APPLICATION NOTICE

PROPOSED NEW LARGE TRANSMISSION NETWORK ASSET

REDEVELOPMENT OF LAKE MUNMORAH ZONE SUBSTATION

19th December 2008

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Executive Summary

This Application Notice has been prepared to provide a basis for EnergyAustralia and TransGrid to consult with NEM registered participants and interested parties on options for the development of the electricity supply network in the Lake Munmorah area in accordance with section 5.6 of the National Electricity Rules (the Rules). The preferred action is for a redevelopment of Lake Munmorah zone substation and related 132 kV works that would be classified as a New Large Transmission Network Asset under the Rules.

To ensure a safe and reliable electricity supply for existing customers and new developments in the Lake Munmorah area an overall area supply strategy is required to:

- Replace or retire aging equipment in zone substations over the next decade; and
- Provide additional supply system capacity to meet projected load growth.

EnergyAustralia and TransGrid have conducted a preliminary economic analysis of currently identified feasible options to identify a preferred option that would satisfy the regulatory test as promulgated by the Australian Energy Regulator (AER). The regulatory test prescribes a methodology to assess the economic efficiency of a network investment.

This Application Notice is presented in the following sections:

Section 1 provides a description of the Lake Munmorah load area and the context of the Application Notice within the regulatory process.

Section 2 describes the limitations affecting the supply network in the area and the need for augmentation of supply to the area. The objectively measurable service standard (planning criterion), against which the need and effectiveness of augmentation options are to be assessed, is also presented.

Section 3 presents two feasible network augmentation options that have been identified to address the issues affecting the supply network. Both options are presented within the context of overall supply strategies for the area:

Option 1: Rebuild Lake Munmorah zone substation as a 132/11kV substation with 2x37.5MVA transformers on the existing site plus associated 132 kV works.

Option 2: Rebuild Lake Munmorah zone substation as a 33/11kV substation with 2x33MVA transformers on the existing site plus associated 132 kV works.

An ongoing demand management investigation is also described.

Section 4 presents the results of a preliminary application of the regulatory test to the two overall supply strategies.

Section 5 concludes that Option 1 forms part of the least cost area supply strategy and would therefore satisfy the regulatory test.

Therefore at this stage, subject to outcomes of the consultation process and the ongoing Demand Management investigation, EnergyAustralia and TransGrid's recommended action is for EnergyAustralia and TransGrid to construct Option 1. These works include the rebuilding of the existing Lake Munmorah zone substation on the existing site as a 132/11kV substation with 2x37.5MVA transformers, supplied at 132 kV from TransGrid's Vales Point and Munmorah 132 kV BSPs, and also 11kV load transfer from Noraville zone substation to the new Lake Munmorah zone substation. The total capital cost of these works is estimated to be $70.7M. The 132kV BSP busbars and the new Lake Munmorah zone substation are expected to be commissioned by summer 2011/12.

Also it is proposed to continue the Demand Management investigation with the view to implementing a suitable demand management project that would delay the need for construction of these works.

1 Background

1.1 Purpose and Scope

This Application Notice has been prepared to provide a basis for EnergyAustralia and TransGrid to consult with Registered Participants and interested parties on options for the development of electricity supply in the Lake Munmorah load area.

The information provided includes:

- A discussion of the supply system limitations identified by EnergyAustralia and TransGrid. From this, feasible options have been identified for the replacement and augmentation of network infrastructure in the area.
- A discussion of the service standard that has been adopted for planning purposes.
- A description of feasible options that have been identified for development of electricity supply in the area.
- A preliminary application of the AER's regulatory test to these options within the context of overall area supply strategies.

1.2 Applicable National Electricity Rules Requirements

The existing 33/11kV Lake Munmorah zone substation and its associated 11kV distribution network are classified as distribution system assets by the Rules. The preferred actions involve redeveloping the existing zone substation to 132/11kV operation. This will require it to be connected at 132kV between TransGrid's Vales Point and Munmorah 132 kV Bulk Supply Points (BSPs) which will also need to be augmented. The new zone substation and new 132 kV feeders would be classified as transmission assets under the Rules.

The cost of the network augmentation component of the preferred actions is expected to exceed $20 million and consequently they would be a New Large Transmission Network Asset.

The Rules (clauses 5.6.2 (e) and (f)) require that, where analysis indicates that any relevant technical limits of a distribution system will be exceeded, the Distribution Network Service Provider must notify any affected Registered Participants of these limitations and the expected time for corrective action and consult with affected Registered Participants and interested parties on possible options to address the projected limitations.

In this case, as the preferred actions are for the construction of a New Large Transmission Network Asset, consultation is being carried out under Clause 5.6.6 of the Rules with EnergyAustralia and TransGrid as joint TNSP Applicants. This Application Notice has therefore been prepared to enable them to consult on options that have been developed to meet the projected limitations.

The development of options is necessitated principally by the future inability to meet the minimum network performance requirements as set out in Schedule 5.1 of the Rules. Consequently limb (a) of the regulatory test should be applied to determine the option that satisfies the test. Under limb (a) the option that satisfies the regulatory test is the one that minimises the present worth of cost compared with a number of alternative options in the majority of reasonable scenarios.

1.3 Joint Planning

EnergyAustralia and TransGrid have jointly planned the 330kV and 132kV networks supplying the Upper Central Coast area for many years.

TransGrid and EnergyAustralia have carried out joint annual planning reviews as required by Clause 5.6.2(b) of the Rules. As required by Clause 5.6.2(c) they have identified that the network limitations outlined in section 2.5 give rise to a need for network augmentations and have carried out joint planning to determine options for these augmentations.

1.4 Material Inter-network Impact

The rules require an assessment of whether a proposed new large transmission network asset is reasonably likely to have a material inter-network impact.

EnergyAustralia and TransGrid have determined that none of the options described in section 3 will impose power transfer constraints or adversely impact on the quality of supply to adjoining transmission networks.

1.5 Existing Supply Arrangements

The Lake Munmorah load area is situated in the Upper Central Coast area. Figure 1a below is a geoschematic diagram of the Upper Central Coast area and Figure 1b on the next page is a single line diagram detailing the existing connections to Lake zone substation.

Figure 1a: Upper Central Coast Geoschematic Diagram

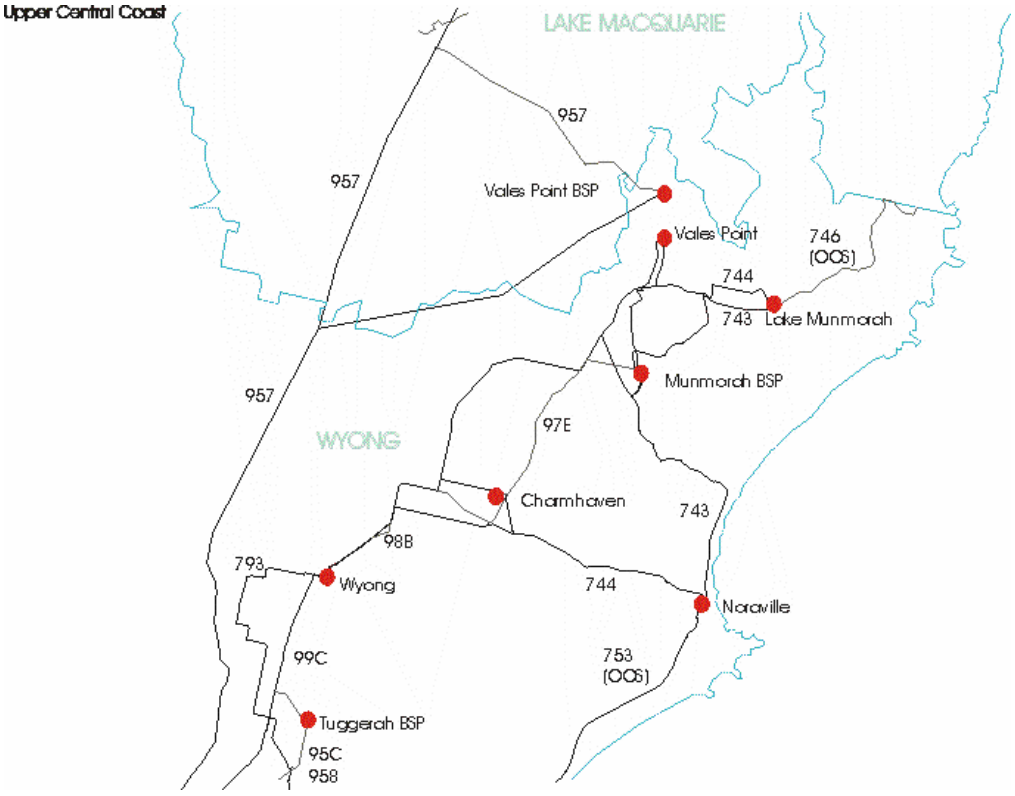
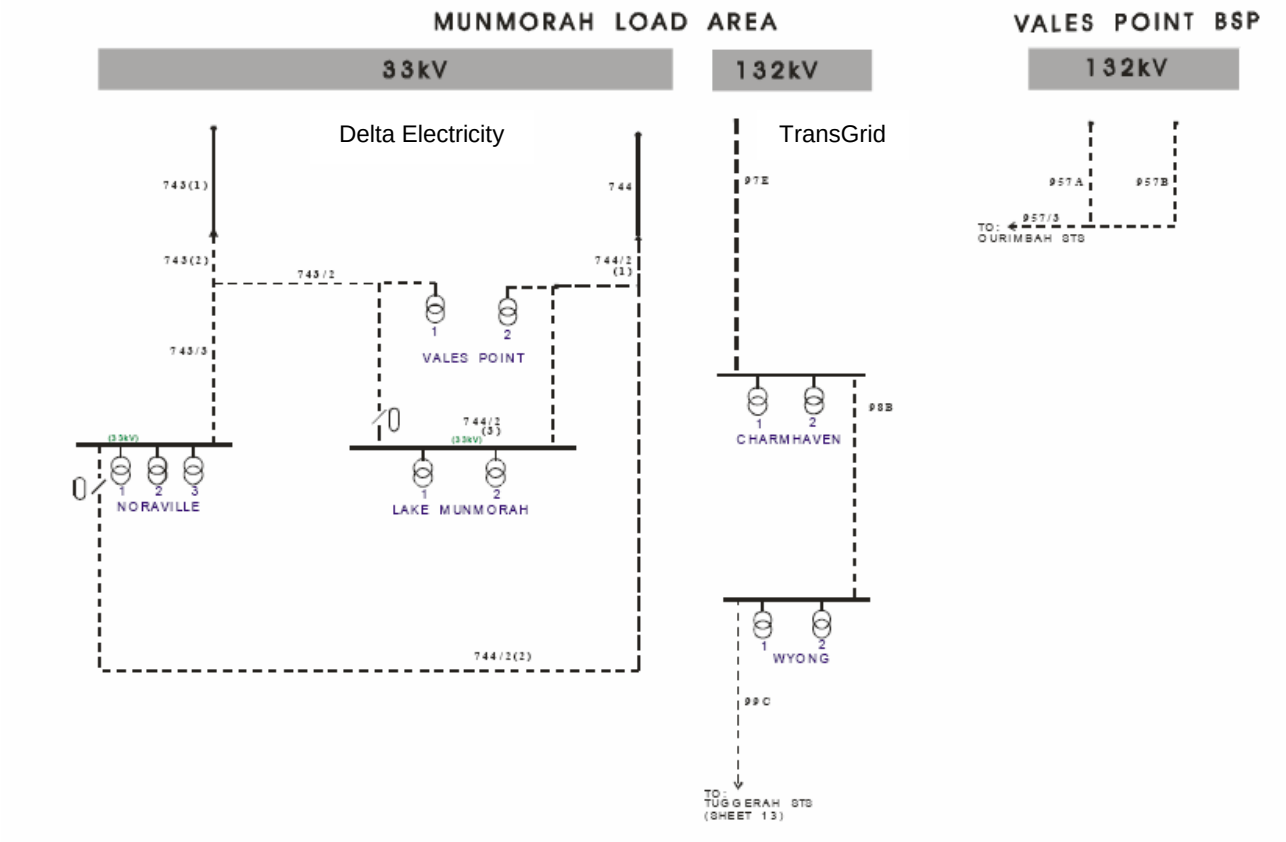


Figure 1b: Upper Central Coast Single Line Diagram



1.5.1 Lake Munmorah Zone Substation

Lake Munmorah is a 33/11kV zone substation that was commissioned in 1979. It is supplied from a 33 kV BSP at Delta Electricity's Munmorah Power Station via two 33kV feeders 743/2 and 744/2. It supplies parts of the following suburbs: Budgewoi, Chain Valley Bay, Doyalson, Elizabeth Bay, Frazer Park, Gwandalan, Lake Munmorah, Mannering Park and Summerland Park.

The substation was designed to accommodate two 12.5MVA transformers. A third transformer was installed as a temporary measure in December 2007 to increase the firm capacity of the substation from 14.7MVA to 26.5MVA in summer and from 17.2MVA to 26.9MVA in winter.

1.5.2 Noraville Zone Substation

Noraville 33/11kV zone substation is equipped with three 12.5MVA transformers and is supplied via two 33kV feeders 743/3 and 744/3 from Delta Electricity's Munmorah Power Station. The firm capacity of Noraville zone substation is 22.6MVA in summer and 24.3MVA in winter.

1.5.3 Vales Point Zone Substation

Vales Point 33/11kV zone substation is equipped with two 15MVA transformers and is supplied via two 33kV feeders 744/2 and 743/2 from Delta Electricity's Munmorah Power Station. The firm capacity of Vales Point zone substation is 14.1MVA in summer and winter.

1.5.4 Supply from Munmorah Power Station

As indicated in Figure 1b EnergyAustralia takes supply at 33 kV from Delta Electricity's Munmorah Power Station via feeders 743 and 744 and at 132 kV from a TransGrid BSP at Munmorah via feeder 97E.

The available capacity from the 33 kV BSP is 69.0MVA in both summer and winter. However the outgoing firm capacity from this BSP is limited in summer to 63.8MVA due to the rating of outgoing underground 33kV feeders.

There is currently no 33kV busbar at the 33 kV BSP. Supply is provided direct from Delta Electricity 330/33kV transformers. The peak load was 39.7MVA in summer 2006/07 and 53.5MVA in winter 2007.

At the 132 kV BSP there is no 132kV busbar. Connection of any additional 132kV feeders to this BSP would require the establishment of a 132kV busbar.

1.5.5 Vales Point Bulk Supply Point

There are two 330/132kV transformers at Vales Point BSP. There is no 132kV busbar at the BSP. EnergyAustralia's single outgoing feeder connects to both 330kV transformers. Connection of any additional 132kV feeders to Vales Point BSP would require the establishment of a 132kV busbar.

1.5.6 Main Cable Supplies – 33kV Feeder System

Lake Munmorah zone substation is supplied by 33kV feeders 743 and 744 from the 33 kV BSP at Munmorah. These feeders also supply Noraville and Vales Point zone substations.

1.6 Supply Strategy

In order to provide a safe and reliable supply of electricity a long term supply strategy must address the following:

- Replace and/or retire aging infrastructure; and
- Provide additional supply system capacity to enable existing infrastructure to be reconstructed and meet projected load growth.

An integrated replacement and augmentation strategy is required to provide:

- Sufficient capacity to enable infrastructure to be replaced or retired; and
- Low cost capacity to meet long term load growth.

The construction of a 132/11kV zone substation would result in an increase in capacity which is therefore regarded as an augmentation under the Rules.

2 Issues

2.1 Applied Service Standard

Distribution Network Service Providers (DNSPs), such as EnergyAustralia, are required to follow the service standards specified in the "*Design, Reliability and Performance Licence Condition for Distribution Network Service Providers*", issued by the Minister for Energy and dated 1 December 2007. The service standards specified in this document that are applicable to a consideration of supply constraints affecting the Lake Munmorah area are summarised below:

2.1.1 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.

2.1.2 Zone Substations and Subtransmission Network

2.1.2.1 Overhead Subtransmission Line and Zone Substations

For a failure of a single critical element (i.e. N-1 conditions) within zone substations supplying greater than 10MVA of load and for overhead subtransmission 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.

Under normal conditions (i.e N conditions) the thermal capacity is required to meet at least 115% of forecast demand.

2.1.2.2 Underground Subtransmission Cables

For an underground subtransmission cable the forecast demand must not exceed the thermal capacity of any underground section at any time under N-1 conditions.

2.2 Description of Network Issues

2.2.1 Load Forecast

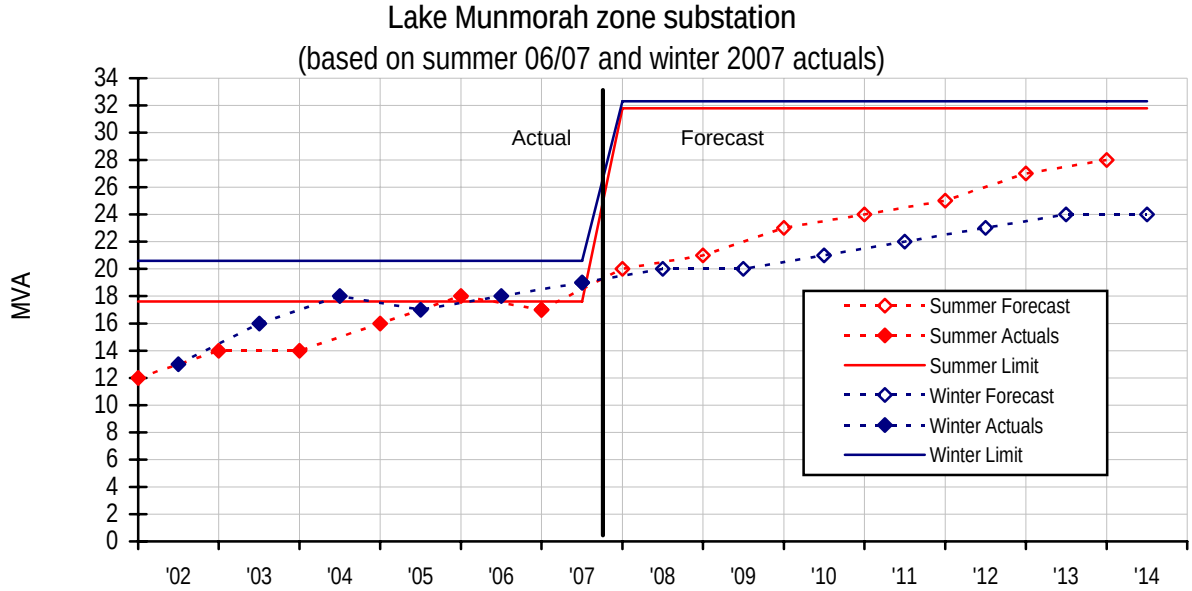
EnergyAustralia has previously published details of its load forecasts and the timing of loads exceeding technical limits of the system in its Annual Electricity System Development Review. The load forecast includes committed spot loads and normal levels of load growth. The timing of constraints for each zone substation are summarised below and are based on the 2008 – 2014 zone substation forecast.

2.2.1.1 Lake Munmorah Zone Substation

Figure 2 shows the peak load forecast and the relevant planning limit, as determined by EnergyAustralia's service standards, for Lake Munmorah 33/11kV zone substation in both summer and winter.

The firm capacity of the zone substation increased in summer 2007/08 following the installation of the temporary third 33/11kV 12.5MVA transformer. The peak load is expected to exceed the substation firm capacity in summer 2012/13 but, as can be seen in Figure 2, is not expected to exceed EnergyAustralia's service standards in this forecast period.

Figure 2: Lake Munmorah Zone Substation Load Forecast



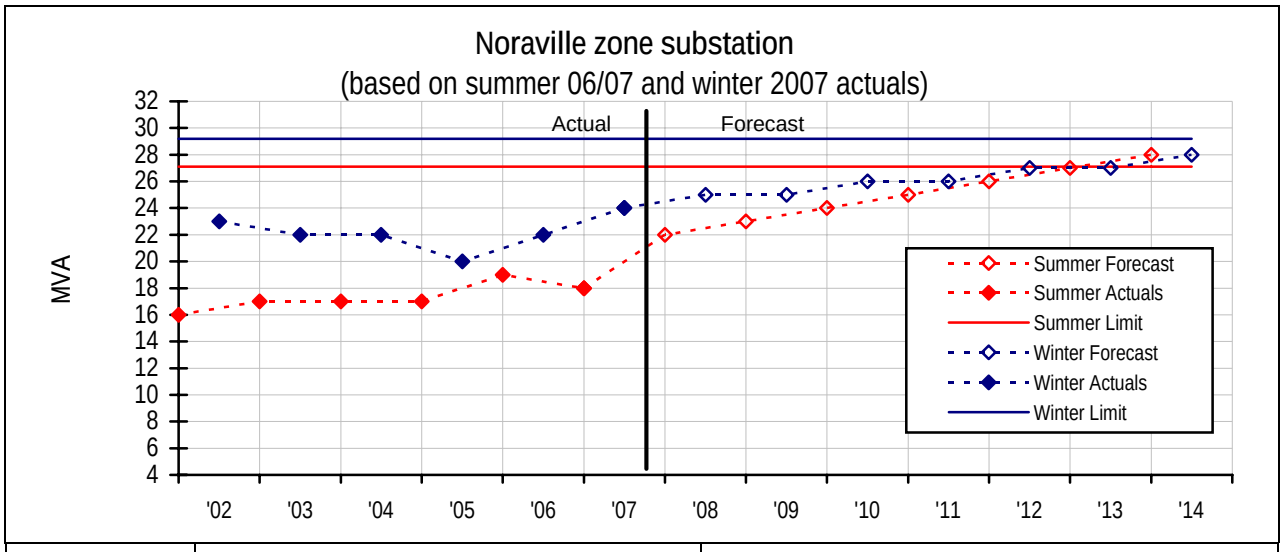
	Actual (MVA)						Forecast (MVA)						
SUMMER	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**
Load	12.0	13.8	14.3	16.1	17.9	16.9	20.0	21.2	22.5	23.8	25.2	26.8	28.4
Firm Capacity	14.7	14.7	14.7	14.7	14.7	14.7	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Limit (120% of Firm Capacity)	17.6	17.6	17.6	17.6	17.6	17.6	31.8	31.8	31.8	31.8	31.8	31.8	31.8
WINTER	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Load	13.0	16.0	18.2	17.1	17.8	19.1	19.5	20.3	21.0	21.8	22.7	23.5	24.4
Firm Capacity	17.2	17.2	17.2	17.2	17.2	17.2	26.9	26.9	26.9	26.9	26.9	26.9	26.9
Limit (120% of Firm Capacity)	20.6	20.6	20.6	20.6	20.6	20.6	32.3	32.3	32.3	32.3	32.3	32.3	32.3

2.2.1.2 Noraville Zone Substation

Figure 3 shows the peak load forecast and the relevant planning limit, as determined by EnergyAustralia's service standards, for Noraville 33/11kV zone substation in both summer and winter.

The peak load is expected to exceed the substation firm capacity from winter 2008 but, as can be seen in Figure 3, is not expected to exceed EnergyAustralia's service standards until summer 2012/13.

Figure 3: Noraville Zone Substation Load Forecast



	Actual (MVA)						Forecast (MVA)						
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**
Load	15.8	17.4	17.4	17.5	19.3	18.0	22.3	23.3	24.2	25.2	26.2	27.3	28.4
Firm Capacity	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6
Limit (120% of Firm Capacity)	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
WINTER	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Load	22.8	21.5	22.2	20.1	21.8	23.7	25.0	25.4	25.9	26.4	26.9	27.3	27.8
Firm Capacity	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3
Limit (120% of Firm Capacity)	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2

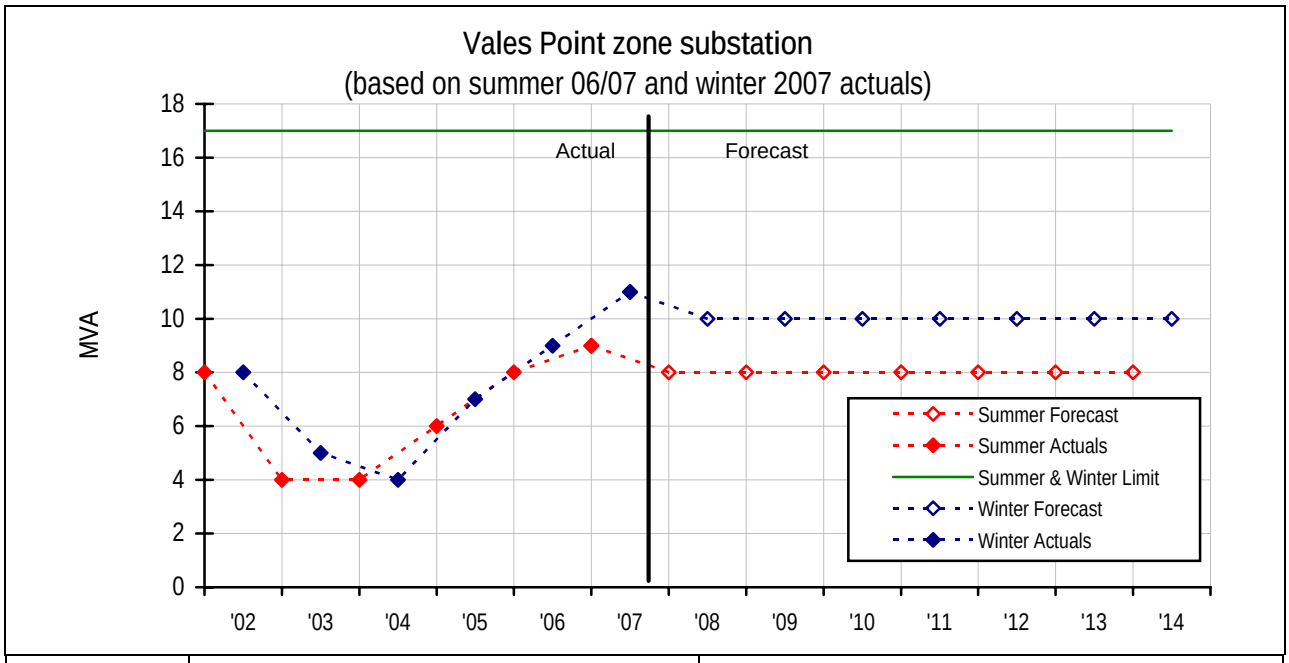
Note: The yellow highlighted field indicates the load is above EnergyAustralia's service standards.

2.2.1.3 Vales Point Zone Substation

Figure 4 shows the peak load forecast and the relevant planning limit, as determined by EnergyAustralia's service standards, for Vales Point 33/11kV zone substation in both summer and winter.

As can be seen in Figure 4 the peak load is not expected to exceed EnergyAustralia's service standards in this forecast period.

Figure 4: Vales Point Zone Substation Load Forecast



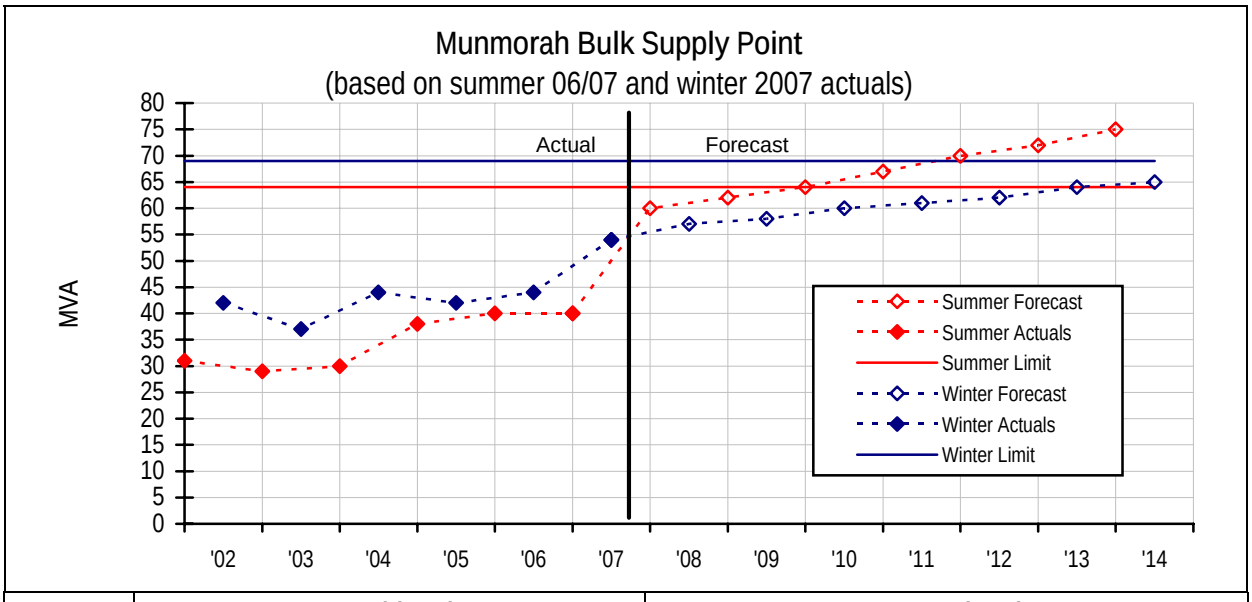
	Actual (MVA)						Forecast (MVA)						
SUMMER	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**
Load	8.2	4.4	4.2	6.0	7.6	8.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Firm Capacity	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
Limit (120% of Firm Capacity)	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
WINTER	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Load	8.3	4.6	4.4	6.9	8.5	11.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
Firm Capacity	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
Limit (120% of Firm Capacity)	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9

2.2.1.4 Munmorah 33 kV Bulk Supply Point

Figure 5 shows the peak load forecast and the relevant planning limit, as determined by EnergyAustralia's service standards, for the Munmorah 33 kV BSP from in both summer and winter.

The Munmorah 33 kV load is forecast to exceed its planning limit in summer 2009/2010.

Figure 5: Munmorah 33 kV BSP Load Forecast



	Actual (MVA)						Forecast (MVA)						
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**
Load	31.1	28.9	30	37.8	40.1	39.7	59.6	61.9	64.4	66.9	69.5	72.2	75.0
Firm Capacity	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0
Limit *	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8
WINTER	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Load	42.4	37	43.5	42.3	43.6	53.5	57.3	58.3	59.8	61.0	62.3	63.6	64.9
Firm Capacity	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0
Limit	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0

Note: The yellow highlighted field indicates the load is above EnergyAustralia's service standards.

* The limit is less than the firm capacity due to the rating of the outgoing 33kV underground feeders.

2.2.1.5 33kV Feeders

There is no 33kV busbar at Munmorah 33 kV BSP and the two 33kV feeders are tail-ended to Delta Electricity 330/33kV transformers. The 33kV zone substations are supplied radially with a standby feeder to provide alternate supply during feeder or 330/33kV transformer outages.

Under N-1 conditions a section of feeder 744 is already above 120% utilisation level in summer and hence does not comply with the licence condition. Feeder 743 is forecast to exceed 120% utilisation level under N-1 conditions in summer 2012/2013.

2.2.2 Asset Condition

2.2.2.1 Lake Munmorah Zone Substation

Based on EnergyAustralia's condition assessment the 11kV and 33kV switchgear at Lake Munmorah zone substation is in relatively poor condition and requires replacement before 2014. The type and the recommended replacement timeframe for the switchgear are summarised in Table 1 below.

Table 1: Recommended replacement timeframe for Lake Munmorah zone substation switchgear

Equipment	Manufacturer	Manufacturer Type	Units	Recommended Timeframe
HV CB	ABB	R-MAG	1	< 5 years
HVCB	AEI	LGIC/44	2	< 5 years
HVCB	EE	OLX	2	< 5 years
HVCB	REY	LMT	2	< 5 years
HVCB	SWALES	D	2	< 5 years
HVCB	WEST	345GC	3	< 5 years
CB HOUSING	EE	OLX	2	< 5 years
CB HOUSING	REY	LZMT	1	< 5 years
CB HOUSING	REY	LMT/X2/MO	1	< 5 years
CB HOUSING	SWALES	D4X4	2	< 5 years

3 Options

Development needs for the Lake Munmorah load area are driven by the need to rectify equipment age and condition issues at Lake Munmorah zone substation and provide sufficient capacity to relieve the 33kV network from Munmorah Power Station and meet forecast load growth in the area.

To meet these objectives EnergyAustralia has investigated a number of options. Possible options are impacted by:

- The availability of land for substation sites in existing established areas.
- The need for the new zone substations to be located near existing zone substations to minimise 11kV connection costs.
- The need to be in close proximity to load centres.

The following sections describe an ongoing Demand Management investigation and two network augmentation options to address the issues described in section 2. The network augmentation options are presented within the context of two overall area supply strategies.

3.1 Demand Management Investigation

Demand management was investigated as an alternative to the proposed network investment.

A demand management screening test was completed in October 2008. This determined that the demand reductions required to postpone the development of 132/11kV Lake Munmorah zone substation are relatively large but the savings available are substantial. It was concluded that it is possible that demand management options may be found that could cost effectively defer this investment.

Demand reductions after summer 2013/14 are not considered beneficial as the 11kV and 33kV switchgear at Lake Munmorah zone substation is in relatively poor condition and requires replacement before 2014.

Therefore it is considered reasonable to expect that it may be cost-effective to postpone any proposed network augmentation works by implementing demand management projects. Consequently a demand management investigation is being undertaken and is expected to be completed by February 2009.

3.2 Option 1: Rebuild Lake Munmorah Zone Substation to 132/11kV Operation on the Existing Site

This option involves rebuilding the existing 33/11kV Lake Munmorah zone substation to a 132/11kV zone substation on the existing site prior to summer 2011/12. The new zone substation would be equipped with two 37.5MVA 132/11kV transformers and would be supplied by two new 132kV feeders, one from Munmorah 132 kV BSP and the second from Vales Point BSP. These two 132kV feeders would utilise relevant sections of existing 33kV overhead feeders 743/2 and 744/2 by reconstructing them at 132kV design.

This option would also require TransGrid to establish new 132kV busbars at Munmorah 132 kV BSP and Vales Point BSP for connection of the new 132kV feeders.

A preliminary consultation with school communities neighbouring the existing Lake Munmorah zone substation site has provided the opportunity to continue to use the existing site with the inclusion of a number of design and siting concessions. This has potentially afforded savings relative to other alternatives that would require relocation, purchase of new land and extension of existing overhead feeders.

The capacity issue at Noraville zone substation is planned to be addressed by 11kV load transfer to the new Lake Munmorah 132/11kV zone substation in 2013.

The expected projects associated with Option 1 are provided in Table 2 below. This option forms Stage 1 of the overall area strategy detailed in the table.

Future projects that are part of this strategy include another load transfer from Noraville zone substation to the new Lake Munmorah 132/11kV zone substation in 2017/18 to address the forecasted capacity limitation at the Noraville zone substation, and installation of a new 132/11kV zone substation at Doyalson in 2022/23 to address the forecasted capacity limitations in the area at that time.

The capital cost for Stage 1 (Option 1) is expected to be $70.7M. The estimated total capital cost of the overall area supply strategy is $110.5M.

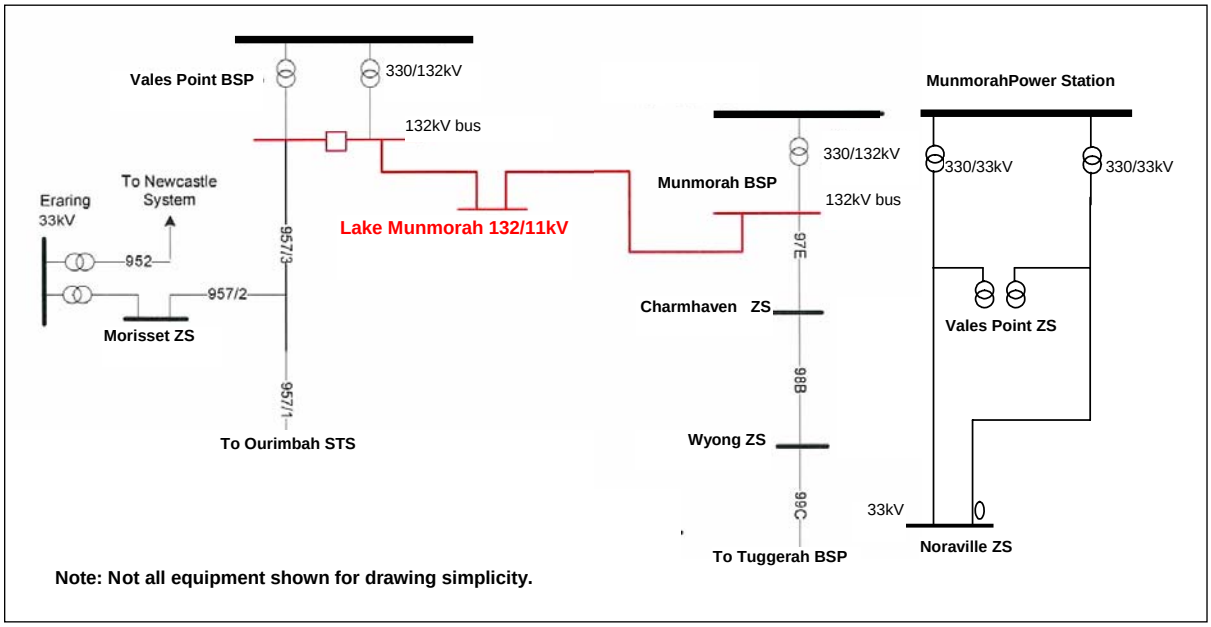
Table 2: Area Supply Strategy Associated with Option 1 with Approximate Timing and Costs

Proposed Project	Estimated Cost ($M)	Estimated Completion
Stage 1 - Rebuild Lake Munmorah zone substation to 132/11kV operation		
Establish 132kV busbar at Munmorah 132 kV BSP by TransGrid	9.1	2011/12
Establish 132kV busbar at Vales Point BSP by TransGrid	5.8	2011/12
Conversion of Lake Munmorah from 33/11kV to 132/11kV +132 kV feeders	48.4	2011/12
Decommissioning of existing Lake Munmorah zone substation	0.2	2012/13
5MVA Load transfer from Noraville to Lake Munmorah zone substation	7.2	2012/13
Total Stage 1 (Option 1) Costs	**70.7**	
Future Works		
Additional switchgear groups at Lake Munmorah 132/11kV zone substation	0.8	2016/17
5MVA Load transfer from Noraville to Lake Munmorah zone substation	7.2	2017/18
New 132/11kV Doyalson zone substation + 132kV feeders	31.8	2023/24
Total Future Works Costs	**39.8**	
Total Area Strategy Costs	**110.5**	

The conversion to 132kV supply would provide sufficient capacity to supply the Lake Munmorah load area and relieve the 33kV network from Munmorah Power Station. This option would also rectify the equipment age and condition issues at the existing 33/11kV Lake Munmorah zone substation.

The overview of network configuration after the completion of Stage 1 of Option 1 is shown in Figure 6 below.

Figure 6: Network Overview after the Completion of Stage 1 of Option 1.



3.3 Option 2: Upgrade Existing 33/11kV Lake Munmorah Zone Substation on the Existing Site

This option involves upgrading the existing 33/11kV Lake Munmorah zone substation to a new 33/11kV zone substation to address its aged asset issues. The new substation would be initially equipped with two 33MVA transformers. This upgrade could be completed prior to 2014.

A 132/33kV sub-transmission substation would be constructed at Doyalson in order to address the capacity issues at Munmorah 33 kV BSP and the 33kV feeder network. This also requires TransGrid to establish new 132kV busbars at Munmorah 132 kV BSP and Vales Point BSP for connection of new 132kV feeders to the new Doyalson sub-transmission substation.

In addition, a 132/11kV zone substation would also be constructed at the Doyalson STS site by 2013 to address the capacity issues at Noraville zone substation. In Option 1, the Noraville zone substation capacity issues are addressed via 11kV load transfers, one in 2013 and another in 2017, to the 132/11kV Lake Munmorah zone substation. However, due to the lower capacity of the 33/11kV Lake Munmorah zone substation in Option 2, it is considered more appropriate to commission the Doyalson 132/11kV zone substation in 2013 to address the capacity issues at Noraville zone substation. (Note: The Lake Munmorah 33/11kV zone substation can accept a 5MVA load transfer in 2013 but not in 2017 and hence the Doyalson zone substation would be required in 2017. These works would result in similar present cost as those proposed in Option 2).

The expected projects associated with Option 2 are provided in Table 3 below. The works described above form Stage 1 of the overall area strategy detailed in the table.

Future projects that are part of this strategy include reconductoring of the 33kV feeder 744/2 in 2017/18 to address the capacity limitation on this feeder, and installation of a 132kV feeder from the new Doyalson STS in 2018/19 to supply a future substation at Swansea.

The capital cost for Stage 1 (Option 2) is expected to be $98.8M. The estimated total capital cost of the overall area supply strategy is $113.2M.

Table 3: Area Strategy Associated with Option 2 with Approximate Timing and Costs		
Proposed Project	**Estimated Cost ($M)**	**Estimated Completion**
Stage 1 – Upgrade existing Lake Munmorah zone substation		
Upgrade of existing 33/11kV Lake Munmorah zone substation	14.1	2012/13
Decommissioning of existing Lake Munmorah zone substation	0.2	2013/14
Development of new 132/33kV Doyalson STS + Land	46.3	2011/12
Establish 132kV busbar at Munmorah 132 kV BSP by TransGrid	9.1	2011/12
Establish 132kV busbar at Vales Point BSP by TransGrid	5.8	2011/12
New 132/11kV Doyalson zone substation	23.3	2012/13
Total Stage 1 (Option 2) Costs	**98.8**	
Future Works		
Reconductoring of 33kV feeder 744/2 to tee to Lake Munmorah and Noraville zone substation	3.7	2017/08
132kV feeder from Doyalson STS to Lake Munmorah for Swansea supply	12.4	2018/19
Warnervale 132kV feeder saving due to reduced feeder requirements (compared to Option 1)	-1.6	2016/17
Total Future Works Costs	**14.4**	
Total Area Strategy Costs	**113.2**	

4 Economic 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 Rules. As indicated in section 1.2, the "reliability limb" of the test was applied. It involves the comparison of options by carrying out a Present Worth of Costs (PWC) analysis. For this Application Notice the option that satisfies the regulatory test is considered to be the one that minimises the PWC of the relevant overall area supply strategy.

A range of parameters has been included in the comparison of options such as change in load growth and variations in material costs. In summary the two 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 the PWC of the relevant area supply strategy considering an 8.5% p.a. discount rate for the base case as shown in the following Table 4. The total costs of each strategy are also shown in the table.

Table 4: Comparison of Costs under the Base Case		
Description	**PWC ($M)**	**Cost ($M)**
Option 1: Rebuild Lake Munmorah zone substation to 132/11kV operation on the existing site	70.4	110.5
Option 2: Upgrade existing 33/11kV Lake Munmorah zone substation on the existing site	86.4	113.2

As indicated in the table (yellow shaded cell) Option 1 forms part of the "least cost" area supply 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 rates and price variations. The values of key parameters for the base case and sensitivity cases are shown in the following Table 5.

Table 5: Sensitivity Analysis		
Parameter	**Base Case Value**	**Cases Considered**
Discount Rate		
Real Discount Rate	8.5% p.a.	7% p.a. and 10% p.a.
Cost Variations		
Zone Substation Costs	Base Case	±25% zone substation costs
STS & BSP Costs	Base Case	±25% STS & BSP costs

The results of the sensitivity analysis are provided in Table 6 below.

Table 6: Results of Sensitivity Analysis		Option 1		Option 2	
Parameter		**PWC ($M)**	**Cost ($M)**	**PWC ($M)**	**Cost ($M)**
Real Discount Rate 7%		**76.5**	110.5	92.1	113.2
Real Discount Rate 10%		**65.0**	110.5	81.2	113.2
Zone Substation Costs	25% Increase	**82.8**	130.7	93.3	122.6
	25% Decrease	**57.9**	90.2	78.9	103.8
STS & BSP Costs	25% Increase	**73.3**	114.2	99.2	128.5
	25% Decrease	**67.4**	106.7	73.7	97.9

As indicated in the table (yellow shaded cells) Option 1 forms part of the least cost area supply strategy in each case. The total costs of each strategy for each case are also shown in the table.

5 Preliminary Conclusions and Preferred Actions

At this stage, subject to comments received during the consultation process and the demand management investigation described in section 3.1, TransGrid and EnergyAustralia prefer construction of Option 1 on the basis that Option 1 forms part of the least cost area supply strategy in accordance with the preliminary application of the regulatory test described in section 4.

The estimated capital cost of the Stage 1 of Option 1 is $70.7M. The works associated with the Stage 1 include commissioning of a new 132/11kV Lake Munmorah zone substation on the existing site, new 132kV busbars at TransGrid's Munmorah 132 kV BSP and Vales Point BSP, new 132 kV feeders between Munmorah and Lake Munmorah and between Vales Point and Lake Munmorah, decommissioning of the existing 33/11kV Lake Munmorah zone substation and 11kV load transfer from Noraville zone substation to the new Lake Munmorah zone substation. The 132kV busbars at Munmorah and Vales Point BSPs and the new Lake Munmorah 132/11kV zone substation and its associated works are scheduled for completion prior to summer 2011/2012 subject to the results of Demand Management investigation.

Also it is proposed to continue the Demand Management investigation described in section 3.1 with the view to implementing a suitable demand management project that would delay the need for construction of these works.

6 Contact Details for Enquiries

In accordance with the Rules EnergyAustralia and TransGrid invite written submissions from interested parties on this Application Notice within 30 business days of a summary being published on NEMMCO's website.

Any enquiries regarding this Application Notice should be directed to either of the contacts listed below. Copies of the Application Notice may be obtained from these contacts or downloaded from EnergyAustralia or TransGrid's websites.

EnergyAustralia:

John Hele
A/Manager – Network Investment
GPO Box 4009
Sydney 2001
Email: jhele@energy.com.au
Phone: 02 9269 2862
Website: www.energy.com.au

or

TransGrid:

Email: regulatory.consultation@transgrid.com.au
Website: www.transgrid.com.au

7 Appendix A – Economic Analysis of Base Case

Discount Rate = 8.5% p.a.

All figures are in 2007/08 real dollars ($M).

Option 1: Rebuild Lake Munmorah zone to 132/11kV operation on the existing site																			
Proposed projects – network	**PWC ($M)**	**Total ($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**	**20/21**	**21/22**	**22/23**	**23/24**
Stage 1 - Rebuild Lake Munmorah zone to 132/11kV operation																			
Establish 132kV busbar at Munmorah BSP by TransGrid	6.6	9.1	0.0	0.0	0.0	0.7	8.4												
Establish 132kV busbar at Vales Point BSP by TransGrid	4.2	5.8	0.0	0.0	0.0	0.4	5.4												
Conversion of Lake Munmorah from 33/11kV to 132/11kV +132 kV feeders	36.8	48.4	0.0	0.1	2.7	24.5	21.1												
Decommissioning of existing Lake Munmorah zone substation	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1											
5MVA Load transfer from Noraville to Lake Munmorah zone	4.8	7.2	0.0	0.0	0.0	0.0	0.5	6.6											
Capital Cost (Stage 1)		**70.7**																	
Future Works																			
Additional switchgear groups at Lake Munmorah 132/11kV zone substation	0.38	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8							
5MVA Load transfer from Noraville to Lake Munmorah zone	3.2	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	6.6						
New 132/11kV Doyalson zone substation + 132kV feeders	9.4	31.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	6.8	17.1	7.6
Total Operation and maintenance	4.9		0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0
TOTAL COST	**70.4**	**110.5**	0.0	0.1	2.8	25.6	35.6	7.4	0.8	0.9	0.9	2.3	7.5	1.0	1.0	1.4	7.8	18.1	8.6

Discount Rate = 8.5%

All figures are in 2007/08 real dollars ($M).

Option 2: Upgrade existing 33/11kV Lake Munmorah zone on the existing site																			
Proposed projects – network	**PWC ($M)**	**Total ($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**	**20/21**	**21/22**	**22/23**	**23/24**
Stage 1 – Upgrade existing Lake Munmorah zone + Doyalson STS and zone																			
Upgrade of existing 33/11kV Lake Munmorah zone substation	9.8	14.1	0.0	0.0	0.0	0.2	6.1	7.8											
Decommissioning of existing Lake Munmorah zone substation	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1										
Development of new Doyalson STS + Land	36.0	46.3	0.0	0.4	9.0	21.3	15.7												
Establish 132kV busbar at Munmorah BSP by TransGrid	6.6	9.1	0.0	0.0	0.0	0.7	8.4												
Establish 132kV busbar at Vales Point BSP by TransGrid	4.2	5.8	0.0	0.0	0.0	0.4	5.4												
New 132/11kV Doyalson zone substation	17.0	23.3	0.0	0.0	0.3	6.1	13.5	3.4											
Capital Cost (Stage 1)		**98.8**																	
Future Works																			
Reconductoring of 33kV feeder 744/2 to tee to Lake Munmorah and Noraville zone	1.6	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.4						
132kV feeder from Doyalson STS to Lake Munmorah for Swansea supply	5.2	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	8.2					
Warnervale 132kV feeder saving (compared to Option 1)	-0.8	-1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-1.5							
Total Operation and maintenance	6.7		0.0	0.0	0.0	0.0	0.0	0.9	1.3	1.3	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4
TOTAL COST	**86.4**	**113.2**	0.0	0.4	9.3	28.7	49.1	12.1	1.3	1.3	1.2	0.0	8.9	9.5	1.4	1.4	1.4	1.4	1.4