ETSA Utilities

REASONABLENESS TEST

RT 006/09

Projected Distribution Network constraint:

Overload of Port Augusta West Substation

Issue 1.0 – December 09

DISCLAIMER

The purpose of this document is to inform customers, Interested Parties, Registered Participants and solution providers of the outcome of the application of the Reasonableness Test to the network constraint of overload of the Port Augusta West substation. This document is not intended to be used for other purposes, such as making decisions to invest in generation, transmission or distribution capacity. This document has been prepared using information provided by, and reports prepared by, a number of third parties.

While care was taken in the preparation of the information in this paper, and it is provided in good faith, ETSA Utilities accepts no responsibility or liability for any loss or damage that may be incurred by any person acting in reliance on this information or assumptions drawn from it.

This Reasonableness Test has been prepared in accordance with section 3 of ESCOSA Guideline 12 – Demand Management for Electricity Distribution Networks for the purpose of consulting with Registered Participants, Interested Parties and customers regarding a potential network augmentation.

The Reasonableness Test has been prepared with consideration for pertinent information provided by a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts that, by their nature, may or may not prove to be correct. ETSA Utilities advises that anyone proposing to use this information should verify its reliability, accuracy and completeness before committing to any course of action. ETSA Utilities makes no warranties or representations as to its reliability, accuracy and completeness and ETSA Utilities specifically disclaims any liability or responsibility for any errors or omissions or not.

It is important to note that ETSA Utilities as Distribution Network Service (DNSP) provider can only consider benefits available to the DNSP in evaluating the viability of Demand Management initiatives, e.g. transmission benefits, the possibility of reducing spot market prices and wider benefits like reducing green house gasses have not been considered.

GUIDELINE 12 REASONABLENESS TEST

Constraints on the Port Augusta West Substation

1 CURRENT SUPPLY ARRANGEMENT

Port Augusta West substation is part of the Upper North 33,000 Volt (33kV) electricity distribution system. The substation is supplied directly from the 33kV sub-transmission network and operated at 33kV stepped down to 11,000 Volts (11kV). The substation is connected radially to the 33kV network via a Tee to the Playford / Davenport West to Port Augusta line. Port Augusta West substation has two 11kV feeders that exit from the substation to supply the local residential and commercial load.

The Port Augusta West 33/11kV substation contains one 12.5MVA 33/11kV transformer. Customers will need to be shed from summer 2011/12 if this transformer was to fail. After completion of manual load transfers approximately 6 MVA or 1700 customers would be shed until the mobile substation is installed (12 – 24 hours)

Port Augusta West substation supplies approximately 2,140 residential and commercial customers in the city of Port Augusta and in the surrounding countryside via a long radial line.

The overall supply arrangement of the Port Augusta West area is shown in Figure 1 on the next page.

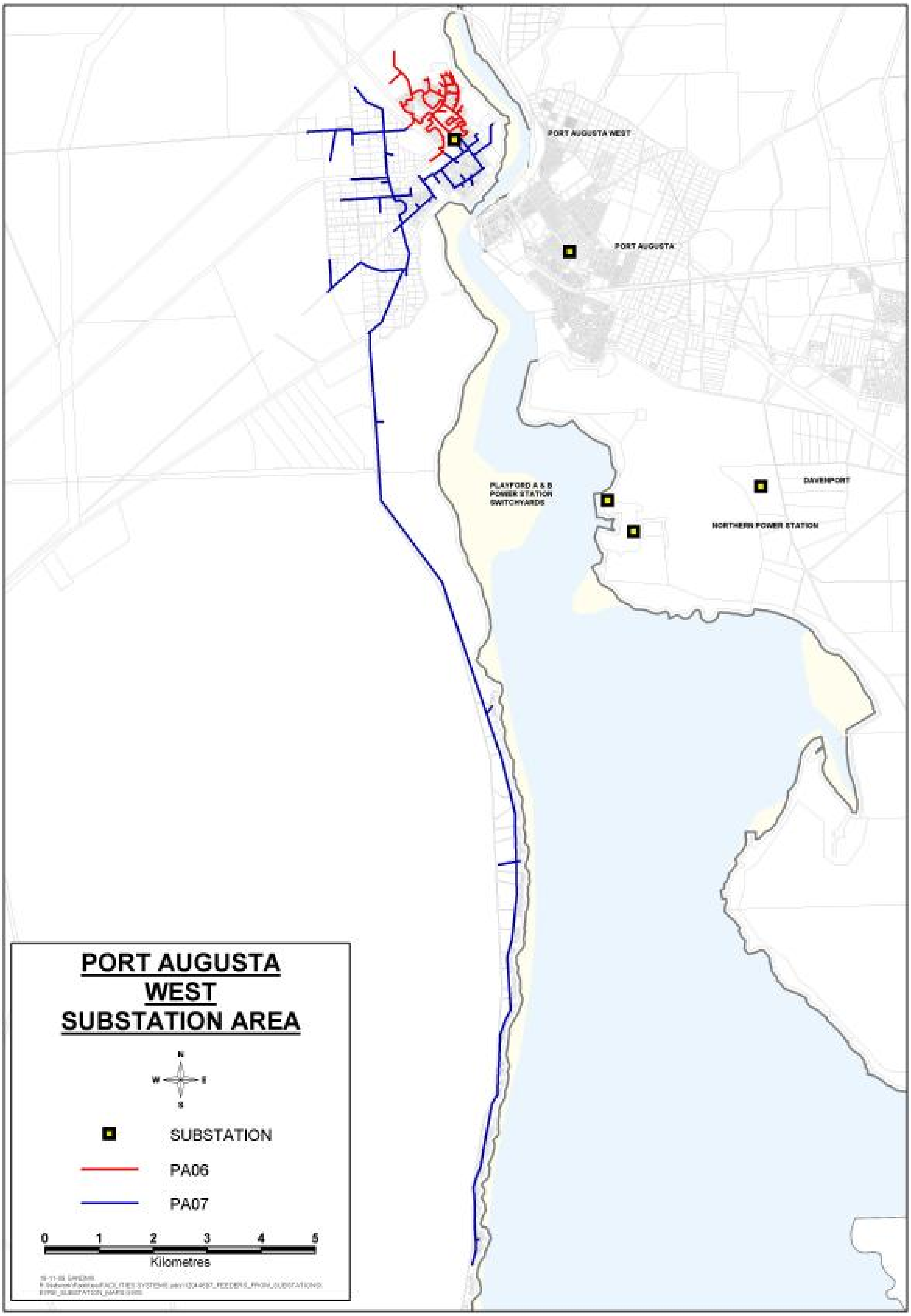
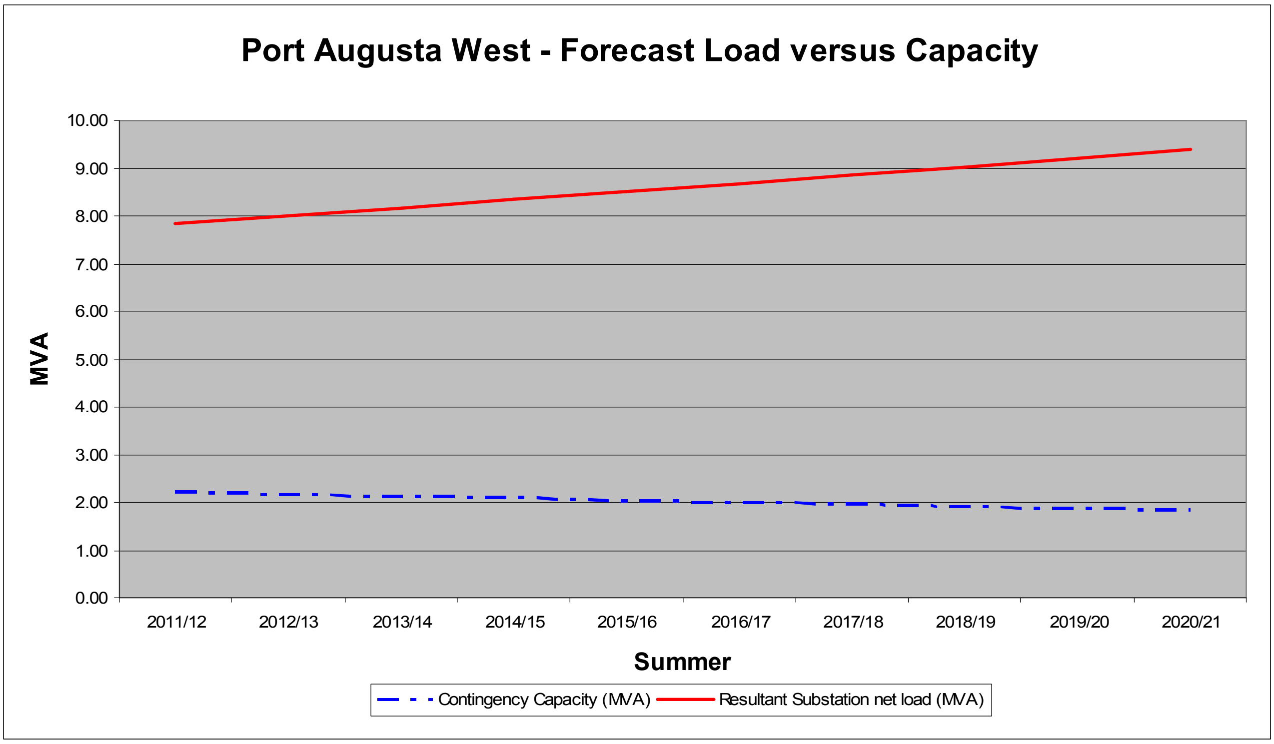


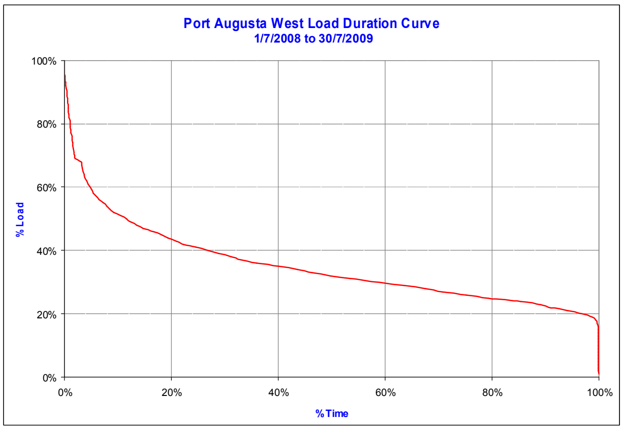
Figure 1: Port Augusta West Electricity Supply System

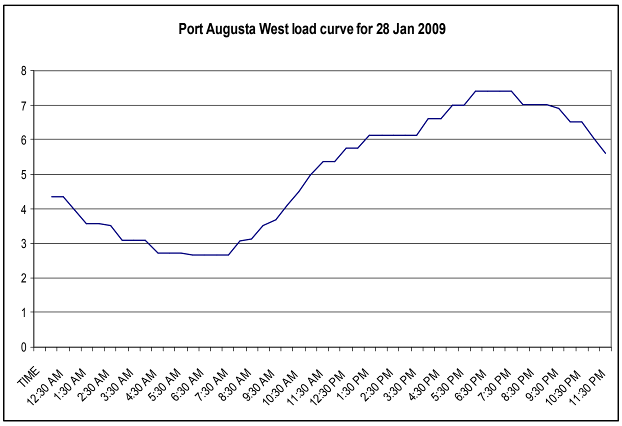
2 PORT AUGUSTA WEST SUBSTATION FORECAST LOAD AND CAPACITY

The load type at Port Augusta West substation contains a strong contribution from residential and to a lesser extent industrial and commercial/retail sites. During hot weather in the summer months residential air conditioning contributes a significant portion to the peak load at Port Augusta West substation. The winter peak load is 72% of the summer peak and is not expected to grow faster than the summer peak load.



3 PORT AUGUSTA WEST SUBSTATION LOADING CHARACTERISTICS





4 NETWORK UPGRADE OPTIONS

Two network augmentation options exist to address the constraint:

- Upgrade Port Augusta West substation with one new 12.5MVA 33/11kV transformer, new 11kV switchboard, new control room, 33kV bus, and new 33kV bus zone protection.
- Build a new 33/11kV substation on vacant land west of the existing, and construct one or more 2.5km 11kV feeders towards Port Augusta West substation and transfer load from Port Augusta West substation.

The deferral of the upgrade by increasing the amount of load transfers to adjacent substations is not considered practical.

Preferred Network Solution

The preferred solution, when the net present value, timing and effectiveness of related upgrade projects are considered, is to upgrade Port Augusta West substation. The indicative cost for this project is $2 to $2.5 Million.

5 DEMAND MANAGEMENT ANALYSIS

5.1 Required Demand Management Characteristics

At peak load times the load profile for Port Augusta West substation is dominated by residential air conditioning, and to a lesser extent government institutions and commercial/retail sites. Peak loads can be expected at the substation during times of sustained hot weather in summer when several consecutive days with ambient temperatures greater than 38 deg C are experienced. Peak loads are more likely to occur on weekdays due to combined residential air conditioning, government institutions and commercial/retail sites.

Given Port Augusta West substation's load forecast in 2011/12 of 7.9MVA, during peak load conditions up to 6 MVA of load may need to be shed in the event of the 12.5 MVA substation transformer failing, which would require the shedding of approximately 1,700 customers until the mobile substation has been installed. The contingency rating of Port Augusta West substation is expected to be exceeded for a total of 19 hours in 2011/12. Peak expected between 16:00h and 21:00h. Actual numbers of customers without supply will be greater, as it is not possible to switch exact number of customers at high voltage (need to switch at existing switching locations on feeders).

5.2 Demand Management Value

The following table indicates the amount of load reduction required in each year and the available $/kVA amount available to make Demand Management viable. To allow for oversubscription in order to guarantee the load reduction required, a range of deferral benefit values are provided. The stated benefits also include an allowance to cover administrative costs.

Table 1 $ per kVA available for Demand Management

Year	Load Reduction Required (kVA)	Maximum Hours at Risk (1)	$/kVA available per year for DM
2011/12	5,650	24	12 – 20
2012/13	5,850	24	11 -19
2013/14	6,050	24	10 -13

1. As a single transformer substation any outage during the year will cause load to be shed when the load is larger than the transfer capacity. This occurs on all but 8 hours a year. The hours at risk is therefore the time it takes for the mobile substation to be installed as replacement unit.

5.3 Demand Management Options Considered

Various Demand Management technologies were considered to determine their viability to assist in reducing the demand in the constrained area. These DM options were evaluated for both technical feasibility as well as cost effectiveness.

(a) Standby diesel generators

Establish contracts with customers who have standby diesel generators on their premises and utilise the generators at peak load times. No installed generators of sufficient capacity that are available for use are known to exist in the distribution network. Consequently this option is not technically feasible.

(b) Install power factor correction

This option will not solve the constraint as the power factor at the substation is already near unity.

(c) Retrofit commercial lighting with efficient lighting.

Upgrade existing commercial fluorescent lighting to T5 lighting. Based on the upgrade of a 400W fluorescent bank with a 2x 80W efficient bank provides the equivalent lumen output. The demand saving per bank is 240W. Significant disruption to the customer while the retrofit is carried out can be expected, which may influence the number of willing participants. The estimated cost for this option is $2,500/kVA. Therefore this option is not commercially viable.

(d) Peak load control – direct load control

Direct load control technology is available where (via a power line carrier) tripping many small air conditioning units supplied from a single distribution transformer can be performed. Recent experiences have shown the costs to range from $300 to 800/kVA. Therefore this option is not commercially viable.

(e) Peak load control – curtailable load

Establishing a contract with one or more large customer's involving turning power supply off to part of their business was investigated. There are no customers that have a load large enough to individually impact the network, as majority of the load in Port Augusta West is due to small residential customers.

(f) Residential Direct Load Control

Demand Management trials using residential metering and control devices indicate take-up rates vary depending on the area. From this response and the expected percentage of suitable air conditioning units residential direct load control is estimated to cost between $335 and $600/kVA. Therefore this option is not commercially viable.

(g) Residential compact fluorescent lamp (CFL) program

This option does not solve the constraint as peak load conditions occur in daylight hours. Load contribution from residential housing lighting during daylight hours is believed to be minimal.

(h) Thermal storage systems

A recent installation at a suitable site revealed a saving in load of 150kVA. The expected cost for this type of installation ranges from $1,000-$1,600/kVA. Smaller scale installations have also been trialled, and are still very much in the development stage (More expensive per kVA). Therefore this option is not commercially viable.

6 CONCLUSION

Based on the Demand Management options considered it is unlikely that sufficient Demand Management could be implemented to achieve a demand reduction to make project deferral technically or commercially viable.

The constraint on the Port Augusta West substation has failed the Reasonableness Test and a Request for Proposal (RFP) will not be issued.