



Submission to the Economic Regulation Authority

Comments on the ERA's Draft Determination for the pre-approval of NFIT for the 132/11 kV Medical Centre Zone Substation

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safe reliable efficient

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1 Introduction

On 7 August Western Power submitted an application under section 6.71 of the Electricity Networks Access 2004 (the Code) for pre-approval of the new facilities investment test (NFIT) for the forecast new facilities investment for the proposed new zone substation at the Sir Charles Gairdner Hospital (SCGH) called the Medical Centre Zone Substation. Additional technical information was provided to the ERA on 21 October 2008 in support of the original application.

This submission is in response to the ERA's draft determination released on 11 December 2008. Western Power has also taken this opportunity to respond to comments submitted by Alinta in response to the initial issues paper.

2 Comments on the Alinta Submission to the initial ERA Issues Paper dated 13 October 2008

2.1 Passing the Regulatory Test

Alinta have stated that the ERA has included the likelihood of a customer capital contribution as a contributing factor in allowing a waiver for the Regulatory Test.

Western Power submits that the ERA has provided justification for the Waiver of the Regulatory Test in accordance with sections 9.3 and 9.4 of the Code. The ERA has accepted Western Power's submission that there was clearly no viable alternative to the project, and, in addition, it has demonstrated sufficiently that the nature of the funding is such that there will be no net cost to those who generate transport and consume electricity in the covered network.

Western Power also submits that the "nature of the funding" does not implicitly require a capital contribution. However the Regulatory Test does require an augmentation to maximise the "net benefit after considering alternative options" (as defined in clauses 9.3 and 9.4 of the Code). In this case where a project is being advanced in time in response to a particular customer request it is considered that there should not be a net financial cost to other customers. In other circumstances it may be appropriate that there are additional costs to customers provided a net benefit (as defined in clause 6.52 (b) (ii) of the Code) can be demonstrated that justifies an increase in costs.

2.2 Efficiency Test – second dot point

Western Power agrees that it needs to demonstrate to the ERA's satisfaction that the scope of work is justified. The justification for various decisions is contained in later sections of this response paper.

2.3 Safety and Reliability Test

Alinta has submitted that the substation should be replaced when it reaches the end of its useful life since it could be considered to be no longer able to provide an acceptable level of supply reliability.

It is not standard practice across the electricity industry to replace network assets at the end of their stated service life. Were this the case Western Power's capital budget would be considerably larger than currently proposed. The life of any in-service asset can be appropriately extended through a rigorous programme of condition monitoring, maintenance and refurbishment, and in fact this is the approach taken by Western Power, in accordance with good electricity industry practice. All infrastructure including gas pipelines, rail and roads routinely remain in service well beyond their defined service life.

The risk of asset failure will increase with age but that risk is limited through standard asset management procedures. In the case of this zone substation there is no indication that replacement simply on the basis of age could be justified.

A second issue submitted by Alinta is that Western Power is discriminatory in treating load growth related to the general customer base differently to that of a single customer. In response to this Western Power submits that the work to meet the load growth related to general load growth is funded by that group of customers through tariffs. The work is performed in a timely manner to meet that load growth.

Where new customers are of sufficient size to bring forward work that would have been undertaken at some point in the future, it is appropriate to ensure that the new customer funds the cost difference so that the general customer base does not have to pick up some of the cost through higher tariffs. In the case of the Sir Charles Gairdner Hospital, an assessment has been made as to their impact on network costs and a capital contribution has been determined on the basis of there being no net cost to other customers.

2.4 Capital Contribution Requirements

Alinta has submitted three issues regarding the determination of capital contributions.

Their first point is that Western Power should fund the zone substation because of its age and that the investment would pass the safety and reliability leg of the NFIT. As previously discussed in section 2.3, Western Power does not agree with this approach because it is not in accordance with standard industry practice, and nor is it sustainable, to replace assets at the end of their defined service life.

The second issue, being that of the installation of 132 kV cable, higher capacity transformers and GIS switchgear, will be addressed in the main section of this submission.

The third issue is discrimination between different customer types based on load size. Once again as discussed in section 2.3 Western Power does not agree with this position and in fact asserts that there is no discrimination.

3 Response to the Draft Decision

3.1 Introductory Comments

Western Power must be able to provide a consistent and transparent response to customers' requests for increases in load and this application by the SCGH for an increase in load (including a change in supply voltage) provides a clear example of how Western Power has historically responded to such requests.

Projects of this nature have the inherent problem that timing of the works is subject to the customer's own timing and that timing is almost always subject to change. Changes in timing depend on a number of factors including the customer's own internal approval processes, the availability of funding, political and/or other pressures, changes in scope or other requirements, and changes in the economic environment. In this particular case the SCGH initially approached Western Power in 2006. The timing of this project is not yet settled and the expansion programme of the hospital is still being finalised.

This request for pre-approval of NFIT is based on cost estimates that may rapidly become out of date, particularly in the current economic environment. On that basis the determination of a particular value of work meeting NFIT does not necessarily provide a useful outcome. The more appropriate question is whether the approach taken by Western Power provides for the correct outcome; that is, that the scope of work is appropriate, and the sharing of costs is also appropriate.

Ultimately, the value that Western Power will seek to include in its asset base will be reflective of the actual costs incurred once the work is undertaken.

It is useful to set out the nature of the customer request and the approach taken by Western Power in determining its response.

- SCGH has requested an increase in electrical load and also requested the supply be converted to 11 kV because its own 6.6 kV network would not be able to cater for the increase in load. SCGH determined that their conversion to 11 kV should be undertaken at the start of their expansion programme.
- Western Power has a long term plan to convert the substations of University, Nedlands and Medical Centre (at SCGH) to 11 kV and in fact planned to convert this substation in 2020. Western Power also takes the view that at that point in time the project would meet NFIT on the basis of meeting the requirements of 6.52 (a) and a combination of 6.52 (b) (i) and (iii) of the Code.
- This project is being undertaken purely at the request of the customer and would not be undertaken before 2020 if that request had not been made. On the basis that the work would meet NFIT if undertaken in 2020 it would be appropriate for the customer to fund the cost of bringing the project forward. Such an approach ensures that the general customer base does not fund any portion of work undertaken at the request of an individual customer. That funding would include any increase in network tariffs and any shortfall being made up by a capital contribution.
- With respect to the transmission component of the project, other sections of part (b) of NFIT have not been taken into account because that implies other customers will get a benefit for which they should pay prior to when they would have been required to fund the conversion to 11 kV in 2020. Western Power does not believe there are any quantifiable benefits, with respect to the transmission network, for which other customers should pay. In the original NFIT submission Western Power has stated that there could be a benefit in delaying the University substation conversion from 6.6 kV to 11 kV. That

benefit is not quantifiable and nor is it certain. Load growth at the University depends on the expansion plans that the University eventually settles on and the timing of those plans. While there is potential for a benefit there is no reasonable case that existing customers should pay for that possible benefit well ahead of it being realised. There could only be a benefit if the substation work would otherwise be required ahead of the voltage conversion timetable currently defined in Western Power's long term plan.

- Western Power does believe there is a benefit in the conversion of the distribution system around the Medical Centre to 11 kV because the additional capacity created by the conversion will obviate other works that would have been required to meet the load growth between now and the original plan of a 2020 conversion. This reduction in works results primarily because of the immediate increase in available distribution capacity provided by the voltage increase. These works are considered to meet a combination of sections 6.52 (b) (i) and (iii) of the Code. Therefore none of the costs for the distribution network voltage conversion have been included in the customer charges.
- In accordance with the approved Capital Contributions Policy, Western Power has included 15 years of revenue in its determination of the portion of the bring forward cost of the substation that meets section 6.52 (b) (i) of the Code.

The following sections 3.2 to 3.5 of this submission deal specifically with issues raised by the Authority in its draft determination.

3.2 Efficiency Test – Considerations of the Authority

Section 34

In section 34 the Authority states that the use of 132 kV equipment is not justified as any conversion from the existing voltage of 66 kV is not sufficiently planned, and that equipment is available with sufficient fault rating. Western Power submits that there are adequate grounds for the choice of 132 kV equipment as follows.

As an initial comment it should be noted that standardisation of equipment is strategically important to any electricity utility. There are long term benefits in a number of areas including:

- The higher volumes of equipment or materials purchased under standard contracts normally means that a better price can be obtained,
- It will normally reduce the lead time to obtain materials because manufacturers will either have stock available or will be able to produce new stock without having to do a special run just for a low volume product,
- There is a lower cost to the utility in carrying spares and in operations and maintenance activities when there is standardisation, and
- Standardisation normally takes into account future expansion or upgrades such as voltage changes.

Western Power has not tried to quantify these benefits in this particular submission. However it does submit to the Authority that any deviation from a policy of standardisation has significant consequences and such a decision cannot be taken lightly. It is standard practice for Western Power to use 132 kV equipment for expansion or development of the 66 kV network. There is no formal long term plan for the whole of the 66 kV network to be converted to 132 kV, but Western Power has recently employed a contract engineer to develop a long term strategic development plan for the transmission network that will specifically include review of the 66 kV

system recognising that the 66 kV network is aging and is unlikely to have the required capacity in the medium to long term.

The current transmission plans as defined in the “2008 Planning Report” located on Western Power’s web site, does include specific examples of conversion of sections of the 66 kV network. For example the nearby Cottesloe substation is currently being converted to 132 kV from 66 kV because the 66 kV network in that area does not have the required capacity.

Western Power certainly takes the view that it is imprudent to install new 66 kV equipment when generally the incremental cost of using 132 kV equipment is not significant in the context of whole of project costs and other benefits such as those listed above are taken into account.

With respect to choice of cable the following comments are provided.

The original cost estimate for the cable circuit work was based on the standard designs used by Western Power which uses single core 132 kV rated cable with a conductor size of 2000 mm². For reference, a cable circuit with these parameters has a rating of 240 MVA (1050A) and 330 MVA (1440A) when laid in trefoil or flat formation respectively, if operated at 132 kV. When operated at 66 kV the ratings are half those values (120 and 165 MVA respectively). The circuit rating requirement for 66 kV is 143 MVA as defined in the Transmission Planning Criteria. It is also worth noting that the rating of the cable is affected by the site soil conditions.

The cost of the cable in the estimate, dated January 2007, was based on \$408/m. The total cost of the cable circuit, which included the cable transition structures, two steel line termination poles and line construction, was \$3,025,836, of which \$980,000 was accounted for by the 132 kV cable.

The following 66 kV cable cost comparisons assume that the cable terminations, transition and termination poles and the line work would remain the same for both the 66 and 132 kV options.

The costs provided by Western Power’s cable supplier (on the 30/12/08) for 2000 mm² conductor suggests that there is a material cost saving of 17% for 66 kV cable over 132 kV cable. Using this information in the 2007 estimate for 2000 mm² 66 kV cable, the cable component becomes \$811,168, which would have reduced the cable circuit cost to \$2,857,000 at 66 kV. This represents a cost reduction 5.6%.

With respect to switchgear we make the following comments.

Confirmation has been obtained from a reputable supplier of GIS that 66 kV equipment at the rating suited to the Medical Centre substation is available but they also confirmed that most customers in the same circumstances normally purchase 132 kV equipment. 132 kV rated circuit breakers are used in both switchboard types but there is a cost saving of around 10% due to aspects related to the busbars and other parts of the switchboards that are cheaper for the 66 kV models.

The total 132 kV single bus GIS cost at \$557,000 per circuit for the seven circuits considered in the original submission for the Medical Centre substation (3 line, 3 transformer and 1 bus section switch) gives a total installed cost of \$3.9M.

The potential cost reduction under that configuration in using 66 kV equipment instead of 132 kV is in the order \$390,000.

However for the ring bus arrangement (discussed in the section below), by purchasing only the number of circuits required for the initial stage, four circuits would be required giving a total cost of \$2.23M. The 10% reduction for using 66 kV instead of 132 kV would therefore provide a cost saving of \$223,000.

The more particular reasons for using the 132 kV gear include standardisation of equipment, as discussed earlier in this submission, and the requirement, should the network be converted to 132 kV, for a brand new cable and switchgear to be installed, with that construction having to be undertaken while keeping supply continuously available to the hospital.

On balance Western Power remains of the view that it is prudent to install 132 kV equipment, in accordance with its standard policy.

Section 35

In section 35 the Authority states that the utilisation of three incoming lines and three transformers is not required. The original intention was to install GIS switchgear for 2 lines, 2 transformers and 1 bus section, but with provision for future expansion to a 3rd line circuit and 3rd transformer circuit. To ensure there would be no compatibility issues of the GIS plant in the future, it was decided to purchase and install the full suite of equipment as part of the initial installation. It is noted that this practice is standard across many other Australian electricity utilities.

Western Power's only existing GIS 132 kV switchboard is in the Cook St substation in West Perth. This switchboard has been developed in stages over several years with circuits being added as and when required. The risk of not catering for the future circuits is that compatible equipment might not be available to extend the switchboard because of the tendency for manufacturers to change their designs over time.

The resulting problems can be serious. This could result in very high costs for equipment needing to be made to order. Operationally, there could be long outages on busbars to add new circuits with the consequence that vital sections of the transmission system could be out of service for extended periods.

The fact that Cook St has a single busbar configuration adds to the problem in that sectionalising (opening) of the busbar for any reason can result in more severe consequences on transformer and line security than alternative configurations.

This single bus configuration was the basis of the original concept design and estimate for the Medical Centre substation. To overcome the previously mentioned risks associated with this configuration, the GIS switchboard recommended was to accommodate the ultimate development ie three transformers, three lines and a bus section circuit.

However further research on the configuration of GIS substations has been undertaken since the Medical Centre estimate was developed, to ascertain whether the single bus arrangement is the most appropriate and whether the early purchase of future circuits for GIS switchboards is financially and technically sound. The findings have shown that some alternative busbar configurations can facilitate future expansions with less impact on busbar security than some single busbar configurations.

The busbar configuration now recommended for GIS substations is the ring bus. Its main benefit is that when the busbar is opened, supplies to transformer and line circuits are more secure than for a single bus arrangement with one bus section circuit. This enhanced flexibility means the ring bus GIS can be extended in stages similarly to an air insulated busbar.

As a consequence, Western Power has decided that only the equipment necessary to meet the needs of the initial substation development will be purchased and future expansion of GIS switchboards will be done on an as and when required basis (unless any the timing of any future stages can support the early purchase of future equipment financially). For the Medical Centre substation GIS, sufficient equipment

for only two line circuits and two transformers will be purchased as part of the initial stage of development.

Western Power intends to use the ring bus arrangement from now on for all future GIS zone substations. As an aside, it should be noted that GIS substations will only be used where there are compelling environmental or community issues or where tracts of land large enough for air insulated substations cannot be obtained.

It is worth noting that Western Power has reviewed its forecasts and plans for the new Medical Centre substation. The revised load forecast indicates that a 3rd transformer will be required at this site in approximately 20 years.

Section 36

In section 36 the Authority states that the cost for environment and land management activities may be excessive. Further information to justify these costs is as follows.

The costs are based on the best estimate of what is expected to be incurred but the actual costs are likely to be different depending on circumstances that emerge at the time of construction. The original costing was in December 2006 with the estimate at that point in time being \$1.01M. The updated estimate of \$1.288M was based on escalation over the period to now being estimated for this type of work at 27.5%. Once again it is noted that it is the actual costs incurred rather than forecast costs that will be taken into account in adjusting the regulated asset base.

The larger items that were included in the estimate are as follows.

\$350K to \$450K for noise enclosures:

Noise from the Medical Centre substation is at the maximum allowable level. The upgrade of the substation requires the running of two 66/11kV and two of the existing 66/6.6kV transformers concurrently for a period of 3 years. It is expected that there will be a requirement for the construction of noise enclosures. Western Power will not be able to determine a firm figure for the enclosures until the exact location of the substation, fencing type and transformer type have been identified.

\$200K to \$300K has been included to cover mitigation/relocation of existing services:

Earth potential rise and low frequency induction from earthed power poles and substation earth-grids result in touch potential of other assets increasing to levels that are deemed unsafe under Aust/NZ standards. To allow the relevant utilities (Water Corp, Telstra etc) to continue to work on these assets in a non hazardous manner mitigation or relocation of the asset may be required. Past experience indicates that this cost is a reasonable estimate for the cost of undertaking this work. To obtain a more accurate cost for this work we would need to have details of the proposed substation earth grid location, earthing arrangement, pole locations and have conducted an earth potential rise and low frequency induction (EPR/LFI) study.

\$40K for a EPR/LFI mitigation study.

\$100K to \$200K for soil remediation:

Previous investigations indicate that the current Medical Centre substation site is contaminated by oil leaking from the transformers and two of the transformers are not banded. The funds are required to cover the cost of excavating contaminated soils within the site, disposing of these soils, replacing with clean fill and conducting further soil tests once the new Medical Centre substation has been established.

\$11K for labour costs for liaison - as the substation is opposite a residential area, significant liaison with residents would be required.

\$10K for centre-line survey - line designers will need a ground profile survey of the proposed line entry route for the 66 kV lines into the sub in order to undertake their design.

\$10K for landscaping - this may be insufficient if overhead line entries are used rather than cable - If this is the case we may need ~\$85K for visual screening and landscaping.

\$10K for vegetation clearing - This is required to clear vegetation to allow for relocation of 66 kV line entries.

\$25K for newspaper advertisements.

Sections 37 and 38

In section 37 and 38 the Authority has provided a revised cost estimate for the project. Based on the comments above for sections 34 to 36 Western Power submits that the cost should not be changed from that which was submitted.

3.3 Incremental Revenue Test – Considerations of the Authority

Sections 42 to 44

In section 42 to 44 the Authority states that Western Power should consider incremental revenue over a longer period than 15 years, and in fact should consider up to 50 years.

It is recognised that the incremental revenue considered in clause 6.52(b)(i) of the Code is not linked to any definition of time period over which the revenue should be assessed. However there is guidance in the model capital contributions policy in the Code and also in the approved Capital Contributions Policy which does provide a definition of reasonable period. Any alternative interpretation makes the determination of capital contributions practically impossible in that the time period would become a matter of dispute in most cases.

A period of 15 years (as per the approved capital contributions policy) is appropriate in that it defines the maximum period over which any connection and augmentation works can be assessed against the incremental revenue test.

3.4 Net Benefits Test – Considerations of the Authority

Sections 47 and 48

In section 47 and 48 the Authority states that Western Power considers there will be a number of benefits outside of the direct benefit to the Sir Charles Gairdner Hospital for this work. The submission did include these benefits but also stated that the benefits are not fully known at this stage. There is potential for a delay in the voltage conversion of the University substation. However at this stage that benefit is unknown. For example there could be no delay at all if the University needs to convert its own internal network to 11 kV to meet its own technical requirements. The Medical Centre has required the voltage conversion for its own internal network and such a need could equally emerge at the University. In addition there is no firm proposal at this stage for load increase at the University.

Consequently to assign any net benefit would be based on uncertain information and would mean that the all other customers would fund this work on the basis that it will see an indeterminate benefit a number of years hence. Therefore Western Power submits that there should be no net benefit allowed in the Authority's NFIT deliberation.

3.5 Safety and Reliability Test – Considerations of the Authority

Section 57

In section 57 the Authority states that replacement of the substation in 2020 to 2024 would be some 15 years beyond the stated economic life of the substation.

As previously discussed it is not common industry practice to routinely replace assets at the end of their stated service life, and nor is it appropriate to do so. The costs would be prohibitive were such an approach to apply to all network assets.

The originally suggested replacement in 2015/16 reflected an earlier plan which has since been reviewed. Asset replacement is part of a rigorous asset management strategy involving maintenance, condition monitoring and refurbishment. Each option is considered on the basis of lowest long term cost against an appropriate level of risk.

As a further consideration the conversion of this substation to 11 kV is part of a broader plan to convert the whole of the Western Suburb area to 11 KV. It would not be sensible to change the substation at a time that is not compatible with the voltage conversion programme.

Western Power therefore submits that the issue of changing the substation because it has reached the end of its economic life is not relevant in this deliberation.

Section 58

In section 58 the Authority states that the method used to determine the amount that passes NFIT is very sensitive to the time chosen for the future asset replacement. This will be the case for any such determination that involves costs reflecting future planned work. Plans will always be subject to change as circumstances change. However the approach taken is based on the best information available at the time.

In this case Western Power believes that the appropriate asset replacement date, in the absence of this load increase from Sir Charles Gairdner Hospital, would be 2020 which is the date to accommodate the voltage conversion of the area.

Sections 59 and 60

In section 59 and 60 the Authority has stated the view submitted by Alinta with respect to the treatment of customer load growth. Western Power has addressed these issues in sections 2.3 and 2.4 of this submission.

4 General Comments

Western Power recognises that interpretation of the NFIT test is difficult because of the ambiguity of the Code provisions. It also recognises the need to develop clarity and consistency in interpretation across projects and this particular project is representative of the typical project that Western Power undertakes.

There are a number of issues highlighted in this submission which include:

- The basis upon which the cost allocated to the customer has been determined. In this instance it is the bring forward cost based on the project meeting NFIT if it were to be undertaken at the time dictated by Western Power's long term planning requirements. The approach ensures the general customer base does not fund any portion of the work that is undertaken purely to meet a customers particular requirement,
- The use of 15 years network access revenue to determine the revenue amount in accordance with section 6.52 (b) (i) of the Code,
- Recognition of the fact that the NFIT determination is based on forecast numbers that will change once the project is undertaken,
- The actual timing of the work and even the scope of works will ultimately depend on the customer's timing and final requirements,
- The requirement for Western Power to satisfy the requirements of section 6.52 (a) of the Code.

Western Power respectfully submits these comments to the Authority for its consideration.