

Final Determination on the Regulatory Test for the Mid West Energy Project (Southern Section)

Submitted by Western Power

3 FEBRUARY 2011

Economic Regulation Authority



WESTERN AUSTRALIA

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Contents

FINAL DETERMINATION	1
REASONS	2
The Regulatory Test	3
Western Power's Major Augmentation Proposal	6
Reasons for the Proposed Augmentation	6
Public Consultation Undertaken by Western Power	8
Requirements of the Access Code	8
Western Power's Consultation	9
Submissions to the Authority	10
Considerations of the Authority	10
Identification of Alternative Options	11
Requirements of the Access Code	11
Alternative Options Identified by Western Power	11
Submissions to the Authority	12
Considerations of the Authority	12
Assessment of Net Benefits of Alternative Options	13
Requirements of the Access Code	13
Western Power's Assessment of Alternative Options	14
Submissions to the Authority	18
Considerations of the Authority	20

FINAL DETERMINATION

1. On 26 November 2010, the Economic Regulation Authority (**Authority**) received a major augmentation proposal from Western Power submitted under section 9.15 of the *Electricity Networks Access Code 2004* (**Access Code**).¹ The major augmentation proposal comprises information required to be provided by Western Power to the Authority, in respect of the regulatory test under Chapter 9 of the Access Code, for an augmentation of Western Power's covered (regulated) network involving the construction of a 330 kV double circuit transmission line from Neerabup to the Karara mine site and a 330/132 kV transformer at Three Springs to interconnect the existing 132 kV network with the new 330 kV transmission line ("**proposed transmission line**").
2. As part of its assessment of the major augmentation proposal, the Authority undertook public consultation as provided for under section 9.19 of the Access Code. As part of this consultation, the Authority prepared an issues paper on the major augmentation proposal to assist interested parties in understanding Western Power's proposal.² The invitation for submissions was published by the Authority on 20 December 2010 with a closing date for submissions of 6 January 2011. Submissions were received from the following parties:³
 - City of Geraldton-Greenough
 - Crosslands Resources Ltd
 - Eneabba Energy Pty Ltd (provided on a confidential basis)
 - Energy Response Pty Ltd
 - ERM Power Ltd
 - Extension Hill Pty Ltd
 - Geraldton Iron Ore Alliance
 - Griffin Energy
 - Independent Market Operator
 - Member of public (name removed for publication)
 - Mid West Development Commission
 - Perth Energy Pty Ltd
 - Shire of Perenjori
 - Western Power

¹ Western Power, November 2010, Submission to the Economic Regulation Authority Major Augmentation Proposal Mid West Energy Project (Southern Section) Neerabup to Karara Mine Site via Eneabba (hereafter referred to as "**major augmentation proposal**").

² Economic Regulation Authority, 20 December 2010, Issues Paper: Regulatory Test Application for the Mid West Energy project (Southern Section) Submitted by Western Power.

³ These submissions are available on the ERA's website:
http://www.erawa.com.au/3/954/48/mid_west_energy_project_southern_section_augmentat.pm

3. To assist with its assessment of Western Power's major augmentation proposal, the Authority commissioned independent technical advice from Geoff Brown and Associates (**GBA**) and economic advice from Marsden Jacob Associates (**MJA**).⁴
4. Having regard to Western Power's major augmentation proposal, the independent advice from GBA and MJA, and submissions received from interested parties, the Authority has determined, pursuant to section 9.18 of the Access Code, that the regulatory test as defined in sections 9.3 and 9.4 and applied in accordance with section 9.20 of the Access Code is satisfied, in that:
 - Western Power has made a defensible statement under section 9.16(b) of the Access Code that the proposed transmission line maximises the net benefits after considering alternative options;
 - Western Power has applied the regulatory test properly to the proposed transmission line –
 - using reasonable market development scenarios which incorporate varying levels of demand growth at relevant places, and
 - using reasonable timings, and testing alternative timings, for project commissioning dates and construction timetables for the major augmentation and for alternative options; and
 - Western Power has conducted a consultation process that meets the requirements of section 9.16(c) of the Access Code.

REASONS

5. The Authority's determination on the major augmentation proposal is limited to the scope of the regulatory test under Chapter 9 of the Access Code and addresses the question of whether the proposed transmission line maximises the net benefit to generators, transporters and consumers of electricity after consideration of alternative options for meeting demands for electricity services and addressing constraints in the electricity system, and in particular having regard to all reasonable alternative options, including the likelihood of each alternative option proceeding. While the Authority's determination is necessary for Western Power to commit to the proposed transmission line, approvals and permissions relating to a number of other matters are outside of the Authority's role and responsibilities. Such matters include environmental management, compensation arrangements for affected landowners and the commencement and timing of works to the extent that these matters do not affect net benefits.
6. In these reasons the following matters are addressed:
 - the requirements for the regulatory test under Chapter 9 of the Access Code;

⁴ Geoff Brown and Associates, 2011, Technical Review of Mid-West Energy Project Regulatory Test Application, prepared for Economic Regulation Authority of Western Australia.
Marsden Jacob Associates, 2011, Regulatory Test for Western Power's Mid-West Energy Project (Southern Section), prepared for Economic Regulation Authority of Western Australia.
These reports are both available on the ERA website:
http://www.erawa.com.au/3/954/48/mid_west_energy_project_southern_section_augmentat.pm

- the need for, and stated objectives of, Western Power's proposed transmission line;
- the adequacy of consultation undertaken by Western Power;
- the identification of "alternative options" to the proposed transmission line; and
- the assessment of the relative net benefits of Western Power's proposed transmission line and alternative options.

The Regulatory Test

- Chapter 9 of the Access Code establishes the regulatory test that is applied to proposals for major augmentations of a covered network.
- The regulatory test prevents a service provider from committing to a major augmentation of a network until it has been determined that the requirements of the regulatory test have been satisfied. The Authority is of the opinion that the purpose of the regulatory test is to determine whether a proposed augmentation to an electricity transmission and/or distribution network is the best way of developing the wider electricity system. The test requires that the service provider demonstrate that augmentation of the network is the best means of developing the electricity system compared to alternative options, such as alternative network investments, investment in generation or management of electricity demand.
- The regulatory test is required only for "major augmentations" of a covered network, as defined in Chapter 1 of the Access Code:

"major augmentation" means an augmentation for which the new facilities investment for the shared assets:

 - exceeds \$10 million (CPI adjusted), where the network assets comprising the augmentation are, or are to be, part of a distribution system; and
 - exceeds \$30 million (CPI adjusted), where the network assets comprising the augmentation are, or are to be, part of:
 - a transmission system;
 - both a distribution system and a transmission system.
- Under section 9.2 of the Access Code, a service provider must not commit to a major augmentation before the Authority determines, or is deemed to determine, that the regulatory test is satisfied.
- The process of the regulatory test commences with the submission, by a service provider to the Authority, of a "major augmentation proposal". This may occur either:
 - with the major augmentation proposal submitted as part of a proposed access arrangement, and the Authority's determination of whether the regulatory test is satisfied forming part of the Authority's decision on the proposed access arrangement (section 9.10 of the Access Code); or
 - with a major augmentation proposal submitted other than as part of a proposed access arrangement and the Authority's determination on whether

the regulatory test is satisfied being a determination separate from the approval process for a proposed access arrangement (section 9.15 of the Access Code).

12. Western Power's major augmentation proposal that is the subject of this determination has been submitted under the second of these two processes (i.e. under section 9.15 of the Access Code).

13. Section 9.16 of the Access Code establishes the requirements for a major augmentation proposal submitted to the Authority other than as part of a proposed access arrangement:

9.16 A major augmentation proposal submitted under section 9.15:

- (a) must describe in detail each major augmentation to which the major augmentation proposal relates; and
- (b) must state that, in the service provider's view, each proposed major augmentation maximises the net benefit after considering alternative options; and
- (c) must demonstrate that the service provider has conducted a consultation process in respect of each proposed major augmentation which:
 - (i) included public consultation under Appendix 7; and
 - (ii) gave all interested persons a reasonable opportunity to state their views and to propose alternative options to the proposed major augmentations, and that the service provider had regard to those views and alternative options; and
 - (iii) involved the service provider giving reasonable consideration to any information obtained under sections 9.16(c)(i) and 9.16(c)(ii) when forming its view under section 9.16(b);and
- (d) must comply with the current requirements published under section 9.17.
- (e) may include a request that the Authority give prior approval under section 6.72 in respect of the new facilities investment for one or more proposed major augmentations.

14. "Alternative options" and "net benefit", referred to in section 9.16(b), are defined under Chapter 1 of the Access Code:

"alternative options", in relation to a major augmentation, means alternatives to part or all of the major augmentation, including demand-side management and generation solutions (such as distributed generation), either instead of or in combination with network augmentation.

...

"net benefit" means a net benefit (measured in present value terms to the extent possible) to those who generate, transport and consume electricity in (as the case may be):

- (a) the covered network; or

- (b) the covered network and any interconnected system.
- 15. For a major augmentation proposal submitted to the Authority other than as part of a proposed access arrangement, the requirements for the regulatory test to be satisfied are set out in section 9.20 of the Access Code:
 - 9.20 The test in this section 9.20 is satisfied if the Authority is satisfied that:
 - (a) the service provider's statement under section 9.16(b) is defensible; and
 - (b) the service provider has applied the regulatory test properly to each proposed major augmentation:
 - (i) using reasonable market development scenarios which incorporate varying levels of demand growth at relevant places; and
 - (ii) using reasonable timings, and testing alternative timings, for project commissioning dates and construction timetables for the major augmentation and for alternative options;
 - and
 - (c) the consultation process conducted by the service provider meets the criteria in section 9.16(c).
- 16. Section 9.18 of the Access Code establishes the timeframes for a determination by the Authority on whether the regulatory test is satisfied or not satisfied:
 - 9.18 The Authority must in respect of a major augmentation proposal submitted under section 9.15 make and publish a determination whether the test in section 9.20 is satisfied or not satisfied, and must do so:
 - (a) if the Authority has consulted the public under section 9.19 – within 45 business days; and
 - (b) otherwise – within 25 business days,
 after receiving the augmentation proposal.
- 17. The role of the Authority is to consider the information provided by a service provider in the major augmentation proposal and to determine whether the regulatory test set out in section 9.20 of the Access Code is satisfied. Section 9.21 of the Access Code places the onus on the service provider to demonstrate that the regulatory test is satisfied.
 - 9.21 If the Authority is unable to determine whether the test set out in section 9.20 is satisfied or is not satisfied because the service provider has not provided adequate information (despite the Authority having notified the service provider of this fact and given the service provider a reasonable opportunity, having regard to the time periods specified in section 9.18, to provide adequate information), then the Authority may determine that the test in section 9.20 is not satisfied.
- 18. The Authority's role ends with the determination of whether the regulatory test is satisfied or not satisfied. If the latter determination is made, the Authority does not have a role to remedy any deficiency in the major augmentation proposal or to make any determination on the alternative option that may maximise net benefits.

Western Power's Major Augmentation Proposal

Reasons for the Proposed Augmentation

Demand Forecasts

19. Western Power's major augmentation proposal states that the Mid West region is an area of Western Australia that is experiencing strong population and economic growth, with potential for major new developments in the mining and power generation industries. Historically, electricity loads in the region have been supported by a 132 kV transmission network. The existing electricity network is nearing its capacity and does not have the capability to meet future requirements.
20. In its major augmentation proposal, Western Power has considered "central", "low" and "high" load growth scenarios.⁵ These load forecasts have been broken down into underlying (natural) growth of the existing customer base and block load growth relating to the development of potential major new loads in the Mid West region, as indicated in the table below.

Demand Components	2020 Demand Scenario (MW)		
	Low	Central	High
2010 Peak Load	115	115	115
Underlying (natural) growth	36	42	51
Block Loads			
Small block loads including Port of Oakajee and Oakajee Industrial Estate	27	38	113
Karara Stage 1	-	102 (up to 120)	102 (up to 120)
Karara Stage 2	-	-	152
Extension Hill	-	-	119
Diversified System Peak	178	297	652
Non-Diversified System Peak	205	333	701

21. Western Power's major augmentation proposal concentrates on the central and high load growth scenarios for the following reasons.
 - The low forecast scenario does not include any new major load developments and only reflects underlying natural load growth for the region. The extent and timing of reinforcement to accommodate the low load forecast would be substantially different to the central and high growth scenarios.
 - A different augmentation proposal would need to be developed to accommodate the low growth scenario as any augmentation just sufficient to

⁵ Western Power, Major augmentation proposal, pages 13 -16.

meet the low load forecast would be inadequate to supply the central or high forecast scenarios.

Objective in Network Augmentation

22. Western Power indicates the key drivers for the proposed major augmentation relate to the need to meet the electricity demands of existing and prospective customers, particularly:
 - major new iron ore mining and processing loads east of Three Springs and load growth from the proposed new port developments and industrial estate at Oakajee north of Geraldton;
 - substantial new generation projects seeking to connect to the network along the coastal region north of Pinjar (primarily wind resources, but other proposals such as gas, coal and solar thermal exist); and
 - underlying natural load growth, mainly in the Geraldton region.⁶
23. The first major load proposal is Karara Mining Limited's (**KML**) new mine at Karara (approximately 100 km northwest of Three Springs). KML has approached Western Power to provide a network supply to its iron ore mine site. As part of an interim supply arrangement, KML is proposing to fund and construct a 330 kV transmission line from Eneabba to its mine site via Three Springs and Koolyanooka.

Proposed Transmission Line

24. Western Power's preferred option for network augmentation is the construction of a 330 kV double circuit transmission line from Neerabup to the Karara mine site, and a 330/132 kV transformer at Three Springs to interconnect the existing 132 kV network with the proposed new 330 kV transmission line.
25. Western Power intends to construct the proposed transmission line in the corridor of an existing 132 kV transmission line between Pinjar, Regans Ford, Cataby and Eneabba. Western Power proposes to enter into commercial arrangements with KML to enable it to use the line constructed by KML from Eneabba to Three Springs to form part of the shared transmission network.
26. Western Power has claimed the proposed transmission line will provide various benefits including:
 - the needs of the foundation customer (KML) and the load forecast for the next 20 years will be met;
 - economies of scale will be achieved (demonstrated by an additional 220 MW of network capacity (80% of the total) above the single circuit line option at a net present cost of approximately \$30 million (7%) greater for the central load forecast);
 - a lower net present cost of \$137 million (30%) will be realised, provided the high load forecast scenario eventuates;

⁶ Western Power, Major augmentation proposal, page 2.

- minimising the environmental and social impacts faced by local communities, by maximising the power transfer potential along the existing transmission line corridor;
- reducing the environmental, social and commercial risks that would be associated with the single circuit option under a high load scenario (i.e. a potential need for a further major reinforcement in the region within a few years); and
- maximising the potential for new generation connections in the region by maximising the new capacity provided.

Public Consultation Undertaken by Western Power

Requirements of the Access Code

27. The requirements for Western Power to undertake public consultation on the major augmentation proposal are set out in section 9.16(c) of the Access Code:

9.16 A major augmentation proposal submitted under section 9.15:

...

- (c) must demonstrate that the service provider has conducted a consultation process in respect of each proposed major augmentation which:
 - (i) included public consultation under Appendix 7; and
 - (ii) gave all interested persons a reasonable opportunity to state their views and to propose alternative options to the proposed major augmentations, and that the service provider had regard to those views and alternative options; and
 - (iii) involved the service provider giving reasonable consideration to any information obtained under sections 9.16(c)(i) and 9.16(c)(ii) when forming its view under section 9.16(b);

...

28. Appendix 7 of the Access Code establishes the following requirements on Western Power in undertaking consultation on a major augmentation proposal:

- publication of an invitation for submissions (section A7.6);
- specification of the length of time allowed for the making of submissions that must be at least 10 business days and no greater than 20 business days (sections A7.7 and A7.9); and
- publication of submissions (section A7.20).

29. Appendix 7 would also allow, but not require, Western Power to:

- produce and publish an issues paper examining the issues relating to the major augmentation proposal (section A7.4);
- consider any submissions made after the time for making submissions has expired (section A7.21).

Western Power's Consultation

30. In its major augmentation proposal, Western Power indicates that its consultation process involved:
 - publication in July 2010 of an "Invitation for Submissions" on the websites of both Western Power and the ERA with the consultation period closing on 4 August 2010;
 - a number of industry and community forums held in various locations (Perth and the Mid West region) between 13 and 16 July 2010, which were attended by over 150 participants;
 - additional briefings for key stakeholders who were unable to attend the community forums and for those who required further clarification;
 - written responses to each submission received;
 - additional briefings for parties who had made complex submissions that required detailed responses and explanations; and
 - publishing, on Western Power's website, the submissions received together with responses to the key issues raised.
31. During the consultation period Western Power received independent advice that the regulatory test may need to be expanded to include the proposed assets from Eneabba to the Karara mine site that will be constructed by KML. In light of this advice, Western Power conducted a second round of consultation in September 2010, lasting 10 business days.
32. Western Power's first invitation for submissions included an options paper on the proposed transmission line.⁷ This paper provided general information on:
 - the existing transmission network in the Mid West region;
 - the reasons for the proposed transmission line, described mainly in terms of forecast load growth in the region;
 - a description of the proposed transmission line and a description of alternative options to the proposed transmission line that were examined by Western Power; and
 - a summary of reasons why the proposed transmission line is the preferred option.
33. Western Power's second invitation for submissions included an updated (revised) options paper to expand the regulatory test to include the assets to be constructed by KML and to reflect comments received during the first round of consultation.⁸

⁷ Western Power's options paper is reproduced in Attachment 2 of Western Power's Major Augmentation Proposal.

⁸ Western Power's revised options paper is reproduced in Attachment 5 of Western Power's Major Augmentation Proposal.

Submissions to the Authority

34. In its submission to the Authority's consultation process, Western Power provided additional information to substantiate its consultation process. Specifically, Western Power advised that it:
- undertook a series of advertising in state newspapers (The West Australian, WA Business News) and in community newspapers and localised newsletters;
 - produced a comprehensive public information brochure;
 - provided regular media updates; and
 - provided additional stakeholder briefings on the request of organisations.⁹
35. A number of submissions received by the Authority commented on Western Power's consultation process, with the comments generally supporting Western Power's claims that it undertook a comprehensive and transparent consultation process.¹⁰

Considerations of the Authority

36. The Authority is required to determine whether it is satisfied that Western Power has undertaken consultation in accordance with the requirements of section 9.16(c) of the Access Code; in particular:
- whether Western Power undertook consultation in accordance with the generic guidelines for consultation under Appendix 7 of the Access Code;
 - whether Western Power gave all interested parties a reasonable opportunity to state their views and to propose alternative options to the proposed major augmentation;
 - whether Western Power has had regard to the views and alternative options put forward by interested parties; and
 - whether Western Power has given reasonable consideration to information obtained from interested parties through the consultation process.
37. It is evident from the information provided by Western Power that it undertook a comprehensive consultation process. In particular, it is evident that Western Power widely advertised the opportunities to participate in the consultation process and to make submissions, and made available information on the nature of the regulatory test and the proposed major augmentation. Western Power also published submissions made to it as part of the regulatory test process.
38. Taking into account the information and submissions on the consultation program undertaken by Western Power, the Authority is satisfied that Western Power has complied with the general requirements for consultation under Appendix 7 of the

⁹ Such organisations included: Extension Hill Pty Ltd; Geraldton Iron Ore Alliance; Independent Market Operator; Chamber of Minerals and Energy; Geraldton Infrastructure Committee; Hon. Mia Davies MLC.

¹⁰ Submissions from Independent Market Operator; Griffin Power; Geraldton Iron Ore Alliance; Mid West Development Commission; Perth Energy; Extension Hill; and Energy Response.

Access Code, and the specific requirements of section 9.16(c)(ii) of the Access Code, to give all interested persons a reasonable opportunity to state their views and to propose alternative options to the proposed transmission line.

39. The Authority notes that in its submission to the Authority, the Shire of Perenjori suggested that insufficient weight had been given to its comments by Western Power. However, as the comment related only to Western Power's low demand forecast scenario, which was not used by Western Power to justify the proposed major augmentation, the Authority considers it reasonable that Western Power gives a lower weighting to this view when developing its proposal for submission to the Authority.
40. With the exception of the Shire of Perenjori, no other consultation issues were raised by interested parties. For this reason, the Authority is satisfied that Western Power has given reasonable consideration to information obtained through its consultation process and accordingly, the Authority is satisfied that Western Power has conducted a consultation process in accordance with the requirements of section 9.16(c) of the Access Code.

Identification of Alternative Options

Requirements of the Access Code

41. Under section 9.16(b) of the Access Code, Western Power is required to have considered alternative options to the proposed transmission line.
42. "Alternative options" is defined under Chapter 1 of the Access Code:

"alternative options", in relation to a major augmentation, means alternatives to part or all of the major augmentation, including demand-side management and generation solutions (such as distributed generation), either instead of or in combination with network augmentation.
43. The Authority has addressed, as separate matters, whether Western Power has identified all relevant alternative options to the proposed transmission line and Western Power's assessment of the alternative options identified in its major augmentation proposal. This section of the Authority's determination addresses the former of these two matters (i.e. the identification of all relevant alternative options).

Alternative Options Identified by Western Power

44. In its major augmentation proposal, Western Power indicates that it considered ten options, including the proposed transmission line. These are described as follows.
 - Non-network solutions:
 - local generation (as an isolated non-grid supply);
 - local generation (as a network support control service); and
 - demand side management.
 - Network solutions:
 - reactive compensation;

- high voltage direct current link (HVDC);
 - a 132 kV double circuit transmission line;
 - a 220 kV double circuit transmission line;
 - a 275 kV double circuit transmission line;
 - a 330 kV double circuit transmission line (the proposed option); and
 - a 330 kV single circuit transmission line.
45. Western Power indicated in its major augmentation proposal that no alternative options that could effectively (economically) alleviate the identified constraints were proposed through its public consultation process.

Submissions to the Authority

46. While several submissions to the Authority stated that Western Power had identified all relevant alternative options to the proposed transmission line,¹¹ and no submissions identified any alternative options, two submissions raised matters related to Western Power's process of identifying alternative options.
47. The Shire of Perenjori submitted that while Western Power gave appropriate weight to the options for transmission infrastructure, it did not give sufficient regard to the Mid West region as a future energy hub. With mature proposals for gas, coal, solar thermal and wind projects already in the public domain, the Shire is of the view that a significant part of Western Power's business case should be based on the capacity of the Mid West to deliver energy back to the grid (i.e. energy being transported from the north to the south).
48. Extension Hill submitted that Western Power's process to identify alternative options and the consideration of these options "erred on being overworked" and that the proposed option of a 330 kV double circuit transmission line is the only sensible one. Furthermore, Extension Hill also raised an issue regarding compliance with the Technical Rules; noting that the load shedding regime accepted by KML to enable Western Power to seek a derogation from the "N-1 technical rule" is unlikely to be acceptable to Extension Hill. In particular, the circumstances under which load shedding, and length of time the load would have to remain disconnected, will increase dramatically when Extension Hill's load (130 MW) is added to KML's load (120 MW). This situation may impact on the operations of generators (e.g. generators may be required to shutdown in some instances to protect equipment) and potentially increase the costs for customers connected to the system.

Considerations of the Authority

49. In its determination on the major augmentation proposal, the Authority has given consideration to whether Western Power has identified all relevant alternative options to the proposed transmission line.

¹¹ Submissions from Perth Energy, City of Geraldton-Greenough and Extension Hill.

50. Submissions made to the Authority did not identify any alternative proposals to those identified by Western Power.
51. In response to the matters raised by the Shire of Perenjori with respect to the capacity of the Mid West to deliver energy back to the grid, the Authority agrees that Western Power should have given greater consideration to this, however, the Authority does not consider that this has led to any relevant viable options not being considered.
52. In response to the matters raised by Extension Hill regarding compliance with Western Power's Technical Rules, the Authority has had regard to the following technical advice.
53. The Authority's technical advisor has indicated that it is normal practice to build a degree of redundancy into a transmission network in order to ensure an acceptable quality of supply; noting that the Technical Rules, which form the basis for Western Power's grid development planning, require this. However, there is an economic cost for the provision of additional capacity and for very large point loads such as mining loads this cost could potentially be very high. The Technical Rules are designed around an implicit assumption that, while new users must pay the cost of connecting their loads to the grid, the cost of deep seated grid augmentations to support load growth would be shared by all grid users. It could be argued that requiring grid users to pay for high cost grid augmentations, required primarily to provide supply security to large mining loads, would not be consistent with the economic objectives of the Access Code. Having regard to this technical advice, the Authority is of the view that this issue is unlikely to have impacted on the options selection process, but is something that will need to be considered if, and when, Western Power submits a new facilities investment test application for this augmentation.
54. Further technical advice to the Authority advises that the use of a voltage higher than 330 kV could have been given more detailed consideration by Western Power on the basis that actual demand may be greater than Western Power's high forecast. Western Power's high forecast does not include potential expansion of the Extension Hill mine or the connection of any other new mining loads within a 20 year planning period. It is noted, however, that Western Power did not consider this option for a number of reasons including the need to obtain environmental approvals for a higher voltage (current approvals are for a voltage of 330 kV) and to resolve technical issues; each of which would result in significant delays. Furthermore, given the history of the project and funding constraints imposed on Western Power, it is doubtful that the option of using a voltage higher than 330 kV is a realistic option.
55. Having regard to the above considerations, the Authority is satisfied that Western Power has adequately identified and considered alternative options to the proposed transmission line.

Assessment of Net Benefits of Alternative Options

Requirements of the Access Code

56. Under section 9.20(a) of the Access Code, the Authority must determine whether it is satisfied that Western Power has made a defensible statement that, under

section 9.16(b), the proposed major augmentation maximises the net benefit after considering alternative options.

57. The Authority has addressed, as separate matters, whether Western Power has identified all relevant alternative options to the proposed transmission line and Western Power's assessment of the alternative options identified in its major augmentation proposal. This section of the Authority's determination addresses Western Power's assessment of alternative options.

Western Power's Assessment of Alternative Options

58. Western Power has assessed alternative options by:
- identifying a set of potential alternative options (as described in the previous section of this determination, refer to paragraph 44 above);
 - assessing whether the potential alternative options are viable; and
 - comparing the viable set of alternative options by a comparison of the present value of costs of each option to meet the central load forecast, the additional costs of work that would be required to extend each option to supply the high load forecast, and non economic benefits delivered.
59. In its assessment of whether a potential solution is viable, Western Power requires the potential solution to:
- be capable of meeting the central load forecast demand scenario; and
 - have the potential to incorporate extensions or enhancements to accommodate the high load forecast demand scenario.
60. Western Power's reasons for eliminating some of the potential alternative options from consideration are as follows:
- Elimination of the option of using reactive power compensation on the basis that the amount of additional load to be connected is beyond the present capabilities of the network and reactive compensation is only able to achieve relatively minor increases in network capacity.
 - Elimination of the option of a high voltage direct current link due to higher overall costs combined with higher technological risk for Western Power and reduced flexibility for additional new connections.
 - Elimination of the option of a 132 kV double circuit transmission line on the basis that it would add only one additional 132 kV circuit to the existing system which would not be sufficient to supply the Karara mine site.
 - Elimination of local generation as an isolated non-grid supply option on the basis of the additional generation requirements for the islanded system (e.g. spinning reserve capacity and stand-by generation capacity), an inability to meet stability requirements with substantial wind generation, and a loss of market opportunities for new wind generation in the Mid West (i.e. the ability to export energy south) and generation in the South West (i.e. the ability to export energy north).
 - Elimination of the option of local generation as a network support control service on the basis that it is unlikely that an alternative new project would be

able to achieve the required environmental approvals and construct plant to meet the supply requirements of KML.

- Elimination of demand-side management options on the basis that the potential for demand-side management is insufficient to meet the central demand forecast.
61. On the basis of the above viability criteria, the following solutions have been identified by Western Power to be viable:
- a 220 kV double circuit transmission line;
 - a 275 kV double circuit transmission line;
 - a 330 kV double circuit transmission line; and
 - a 330 kV single circuit transmission line.
62. Western Power has compared these viable solutions by a comparison of the present value of costs of each option and a qualitative consideration of differences in benefits and risks. A summary of this comparison is provided in the table below.

Option	Estimated Mine Site Load Serviced ¹²	Benefits and Risks	Cost (NPC)	
			Central F/Cast (\$m)	High F/Cast (\$m)
220 kV double circuit	250 MW	Benefits - Sufficient capacity to meet Karara Stage 1 plus an additional 130MW load in the mine site locality. - Compared with the 275 kV option this alternative delivers less capacity but does not introduce a new voltage level into the system. Risks - Additional needs beyond 250 MW will require a second reinforcement. This will entail another new transmission line, probably along the Muchea-Moora-Three Springs corridor. - Potential delay in provision of supply to new customers if a second reinforcement is required (time required to establish an additional new transmission line route).	421	732
275 kV double circuit	380 MW	Benefits - Sufficient capacity to meet Karara Stage 1 plus either Karara Stage 2 or Extension Hill Stage 1 while still providing some spare capacity to accommodate new load beyond that. Risks - Additional needs beyond 380 MW will require a second reinforcement. This will entail another new transmission line, probably along the Muchea-Moora-Three Springs corridor. - Introduction of a new voltage level into the SWIN, adding operational and asset management complexity and adding to the need for strategic system spares. - Higher cost option for the central load forecast.	441	663
330 kV double circuit	480 MW	Benefits - Sufficient capacity to meet Karara Stage 1 and prospective loads in the Mid West region. - Highest capacity option- therefore represents the option that will facilitate the greatest level of load and generation development in the region. Risks - Option 7% higher cost than single circuit 330 kV option for the central forecast scenario.	430	455
330 kV single circuit	275 MW	Benefits - Sufficient capacity to meet Karara Stage 1 plus an additional 155MW load in the mine site locality. Risks - Additional needs beyond 275 MW will require a second reinforcement. This will entail another new transmission line, probably along the Muchea-Moora-Three Springs corridor. - Potential delay in provision of supply to new customers if a second reinforcement is needed.	401	592

63. As the difference between the net present cost for the central forecast for each option is relatively small, Western Power has submitted that consideration of other benefits associated with each option should contribute to the options selection process. Western Power's comparison of other benefits for each of the single and double circuit 330 kV options is set out in the table below.

¹² Capacity stated is at mine site, not for the entire network and is for the Central forecast development scenario. The mine site capacity has been calculated after all other load in the region is supplied.

Single Circuit 330 kV	Double Circuit 330 kV
Lower tower height for single circuit construction.	Best power transfer capacity/corridor width balance.
Lower outage risk during construction (existing circuit remains in place during and post construction).	Single power transmission corridor for high and central forecast case.
	Narrower environmental footprint (through use of single, narrower corridor).
	Single major construction phase-minimising safety and construction risks.
	Minimum lead time risk for new major resource projects.

64. Based on the above analysis, Western Power has concluded that its preferred option of a 330 kV double circuit transmission line maximises net benefits as this option:
- meets the needs of the foundation customer (KML) and the load forecast for the next 20 years;
 - provides an additional 220 MW of network capacity (80% of the total) above the single circuit line option at a net present cost of approximately \$30 million (7%) greater for the central load forecast, demonstrating economies of scale;
 - has a lower net present cost of \$137 million (30%) for the high load forecast scenario, should that load eventuate;
 - minimises the environmental and social impacts faced by local communities by maximising the power transfer potential along the existing transmission line corridor;
 - reduces the environmental, social and commercial risks that would be associated with the single circuit option under a high load case scenario (i.e. reduces the potential need for a further major reinforcement in the region within a few years); and
 - maximises the potential for new generation connections in the region (by maximising the available new capacity).
65. Western Power has also claimed that the proposed augmentation will:
- facilitate the continued economic and social development of the Mid West region; and
 - offer opportunities for new wind farms to be established along the coastal region between Perth and Eneabba and contribute towards a more competitive market for energy in the wholesale electricity market, resulting in lower prices for electricity consumers.

Submissions to the Authority

Demand Forecasts

66. In its submission to the Authority, Western Power included the executive summary of a report it commissioned from Sinclair Knight Merz (**SKM**) to provide an independent review of its demand forecasting methodology and forecasts for the electricity supply in the South West interconnected system. The report concluded that the forecasting methodology adopted by Western Power is comparable with good industry practice throughout Australia.
67. A number of submissions received by the Authority comment on Western Power's demand forecasts. Generally, interested parties were supportive of the methodology and assumptions used, however, some interested parties considered Western Power's forecasts to be too conservative.¹³

Feasibility Analysis of Alternative Options

68. Only one submission received by the Authority commented on Western Power's feasibility analysis of alternative options, where it was considered that Western Power's feasibility analysis was reasonable and robust.¹⁴

Analysis of Net Benefits

69. A number of submissions received by the Authority commented on Western Power's analysis of net benefits, with interested parties generally supportive of the analysis undertaken.
70. Some submissions, suggested that a number of benefits had been ignored in Western Power's analysis.¹⁵ Such benefits include:
- maximising the long term use of scarce corridors and preserving the second Moora corridor for future use (given the potential loads in the region the second 330 kV line through Moora may be needed sooner rather than later);
 - improving reliability in the Mid West region, as a 330 kV steel lattice tower construction is inherently far more reliable than the existing wood line poles;
 - reducing the impact on farmers and private landholders, as access requirements for inspections, maintenance and emergency repairs is significantly lower with new steel power line structures than the old wood structures;
 - reducing the risks to land owners of infringing bio-security plans and the costs involved to address such infringements (e.g. the spread of weeds);

¹³ Submissions from Perth Energy, City of Geraldton-Greenough, Extension Hill, Crosslands Resources, Geraldton Iron Ore Alliance and Shire of Perenjori.

¹⁴ Submission from City of Geraldton-Greenough.

¹⁵ Submission from Extension Hill and Mid West Development Commission.

- improving safety for land owners (especially farmers), as the clearance under steel lattice towers will accommodate the use of normal farm plant equipment;
 - reducing the risk of fires from pole top fires, conductor clashing and lightening strikes which, given the recent incident of severe fires in farming crops and bushlands, provides a significant risk reduction and benefit;
 - increasing confidence in the availability and reliability of energy supplies in the Mid West region to support and promote regional business development;
 - stimulating power generation within the region, particularly renewable generation options;
 - providing a short and long term solution to the energy needs of the Mid West region;
 - the full realisation of a double circuit 330 kV line can be developed in line with demand, initially with the 330 kV southern section, followed by completion of the northern section and ultimately the installation of a second 330 kV line; and
 - the provision of another geographically dispersed energy “spine” could mitigate against the risk of other major energy incidents (e.g. Varanus Island) that have the potential to impact heavily on the Perth and the lower South West regions.
71. Other submissions raised issues relating to the costs of the project and how such costs should be allocated to customers.¹⁶ Such issues include:
- the need to review Western Power’s contributions policy, in particular how augmentation costs are shared between customers;
 - the need to assess and ensure all expenditures, which are recoverable through network access charges, are prudent and have been subjected to appropriate commercial processes; and
 - the need for assets constructed by private sector companies, which are intended to be connected to Western Power’s network, be subject to some scrutiny to ensure competitive and prudent outcomes.
72. Further to the matters raised by interested parties above, the City of Geraldton-Greenough raised two particular issues relating to stage 2 of the Mid West Energy Project (i.e. the northern section).
- The real economic costs (including costs of major and local economic development projects that have been deferred pending the availability of essential electricity supplies) of not simultaneously developing the northern section of the Mid West Energy Project should be assessed and taken into account when appraising the southern section proposal.
 - Costs for the southern section proposal should include the full costs of all essential enhancements required to the transmission and distribution systems in the northern section.

¹⁶ Submission from Perth Energy.

Considerations of the Authority

73. The Authority has considered whether Western Power has assessed alternative options in accordance with the requirements of the Access Code. The relevant criteria under the Access Code is whether the Authority is satisfied that Western Power has appropriately determined the net benefits of the alternative options and, ultimately, whether the Authority considers that Western Power has made a defensible statement that the proposed major augmentation maximises the net benefit after considering alternative options. If the Authority determines that this criteria is not satisfied, it is not the role of the Authority itself to remedy any deficiency in the assessment of net benefits or to reach its own conclusion on the alternative option that would maximise the net benefit.
74. The matters that the Authority has taken into account are set out below.

Demand Forecasts

75. Western Power has considered alternative scenarios of energy demand for the Mid West region based on long term trends in load growth and a forecast of prospective new block loads (described in paragraph 20 of this determination).
76. As noted in paragraph 67 above, submissions made to the Authority generally considered Western Power's demand forecasts, particularly with regard to new block loads, to be conservative. A submission from the City of Geraldton-Greenough considered the high growth scenario was more likely and should be used for planning purposes.
77. The Authority has obtained independent (economic and technical) advice on Western Power's demand forecasts for the purposes of considering whether the forecasting methods adopted by Western Power are consistent with good industry practice and form an appropriate basis for the consideration of alternative options for increasing capacity of the electricity system in the Mid West region.
78. Economic advice to the Authority from MJA noted that, while large block load demands cannot be predicted with certainty, Western Power has reviewed prospective large block loads and has proposed several scenarios in which large block loads are either included or excluded in the demand forecasts (as set out in paragraph 20 above).
79. In MJA's opinion Western Power's "low growth" and "central growth" scenarios should be adjusted.
- Western Power's low growth scenario should be adjusted to include the Karara Stage 1 load.
 - Western Power's central growth scenario should be adjusted to include either the Karara Stage 2 load or Extension Hill load.
80. MJA further noted that Western Power's natural load growth scenario is not only based on increased population rates, but also from expanding economic activity and the resultant enhanced economic status of the population. However, MJA has suggested it is not clear that increasing affluence automatically translates to

increased energy usage. MJA noted information from the Environmental Protection Agency which indicates that, while per capita residential energy use in Western Australia increased by approximately 15% from 1990 to 1995, energy usage rose and fell each year to remain almost unchanged by 2005. MJA noted that ongoing demand management efforts and increases in the price of electricity may also have a significant downward impact on per capita energy demand, and therefore considered that the low growth scenario should be based on population growth only. While MJA has some concerns regarding Western Power's natural growth estimates, the impact of these estimates on the choice of augmentation option is considered to be small when compared with the significant impact of the large block loads and, to a lesser extent, the small block load forecasts.

81. With regard to small block load forecasts, MJA noted that Western Power has developed a comprehensive list of prospective small block load customers. The demands from small block loads include a number of customer types, but predominantly relate to demand from the Oakajee port and rail development and other customers in Geraldton. As the existing transmission lines north of Eneabba are approaching capacity, the high growth load estimate is likely to require the development of the northern section (stage 2) of the Mid West Energy Project. This assumes that no local power station will be developed to service the port and industrial area and that demand management or other options cannot be utilised to service the demand requirements.
82. The Authority's technical advisor, GBA, has reviewed Western Power's demand forecasts and, for the reasons outline below, has concluded that Western Power's high load forecast has a high probability of being realised and is therefore a prudent basis for grid planning:
 - Western Power's major augmentation proposal is based on an immediate need to provide a supply for KML's Stage 1 development.
 - Based on submissions made to Western Power and the Authority, there are a number of other potential mining loads in the Mid West area.
 - The prospective mining loads are large in comparison to current demand (e.g. Karara Stage 1 is greater than the total current demand in the constrained area). Augmentations in the Mid West region are consequently driven by the need to supply large spot loads at two or three mining sites rather than the more normal situation of supplying a forecast increase in the electricity demand of large numbers of indirectly connected small use customers dispersed over a wide area. This implies a high level of uncertainty which creates a significant planning risk. The least cost grid development program to provide for the Stage 1 KML mine only will be very different from the least cost program if all the other known potential mine sites were certain to proceed over the next 15 to 20 years.
 - Primary grid assets have a high capital cost, an economic life of 40 years or more and no alternative use. The incremental cost of incorporating additional capacity to meet future needs is low compared to the cost of constructing a new asset.
 - If any additional mining load is likely to materialise within a reasonable time frame relative to the economic life of the assets, it may be more economic to make provision for this load now rather than having to construct a new asset in the future.
 - Western Power has undertaken its cost benefit analysis over a period of 20 years, which GBA states strikes is a reasonable balance between risk and

cost, as a load connected at the end of the 20 year planning period would still get 20 years use out of the asset.

- GBA has reviewed Western Power's central and high demand forecasts in relation to large block loads and has advised that, given the extent of mineral resources available at the Karara and Extension Hill mine sites, it is reasonable to assume that at least some of the planned expansions will proceed before the end of the planning period in 2030. On this basis, if load growth falls short of the high load forecast of 650 MW by 2018, it is likely that Western Power will still be required to meet forecast demand of 700 MW by 2030.

83. Noting the advice to the Authority, the Authority accepts that forecasts of electricity demand are inherently subjective and contingent on assumptions about the probability of new loads eventuating. The degree of subjectivity is particularly great for the Mid West region where new loads arise predominantly from proposed mining projects that are subject to changes in timing and scope. Taking these matters into account, along with information submitted by Western Power and submissions to the Authority, the Authority considers that the demand forecasting procedures used by Western Power are consistent with good industry practice and form an appropriate basis for the consideration of alternative options for increasing capacity of the electricity system in the Mid West region.

Feasibility Analysis of Alternative Options

84. Western Power's consideration of the feasibility of alternative options is based on whether alternative options will meet the central forecast demand for the Mid West region. Several alternative options have been eliminated by Western Power on the basis of their inability to meet the required demand (as set out in paragraph 61 above).

85. Economic and technical advice to the Authority in relation to Western Power's feasibility analysis of alternative options indicates the following.

- Economic advice from MJA indicates that:
 - While demand side management could be utilised to meet a portion of future demand, it would be insufficient to meet the forecast load in total.
 - Separate analysis undertaken by MJA, using data available to it, is consistent with Western Power's claim that the isolated local generation (non grid supply) option would cost more than a transmission line option.
 - Western Power has provided limited detail on its analysis of the potential to supply energy requirements from locally connected gas or coal fired power stations (the local generation network support option). In particular, there is no quantification of the costs and benefits of potential energy supply options, such as the proposed Centauri 1 (Eneabba Gas) and Coolimba (Aviva) power stations. It is noted, however, that neither Eneabba Gas nor Aviva has opposed Western Power's proposed network augmentation and do, conversely, support its further expansion to Geraldton. This, combined with the fact that KML has not negotiated a supply arrangement directly with either

proponent, provides qualified support for Western Power's claim that these power stations do not provide a feasible alternative.

- Technical advice from GBA indicates that:
 - Energy cost savings from a grid connection compared with stand-alone generation would be more than sufficient to meet the cost of the network augmentation required.
 - GBA has not been able to obtain adequate information on the costs of a direct connection to the Karara mine site to support a dedicated supply. Given the existence of a willing seller and willing buyer, GBA considers it appropriate to assume that this option has been considered by the parties involved and discarded for economic or technical reasons;
 - Reactive compensation would not provide the required additional power.
 - The cost of alternating direct current converter stations makes high voltage direct current transmission uneconomic over distances of less than about 600 km; and
 - Given the history of the project and funding constraints imposed on Western Power it is doubtful that an option of using a voltage higher than 330 kV is a realistic option.

86. The Authority has considered the above advice regarding Western Power's analysis of the local generation option and agrees that Western Power's analysis could be further substantiated. However as noted by MJA, neither Eneabba Gas nor Aviva has opposed the development of Western Power's proposed network augmentation and do, conversely, support a further expansion of the proposed augmentation north to Geraldton. The Authority also notes the advice of GBA that given the existence of commercial negotiations/contracts, it is reasonable to assume that this option has been considered by the parties involved and discarded for either economic and/or technical reasons. While the Authority notes that Western Power should have adopted a more rigorous approach to assessing the feasibility of local generation, the Authority considers that on the basis of independent advice and the commercial arrangements that KML have negotiated with respect to energy supply contracts for its mining operations, it would appear that this option is unlikely to be a viable option at this point in time.

87. Having regard to the above matters, the Authority is satisfied that Western Power has appropriately considered the feasibility of alternative options and eliminated several options from consideration under the regulatory test on the basis of an inability to meet projected demand within the required timescales.

Analysis of Net Benefits

88. Western Power has assessed all viable options as similar in terms of the benefits delivered and has therefore compared the net present cost of alternative transmission options, including the works required to meet both the central case load forecast and high case load forecast. While some qualitative consideration is given by Western Power to differences in benefits between the proposed transmission line and alternative options, the Authority considers that this is deficient and not in accordance with the requirement under the regulatory test to consider net benefits in present value terms where possible.

89. In consideration of the absence of an assessment of net benefits, the Authority has given consideration to various matters including:
- whether, in comparing net present costs, Western Power has used rigorous and robust cost estimates for the proposed transmission line and alternative options; and
 - whether a quantitative consideration of differences in benefits between the proposed transmission line and the alternative options may cause the net benefit of one or more of the alternative options to exceed that of the proposed transmission line.
90. In respect of the detail of Western Power's comparison of the net present costs of the proposed transmission line and alternative options, Western Power has claimed confidentiality over the detailed cost estimates for the proposed transmission line and alternative options. As such, there has been limited opportunity for interested parties to scrutinise and make submissions on the cost estimates. The Authority has, however, examined these costs estimates with the assistance of advice from its technical advisor, GBA.
91. The Authority's technical advisor has noted that the estimation of project costs is a difficult exercise because of the wide range of variables that can affect the delivered cost of a new project.
92. Western Power claims that its cost estimates are accurate within a +/-30% margin. While GBA has not conducted a detailed review of Western Power's cost estimates, it is satisfied that the differences in the costs of the options considered by Western Power's analysis are reasonable. GBA notes that a more accurate estimate of the cost of Western Power's preferred option will be required for an assessment against the new facilities investment test.
93. Independent analysis undertaken by the Authority's economic adviser, MJA, using its revised demand forecasts (refer to paragraph 79) has indicated that Western Power's preferred option is the most economic, provided the likelihood of requiring more than 510 MW by 2016 is greater than 18%. Based on this analysis, MJA has concluded that it can be argued that Western Power's preferred network augmentation is defensible.
94. With respect to the absence of quantitative consideration by Western Power of any differences in benefits between the proposed transmission line and alternative options, the Authority considers that the major augmentation proposal is deficient in not providing a robust quantitative analysis of benefits. As identified in a number of submissions to the Authority and in the reports prepared by the Authority's technical and economic advisors, there are significant potential benefits related to the proposed augmentation. The proposed transmission line and alternative options may vary significantly in the benefits for generators, transporters and consumers of electricity, most particularly through differences in the potential for connection of new generation in the Mid West region and potential effects on competition amongst generators.
95. The Authority considers that the proposed transmission line and the alternative options may differ considerably in market benefits as a result, for example, of differences in the potential for import and export of energy into and out of the Mid West region with consequent competition benefits in the wholesale electricity market. However, as the potential for such benefits is likely to be greatest for the

proposed transmission line, the Authority considers that the quantification of benefits of the different alternative options would only enhance the relative net benefit of the proposed transmission line (and alternative options involving a 330 kV transmission line) over other alternative options.

96. The Authority notes that the following issues raised in submissions are matters that are likely to be considered if, and when, Western Power submits a new facilities investment test application in relation to the proposed augmentation:
- how the costs of the augmentation are shared between customers; and
 - ensuring all expenditures which are recoverable through network access charges are prudent and have been subjected to appropriate commercial processes including the costs of assets constructed by private sector companies.
97. Furthermore, the Authority notes the matters raised in submissions relating to the northern section of the Mid West Energy Project. Under the requirements of the Access Code, however, the Authority is only able to determine whether the regulatory test is satisfied or not satisfied in relation to the major augmentation proposed that is submitted by the service provider. The proposed major augmentation, which is the subject of this determination, is focused on the Southern section of the Mid West Energy Project, and is primarily driven by the requirements of KML as the 'foundation customer'. With respect to the northern section of the Mid West Energy Project, the Authority notes Western Power's view, that short term load growth in the Geraldton area can be accommodated by a combination of low cost strategic grid upgrades, demand management and the controlled dispatch of available generation in a network support role.