

Determination on the Regulatory Test for a 330 kV Transmission Line and Associated Works in the Mid-West Region of Western Australia

Submitted by Western Power

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Economic Regulation Authority



WESTERN AUSTRALIA

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DETERMINATION

1. On 4 October 2007, Western Power submitted to the Economic Regulation Authority (“**Authority**”) a major augmentation proposal 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 a single augmentation of the South West Interconnected Network (“**SWIN**”): a 330 kV transmission line and associated works in the Mid-West Region of Western Australia (“**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, the Authority’s intended approach to assessment of the proposal, and some of the major issues to be addressed in determining whether the regulatory test is satisfied. An invitation for submissions was made by the Authority on 24 October 2007 with a closing date for submissions of 21 November 2007. Submissions were received from the following parties:
 - Ardross Group of Companies
 - Aviva Corporation Ltd
 - Energy Visions Pty Ltd
 - Extension Hill Pty Ltd
 - Geraldton Iron Ore Alliance
 - Gillam Farms
 - Gindalbie Metals Ltd
 - Griffin Energy
 - Mid West Development Commission
 - Midwest Powerline Action Group
 - Mid West Gascoyne Area Consultative Committee
 - Sky Farming Pty Ltd
 - Western Australian Farmers Federation
 - Western Power
3. Prior to receiving the major augmentation proposal, the Authority received unsolicited submissions from:
 - Eneabba Energy Pty Ltd (confidential written submission dated 3 July 2007)

¹ Western Power, 2 October 2007, Submission to the Economic Regulation Authority Major Augmentation Proposal 330 kV Transmission Line and Associated Works in the Mid-West Region of Western Australia. (Hereafter cited as the “major augmentation proposal”).

- DC and BD Brindal to the Economic Regulation Authority (written submission dated 13 August 2007)
 - Gary Snook MLA (written submission dated 14 August 2007)
 - Midwest Power Line Action Group (presentation on 17 August 2007)
 - Western Australian Farmers Federation (written submission dated 3 September 2007)
4. The Authority obtained technical advice from Parsons Brinckerhoff Associates (PB Associates). This advice was published by the Authority for the purposes of public consultation.²
5. After consideration of the major augmentation proposal, technical advice obtained by the Authority from PB Associates and submissions received from interested parties, the Authority has determined, pursuant to section 9.18 of the Access Code, that the 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 FOR DETERMINATION

6. 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

² Parsons Brinckerhoff Associates, 29 October 2007, *Technical Appraisal of Western Power's Major Augmentation proposal for a 330 kV Transmission Line & Associated Works in the Mid-West Region of Western Australia*, prepared for Economic Regulation Authority of Western Australia.

affected landowners and the commencement and timing of works to the extent that these matters do not affect net benefits.

7. In these reasons the following matters are addressed:
 - the requirements for the regulatory test under Chapter 9 of the Access Code;
 - 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

8. Chapter 9 of the Access Code establishes the regulatory test that is applied to proposals for major augmentations of a covered network.
9. 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's view is 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 such as alternative network investments, investment in generation or management of electricity demand.
10. The regulatory test is required only for "major augmentations" of a covered network, defined in Chapter 1 of the Access Code:

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

 - (a) exceeds \$5 million (CPI adjusted), where the network assets comprising the augmentation are, or are to be, part of a distribution system; and
 - (b) exceeds \$15 million (CPI adjusted), where the network assets comprising the augmentation are, or are to be, part of:
 - (i) a transmission system;
 - (ii) both a distribution system and a transmission system.
11. 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.
12. 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).
13. The major augmentation proposal that is the subject of this determination has been submitted under the second of these two processes (and, accordingly, under section 9.15 of the Access Code).
14. 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.
15. "Alternative options" and "net benefit", referred to in section 9.16(b), are defined under Chapter 1 of the 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.

16. 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).

17. 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.

18. 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.

19. 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.

The Proposed Transmission Line

Reasons for Proposed Augmentation

Demand Forecasts

20. In its major augmentation proposal, Western Power presents three forecasts of peak load for the region that Western Power refers to as the North Country Region, as follows.³
- “Low forecast”, based on a historical trend in load growth (natural load growth) plus small block loads that have already been approved by Western Power. This forecast is for an approximately linear increase in peak load from about 130 MW in 2007 to 195 MW in 2016.
 - “Central forecast”, being the low forecast plus “diversified prospective loads” with a probability weighting. This forecast is indicated to include probability weighted loads of 300 MW of new block loads and 900 MW of new generation (600 MW of gas and coal generation and 300 MW of wind generation) with increases in peak load from 130 MW in 2007 to 315 MW in 2012 and 335 MW in 2016.
 - “High forecast”, being low forecast plus 100 per cent of prospective loads, with increases in peak load from 130 MW in 2007 to 430 MW in 2012 and 475 MW in 2016.

Objective in Network Augmentation

21. Western Power indicates that augmentation of the transmission network in the Mid-West Region is required to overcome network constraints and maintain system reliability in the face of forecast increases in load in the region and to meet demands for connection of generation. The North Country Region is indicated to have a supply capacity of approximately 155 MW, which Western Power expects to be exceeded by peak demand at some time during the period 2008 to 2010, depending upon the demand forecast considered.⁴
22. The system constraints indicated by Western Power comprise:⁵
- constraints on import of energy into the region from the South West, with forecasts of loads indicating a risk of load shedding and power supply disruptions during periods of peak summer demand from 2010/11 onwards; and
 - a lack of transmission capacity to connect new generation between Pinjar and Eneabba, with significant forecast demand for connection from existing proposals for wind-farm, coal-fired and gas-fired generation.
23. Western Power also indicates that the need for network augmentation arises from uncertainty after October 2009 in the availability of existing local generation (from

³ Major Augmentation Proposal, pp. 6, 7.

⁴ Major Augmentation Proposal, p. 8.

⁵ Major Augmentation Proposal, pp. 4 – 6.

Mungarra Power Station and Geraldton Gas Turbine) that currently supplies energy and system support.⁶

Proposed Transmission Line

24. Western Power's preferred option for network augmentation is construction of a 330 kV double-circuit transmission line between Pinjar and Geraldton together with:
 - a new 330/132 kV terminal station at Moonyoonooka;
 - a new 330 kV circuit at Neerabup; and
 - a new 132 kV line circuit at Pinjar.
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, and on a new corridor between Eneabba and Geraldton.⁷
26. Western Power has claimed the following benefits from the proposed transmission line:⁸
 - 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-load 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.

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:

...

⁶ Major Augmentation Proposal, p. 8.

⁷ Major Augmentation Proposal, p. 11.

⁸ Major Augmentation Proposal, p. 13.

- (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 the 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).

Consultation Undertaken by Western Power

30. In its major augmentation proposal, Western Power indicates that its consultation process involved:
- publication on 22 March 2007 of an “Invitation for Submissions” and the “CRA evaluation report” on the web sites of both Western Power and the Authority;
 - conduct, on 4 April 2007 of a public forum at the Perth Town Hall;
 - advertising in *The West Australian* and local newspapers on various dates between 20 March 2007 and 12 April 2007 of the opportunity to make submissions, including advertisements on three occasions in *The West Australian* (21 and 28 March and 11 April 2007);
 - issuing on 23 March 2007 of a media release; and
 - providing for submissions to be received by 18 April 2007.

31. Western Power's invitation for submissions included an information paper on the proposed transmission line.⁹ This information 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 constraints on the existing transmission system, 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.
32. Western Power's submission to the Authority (made as part of the Authority's public consultation process) provides further information on the consultation undertaken by Western Power, including details of:
- workshops held for the purposes of obtaining "initial high-level input" on design parameters for the transmission line;
 - workshops held in the Mid-West Region to take comment from stakeholders, obtain input of interested parties into "project sustainability principles", obtaining comment on draft corridor options, and obtaining comment and information on "key constraints and opportunities in the project area";
 - group and individual meetings with farmers;
 - special-interest group meetings with representatives of indigenous communities;
 - workshops held with stakeholders and landowners on "sustainability assessment verification" and allowing for comment and input into "sustainability assessment scoring";
 - information sessions held to provide information to interested parties on the results of the sustainability assessment and to respond to community questions and concerns; and
 - other meetings between potentially-affected landholders and interested stakeholders.¹⁰
33. Western Power's submission also provides information on the manner in which Western Power has had regard to information obtained through consultation with interested parties; notably information on the "multi-criteria analysis" used by Western Power and its consultants to identify the preferred line corridor and details of responses to issues raised in consultation.¹¹

⁹ Reproduced in Attachment 4 of the Western Power's Major Augmentation Proposal.

¹⁰ Western Power submission, 21 November 2007, pp. 3, 4, Appendices 1, 5.

¹¹ Western Power submission, 21 November 2007, p. 5, Appendices 2 – 4.

Considerations of the Authority

34. 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.
35. It is evident from the information provided by Western Power that there was a high level of consultation undertaken both in respect of matters of particular relevance to the regulatory test (the identification of potential alternative options) and the planning of the proposed transmission line. It is also evident that Western Power widely advertised the opportunities to participate in consultation and to make submissions, and that Western Power made available information on the nature of the regulatory test and the process of identification of alternative options. Western Power published submissions made to it as part of the regulatory test process.¹²
36. Some parties have submitted that the consultation programme of Western Power provided insufficient information to potentially affected landholders on the potential route of the transmission line and the basis for selection of a preferred route.¹³ In particular, these parties contend that Western Power did not provide landholders with timely information on the possible route of the proposed transmission line and the possible departure from a direct route, affecting the incentive for affected landholders to engage in the consultation process and, potentially, to make submissions relating to the regulatory test. Notwithstanding these submissions, other affected landholders found the consultation programme adequate.¹⁴ Also, there have not been any submissions made to either Western Power or the Authority claiming explicitly that interested parties were not given reasonable opportunity to make submissions that identify alternative options that should be considered as part of the regulatory test, as opposed to impacts of different routes for the proposed transmission line.
37. The Authority considers that Western Power could have provided greater opportunity for landholders potentially affected by the proposed transmission line to make submissions within the particular context of the regulatory test. However,

¹² http://www.westernpower.com.au/mainContent/projects/communityConsultation/Consultation_documents.html

¹³ Letter from Gary Snook MLA to the Economic Regulation Authority, 14 August 2007; Letter from the Western Australian Farmers Federation to the Economic Regulation Authority, 3 September 2007; Letter from DC and BD Brindal to the Economic Regulation Authority, 13 August 2007; Presented submission from the Midwest Powerline Action Group, 17 August 2007; Submission from the Midwest Powerline Action Group, 20 November 2007.

¹⁴ Submission from Gillam Farms, 21 November 2007.

notwithstanding this and taking into account the information and submissions on the consultation programme undertaken by Western Power, the Authority is satisfied that Western Power has complied with the general requirements for consultation under Appendix 7 of the 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.

38. The Authority further considers that information provided by Western Power makes it evident that:
 - information obtained through submissions on the alternative options has been addressed in Western Power's identification and assessment of alternative options (refer to the following sections of this determination); and
 - information obtained by Western Power through submissions, and through more general consultation on the selection of alternative routes for the transmission line, was taken into account in planning and design for the proposed transmission line.
39. On this basis, the Authority is satisfied that Western Power has given reasonable consideration to information obtained through consultation.
40. 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 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 reasons addresses the former of these two matters.

Alternative Options Identified by Western Power

44. In its major augmentation proposal, Western Power indicates that it considered 12 alternative options, including the proposed transmission line and a “do-nothing” option, with some “sub-options” also considered. These are described as follows.¹⁵

- Transmission solutions
 - Option 1 (the proposed transmission line) – a double circuit 330 kV line constructed between Perth and Geraldton by November 2010 and with one side initially energised at 132 kV.

Option 1A – a staged construction of the 330 kV transmission line with the Eneabba-Geraldton section constructed by 2010 and the Pinjar-Eneabba section constructed by 2014.

Option 1B – a staged construction of the 330 kV transmission line with the Eneabba-Geraldton section constructed by 2010 and initially energised at 132 kV and the Pinjar-Eneabba section constructed by 2011.

Option 1C – the 330 kV transmission line as per Option 1, but delayed by one year to November 2011.
 - Option 2 – a 132 kV line from Eneabba to Geraldton constructed by November 2010, with retention of generation capacity and with the 330kV line (as in Option 1) deferred until November 2014.

Option 2A – a variation of Option 2 with a double circuit 132 kV line between Eneabba and Geraldton.
 - Option 3 – 132 kV lines from Eneabba to Three Springs, and Mungarra to Rangeway Substation with the 330 kV line (as for Option 1) deferred until Nov 2014.
 - Option 4 – reinforcement of the existing network using lines of 132 kV and construction in increments by 2010, 2015, 2021 and 2025.
 - Option 5 – a single 220 kV line between Perth and Geraldton constructed by November 2010 and with retention of existing generation capacity.
 - Option 6 – an option identical to Option 1 but with line towers designed for 500 kV lines (initially insulated and operated at 330 kV).
 - Option 7 – a direct current line from Perth to Geraldton.
 - Option 8 – do nothing.
- Generation solutions:
 - Option 9 – addition of generation at Mungarra Power Station.
 - Option 10 – addition of generation at Dongara.

¹⁵ There are different descriptions of the alternative options in different sections of the Western Power Proposal. These descriptions are taken from Attachment 1 of the Western Power Proposal (Internal Report) and Attachment 2 (report by CRA International dated 30 March 2007).

- Option 11 – permanent “islanding” of the Mid-West Region from the SWIS at Three Springs.
- Other solutions:
 - Option 12 – demand-side management to reduce peak demand.

Consultation Undertaken by Western Power

45. Western Power has indicated in its major augmentation proposal that two parties made submissions identifying and/or supporting alternative options to the proposed transmission line. Other submissions are indicated as supporting Western Power's proposed transmission line.
46. Eneabba Gas Limited made a submission to Western Power in support of minimal transmission reinforcements and suggesting that new customers can be supplied from either self generation or generation within an islanded grid. In response to this submission, Western Power states that the options described by Eneabba Gas Limited are similar to the options examined by Western Power that involve reinforcement of 132 kV transmission lines and deferral of construction of the proposed transmission line until November 2014 (Options 2 and 3), and the option of the islanded network (Option 11).
47. Transfield Services made a submission to Western Power in support of consideration of alternative options of:
 - establishing Three Springs as the regional electricity hub, rather than Geraldton, with analysis of alternative options recognising the potential for mining load east of Three Springs;
 - more non-network and generation options; and
 - creation of an islanded network.
48. In response to the submission from Transfield Services, Western Power states that:
 - the option of terminating the 330 kV line at Three Springs was not considered as the proposal for 330 kV transmission line to Geraldton was determined to provide the greatest net benefit when considering a probability weighted assessment for each new load or generation connection;
 - non-network and generation options have been considered but additional generation or network support contracts will not result in an increase to overall network capacity and, therefore, these options cannot be used to defer network reinforcement; and
 - the option of operating an islanded network is one of the alternative options assessed by Western Power.

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.

50. Submissions made as part of Western Power's consultation programme suggested additional alternative options that have not been explicitly addressed by Western Power.
51. Energy Visions Pty Ltd and Sky Farming Pty Ltd identified an option of constructing a transmission line with capacity of 1000 MW to enable additional wind-energy generation in the Mid-West Region (presumably referring to capacity for 1000 MW of generation). Western Power has indicated that these suggested options are addressed by the identified alternative option (Option 7) of constructing the 330kV line with towers for a 500 kV line. While the capacity of the transmission line of Option 7 is less than that favoured by Energy Visions and Sky Farming, Western Power indicates that a greater capacity is not justified by demand forecasts. On this basis, the Authority is satisfied that Western Power has addressed (in Option 7) the alternative option of a transmission line of greater capacity.
52. Eneabba Gas identified the option of limited reinforcement of the 132 kV lines and islanding of the Mid-West network. Western Power has given consideration to both reinforcement of the 132kV lines and islanding of the Mid-West network as options to the proposed transmission line (Options 2, 3 and 11). The Authority is satisfied that Western Power has addressed the submission from Eneabba Gas in this alternative option.
53. Transfield Services identified the option of termination of the 330 kV line at Three Springs, addressing a perceived potential for Three Springs to become the load centre for the region. Western Power has not considered this as an alternative option, indicating that probability-weighted forecasts of energy demand indicate a load centre at Geraldton rather than Three Springs. Technical advice obtained by the Authority broadly verifies Western Power's demand forecasts, including the forecast of the load centre being located at Geraldton,¹⁶ and the Authority is satisfied that this provides sufficient reason for not considering an alternative option as submitted by Transfield Services.
54. Agricultural landholders and their representatives have submitted that there may be alternative routes for the proposed transmission line – in particular, shorter and more direct routes through predominantly Crown land rather than the proposed route through agricultural land – that may involve a materially lower cost for the transmission line and avoid imposing costs on landholders through the disruption of agricultural activities.¹⁷
55. Western Power has not identified alternative options comprising different routes for the proposed transmission line.
56. In determining whether an alternative configuration of a network augmentation should appropriately be considered to comprise an alternative option, the Authority has given attention to the central requirement under the regulatory test of comparison of a proposed augmentation with alternative options on the basis of the net benefits of each. In accordance with this requirement, the question of whether

¹⁶ PB Associates, 29 October 2007, pp. 9 – 13, 17.

¹⁷ Letter from Gary Snook MLA to the Economic Regulation Authority, 14 August 2007; Letter from the Western Australian Farmers Federation to the Economic Regulation Authority, 3 September 2007; Letter from DC and BD Brindal to the Economic Regulation Authority, 13 August 2007; Presented submission from the Midwest Powerline Action Group, 17 August 2007; Submission from the Midwest Powerline Action Group, 20 November 2007.

or not an alternative route for a transmission line should constitute an alternative option can be determined by a consideration of whether or not it is likely that there will be a material difference in the net benefits of transmission lines constructed on the alternative routes. In this regard, the definition of net benefits in the Access Code refers to costs and benefits to parties that generate, transport and consume electricity in the covered network. The relevant costs and benefits taken into account in the calculation of net benefits are costs and benefits that are incurred by these parties *in their capacities as generators, transporters or consumers of electricity*. Costs such as the impacts of the transmission line on farming activities are relevant in the assessment of net benefits under the regulatory test if they constitute an explicit cost to the network service provider such as, for example, costs to a network service provider in payment of compensation to affected farmers.

57. In the particular case of the current major augmentation proposal, the Authority considers that a consideration by Western Power of alternative routes as alternative options would not necessarily have affected the defensibility of Western Power's statement that the proposed transmission line maximises the net benefit after considering alternative options. In reaching this view, the Authority has taken into account the following matters.
58. First, the Authority acknowledges that the designated route of the proposed transmission line has been established by Western Power as a feasible route that has been determined after taking into account a range of planning and environmental factors that influence the determination of a route. In its submission to the Authority as part of the Authority's consultation programme, Western Power has provided information on the process of selection of the route of the proposed transmission line.¹⁸ Western Power indicates that the selection of the preferred route was undertaken using a multi-criteria analysis with weighted consideration given to a range of factors including construction cost, impacts on various land uses (including agriculture), environmental impacts and social impacts, and with the weights assigned to the various criteria determined taking into account results of Western Power's own consultation. While the Authority is not satisfied that this particular analysis is necessarily credible and objective in identifying a uniquely superior route option, the information provided indicates that Western Power's preferred route has been determined as feasible after consideration of factors including cost; environmental impacts; impacts on agriculture, mining and other land uses; and the timeliness of development.
59. Secondly, there is no convincing evidence in information provided by Western Power or in submissions from interested parties that there would be a material difference in the net benefits of alternative routes for the proposed transmission line. Western Power's major augmentation proposal did not quantify the variation in net benefits, or differences in costs, of alternative routes for the proposed transmission line. Submissions to the Authority have indicated that a more direct route for the transmission line would be cheaper to construct by some \$25 million (8.5 per cent), based on a shorter distance and a unit-distance cost of construction.¹⁹ Western Power indicates, however, that a direct route would have additional costs in avoiding the Eneabba townsite and mining and energy projects. Western Power also indicates that an alternative route may entail lower benefits due to delays in construction and the consequent reduction in the ability of Western

¹⁸ Western Power, 21 November 2007, pp. 2 – 5.

¹⁹ Midwest Powerline Action Group, 20 October 2007.

Power to meet reliability standards in transmission services and to meet demands for new electricity connections and services.²⁰

60. Further matters relating to the identification of alternative options have been raised in technical advice obtained by the Authority and in submissions from interested parties made as part of the Authority's consultation programme.
61. Technical advice received by the Authority on the alternative options identified by Western Power has indicated that greater attention could have been given by Western Power to options for demand-side management and for utilisation of a 132 kV network.²¹
62. Western Power has addressed both of these matters in its submission made as part of the Authority's public consultation programme.
63. On the prospects for demand-side management, Western Power has identified demand-side management as an alternative option (Option 12), but indicated both in its major augmentation proposal and subsequent submission that opportunities for demand-side management are very limited in the face of forecast increases in demand.²² In view of the substantial number of submissions from potential new users of electricity in the Mid-West that have emphasised the prospects for new demand,²³ the Authority accepts that Western Power has adequately addressed prospects for demand-side management.
64. On the matter of strengthening of the 132 kV network, Western Power has provided information in its submission on three additional alternative options involving strengthening of the 132 kV network:²⁴
 - Option 2B – new Eneabba to Geraldton 132 kV transmission line and local generation;
 - Option 2C – as for Option 2B plus rebuild of the Pinjar – Regans Ford – Cataby – Eneabba 132 kV transmission line; and
 - Option 2D – as for Option 2C plus rebuild of the Northern Terminal – Muchea – Moora – Three Springs 132 kV transmission line.
65. These additional alternative options were assessed by Western Power for technical feasibility and cost, as described in the next section of this determination.
66. Taking all of the above matters into account, the Authority is satisfied that Western Power has adequately identified alternative options for the proposed transmission line.

²⁰ Western Power, 21 October 2007, Appendix 3.

²¹ PB Associates, 29 October 2007, pp. 1, 18.

²² Western Power, 21 November 2007, pp. 3, 4.

²³ Aviva Corporation Ltd, Energy Visions Pty Ltd, Extension Hill Pty Ltd, Geraldton Iron Ore Alliance, Gindalbie Metals Ltd, Griffin Energy, Mid West Development Commission, Mid West Gascoyne Area Consultative Committee, Sky Farming Pty Ltd.

²⁴ Western Power, 21 November 2007, pp. 6, 7.

Assessment of Net Benefits of Alternative Options

Requirements of the Access Code

67. 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.
68. 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 reasons addresses Western Power's assessment of alternative options.

Western Power's Assessment of Alternative Options

69. Western Power has assessed alternative options by:
 - identifying a set of potential alternative options (as described in the previous section of this determination);
 - assessing whether the potential alternative options are technically feasible and meet the objectives for the electricity system, and reducing this set by eliminating some alternative options as not feasible; and
 - comparing the net benefits of the feasible set of alternative options by a comparison of the present value of costs of each option and a qualitative consideration of differences in benefits.
70. Western Power's reasons given for eliminating some of the potential alternative options from consideration are as follows:²⁵
 - elimination of the single circuit 132 kV line options (with deferral of the 330 kV line till November 2015) (Options 2 and 3) on the basis that these options are not feasible in the absence of assurance that the Mungarra Power Station would be available after October 2009, and that these options do not satisfy a technical requirement to maintain services on the network during an N-1 contingency (a failure of an individual element of the electricity system);
 - elimination of options for rebuilt and additional 132 kV transmissions lines (Options 2B and 2C²⁶) due to failure to meet requirements for synchronous stability and transient voltage recovery under the Technical Rules;
 - elimination of the do-nothing option (Option 8) as it fails to address system security and reliability requirements under current and forecast loads;

²⁵ Western Power Proposal, Attachment 1 (Internal Report) and Attachment 2 (report by CRA International); Western Power Submission, 21 November 2007, Appendix 8.

²⁶ Identified in Western Power's submission of 21 November 2007.

- elimination of the generation options (Options 9 and 10) on the basis that these options are not technically feasible because of synchronous stability and a failure to satisfy the Technical Rules for the transmission network;
 - elimination of the generation and islanding option (Option 11) on the basis of the additional generation requirements for the islanded system (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 (export of energy south) and generation in the South West (export of energy north); and
 - elimination of demand-side management (Option 12) on the basis of an expectation that there would be insufficient demand-side management possible to defer the augmentation of transmission capacity.
71. Western Power compared the remaining alternative options by means of a cost-effectiveness analysis and a “rank ordering” of the options. This involved a comparison of the alternative options by comparison of the present value of the cost of each (with a real discount rate of 6.6 per cent). No quantification of benefits was undertaken although qualitative differences in benefits are described. A summary is provided in Table 1 of differences in the present value of costs from the cost of the proposed transmission line and the qualitative differences in benefits.
72. Western Power concludes from its analysis that the comparison of costs of alternative options indicates that the proposed transmission line is the least-cost option for energy demand in the Mid-West Region. One variation of the proposed transmission line (Option 1A – staged construction with completion by 2014) had a lower present value of costs than Western Power’s preferred option (completion by 2010); however, Western Power concluded that this lower value was offset by benefits of the proposed transmission line (described in quantitative terms) of a lower level of unserved energy and earlier provision for connection of new generation in the region.
73. Western Power and its consultants undertook sensitivity analysis of the rank ordering approach with different values of the discount rate between 4 per cent and 9 per cent in a cost analysis in real terms, and between 7.03 and 10.05 per cent in a cost analysis in nominal terms. The use of different discount rates and a real or nominal analysis did not alter the rank ordering of the proposed transmission line and alternative options.

Table 1 Differences in costs and benefits of alternative options from the proposed transmission line

Alternative Option	Difference in cost	Difference in benefits
Option 1A: Staged construction of the 330 kV transmission line with an Eneabba-Geraldton section constructed by 2010 and Pinjar Eneabba section constructed by 2014	- \$8.8 million (- 3%)	Does not support connection of new generation until 2015 and will have higher unserved energy due to less spare capacity.
Option 1B: Staged construction of the 330 kV transmission line with an Eneabba-Geraldton section constructed by 2010 and initially energised at 132 kV and a Pinjar Eneabba section constructed by 2011	+ \$15.8 million (+ 5.4%)	

Alternative Option	Difference in cost	Difference in benefits
Option 1C: 330 kV transmission line as per Option 1, but delayed by one year to November 2011	+ \$7.5 million (+2.6%)	Inability to meet forecast peak load in 2010/11.
Option 2A: double circuit 132 kV line from Eneabba to Geraldton constructed by November 2010, with retention of generation capacity and with the 330kV line (as in Option 1) deferred until November 2014	+ \$37.1 million (+ 12.7%)	Does not support large block loads and connection of new generation before 2016.
Option 2D: new Eneabba to Geraldton 132 kV transmission line, local generation, rebuild of the Pinjar – Regans Ford – Cataby – Eneabba 132 kV transmission line, and rebuild of the Northern Terminal – Muchea – Moora – Three Springs 132 kV transmission line.	+ \$90 million (+ 30.6%)	Does not support additional wind farm generation or provide for demand beyond 2015.
Option 4: reinforcement of the existing network using lines of 132kV.	+ \$59.9 million (+ 20.5%)	Does not support large block loads and connection of new generation. Higher transmission losses than a 330 kV line, less improvement to system stability and greater requirement for reactive support.
Option 5: single 220 kV line between Perth and Geraldton constructed by November 2010.	+ \$157.5 million (+ 53.8%)	Lower capacity than a 330 kV line and less improvement to system stability.
Option 6: 330 kV line (as per Option 1) but with line towers designed for 500 kV lines	+ \$47.5 million (+ 16.2%)	Possible benefits in lower energy losses of a 500 kV line and ability to meet substantially higher transfer requirements, but these are indicated to be second order or largely redundant.
Option 7: Direct current line from Perth to Geraldton	+ \$147 million (+ 50.4%)	

Source: Western Power, 2 October 2007, Submission to the Economic Regulation Authority Major Augmentation Proposal 330 kV Transmission Line and Associated Works in the Mid-West Region of Western Australia, Attachment 1 (Internal Report), Attachment 2 (report by CRA International).

Consultation Undertaken by Western Power

74. None of the submissions received by Western Power addressed Western Power's assessment of the net benefits of alternative options to the proposed transmission line.

Considerations of the Authority

75. The Authority has considered whether Western Power has assessed alternative options in accordance with the requirements of the Access Code. The relevant test 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 test 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.

76. The matters that the Authority has taken into account are set out below.

Demand Forecasts

77. Western Power has considered alternative scenarios of energy demand for the Mid-West Region based on long term trends in load growth and a probabilistic analysis of prospective new block loads (described in paragraph 20 of this determination).
78. The Authority has obtained 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.
79. The advice obtained from PB Associates was based on applying a different forecasting methodology from that applied by Western Power, utilising a Monte Carlo simulation technique to derive a probabilistic forecast from a trend and variance in natural load growth and probabilities of new load. Using this methodology, PB Associates advised that demand increases are likely to occur more gradually than anticipated by Western Power, in which case there may be an opportunity to delay augmentation of the transmission network for one to two years.²⁷
80. Several submissions to the Authority addressed the advice on demand forecasts provided by PB Associates, indicating either that the difference in the demand forecasts of PB Associates and Western Power were not sufficient to consider deferral of the proposed transmission line, or that PB Associates had made inappropriate assumptions on the probability of new loads.²⁸ Western Power submits that the forecasts applied in the major augmentation proposal were made in 2006 and the forecast load for 2007 has already been exceeded, indicating that the forecasts are conservative.²⁹
81. The Authority accepts that forecasts of electricity demand are inherently subjective and highly contingent on assumptions of the probabilities of new loads. The degree of subjectivity is particularly great in circumstances such as for the Mid-West Region where new loads arise predominantly in proposed mining projects that are subject to increases or decreases in scope and changes in timing. Taking these matters into account, the Authority considers that the analysis undertaken by PB Associates broadly confirms the forecast of Western Power and a difference in the forecast timing of demand growth by one to two years is not material in the context of Western Power's major augmentation proposal.

²⁷ PB Associates, 29 October 2007, pp. 1, 9 – 13.

²⁸ Extension Hill Pty Ltd, Gindalbie Metals Ltd, Mid West Development Commission, Mid West Gascoyne Area Consultative Committee, Geraldton Iron Ore Alliance, Griffin Energy.

²⁹ Western Power, 21 November 2007, p. 7.

Feasibility Analysis of Alternative Options

82. Western Power's consideration of the technical feasibility of alternative options is based first on a technical analysis of whether alternative options will meet requirements for the transmission system under the Technical Rules and will meet the forecast demand for the Mid-West Region. Several alternative options are eliminated on the basis of expected non-compliance with the Technical Rules (refer to paragraph 70, above).
83. None of the submissions made to the Authority have raised issues with Western Power's assessment of expected compliance with the Technical Rules.
84. The Authority is satisfied that Western Power has appropriately considered the feasibility of alternative options and had eliminated several options from consideration under the regulatory test on the basis of expected non-compliance with the Technical Rules.

Analysis of Net Benefits

85. Western Power has compared the proposed transmission line and alternative options on the basis only of costs using a cost-effectiveness analysis. 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 at best cursory and not in accordance with the requirement under the regulatory test to consider net benefits in present value terms where possible.
86. In consideration of Western Power's assessment of net benefits, the Authority has given consideration to various matters including:
 - whether, in applying the cost-effectiveness analysis, 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.
87. Turning first to the detail of Western Power's cost-effectiveness analysis of the proposed transmission line and alternative options, Western Power has claimed confidentiality over the 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 PB Associates.
88. PB Associates has indicated that the unit costs applied in, or implied by, Western Power's estimates of costs for alternative options are within plus or minus

25 per cent of benchmark unit costs for Australian conditions and within a level of accuracy that is reasonable for the regulatory test.³⁰

89. A matter raised in submissions to the Authority is whether all relevant costs have been taken into account for the proposed transmission line. In particular, submissions received from agricultural landholders and their representatives indicate that the estimated cost of the proposed transmission line may include an inadequate allowance for compensation that may be payable to owners of agricultural land that would be traversed by the transmission line corridor.
90. Western Power has submitted that an allowance of \$2.5 million has been made in the cost estimate for the proposed transmission line and alternative options for compensation and other landholder-related costs for the Eneabba to Moonyoonooka section of the line, although indicating that an agricultural consultant has been appointed to determine impacts on agricultural production.³¹ However, the results of the consultancy are not available to the Authority at the time of this determination.
91. The Midwest Powerline Action Group has submitted that the costs to agricultural landowners arising from disruptions to farming activities for the proposed transmission line would amount to \$4,207.50 per km per year over approximately 163 km,³² which equates to a present value of costs of \$9.4 million at a real discount rate of 6.6 per cent.
92. The information available at the current time indicates a difference of view between Western Power and landholders on the costs that might be incurred by landholders as a result of construction of the proposed transmission line, with this difference in cost potentially being in the order of \$6 to \$7 million in present value terms. The Authority understands that this difference of view will be resolved through the work of the agricultural consultant that Western Power indicates has been appointed to determine the impacts of the proposed transmission line on agricultural production.
93. The value of any compensation that may be payable to landowners is not a matter for determination by the Authority. Rather, the issue of concern to the Authority is whether the allowance for costs of compensation in the estimate of costs for the proposed transmission line may be understated to a degree sufficient to cause the rank order of the proposed transmission line and alternative options to be different.
94. The maximum amount by which Western Power may have underestimated the potential costs of compensation would appear to be in the order of \$6 to \$7 million, taking into account the present value of costs that landholders claim may be incurred due to the effects on agricultural production. This is substantially less than the difference in estimate costs of the proposed transmission line and alternative options. The Authority is therefore of the view that uncertainty over the costs of compensation is unlikely to affect the defensibility of Western Power's statement that the proposed transmission line maximises net benefits after consideration of alternative options. The Authority reiterates that this determination on the

³⁰ PB Associates, 29 October 2007, pp. 20, 21.

³¹ Western Power, 21 November 2007, pp. 6,7 and Appendix 2, p. 4. Western Power indicates that the report of the independent consultant will not be available within the timeframe of the Authority's determination on the major augmentation proposal.

³² Midwest Powerline Action Group, 20 November 2007, section 1.6 and attachment.

regulatory test does not constitute an approval of any amount of compensation, which is not a matter for determination by the Authority.

95. Turning 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 such an analysis. 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 potential for connection of new generation in the Mid-West Region and potential effects on competition amongst generators.
96. 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 electricity market. However, Western Power and some interested parties with interests in generation have indicated the potential for such benefits to be greatest for the proposed transmission line and alternative options involving the construction of a 330 kV transmission line. On this basis, 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 alternative options.