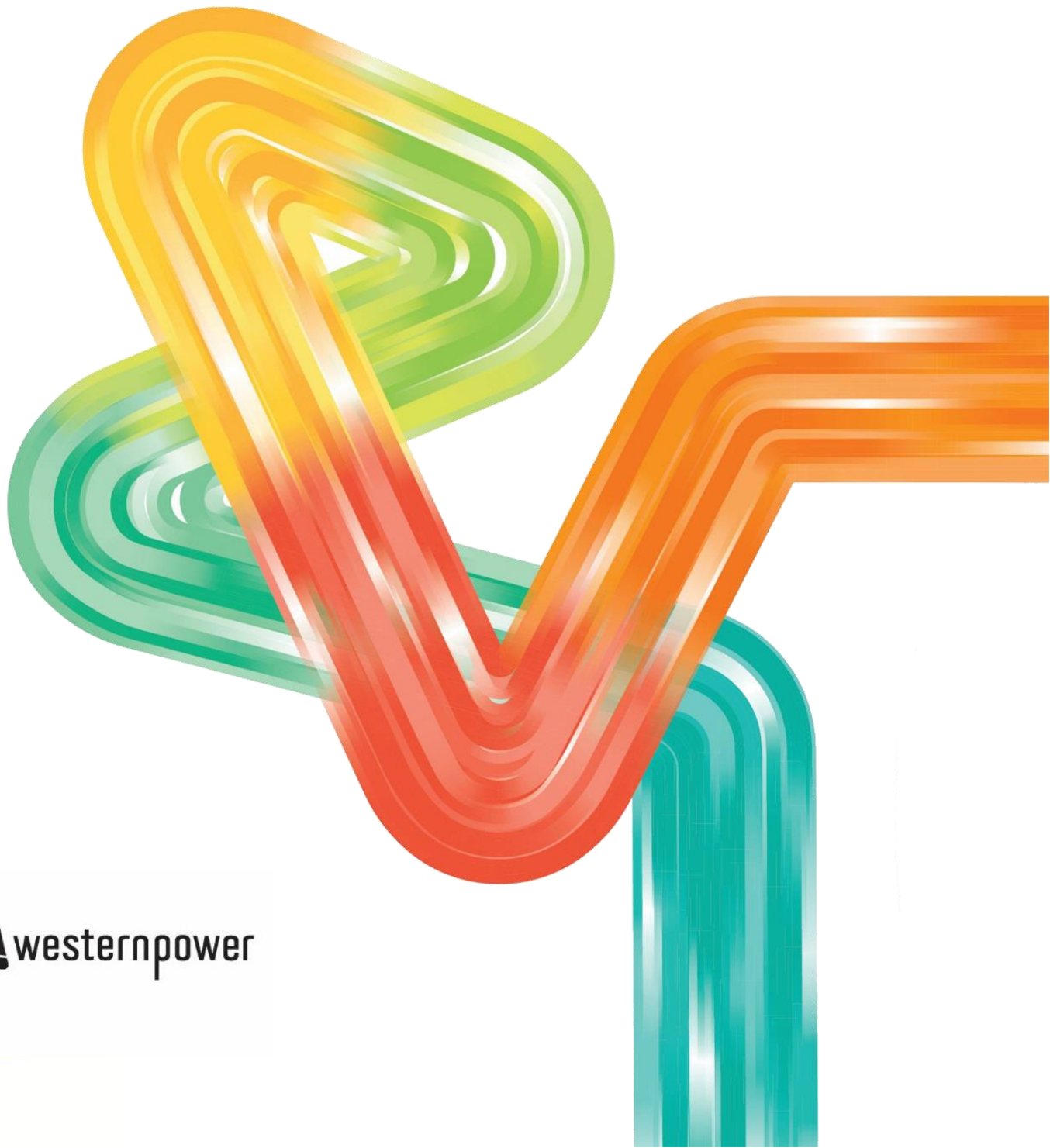


Submission for exemption from compliance with the Technical Rules

Bounty Substation and Kondinin-Bounty Sub-Network

7 July 2023



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Glossary

Acronym/Term	Meaning
BNY	Bounty Substation
CMD	Contracted Maximum Demand
EC	East Country Load Area
EGF	Eastern Goldfields Load Area
ELPS	Eastern Goldfields Load Permissive Scheme
ERA	Economic Regulation Authority
FY	Financial Year
KDN	Kondinin substation
kV	Kilo Volts (1000 Volts)
MRT	Merredin terminal
MVA	Apparent Power unit (Mega Volt Amp)
MW	Real Power unit (Mega Watts)
SLD	Simplified Single Line Diagram
TR	Technical Rules
WP	Western Power

1. Executive Summary

This submission requests the Economic Regulation Authority (ERA) grant Western Power (WP) exemption from complying with clause 2.5.2.2 (N-1 criterion) of the Technical Rules (TR) in respect to the Kondinin - Bounty (KDN-BNY) sub-network and the Bounty zone substation (BNY).

- The existing network is N-0 compliant based on existing load;
- A new block load causes the network to exceed N-0 planning limits, therefore drives the need for N-1 compliance;
- 3 network elements would need to be upgraded to achieve N-1 compliance:
 - 2 of these will be resolved, but timeframes don't meet the customer's needs, so temporary exemption is proposed until we can complete the work (5 years)
 - 1 of these is not economically viable, so permanent exemption is proposed

The KDN-BNY sub-network comprises a series of N-0 equipment including the 220/132/33kV transformer at KDN, a 154km 132kV line from Kondinin to Bounty and a 132/33kV transformer at BNY. BNY hosts two 33kV connected loads only and current peak demand is closely aligned with contracted maximum demand of 9.7MVA, which is compliant with N-0 criterion of 2.5.2.1(b).

WP is currently progressing a connection application for connection of a 13.5MVA mining load adjacent to BNY substation, which will increase BNY loading up to an expected 23.2MVA. Due to the aggressive timing requirements of the new mining load, Western Power proposes an interim supply via the existing 27MVA 132/33kV BNY transformer while a permanent solution is developed. Permanent options at BNY include either installing a second 132/33kV transformer at BNY or moving the new 13.5MVA mining customer to a 132kV connection. Installing a second 220/132/33kV transformer at KDN will partially resolve the 20MVA sub-network non-compliance. Western Power proposes that duplicating the 150km 132kV line from KDN to BNY is not financially viable.

WP is therefore seeking exemption to TR 2.5.2.2 as outlined in the table below. WP proposes this sub-network and zone substation will continue to be operated in accordance with TR 2.5.2.1, N-0 Criterion.

Network	Criteria	Reason for not meeting the criteria	Exemption (requested)
Part A: KDN-BNY 81	2.5.2.2 N-1 Criterion of the sub-network with peak load of greater than 20MVA	Total line loading increased - greater than 20MVA To achieve full compliance would require duplicating KDN-BNY 132 circuit (154km line) – The expected cost in excess of \$100M, therefore deemed uneconomical.	Permanent – upper limit: 29MVA
Part B: KDN T1	2.5.2.2 N-1 Criterion of the sub-network with peak load of greater than 20MVA	Total load at KDN T2 increased - greater than 20MVA Customer timing is not aligned with network augmentation timing.	Temporary – 5 years – upper limit 27MVA
Part C: BNY T1	2.5.2.2 N-1 Criterion of zone substations with a peak load of greater than 10 MVA	Total loading of BNY T1 increased – greater than 10MVA Customer timing is not aligned with network augmentation timing.	Temporary – 5 years – upper limit 27MVA

In summary, WP considers the advantages of approving the exemption to TR clause 2.5.2.2 outweigh the benefits of achieving compliance with the same.

2. Overview of supply to Bounty substation

BNY is situated in the East Country (EC) Load Area, approximately 370km east of Perth. It is supplied by a single-circuit 132kV transmission line, KDN-BNY 81, extending approximately 154km from Kondinin (KDN), as per Figure 1. KDN is located midway between Muja and West Kalgoorlie terminals and supplied via the single circuit 220kV line. The default planning criteria for majority of the network is N-1, however this subnetwork meets the N-0 planning criterion due to the load (total less than 20MVA) in this area.

BNY supplies two existing mining and mineral-processing loads¹ via a 57km long distribution feeder. There are no residential customers supplied from the substation and no adjoining distribution networks for interconnection.

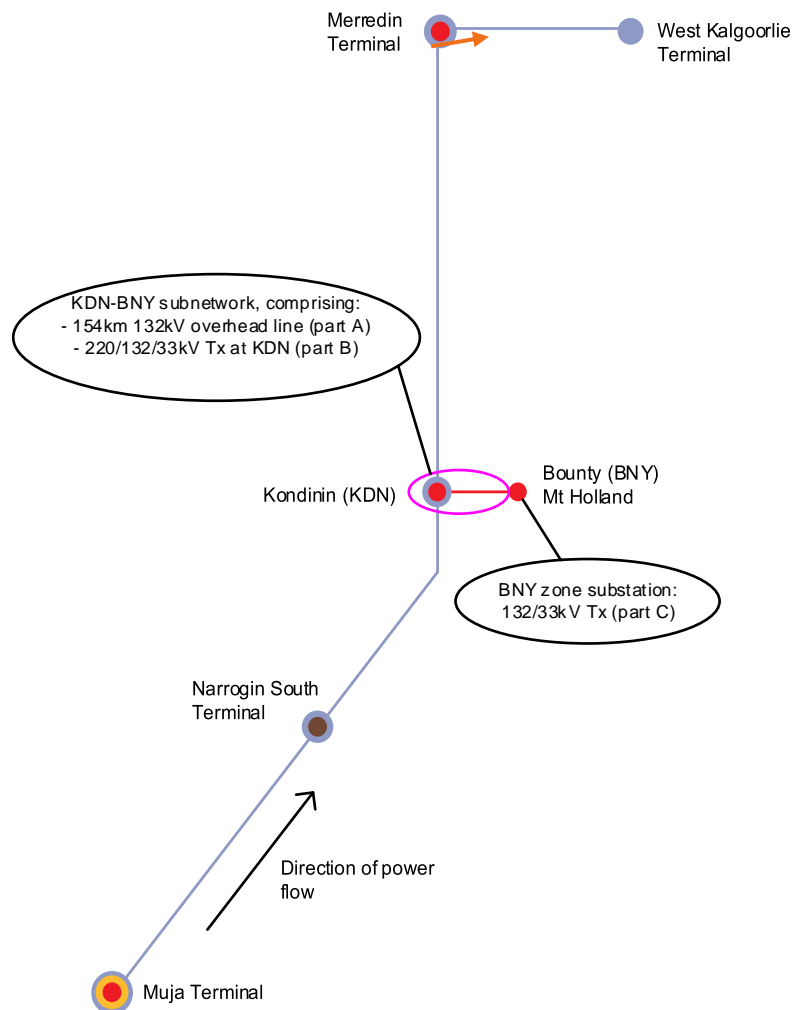


Figure 1: Network supplying Bounty substation²

¹ The existing loads are distribution connected customers, that have contracts in place with retailers. These customers are connected under a standard reference service and Western Power has rights under Retailers Electricity Transfer Access Contract (ETAC) to curtail services for planned works.

² Distribution feeders not shown.

2.1 KDN-BNY 81 transmission line (Part A)

The 154km, single-circuit 132kV transmission line from KDN to BNY was established in 1993 and is constructed of tubular steel poles with 'Grape' conductor and an overhead earth wire. The line has a protection limit of 29MVA and reliability is considered good. KDN-BNY 81 is radial and remote, with no nearby substations for interconnection.

WP is able to reasonably operate and maintain KDN-BNY 81 line, and without a change to the peak load, WP has no driver to augment this line.

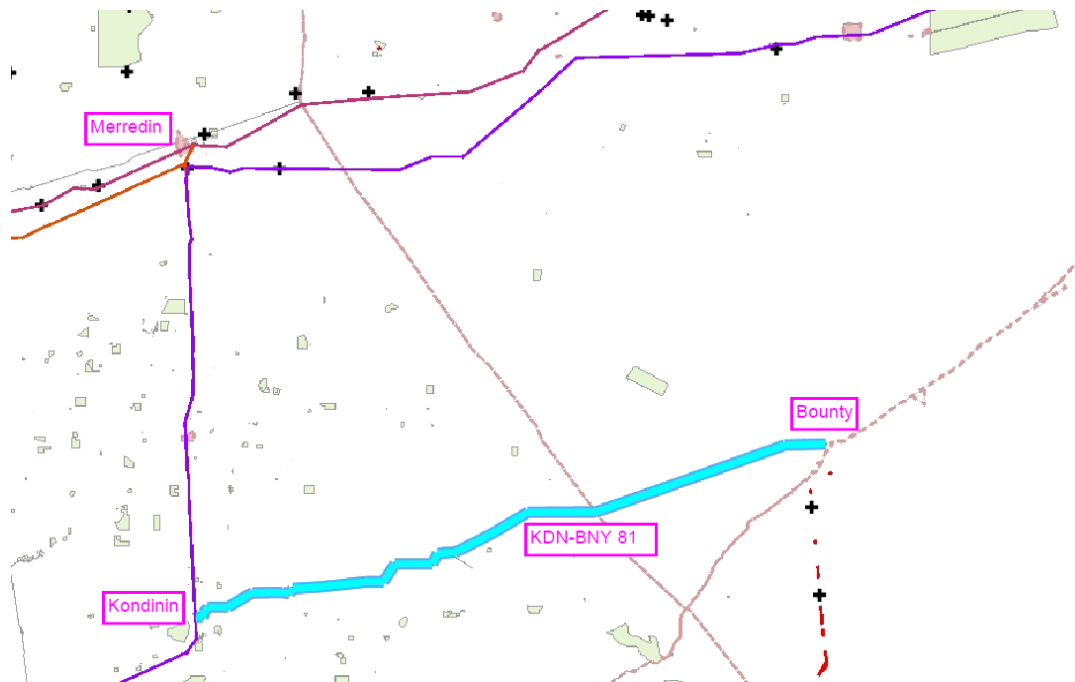


Figure 3: Geographical representation of KDN-BNY 81 line

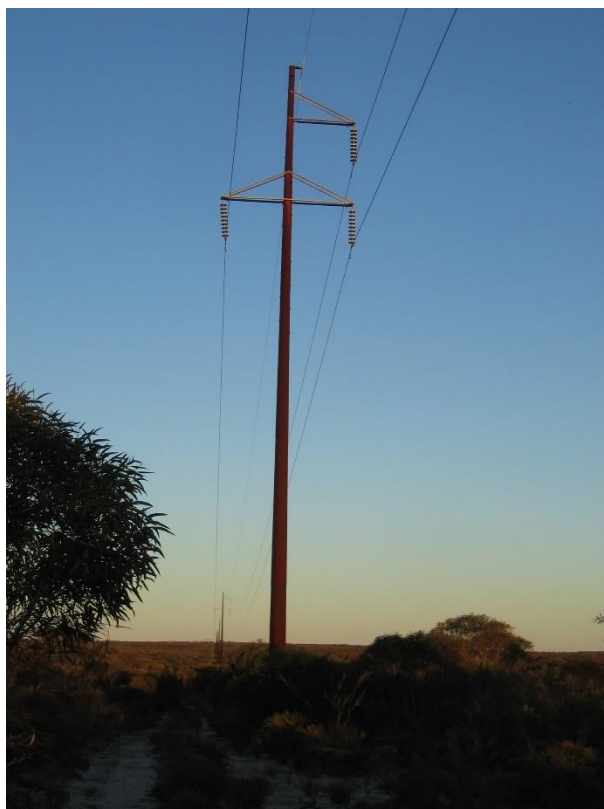


Figure 4: Typical pole KDN to BNY 81 line

2.2 Kondinin Substation (Part B)

KDN substation was established around 1980 with a single 45MVA 220/132/33kV transformer supplying BNY and the local 33kV distribution network. The transformer is around 30 years old and described as good condition. A second 220/33kV transformer provides secure supply to the residential and farming area around Kondinin townsite. Local load supplied out of Kondinin 33kV network is approximately 2-3 MW. WP is able to reasonably operate and maintain KDN, and without a significant change to the peak load, WP has no driver to augment this substation.

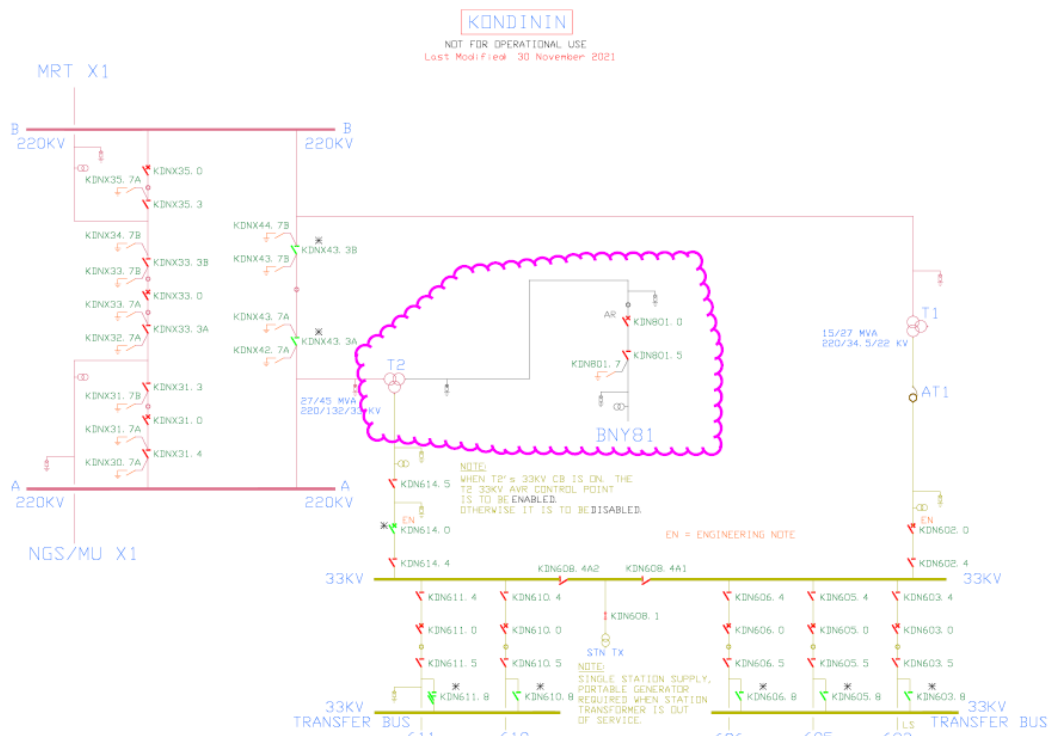


Figure 2: Kondinin substation SLD

2.3 Bounty substation (Part C)

BNY substation was established in 1993 with a single 27MVA 132/33kV transformer. The transformer is around 30 years old and is described as good condition. The transformer is lightly loaded at around 35% of name plate capacity.

WP is able to reasonably operate and maintain BNY, and without a significant change to the peak load, WP has no driver to augment this substation.

Based on the current risk assessment, WP does not carry strategic spares for this transformer.

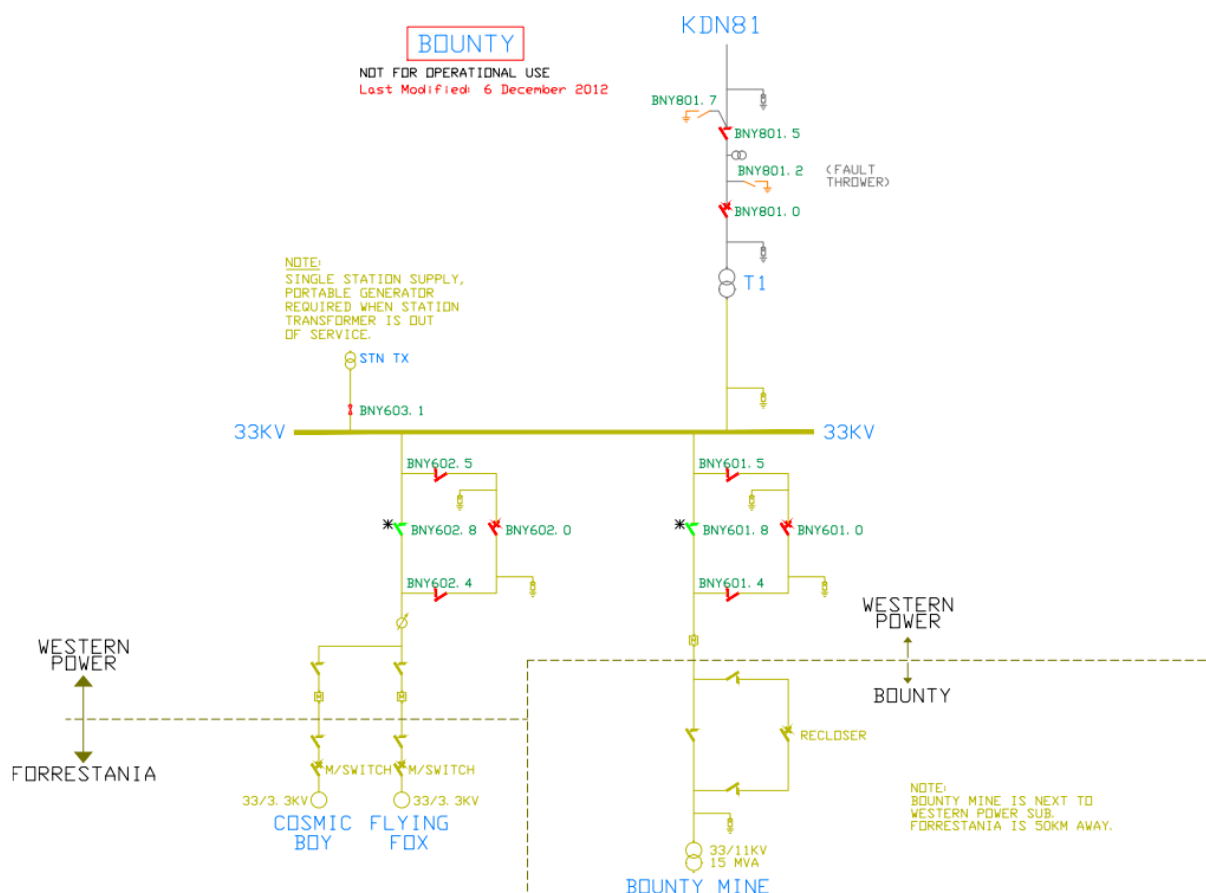


Figure 5: Bounty substation

Note: in the above diagram, 'Bounty Mine' feeder is currently not in operation. The connection point is to be repurposed for this new load connection.

2.4 Current and future load at Bounty substation

There are two existing mining loads connected to BNY at 33kV, with a combined contract maximum demand of 9.669 MVA.

2.4.1 New applicant

WP is currently working with an applicant for 13.5MVA load for a lithium mining and concentrating facility adjacent to BNY substation, with a staged required in service date from 5MVA in February 2023 up to 13.5MVA by Q3 2023. This new customer load will be connected on a non-reference basis, with load shedding capability. This new connection will take the loading up to an expected 23.2MVA, exceeding the 10MVA and 20MVA thresholds allowed under the N-0 planning criterion, thereby requiring compliance with the N-1 planning criterion.

WP is considering connecting the load on an interim basis at 33kV via the existing 27MVA 132/33kV BNY transformer. This will require an exemption from clause 2.5.2.2 of the Technical Rules to continue to operate under the N-0 planning criterion.

The customer acknowledges the risk of connecting on an N-0 basis of this location and prefers to accept this risk as an alternative to deferring their project for several years – refer Attachment A.

3. Options to achieve compliance with N-1 planning criterion

WP has considered the following options to become compliant with the N-1 planning criterion to supply the new mining load.

3.1 KDN-BNY sub-network (Parts A & B)

There are three potential options to achieve compliance with the N-1 planning criterion for the KDN-BNY sub-network. A fourth option is added that achieves partial compliance. Detailed cost estimates have not been prepared as the expected cost far outweighs the benefit.

3.1.1 Partial compliance – second 220/132kV transformer at KDN (Part B only)

This option involves:

- Replacing the existing 220/33kV T1 transformer at KDN with a 220/132/33kV transformer
- Build an interconnect between new transformer and 132kV line circuit at KDN

While not achieving full N-1 compliance for the KDN-BNY sub-network, this solution is expected to reduce the duration of planned and unplanned outages due to KDN 220/132/33kV T2. Faults effecting a transmission lines can generally be repaired in hours to days, where total failure of T2 would result in prolonged outage for several months.

This partial compliance solution represents best value trade off between customer reliability and capital cost for the sub-network, to be delivered within the 5 years temporary exemption period. Sizing of the transformer will be determined based progress with a generation applicant.

The estimated cost of this option is \$8.7 - \$15M.

3.1.2 Duplicate KDN-BNY circuit (Parts A & B)

This option involves:

- Replacing the existing 220/33kV T1 transformer at KDN with a 220/132/33kV transformer
- Build new 132kV line circuit at KDN
- Build new 154km line from KDN to BNY
- Build new 132kV bus at BNY

The estimated cost of this option is in the order of \$133M.

Notes:

- Significant environmental challenges are anticipated.
- Upgrading the existing KDN-BNY 81 line to dual circuit is discounted, as the existing poles are unlikely to take the additional loading and the outage required for construction would be significant.

3.1.3 Merredin interconnect (Parts A & B)

Alternatively, a new line could be constructed from Merredin terminal (MRT). This option involves:

- Build new 132kV line circuit at MRT
- Build new 160km line from MRT to BNY

- Build new 132kV bus at BNY

The estimated cost of this option is in the order of \$129M.

Notes:

- Significant environmental challenges are anticipated.
- This option does not require 3.1.1 (new 220/132/33kV Tx at Kondinin) to achieve compliance.

3.1.4 Yilgarn interconnect (Parts A & B)

This option is the shortest geographically between BNY and the 220kV network. This option involves:

- Establishing a new 220/132kV terminal at Yilgarn
- Build new 95km line from Yilgarn to BNY
- Build new 132kV bus at BNY

The estimated cost of this option is in the order of \$106M.

Notes:

- Significant environmental challenges are anticipated.
- This option does not require 3.1.1 (new 220/132/33kV Tx at Kondinin) to achieve compliance.

3.2 BNY zone substation (Part C)

Existing loading of BNY is 9.7MVA which complies with N-0 criterion in TR 2.5.2.1. Adding the new applicant 13.5MVA load will take the transformer loading to 23.2MVA, which exceeds the N-0 criterion of 20MVA.

The existing BNY transformer is unique in WP's inventory and we currently carry no strategic spares. Replacement of the transformer on failure is expected to take 18-24 months, during which time supply to the 33kV loads around BNY is not possible due to the isolated location and lack of interconnecting network. While the likelihood of catastrophic failure does not increase, the consequence does increase as a result of increase in unserved load. Therefore, WP proposes that mitigating the adverse reliability experience at BNY, which would be exacerbated by the proposed new connection, is a high priority should the new applicant proceed to an Access Offer.

An interim temporary exemption from compliance with N-1 planning criterion is sought for the Bounty zone substation to enable connecting the new mining load and continuing to supply at N-0 reliability. The temporary exemption is sought for a period of 5 years to enable a N-1 compliant solution to be delivered. The five-year period is required, for WP and customer to plan, design, procure and construct.

WP is considering two options in conjunction with the new load customer:

1. Installing a second 132/33kV transformer at BNY.
2. Moving the new 13.5MVA mining customer to a 132kV connection.

4. Exemption Request

4.1 Statement of Technical Rules exemption

Under section 12.40 of the *Electricity Networks Access Code 2004*, WP as the *Service Provider* for the *Western Power Covered Network* hereby applies to the Authority for exemption from the N-1 criterion of clause 2.5.2.2 of the TR, as follows.

Part A

In respect to the KDN-BNY sub-network KDN-BNY 81 line, a permanent exemption from clause 2.5.2.2 is sought such that the peak load of up to 29 MVA, the line's protection limit may be supplied at N-0 reliability.

Exemption is sought based on adherence by Western Power to the following provisions:

- 1. Reliability and quality of supply to existing network loads will not be adversely impacted.*

Part B

In respect to the KDN-BNY sub-network KDN 220/132/33 transformer, a temporary exemption from clause 2.5.2.2 is sought such that the N-0 criterion may be applied to the sub-network with a peak load of up to 27MVA.

Exemption is sought based on adherence by Western Power to the following provisions:

- 1. New loads will be supplied on a curtailable basis;*
- 2. Reliability and quality of supply to existing network loads will not be adversely impacted;*
- 3. The exemption will be time bound to 5 years maximum, commencing from the time at which load at KDN-BNY sub-network load exceeds 20MVA.*

Prior to expiry of 5 year exemption period, one of the solutions proposed in section 3 shall be implemented.

Part C

In respect to the Bounty zone substation, a temporary exemption from clause 2.5.2.2 is sought such that total load up to 27MVA may be supplied at N-0 reliability.

Exemption is sought based on adherence by Western Power to the following provisions:

- 1. New loads will be supplied on a curtailable basis;*
- 2. Reliability and quality of supply to existing network loads will not be adversely impacted;*
- 3. The exemption will be time bound to 5 years maximum, commencing from the time at which load at BNY exceeds 10MVA.*

Prior to expiry of 5 year exemption period, one of the solutions proposed in section 3 shall be implemented.

4.2 Background to Exemption Request

The 'default' planning criterion for the majority of WP network is N-1, which mandates continued supply and avoidance of load shedding for loss of any single transmission element (a transmission line or a transformer).

Since energisation of the transformer at BNY in 1993, the substation has been connected to the single 132kV circuit radial transmission line, and has been supplying a maximum load that is less than 20MVA making it N-0 criterion compliant³. Adding the new applicant's 13.5MVA load will exceed the N-0 sub-network limit by 16% to 23.2MVA. Reliability to the existing two customers connected to BNY will not change as a result of approving part A of the exemption request as they will still be without supply for the same planned and unplanned outages. The new applicant will be connected on a non-reference service.

For part B and C of the exemption request, the time without power following a major transformer failure results in potential large loss of earning for customers and Western Power, therefore it is appropriate to rectify this situation within reasonable timeframe.

Given this non-compliance, WP is seeking an exemption from TR clause 2.5.2.2 on the basis of the justifications provided in this document.

5. Exemption Assessment

Provided below is WP's assessment of the requested exemption compared with the alternative option of making the BNY and KDN-BNY sub-network N-1 criterion compliant. It details the impact on existing and new users, and an assessment of the risk associated with granting of the exemption.

5.1 Proposed Option – apply for exemptions

The two existing customer loads connected to BNY zone substation are currently connected on a Technical Rules compliant N-0 basis.

Granting the requested exemptions will allow for timely supply to the new applicant while not alter 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.

The Connection Agreement with the new customer will reinforce Western Power's rights to curtail the new non reference load for reliability and maintainability purposes.

5.1.1 KDN-BNY 81 sub-network - KDN-BNY 81 line (Part A)

WP expects no change to existing levels of safety and reliability to the network users in respect to part A of this exemption. Increased loading of the KDN-BNY 81 line through the provision of supply to new applicant is not expected to reduce circuit availability or frequency of planned or unplanned outages, supporting the assertion that the requested exemption will not adversely impact existing customers.

As of July 2020, WP deemed the KDN-BNY 81 transmission line and associated line bay circuits to be in FAIR to GOOD condition in accordance with existing WP asset management practices. It is expected that KDN-BNY sub-network will remain in good condition with continued maintenance, as aligned with good industry practice. It is worth noting that increased load on the KDN-BNY 81 circuit would not adversely impact the asset condition or availability, and that asset rating exceeds the forecast load.

³ Technical Rules clause 2.2.5.1 (b) allows for sub-networks below 20 MVA peak load to comply with N-0 criterion only.

5.1.2 KDN-BNY 81 sub-network – KDN transformer (Part B)

WP expects no change to existing levels of safety and reliability to the network users in respect to part B of this exemption. Increased loading of the KDN-BNY 81 sub-network through the provision of supply to new applicant is not expected to reduce circuit availability or frequency of planned or unplanned outages, supporting the assertion that the requested exemption will not adversely impact existing customers.

As of July 2020, WP deemed the KDN 220/132/33kV T2 and associated circuits to be in GOOD condition in accordance with existing WP asset management practices. It is expected that KDN T2 will remain in good condition with continued maintenance, as aligned with good industry practice. It is worth noting that increased load on the KDN T2 would not adversely impact the asset condition or availability, and that asset rating exceeds the forecast load.

It is expected that access for routine maintenance will be more difficult to negotiate with a third, large customer attached, therefore WP proposes to install a second 220/132/33kV Tx in place of the existing 220/33kV transformer before the next major service is due in January 2027. A Connection Agreement with the Customer will reinforce Western Power's rights to curtail for reasons including maintenance.

5.1.3 Bounty Substation N-0 considerations (Part C)

In addition to the exemptions in respect to the KDN-BNY sub-network, WP is also seeking a temporary exemption from clause 2.5.2.2 such that load of up to 27MVA may be supplied at N-0 reliability at BNY substation (27MVA being the total transformer capacity of the single BNY transformer) (Part C).

The circa 30-year-old transformer at BNY is considered in good condition and expected to continue service for many years to come, due in part to the light loading (around 35% of name plate capacity). Regular maintenance inspections, including transformer oil quality testing, will enable WP to monitor the transformer condition and reduce the risk of premature failure.

It is expected that access for routine maintenance will be more difficult to negotiate with a third, large customer attached, therefore WP proposes to complete the upgrade works before the next major service is due in January 2027.

WP proposes that the connection agreement with the new applicant is contingent on continued progress towards a permanent solution of either a 132kV connection or installation of second 132/33kV transformer.

5.1.4 Impact on new customers

As previously stated, there is currently one generation enquiry for connection via the KDN-BNY 81 line. The area is isolated and natural load growth is unlikely. It is possible that an applicant may seek a new small load of less than 1MVA (for example, to run bore pumps) in the area. The impact of this small load would be immaterial on the operation of anything set out in this exemption application. This exemption application therefore seeks to accommodate any such request by adopting a maximum N-0 load up to the BNY transformer name plate capacity, subject to any new load being connected on a non-reference basis.

Should WP receive any new block-load applications from new or existing customers beyond the nominated 27MVA, the assumptions in this submission will be revisited.

5.2 Risk assessment

WP has identified the following risks in respect to the current (pre-exemption) and future (post-exemption) state⁴.

Post exemption, the risk position is assessed as 'Low'. This target assessment considers the risks (where applicable) which are created/exacerbated as a result of approval of the exemption request.

Table 1: Assessment of Exemption Risks

Risk	Pre-exemption (Current) Risk Rating	Post-exemption Risk Rating	Comment
Reliability (Existing Loads)	Low	Low	<ul style="list-style-type: none"> Availability of supply with respect to KDN-BNY sub-network for existing loads will remain unchanged at N-0. Availability of supply with respect to BNY transformer capacity for existing loads will remain unchanged at N-0.
Reputation (Technical Rules)	Low	Low	<ul style="list-style-type: none"> The exemption mitigates the reputational risk associated with non-compliance of Technical Rules by WP.
Compliance (Customer Access)	Medium	Low	<ul style="list-style-type: none"> The exemption enables WP to issue access offers to customers in respect to N-0 reliability and to meet its regulatory obligation to use reasonable endeavours to provide access to covered services under the Electricity Networks Access Code 2004.
Reputation (New Loads)	Medium	Low	<ul style="list-style-type: none"> Pre-exemption, WP would be unable to connect any new loads in a timely manner, which would have a significant financial impact on them and presents a reputational risk to WP. The exemption mitigates the potential reputational risk associated with customer and stakeholder dissatisfaction with WP's failure to use reasonable endeavours to provide for customer access to the network.

⁴ The risks have been assessed using WP's Enterprise Risk Assessment Criteria.

6. Summary

The advantages and disadvantages of operating BNY zone substation and the KDN-BNY sub-network with exemption to TR clause 2.5.2.2 are summarised below. In summary, WP considers that the advantages outweigh the disadvantages and that an application for exemption is justified and consistent with good electricity industry practice.

6.1.1 Advantages

- Granting the exemption to Part A of the exemption request is a low-cost alternative to network augmentation, given that the estimated cost of the network augmentation required to duplicate the KDN-BNY line to achieve N-1 planning criterion is in excess of \$100M.
- Granting the exemption to Part B and Part C of the exemption request will provide early access to network connection while more permanent solutions, aligned with the evolving requirements of the new customer, are developed and implemented in the medium term.
- As mining loads fluctuate and have historically had a relatively short life compared to the life span of network asset, the exemption will avoid the risk of assets, constructed through augmentation, becoming stranded and redundant.
- WP's assessment of the proposed arrangement shows no adverse impact to existing network users on safety, power quality and low impact on reliability.

6.1.2 Disadvantages

- Taking immediate action to mitigate non-compliance at BNY through installation of a new 132/33kV transformer will not represent an efficient investment, should this customer proceed with its plans for a 'stage 2' load increase, with preference for 132kV connection at BNY.
- New loads connecting at BNY will be subject to load curtailment and will be eligible for a non-reference service only. New loads will be subject to curtailment upon loss of the KDN-BNY sub-network or loss of a transformer at BNY substation. Customers must agree to the proposed connection arrangement and load curtailment scheme and would need to accept the associated impact to their operations. Alternatively, their contributions towards the cost of the required network augmentation in accordance with the *Applications and Queuing Policy* and *Contributions Policy* would be sought.
- The duration of load curtailment resulting from loss of a transformer at BNY or KDN will be extensive in the case of a major failure, with reinstatement of supply dependent on installation of a replacement transformer which will likely need to be purchased⁵.

⁵ WP has only a relatively small number of 132/33kV transformers in its network and all are in service, that is, no spare is currently available.