

#P13 Mickleton 600 MW
Generation Interconnection

This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM system as a Capacity Resource.

Network Impacts

The #P13 project was studied as an injection of 600 MW into Mickleton 230kV bus. Project #P13 was evaluated for compliance with reliability criteria for summer peak conditions in 2010. Potential network impacts were as follows:

Generator Deliverability

1. The Eddystone – Island Road 230 kV circuit is overloaded at around 103% of its emergency rating (1235 MVA) for the outage of the Macdade – Ridley 230 kV circuit. The P13 project contributes approximately 43 MW to the contingency facility loading.
2. The Eddystone-Llanerch 138kV line #130-42 is overloaded at 101.3% of it's emergency rating for the loss of the Eddystone-Llanerch 138kV line #130-45 line.
3. The Master – N Philadelphia 230 kV circuit is overloaded at around 104% of its normal rating (462 MVA). The P13 project contributes approximately 20 MW to the normal facility loading.

Multiple Facility Contingency

4. The Northwest – Conastone 230 kV circuit (#2310) is overloaded at 103.5% of its emergency rating (923 MVA) for the tower outage of the Brighton – Doubs 500kV line and Brighton - Conastone 500 kV. The P13 project contributes approximately 36 MW to the contingency facility loading.
5. The Northwest – Conastone 230 kV circuit (#2322) is overloaded at 111.5% of its emergency rating (803 MVA) for the tower outage of the Brighton – Doubs 500kV line and Brighton - Conastone 500 kV. The P13 project contributes approximately 35 MW to the contingency facility loading.

Note 1: There were two different levels of upgrade previously identified for circuit #2322 due to the interconnection of Queues P04 (re-tension), and P05, P06 and P07 (reconductor circuit #2322 only). Queue P13 interconnection causes an overload that will require a third level of upgrade (line rebuild) to achieve adequate rating. **Please note that circuits #2322 and #2310 are on the same double circuit towers.**

Short Circuit

No problems identified.

New System Reinforcements

1. Upgrade Eddystone to Island Road 230kV line (220-23) terminals at both Eddystone and Island Road Substations to increase the emergency rating. Substation work at Eddystone and Island Road is estimated to cost a total of \$1,000,000. The time to complete the work is 18-24 months.
2. Upgrade Eddystone to Llanerch 138kV line (130-42) terminals to increase the emergency rating, Substation work at Eddystone and Llanerch \$800,000 This work will take approximately 30 months to complete after the ISA is signed.
3. Upgrade the Master to North Philadelphia 230kV line (220-44) to increase the rating by reconductoring the line and modifying structures as required. The total cost is estimated at \$4,050,000 (\$3,900,000 for line work and \$150,000 for substation work at Master and North Philadelphia). This work will take approximately 30 months to complete.
4. and 5. To mitigate the contingency overload of The Northwest – Conastone 230 kV circuits (#2310 and #2322) will require the line to be rebuilt because the existing structures are not adequate to support the required conductor size. **See Note 1 on the previous page, also please note that circuits #2322 and #2310 are on the same double circuit towers.**

The cost per mile for rebuilding the double circuit tower line (circuits #2310 and #2322) is estimated to cost \$1,750,000 / mile. The total cost estimate for the 23.7 mile line is \$41,500,000. A CPCN from the state of Maryland and an extensive outage, with much temporary work, would likely be required. Considering the potential for delays the construction time may be in the 5 – 7 year range.

Contribution to Previously Identified Overloads

- The Graceton – Raphael Rd. 230kV circuit is overloaded at 122% of its emergency rating (659 MVA) for the tower outage of the Brighton – Doubs 500kV line and Brighton - Conastone 500kV. The P13 project contributes approximately 43MW to the contingency facility loading. The total cost to reductor the Graceton – Raphael Rd. 230 kV circuit is estimated to cost \$17,900,000. This work will take approximately 30-36 months to complete.
- The Northwest – Conastone 230kV circuit is overloaded at 109.3% of its emergency rating (819 MVA) for the tower outage of the Brighton – Doubs 500kV line and Brighton - Conastone 500kV. The P13 project contributes approximately 35MW to the contingency facility loading. **See Note 1 on previous page 4 and new reinforcements 3 and 4 above. The upgrade requirement identified as 3 and 4 above also satisfies this previously identified overload, However some of the cost would be shared by Queues P04, P05, P06 and P07. The cost allocation among these projects and P13 will be determined during the Impact Study.**
- The Graceton – P05 tap 230kV circuit is overloaded at around 121.3% of its emergency rating (627 MVA) for the outage of the Conastone – Peach Bottom 500kV circuit. The P13 project contributes approximately 49MW to the contingency facility loading. The total estimated cost to mitigate this overload is \$1,655,200.

(BGE Portion of the P05 to Graceton line) Reconductor 230 kV line 220-08 from Graceton to the Pennsylvania / Maryland state line (220-08). The estimated cost is \$835,200. This work will take approximately 18-36 months to complete depending on whether a CPN filing is required.

(PECO portion of the P05 to Graceton line) Reconductor 230kV line 220-08 from the Pennsylvania / Maryland state line to Queue P05 tap point. The estimated cost is \$820,000. This work will take approximately 24 months to complete.

Potential Issues

- The Parrish – Grays Ferry 230kV line may be overloaded for normal, non-contingency conditions. The normal rating of the Parish - Grays Ferry 230kV line is 736 MVA. The P13 project contributes approximately 53 MW to the normal facility loading. The line (emergency rating is 874 MVA) also may be overloaded for the outage of the East Windsor – Salem 500 kV circuit. The P13 project contributes approximately 53 MW to the contingency facility loading. The cost to reconductor the Grays Ferry – Parrish 230kV circuit 220-27 was estimated to be \$2,630,000 per the Queue #A27 Facilities Study performed in 2002. A better estimate will be developed if Queue P06 is found to cause or contribute to this contingency overload during the Impact Study.