



Economic Regulation Authority

Application for exemption from the Technical Rules – Bounty Substation and Kondinin-Bounty Sub-Network

Determination

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Economic Regulation Authority

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1. Determination

Western Power submitted an application to the Economic Regulation Authority for exemption from compliance with clause 2.5.2.2 (N-1 criterion) of the Technical Rules in respect to the Kondinin-Bounty sub-network and the Bounty zone substation.¹

The application has been made under section 12.40 of the Electricity Networks Access Code 2004.

The Technical Rules are the standards, procedures and planning criteria governing the construction and operation of an electricity network and are required under the Access Code for all covered networks.

A service provider may apply to the ERA for an exemption from one or more requirements of its technical rules. The ERA 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.

The ERA issued an invitation for submissions on 15 August 2023, with a closing date of 29 August 2023. As part of this consultation, the ERA prepared an issues paper to assist interested parties. One submission was received and has been published on the ERA's website.

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 ERA has determined that the disadvantages of requiring compliance with the Technical Rules are likely to exceed the advantages. The ERA, therefore, has granted the following exemption:

- Part A: In respect to the Kondinin-Bounty sub-network KDN-BNY 81 transmission line, an exemption from clause 2.5.2.2 so that peak load of up to 29 MVA may be supplied at N-0 reliability.
- Part B: In respect to the Kondinin-Bounty sub-network KDN 220/132/33 transformer, an exemption from clause 2.5.2.2 so that peak load of up to 27MVA may be supplied at N-0 reliability.
- Part C: In respect to the Bounty zone substation, an exemption from clause 2.5.2.2 so that total load up to 27MVA may be supplied at N-0 reliability.
- The exemption is subject to Western Power ensuring:
 - Reliability and quality of supply to existing network loads will not be adversely affected.
 - New loads connected to the KDN-BNY sub-network and Bounty zone substation will be supplied on a curtailable basis.

The reasons for the Authority's decision are set out below.

¹ Terminology such as "N-1" is commonly used for describing the level of security of the transmission system. N-1 requires supply to be maintained and load shedding avoided if one transmission element, such as a transmission line or transformer fails. "N-0" means, if there is a loss of a single transmission element (a transmission line or a transformer), power cannot be restored until the transmission element has been repaired or replaced.

2. Reasons

2.1 Access Code Requirements

Section 12.41 of the Access Code requires the ERA 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 ERA 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.

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.
- May be varied or revoked by the service provider after reasonable notice to the network persons.

2.2 Western Power's application

The Bounty zone substation is approximately 370 km east of Perth. It is supplied by a 154 km single circuit transmission line from the Kondinin zone substation. The Kondinin zone substation is located midway between Muja and West Kalgoorlie.

The Bounty zone substation supplies two existing mining and mineral-processing loads via a 57 km distribution feeder. There are no residential customers supplied from the Bounty zone substation and no adjoining distribution networks for interconnection. The total contracted load for the two connected customers is 9.7 MVA.

The default planning criterion for most of the Western Power transmission network is N-1. This means it is designed to a level of network redundancy so that if a single transmission element (a transmission line or transformer) fails, power is not lost as it is rerouted via an alternative transmission asset.

However, clause 2.2.5.1(b) of the Technical Rules permits sub-networks with a peak load of less than 20 MVA and zone substations with a peak load of less than 10 MVA to be designed to N-0. This means, if there is a loss of a single transmission element (a transmission line or a transformer), power cannot be restored until the transmission element has been repaired or replaced.

As the current load on the Bounty zone substation is less than 10 MVA, the transmission line from Kondinin and the Bounty zone substation are designed to N-0.

Western Power is currently progressing a connection application for connection of a new lithium mine and concentrating facility with a load of 13.5 MVA to the Bounty zone substation. This will increase total demand on the Kondinin – Bounty sub-network and Bounty zone substation to 23.2 MVA. Consequently, it will be above the threshold specified in the Technical Rules that allows an N-0 design and will instead be captured by clause 2.5.2.2 that requires it to be designed to N-1.

Western Power has identified three network elements that it considers would need to be upgraded to meet an N-1 design:

- Build a second transmission line from Kondinin to the Bounty substation.
- Augment the Kondinin zone substation.
- Augment the Bounty zone substation.

To enable the new customer to be connected as soon as possible, Western Power proposes initially connecting the customer on a non-firm basis with load shedding capability and is seeking the following exemptions from the Technical Rules:

- Part A – Western Power has estimated the cost of building a new transmission line from Kondinin to the Bounty substation would be in excess of \$100 million and would not be economic for the forecast load. So it is seeking a permanent exemption from clause 2.5.2.2 for the transmission line between the Kondinin and Bounty zone substations to enable a peak load of up to 29 MVA to be supplied at N-0 reliability subject to Western Power ensuring the reliability and quality of supply to the existing network loads will not be adversely affected.
- Part B – Western Power has identified several options to augment the Kondinin substation but it will take a number of years to determine the best option and then plan and build. So it is seeking a 5-year temporary exemption for the transformer at the Kondinin zone substation to enable a peak load of up to 27MVA to be supplied at N-0 reliability subject to Western Power supplying new loads on a curtailable basis and ensuring the reliability and quality of supply to existing network loads will not be adversely affected.
- Part C – Western Power has identified several options to augment the Bounty substation but it will take a number of years to determine the best option and then plan and build. So it is seeking a 5-year temporary exemption for the Bounty zone substation to enable peak load of up to 27MVA to be supplied at N-0 reliability subject to Western Power supplying new loads on a curtailable basis and ensuring the reliability and quality of supply to existing network loads will not be adversely affected.

Western Power states that the new customer load will be connected on a non-standard access contract with load shedding capability. Western Power has provided a letter confirming the new customer acknowledges the risk of connecting on this basis and prefers to accept this risk rather than deferring its project for several years.

Western Power submits that the requested exemptions will allow for timely supply to the new applicant while not altering the existing customer's reliability due to planned or unplanned outages. Rejecting the exemptions will delay the new customer's connection and mining operation for 3-5 years.

2.3 Public submissions

A submission was received from IGO Forrester Nickel Operation. IGO owns and operates the existing nickel mine and concentrate process plant connected to the Bounty Substation.

IGO states it has previously investigated increases to its existing contract maximum demand with Western Power but has kept it at 9.7MVA because of the current N-0 design of the substations and the N-1 requirement that would be triggered if the peak load was greater than 10MVA.

IGO is concerned that there will be an increased risk of transformer failure due to the increased load from the new customer. It noted it had experienced many power interruptions in the past. Some were due to bushfires but there were also extended outages required by Western Power to undertake maintenance activities. In particular, IGO noted an extended outage in January 2022 that resulted in the concentrate processing plant needing to hire temporary diesel generation and the mine and accommodation needing to run diesel generation continuously for days.

IGO also noted that it experiences many power outages that it considers are due to the length of the line between its mine and the design of the substation and protection systems. It considers it is experiencing higher power outages than most other customers and encouraged the ERA to seek System Average Interruption Duration Index (SAIDI) information to validate this statement.

IGO agrees that building a second transmission line from Kondinin to Bounty is not warranted. It noted the existing line can accommodate the existing and new load and that the asset is primarily composed of components easily replaced and maintained.

However, IGO considers a suitable N-1 transformer and switching arrangement is needed at the Kondinin and Bounty substations to:

- Ensure increased loads from a new connection will not accelerate the failure of the existing “hard-to-replace aged ... transformer asset[s]”.
- Increase fault currents to improve protection grading and reduce false trips.
- Reduce the need for load-shedding control which will increase production loss and interruption to the users.

2.4 ERA’s considerations

In considering whether to approve Western Power’s application for exemption from certain aspects of the Technical Rules, the ERA 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.

The ERA appointed a technical advisor, Geoff Brown and Associates (GBA), to provide advice in relation to Western Power’s application.

As noted in Western Power’s application, granting the exemption will enable a new lithium mine and concentrator to be connected. Rejecting the exemption would delay the connection and mining operation for three to five years.

The new customer has agreed to be connected on a non-standard access contract with load shedding capability. It acknowledges the risk of connecting on this basis and prefers to accept this risk rather than deferring its project for several years.

Western Power submits that connecting the new customer on a curtailable basis and granting exemptions from the N-1 planning criteria will not alter the existing customer’s reliability.

The existing customer (IGO) has raised concerns about its current reliability and considers that there will be an increased risk of transformer failure due to the increased load from the new customer.

The ERA has reviewed outage data for the last six years and agrees with IGO's view that it appears to be on the relatively high side compared to most customers. The average SAIDI for IGO appears to be in the region of 2,000 minutes compared to the average for all rural short customers of about 193 minutes. However, there seems to have been a significant improvement in 2022/23 with no unplanned interruptions reported.

As set out in the ERA's recent decision on Western Power's fifth access arrangement, some customers, particularly in regional areas, are experiencing a poor level of supply. The ERA has required Western Power to develop a strategy to improve regional reliability. Western Power has advised that it will engage with IGO on the concerns it has raised about reliability.

However, most of the unplanned outages are related to the distance of the load from the substation and the distribution feeder. In relation to the exemption being sought for the transmission sub network, Western Power has advised that the new load connection and exemption application will have no impact on reliability or performance of the transformers.

The transformers are about two-thirds through their expected life and reported to be in good condition. As noted in GBA's report, the Bounty transformer will need to be carefully managed to mitigate the risk if any of the cooling systems on the transformer fail, which Western Power has indicated it will. GBA notes:

- If the transformer oil pump and air fans are both working, the transformer rating is 27MVA, and this would be the situation most of the time. Should the air fans fail the transformer rating would reduce to 22MVA, and if the oil pump fails the transformer should be able to be safely loaded to somewhere between 22MVA and 27MVA. The transformer rating would only be reduced to 20MVA if both the oil pump and the fans were out of service at the same time. This is unlikely.
- Western Power will be able to monitor the transformer load through its SCADA system and GBA expects a cooling system failure to be alarmed. Importantly, should a potential transformer overload become apparent, Western Power is able to ask the lithium mine to reduce its load. The lithium mine has confirmed that it can do this using its onsite generators.

Taking account of the information provided by Western Power and advice from GBA, the ERA is satisfied that granting the exemption will not adversely affect the quality of supply currently provided to IGO.

In any case, the exemption approved by the ERA is subject to Western Power ensuring:

- Reliability and quality of supply to existing network loads will not be adversely affected.
- New loads connected to the KDN-BNY sub-network and Bounty zone substation will be supplied on a curtailable basis.

In relation to a time limit on the exemption, GBA's advice identifies other developments likely in the next few years that will affect the requirements for the Kondinin – Bounty sub-network and the Bounty zone substation:

- The lithium mine is likely to expand, requiring a larger load, and may connect directly into the transmission line (rather than the Bounty substation).
- Synergy's 150 MW King Rocks windfarm is expected to be connected to the Kondin – Bounty sub-network.

It is probable that the capacity of the sub-network will need to be increased to supply these new projects rather than to achieve compliance with the arbitrary planning criteria in the Technical Rules. However, if a time limit is set for the exemption, Western Power may focus on network solutions rather than negotiating with the users to agree a cost-effective subnetwork development plan that provides the power transfer capacity they need at the level of security they require. This could include a combination of users' onsite generation/storage/demand management and network investments.

For consistency with the Access Code objective to promote efficient investment in, and efficient operation and use of, services of networks in Western Australia for the long-term interests of consumers, the ERA considers it is better to not include a time limit on the exemption. The requirement to ensure the reliability and quality of supply to existing network loads will ensure that any negotiations to change the capacity or configuration of the subnetwork will not result in an adverse effect on existing customers.