

## **X1-039 Eagle Point 230kV**

### **Generation Interconnection**

#### **Network Impacts**

Queue project X1-039 was studied as a(n) 27.9 MW (27.9 MW of which was Capacity) injection into PSEG's system at the EAGLE PT 230.0 kV substation. Project X1-039 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential transmission network impacts are as follows:

#### **Generator Deliverability**

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

No problems identified.

#### **Multiple Facility Contingency**

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

No problems identified.

#### **Short Circuit**

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

No problems identified

#### **Stability**

Not required because the project is less than 30 MW.

#### **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.)*

1. (PECO) The Richmond-Waneeta 3 230 kV line (from bus 213922 to bus 214012 ckt 1) loads from 135.03% to 136.05% (DC power flow) of its emergency rating (914 MVA) for the single contingency 'CHIC125', loss of the Chichester-Delco circuit. This project contributes approximately 9.37 MW to the thermal violation.

2. (PSEG) The Gloucester-Cuthbert Blvd. 230 kV line (from bus 219110 to bus 219108 ckt 1) loads from 135.20% to 136.5% (DC power flow) of its emergency rating (700 MVA) for the single contingency 'GLO\_CUTH\_NEW', loss of Gloucester-Cuthbert Blvd. circuit #2. This project contributes approximately 9.10 MW to the thermal violation.

3. (PSEG) The Gloucester-Cuthbert Blvd. 230 kV line (from bus 219110 to bus 219108 ckt 1) loads from 115.55% to 116.66% (DC power flow) of its normal rating (500 MVA) for non contingency condition. This project contributes approximately 5.57 MW to the thermal violation.
4. (PSEG) The Eagle Point-Gloucester 230 kV line (from bus 219120 to bus 219110 ckt 2) loads from 154.61% to 156.31% (DC power flow) of its emergency rating (1000 MVA) for the single contingency 'PS18', loss of the Gloucester-Eagle Point 230kV circuit. This project contributes approximately 18.16 MW to the thermal violation.
5. (PSEG) The Cuthbert Blvd.-Camden 230 kV line (from bus 219108 to bus 219125 ckt 2) loads from 174.97% to 176.86% (DC power flow) of its emergency rating (500 MVA) for the single contingency 'CAM\_CUTH', loss of the Camden-Cuthbert Blvd 230kV circuit #2. This project contributes approximately 9.48 MW to the thermal violation.
6. (PSEG/PECO) The Camden-Richmond 230 kV line (from bus 219125 to bus 213922 ckt 1) loads from 111.28% to 112.4% (DC power flow) of its normal rating (836 MVA) for non contingency condition. This project contributes approximately 9.73 MW to the thermal violation.
7. (PSEG) The Gloucester-Cuthbert Blvd. 230 kV line (from bus 219110 to bus 219108 ckt 2) loads from 188.61% to 190.43% (DC power flow) of its emergency rating (500 MVA) for the single contingency 'GLO\_CUTH', loss of the Gloucester-Cuthbert Blvd. 230 kV circuit #1. This project contributes approximately 9.10 MW to the thermal violation.
8. (PSEG) The Gloucester-Cuthbert Blvd. 230 kV line (from bus 219110 to bus 219108 ckt 2) loads from 152.09% to 153.56% (DC power flow) of its normal rating (380 MVA) for non contingency condition. This project contributes approximately 5.57 MW to the thermal violation.
9. (PSEG) The Eagle Point-Gloucester 230 kV line (from bus 219120 to bus 219110 ckt 1) loads from 107.21% to 108.24% (DC power flow) of its emergency rating (1000 MVA) for the single contingency 'CHIC125', loss of the Chichester-Delco circuit. This project contributes approximately 10.30 MW to the thermal violation.
10. (PSEG) The Eagle Point-Gloucester 230 kV line (from bus 219120 to bus 219110 ckt 1) loads from 101.25% to 102.37% (DC power flow) of its normal rating (850 MVA) for non contingency condition. This project contributes approximately 10.12 MW to the thermal violation.
11. (PSEG) The Gloucester-Camden 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 100.29% to 101.29% (DC power flow) of its emergency rating (700 MVA) for the single contingency 'GLO\_CUTH', loss of the Gloucester-Cuthbert Blvd. 230 kV circuit #1. This project contributes approximately 7.00 MW to the thermal violation.

12. (PSEG) The Gloucester-Camden 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 104.21% to 105.27% (DC power flow) of its normal rating (500 MVA) for non contingency condition. This project contributes approximately 5.29 MW to the thermal violation.

13. (PSEG) The Cuthbert Blvd.-Camden 230 kV line (from bus 219108 to bus 219125 ckt 1) loads from 129.05% to 130.49% (DC power flow) of its emergency rating (700 MVA) for the single contingency 'CAM\_CUTH\_NEW', loss of Gloucester-Cuthbert Blvd. circuit #2. This project contributes approximately 10.05 MW to the thermal violation.

14. (PSEG) The Cuthbert Blvd.-Camden 230 kV line (from bus 219108 to bus 219125 ckt 1) loads from 111.92% to 113.16% (DC power flow) of its normal rating (500 MVA) for non contingency condition. This project contributes approximately 6.23 MW to the thermal violation.

## **New System Reinforcements**

None

## **Contribution to Previously Identified System Reinforcements**

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

1. The overload on the Richmond-Waneeta 230kV circuit can be alleviated by upgrading the underground and aerial conductors. The estimated reinforcement cost is **\$20 Million**; and the estimated lead time 3 years

2,3. Th overload on the Gloucester-Cuthbert Blvd 230kv circuit can be alleviated by creating an express circuit from Gloucester to Camden and eliminating Ckt 1 from Gloucester to Cuthbert. In doing so now there will be two express circuits from Gloucester to Camden and only one circuit from Gloucester – Cuthbert Blvd. **No extra cost** will be incurred.

4,9,10. The overload on the Eagle Point-Gloucester 230kV circuit can be alleviated by reconductoring the line with a higher rated conductor, with two conductors per phase to get an emergency rating of 1800MVA. Total cost for this project would be **\$6 Million** with an estimated lead time of 36-48 months.

5. The overload on the Cuthbert Blvd.-Camden 230kV circuit can be alleviated by creating an express circuit from Gloucester to Camden and eliminating Ckt 2 from Cuthbert Blvd to Camden Ckt 2. In doing so now there will be two express circuits from Gloucester to Camden and only one circuit from Cuthbert Blvd to Camden. **No extra cost** will be incurred.

6. This overload on the Camden-Richmond 230kV circuit can be alleviated by creating an express circuit from Camden to Richmond. This overload has been identified by RTEP 2016. We need to expediate this re-inforcement for RTEP2016. Total cost for this project is **\$40 Million** with a lead time of 36-48 months.

7,8. The express line from Gloucester to Camden mentioned in 2,3 and 5 will eliminate the overload on the Gloucester-Cuthbert Blvd 230kv circuit #2.

11,12. The overload on the Gloucester-Camden 230kv circuit can be eliminated by increasing the emergency rating of the underground cable to 750MVA.

13,14. The express line from Gloucester to Camden mentioned in 2,3 and 5 will eliminate the overload on the Cuthbert Blvd.-Camden 230 kV circuit #1.

### **Energy Portion of Interconnection Request**

*(PJM also studied the delivery of the energy portion of the surrounding generation. Any potential 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 Transmission Interconnection request.*

*Note: 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 analyzes all overload conditions associated with the overloaded element(s) identified. As a result of the aggregate energy resources in the area, the following violations were identified.)*

No problems identified.

### **Network Impacts**

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### **Generator Deliverability**

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

No problems identified.

### **Multiple Facility Contingency**

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

No problems identified.

### **Short Circuit**

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

No problems identified

### **Stability**

Not required because the project is less than 30 MW.

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

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