75
904212	V4-022E	0.61
232813	VAUGHN	0.15
232919	VN10	0.57
901004	W1-003 E	0.89
901014	W1-004 E	0.89
901024	W1-005 E	0.89
901034	W1-006 E	0.89
901411	W1-062	2.28
907052	X1-032 E	0.79
907324	X1-096 E	18.27
910571	X3-008 C	0.32
910572	X3-008 E	2.68
910591	X3-015 C	0.3
910592	X3-015 E	2.51
910821	X3-066 C	0.17
910822	X3-066 E	1.41
913361	Y1-079 C	0.24
913362	Y1-079 E	1.96
913411	Y1-080 C	0.05
913412	Y1-080 E	0.43
915751	Y3-033	1.46
915752	Y3-033	9.76
920543	Y3-054 E	2.48
915541	Y3-058 C	0.22
915542	Y3-058 E	1.86
920582	Z1-076 C	1.05
920583	Z1-076 E	1.71
920592	Z1-077 C	0.75
920593	Z1-077 E	1.22
916281	Z1-081 C	0.2
916282	Z1-081 E	1.65
917082	Z2-012 E	2.44
920763	Z2-076 E	0.4
920773	Z2-077 E	0.4
920812	Z2-097 C	1.57
920813	Z2-097 E	0.65
921122	AA1-059 C	0.84
921123	AA1-059 E	0.33
921142	AA1-061 C	2.87
921143	AA1-061 E	1.41
921442	AA1-110 C	1.78
921443	AA1-110 E	0.89
921592	AA1-140 C	1.51

921593	AA1-140 E	2.47
921602	AA1-141 C	1.13
921603	AA1-141 E	1.84
921872	AA2-069	104.81
922213	AA2-129 E	3.94
922222	AA2-130	0.39
922752	AB1-056 C OP	12.79
922753	AB1-056 E OP	36.43
922762	AB1-057 C	12.99
922763	AB1-057 E	37.03
923282	AB1-137 C	2.79
923283	AB1-137 E	1.2
923322	AB1-141 C OP	5.3
923323	AB1-141 E OP	2.47
923332	AB1-142 C OP	5.3
923333	AB1-142 E OP	2.47
923452	AB1-162 C OP	2.4
923453	AB1-162 E OP	3.92
923602	AB1-176 C	1.29
923603	AB1-176 E	2.12
923902	AB2-030 E	0.79
923921	AB2-032 C	5.34
923922	AB2-032 E	2.51
923931	AB2-033 C	1.41
923932	AB2-033 E	0.56
923951	AB2-036 C	13.81
923952	AB2-036 E	22.54
923961	AB2-037 C	14.99
923962	AB2-037 E	24.45
924191	AB2-063 C	2.87
924192	AB2-063 E	4.69
924361	AB2-084 C	0.75
924362	AB2-084 E	1.22
924461	AB2-095 C	2.27
924462	AB2-095 E	3.7
924681	AB2-120 C OP	7.49
924682	AB2-120 E OP	12.21
924781	AB2-130 C OP	7.73
924782	AB2-130 E OP	12.62
924801	AB2-133 C OP	14.2
924802	AB2-133 E OP	19.08
924821	AB2-135 C	12.06
924822	AB2-135 E	18.18
924831	AB2-136 C OP	5.19
924832	AB2-136 E OP	7.37

924881	AB2-142 C	1.14
924882	AB2-142 E	1.85
924891	AB2-143 C OP	3.37
924892	AB2-143 E OP	5.5
924971	AB2-153 C	2.98
924972	AB2-153 E	4.87
925071	AB2-164 C OP	1.5
925072	AB2-164 E OP	2.44
925081	AB2-165 C OP	1.5
925082	AB2-165 E OP	2.44
925091	AB2-166 C	0.4
925092	AB2-166 E	0.7
925101	AB2-167 C	1.05
925102	AB2-167 E	1.72
925151	AB2-172 C OP	4.11
925152	AB2-172 E OP	6.7
925231	AB2-177 C	0.49
925232	AB2-177 E	0.81
925251	AB2-179 C OP	26.29
925252	AB2-179 E OP	8.67
925261	AB2-180 C	2.8
925262	AB2-180 E	1.2
925271	AB2-185 C OP	4.42
925272	AB2-185 E OP	1.89
925311	AB2-192 C OP	1.5
925312	AB2-192 E OP	2.44

Appendix 6

(DP&L - DP&L) The AB2-135 TAP-NMEREDTH 69 kV line (from bus 924820 to bus 232812 ckt 1) loads from 54.29% to 71.83% (DC power flow) of its emergency rating (93 MVA) for the line fault with failed breaker contingency outage of 'DP65_A'. This project contributes approximately 16.31 MW to the thermal violation.

CONTINGENCY 'DP65_A'

/*CHURCH BUS BREAKER /* ADDED

DEC_ 22 2009

DISCONNECT BRANCH FROM BUS 232100 TO BUS 923320 CKT 1
141 TAP 138

/*CHURCH AB1-

DISCONNECT BRANCH FROM BUS 232801 TO BUS 923950 CKT 1
036 TAP 138 138

/*CHURCH AB2-

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
910821	X3-066 C	0.05
910822	X3-066 E	0.44

915751	Y3-033	0.71
915752	Y3-033	4.78
916281	Z1-081 C	0.1
916282	Z1-081 E	0.81
920812	Z2-097 C	0.77
920813	Z2-097 E	0.32
921442	AA1-110 C	0.87
921443	AA1-110 E	0.43
923452	AB1-162 C OP	0.74
923453	AB1-162 E OP	1.21
923602	AB1-176 C	0.4
923603	AB1-176 E	0.66
923951	AB2-036 C	8.08
923952	AB2-036 E	13.18
924191	AB2-063 C	0.89
924192	AB2-063 E	1.45
924801	AB2-133 C OP	6.96
924802	AB2-133 E OP	9.35
924821	AB2-135 C	10.31
924822	AB2-135 E	15.56
924891	AB2-143 C OP	1.65
924892	AB2-143 E OP	2.7
925251	AB2-179 C OP	3.76
925252	AB2-179 E OP	1.24

Appendices **(Secondary Point of Interconnection)**

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. Although this information is not used "as is" for cost allocation purposes, it can be used to gauge other generators impact.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

Appendix 1

(DP&L - DP&L) The MASSEY-MASSYREA 69 kV line (from bus 232201 to bus 232810 ckt 1) loads from 82.8% to 116.46% (DC power flow) of its emergency rating (95 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
915751	Y3-033	3.28
915752	Y3-033	21.98
921442	AA1-110 C	4.
924801	AB2-133 C OP	31.98
924891	AB2-143 C OP	7.6

Appendix 2

(DP&L - DP&L) The MASSYREA-CHURC_69 69 kV line (from bus 232810 to bus 232203 ckt 1) loads from 96.34% to 146.31% (DC power flow) of its emergency rating (64 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
915751	Y3-033	3.28
915752	Y3-033	21.98
921442	AA1-110 C	4.
924801	AB2-133 C OP	31.98
924891	AB2-143 C OP	7.6

Appendix 3

(DP&L - DP&L) The Y3-033 TAP-MASSEY 69 kV line (from bus 915750 to bus 232201 ckt 1) loads from 86.41% to 120.79% (DC power flow) of its emergency rating (93 MVA) for the single line contingency outage of 'CKT 6773'. This project contributes approximately 31.98 MW to the thermal violation.

CONTINGENCY 'CKT 6773'
DISCONNECT BUS 232811
CHESTERTOWN 69
END

/ CHURCH - CLOUGH -

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
915751	Y3-033	3.28

915752	Y3-033	21.98
924801	AB2-133 C OP	31.98
924891	AB2-143 C OP	7.6

Appendix 5

(DP&L - DP&L) The AB2-135 TAP-NMEREDTH 69 kV line (from bus 924820 to bus 232812 ckt 1) loads from 54.29% to 71.83% (DC power flow) of its emergency rating (93 MVA) for the line fault with failed breaker contingency outage of 'DP65_A'. This project contributes approximately 16.31 MW to the thermal violation.

CONTINGENCY 'DP65_A' /*CHURCH BUS BREAKER /* ADDED
 DEC_22 2009
 DISCONNECT BRANCH FROM BUS 232100 TO BUS 923320 CKT 1 /*CHURCH AB1-
 141 TAP 138
 DISCONNECT BRANCH FROM BUS 232801 TO BUS 923950 CKT 1 /*CHURCH AB2-
 036 TAP 138 138
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
910821	X3-066 C	0.05
910822	X3-066 E	0.44
915751	Y3-033	0.71
915752	Y3-033	4.78
916281	Z1-081 C	0.1
916282	Z1-081 E	0.81
920812	Z2-097 C	0.77
920813	Z2-097 E	0.32
921442	AA1-110 C	0.87
921443	AA1-110 E	0.43
923452	AB1-162 C OP	0.74
923453	AB1-162 E OP	1.21
923602	AB1-176 C	0.4
923603	AB1-176 E	0.66
923951	AB2-036 C	8.08
923952	AB2-036 E	13.18
924191	AB2-063 C	0.89
924192	AB2-063 E	1.45
924801	AB2-133 C OP	6.96
924802	AB2-133 E OP	9.35
924821	AB2-135 C	10.31
924822	AB2-135 E	15.56
924891	AB2-143 C OP	1.65
924892	AB2-143 E OP	2.7