FINAL REPORT

DEVELOPMENT OF

KURRI 132/11kV SUBSTATION

(to replace aged assets and address capacity constraints in the Greater Cessnock Area)

25 August 2008

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EXECUTIVE SUMMARY

This paper has been prepared to report on the assessment of options for corrective action to address projected limitations of the electricity supply network in the Greater Cessnock area in accordance with Clause 5.6.6(h) of the National Electricity Rules (the Rules). The report recommends certain upgrade work, being the development of Kurri 132/11kV zone substation, which will be classified as a new large transmission network asset under the National Electricity Rules.

An application notice on the projected limitation and options for corrective action was published on 24 June 2008. This application notice included a preliminary application of the Regulatory Test to options that had been identified to address the projected limitations. No submission was received in response to this paper.

To provide a safe and reliable electricity supply for existing customers and new developments in the Upper Hunter area, EnergyAustralia is faced with a primary need to provide additional supply system capacity to meet forecasted load demands. The provision of additional capacity is required to meet network performance requirements set in accordance with Schedule 5.1 of the Rules and EnergyAustralia's licence conditions.

This report covers the following issues:

Section 1 provides a background of the Greater Cessnock area and describes the proposed augmentation and its status under the Rules. The proposed Kurri 132/11kV zone substation is classified as a distribution network asset by the Rules, and the proposed development is classified as a new large network asset as it involves augmentation expenditure of above $10M.

Section 2 presents EnergyAustralia's service standards for the area and describes, in detail, various asset condition and forecast capacity issues in the area that resulted in the need for augmentation of supply to the area.

Section 3 describes the options that were considered to address the issues affecting the supply network including options for supply system development. Two feasible augmentation options are described:

Option 1: Replace Kurri zone with a new 132/11kV substation

Option 2: Replace Kurri zone with a new 33/11kV substation

These options have been considered in the context of the long term area strategy for the Greater Cessnock area.

Section 4 presents the results of the regulatory test and the options are ranked.

Section 5 concludes that the most cost effective option within the regulatory test is Option 1 – Replace Kurri zone with a new 132/11kV substation.

The estimated capital cost of this option is $25.5M which includes commissioning of new 132/11kV Kurri zone substation, associated easement cost and decommissioning of the existing 33/11kV Kurri zone substation. The project is scheduled for completion in mid 2010.

1 BACKGROUND

1.1 Purpose and Scope

This Final Report has been prepared to meet the requirements of clause 5.6.6(h) of the National Electricity Rules (the Rules) and to advise on the development work that is proposed to develop the electricity supply network in the Greater Cessnock area. The information provided includes:

- A discussion of emerging supply system limitations identified by EnergyAustralia that have led to identification of options for corrective action to address projected limitations for the supply network in the Greater Cessnock area;
- A discussion of the service standard that has been adopted for planning purposes;
- A description of options for development of the electricity supply in the area and the conclusion that augmentation of the distribution network in the area is required; and
- Details of the outcomes of cost effective analysis for the options considered.

1.2 Applicable National Electricity Rules Requirements

The requirements of the National Electricity Rules (the Rules) for new asset proposals are outlined in Section 5.6 and depend on the cost, purpose and function of the new asset.

Kurri zone substation and the associated 33kV network are classified as distribution system assets by the National Electricity Rules (the Rules). The preferred option considered involves constructing a new 132/11kV zone, which will be connected at 132kV by looping into feeder 96U. Consequently, the new zone will be classified as transmission asset under the rules.

The cost of the augmentation component of the preferred option considered under Section 3 is estimated at approximately $16 million. As such it is considered a new large transmission network asset as it involves a network augmentation with expenditure in excess of $10 million and is therefore subject to consultation in accordance with section 5.6.6 of the Rules. Note that the augmentation component of the alternative option is less than $10 million.

A network service provider is required to consult on proposals to construct a new large transmission network asset. Accordingly, an Application Notice on the projected limitation and options for corrective action was published on 24 June 2008. This Application Notice included a preliminary application of the Regulatory Test to options which had been identified to address the projected limitations. No submission was received in response to this paper and there has been no change to the proposed investment since the issuing of the application notice. In addition, EnergyAustralia has previously provided notification of emerging constraints at Kurri and Kurri STS in the AESDR of 2006/07 and AESDR of 2007/08.

The new capacity provided by the proposed augmentation has been necessitated by the need to meet the service standards described in Section 2 and has therefore been treated as a reliability driven augmentation for the purposes of the Regulatory Test. Consequently, EnergyAustralia has used a least cost test to examine the options identified to address projected system limitations.

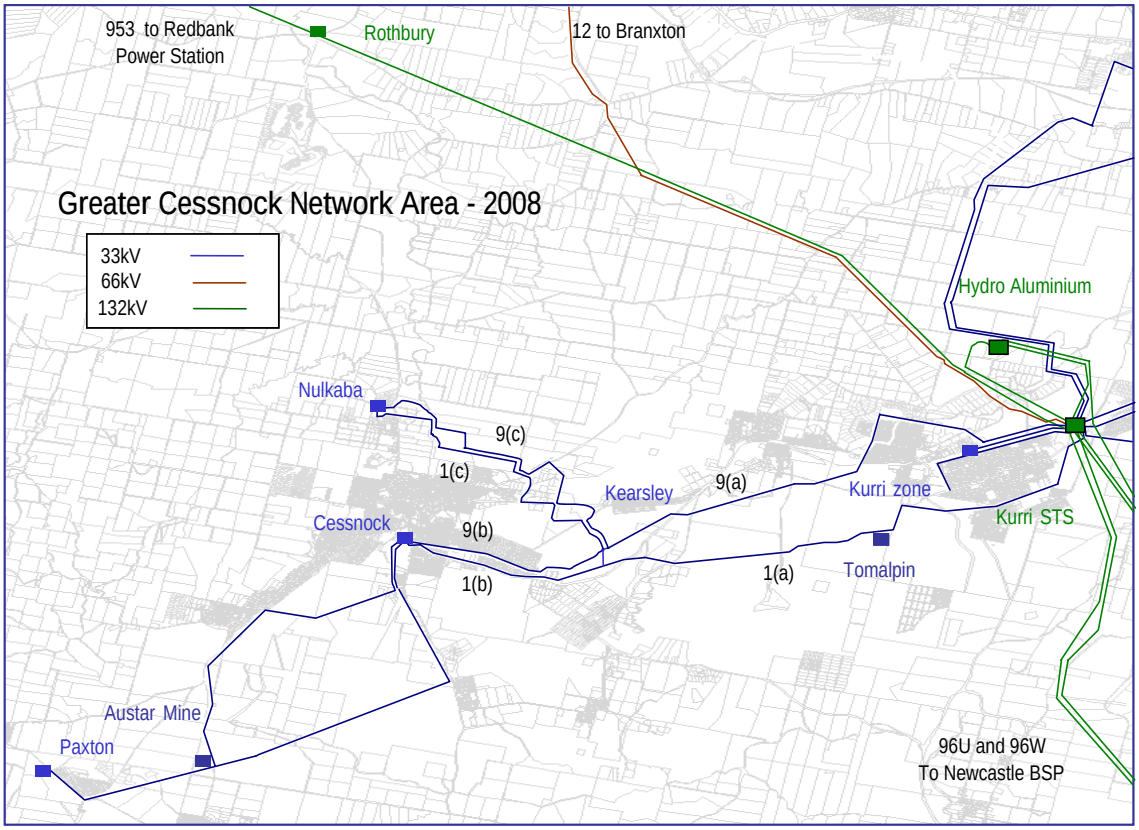
EnergyAustralia has consulted separately over the community aspects of the proposed development.

EnergyAustralia does not consider the proposed works will have any material Inter-Network Impact.

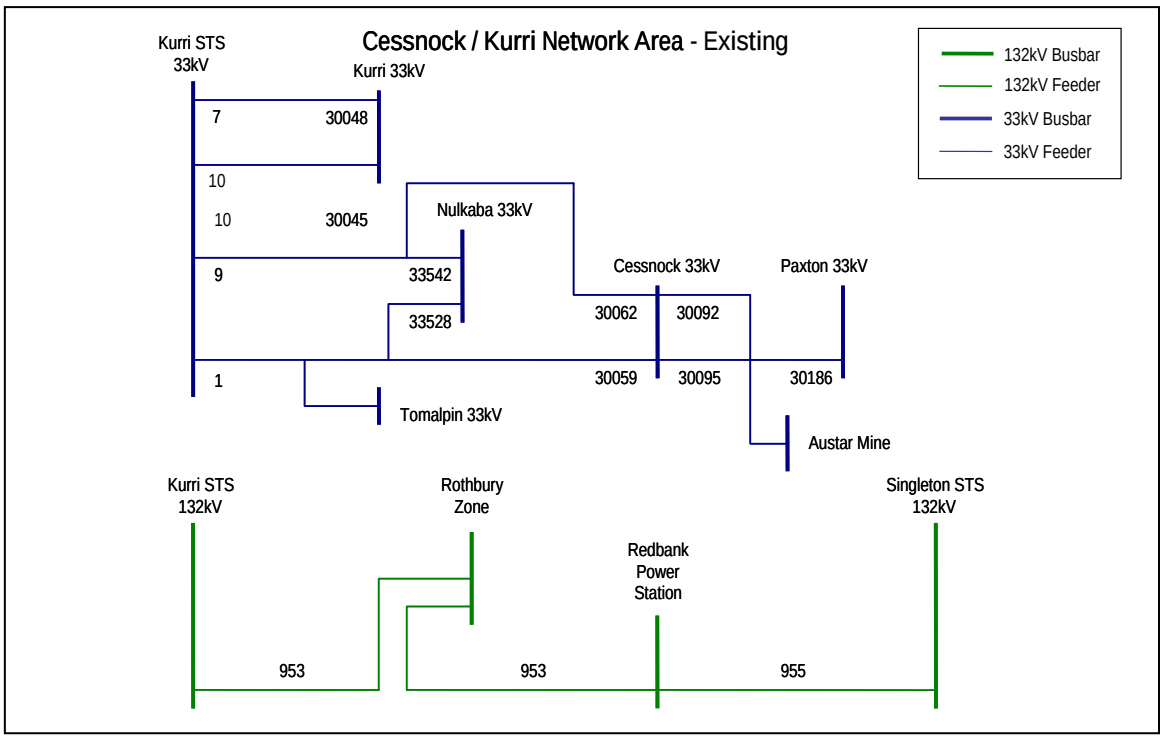
1.3 Existing Supply Arrangements

Kurri STS is a 132/66/33kV substation that supplies the Maitland and Greater Cessnock areas via a 33kV network and also provides backup 66kV supply to Branxton and to Country Energy's Stroud Road substation.

Kurri zone substation is supplied at 33kV by two direct feeders from Kurri STS (Feeder 7 and Feeder 10). Residential and industrial growth at Kurri Kurri necessitated the installation of a temporary 15MVA transportable substation within the Kurri zone substation yard in 2001.



The Cessnock 33kV subtransmission network supplies zone substations at Nulkaba, Cessnock, and Paxton as well as 33kV customer Austar Mine. To improve the voltage and capacity on the 33kV network, a small section of line was constructed in order to reconfigure feeders 1 and 9 to form two teed feeder from Kurri STS to Cessnock and Nulkaba.



1.4 Large Customers and Developments

A proposed industrial park is expected to be developed over the next 5 years and supplied from Tomalpin zone. A customer owned 29MVA diesel fired generator is scheduled to be connected to the 33kV bus at Tomalpin zone substation in February 2008.

The RTA is funding the relocation of portions of the EnergyAustralia 132kV and 33kV transmission lines in the vicinity of Kurri STS to allow construction of the F3 freeway extension. The proposed F3 freeway will pass between the Kurri STS and the zone substations in the Greater Cessnock Area.

2 ISSUES

2.1 Applied Service Standard

The service standards that are applicable to a consideration of supply constraints affecting the Greater Cessnock area are summarised below:

Applicable to all Network Elements

The minimum requirement for any network element is that, with all elements in service, the thermal capacity is required to meet at least 115% of forecast demand. The requirements described in the following sections are additional to this requirement.

Subtransmission substations

For a failure of a single critical element (i.e. N-1 conditions) within a subtransmission substation, the forecast demand is not to exceed the thermal capacity. Recovery of load should be within one minute.

Zone substations and 33kV subtransmission network

For a failure of a single critical element (i.e. N-1 conditions) within zone substations supplying greater than 10MVA of load and for 33kV overhead network, the forecast demand is not to exceed the thermal capacity for more than 1% of the time i.e. a total aggregate time of 88 hours per annum; up to a maximum of 20% above the thermal capacity. Recovery of load should be within one minute.

2.2 Description of Network Issues

The load forecast indicates that the load at Kurri Kurri currently exceeds the capacity that can reliably be supplied from Kurri zone and to maintain the existing equipment at Kurri zone beyond 5 years will require a major refurbishment of the zone. In addition, Kurri STS, which provides supply to Kurri zone, is expected to reach its secure supply capacity in 2010. Further details are provided in the following sections:

2.2.1 Kurri 33/11kV Zone Substation

Kurri zone consists of a two transformer permanent substation and a temporary single transformer transportable substation. The permanent substation was originally constructed in 1963 and utilises an outdoor 33kV bus and switchgear to supply two 12.5MVA transformers, which in turn supply an indoor 11kV switchboard. The temporary substation was installed in 2001 and consists of a single 15MVA transformer.

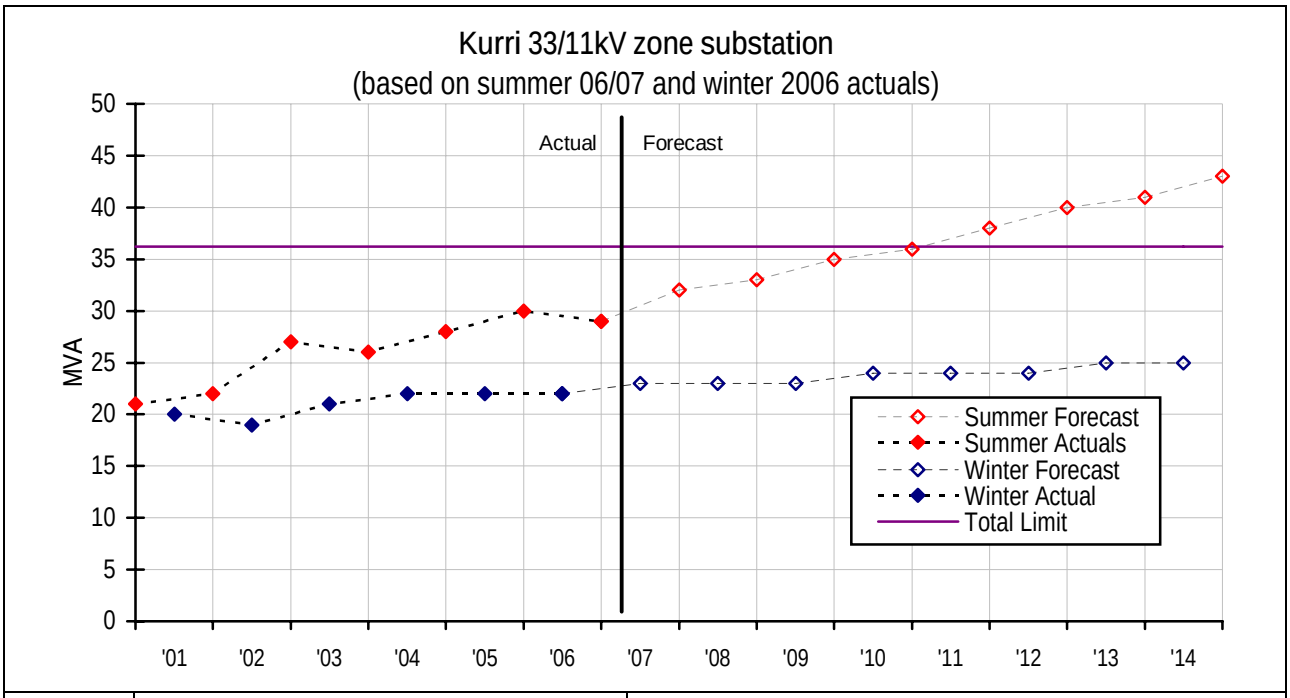
Including both temporary and permanent substations, the firm capacity of this substation is 30.2MVA. The applicable design planning limit for Kurri zone is 120% of the firm capacity, or 36.2MVA. Kurri zone substation is forecast to exceed this limit in summer 2010/11.

Transfer of load between the temporary and permanent substations is limited and relies on manual switching, which means the recovery time for a transformer failure exceeds the one minute limit that is required for zone substations of this size.

Condition

To maintain the existing permanent equipment at Kurri zone beyond 5 years will require a major refurbishment of the zone. The transportable substation is in good condition and expected to have at least 20 years serviceable life. It is, however, a temporary solution and is not considered suitable for the long term support of Kurri zone.

Forecast



	Actual						Forecast							
SUMMER	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Load	22.0	26.6	25.7	28.3	30.1	28.6	31.9	33.3	34.8	36.3	37.9	39.6	41.3	43.2
Limit	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2
WINTER	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Load	19.9	19.3	21.4	21.8	21.8	22.5	22.8	23.1	23.4	23.7	24.0	24.3	24.6	25.0
Limit	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2

2.2.2 Kurri 132/33/66kV Subtransmission Substation

Kurri subtransmission substation (STS) was established in 1964. It is a 132/66/33kV substation that utilises an outdoor 132kV bus, outdoor transformers and outdoor 33kV switchgear. The 66kV supply from Kurri STS provides backup supply to Branxton and Country Energy's Stroud Road substation.

Kurri STS consists of three 60MVA transformers. The effective firm capacity is 137.1MVA, limited by the 33kV transformer secondary bay equipment.

Forecast

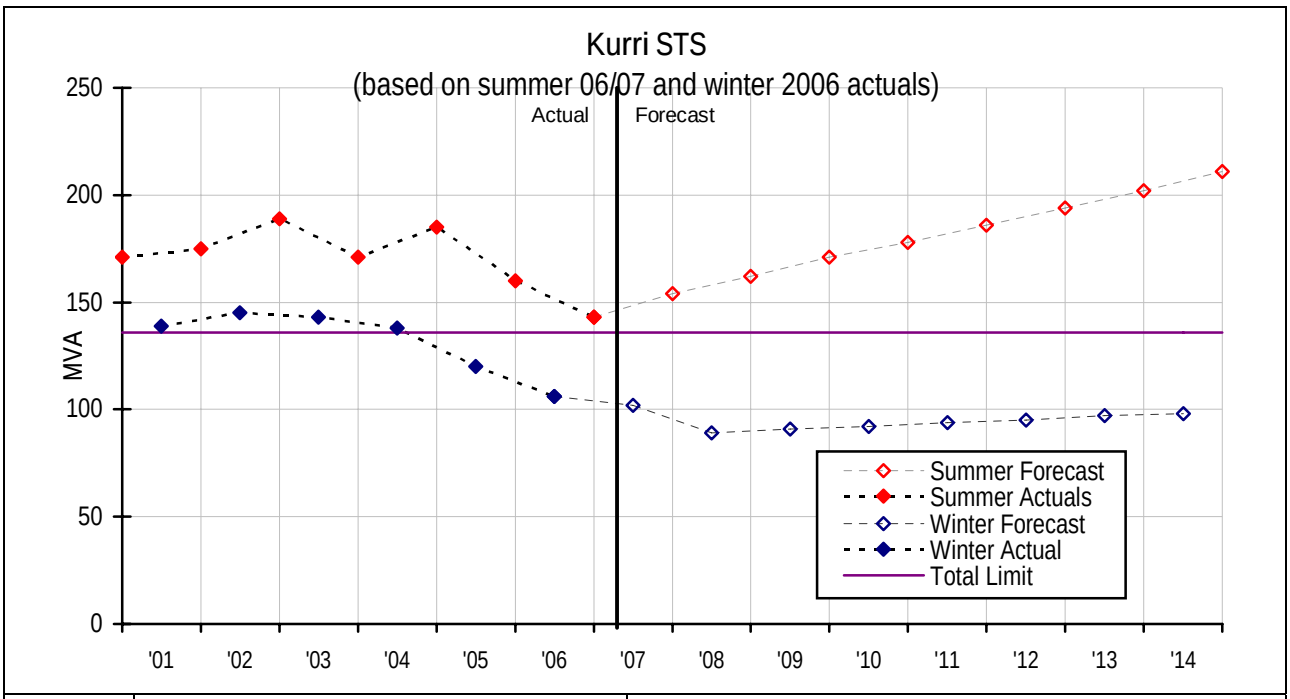
East Maitland zone was transferred to Beresfield STS prior to Summer 2005/06. The winter forecast assumes that Maitland Central zone will be transferred from Kurri STS to Beresfield STS prior to summer 2007/08, however this transfer is no longer likely and so it has not been included in the summer forecast.

Condition

The 132kV switchyard underwent a major refurbishment in the mid eighties and the 66kV circuit breakers were recently replaced with dead-tank units. In 2005, the three 60MVA 132/33kV transformers were replaced.

The 33kV breakers at Kurri STS are outdoor type bulk oil circuit breakers (33kV OCBs) which have a history of failures; and the 33kV busbar does not comply with current minimum height requirements. A project is under development to install a new 33kV indoor switchroom to replace the 33kV breakers and busbar. This project will also result in an increase in substation firm capacity to 156MVA by removing the fault level limitation on the 33kV switchgear[1].

[1] There is a 2% incremental cost to the project to enable this increase in capacity.



	Actual						Forecast							
SUMMER	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Load	174.7	188.6	170.6	184.8	159.6	143.1	153.8	162.0	170.6	178.5	186.2	194.3	202.0	210.9
Limit	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0
WINTER	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Load	139.1	145.3	143.0	138.0	119.8	106.3	102.0	89.4	90.8	92.3	93.8	95.3	96.9	98.5
Limit	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0	136.0

2.2.3 Other Relevant Information

Kurri Kurri is surrounded by Endangered Ecological Communities: Kurri Sands Swamp Woodland and Lower Hunter Spotted Gum Ironbark Forest, which significantly limits available feeder routes and substation locations. The probability of obtaining permission to clear land for feeders or a substation is very low.

3 OPTIONS CONSIDERED

Two feasible options were considered for providing additional capacity to the Kurri Kurri area:

- Option 1: Replace Kurri zone with a new 132/11kV substation
- Option 2: Replace Kurri zone with a new 33/11kV substation

These options are discussed in detail in the following sections. The options have been considered in the context of the long term area strategy. Both options enable retirement of the existing Kurri zone substation and address the capacity issues at Kurri zone substation.

The age and condition of equipment at Kurri zone and space restrictions on the existing site make augmentation of the existing zone impractical and so this was not considered a feasible option. A new site has been purchased on Johnston Avenue in Kurri Kurri for the purpose of constructing a replacement for Kurri zone substation, and is common to all options. This site was selected from a number of alternatives on the basis that it is:

- marginally cheaper to construct a substation on this site (irrespective of voltage);
- a relatively level vacant site in a commercial region located centrally to the current load centre;
- is well located to supply the most likely region for future growth of Kurri Kurri; and
- carries fewer development risks than the alternative sites.

The alternative sites are remote from the township and are bounded by the F3 and Endangered Ecological Communities, which limits the options for feeders from these sites.

Both strategies include replacement of Cessnock zone substation with a new 33/11kV zone in 2013 and replacement of the 33kV bus bar at Kurri STS in 2011.

3.1 Demand Side Management

A review of demand management opportunities in the Greater Cessnock supply area was carried out in November 2007. The review indicated that 16.8MVA of demand reduction would be required prior to Summer 2009/10 to enable deferral of the need for the proposed Kurri 132/11kV zone, which is the preferred supply side solution. The required demand reduction is very high in absolute terms, and also as a proportion of the total demand in the local area; and the potential savings are low in relation to those requirements. Consequently, it was not considered reasonable to expect that it would be cost-effective to postpone the supply-side investment by implementing demand management strategies.

3.2 Option 1: Replace Kurri zone with a new 132/11kV substation

Option 1 is to construct a new 132/11kV Zone Substation to replace the existing Kurri 33/11kV zone. The substation will consist of an indoor 11kV switchroom, an outdoor 132kV switchyard and two 50MVA transformers. The substation will be supplied by two new 132kV feeders formed by looping into feeder 96U[2], with provision made for a further two feeders. The new Kurri 132/11kV zone will enable retirement of the existing Kurri zone substation and resolve capacity constraints at Kurri zone and at Kurri STS.

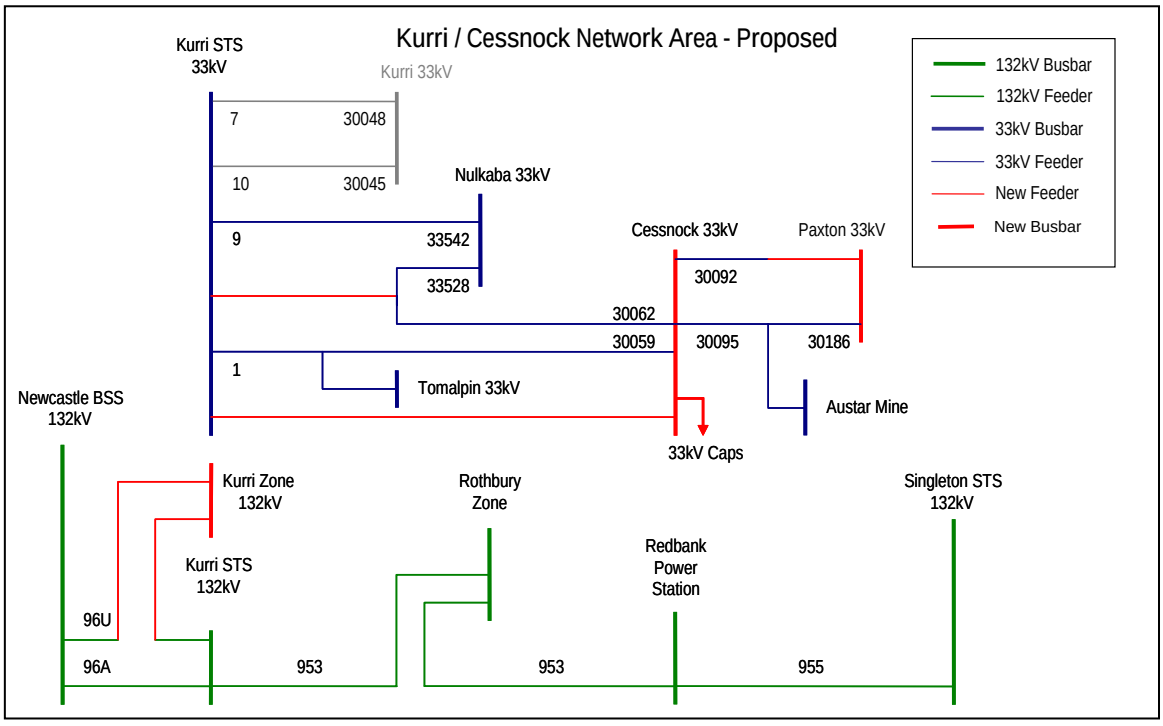
The most likely area strategy associated with this option is provided in Table 1. The new Kurri zone will provide load relief for Kurri STS. In 2014/15, the load at Kurri STS is again forecast to exceed its planning limit; to address this, supply to Maitland zone will be transferred from Kurri STS to Beresfield STS. This is achieved by installing a 3rd transformer at Beresfield STS.

[2] Of feeders the 132kV feeders (96A, 96U and 953) that are in proximity to the area, feeder 96U was identified as the most appropriate 132kV connection. Feeders 96A and 96U follow a similar route; however connection to 96U is of lesser cost as it requires fewer crossovers of the 132kV feeders. Feeder 953 was considered unsuitable for connection to a new substation.

Table 1: Area strategy with approximate timing and costs associated with Option 1		
Proposed Project	**Estimated Cost ($m)**	**Estimated Completion**
New 33kV feeder (Cessnock subtransmission network) + Easement	9.4	2009
Replace Kurri zone with a new 132/11kV substation & 132kV feeder connections + Decommissioning of existing zone +Easement	**25.5**	**2010**
Replacement of Kurri STS 33kV busbar	17.4	2011
Replace Cessnock zone with a new 33/11kV substation +Decommissioning of existing zone	24.8	2013
Replace Paxton zone with a new 33/11kV substation +Decommissioning of existing zone	21.6	2013
Install 3rd transformer at Beresfield STS	5.0	2014
Transfer Maitland zone to Beresfield STS (requires new 33kV feeder)	7.3	2014
New (3rd) 33kV feeder between Kurri and Cessnock	31.1	2019
TOTAL	144.1	

There are several strategic advantages to this option over the alternative:

- increased capability to supply Tomalpin zone should the proposed industrial park go ahead; and
- flexibility to supply Cessnock at 132kV[3] if required.



The total net present cost (NPC) of this strategy is $98.9m, which includes operational and maintenance costs and easement costs.

[3] A third strategy has been considered that includes a 132/11kV Kurri zone and a 132kV STS or zone in Cessnock. Based on current estimates this strategy is 15% more expensive than the alternative strategies in net present terms, and so has not been included in this analysis.

3.3 Option 2: Replace Kurri zone with a new 33/11kV substation

Option 2 is to construct a new 33/11kV Zone Substation on land which is owned by EnergyAustralia on Johnson Avenue in Kurri Kurri (Lot 21 DP855643). The substation will consist of an indoor 11kV switchroom, an outdoor 33kV switchyard and two 33MVA transformers. The substation will be supplied by extending the existing 33kV feeders to the new site. The new Kurri 33/11kV zone will enable retirement of the existing Kurri zone substation and resolve capacity constraints at Kurri zone.

The most likely area strategy associated with this option is provided in Table 2. Since the new Kurri 33/11kV zone does not provide load relief for Kurri STS, additional capacity is required. This will be achieved by upgrading the 60 MVA transformers at Kurri STS to 120MVA units. In 2015, a 3rd transformer will be installed at Beresfield STS to address loading issues in the Maitland area. In addition, the 33kV Cessnock subtransmission network will require successive upgrades and a third feeder to Cessnock will be required in 2019.

Table 2: Area strategy with approximate timing and costs associated with Option 2

Proposed Project	Estimated Cost ($m)	Estimated Completion
New 33kV feeder (Cessnock subtransmission network) + Easement	9.4	2009
Replace Kurri zone with a new 33/11kV substation +Decommissioning of existing zone	**20.5**	**2010**
Replacement of Kurri STS 33kV busbar	17.1	2010
Upgrade transformers at Kurri STS to 120MVA units	13.2	2010
Upgrade 33kV feeder 7 between Kurri STS and Kurri zone	1.9	2011
Replace Paxton zone with a new 33/11kV substation +Decommissioning of existing zone	21.3	2012
Replace Cessnock zone with a new 33/11kV substation + Decommisioning of existing zone	24.8	2013
Install 3rd transformer at Beresfield STS	5.0	2015
Install 3rd transformer at Kurri zone substation	5.0	2016
New (3rd) 33kV feeder between Kurri and Cessnock	31.1	2019
Upgrade 33kV feeder 10 between Kurri STS and Kurri zone	1.3	2020
TOTAL	**150.8**	

The total net present cost (NPC) of this strategy is $108.1m, which includes operational and maintenance costs.

4 ANALYSIS OF OPTIONS

Economic analysis has been carried out in accordance with the regulatory test promulgated by the ACCC under clause 5.6.5A of the National Electricity Rules. As indicated in section 1.2, the "reliability limb" of the test was applied. It involves the comparison of options on an economic basis by carrying out NPC analysis for each of the options. The option that satisfies the regulatory test is the one that minimises the present value of the costs of meeting relevant service standards discussed in section 2.

EnergyAustralia has included a range of parameters in comparison of options such as change in load growth and variations in material costs. In summary, the three options presented are technically and economically comparable, given due consideration to all capital and operating costs that are able to be defined and quantified.

4.1 Base Case Analysis

The options considered are ranked by cost considering 8.5% discount rate as the base case in the following table. The options are considered in the context of the broader area strategy.

Table 3: Comparison of costs under the base case

Description	NPC ($m)	Cost ($m)
Option 1: Replace Kurri zone with a new 132/11kV substation	98.9	144.1
Option 2: Replace Kurri zone with a new 33/11kV substation	108.1	150.8

As per the above table Option 1 is the least cost strategy. Refer to APPENDIX A – ECONOMIC ANALYSIS OF BASE CASE for the detailed analysis.

4.2 Sensitivity Analysis

Sensitivity Analysis was carried out to consider the impact of different discount factors and price variations. The base case and the range over which sensitivity checks were conducted are shown in Table 4.

Table 4: Sensitivity analysis conducted

Parameter	Base Case Value	Cases Considered
Discount Rate		
Real Discount Rate	8.5%	7% and 10%
Cost Variations		
Material Costs	Base Case	±10% material costs
Contractor Costs	Base Case	±10% contractor costs
Labour costs	Base Case	±10% labour costs

4.3 Results of Sensitivity Analysis

The results of the sensitivity analysis are provided in Table 5.

Table 5: Results of Sensitivity Analysis		Option 1		Option 2	
Parameter		**NPC ($m)**	**Cost ($m)**	**NPC ($m)**	**Cost ($m)**
Real Discount Rate 8.5% (Base Case)		**98.9**	144.1	108.1	150.8
Real Discount Rate 7%		**105.8**	144.1	115.0	150.8
Real Discount Rate 10%		**92.8**	144.1	101.9	150.8
Material Costs	10% Increase	**105.9**	152.5	116.3	162.7
	10% Decrease	**92.4**	132.4	100.5	139.8
Labour Costs	10% Increase	**105.0**	151.2	114.3	160.0
	10% Decrease	**93.2**	133.5	102.2	142.2
Contractor Costs	10% Increase	**105.3**	151.8	114.8	160.7
	10% Decrease	**93.0**	133.1	101.8	141.6

5 CONCLUSION AND RECOMMENDED ACTION

EnergyAustralia favours construction of Option 1 on the basis that this solution represents the least cost in line with the Regulatory Test. This option involves construction of a new 132/11kV Kurri zone substation. When considered in the context of the long term area strategy, construction of new 132/11kV Kurri zone substation is the preferred strategy should the development of the Tomalpin industrial estate take place.

The estimated capital cost of this option is $25.5m which includes commissioning of new 132/11kV Kurri zone substation, associated easement cost and decommissioning of the existing 33/11kV Kurri zone substation. The project is scheduled for completion in mid 2010.

This service availability date may change if the project is affected by circumstances beyond EnergyAustralia's control, such as changes in the timing of customer load increases or other issues such as delays in the approval process, equipment supply difficulties, and unforeseen technical constraints.

6 CONTACT DETAILS FOR ENQUIRIES

This report recommends the construction of a new large distribution network asset. Registered Participants may dispute the recommendations of the report under Clause 5.6.6(j) of the Rules. Registered participants who intend to dispute the recommendations of this report must do so within 40 business days of the report being published and made available on EnergyAustralia's website.

Any enquiries regarding this report should be directed to the contact listed below:

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7 APPENDIX A – ECONOMIC ANALYSIS OF BASE CASE

Discount Rate = 8.5%

All figures are in 2007/08 real dollars.

Option 1: Replace Kurri zone with a new 132/11kV substation															
Proposed projects – network	**NPC ($m)**	**Total ($m)**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**
Stage 1 - New 33kV feeder (Cessnock subtransmission network) including projected easement costs	8.2	8.5	4.1	4.4	-	-	-	-	-	-	-	-	-	-	-
Replace Kurri zone with a new 132/11kV substation +132kVfeeder connections + decommission existing zone + Easements	23.0	25.5	1.1	16.1	8.7	-	-0.5	-	-	-	-	-	-	-	-
Replacement of Kurri STS 33kV busbar	12.7	17.4	-	-	-	1.3	16.1	-	-	-	-	-	-	-	-
Replace Cessnock zone with a new 33/11kV substation +Decommisioning of existing zone	16.0	24.8	-	-	0.9	-	0.6	9.4	13.9	-	-	-	-	-	-
Replace Paxton zone with a new 33/11kV substation +Decommisioning of existing zone	14.0	21.6	-	0.9	-	-	0.6	8.6	11.4	-	-	-	-	-	-
Install 3rd transformer at Beresfield STS	3.0	5.0	-	-	-	-	-	-	4.6	0.4	-	-	-	-	-
Transfer Maitland zone to Beresfield STS	4.1	7.3	-	-	-	-	-	-	0.5	6.7	-	-	-	-	-
New (3rd) 33kV feeder between Kurri and Cessnock	12.4	31.1	-	-	-	-	-	-	-	-	-	-	-	22.3	8.8
Total Capital Cost	**94.3**	**144.1**	**5.3**	**24.4**	**9.6**	**1.3**	**16.9**	**18.0**	**30.5**	**7.1**	**-**	**-**	**-**	**22.3**	**8.8**
Operational and maintenance	4.6	-	-	-	-	0.0	0.4	0.5	0.6	1.2	1.3	1.3	1.3	1.3	1.4
Total Cost	**98.9**	**144.1**	**5.3**	**24.4**	**9.6**	**1.3**	**17.2**	**18.5**	**31.1**	**8.3**	**1.3**	**1.3**	**1.3**	**23.7**	**10.2**

Discount Rate = 8.5%

All figures are in 2007/08 real dollars.

Option 2: Replace Kurri zone with a new 33/11kV substation

Proposed projects - network	NPC ($m)	Total ($m)	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20
Stage 1 - New 33kV feeder (Cessnock subtransmission network) including projected easement costs	9.0	9.4	4.1	5.3	-	-	-	-	-	-	-	-	-	-	-
Replace Kurri zone with a new 33/11kV substation + feeder connections + decommission existing zone	18.5	20.5	1.5	10.3	9.2	-	-0.5	-	-	-	-	-	-	-	-
Replacement of Kurri STS 33kV busbar	14.5	17.1	-	-	15.8	1.3	-	-	-	-	-	-	-	-	-
Upgrade transformers at Kurri STS to 120MVA units	10.4	13.2	-	-	1.0	12.2	-	-	-	-	-	-	-	-	-
Upgrade 33kV feeder 7 between Kurri STS and Kurri zone	1.3	1.9	-	-	-	0.1	1.7	-	-	-	-	-	-	-	-
Replace Cessnock zone with a new 33/11kV substation +Decommisioning of existing zone	16.0	24.8	-	-	0.9	-	0.6	9.4	13.9	-	-	-	-	-	-
Replace Paxton zone with a new 33/11kV substation +Decommisioning of existing zone	15.0	21.3	-	0.9	-	0.6	8.8	11.0	0.0	-	-	-	-	-	-
Install 3rd transformer at Beresfield STS	2.8	5.0	-	-	-	-	-	-	-	4.7	0.4	-	-	-	-
Install 3rd transformer at Kurri zone substation	2.4	5.0	-	-	-	-	-	-	-	-	0.4	4.6	-	-	-
New (3rd) 33kV feeder between Kurri and Cessnock	12.4	31.1	-	-	-	-	-	-	-	-	-	-	-	22.3	8.8
Upgrade 33kV feeder 10 between Kurri STS and Kurri zone	0.5	1.3	-	-	-	-	-	-	-	-	-	-	-	-	1.3
Total Capital Cost	**102.8**	**150.8**	**5.7**	**16.6**	**26.9**	**14.3**	**10.6**	**20.3**	**13.9**	**4.7**	**0.8**	**4.6**	**-**	**22.3**	**10.1**
Operational and maintenance	5.2	-	-	-	-	0.0	0.5	0.7	0.7	1.3	1.3	1.4	1.4	1.5	1.6
Total Cost	**108.1**	**150.8**	**5.7**	**16.6**	**26.9**	**14.3**	**11.2**	**21.1**	**14.6**	**6.0**	**2.1**	**6.0**	**1.4**	**23.8**	**11.7**