ETSA Utilities

REASONABLENESS TEST

RT 008/09

Projected Distribution Network constraint:

Overload of Naracoorte Substation

Issue 1.0 – December 2009

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 Naracoorte 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 Naracoorte Substation

1 CURRENT SUPPLY ARRANGEMENT

Naracoorte substation is part of the South East 33kV electricity distribution system. The substation is supplied directly from a 33,000 volt (33 kV) sub-transmission line and operated at 33kV stepped down to 11,000 volts (11 kV). The substation is part of a radial 33kV system with one 33kV sub-transmission line from Kincraig 132/33kV Connection Point. Naracoorte substation has four 11kV feeders that exit from the substation to supply the local rural residential and commercial load.

Naracoorte 33/11kV substation contains two 10MVA 33/11kV transformers. If one of these transformers were to fail the substation will be overloaded at peak times in 2011/12. Approximately 6 MVA or 1,100 customers would be shed until the mobile substation is installed (12 – 24 hours)

As there are no adjacent substations load transfers are not possible .

Naracoorte substation supplies residential and commercial customers in the township of Naracoorte and surrounding rural areas (approximately 3,800 customers).

Several of the 11 kV feeders are very long (45 kilometres) and customer voltages are also a constraint.

The overall supply arrangement is shown in Figure 1 on the next page.

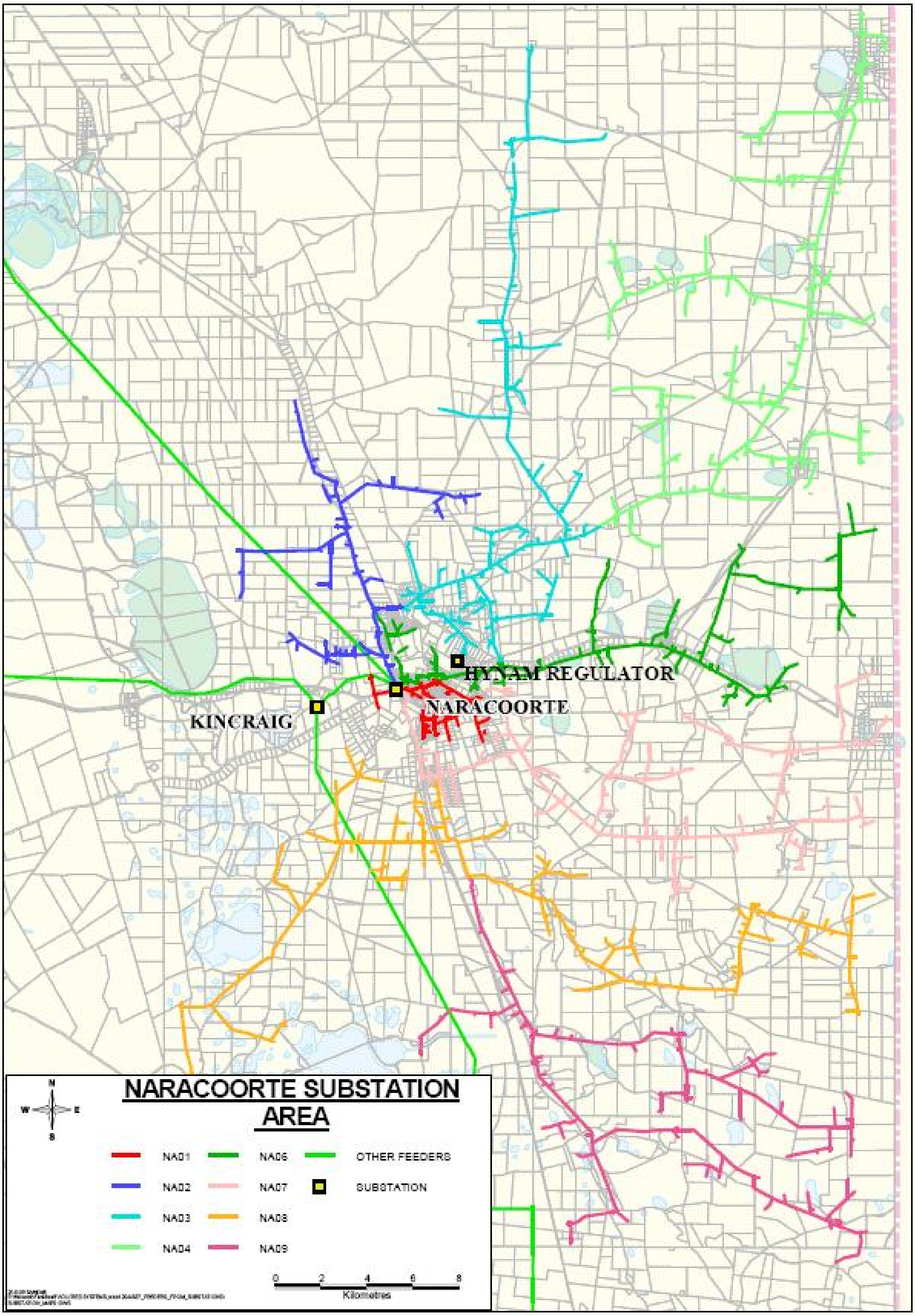
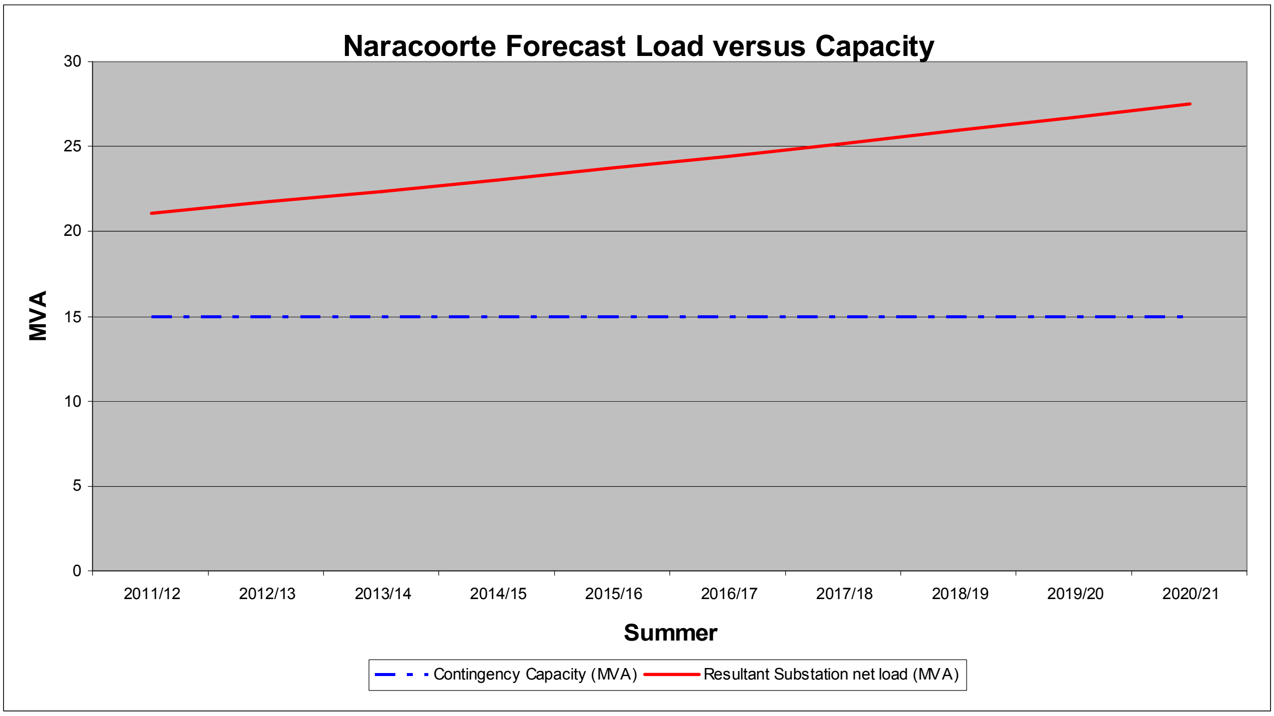


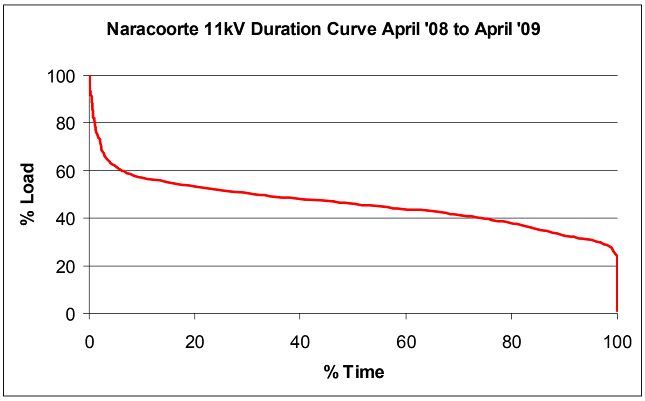
Figure 1: Naracoorte Electricity Supply System

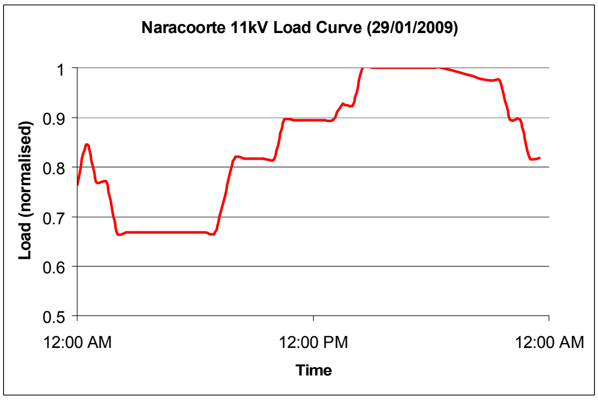
2 NARACOORTE SUBSTATION FORECAST LOAD AND CAPACITY

The load type at Naracoorte substation contains contributions from residential and commercial/retail sites. During hot weather in the summer months residential air conditioning contributes a significant portion to the peak load at Naracoorte substation. The winter peak load is 64% of the summer peak and is not expected to become a future problem.



3 NARACOORTE SUBSTATION LOADING CHARACTERISTICS





4 NETWORK UPGRADE OPTIONS

Three alternative network augmentation options exist to address the constraint:

- Install 9MVAr 11kV capacitor bank at Naracoorte substation.
- Upgrade Naracoorte substation with two 25MVA 66/11kV transformers, new control room and new 33kV protection.
- Build a new 10km 33kV sub-transmission line and new 33/11kV substation east of Naracoorte substation

The first two options will reduce the number of customers and the size of the load at risk but do not solve known 11kV feeder voltage problems on the long radial 11kV feeders (up to 45km in length).

Preferred Network Solution

The preferred solution, when the net present value, timing and effectiveness of related upgrade projects is considered, is to establish a new 10km 33kV sub-transmission line and new 33/11kV substation east of Naracoorte substation. The indicative cost for this project is between $3,000,000 and $4,000,000.

5 DEMAND MANAGEMENT ANALYSIS

5.1 Required Demand Management Characteristics

At peak load times the load profile for Naracoorte substation is dominated by residential air conditioning, and to a lesser extent 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 and commercial/retail sites.

Given Naracoorte substation's load forecast in 2011/12 of 20.5MVA, during peak load conditions up to 6.0 MVA of load may need to be shed in the event of one of the 10MVA substation transformers failing until the mobile substation has been installed (12 to 24 hours) Peak expected between 14:00h and 19:00h. Actual numbers of customers without supply will be greater than the minimum 1,700 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	6,100	24	15 -25
2012/13	6,700	24	12 -20
2013/14	7,400	24	11 -19

1. Load will be at risk whenever the connected load is greater than the contingency capacity of the substation, this will occur for approximately 212 hours in 2011. The maximum period that load may be shed following an outage will be the time taken to install the mobile substation, estimated at between 12 and 24 hours.

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. However no generators of adequate capacity have been identified on the network at Naracoorte. Therefore this option is not technically feasible.

(b) Install power factor correction

This option is not technically viable given the size (6 to 7 MVA) of the load reduction required and the feeder low voltage constraint.

(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 which means that 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 which means that this option is neither commercially viable nor technically viable given the size of the load reduction required.

(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 very few large customers that have a load large enough to individually impact the network, as majority of the load in Naracoorte is due to residential customers. Customers in the vicinity with large maximum demands include hospitals and commercial/retail businesses. Due to the nature of these customers, this option is not technically suitable.

(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, which means that 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), which means that 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 and economically viable.

The constraint on the Naracoorte substation has failed the Reasonableness Test and no Request for Proposal (RFP) will be issued.