Notice

Invitation for submissions

Proposed improvements to the Mid West region's transmission network

DATE:

22 March 2007

DOCUMENT PREPARED BY:

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safe reliable efficient

1 Summary

The purpose of this document is to inform the public and interested parties about Western Power's proposed improvements to the transmission line between Pinjar to Geraldton. The public are invited to make submissions to Western Power regarding alternative options or opinions on the proposed transmission line. Western Power also welcomes feedback on the contents of this public notice – in particular, where parties are considering connecting into the network. This project will improve power supply to the Mid-West region of Western Australia.

Western Power is considering a number of potential corridors for the transmission line between Eneabba and Moonyoonooka and has conducted a series of workshops with communities in this area.

The existing transmission network in the Mid-West region is interconnected to the South West Interconnected System (SWIS) by 132 kV transmission lines from Pinjar and Muchea. These lines connect Geraldton to Pinjar through Cataby, Eneabba and Three Springs.

A 132 kV transmission line between Pinjar and Eneabba was commissioned in mid-2004 in response to an emerging network constraint. In 2010 this increased capacity will be exceeded due to expected increases in demand and connection of wind farms at Walkaway and Emu Downs. At present there are wind farms and conventional generation proposals that are unable to connect due to a shortfall in transmission capacity. There is also an emerging shortfall of supply capacity by summer 2009/10. Without the proposed improvement, Western Power will be unable to meet the natural load growth and demand for connection of power plants in the Mid-West region. There is also a significant risk that some of the development opportunities in the Mid-West region may not proceed if the proposed improvement to the transmission line is not delivered by 2010/11.

At present, there are a significant number of connection enquiries from proponents of industrial and mining loads, and new generation. This amounts to about 300 MW of load and about 1,000 MW of new generation. These proposals will create large opportunities for the Mid-West region. Without major transmission reinforcement there is no available network capacity to accommodate any of these new connections.

Western Power has identified 12 major options to address the capacity constraints in the Mid-West region. These options include transmission, generation and demand load management solutions. An independent consultant, CRA International Pty Ltd (CRA), has evaluated Western Power's improvement options and concluded that a new 330 kV line between Pinjar and Geraldton (Option 1) is the best technical and economic solution to meet the forecast load up to 2030 [1].

This proposal will be subject to review by the Economic Regulation Authority under the New Facilities Investment Test (NFIT) and regulatory test. The regulatory test requires demonstration that other possible options for provision of services *(*such as a demand side management initiative or generation solution*)* have been properly evaluated and that the proposed network investment is the most efficient outcome.

[1] CRA's option evaluation report is available on WP's website (www.westernpower.com.au)

On the basis of the CRA evaluation, Western Power believe that the proposed 330 kV transmission line is the best economic solution that will provide transmission capacity required to support natural load growth, connection of new industrial or mining loads, and access connections for wind farms and conventional generation. Stakeholders are encouraged to submit any alternative proposal. Western Power will evaluate all proposals before submission of its final recommendation under the regulatory test.

2 Purpose

This document has been prepared to provide information on:

- network constraints in the Mid–West region;
- shortfall of capacity to meet demand;
- options for network improvement considered; and
- the preferred 330 kV transmission powerline option.

The document:

- seeks alternative proposals to alleviate the network constraints as required by the Electricity Networks Access Code 2004; and
- invites stakeholders to make submissions to Western Power regarding alternative options or opinions on the proposed 330 kV transmission line.

3 Background

Western Power's transmission network in the Mid–West region extends 400 km from Pinjar and Muchea to Geraldton. It consists of a number of 132 kV transmission lines as shown in Figure 1 below.

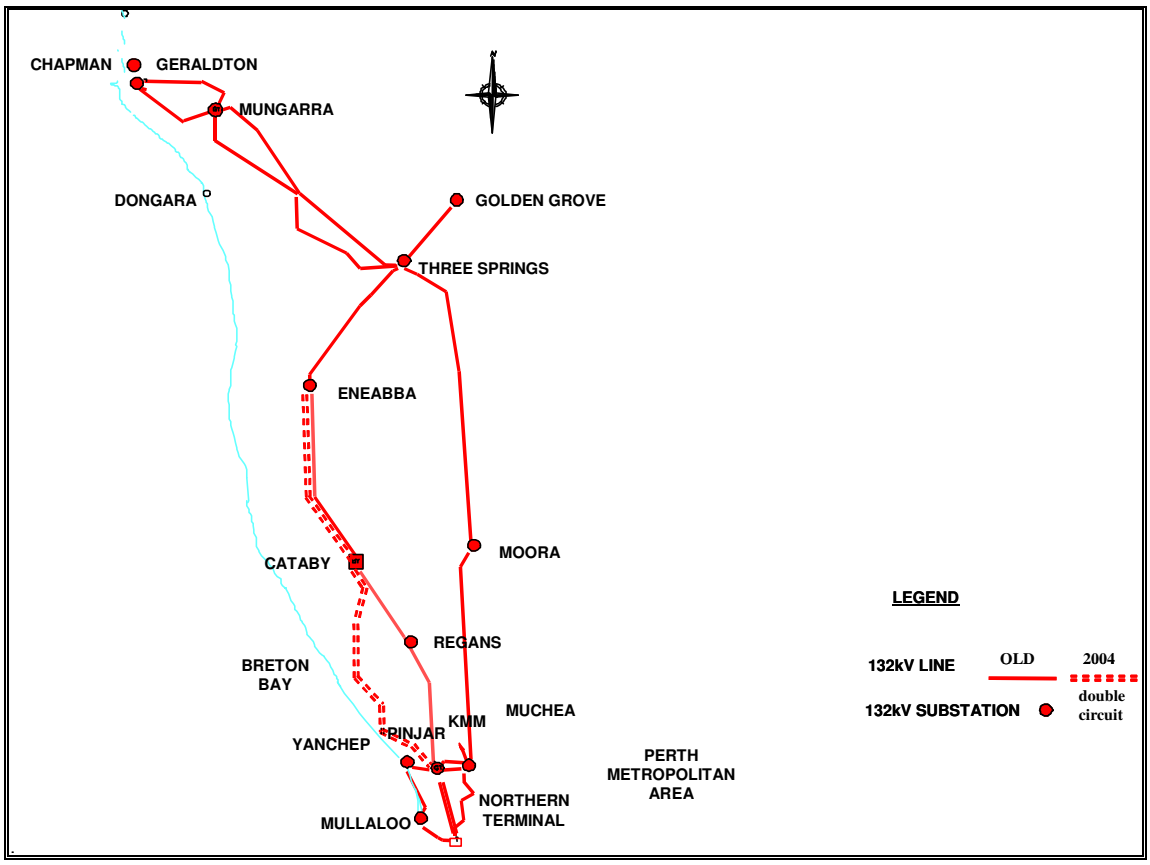
The transmission network is significantly constrained in this region. The network was designed to supply relatively small loads distributed over a large geographical area. The network is not capable of transferring large amounts of power due to thermal, voltage and synchronous stability limitations[2]. Heavy reliance is placed on the use of generation at Mungarra and Geraldton to maximise supply capacity.

However, operation of the gas turbines at Mungarra introduces the risk of synchronous instability for faults on the lines in the Mid-West region or in the South-West Interconnected System (SWIS). For high levels of power transfer, network disturbances can produce voltage depressions sufficient to cause loss of synchronism.

[2] See Appendix for definition of terms.

The power transfer limits are currently constrained by the potential risk of synchronous instability. Operation with power transfers above the stability limits would expose the regional network to a risk of islanding from the SWIS with significant load shedding in the area north of Three Springs. The existing stability limits are required until new transmission reinforcements can be constructed. System studies have demonstrated that the addition of gas turbine generation in the Mid–West region would reduce transmission stability limits resulting in no gain or increase in total power supply capacity to the region.

Figure 1: Overview of transmission network in the Mid-West region



In 2001, Western Power's Networks Business Unit sought approval to construct a new 330 kV transmission line between Pinjar and Eneabba operated initially at 132 kV. However, Western Power was unable to secure funding for the project and as a result, a 132 kV construction option of a lower initial capital cost was approved. This line was commissioned in 2004. This line increased supply capability to the Mid–West region and in particular, increased supply capacity significantly in the area between Pinjar and Eneabba.

Western Power has assessed the adequacy of the existing 132 kV transmission network supplying the Mid–West region and has identified an emerging shortfall in capacity.

Existing supply capacity in the region north of Muchea and Eneabba is approximately 155 MW. This consists of:

- transmission capacity of 65 MW in summer conditions;
- local generation capacity of 85 MW – based on Mungarra power station only; and
- wind generation with firm contribution of 5 MW in summer conditions.

The constraints in the Mid-West region are:

South to north power transfer: The import capability into the Mid-West region is very complex. It depends on a number of factors including local generation, availability of local reactive support, regional load (north of Eneabba and Muchea) and the thermal ratings of the transmission lines.

The thermal ratings of the lines are dependent on ambient weather conditions. System simulation studies show that the power transfer limit can be as low as 43 MW without the Mungarra generators in operation. However, with three gas turbines operating at Mungarra and without the Walkaway wind farm, the power transfer limit increases to 73 MW in summer or 95 MW in winter.

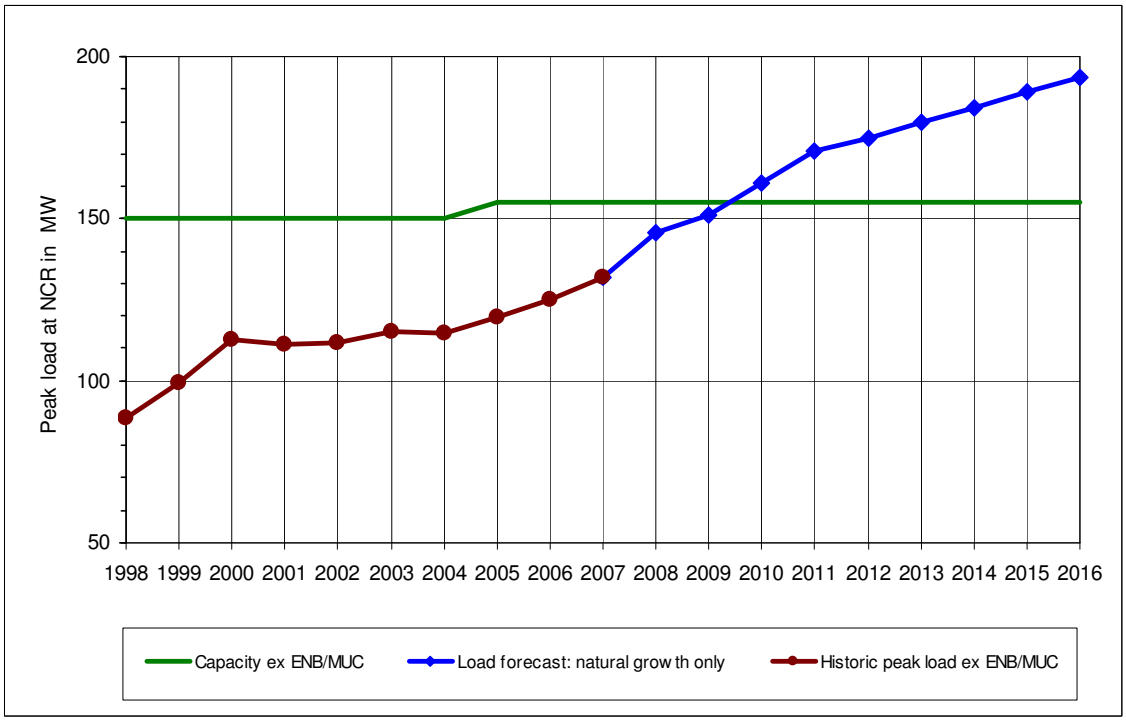
High utilisation of the transmission system results in voltage, thermal and transient stability limits being imposed on the network. Forecast load demand will create a risk of voltage and synchronous instability following a single line trip after summer 2009/10.

This instability could result in widespread load shedding and power supply disruptions particularly following a single line trip during periods of peak summer demand. In addition, system studies show that further gas turbine generation in the region will reduce synchronous stability limits, with no gain in total power supply capacity to the region.

North to south power transfer: The Mid-West region network is significantly constrained by existing 132 kV line thermal ratings and synchronous stability. Construction of the 132 kV line between Pinjar and Eneabba in 2004 has temporarily eased some of theses constraints. However, the recent connection of the Emu Downs wind farms has exhausted transmission capacity available to connect new generation between Pinjar and Eneabba. New generation in the Geraldton area cannot be accommodated due to existing thermal limits on the 132 kV network. If the existing lines are run above their thermal limits following a single line trip, conductor sagging could reduce clearances creating a public safety risk.

Constraints in the northern part of the Mid-West region are the principal reason that the system requires reinforcement. The following figure shows the expected natural load growth in the region.

Figure 2: Supply and demand based on natural load growth from 1997/98 to 2015/16



Western Power has reviewed the load forecast and adequacy of the existing 132 kV transmission network that supplies the area north of Eneabba and Muchea. Spare firm supply capacity to the area north of Eneabba and Muchea is just above 20 MW. Forecast load is expected to exceed supply capacity by summer 2009/10.

The increase of 5 MW in the firm capacity shown in the above graph is due to the contribution from the Walkway wind-farm near Geraldton commissioned in 2005. Although, this wind-farm has an installed capacity of 90 MW, its contribution to the summer peak capacity is significantly lower than its installed nominal capacity. The wind farm power output is a function of prevailing winds, and is not reliable during times of the system peak demand.

3.1 Options considered

Western Power has identified a total of 12 major improvement options to address the emerging shortfall of power supply capacity in the Mid-West region. These are:

Transmission solutions:

1. Establish a double circuit 330 kV line (with one side initially energised at 132 kV) between Perth and Geraldton by November 2010.

2. Establish a 132 kV line between Eneabba and Geraldton by November 2010 with the 330 kV line (as in Option 1) deferred until Nov 2014.

3. Establish 132 kV lines from Eneabba to Three Springs, and Mungarra to Rangeway with the 330 kV line (as in Option 1) deferred until Nov 2014.

4. Reinforce existing network using lines of 132 kV construction only.

5. Establish a single 220 kV line between Perth and Geraldton by November 2010.

6. Build reinforcement with line towers designed for 500 kV initially insulated and operated at 330 kV.

7. Build a DC (Direct Current) line.

8. Do nothing.

3.1.1 Generation solutions:

9. Add more generation at Mungarra Power Station.

10. Additional private generation at Dongara.

11. Permanently island the Mid-West region from the SWIS at Three Springs.

3.1.2 Other solutions:

12. Rely solely on a demand management program to reduce peak demand.

Generation options (9-11) were discounted on the basis of non-compliance with the technical requirements. Due to the high use of the existing transmission network, connection of additional generation in the region is not technically feasible until major transmission reinforcement is commissioned.

Load reductions that can be achieved through demand management (Option 12) are unlikely to be sufficient to defer network expansion even under low demand scenarios. Therefore, this option is not considered viable.

System studies have shown that single circuit 132 kV transmission expansion options, or the option of doing nothing, will not meet planning criteria and are therefore not viable. Without network expansion, it will not be possible to meet the system's natural load growth or to accommodate new customers beyond 2010, without compromising system security, reliability and quality of supply.

Transmission options (2-7) are of higher net present costs than Option 1 and are therefore less economically attractive.

The above options were reviewed by CRA in January 2007 [3]. CRA concluded that construction of the new 330 kV line between Pinjar and Geraldton by November 2010 (as per Option 1) is preferable to the other transmission options considered, including doing nothing and load demand management. The generation options considered would fail the feasibility test, as new transmission capacity would be needed to connect new generation. Option 1 will facilitate the load forecast and connection of new generation in the Mid–West region up to 2030.

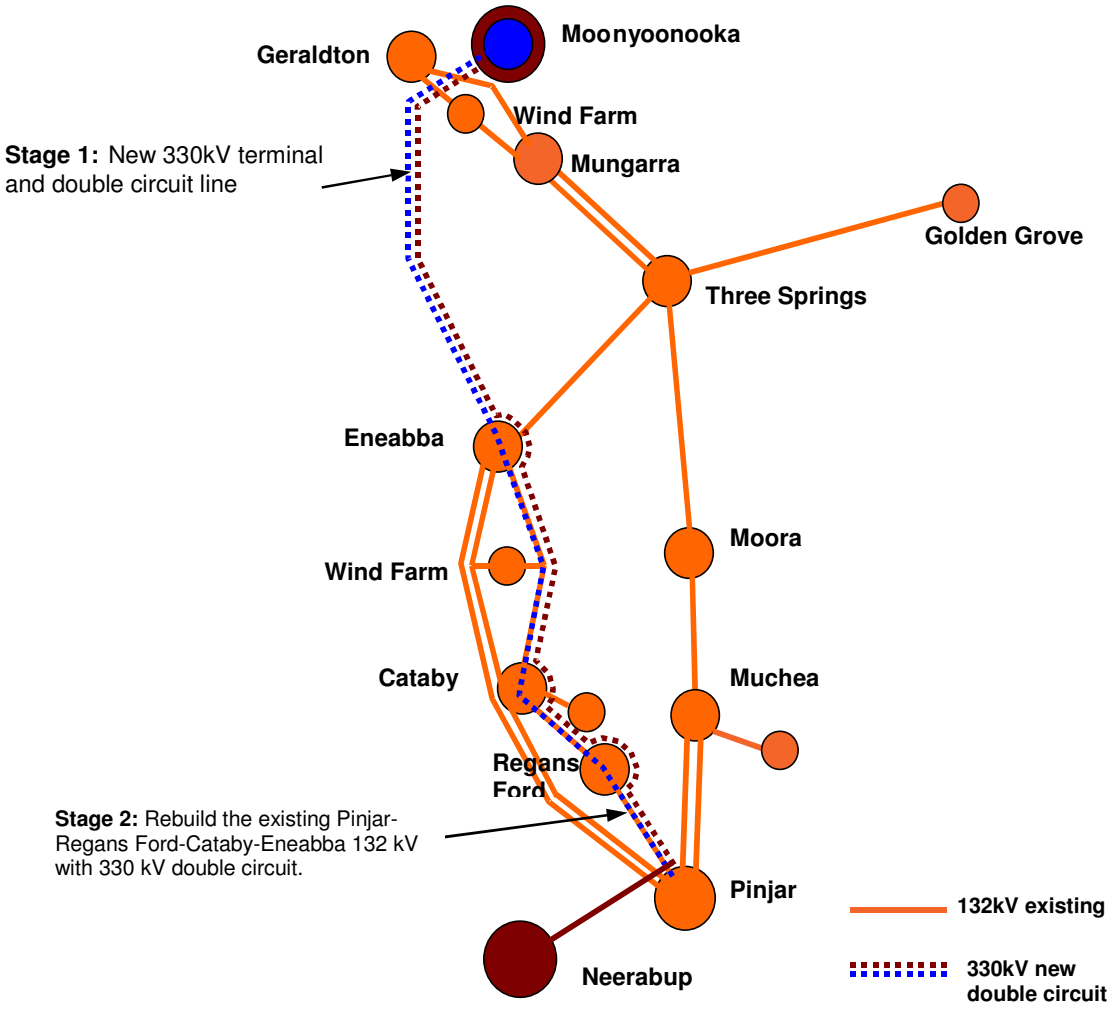
[3] For more details see Section 6 'Conclusion' of CRA's report located on WP's website.

4 Proposed 330 kV transmission line to Geraldton

4.1 The project

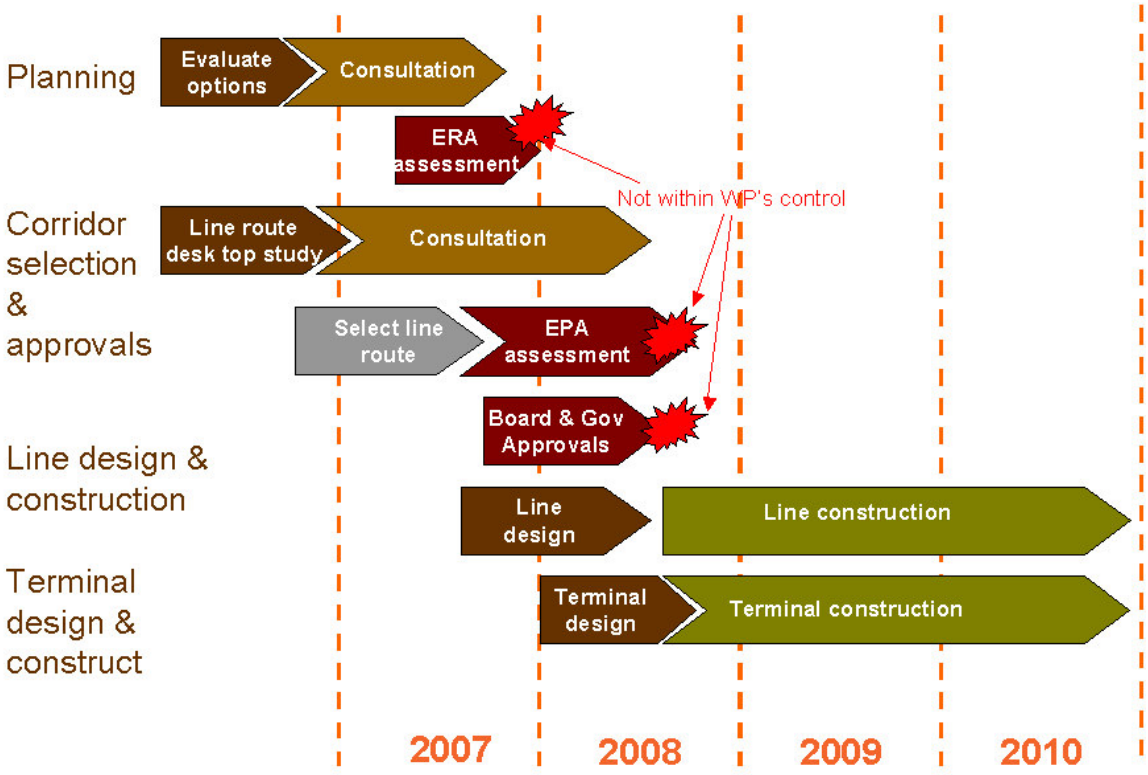
To meet the load forecast and alleviate system constraints, Western Power's preferred option is to construct a new 330 kV double-circuit transmission line between Pinjar and Geraldton (with one side initially energised at 132 kV) and a new 330/132 kV Moonyoonooka Terminal east of Geraldton as shown in Figure 4.

Figure 4: Proposed 330 kV transmission line.



4.2 Proposed timeline

Mid 2004	**Identified need for major reinforcement**
December 2004	Board approved advancement of funds for line corridor selection
January 2005 – late 2008	Line route selection and approvals
November 2006 – April 2007	Community consultation on the line route
October 2006 – January 2007	Evaluation of options by consultants
February 2007 – April 2007	**Public consultation**
By May – June 2007	Economic Regulation Authority submission
By September – December 2007	Economic Regulation Authority approval (expected)
By March 2008	Board and government approvals (including funding)
By May 2008	Line tender for Pinjar - Eneabba line section
By May 2008	Possible tender for terminal works
July 2008 – September 2010	Pinjar-Eneabba line construction
By February 2009	Line tender for Eneabba - Geraldton line section
March 2009 – November 2010	Eneabba – Geraldton line construction
July 2008 – October 2010	Terminal construction
November 2010	**Project target completion date**



NOTE: Subject to ERA and EPA approvals.

4.3 Expected benefits

Expected benefits of the proposed improvements to the transmission network:

- ability to accommodate natural load growth in the region;
- increase in transmission capacity to support forecast load growth in the region;
- increase in transmission capacity to enable connection of customers (new loads and generation);
- improvements in reliability of power supply to all customers in the region;
- ability to connect new wind farms;
- ability to connect new base generation located north of Perth;
- facilitation of entry of lower cost generation in the region;
- opportunity to retire old and inefficient gas turbines at Geraldton and Mungarra; and
- reduction in transmission losses.

4.4 Loss of opportunities

There is a significant risk that if the proposed transmission line is not delivered by 2010/11, some of the development opportunities will be lost. If a number of these projects cannot connect to the transmission network from 2009 to 2014 there is a high possibility that these proposals will not eventuate.

4.5 Other facts at a glance

- Independent evaluation of the reinforcement options for the regulatory test and NFIT has been commissioned. After summarising submissions from public consultation the regulatory test submission will be lodged with the Economic Regulation Authority (ERA).
- The proposed 330 kV transmission line length is approximately 370 km.
- The total cost of the project is expected to be in excess of $300 million.
- Works on the selection of a transmission line corridor are currently undergoing wide community consultation for the Eneabba to Geraldton section of the proposed transmission line.
- Most of the electricity carried by the proposed 330 kV line will flow from north to south, as the new line will allow connection of a number of new generation sources including wind farms.

4.6 Why public consultation is needed?

The Electricity Networks Access Code 2004 requires Western Power to undertake a public consultation process for each major network augmentation.

The objective of the Code is to:

- inform the public, customers and interested parties about the proposed transmission line;
- ensure that all credible alternative options are considered and compared with the proposed improvements; and
- ensure that all opinions and comments are summarised and included in the Regulatory Test Submission as required by the Electricity Industry Act 2004.

It is essential that Western Power has regard to those views and alternative options and gives reasonable consideration to any information obtained under the consultation process when forming its view and conclusion.

5 Invitation

Western Power encourages submissions from stakeholders - in particular, where parties consider that there may be an alternative option to the proposed transmission line and where parties are considering connecting to the network.

Comments and submissions should be in both printed and electronic form and should be received by 5:00 pm on Wednesday 18 April 2007[4], addressed to:

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Facsimile: (08) 9218 5167

Email: laurie.curro@westernpower.com.au

Alternatively, email submissions to: lia.przymenska@westernpower.com.au

[4] 'Electricity Industry Act 2004' requires that for the first round public submissions, the period for the lodging of submissions must be: (a) at least ten business days; and (b) no greater than 20 business days after the invitation is published, and must be at least ten business days after any issues paper was published under clause A7.4.

5.1 Confidentiality

In general, all submissions from interested parties will be treated as being in the public domain and placed on either Western Power's or the Economic Regulation Authority's website.

If an interested party wants to make a confidential submission, it should clearly indicate the confidential sections of their submission and outline in reasonable detail the request for the confidentiality.

The receipt and publication of any submission on Western Power's or the ERA's website shall not be taken as indicating that Western Power or the ERA have knowledge, either actual or constructive, of the contents of a particular submission and, in particular, whether the submission in whole or in part contains information of a confidential nature and no duty of confidence will arise for the Western Power or the ERA in these circumstances.

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Appendix A - Definition of terms

Term	Definitions
ERA	Economic Regulation Authority
Natural load growth	The forecast load growth based on historical trends.
Power system stability	The ability of the power system that enables it to remain in a state of operating equilibrium under normal operating conditions and to regain an acceptable state of equilibrium after being subjected to a disturbance.
Synchronous stability	The ability of the power system to remain in synchronism when subjected to a severe transient disturbance.
Thermal Limits	The operational restriction on the network assets (typically for transformers and transmission lines) due to over heating.
Voltage stability	The ability of the power system to maintain steady acceptable voltages at all buses in the system under normal operating conditions and after being subjected to a disturbance.