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

Network Impacts -1200 MW Injection into the Brunner Island 230kV substation (G33)

Network Impacts

Potential network impacts for the injection of 1200MW into the Brunner Island 230 kV transmission line was evaluated for summer peak conditions in 2005. The load flow study was performed under the assumption that the Yorkana-Otter Creek 230 kV line and Otter Creek 230 kV switchyard are in-service.

Generator Deliverability

- The Otter Creek - Conastone 230 kV circuit is normally overloaded at 125% of its normal rating (425 MVA). The G33 project contributes approximately 160 MW to the loading on this circuit.
- The North Temple - Hosensack 230 kV is contingency overloaded at 115% of the emergency rating (474MVA) for the outage of the Lyons - N. Temple 230 kV circuit. The G33 project contributes approximately 90 MW to the loading on this circuit.
- The Brunner - West Hempfeild 230 kV circuit is contingency overloaded at 130% of the emergency rating (611MVA) for the outage of the Conastone - Manor, Otter Creek - Conastone 230 kV circuit. The G33 project contributes approximately 170 MW to the loading on this circuit
- The Manor - Graceton 230 kV circuit is contingency overloaded at 130% of the emergency rating (531MVA) for the outage of the Otter Creek - Conastone 230 kV circuit. The G33 project contributes approximately 210 MW to the loading on this circuit.
- The Otter Creek - Conastone 230 kV circuit is contingency overloaded at 130% of the emergency rating (531 MVA) due to the outage of the Manor - Graceton 230 kV circuit and the Safe Harbor units. The G33 project contributes approximately 230 MW to the loading on this circuit.

Multiple Facility Contingency - Tower Line Outages (MAAC Criteria IIC)

No identified problems.

Short Circuit

Thirteen (13) 230kV circuit breakers at Brunner Island substation exceed their interrupting duty with the addition of project G33. Some of the circuit breakers will exceed 63kA and will require the addition of 80kA circuit breakers.

Sub-Transmission System 69kV Overloads

Several 69kV system overloads were identified as a result of adding the G32 project.

- Manor-Engleside #2 line
- Manor-Engleside #1 line
- Manor-Face Rock line
- Manor-West Hempfield line

New System Reinforcements

- Reconductor the Brunner Island-West Hempfield 230kV circuit (14.43 miles) with 1590 ACSR conductor operating at 125degree C and replace the wave trap (1600 to 2000 amp) at Brunner Island substation and the wave trap (1600 to 200 amp), switch (1200 to 2000 amp) and current transformer setting (1200/5 to 2000/5) at West Hempfield substation .
- Reconductor a 3200' portion of the Brunner Island-Yorkana 230kV circuit with 1590 ACSR conductor (existing 1034) operating at 125 degreee C.
- Reconductor the Otter Creek-Conastone 230kV circuit with 1590 ACSR conductor operating at 125 degree C and replace the circuit breaker (1200 to 2000 amp) and switch (1200 to 2000 amp) at Manor substation.
- Increase the operating temperature on the Manor-Graceton 230kV circuit from 125 degree C to 160 degree C and replace a circuit breaker (1200 to 2000 amp) at Manor substation.

The estimated cost to complete the line upgrades listed above is $60 million. Outage requirements, PUC approvals and permitting will result in a 5 to 6 year time frame to complete the work. The estimated cost for the terminal equipment replacements described above is $1.41 million with all replacements completed within 18 months

The total cost to eliminate the overloads on the 69kV sub-transmission system is estimated to cost $5 million and take 3 years to complete. A more refined description of the 69kV overloads and associated cost and time estimates will be provided in the Impact Study.

- Replace 13 230kV circuit breakers at Brunner Island 230kV substation at an estimated cost of $6.5 million. The replacement of the circuit breakers is estimated to take 3-4 years.

Contribution to Previously Identified System Reinforcements

The G32 project will be allocated a percentage of the costs for the following previously identified network reinforcements:

- Installation of a new 230 kV circuit form Brunner Island - Otter Creek. The installation of the line is estimated to cost $30.2 million and take 6-8 years to complete. The G33 project contributes approximately 120 MW toward the need for this reinforcement.

Cost allocation percentages are not provided as part of the Feasibility Study analysis, however, cost allocation will be provided at the conclusion of the Queue G Impact Study evaluations.