

## DEMAND MANAGEMENT SCREENING TEST

### Adamstown 132/11kV Zone Substation

#### Current Supply Arrangements

Adamstown 33/11kV zone substation consists of two 25MVA transformers and is supplied from Merewether subtransmission substation (STS) at 33kV via three 33kV feeders.

Merewether STS supplies Adamstown, City Main, Kotara, Broadmeadow, New Lambton, Carrington, Charlestown, Cardiff, Dudley, Gateshead, Jewels, Pelican and Swansea zone substations. This 33kV system is interconnected with Waratah STS.

Summer is the critical season for the Merewether system, however winter loads are also approaching capacity limits. Under the applicable design planning criteria, capacity of Merewether STS is limited by the transformers to 274MVA in both summer and winter.

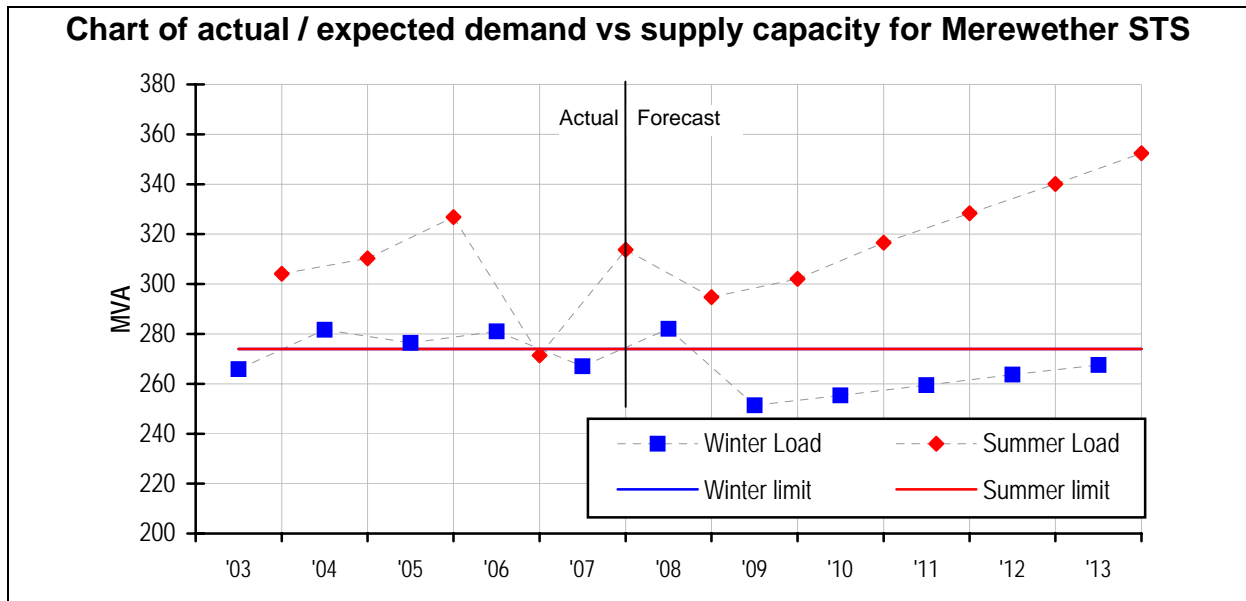
Adamstown zone is over 50 years old and requires major refurbishment or replacement as soon as practicable, with most of the equipment nearing the end of its serviceable life. The capacity of this zone substation is limited by the 11kV switchgear to 27.5MVA in summer and winter.

This system supplies a large area including most of the Newcastle urban area and a significant proportion of the eastern Lake Macquarie.

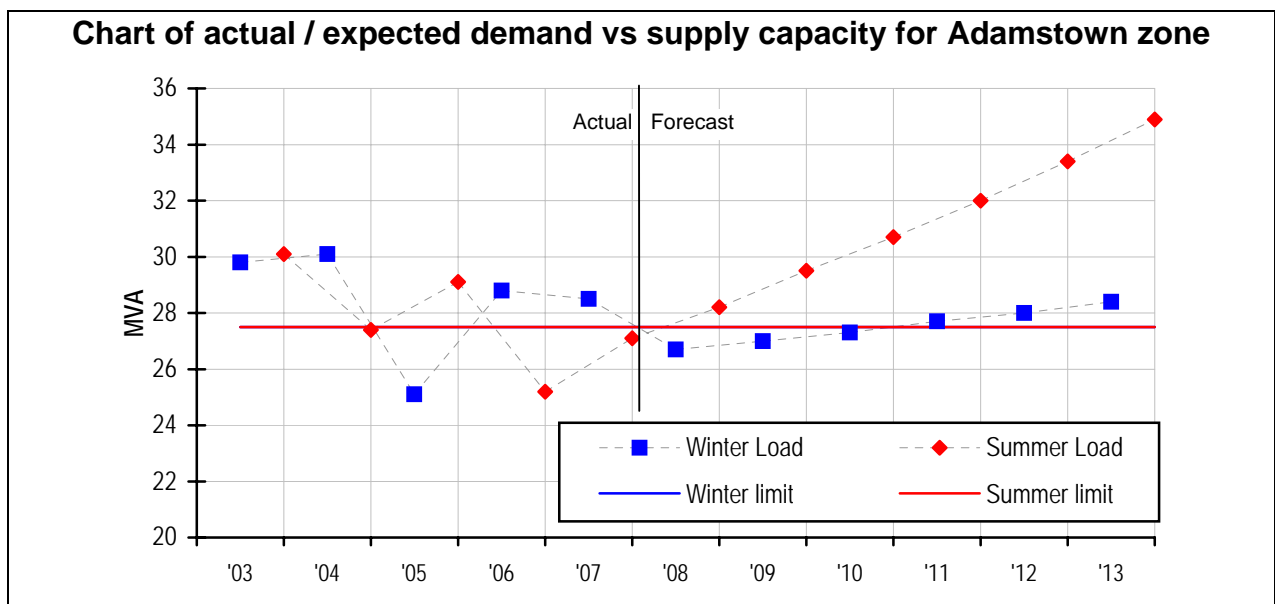
#### Supply Capacity and Demand Forecast

The load on the Merewether STS system is predominantly residential, with some commercial and industrial loads. Merewether STS and Adamstown zone substation experience summer afternoon and evening peaks.

The forecast of peak demand and design limit for Merewether STS is shown on the chart below. In summer 2009/10 the peak load would be approximately 20.7MVA above the design planning limit, rising to 28.1MVA above the limit in summer 2010/11.



The forecast of peak demand and design limit for Adamstown zone substation is shown on the chart below. In summer 2009/10 the peak load would be approximately 2.0MVA above the design planning limit, rising to 3.2MVA above the limit in summer 2010/11.



There are numerous other zones and 33kV feeders on the Merewether STS system where demand is forecast to exceed relevant limits in the near future, including Newcastle CBD, Kotara, New Lambton & Broadmeadow.

**Supply Strategy Option**

The preferred option is to construct a new 2 x 50MVA 132/11kV Adamstown zone substation supplied from the Merewether STS 132kV busbar to replace the existing Adamstown zone substation. The limit of the new substation will be 65MVA.

This will move load off Merewether STS, and the additional capacity at the new zone will allow load to be transferred to it from constrained adjacent zone substations.

It is anticipated that this project will be completed in March 2010 at an estimated cost of \$24.6m. To meet this commissioning date, an investment decision must be made as soon as possible.

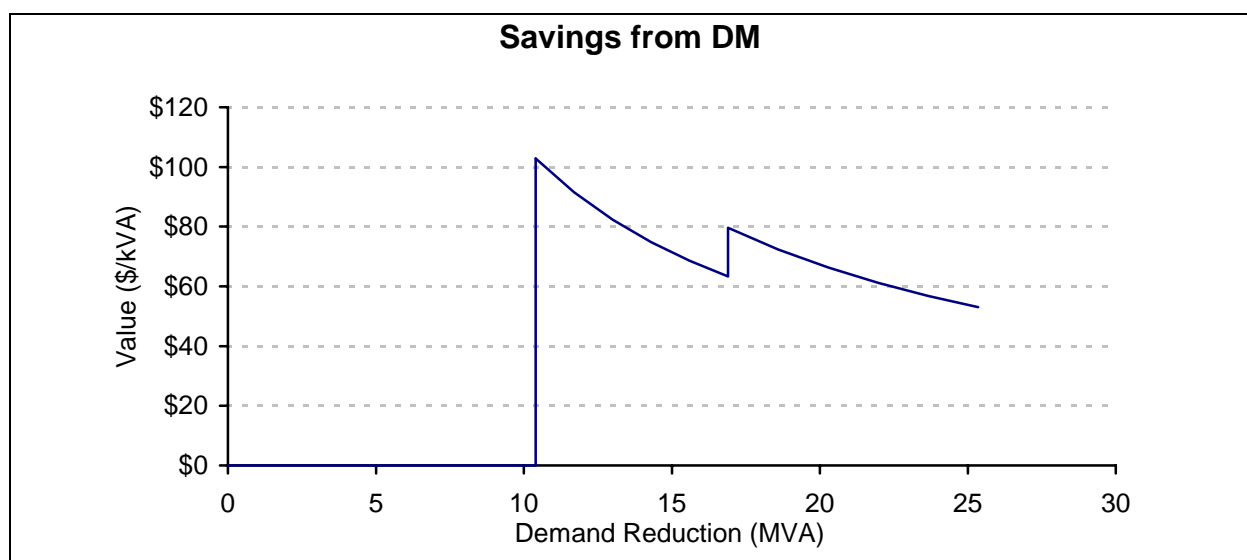
### Required Demand Management Characteristics

Because the new Adamstown zone substation must be commissioned as soon as practicable due to aged asset issues, it is not possible to defer the project by reducing demand. However, reducing demand may enable an alternative area strategy including a smaller capacity substation at Adamstown. The smallest capacity 132/11kV substation option is a 2 x 37MVA transformer design, which is estimated to be \$1.27m cheaper than a 2 x 50MVA design.

We have reviewed a number of demand reduction scenarios that would enable a smaller substation at Adamstown, including the effect on future investments on this part of the network. We have concluded that demand reductions of less than 10.4MVA would not be sufficient to enable an alternative strategy that had a net saving in capital costs, and therefore are not considered further in this report.

If at least 10.4MVA of demand reduction could be implemented by summer 2012/13 at Adamstown and/or adjacent zone substations, then this would enable the lower cost 2 x 37MVA substation to be built. This is around 5% of the total demand in this area. It would also be necessary to bring forward by one year the proposed busbar upgrades at Carrington and Newcastle CBD zones (from 2016 to 2015). This would result in a net saving of \$1.07m, or \$103/kVA.

If 16.9MVA of demand reduction could be implemented by summer 2012/13 at Adamstown and/or adjacent zone substations, then this would enable the lower cost 2 x 37MVA substation to be built. This is around 8% of the total demand in this area. No other changes to the area strategy would be required. This would result in a net saving of \$1.34m, or \$80/kVA.



The demand management requirement is large in total MVA, and moderately significant in relation to total demand in the area. The deferral value is low. There is little time to identify and develop DM options before the investment decision must be made.

On balance it is considered very unlikely that sufficient cost effective demand reductions could be identified to enable a smaller capacity and lower cost design at the new Adamstown zone substation.

### **Recommendation**

Based on this analysis it is not considered reasonable to expect that it would be cost-effective to postpone the proposed supply-side solution by implementing demand management strategies.

However, demand reductions on this system may be cost effective as a means to reduce the likelihood of loss of supply in the event of a major outage prior to the commissioning of this project. A separate report will be prepared regarding this opportunity.