

Determination on Application for exemption from certain requirements of the Technical Rules submitted by Western Power

Meadow Springs Zone Substation Exemption

July 2015

Economic Regulation Authority

WESTERN AUSTRALIA

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Contents

Decision	1
Reasons	2
Access Code Requirements	2
Western Power’s Application for Exemption	2
Western Power’s Assessment	2
Public Submissions	3
Technical Advice	3
Authority’s Considerations	5

Decision

1. Western Power submitted an application to the Economic Regulation Authority (**Authority**) for a temporary exemption from compliance with certain requirements of its Technical Rules in relation to the capacity requirements at the Meadow Springs zone substation.
2. Technical Rules consist of the standards, procedures and planning criteria governing the construction and operation of an electricity network and are required under the *Electricity Networks Access Code 2004* (**Access Code**) for all covered networks. The Authority first approved and published Western Power's Technical Rules on 26 April 2007 and they became effective from 1 July 2007. Revisions to the Technical Rules were approved by the Authority on 10 November 2011 and took effect from 23 December 2011.
3. Under section 12.40 of the Access Code, a service provider may apply to the Authority for an exemption from one or more requirements of its technical rules which apply to the service provider and all applicants, users and controllers of the covered network.
4. Section 12.41 of the Access Code requires the Authority to determine an application as soon as practicable as a reasonable and prudent person on reasonable technical and operational grounds and having regard to the effect the proposed exemption will have on the service provider and users of the network and any interconnected network. The Authority must grant the exemption if it determines that in all the circumstances, the disadvantages of requiring compliance with the Technical Rules are likely to exceed the advantages.
5. Under section 12.46 of the Access Code, the Authority may consult the public in accordance with Appendix 7. The Authority issued an invitation for submissions on 18 June 2015, with a closing date of 2 July 2015. As part of this consultation, the Authority prepared an issues paper to assist interested parties. One submission was received and has been published on the Authority's website.
6. After consideration of Western Power's application for exemption from the Technical Rules, independent advice from the Authority's technical adviser and the public submission received, the Authority has determined that the disadvantages of requiring compliance with the Technical Rules are likely to exceed the advantages. The Authority, therefore, approves Western Power's application for an exemption.
7. The following exemption is granted:

"Western Power is temporarily exempted from complying with the requirements of clause 2.5.4(b) (NCR Criterion) of the Transmission Planning Criteria in the Technical Rules at Meadow Springs zone substation.

The Stated temporary exemption applies until the completion of Stage 2 of the Mandurah load area investment strategy, or unless otherwise revoked under the provisions of the *Electricity Networks Access Code 2004*."
8. The reasons for the Authority's decision are set out below.

Reasons

Access Code Requirements

9. Section 12.41 of the Access Code requires the Authority to determine an application as soon as practicable as a reasonable and prudent person on reasonable technical and operational grounds and having regard to the effect the proposed exemption will have on the service provider and users of the network and any interconnected network. The Authority must grant the exemption if it determines that, in all the circumstances, the disadvantages of requiring compliance with the Technical Rules are likely to exceed the advantages.
10. Under section 12.43 of the Access Code, an exemption:
 - may be granted for a specified period or indefinitely;
 - may be subject to any reasonable conditions the service provider considers fit, in which case the network persons must comply with the conditions, or may be unconditional; and
 - may be varied or revoked by the service provider after reasonable notice to the network persons.

Western Power's Application for Exemption

11. Western Power submitted an application for an exemption from compliance with the Technical Rules to the Authority on 15 May 2015.
12. The application is for a temporary exemption from compliance with clause 2.5.4(b) of the Technical Rules (i.e. Normal Cyclic Rating (**NCR**) Criterion¹) for the Meadow Springs zone substation. The exemption will apply until the completion of Stage 2 of the Mandurah load area investment strategy, or unless otherwise revoked under the provisions of the Code.

Western Power's Assessment

13. The exemption is requested as Western Power's 2014 load forecasts indicate the NCR capacity of the Mandurah and the Meadow Springs zone substations in the Mandurah load area will be exceeded within the five year outlook. The Mandurah zone substation has forecast non-compliance exposure with the NCR Criterion from 2016/17 and the Meadow Springs zone substation has forecast non-compliance exposure with NCR Criterion from 2015/16.
14. Western Power studies, based on the Technical Rules planning criteria, have shown that in order to maintain compliance obligations at both substations, the required network investment option (Mandurah Extension Project) would involve significant substation augmentation at Mandurah. The project cost estimate is \$27 million.

¹ The NCR criterion permits the loss of a portion of power transfer capacity at a substation following the unplanned loss of a supply transformer.

15. Western Power has undertaken a cost benefit analysis using risk-based planning techniques. Based on this analysis, Western Power proposes deferring the Mandurah Extension Project to 2019/20 and, instead, bringing forward capacity expansion at the Meadow Springs substation to 2016/17. The Meadow Springs expansion project cost estimate is \$9.2 million.
16. Western Power considers the revised strategy represents a pathway towards compliance whilst minimising the risk of over-investment in the face of potential variability in forecast demand.
17. Western Power considers there is no foreseeable adverse impact on the existing level of safety and reliability to other network users as a result of its proposal. It notes the impact on its compliance, reputation and financial risk exposure will be reduced by obtaining an exemption.

Public Submissions

18. Under section 12.46 of the Access Code, the Authority may consult the public in accordance with Appendix 7. The Authority issued an invitation for submissions on 18 June 2015, with a closing date for submissions of 2 July 2015. One submission was received from Community Electricity.
19. Community Electricity notes its support of avoidance of over investment in the network. However, Community Electricity also notes that Western Power appears to intend to proceed with its proposal with or without the exemption and that granting the exemption will enable it to do so with reduced “impact on its compliance, reputation and financial risk exposure”. Community Electricity considers, if this is the case, that it is not an appropriate use of an exemption and does not support it.

Technical Advice

20. The Authority appointed a technical advisor, Geoff Brown and Associates (**GBA**), to provide advice in relation to Western Power’s application.
21. GBA notes that it is not good industry practice to load substations up to the total capacity of the installed power transformers, as spare capacity must be available so that supply to consumers is maintained during unplanned transformer interruptions and also during planned maintenance outages.
22. The Mandurah substation is currently operating at close to its NCR and is expected to exceed its NCR in the summer of 2017. The Meadow Springs substation marginally exceeded its NCR in the 2014 summer but the load fell back to below the NCR in 2015 due to a contingency event in January which resulted in the temporary transfer of 6MVA to Waikiki zone substation. It is expected to exceed its NCR again during the 2016 summer.
23. Clause 2.5.4 of Western Power’s Technical Rules specifies planning criteria that determine the maximum allowable power transfer through a substation when all installed transformers are in service. The clause specifies a number of alternative planning criteria to be used, dependant on a range of factors, including location and the magnitude and criticality of the load supplied. The planning criteria for both Mandurah and Meadow Springs substations is based on the Normal Cyclic Rating (NCR) criterion.

24. Application of the NCR criterion is based on the premise that, in the event of an unplanned transformer interruption, it is acceptable for there to be some inability to supply consumer demand until a replacement transformer can be installed to replace the out-of-service transformer. If each substation was operating at its NCR, this load at risk would be 11.7MVA at Mandurah and 20.1MVA at Meadow Springs in the worst case scenario of an unplanned interruption of the larger transformer at either site. Additional demand beyond the NCR rating would add directly to this load at risk.
25. Western Power has two rapid response spare supply transformers (**RRSST**) available to use as temporary replacements at either substation and has a target RRSST installation time of 12 hours.
26. GBA notes that in reality, the risk to Western Power is significantly less than suggested by this analysis due to the following mitigating factors:
- The calculations are based on forecast peak summer loads and at other times of the year the loads are significantly lower and the load at risk is correspondingly lower;
 - The calculated load at risk assumes a failure of the largest transformer at each substation coinciding with the peak demand period. While there may be some elevated risk of failure during periods of high demand, transformer failure can occur at any time;
 - Variations in load across the daily load cycle mean that the load at risk will be lower than the peak during much of the 12 hour period required to commission the RRSST;
 - There is highly likely to be some load transfer capacity in the distribution network that will allow some load to be transferred to neighbouring zone substations, which can be loaded up to the full cyclic rating of their installed power transformers during the contingency;
 - Power transformer failures are relatively rare, although the recent loss of two interconnecting transformers at Muja power station is evidence that such events can and do occur;
 - If supply interruptions are necessary to manage transformer loads, they are introduced on a rotational basis to minimise the impact on individual customers.
27. GBA notes Western Power has a transformer capacity augmentation plan in place to ensure that both Mandurah and Meadow Springs substations will comply with the NCR criterion of the Technical Rules by 2020 for which limited information was provided in the application. On the basis of the information provided in Western Power's application, GBA surmised the following:
- The augmentation plan will be implemented in two stages with the installation of a third transformer at Meadow Springs by 2016/17 and the completion of the Mandurah extension project by 2019/20;
 - While load growth is currently relatively high in the Mandurah load area, future demand forecasts have a high level of uncertainty. If load growth is lower than forecast, the augmentation of transformer capacity can be deferred; and

- It appears that the transformer capacity shortfall is most critical at Mandurah. However this substation has three transformers and transformer capacity augmentation will be difficult, with an estimated cost of \$27 million. Western Power's strategy appears to be to defer this for as long as possible by installing a third transformer at Meadow Springs and transferring load to it.
28. GBA notes Western Power has calculated the maximum allowable power transfer for the substation based on the total installed power transformer capacity within the substation, whereas the Technical Rules specify it should be based on the capacity of the smallest supply transformer. However, GBA considers the wording of the Technical Rules does not convey its intended meaning which is to specify the maximum allowable power transfer through a substation under normal operating conditions having due regard for the need to maintain spare transformer capacity to cater for contingency situations. GBA recommends the wording of the Technical Rules should be revised and for the purposes of this review has used Western Power's interpretation.
 29. GBA considers the 75 per cent NCR planning threshold to be reasonable, but notes it is deterministic in nature. GBA notes that, when mandated as a regulatory requirement, deterministic criteria can give rise to suboptimal outcomes by limiting the options available to a service provider to manage risk in specific situations.
 30. For example, GBA notes the optimum loading at which a particular substation might be loaded could be impacted by the available distribution transfer capacity and the extent to which the transformer capacity in adjacent substations is utilised. It would be reasonable for the maximum allowable transfer to be a higher proportion of total transformer capacity if load could be readily transferred to adjacent substations following a transformer failure than if this option was not available.
 31. GBA notes that insufficient information was provided in Western Power's application for it to undertake a full analysis, particularly in relation to the detail and timing of Western Power's planned augmentations and the available risk mitigation options. However, GBA considers there is sufficient information in the application for it to be satisfied that the risk in granting the exemption application is low and is likely to be overshadowed by the potential for suboptimal or inefficient investment if the exemption is not granted.
 32. GBA recommends that the exemption should be approved.

Authority's Considerations

33. In considering whether to approve Western Power's application for exemption from certain aspects of the Technical Rules, the Authority must, having regard to the effect the proposed exemption will have on the service provider and users of the network and any interconnected network, grant the exemption if it determines that in all the circumstances, the disadvantages of requiring compliance with the Technical Rules are likely to exceed the advantages.
34. The Authority notes there is considerable uncertainty in the demand forecasts for the Mandurah area. Proceeding to invest now based on the prescriptive requirements of the Technical Rules could result in significant underutilised assets in future.
35. Based on Western Power's application and GBA's advice, it appears the risk of interruption to customers over the next five years is small and mitigation measures

can be put in place to mitigate this further. The Authority also notes Western Power has a transformer capacity augmentation plan in place to ensure that both the Mandurah and Meadow Springs substations will comply with the NCR criterion requirement of the Technical Rules by 2020. Furthermore, this investment could be brought forward in the event that projected demand increased above the current forecasts.

36. Taking account of the information in Western Power's application and the advice of GBA, the Authority considers Western Power's proposed investment strategy provides a balance between minimising the financial risk of premature investment in the Mandurah load area and the risk to customer supplies. It also provides flexibility for changes to be made in response to changes in forecast demand.
37. Accordingly, the Authority considers an exemption from clause 2.5.4(b) of the Technical Rules to enable Western Power to adopt its proposed risk based approach, rather than the deterministic requirement of the Technical Rules, is appropriate.
38. The Authority notes the comments from Community Electricity in relation to the appropriate use of exemptions. Whilst Community Electricity supports avoidance of over investment in the network, it notes that Western Power appears to intend to proceed with its proposal with or without the exemption and that granting the exemption will enable it to do so with reduced "impact on its compliance, reputation and financial risk exposure". As outlined above, the Authority considers Western Power's proposed risk based investment strategy is more efficient than what would be required using the deterministic planning criterion in the Technical Rules. To enable Western Power to use a different planning methodology from the one prescribed in the Technical Rules, an exemption is required.
39. However, as noted in GBA's report, the information included in Western Power's submission in relation to the planned investment and mitigation of risks is limited. The Authority considers future applications should be customer focussed with a comprehensive explanation of the drivers behind Western Power's proposed course of action and its risk assessment to enable stakeholders to better understand and assess the proposal in terms of its benefits to customers.
40. The Authority also notes GBA's recommendation regarding reviewing the wording of clause 2.5.4 and the more general comments GBA has made in relation to the shortcomings of prescriptive planning standards. The Authority notes that the State Government is currently considering the transfer of network regulatory functions to the national regime. The Authority recommends that these points be considered by the project group investigating the means for this transfer.