Submission to the Economic Regulation Authority

PRE-APPROVAL OF NEW FACILITIES INVESTMENT

330 kV Transmission Line and Associated Works in the Mid-West Region of Western Australia

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safe reliable efficient

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Contents

1 Executive Summary

A major augmentation proposal for the construction of a 330 kV transmission line from Pinjar to Geraldton (and associated works) was submitted to the Economic Regulation Authority (the Authority) under section 9.15 of the Electricity Networks Access Code 2004 (the Code) on 4 October 2007 for assessment against the regulatory test. This submission included a summary of Western Power's evaluation of twelve alternative options to increase the power supply capacity to the Mid West region of Western Australia to meet the forecast demand. The existing 132 kV power supply system in the Mid West region is operating almost at its limits, and it is restricting new connections requested by the new industrial and mining expansion. The existing system is also unable to meet the natural growth demand beyond 2010 and also unable to accommodate the connection of prospective new generation.

On 7 December 2007, the Authority published the "Determination on the Regulatory Test for a 330 kV Transmission Line and Associated Works in the Mid-West Region of Western Australia" in which the Authority concurred with Western Power that the proposed major augmentation maximised the net benefit to generators, transporters and consumers of electricity after considering all reasonable alternative options for meeting demands for electricity services and addressing constraints in the electricity system. The Authority's determination was that the regulatory test under Chapter 9 of the Code was satisfied.

This submission to the Authority is being made under section 6.71 of the Code to request the Authority to determine that the new facilities investment test as set out in section 6.52 of the Code when applied to the proposed major augmentation is satisfied such that the new facilities investment may be added to Western Power's capital base. If the new facilities investment can not be added to the capital base, Western Power can not earn an economically efficient return on the investment and it would consequently be unlikely for the project to proceed.

2 Introduction

N.B.
All of the information provided here in this Introduction section has been summarised from the *major augmentation proposal* Western Power submitted to the Authoity on 4 October 2007. For more detailed information, please refer to the original *major augmentation proposal.*

2.1 Brief Background

Western Power's transmission network in the Mid-West region extends 400 km from Pinjar and Muchea to Geraldton. It consists of a number of 132 kV transmission lines, most of which were built in the 1970's and were designed to meet needs of a predominantly rural community. The network was designed to supply relatively small loads distributed over a large geographical area. The network is not capable of transferring large amounts of power due to thermal, voltage and synchronous stability limitations.

The existing 132 kV power supply system in the Mid West region has been the subject of numerous technical studies and several minor augmentations over the past two decades. Recent issues of concern include the need to meet growing natural growth demand and also accommodation of the connection of new prospective industrial customers that include large loads and generation. However, the existing system is operating almost at its limits, and it is restricting new connections requested by the new industrial and mining expansion.

2.2 Load Forecast

Low, central and high load forecasts have been prepared as follows.

2.2.1 **Low forecast**

Western Power reviewed the load forecast and adequacy of the existing 132 kV transmission network that supplies the area north of Eneabba and Muchea. Figure 1 below shows a low demand forecast based on 'natural' load growth plus already approved small block loads. Presently, spare firm supply capacity to the area north of Eneabba and Muchea is just above 20 MW. Forecast load is expected to exceed supply capacity by summer 2009/10 which is from December 2009 to March 2010.

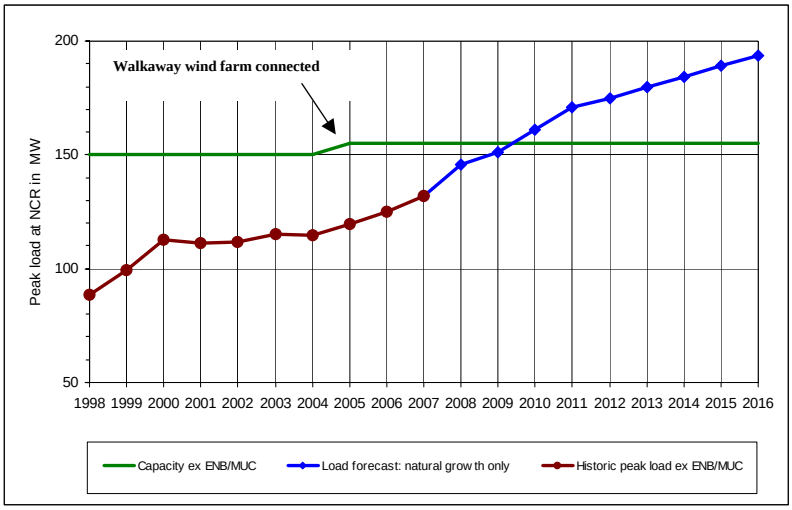

Figure 1: Supply and demand based on natural load growth from 1997/98 to 2015/16

2.2.2 Central and high forecasts

Presently there are a number of prospective industrial customers, comprising of mining and industrial load, wind, gas and coal generation, who wish to connect to the network. Potential new demand for connection of new customers in excess of the low forecast is:

- 300 MW of new block loads (twice the load of the existing Mid West network), and
- 900 MW of new generation:
- ~ 600 MW of conventional generation (gas, coal), and
- ~ 300 MW of wind farms.

Figure 2 below shows the low, central and high load forecasts for the area north of Eneabba and Muchea. The central and high forecasts are based on a probability weighted analysis of all connections, and 100% of all connections respectively.

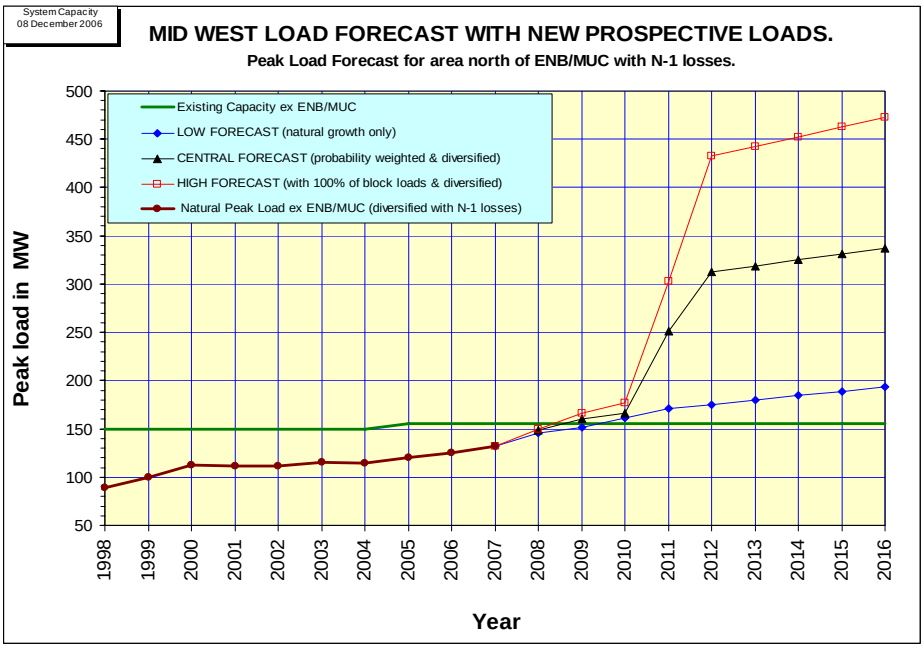

Figure 2: Peak Load Forecast for the Area North of Eneabba and Muchea including prospective new block load connections.

2.3 Summary of Relevant Requirements of Technical Rules

Subject to any exemptions granted under the Code, Western Power and users of the South West Interconnected Network (SWIN) must comply with the technical rules as approved by the Authority. These technical rules impact on the operation of the network and the determination of the transmission line transfer limits required to maintain safe and reliable operation.

The technical requirements that apply to the design and operation of the network include:

- performance standards in respect of service standard parameters, and
- network planning criteria, including contingency criteria, steady-state criteria, stability criteria and quality of supply criteria.

Of particular relevance to the proposed major augmentation are the requirements regarding the following sections of the technical rules:

- 2.2.7 - Transient Rotor Angle Stability (Synchronous Stability)
- 2.2.8 – Oscillatory Rotor Angle Stability
- 2.2.9 – Short Term Voltage Stability

- 2.3.7 – Power System Stability and Dynamics, and
- 2.3.8 – Determination of Power Transfer Limits

Western Power is obliged to maintain and operate the network in accordance with the above sections of the technical rules, and the proposed major augmentation is required to enable Western Power to meet these obligations.

2.4 New Generation

The Mid-West network was designed to supply relatively small loads distributed over a large geographical area and is relatively 'weak'. There is insufficient capacity for connection of any new large industrial and mining loads. Full utilisation of the existing transmission capacity and synchronous stability constraints means connection of additional generators to the existing network in the Mid West will not increase overall capacity to the region within the requirements of the technical rules. A major transmission reinforcement is consequently the only viable alternative which will provide the ability to connect new loads. It further provides the ability to connect new generators also.

N.B.
For more detailed information, please refer to the original *major augmentation proposal*. In particular see the independent technical report by Hydro Tasmania (HTC) in Attachment 3.

2.5 Project Description

Western Powers' proposal (as approved by the Authority under the requirements of the regulatory test) is to construct a new 330 kV double-circuit transmission line between Pinjar and Geraldton (with one side initially energised at 132 kV to allow for construction of 132 kV resupply to the Regans substation). The scope of the project includes:

- Establishment of new 330/132 kV terminal station at Moonyoonooka (MNT).
- Establishment of new 330 kV line circuit at Neerabup (NBT).
- Construction of a new 132 kV line circuit at Pinjar (PJR).

See Figure 3 over for a schematic representation of the proposed augmentation.

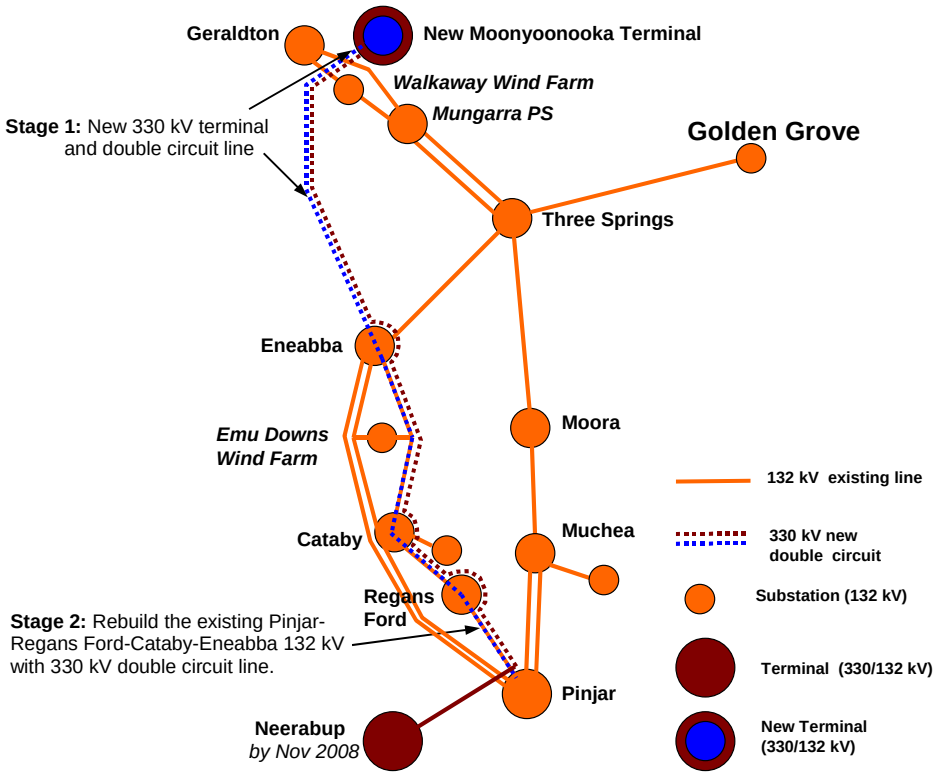

Figure 3: Proposed 330 kV transmission line.

For details regarding the scope of work, please refer to original *major augmentation proposal*.

2.6 Cost of the proposed option

The total cost for the required works has been estimated at approximately $300M.

Detailed project costing was included in the confidential Appendix A in the original major augmentation proposal, and that information has been reproduced in this submission again as confidential Appendix A due to the commercial sensitivity of the costs.

3 The New Facilities Investment Test (NFIT)

Prior to adding new facilities investment to the capital base, the Code requires that investment to be evaluated against the requirements of the new facilities investment test (NFIT) as outlined in section 6.52 of the Code.

This submission is seeking prior approval under section 6.72 of the Code in respect of the new facilities investment for the proposed major augmentation such that it may be added to Western Power's capital base.

An summary (for convenience) of the relevant parts of section 6.52 is given below (please see the Code for actual words):

New Facilities Investment Test (NFIT)

6.52 New facilities investment may be added to the capital base if:

(a) it does not exceed the amount that would be invested by a service provider efficiently minimising costs, having regard to:
  (i) whether it exhibits economies of scale or scope and the increments in which capacity can be added; and
  (ii) whether the lowest sustainable cost option requires the installation of a new facility to meet the forecast sales;

and

(b) **one** or more of the following conditions is satisfied:
  (i) either:
    A. the anticipated incremental revenue for the new facility is expected to at least recover the new facilities investment; or
    B. if a *modified test* has been approved under section 6.53 and the *new facilities investment* is below the *test application threshold* the *modified test* is satisfied; or
  (ii) the new facility provides a net benefit in the covered network over a reasonable period of time that justifies the approval of higher reference tariffs; or
  (iii) the new facility is necessary to maintain the safety or reliability of the covered network or its ability to provide contracted covered services.

3.1 NFIT Interpretation

3.1.1 **NFIT Part A**

Section 6.52(a) of the Code requires that any new facilities investment to be added to the capital base does not exceed the amount that would be invested by a service provider efficiently minimising costs. The new facility should exhibit economies of scale having consideration of system growth and load forecasts. Part A of the test is consequently concerned with ensuring the most appropriate option has been selected to meet the requirements associated with reasonable forecasts of growth of covered services.

These requirements are closely analogous to the requirements of the regulatory test under the Code. The regulatory test is an assessment of whether a proposed major augmentation maximises the net benefit after considering all reasonable alternative

options. Under section 9.14 of the Code the regulatory test is met if the Regulator is satisfied it has been applied:

- 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.

If the regulatory test has been satisfied, then the best option has already been determined having regard to all reasonable alternative options. If an option meets the regulatory test, then that option should also be considered to meet the requirements of part A of the new facilities investment test (on the assumption that the project is procured efficiently).

3.1.2 NFIT Part B

Section 6.52(b) of the Code sets out three conditions, one or more of which must be satisfied (in addition to meeting the requirement of section 6.52(a)) for the new facilities investment to be added to the capital base. Generally, the new facility must either:

- provide sufficient incremental revenue (to recover the new facilities investment), **or**
- provide sufficient net benefit (to justify higher reference tariffs), **or**
- be necessary to maintain safety or reliability of the covered network.

If the purpose of the new facility is one or other of the purposes within the scope of section 6.52(b) then the entire amount of the relevant new facilities investment would meet the new facilities investment test. Also, if a new facility is required to maintain safety or reliability but also has additional benefits it is not precluded from being assessed as a reliability option under section 6.52(b)(iii).

3.1.3 Reliability Options

Under the reliability option, the NFIT relates to the purpose of the new facility and the necessity of the new facility to achieve the purpose. There is no suggestion under section 6.52(b)(iii) of an assessment of the benefits and cost of the new facility.

The necessity for the new facility may be determined by the requirements of:

- Statutory requirements such as the *technical rules* established under the Code.
- Requirements to meet industry best-practice standards.
- Statutory requirements for human and environmental safety.

- Investment required to achieve or maintain reliability of services sufficient to meet contractual obligations.
- Prudent asset management including investment of a "replacement and renewals" nature.

3.1.4 Technical Rules

Chapter 12 of The Electricity Networks Access Code 2004 (WA) requires Western Power to publish the technical rules . These rules as approved by the ERA cover the South West Interconnected Network, and detail the technical requirements to be met by Western Power on the transmission and distribution systems and by other Users who connect to these systems. In addition, the planning criteria to be applied to the transmission and distribution systems are also contained within these rules. Simply put, the technical rules specify the technical standards consistent with good electricity industry practice required to maintain safe and reliable development and operation of the network.

Under the statutory framework applicable to Western Power, it is obligatory for new network developments to meet the requirements of the technical rules.

3.2 Comparison with the National Electricity Rules (NER)

3.2.1 Network Investment under the NER

Under the National Electricity Rules (NER), the equivalent to the New Facilities Investment Test under the Code (WA) is the regulatory test (as defined under section 5.6.5A the NER).

Under the NER, Transmission Network Service Providers are required to apply a regulatory test in respect of both new small network assets and new large network assets. Consequently, almost all capital expenditure on transmission network assets under the NER is subject to a regulatory test, however the complexity and detail in the respective analysis is not required to be disproportional to the size of the project.

Section 5.6.5A of the NER states:

> "The purpose of the *regulatory test* is to identify *new network investments* or non-*network* alternative options that:
>
> (1) maximise the net economic benefit to all those who produce, consume and transport electricity in the *market*; or
>
> (2) in the event the option is necessitated to meet the service standards linked to the technical requirements of schedule 5.1 or in *applicable regulatory instruments*, minimise the present value of the costs of meeting those requirements."

Essentially, the regulatory test under the NER has 2 limbs. Network investments must either maximise the expected net economic benefit or minimise the cost of meeting technical and reliability standards. A reliability augmentation is defined in the NER as "A transmission network augmentation that is necessitated **principally** by inability to meet the minimum network performance requirements set out in schedule 5.1 or in relevant legislation, regulations or any statutory instrument of a participating jurisdiction." The AER has provided further clarity in the "Regulatory Test Application Guidelines" which were published in November 2007. In particular, with respect to reliability investments, the guidelines state:

> "The revised definition of *reliability augmentation* in the *NER* provides that a *transmission network augmentation* will be regarded as a *reliability augmentation* so long as it is principally necessitated by a *reliability requirement*. This reflects a change from the previous provision where a *reliability augmentation* needed to be solely necessitated by a *reliability requirement*. The intent is that an option intended to meet a *reliability requirement* is not precluded from being assessed as a *reliability option* under paragraph (1)(a) of the *regulatory test* if the option also provides *market benefits*."

3.2.2 Performance Requirements under the NER

In the NER, Schedule 5.1 ("Network Performance Requirements to be Provided or Co-ordinated by Network Service Providers") describes the planning, design and operating criteria that must be applied by Network Service Providers to the transmission networks and distribution networks which they own, operate or control. Specifically, Schedule 5.1 details the technical requirements for:

- Network reliability
- Frequency variations
- Magnitude of power frequency voltage
- Voltage fluctuations
- Voltage harmonic or voltage notching distortion
- Voltage unbalance
- Stability
- Protection systems and fault clearance times
- Load and network control facilities
- Automatic reclosure of transmission or distribution lines
- Rating of transmission lines and equipment

3.2.3 Comparison between Access Code (WA) and NER

Capital expenditure on network assets is required to meet respective investment tests under both the Access Code (WA) and the NER. Although the administration of the tests under the different regimes is different (such as in when and how they are applied) there are also striking similarities in the overall objective and the requirements to meet the tests.

The respective investment tests under both the Access Code (WA) and the NER each have a 'reliability limb' with the apparent objective of ensuring the minimization of the cost of meeting prescribed technical and reliability standards. Under the Access Code (WA) the technical standards are prescribed in the technical rules and under the NER they are prescribed in schedule 5.1. There is significant synergy between the requirements of Schedule 5.1 under the NER and the relevant parts of the technical rules in WA. Both are attempting to specify relevant technical standards consistent with good electricity industry practice in order to ensure the safe and reliable development and operation of electricity networks for the overall benefit of users.

Most transmission major augmentations in the eastern states are justified on reliability grounds and the need to ensure networks operate within the requirements of schedule 5.1 of the NER given the relevant load forecasts.

It is consequently consistent with good electricity industry practice that major augmentations to the SWIS could also be justified where relevant on the basis of maintaining safety and reliability of the covered network.

4 CRA's NFIT Assessment

Western Power engaged an independent consultant, CRA International, to assist in the technical and economic analysis required for the major augmentation proposal for the regulatory test. In addition to this, CRA also carried out an assessment of the proposed major augmentation against the requirements of NFIT. CRA's report was attached to the original major augmentation proposal submitted to the Authority.

CRA's assessment included an economic analysis of the anticipated incremental revenue expected to arise from increased sales of covered services consequent to the proposed reinforcement in accordance with the New Facilities Investment Test (NFIT). Revenue from prospective connections of generation and loads using probability weighted forecasts and existing nodal charges were used in the NFIT assessment. Results indicate that this revenue is sufficient to justify the costs of the proposal. For the central load forecast scenario, the expected revenue from probability-weighted connections is estimated as $331.8m (see Table 18 in the CRA report). In Appendix C of their evaluation report, section C3.1, it is stated that:

"In all cases the Net Present Value of future revenue – only considering the period up to 2030 – is greater than the NPC of Option 1 over the same period ($296.8M). Note that if a longer modelling period were adopted the net present value of revenue would increase further, yet there would be no need for additional augmentation necessitating an increase in the cost. While this analysis is high level in nature it suggests that Option 1 should meet this limb [incremental revenue test – leg (i)] of the NFIT".

CRA concluded that the proposed major augmentation option (Option 1) is compliant with the requirements of the NFIT as follows:

- The *proposed major augmentation* (Option 1) is the only option that complies with section 6.52(a) of the test in that it can "provide for forecast sales" and also "reflects economies of scale and the increments in capacity that can be added" (see CRA report section C.2).
- The *proposed major augmentation* (Option 1) is compliant with limb 6.52(b)(i) of the Test, which requires that the *incremental revenue* for the *new facility* is expected to recover the investment cost (see CRA report section C.3.1).
- The *proposed major augmentation* (Option 1) is compliant with limb 6.52(b)(iii) of the test whereby it is required to maintain the safety and reliability of the *covered network* and its ability to provide contracted *covered services* (see CRA report section C.3.3).

Please see the CRA report attached to the original major augmentation proposal for further details.

5 Western Power's NFIT Assessment

Since CRA's original NFIT assessment and the major augmentation proposal for this project being submitted to the Authority, there have been minor changes in some project variables which require appropriate clarification. These are discussed below.

5.1.1 NFIT Part A

As required by section 6.52(a) of the Code, Western Power has prepared forecasts for sales of covered services in the Mid West region. These forecasts (which were developed for the major augmentation proposal submitted to the Authority) included reasonable market development scenarios which incorporated varying levels of demand growth. The forecasts were subjected to independent review and have also been accepted by the Authority in their determination under the regulatory test. These forecasts, together with relevant technical studies, determined that a major augmentation was required to meet the forecast sales while maintaining the reliability and safe operation of the network in accordance with the requirements of the technical rules established under the Code.

A major augmentation proposal was submitted to the Authority and the proposed augmentation was determined to be the best option (amongst all the alternatives) and the project consequently met the requirements of the regulatory test under Chapter 9 of the Code. Given that the project meets the requirements of the regulatory test, it is reasonable to assume it is the lowest sustainable cost option which exhibits appropriate economies of scope and scale also having regard for increments in which capacity can be

added to the system. It is consequently reasonable to assume the project meets the requirements of section 6.52(a) of the Code and part A of the NFIT (on the assumption that the project is procured efficiently).

Section 6.52(a) of the Code requires that any new facilities investment to be added to the capital base does not exceed the amount that would be invested by a service provider efficiently minimising costs while achieving the required project outcome. This can be effectively demonstrated where an appropriate procurement and implementation strategy has been employed.

The cost of labour and materials is currently volatile due to demand/supply imbalances in Western Australia's resources sector. There are significant amounts of electrical infrastructure work for both Western Power and private industry expected over the next 3 years and accessing sufficient specialist line construction services, in particular, will be challenging. Western Power continues to mitigate the risk of increasing costs by subjecting line construction and other major capital work to competitive procurement and, in addition, has established strategic alliances with two consortia of resource companies.

Western Power's Procurement Strategy

Traditional competitive tender arrangements provide value for money outcomes where supply capability exceeds normal demand because suppliers compete for the work on the basis of price. In Western Australia's present situation where demand for labour, plant and materials to construct energy assets far outstrips supply, tendering is unlikely to produce the best value available.

Western Power's strategy through alliance arrangements is to develop long term relationships with resource companies based on co-operation and collaborative effort to provide greater certainty of supply in return for greater certainty of work and lower margins than would be expected in tender negotiations. Further, the alliance arrangements include:

- a painshare/gainshare arrangement to drive all parties to achieve cost, quality and timeliness targets;
- provision for an independent estimator to review the cost estimates developed jointly by Western Power and the Non-Owner Participants to ensure they are market reflective; and
- "open book" accounting.

Under the alliance arrangement, Western Power is not absolutely committed to allocation of any parcel of work to the alliance until the cost estimate is accepted. Thus, in the

event that a cost estimate is unsatisfactory, Western Power retains the right to explore alternative resourcing arrangements, such as via a tender process.

Importantly, one of the key aims of the alliance approach is to give the Non-Owner Participants confidence to recruit skilled workers interstate and, if necessary, overseas. This provides a significant advantage over a normal tender process where, typically:

- Respondents compete for available skilled workers and may drive up the labour cost; and/or
- Respondents are unwilling to commit resources until a potentially lengthy tender process is complete for each project, potentially delaying required "in-service" dates.

It is important to note that Western Power's alliance arrangements have been discussed with the State Supply Commission and no issues have been raised.

It is also noteworthy that alliance arrangements have been successfully deployed by the Main Roads Department and Water Authority in Western Australia. They have also been used successfully by energy utilities in the National Electricity Market with endorsement by the relevant regulators.

Western Power's intention is to construct the 330kV line from Pinjar to Moonyoonooka and associated major substation works at lowest cost, using its alliance partners. Other related minor works will be managed prudently in accordance with Western Power's standard practices.

Western Power consequently contends the proposed major augmentation meets the requirements of Section 6.52(a) of the Code being Part A of the new facilities investment test.

5.1.2 NFIT Part B

Western Power notes that the CRA assessment suggested the project met the requirements of section 6.52(a) of the Code in that it reflects economies of scope and scale, and also met the requirements of section 6.52(b) of the Code in two respects. Firstly, the incremental revenue for the new facility is expected to recover the investment cost, and secondly the major augmentation is required to maintain the safety and reliability of the covered network and it's ability to provide contracted covered services.

Since CRA's original economic assessment of the project, Western Power has recognized minor adjustments that would be required to the economic analysis to both capital cost and incremental revenue. The cost of construction labour and materials is currently volatile in Western Australia due to demand/supply imbalances, and in recent months there has been anecdotal evidence that the overall cost of the project may exceed the

forecast costs which were originally presented to the Authority in the major augmentation proposal. Western Power also has recent qualitative evidence which suggests the forecasts of sales of covered services are conservative. Some prospective users are requesting increases in CMD and are also increasing the probability of their projects proceeding. Although this information has not been consolidated into a revised load forecast it should be noted that Western Power expects actual sales of covered services to be above the forecasts presented in the original major augmentation proposal. Further, significant network tariff increases are anticipated at the start of the next access arrangement period (1 July 2009) which, while indeterminant at this stage, will substantially increase the incremental revenue generated by construction of these new facilities.

The load forecasts presented in the major augmentation proposal are still valid but are now recognized as being conservative. There has been some escalation in the forecast costs for the preferred option, but similar escalation is also applicable to the other network options considered under the regulatory test. Generation options were not possible for technical reasons and the proposed 330kV line was determine to be the most appropriate option to meet base load growth while still having additional capacity to support industrial growth as well. Although there have been some minor changes to some variables since the economic analysis of this project was performed for the major augmentation proposal, Western Power concludes the outcome of regulatory test is still valid.

Further, Western Power assesses the project meets the requirements of Part B of the NFIT without the need to repeat the economic analysis required to demonstrate compliance with section 6.52(b)(i). Western Power is obliged to maintain the operation of the network in accordance with the technical rules, and the project is principally required for this purpose. The project consequently meets the requirements of section 6.52(b)(iii) of the code and Part B of the NFIT is consequently satisfied.

6 Conclusion

This submission to the Authority is being made under section 6.71 of the Code to request the Authority to make a determination regarding the *new facilities investment test* as set out in section 6.52 of the Code when applied to the proposed *major augmentation* being a 330 kV Transmission Line and Associated Works in the Mid-West Region of Western Australia.

The proposed new facility has previously been determined by the Authority to meet the requirements of the *regulatory test* under Chapter 9 of the Code.

Before making the significant economic commitment required by this project, Western Power is seeking the Authority's' determination with respect to the *new facilities investment test* prior to committing to the project such that the *new facilities investment* may be added to Western Power's *capital base*. To meet the forecast system load growth the project is required to be commissioned by November 2010, and to meet the required construction schedule Western Power hopes to commit to a line construction contract by middle May 2008.

Western Power is obliged to maintain and operate the network in accordance with the *technical rules* as approved by the Authority and the proposed *major augmentation* is required to enable Western Power to meet these obligations. The *new facility* provides market benefits but is primarily required to maintain the safety and reliability of the *covered network* given the projected load forecasts in accordance with the *technical rules*.

The proposed *new facility* consequently meets the requirements of section 6.52(a) and 6.52(b)(iii) of the Code, and Western Power respectfully recommends that the Authority determines that the *new facilities investment test* is satisfied.

Appendix A: Cost Estimate for the proposed reinforcement

(Confidential)