

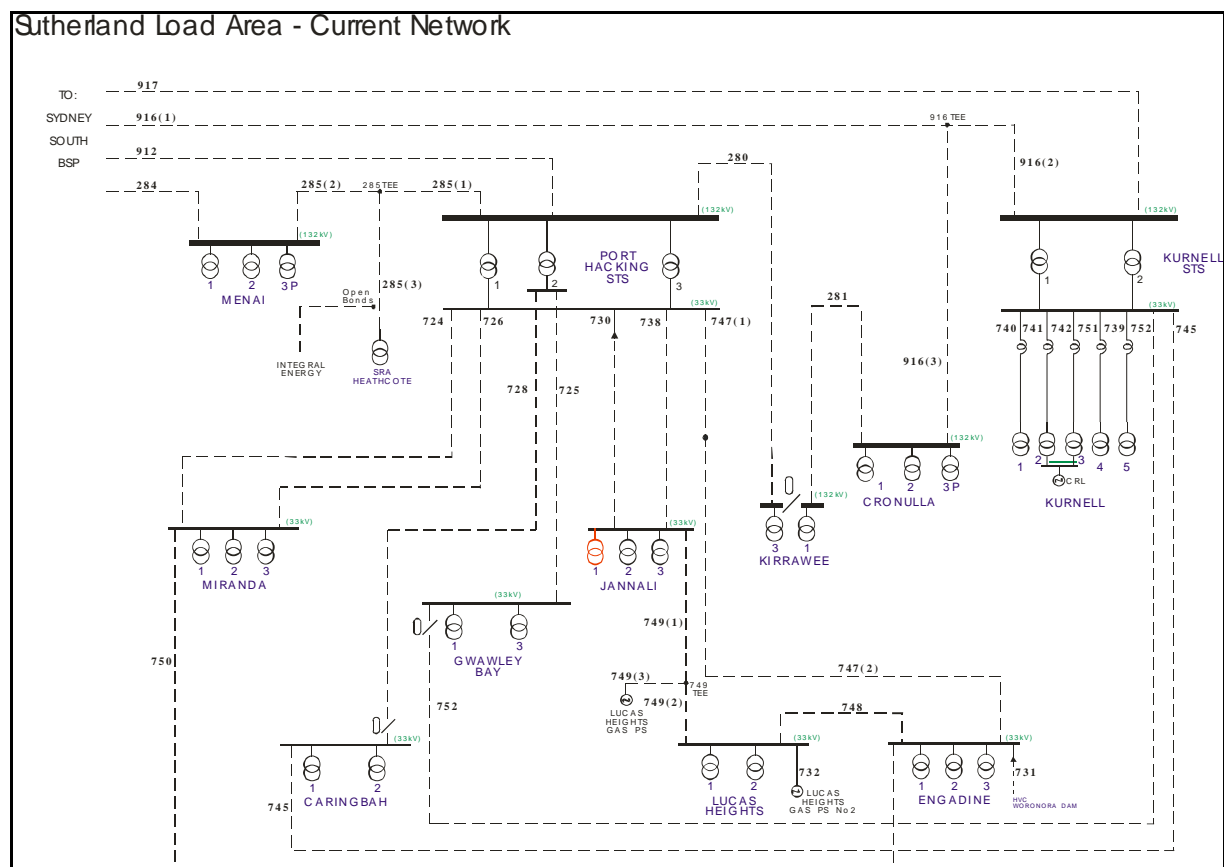
DEMAND MANAGEMENT SCREENING TEST

Gwawley Bay & Engadine Zone Substations

Current Supply Arrangements

Port Hacking Subtransmission Substation (STS) is supplied at 132kV via two feeders from TransGrid's Sydney South substation. These feeders also supply Menai zone substation, part of Kirrawee zone substation and SRA's Heathcote supply point, as shown schematically below.

Both Gwawley Bay & Engadine Zone Substations are supplied from Port Hacking STS via an interconnected 33kV feeder network.



Gwawley Bay 33/11kV Zone Substation consists of two 33MVA transformers. The normal supply is provided by feeder 725 from Port Hacking STS whilst feeder 752 provides backup supply from Kurnell STS. Due to age and condition, the 33kV oil circuit breakers at Gwawley Bay Zone Substation would need to be replaced no later than 2012, and 11kV circuit breakers are scheduled for replacement no later than 2016. Other assets in the 33kV network supplying Gwawley Bay are also due for retirement in 2012.

Engadine 33/11kV Zone Substation consists of two 19MVA transformers and one 10MVA transformer. It is supplied from Port Hacking STS via feeder 747 and feeder

748 via Lucas Heights and Jannali. Due to aged asset issues, Engadine Zone Substation would need to be replaced no later than 2014.

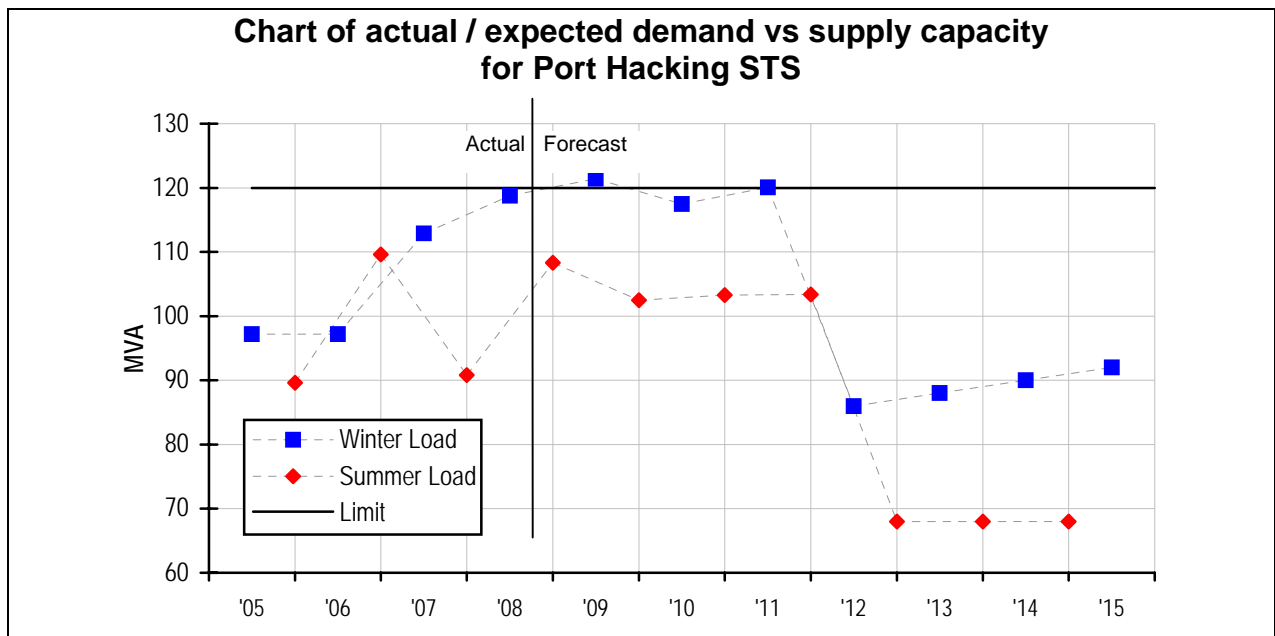
Supply Capacity and Demand Forecast

In the period prior to action being required solely for asset condition issues, there are no forecast load issues at Gwawley Bay zone substation or Engadine zone substation.

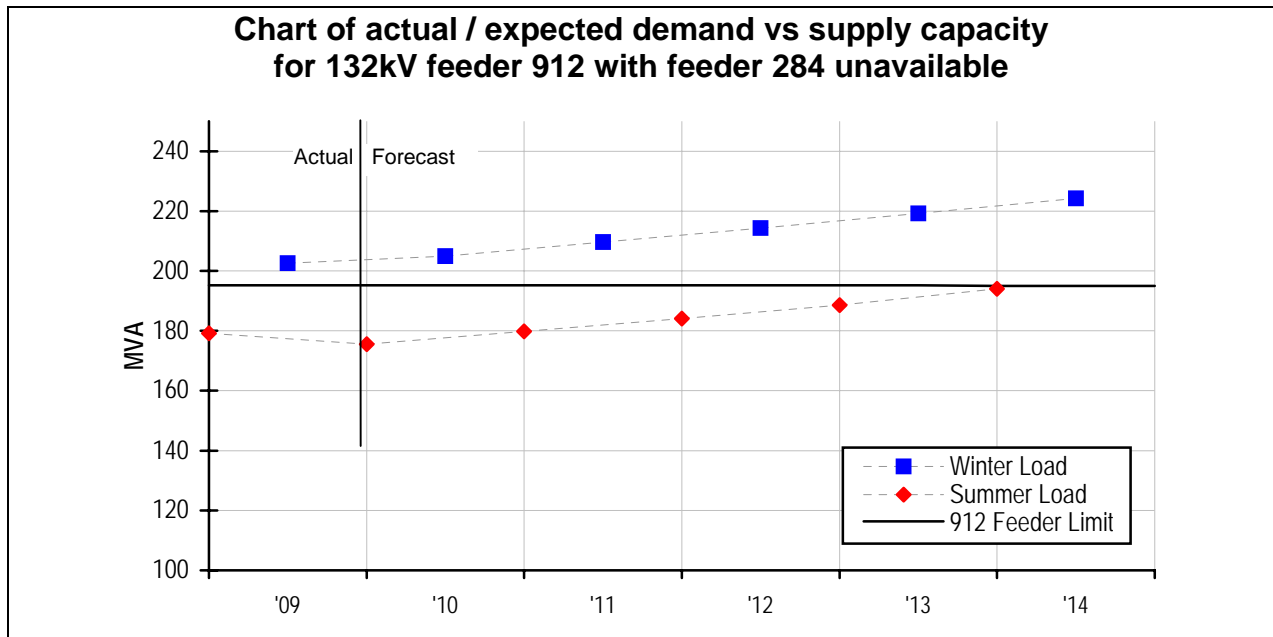
Winter is the critical season for this part of the network.

The relevant capacity limit of Port Hacking STS is 120MVA in both summer and winter. We forecast that demand would exceed capacity by 0.1MVA in winter 2011 and 2.4MVA in winter 2012. However, after 2011 the removal of the Gwawley Bay load to the 132kV system would resolve the load issues.

We forecast that summer demand at Port Hacking STS would be within capacity limits for the foreseeable future.



The relevant capacity limit for the 132kV feeder network supplying Port Hacking STS is 195MVA in summer and winter, limited by the rating of the Port Hacking busbar. The 132kV network is designed so that all load can be supplied when any single element is out of service. The worst case scenario is when feeder 284 is out of service, when the Port Hacking, Menai and SRA Heathcote loads must all be supplied via feeder 912. Under these circumstances, the existing Gwawley Bay and Kirrawee zones would be switched to their alternate supplies. We forecast that, under these conditions, demand would be 24.2MVA more than the feeder capacity in winter 2013, rising to 29.2 in winter 2014.



Supply Strategy Option

The preferred supply side solution is the conversion of both Gwawley Bay Zone Substation and Engadine Zone Substation to 132/11kV operation.

The new Gwawley Bay Zone Substation will be supplied via a tee connection from 132kV feeder 917 and a new 132kV underground feeder from Port Hacking STS. The estimated cost of this investment is \$29.2m. Commissioning is proposed for completion in May 2011. This would reduce the load at Port Hacking STS effectively, but not affect the 132kV feeder issues (since the existing Gwawley Bay zone would not be supplied via feeder 912 if feeder 284 was unavailable).

The new Engadine Zone Substation will connect into reconfigured 132kV feeders 285 & 912. The estimated cost of this investment is \$48.1m. Commissioning is proposed for completion in October 2012. This would reduce the load on the critical elements of the 132kV network and remove the loading issues.

The decision on these investments must be made by June 2009.

Required Demand Management Characteristics

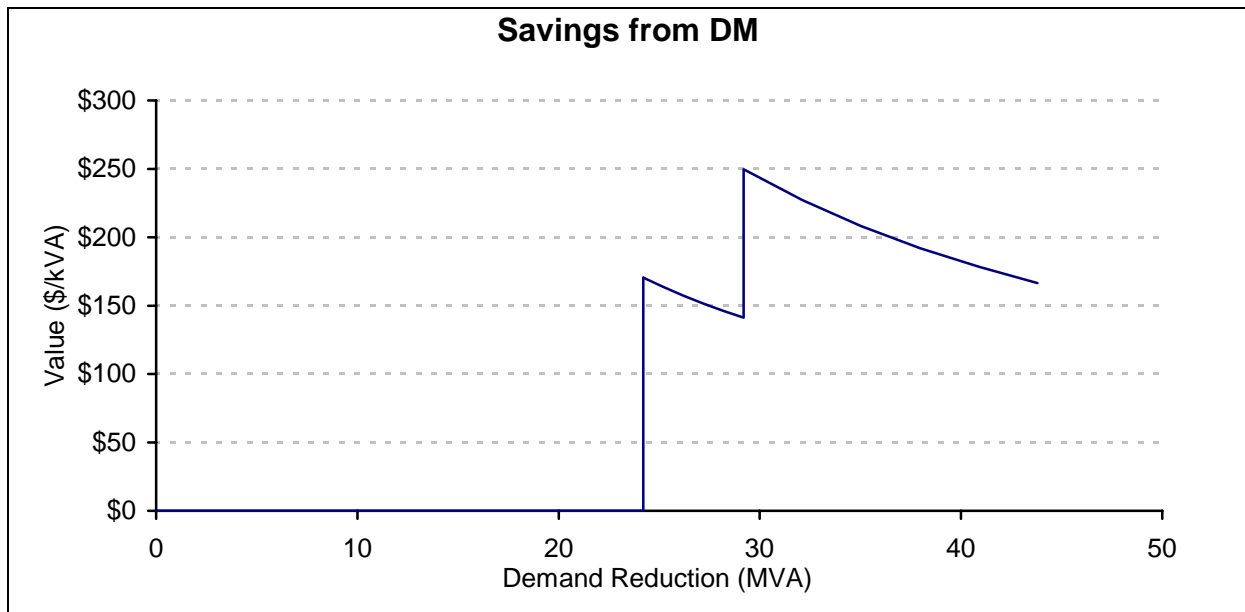
If demand on Port Hacking STS could be reduced by 0.1MVA before winter 2011, then the proposed Gwawley Bay investment could be deferred by one year. The cost saving from this deferral would be \$2.2m, which is very high. Even if a future change in the demand forecast resulted in a demand reduction requirement of up to 1.0MVA, the saving from deferral would be over \$2,000/kVA.

If demand could be reduced by 2.4MVA, the load would be within the design limits in winter 2012. However, the need to retire the 33kV circuit breakers and other equipment in the 33kV supply to Gwawley Bay means that the project would need to be undertaken regardless of load conditions.

If the load on the 132kV feeder network could be reduced by 24.2MVA in winter 2013, the need for proposed Engadine investment could be deferred until winter 2014. The cost saving from this deferral would be \$3.8m or \$160/kVA, which is moderate.

If the load on the 132kV feeder network could be reduced by 29.2MVA in winter 2014, the proposed Engadine investment could be deferred by two years. The cost saving from this deferral would be \$7.3m or \$250/kVA.

The demand reductions would need to address the winter evening peak and could come from Menai, Miranda, Engadine, Lucas Heights or Jannali zone substations, or the SRA Heathcote supply.



The demand reductions required to enable the need for these two investments to be deferred may overlap if the demand reductions from Port Hacking load come from locations that would be supplied by feeder 912 with feeder 284 unavailable.

Reductions in demand at this location may also be beneficial at the transmission level and contribute to the deferral of the proposed Chullora Bulk Supply Point in summer 2012/13. This would be an additional benefit.

There are embedded generators connected to the 33kV system supplied from Port Hacking STS. The combined effect of these generators is equivalent to a reduction of approximately 21MVA. There may be potential to enter into a network support agreement with the owner/operator of these plants.

In addition, assuming the new Gwawley Bay zone substation is completed before winter 2013, there would be an opportunity to transfer load from Miranda zone to the new Gwawley Bay zone, which would also reduce the demand on the critical part of the 132kV network.

The DM requirement to enable deferral of the need for the proposed Gwawley Bay investment to winter 2012 is very small and the benefits are high. It would be expected that such a demand reduction would be readily achieved.

With respect to the proposed Engadine investment, there appears to be significant demand reduction opportunities in the area supplied by Port Hacking STS, and additional cost savings may be attributable at transmission level. It is therefore considered reasonable to expect that demand management could cost effectively defer the need for the proposed supply side project until 2014.

Recommendation

Based on this analysis it is considered reasonable to expect that it may be cost-effective to postpone both of the proposed supply-side solution by implementing demand management strategies. A demand management investigation will be undertaken.