ETSA Utilities

REASONABLENESS TEST

RT 004/09

Projected Distribution Network constraint:

Overload of Balhannah 33kV Network

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 the overload of the Balhannah 33kV network at Balhannah. 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.

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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 33 kV sub transmission system at Balhannah

1 CURRENT SUPPLY ARRANGEMENT

The 33,000 V (33kV) sub transmission network in the Eastern Hills is supplied via Balhannah 66,000 / 33,000 V (66/33kV) Substation and Uraidla 66/33kV Substation. It supplies approximately 11,400 residential and commercial customers in the eastern hills including areas of Uraidla, Piccadilly, Stirling East, Aldgate, Mylor, Nairne, Woodside, Verdun and Balhannah.

Balhannah Substation has 3 x 7.5 MVA 66/33kV transformers, with a summer cyclic rating of 30.3 MVA. The 33kV load forecast for 2010/11 at Balhannah Substation is 32.8 MVA which will exceed the rating by 2.5 MVA.

Uraidla Substation has a single 12.5 MVA 66/33kV transformer, with no contingency supply capacity at peak times. The 33kV load forecast for 2010/11 is 8.3 MVA.

The Uraidla 66/33kV 12.5MVA transformer is scheduled to be replaced in 2010 as part of our asset replacement program for strategic assets. This transformer will be 54 years old in 2010 and is in poor condition.

The overall supply arrangement of the Balhannah – Uraidla component of this system is shown in Figure 1 on the next page.

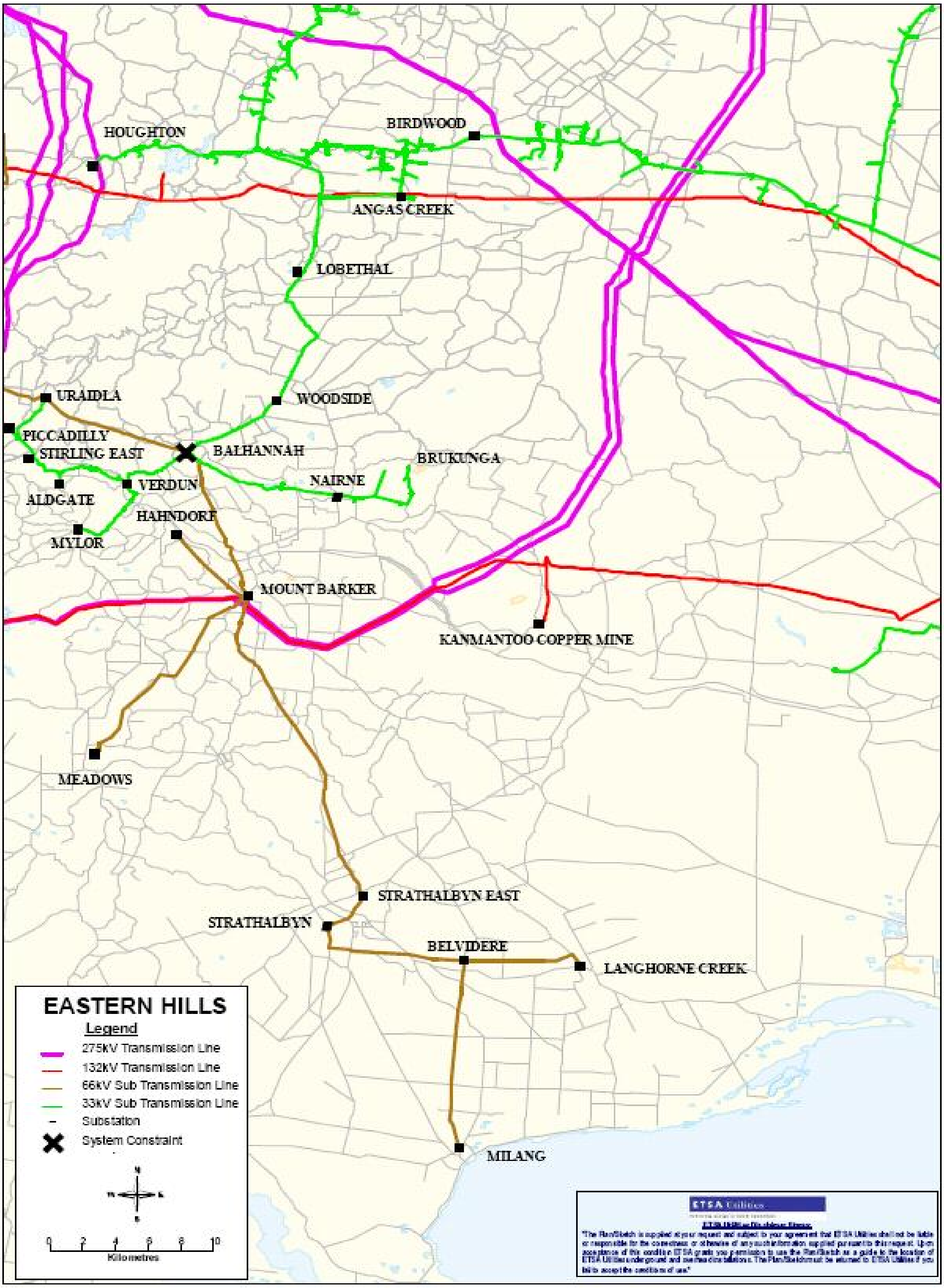

Figure 1: Balhannah – Uraidla 33 kV supply System

2 EASTERN HILLS 33 KV FORECAST LOAD AND CAPACITY

The load in the Eastern Hills 33 kV system is mainly residential and to a lesser extent industrial, government institutions and commercial/retail sites. During hot weather in the summer months residential air conditioning contributes a significant portion to the peak load. The peak load for the system was 29th January 2009 when it peaked out of Balhannah at 30.6 MVA at 18:00 and Uraidla at approximately 7.6 MVA. The winter peak load is 81% of the summer peak at 24.9 MVA on 25th August and is not expected to grow faster than the summer peak load.

The peak load is forecast to continue to grow at approximately 3.6 % from approximately 31 MVA on 2009/10 to 37 MVA in summer 2014/15.

Capacity of the Balhannah 33 kV system is 30.3 MVA and 20.2 MVA following the loss of one of the three 66 / 33 kV transformers.

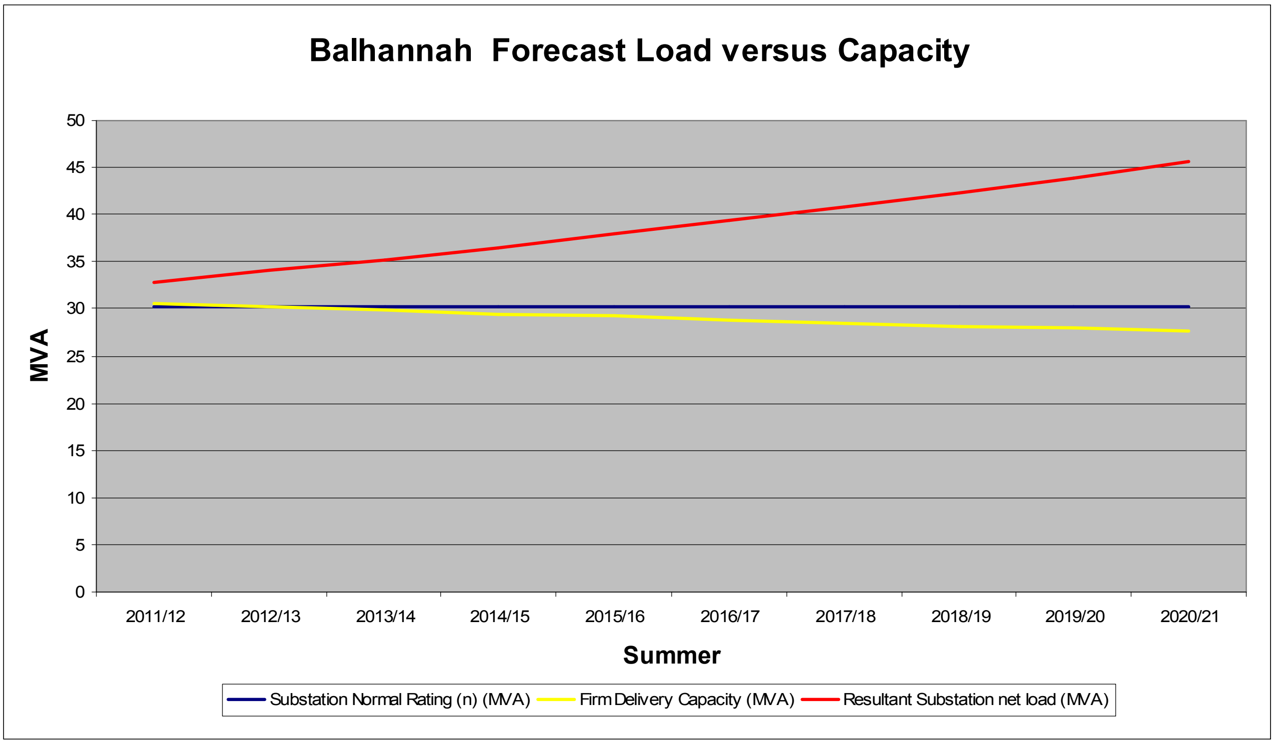

Figure 1 Balhannah forecast load

3 EASTERN HILLS 33 KV LOADING CHARACTERISTICS

Using Balhannah as a proxy for the whole system the peak load profile (Figure 2) demonstrates the mainly residential load of the 33 kV network with a small breakfast peak followed by an increasing air conditioning load through to early evening where it combines with the evening dinner preparation and commuters returning home.

The Balhannah load duration curve (Figure 3) has a peak value of 30.6 MVA and an average value of 13.2 MVA. Load greater than 95% of peak (29 MVA) occurs for 5 hours a year and load greater than 85% of peak (26 MVA) occurs for 38 hours a year.

Peak hours (> 90% of maximum daily load) typically occur between 14:00 and 22:00 with the system peak occurring between 18:00 and 20:00.

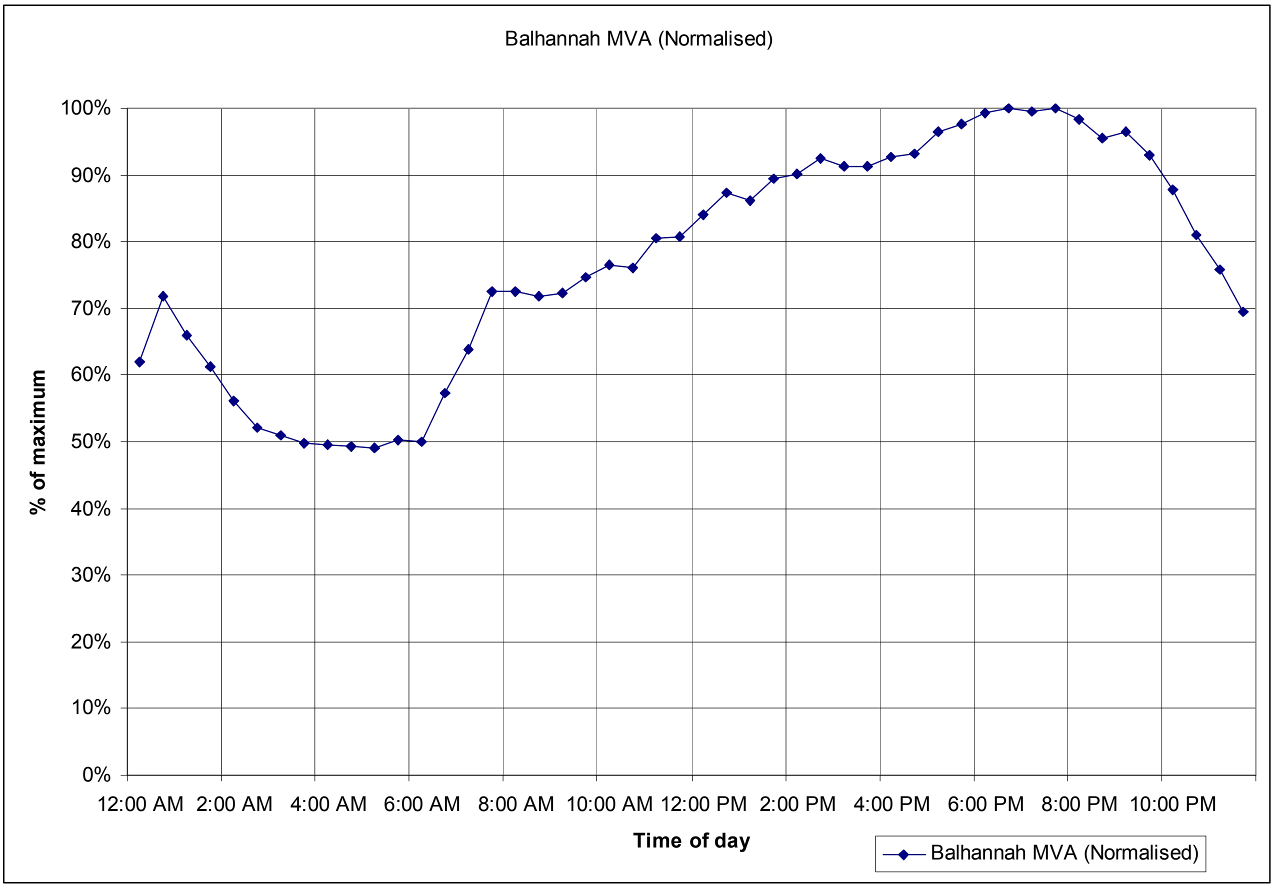

Figure 2 Balhannah Peak Load profile

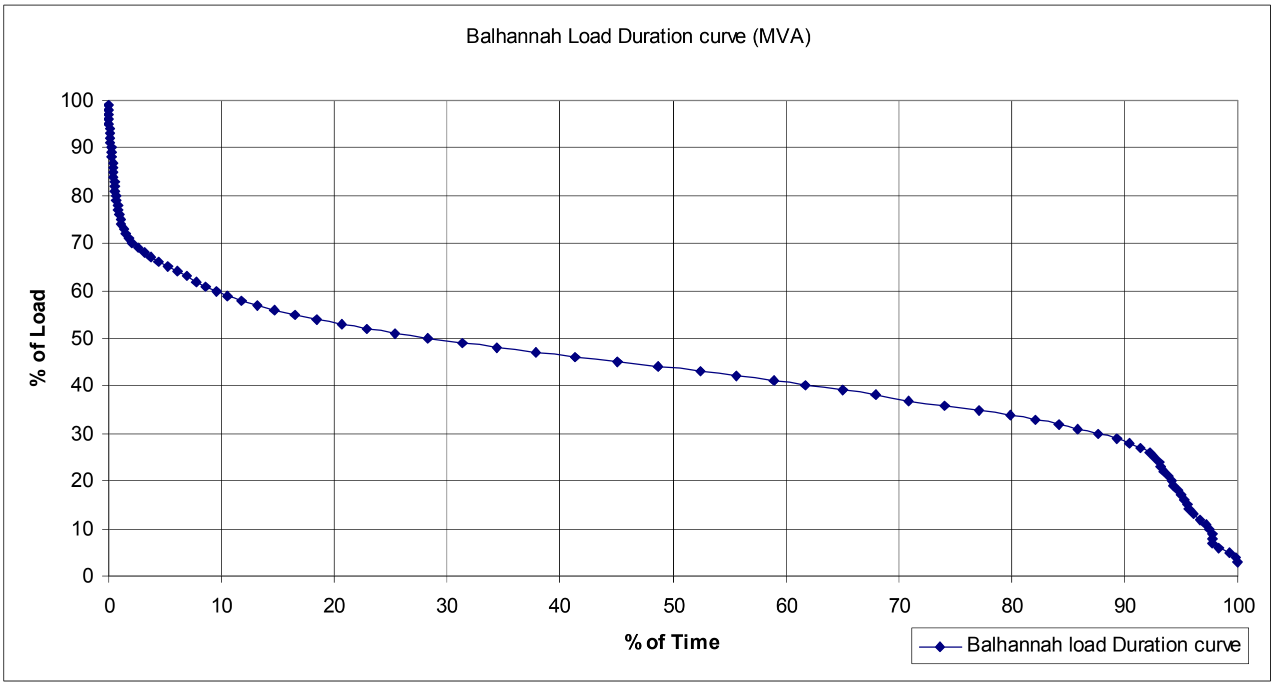

Figure 3 Balhannah Load Duration Curve

4 NETWORK UPGRADE OPTIONS

To prevent the forced shedding of load at peak times the capacity of the Eastern Hills 33kV system must be increased.

Option 1.

- Replace the aging 66 / 33 kV transformer at Uraidla with a larger unit and increase the transfer capability of the network between Uraidla and Balhannah. Change the open point in the Balhannah to Uraidla 33 kV line to permanently transfer load from Balhannah to Uraidla.

Option 2.

- Replace the aging transformer at Uraidla with the same size unit and replace all three 7.5 MVA transformers at Balhannah with 12.5 MVA units.

Preferred Network Solution

The preferred solution, when the net present value, timing and effectiveness of related upgrade projects is considered, is option 1. The capacity upgrade cost for this project is approximately $2 million. This excludes the $1.5 million committed to changing the Uraidla transformer as part of the Asset Replacement plan.

5 DEMAND MANAGEMENT ANALYSIS

5.1 Required Demand Management Characteristics

At peak load times the load profile for the Eastern Hills 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 the Balhannah load forecast in 2010/11 of 32.0 MVA during peak load conditions up to 1.7 MVA of load or 354 customers may need to be shed. Also in the event of one of the 7.5 MVA substation transformers failing, approximately12.6 MVA would have to be shed corresponding to approximately 2,400 customers.

In both cases the 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 to relax the peak load constraint 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	$/kVA available per year for DM
2010/11	1,700	5	60 – 101
2011/12	2,900	12.5	43 – 72
2012/13	4,100	20.5	33 – 55

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 adequate capacity exist in the 33 kV network to make this option viable.

Alternatively generators may be specifically installed at the substation for the purpose of backing up the 33 kV supply. At Balhannah this is not technically feasible due to the very limited space available at the substation and the environmental impacts (noise etc.) on nearby housing.

(b) Install power factor correction

This option will not solve the constraint as the regional power factor is too high.

(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. The estimated cost for this option is $2,500/kVA, which is considerably more than the amounts available. Significant disruption to the customer while the retrofit is carried out can be expected, which may influence the number of willing participants. 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 very few large customers that have a load large enough to individually impact the network, as majority of the load out of Balhannah is due to residential customers. Therefore this option is not technically viable.

(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 improbable that sufficient Demand Management could be implemented to achieve a demand reduction to make project deferral technically or economically viable.

The constraint on the Eastern Hills 33 kV system failed the Reasonableness Test and a Request for Proposal (RFP) will not be issued.