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 - 500 MW into the Susquehanna 230 kV bus

Potential network impacts for the injection of 500 MW into the Susquehanna 230 kV bus were evaluated for summer peak conditions in 2004.

Network Impacts

The C6 project was modeled as connected to the Susquehanna – Stanton 230 kV circuit 1, one-tenth of the electrical distance from the Susquehanna 230 kV substation.

The new Portland – Whippany 230 kV circuit, an upgrade required for previous generators, was modeled as in-service.

Normal System

- The new generation contributes 220 MW to a normal overload on the Susquehanna 500/230 kV transformer T21.

- The new generation contributes 95 MW to a normal overload on the Sunbury 500/230 kV transformer T24.

Single Contingency (MAAC Criteria IIA)

- The new generation contributes 290 MW to an overload on the Susquehanna 500/230 kV transformer T21 for loss of the Sunbury 500/230 kV transformer T24.

- The new generation contributes 195 MW to an overload on the Sunbury 500/230 kV transformer T24 for loss of the Susquehanna 500/230 kV transformer T21.

Multiple Facility Contingency (MAAC Criteria IIC)

- No identified problems.

Generator Deliverability

- The new generation contributes 35 MW to the overload on the Martins Creek - Morris Park 230 kV line for loss of the Hosensack – Steelcity 500 kV line.

Short Circuit Analysis

- No identified problems.

System Reinforcements

Second Susquehanna 500/230 kV Transformer (T22)

The new generation contributes to previously identified overloads on the Susquehanna 500/230 kV T21 and Sunbury 500/230 kV T24 transformers. A new Susquehanna 500/230 kV, 750 MVA transformer is required. The total cost is estimated to be $19.3 million with a lead-time of 3 years (see Figure 2). A third 500/230 kV, 750 MVA transformer may be required to completely eliminate the overload problems in the Northern PPL region for which additional analysis during the Impact study will be needed. The new generator will be allocated a percentage of the costs for the upgrades based on their MW contribution in relation to other new generators. Cost allocation percentages are not provided as part of the Feasibility Study analysis but will be provided in the Impact Study report.

Substation costs for the first 500/230 kV transformer addition are detailed as follows:

- $13,560,000 for work at the Susquehanna 500 kV substation.
- $2,112,000 for work at the Susquehanna 230 kV substation.

Note: These costs do not include any equipment replacements or upgrades due to increased fault duties, and additional costs pertaining to coordination with the Susquehanna Nuclear station may be required.

Since the Susquehanna 500 kV and 230 kV substations are physically separated by the Susquehanna river, a single-circuit 230 kV line approximately two miles in length will be required to connect T22. This line is expected to cost approximately $3.6 million dollars and take 3 years to complete. As PPL owns the property on both sides of the river, no new right of way is required for this line. However, environmental permits are required. Tasks included in the first transformer estimate are:

- Transfer and reconnect the existing 500 kV to 230 kV transmission line yard tie to a new T22 transformer at the Susquehanna Plant 500/230 kV substation.
- Transfer and reconnect the Sunbury 500 kV line to a new bay position at the Susquehanna 230 kV switchyard.
- File a certification application with the PUC and secure a permit for the new 230 kV line crossing of the Susquehanna River.

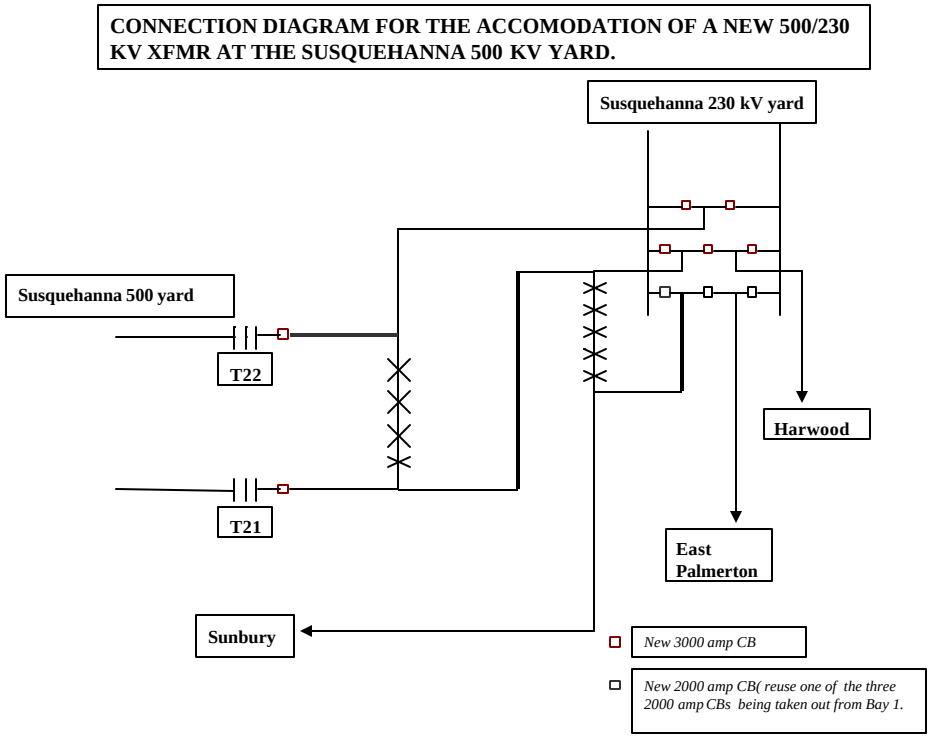

Figure 2: Second Susquehanna 230 kV Transfomer

Northern New Jersey Upgrades

The new generation contributes to previously identified overloads in northern New Jersey. A new Portland – Whippany 230 kV line (see Figure 3) is required to alleviate the overloads. It is estimated that the line will cost $62.3 million with a lead time of 5 years. The new generator will be allocated a percentage of the costs for the upgrades based on their MW contribution (13 MW) in relation to other new generators. Cost allocation percentages are not provided as part of the Feasibility Study analysis but will be provided in the Impact Study report.

The new Portland – Whippany 230 kV line will alleviate the Northern New Jersey overloads mentioned above with the exception of the Martins Creek - Morris Park 230 kV line for loss of the Hosensack – Steelcity 500 kV. Upgrading the Martins Creek - Morris Park 230 kV line to an 888 MW (150 degrees C) 4-hour emergency rating will alleviate this overload, and will be accomplished by replacing terminal equipment at Martins Creek and relocating/reconfiguring two distribution line crossings. The cost is estimated at $160,000 with a lead time of 1 year.

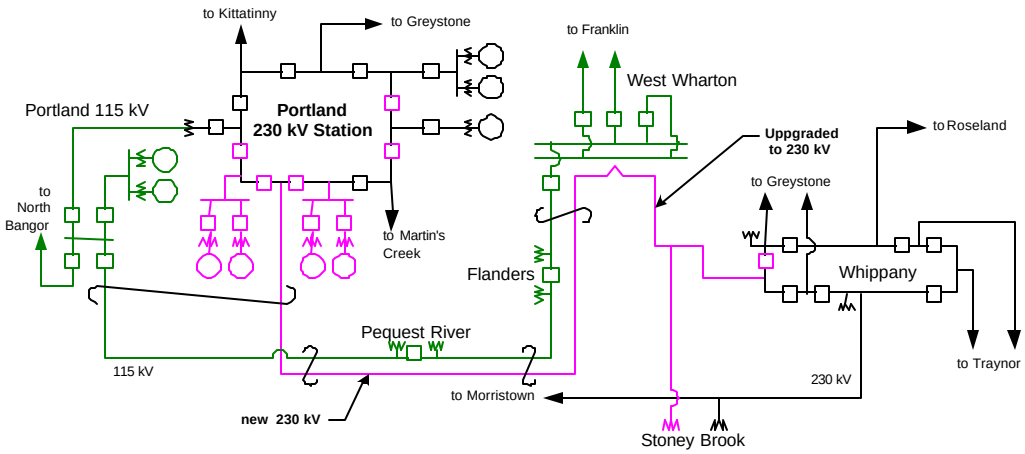

Figure 3: New Portland – Whippany 230 kV Circuit