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 T10 230 kV Bus

Potential network impacts for the injection of 500 MW into the Susquehanna T10 230 kV bus were evaluated for summer peak conditions in 2004.

A summary of the results follows:

Normal System

- The new generation causes a normal overload of 105% on the Susquehanna 500/230 kV transformer T21.
- The new generation causes a normal overload of 104% on the Sunbury 500/230 kV transformer T24.

Single Contingency (MAAC Criteria IIA)

- The new generation causes an overload of 120% on the Susquehanna 500/230 kV transformer T21 for loss of the Sunbury 500/230 kV transformer T24.
- The new generation causes an overload of 113% on the Sunbury 500/230 kV transformer T24 for loss of the Susquehanna 500/230 kV transformer T21.

Multiple Facility Contingency (MAAC Criteria IIC)

- The new generation contributes 40 MW to the overload on the Morris Park - Gilbert 230 kV line for the double circuit tower line outage that includes the Portland - Greystone Q 230 kV and Kittatinny - Pohatcong 230 kV lines.
- The new generation contributes 30 MW to the overload on the Kittatinny - Newton 230 kV line for the double circuit tower line outage that includes the Portland - Greystone Q 230 kV and Kittatinny - Pohatcong 230 kV lines.

Generator Deliverability

The new generation contributes 30 MW to a normal overload on the Martins Creek - Morris Park 230 kV line.

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

The new generation contributes 25 MW to the overload on the Portland - Greystone Q 230 kV line for loss of the Kittatinny - Newton 230 kV line.

Short Circuit Analysis

No identified problems.

System Reinforcements

Second Susquehanna 500/230 kV Transformer

Installing a second Susquehanna 500/230 kV transformer (750 MVA) will alleviate the normal and contingency overloads on the Susquehanna 500/230 kV T21 and Sunbury 500/230 kV T24 transformers (see Figure 2). Work to install the new transformer (designated T22) is expected to cost $19.3 million dollars and take 3 years to complete.

Substation costs 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.

As 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. Since 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 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: Connection Diagram For The Accommodation Of a New 500/230 kV Transformer At The Susquehanna 500 kV Yard.

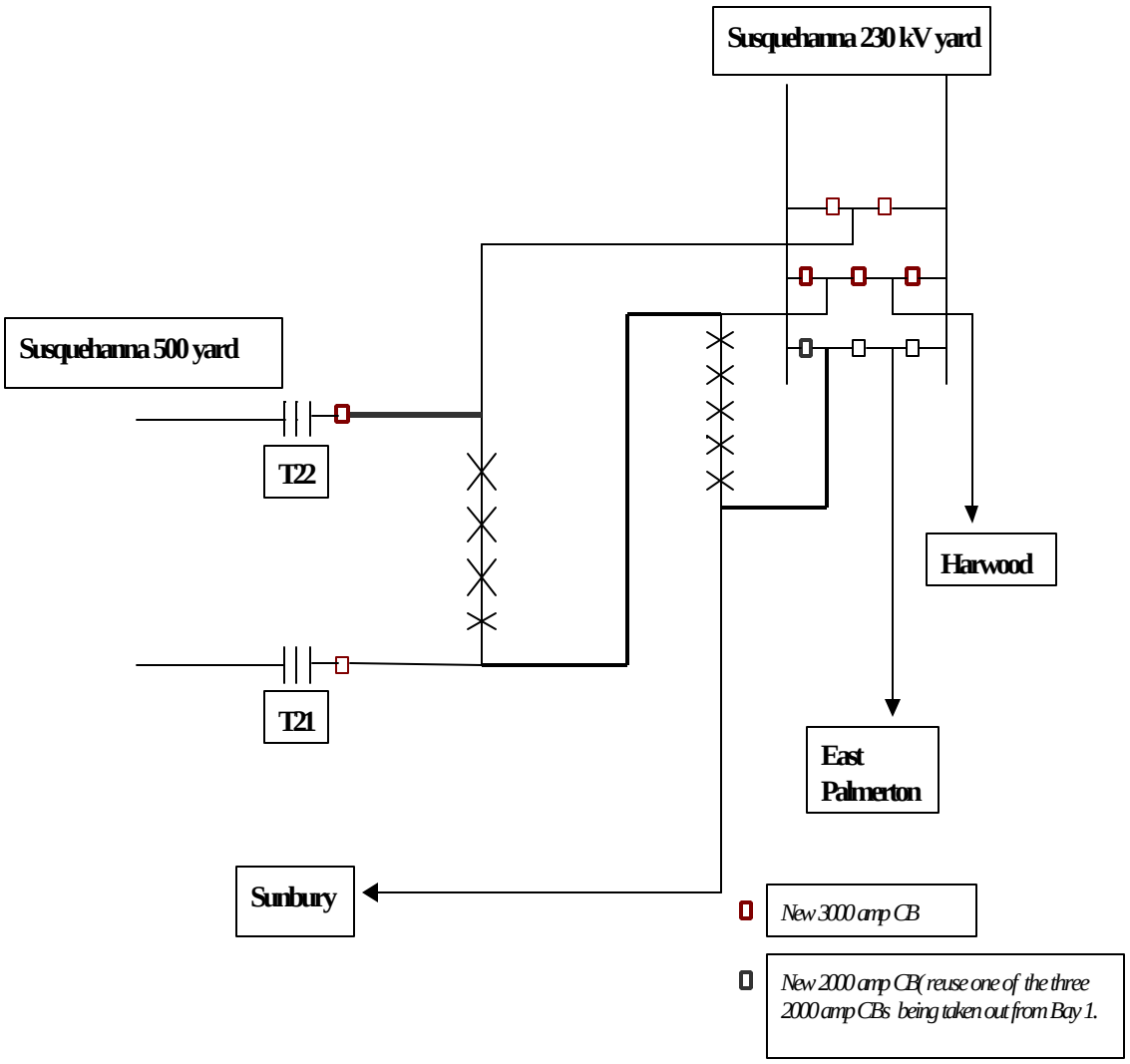

Figure 2

Northern New Jersey Upgrades

The new generation contributes to previously identified overloads in northern New Jersey. 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.

The new generation contributes to the normal overload on the Martins Creek - Morris Park 230 kV line and contingency overloads on the Morris Park - Gilbert 230 kV and Kittatinny - Newton 230 kV lines. These problems were previously identified for an earlier queued generator. 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 and take 5 years to complete.

The overload on the Portland - Greystone Q 230 kV circuit will be alleviated by upgrading the line to an 888 MVA (150 degrees C) 4-hour (Emergency) rating by replacing transmission towers along the line and current transformers at Greystone 230 kV substation. This is expected to cost $750,000 and take 1.5 years.

The contingency overload on the Martins Creek - Morris Park 230 kV circuit will be alleviated by upgrading the line to a 888 MVA (150 degrees C) 4-hour (Emergency) rating by replacing one wave trap at Martins Creek 230 kV substation. This is expected to cost $160,000 and take 9 months.

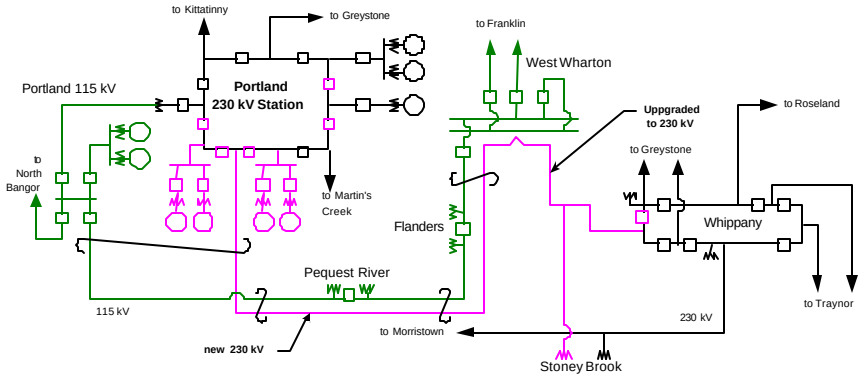

Figure 3