

Submission to the Economic Regulatory Authority for exemption from the Technical Rules clause 2.5.2.2 for Newmont Mining Services.

03 July 2015.

Glossary of terms

Acronym / term	Meaning
Access Code	Electricity Networks Access Code 2004
APR	Annual planning report
AQP	Applications and Queuing Policy
Authority	Economic Regulation Authority
BTT	Bus tie transformer
CAG	Competing applications group
CMD	Contract maximum demand
DSOC	Declared send out capacity
ETAC	Electricity Transfer Access Contract
kVA	Kilo Volt Amperes (Apparent power)
MRT	Merredin terminal
MVA	Mega Volts Amperes (Apparent power)
MW	Mega Watts (Real power)
PKS	Parkeston substation
PPG	Private parallel generator
RIS	Required in service (date)
Technical Rules	Technical Rules 2011
SWIN	Southwest interconnected network
SWIS	Southwest interconnected system
WKT	West Kalgoorlie terminal
WPN	Western Power network

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Executive summary

This submission seeks an exemption under section 12.40 of the Electricity Networks Access Code 2004 (Access Code) from compliance by Western Power with clause 2.5.2.2 of the Technical Rules. The exemption is necessary to enable Western Power to provide an increased supply capacity being sought by Newmont Mining Services Pty Ltd (Newmont) in the Eastern Goldfields region.

The Technical Rules clause 2.5.2.2 requires that Western Power build and operate the transmission system in the SWIN to meet the N-1 planning criteria. The aim of meeting N-1 requirements is to maintain supply and avoid load shedding if one transmission element, such as a transmission line or transformer, is out of service, irrespective of generation schedules. However, the present network supply arrangements for the Eastern Goldfields mean that there are significant periods of time where spare transfer capacity exists but is unable to be consumed due the requirement to reserve transfer capacity to cater for unforeseeable N-1 contingencies. This exemption seeks to enable restricted access to such transfer capacity with an automated inter-tripping system that will revert to the previous (N-1 compliant) situation only if such a contingent event occurs.

Currently, Newmont have a contract maximum demand (CMD) from the Western Power network of 13 MW. As noted, there is insufficient overall capacity on Western Power's Eastern Goldfields network to meet Newmont's request for an increase in CMD to 45 MW and meet the Technical Rules N-1 criteria. Western Power is currently investigating various network augmentation options. Non-network solutions that might provide additional supply capacity to meet the fully compliant requirements of Eastern Goldfield load applicants through a competing application group (CAG)¹ solution are also being considered.

Since a CAG solution is not expected to be implemented until 2018, Western Power has, at Newmont's request, explored opportunities to offer a constrained connection arrangement until an economically viable alternative solution becomes available. Under conditions where it is not possible to meet the required N-1 criteria, the proposed connection configuration enables an inter-trip to disconnect Newmont's additional load. Although this is a cost-effective and operationally acceptable solution, it could result in non-compliance with clause 2.5.2.2. Thus, the exemption will apply until an economically feasible permanent technical solution can be implemented to provide the customer's supply.

Western Power considers that granting the exemption meets the Access Code objectives, in that it will increase the utilisation of existing transmission system assets until an economically feasible permanent technical solution can be implemented.

¹ Under Western Power's Applications and Queuing Policy (AQP), access seekers affected by a common network constraint are grouped together in a CAG. Western Power then seeks to develop a solution to enable all CAG members' access to the network.

1 Introduction

Newmont Mining Services Pty Ltd (Newmont) provides services to Kalgoorlie Consolidated Gold Mines (KCGM) to support their gold mining operations in Kalgoorlie, 600 km east/north east of Perth. Both Newmont and Newmont Power Pty Ltd (operator of the Parkeston Power Station) are connected at Parkeston through a shared connection point. Figure 1 shows the Eastern Goldfields load supply area whilst Figure 3 in Appendix C shows the Western Power network that feeds this load area. Newmont presently has a contract maximum demand (CMD) of 13 MW at Parkeston for its supply from the Western Power network (WPN), and operates a gas turbine (GT) at Parkeston Power Station to provide supply for the remainder of the site load that exceeds 13 MW.

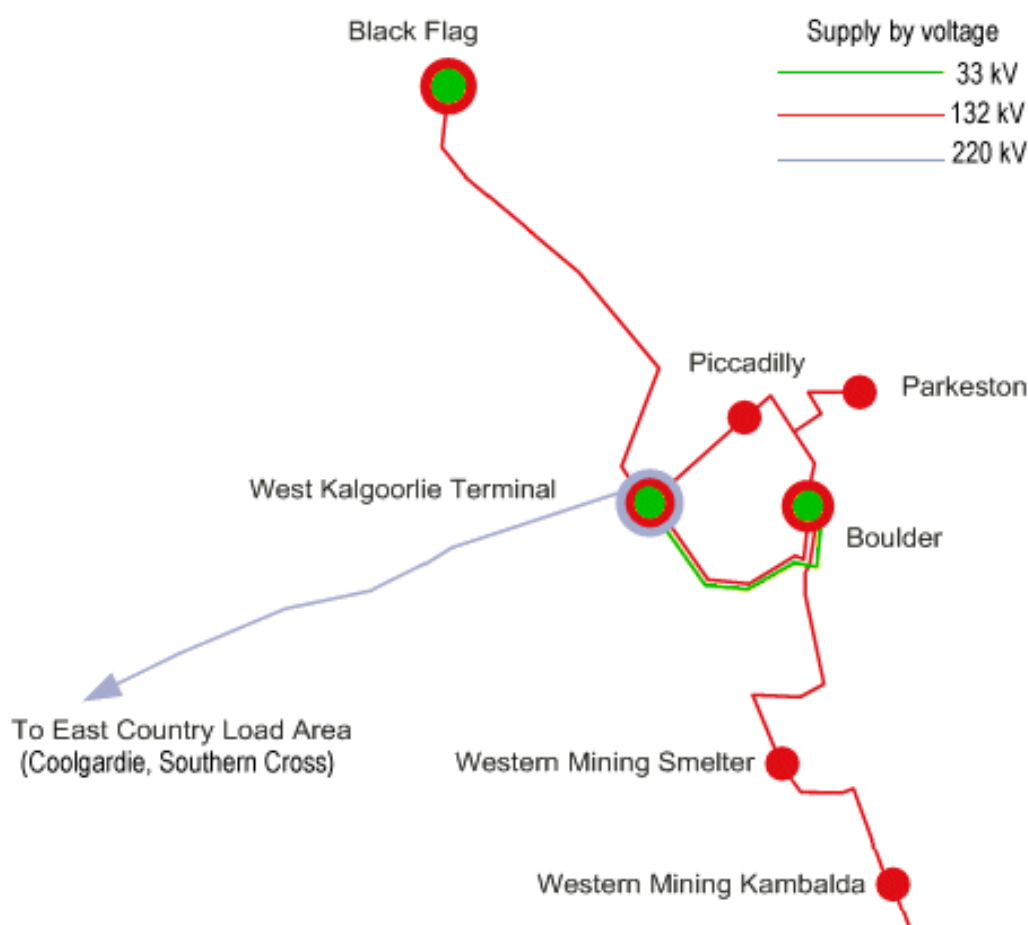


Figure 1 Eastern Goldfields network 'load area'

Newmont is seeking to reduce reliance on the gas power generation at Parkeston Power Station. To do this, Newmont have submitted a connection application to Western Power to increase their CMD from 13 MW to 45 MW.

1.1 Background

Between 2009 and 2013, Newmont operated at a demand of up to 45 MW during overnight periods (with no GTs in service) on a trial basis, and subject to WPN equipment status. The trial data² has been analysed and the determination made that this connection can proceed, albeit contingent on gaining the exemption sought in this submission.

In 2013, complications arose following outages of Muja 330/132 kV bus tie transformer (BTT1) and Muja 220/132 kV transformer (BTT2). In addition, the subsequent relocation of Merredin 220/132 kV MRT1 to replace BTT2 led to the associated outage of one of the saturated reactors at Merredin. These circumstances caused a long delay in moving the trial scheme into a more permanent arrangement.

Newmont's connection application is presently being processed as part of an Eastern Goldfields Competing Application Group (CAG), which seeks to provide additional supply capacity for Newmont and other CAG applicants. Since the expected timing of this solution is after 2018, Western Power has, at Newmont's request, explored opportunities to reinstate an interim arrangement until a CAG solution comes into effect. The viability of this scheme considers:

- the impact of the Merredin saturated reactor outage on voltage stability limits
- the impact and requirements for any changes in organic load growth and changes in User operating patterns
- other requirements, which include power factor requirements, harmonic emission limits, West Kalgoorlie 220/132 kV transformer loading limits and Muja 330/220 kV transformer voltage set-point requirements

Western Power is currently investigating a number of options to alleviate the voltage and transient stability limitations in the Eastern Goldfields load area. The expected replacement of the ageing saturated reactors at Merredin terminal and West Kalgoorlie terminals with new technology is likely to offer an increase in transfer limits in 2018/19 (APR³, p. 53).

Western Power is also investigating Network Control Service options to limit the market requirement for additional load rejection services associated with connection of block loads in the Eastern Goldfields load area.

² Figure 2 shows a 2 year profile of MVA transferred inwards to West Kalgoorlie terminal (WKT)

³ Western Power Annual Planning Report 2014/15.

1.2 Network assessment

Detailed planning studies have showed that the power transfer limit for power flows into WKT is limited by dynamic voltage constraints – and is presently defined to be 155 MW. This is shown in Figure 2, which also shows the power flows into WKT over a 2 year period.

1.2.1 Operating availability

Normal operation with CMD of 13 MW applies from 7 am to 10 pm. Based on historic power transfer information, the proposed solution will facilitate a demand level of 45 MW over night-time periods from 10 pm – 7 am. Should power transfer limits be exceeded during this period, or a transformer forced outage occur, Newmont will receive a signal to commence operation of a GT or trip motor loads. Equipment is designed to be fail-safe and will automatically island the PKS network should the scheme fail to limit transformer loading to within its rating. As such, the service level for the demand above 13 MW and up to 45 MW is considered non-reference.

1.2.2 Inter-tripping scheme

This proposal requires that a network inter-tripping scheme is incorporated in addition to the existing site load control scheme at PKS. The high-speed performance capability of the existing scheme makes it suitable for load inter-tripping should there be a loss of a WKT 220/132 kV transformer.

1.2.3 Power quality

A further pre-requisite of implementing this solution is for Newmont / KCGM to utilise harmonic filters when the PKS GTs are offline to limit harmonic emission levels and to maintain load power factor within required limits. Newmont / KCGM are to determine the necessary set of harmonic filters including sizing, tuning, and quantity, such that both the harmonic emissions are within the allocated limits (see Appendix D), and power factor at the connection point is in compliance with the Technical Rules (see Appendix E), at all times that the PKS GTs are offline.

Due to these requirements, Western Power requires provision of a real-time control signal showing the in-service status of the harmonic filters. Further to this, monitoring harmonics emissions to Australian Standards requirements means the existing ION 7600 meter must be replaced with a higher specification ION 7650 meter.

2 Exemption details

This exemption submission concerns the challenges for the Eastern Goldfields network in meeting the N-1 criteria of the Technical Rules. Insufficient redundancy exists for it to operate on an unconstrained basis at all times when the proposed Newmont connection is in place. The exemption is required because it is not possible (at all times) to maintain supply and avoid load shedding if one transmission element, such as a transmission line or transformer, is out of service, irrespective of generation schedules.

2.1 Technical Rules requirement

Clause 2.5.2.2 of the Rules states:

2.5.2.2 N-1 Criterion

- (b) *For sub-networks designed to the N-1 criterion (excluding a zone substation designed to the 1% risk or NCR criteria in accordance with clause 2.5.4), supply must be maintained and load shedding avoided at any load level and for any generation schedule following an outage of any single transmission element.*

2.2 Exemption connection point details

Schedule 3 of the Newmont's Electricity Transfer Access Contract (ETAC) describes details for this connection point which is shared by Newmont and Goldfields Power Pty Ltd (GPPL) (as the operator of Parkeston Power Station). A summary of the connection point details are shown in Table 1.

Table 1 Connection point details

Applicant	Newmont Mining Services Pty Ltd
Application Number	SW060622
Connection Point Title	Parkeston Interconnection Substation
Address of Premises	Lot 224 Bulong Road, Kalgoorlie WA 6430
NMI or National Market Identifier	8001000279
CMD	45MW non-firm (refer to details in ETAC)
DSOC	16 MW (refer to details in ETAC)
Service	Non-Reference bi-directional Service (as defined in the Code)

2.2.1 Non-reference service details

Subject to the granting of this exemption, schedule 9 of the Newmont connection ETAC will fully describe the non-reference service provided by Western Power at the stated connection point.

3 Exemption impacts and risk

Western Power has investigated options to provide an N-1 compliant solution and presented the estimated costs to Newmont, who has then determined that the costs of a compliant solution do not result in sufficient benefits. Hence, Newmont has requested Western Power to seek the relevant exemption from the Technical Rules and acknowledge (see Appendix A) the non-compliance in their connection agreement. The exemption applies for the duration of Newmont's supply unless otherwise revoked under the provisions of the Access Code.

The Access Code objective incentivises Western Power to maximise the utilisation of network assets. This exemption will allow Western Power to increase Newmont's demand without network augmentation, which is the most efficient approach to maximise network utilisation.

3.1 Network constraints applicable to this connection

Studies have determined network constraints apply to the Newmont's connection application and each is treated as shown in Table 2, except those requiring Technical Rules N-1 exemption.

Table 2 Network constraints

Network constraint	Description	Resolution
Merredin Terminal to Northam 132 kV line	Resolve Merredin Terminal to Northam (MRT-NOR) overloading issues	The transfer limit of the Newmont inter-tripping scheme is defined so that this constraint limitation is not exceeded
220 kV Transmission - transient overvoltage	The 220 kV transmission supply between Muja and the Eastern Goldfields comprises a 650 km single circuit overhead line. The low load compared to the line's surge impedance leads to a surplus of capacitive reactive power which can cause Ferranti over-voltages.	The transfer limit of the Newmont inter-tripping scheme is defined so that this constraint limitation is not exceeded
220 kV Transmission - Load rejection ancillary services	Procurement for ancillary services to help manage over frequency in the SWIS, as defined in clause 3.9.6 of the Wholesale Electricity Market Rules.	This constraint is to be addressed in parallel with the Newmont inter-tripping scheme solution
Eastern Goldfields - Voltage quality and stability limits	The balance of static and dynamic reactive compensation plant and generator and load mix and quantities affects both voltage quality and stability limits.	The transfer limit of the Newmont inter-tripping scheme is defined so that this constraint limitation is not exceeded
Eastern Goldfields - Synchronous stability limits	The 220 kV transmission supply between Muja and the Eastern Goldfields comprises a 650 km single circuit overhead line. The ability for generators at each end to remain in synchronism following a disturbance is reduced.	The transfer limit of the Newmont inter-tripping scheme is defined so that this constraint limitation is not exceeded
Eastern Goldfields - West Kalgoorlie Terminal 220/132kV	At West Kalgoorlie Terminal substation the two 220/132 kV transformers are each rated at 120 MVA. If one transformer fails, only a total of	This constraint is addressed through the Newmont inter-tripping scheme solution via

transformer capacity	120 MVA of load can be supported continuously	automated load shedding and/or starting of a GT at Parkeston Power Station
Parkeston 132/33 kV transformer	There is a single transformer at Parkeston 132/33 kV, which does not satisfy the requirements of Technical Rules clause 2.5.2.2.	This constraint remains non-compliant with clause 2.5.2.2
Muja - BTT2 (MRT BTT1) transformation capacity	The Merredin 220/132 kV transformer BTT1 was relocated to Muja to replace a failed Muja transformer. This limits the maximum transfers along this 220 kV transmission system.	The transfer limit of the Newmont inter-tripping scheme is defined so that this constraint limitation is not exceeded

Western Power assesses market impacts when connecting customers and is currently progressing a competing applications group in the Eastern Goldfields. This process will further consider the efficiency of investment in network infrastructure (including market impacts associated with any increase to loss factors and load rejection requirements) against alternative options such as Network Control Services (local generation) in the Eastern Goldfields.

Over time, load growth in the Eastern Goldfields area, changes in customer operations patterns, and provision of additional supply capacity to customers such as Newmont, may result in an increased requirement for market load rejection ancillary services to cater for outages of 220 kV line sections between Muja and West Kalgoorlie. Western Power understands that the IMO, under the current Wholesale Electricity Market Rules, does not have an ability to recover cost increases for load rejection ancillary services from individual customers. Western Power also does not have an ability to pass load rejection ancillary services costs to an individual customer, if it could be demonstrated that an increase in the requirement is directly attributable to an individual customer.

Western Power continues to actively engage with stakeholders, in particular System Management, regarding market implications relating to supply of capacity to Newmont during overnight periods, and longer term development solutions.

3.2 Impacts on network users

Western Power studies show that Newmont's non-reference service and associated load-shedding and inter-tripping scheme will meet the above requirements. The filtered time-stamped data shown in Figure 2 was increased by 27 MW (32 MW – 5 MW) between the hours of 10 pm and 7 am and was modified to include the transfer limit of 155 MW. The results indicate that an increase in demand of 32 MW can be supplied between the hours of 10 pm to 7 am.

In previous correspondence with the Authority, Western Power has stated that additional independent bespoke runback and load curtailment systems may be possible in some locations, providing these systems:

- do not compromise the management of system security
- can be coordinated to ensure appropriate non-discrimination of customers consistent with their connection agreements
- do not degrade the operability of the network to an unacceptable state
- do not violate market objectives or good industry practice

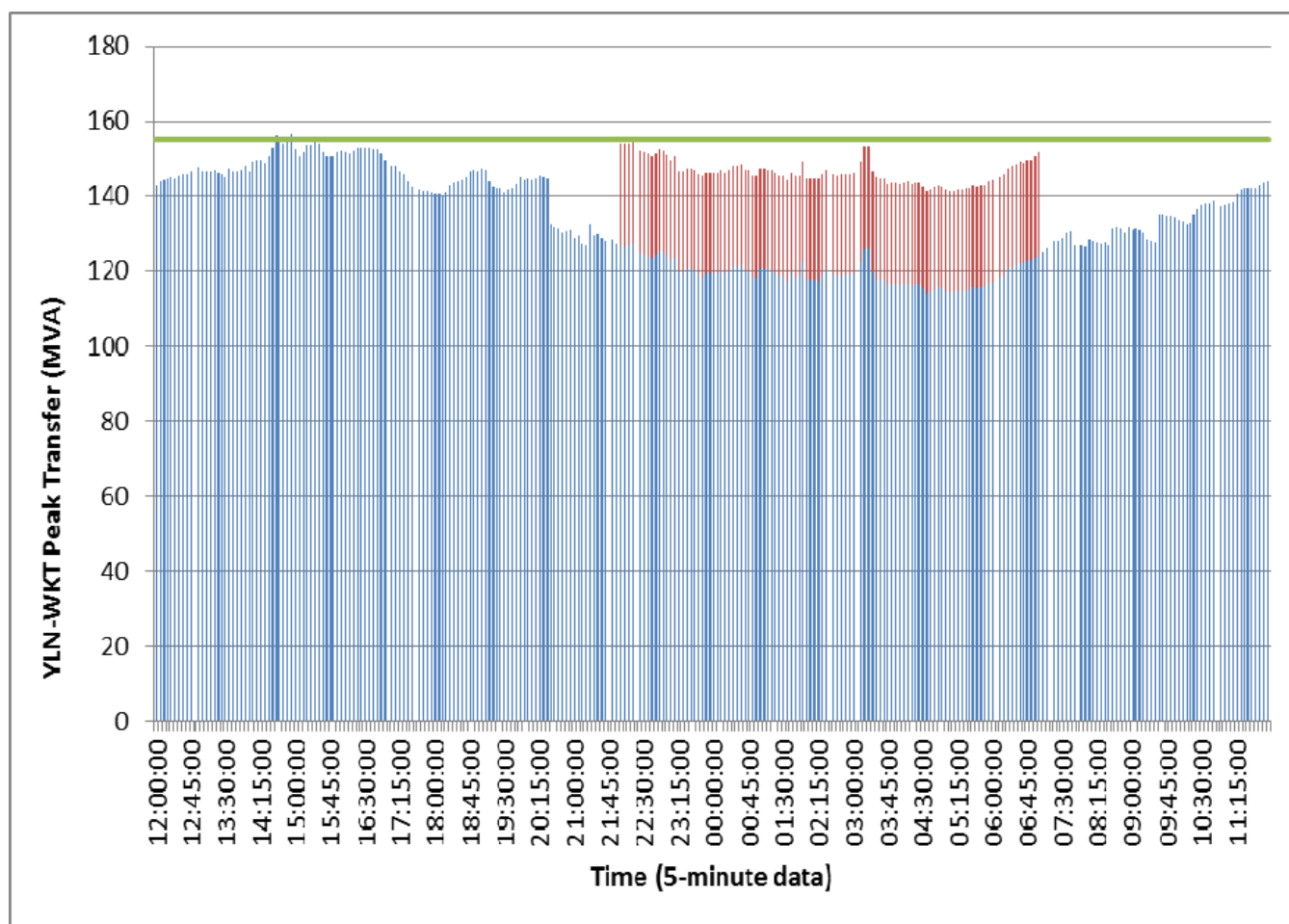


Figure 2 Max MVA transferred inwards to West Kalgoorlie terminal (WKT) for each 5 min time stamp during a two year period from 1/01/13 to 28/02/15 with additional 27MW between 10 pm and 7 am and 155 MW Transfer limit

Other members of the Eastern Goldfields load CAG would not be impacted by Newmont's connection. If another CAG member seeks a similar interim arrangement, Western Power would assess their suitability on a case-by-case basis and potentially offer similar arrangements, subject to the same criteria, if the customer chose to connect earlier.

Works to develop and implement the load-shedding and inter-tripping scheme will be funded in accordance with Western Power's Contributions Policy.

3.3 Risk

The Access Code provides guidance in relation to how assessing network service provider (Western Power) proposed Technical Rules exemptions will be assessed. The following discussion about the present risk and future risk helps to explain how these requirements are met under the proposed connection arrangement.

3.3.1 Risk related to the proposed amendment

A risk impact assessment of the issues and potential network outcomes associated with this amendment is summarised in Table 3.

Table 3 Risk impact assessment

Risk	Assessment and comments
Safety risk	Granting this exemption is not expected to change or impact the network safety risk – so impact on safety risk is assessed here as being low.
Supply reliability risk	Supply reliability risk impact is low. If the capability to supply the entire load reliably reduces below a given threshold, an inter-trip arrangement will reconfigure the load and restore the previous network supply conditions.
Network and other User risk	<p>Newmont is the only customer that will be impacted by an outage of either of the two 120 MVA 220/132 kV power transformers at West Kalgoorlie Terminal. Western Power is not currently aware of any other Users that may be seeking to connect to the west of WKT in the near future.</p> <p>Therefore, changes in existing risks on the power network and to other Users due to this exemption are minimal. The inter-trip arrangement will allow access to existing spare transfer capacity only under acceptable network conditions.</p>

4 Recommendation

The connection application for Newmont has progressed in accordance with the Application and Queuing Policy (AQP) in Western Power's current approved Access Arrangement, which involves extensive consultation to develop an appropriate solution. Based on efficiently balancing Newmont's requirements and current network considerations, Western Power and the Newmont have agreed the most appropriate connection arrangement involves Newmont being supplied with a non-reference service. This arrangement requires an exemption from the Technical Rules to be granted to Western Power by the Authority.

4.1 Advantages and benefits

Western Power considers the following grounds as reasonable and prudent to granting the Technical Rules exemption request:

- Western Power considers that the proposed connection arrangement permits Newmont to obtain a covered service whilst minimising costs.
- Newmont has indicated their preference for the proposed connection arrangement.
- The impact of the reduced reliability has also been assessed by Newman who has confirmed it is an acceptable trade-off between initial capital cost and supply reliability.
- Granting the exemption will enable Newmont to become operational in the shortest possible timeframe in accordance with their proposed operational time line.
- Western Power's assessment of the proposed connection arrangement shows no adverse impact on the existing level of safety or quality and reliability of supply for other network users.

As such, Western Power considers that the proposed connection arrangement permits Newmont to obtain a covered service and efficiently minimises costs, whilst meeting their supply requirements.

Western Power considers the advantages of operating with the exemption sought outweigh the disadvantages of requiring full compliance in this case, as Newmont is the sole user impacted by this exemption and have acknowledged the associated risks.

The proposed connection will be a non-reference service under the Western Power Access Arrangement.

5 Statement of Technical Rules exemption

5.1 Technical Rules exemption and revised wording

Under section 12.40 of the Access Code, Western Power as the Network Service Provider for the Western Power Covered Network hereby applies to the Authority for exemption from a specific requirement of the Technical Rules, as follows:

“Western Power shall be exempt from complying with the requirements of clause 2.5.2.2 of the Technical Rules with respect to providing the CMD increase up to a maximum of 45 MW to Newmont Mining Services Pty Ltd at Parkeston Substation. This exemption:

- (1) shall be noted in the customer’s connection agreement which shall specify a non-reference service in accordance with the Electricity Networks Access Code 2004 and Western Power’s Access Arrangement;*
- (2) removes the requirement to install a redundant power transformer at West Kalgoorlie terminal; and*
- (3) removes the requirement to install a redundant power transformer at Parkeston substation.*

The exemption will apply until an economically feasible permanent technical solution can be implemented to provide the customer’s supply, or until unless otherwise revoked under the provisions of the Electricity Networks Access Code 2004.”

Appendix A – Letter of acknowledgement



Newmont Mining Services Pty Ltd
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29 June 2015

Western Power
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Attention: Choon Tan

By email: choon.tan@westernpower.com.au

Dear Mr Tan

RE: EGF CAG

Newmont has had a long standing application in place with Western Power for increased SWIN capacity on the Eastern Goldfields Line. Previously Newmont has participated in a trial of increased overnight non-firm off-peak power capacity that successfully achieved its aims.

The trial was driven by the desire from Newmont to reduce its dependency for power on gas for economic reasons. To this end Newmont has installed SCADA load shedding communications equipment to automate the non-firm capacity availability. This equipment would have allowed Western Power to shed load quickly enough, in times of power frequency fluctuations, to keep the system in balance.

Unfortunately transformers failed at Muja followed closely by increased capacity usage by existing Western Power customers, within their allocations, which has prevented the application of Western Powers EGF CAG solution for the Eastern Goldfields Network, and accordingly Western Power advised Newmont that it could only achieve the desired earlier capacity availability aims with additional SCADA communication requirements.

Newmont has provided funding for these works because of the continuing extreme economic losses it incurs for the supply of power to its customers.

Accordingly this letter supports Western Power's submission for an exemption to Technical Rules clause 2.5.2.2 with respect to Newmont's 32 MW load increase (from 13 MW to 45 MW) to our existing 33 kV connection. We understand that this supply increase will be provided on a non-firm, off-peak basis (10pm to 7am) through the implementation of a load intertripping scheme. Newmont's existing Contract Maximum Demand (CMD) of 13 MW will continue to be supplied on a firm basis.

Normally an N-1 supply planning criterion would apply for this service but Newmont's increased CMD means Western Power must seek an exemption so that the N-0 planning criterion, under clause 2.5.2.1, can be applied instead. The implementation of a curtailable supply and the operation of a load intertripping scheme is supported by Newmont as a requirement to overcome practical network supply limitations that exist. We believe the level of reliability and energy at risk anticipated under the load intertripping scheme to be acceptable and support Western Power's conclusion that this connection arrangement provides an interim supply ahead of any future Eastern Goldfields Load Competing Applications Group (CAG) solution.

The exemption is sought on the basis that:

- Newmont accepts the expected level of service associated with the N-0 criteria (as per clause 2.5.2.1) and the associated risk of loss of supply at the Parkeston connection point
- The additional cost and timeframes in providing a fully compliant N-1 connection to the Parkeston connection point at this time does not meet Newmont's project requirements.

Please don't hesitate to contact me if you require any further information.

Yours sincerely

Andrew Strelein

Director – Newmont Power Pty Ltd
Group Executive Corporate

CC: Annette McLagan/Tim Gordon/David Lyne

Appendix B – Documents referenced

DM Reference	Title of document	Relevance of document*	Available publicly? (Yes/No)
12417624	Annual Planning Report (APR) 2014/15.	Network planning information for Eastern Goldfields region	Yes, available publically ⁴
6800863	Technical Rules 2011	Approved Technical Rules	Yes, available publically ⁵

⁴ http://www.westernpower.com.au/documents/2014-15_annual_planning_report.pdf

⁵ <https://www.erawa.com.au/electricity/electricity-access/western-power-network/technical-rules/technical-rules>

Appendix C – Network map

Eastern Goldfields transmission load area is supplied from the west and is N-0 between Merredin and Kalgoorlie, and Muja and Merredin (see APR. p32.).

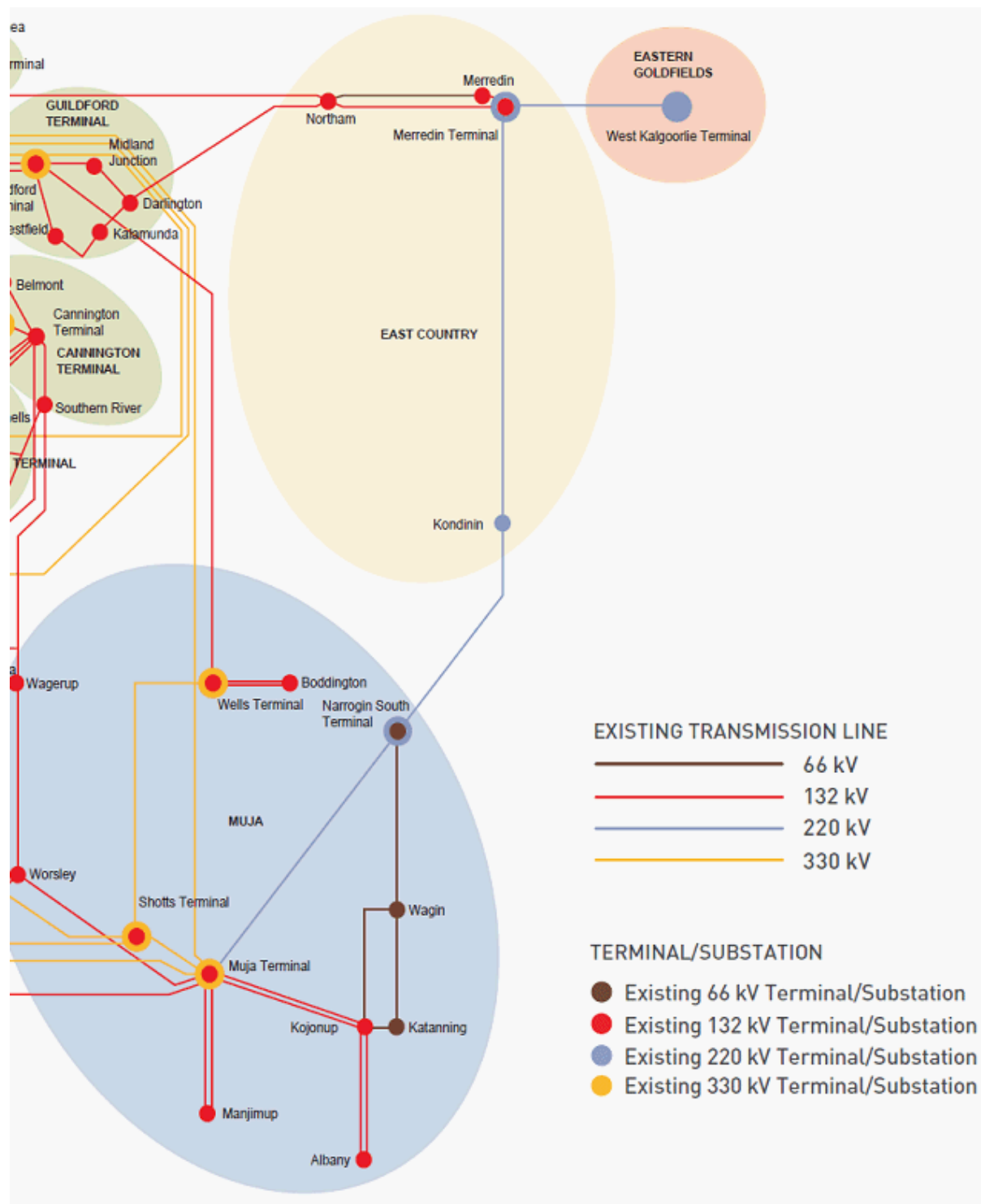


Figure 3 Eastern goldfields network supply map

Appendix D – Harmonic allocated limits

The following table lists the allocated harmonic limits.

Table 4 Harmonic allocated limits for Newmont at Parkeston

Harmonic order (n)	Allocated limits (% of fundamental)	Harmonic order (n)	Allocated Limits (% of fundamental)
2	0.34	22	0.13
3	0.51	23	0.61
4	0.15	24	0.11
5	0.33	25	0.49
6	0.09	26	0.10
7	0.98	27	0.08
8	0.17	28	0.08
9	0.14	29	0.29
10	0.15	30	0.06
11	0.79	31	0.20
12	0.13	32	0.04
13	0.45	33	0.03
14	0.04	34	0.02
15	0.18	35	0.05
16	0.13	36	0.01
17	0.84	37	0.03
18	0.13	38	0.01
19	0.58	39	0.01
20	0.06	40	0.02
21	0.11	THD	0.15

Appendix E – Power factor requirements

The power factor requirements of Newmont operating as a load for a connection point at Parkeston Substation (where the connection point is at 33 kV) is shown underlined in the bottom row of Table 5 (from clause 3.4.7 of the Technical Rules), to be between 0.9 lagging to 0.9 leading.

Table 5 Power factor requirements for Newmont supplied at 33 kV

Permissible Range	
<i>Supply voltage</i> (nominal)	<i>Power factor</i> range (half-hour average, unless otherwise specified by the <i>Network Service Provider</i>)
220kV / 330 kV	0.96 lagging to unity
66kV / 132 kV	0.95 lagging to unity
<66kV (applies at 33 kV)	0.9 lagging to 0.9 leading [emphasis added]