Karara Mining Limited 120 MW Connection

Submission for Exemption from Technical Rules

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safe reliable efficient

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Executive Summary

Karara Mining Limited (KML) has submitted a connection application for an iron ore mine east of Three Springs (load facility) with a contracted maximum demand (CMD) for its operations of 120 MW. Following extensive consultation and technical studies it is proposed to connect the KML load facility in three stages to meet KML's timeframes, namely:

1. Stage 1A – 132 kV 'Contingent' N-0 supply with a CMD of 50 MW ex Eneabba Substation (late April 2012 – September 2012).
2. Stage 1B – 132 kV 'Interim' N-0 supply with a CMD of 95 MW ex Eneabba Substation (September 2012 – April 2014).
3. Stage 2 – 330 kV 'Final' N-0 supply with a CMD of 120 MW ex Three Springs Terminal (April 2014 onwards).

Contingent and Interim Supply

Under Section 2.5.2.2 of the Technical Rules an N-1 supply planning criterion is required to be met in providing KML with a reference service supply for these supply stages from the existing 132 kV sub-network at Eneabba substation.

Western Power is seeking an exemption from this requirement in this submission for an N-0 planning criterion to apply. This exemption will apply to the KML load facility only, as load shedding and load tripping schemes will be installed as part of this connection to ensure other network customers do not experience a reduced quality and reliability of supply.

The Contingent Supply and Interim Supply arrangements are temporary and contingent arrangements are provided from the existing 132 kV network ahead of delivery of the 330 kV Mid West Energy Project (MWEP) connection. Exemptions are sought solely to enable KML's initial connection to transition to the 330 kV Final Supply arrangement in a manner that does not materially impact on other network users. There are no feasible solutions identified that can provide a compliant N-1 criterion to meet KML's requirements.

Final Supply

Under the Technical Rules, for the Final Supply stage, an N-1-1 supply planning criterion is required to be met in providing KML with a reference service supply from the proposed 330 kV sub-network at Three Springs Terminal.

Western Power is seeking an exemption from this requirement in this submission for an N-0 planning criterion to apply. This exemption will apply to the KML load facility only, as load shedding and load tripping schemes will be installed as part of this connection to ensure other network customers do not experience a reduced quality and reliability of supply. The exemption is sought on the basis that:

- It is consistent with the need for an exemption identified in Western Power's MWEP Regulatory Test submission approved by the Economic Regulation Authority ("Authority"), and also with the subsequent pre-approval NFIT determination by the Authority.
- The intent of the N-1-1 planning criterion covering all 330 kV equipment embedded in the Technical Rules (to avoid the loss in supply to a large number of customers) is not reasonably applicable for supply to a distant single customer such as KML.
- The additional cost of providing a fully compliant N-1-1 connection at Three Springs Terminal, estimated at $461 million in real 30 June 2010 dollars (in addition to the capital cost of the MWEP solution) is clearly uneconomic to KML and other network users.

- The additional cost of providing an N-1 connection at Three Springs Terminal as an alternative solution is estimated at $79 million in real 30 June 2010 dollars. The Authority's final MWEP NFIT determination shows these higher costs would not meet NFIT and would require a major capital contribution from KML without additional major mining or other block loads connecting beyond KML's 120 MW.

- The provision of a higher level of reliability (i.e N-1 and N-1-1) at the 330 kV bus at Three Springs Terminal would only result in a marginal improvement in supply reliability for KML given that KML will be exposed to an N-0 level of supply reliability over its 110 km 330 kV transmission connection asset to its mine site.

- In extensive consultation with KML over an extended period, KML has confirmed that an N-0 level of supply reliability is acceptable to the KML operation to avoid the additional costs of providing a higher level of supply reliability for its initial operations.

KML has provided a letter of support for Western Power's exemption submission acknowledging the extensive consultation that has taken place over an extended period on the proposed supply arrangements. This letter further confirms that KML understands the meaning of the N-0 criterion and its impact on KML's operations and that such a criterion is acceptable for KML's operations of 120 MW (see Attachment 4).

Under section 12.40 of the Electricity Networks Access Code 2004, Western Power, as the Service Provider for the Western Power Covered Network, is seeking exemptions to the requirements of the Technical Rules, as set out in Section 9 Statement of Rules Exemption. It must be noted that a condition of the commercial agreements under which network services will be provided to KML is that the Authority grants to Western Power, under sections 12.40 to 12.49 of the Code, any necessary exemptions or derogations to the Technical Rules in respect of the services provided.

1 Introduction

KML Load Application

Karara Mining Limited (KML) has submitted a connection application for an iron ore mine east of Three Springs with a contracted maximum demand for its operations of 120 MW.

KML and Western Power have progressed this connection application through an extensive consultation process and have proposed staged network solutions that facilitate as far as practicable KML's project timeframes whilst seeking to minimise the cost of network connection and avoid any material impacts on the quality and reliability of supply to other network users. KML has accepted connection at less than standard service reliability levels in order to achieve these outcomes.

After completion of detailed system simulation studies, regulatory assessments and detailed consultation, it is proposed to connect the KML load facility in three related stages, namely:

1. Stage 1A – 132 kV 'Contingent' N-0 supply with a CMD of 50 MW ex Eneabba Substation (late April 2012 – September 2012).
2. Stage 1B – 132 kV 'Interim' N-0 supply with a CMD of 95 MW ex Eneabba Substation (September 2012 – April 2014).
3. Stage 2 – 330 kV 'Final' N-0 supply with a CMD of 120 MW ex Three Springs Terminal (April 2014 onwards).

The proposed network configurations for each of these stages of supply are briefly summarised below and explained in further detail in Section 2.

Contingent and Interim Supply Arrangements

The 132 kV Contingent Supply and Interim Supply arrangements proposed in Stages 1A and 1B are designed to provide KML with a limited and conditional non-reference service from the existing 132 kV network. These arrangements enable early commencement of operations at the KML mine site ahead of completion of a 330 kV connection without materially impacting upon other network users.

As part of these supply arrangements, KML is funding and/or constructing (i) a new double circuit 330 kV transmission line from Eneabba to Three Springs, initially operating at 132 kV, (ii) a new step-up 132/330 kV transformer substation at Three Springs Terminal, and (iii) a new 110 km 330 kV transmission line from Three Springs to the KML mine site (via Koolanooka) and associated electrical infrastructure at the mine site switchyard.

330 kV Final Supply Arrangement

The 330 kV Final Supply arrangement proposed in Stage 2 provides KML with its full 120 MW capacity application requirements.

This stage entails Western Power constructing (i) a double circuit 330 kV transmission line from Perth to Eneabba, and (ii) completing the interconnection of the existing 132 kV Three Springs substation with the 330 kV Three Springs terminal, to form a 330 kV transmission line between Perth and Three Springs Terminal. This transmission line will initially operate with one circuit at 330 kV and the other at 132 kV replacing existing 132 kV lines decommissioned to facilitate the new 330 kV line construction.

2 Regulatory Test and NFIT Background

Western Power submitted a Regulatory Test submission to the Authority on the proposed major network augmentation for the Mid West Energy Project (Southern Section) (MWEP) in November 2010. Western Power's submission recommended establishing a new double circuit 330 kV transmission line from Neerabup to KML mine site, stating in its recommendation that:

> *"The transmission line from Eneabba to Koolanooka will be constructed along the route of an existing 132 kV transmission line, which will need to be decommissioned after the new line is operating as part of the shared transmission network and energised at its final operating voltage. The new transmission line will initially operate with one circuit at 330 kV and the other at 132 kV (effectively replacing the decommissioned 132 kV line) until such time as there is sufficient electricity demand or new generator connections to warrant the conversion of the second circuit to 330 kV."*

In its Regulatory Test submission Western Power identified the need for an exemption to the Technical Rules for the proposed major network augmentation, as follows:

> *"The Technical Rules currently specify that a 330 kV network should be designed to the N-1-1 criterion. Western Power intend to apply for a derogation to that clause for the initial configuration of the Mid West Energy Project (southern section) on the basis that the N-1-1 criteria is not required to be met to deliver the reliability of supply sought by the foundation customer and this arrangement will not affect the reliability of supply to other existing customers."*

In February 2011 the Authority determined that the MWEP augmentation as proposed by Western Power satisfied the Regulatory Test.

Western Power subsequently submitted a New Facilities Investment Test (NFIT) in August 2011 on the recommended MWEP augmentation consistent with the Regulatory Test determination. The NFIT submission set out the design configuration and detailed costing of the proposed MWEP augmentation. The Authority provided a final determination of Western Power's NFIT pre-approval submission in January 2012.

In its final NFIT determination the Authority's gave pre-approval to include $377.8 million (real dollars at 30 June 2010) of capital expenditure in Western Power's capital base – to occur at the point in time when the MWEP is commissioned at 330 kV and component network assets are purchased from KML. In this final NFIT determination the Authority stated that it was satisfied that the overall net present value of the benefits of the MWEP would be at least $414 million (real dollars at 30 June 2010), providing a modest surplus of benefits over cost in present value terms.

The Authority also noted that, to the extent that additional major mining or other block loads connect to the MWEP beyond KML operations of 120 MW, or there is additional wind generation in the region beyond the estimated 275 MW assumed for this determination, then the benefits could be significantly higher. This view supports the proposal that conversion of the 330 kV MWEP transmission line to operate at double circuit 330 kV should be appropriately deferred until there is sufficient electricity demand or new generator connections to warrant the conversion of the second circuit to 330 kV.

This submission requests that the Authority provide an exemption to Western Power for the 330 kV Final Supply arrangement to KML consistent with the requirements identified in the Regulatory Test submission and with the NFIT pre-approval submission.

3 KML Supply Arrangements

This section describes the supply configuration arrangements proposed in each of the supply stages.

3.1 Stage 1A: 132 kV Contingent Supply Arrangement

A summary of the Stage 1A supply network configuration layout is provided in Figure 1 of Attachment 1: Network Diagrams.

This supply arrangement has been configured to meet KML's stated April 2012 timeframe for initial power connection to the mine site. The arrangement effectively bypasses the 132/330 kV Three Springs Terminal which remains under construction until September 2012, and as a result allows the transmission lines between Eneabba and the KML mine site to be commissioned and operated at a 132 kV voltage level.

The Stage 1A: Contingent Supply is a temporary, limited, contingent and fully curtailable non-reference service supply arrangement provided from the existing 132 kV network until the 132/330 kV Three Springs Terminal is commissioned (Stage 1B then commences).

Detailed system simulation studies performed show system voltage stability constraints exist and a non-reference service N-0 supply can only be provided to KML at a 132 kV voltage level in this supply stage (refer to Section 6 for detail).

A summary of the agreed Contingent Supply details is provided in Table 1 below.

Table 1 Stage 1A – 132 kV Contingent Supply details

Point of Connection	Eneabba Substation – 132 kV line bay disconnector on new ENB-KRA line
CMD	50 MW
Period of Supply	Late April 2012 – September 2012
Reliability Provided	N-0

3.2 Stage 1B: 132 kV Interim Supply Arrangement

A summary of the Stage 1B network configuration layout is provided in Figure 2 of Attachment 1: Network Diagrams.

This supply arrangement is an extension of the Stage 1A supply arrangement and has been configured as is practicable to meet KML's CMD requirements pending delivery of the 330 kV MWEP. The supply arrangement commissions the 132/330 kV Three Springs Terminal, and as a result allows the transmission line between Three Springs and the KML mine site to be operated at a 330 kV voltage level, increasing power transfer levels to the KML load facility.

The Stage 1B: Interim Supply is a temporary, limited, contingent and fully curtailable non-reference service arrangement provided from the existing 132 kV network at Eneabba until the 330 kV MWEP transmission line is commissioned (Stage 2 then commences).

Detailed system simulation studies performed show system voltage stability constraints exist and following extensive consultation with KML a non-reference service N-0 supply for 95 MW, and an N-1 supply for 10 MW will be provided to KML at a 132 kV voltage level in this supply stage (refer to Section 6 for detail).

Western Power's system studies assessed the period up to 31 October 2013, and the level of N-0 supply provided to KML under this arrangement may be reduced after this time as new loads are connected in the Mid West region.

A summary of the agreed Interim Supply details is provided in Table 2.

Table 2 Stage 1B: Interim Supply details

Point of Connection	Eneabba Substation – 132 kV line bay disconnector on new ENB-TST line (constructed as part of the Stage 1A)
CMD	95 MW
Period of Supply	September 2012 – April 2014
Reliability Provided	N-0

3.3 Stage 2: 330 kV Final Supply Arrangement

A summary of the Stage 2 network configuration layout is provided in Figure 3 of Attachment 1: Network Diagrams.

Stage 2: Final Supply is the permanent supply arrangement for the KML load facility and connects the KML mine site to the 330 kV MWEP following completion of construction due in April 2014. KML's Point of Connection for this supply stage is moved to the 330 kV Three Springs Terminal.

As a result of the loss of the NBT-TST 330 kV line, the Three Springs Terminal will be supplied via the existing 132 kV network at Three Springs substation (step up to 330 kV at TST). The detailed system simulation studies show voltage recovery issues and the 132 kV network at Three Springs substation does not have capacity to supply the entire KML load (refer to Section 6 for detail). Following extensive consultation with KML an agreed non-reference service N-0 supply for 120 MW and an N-1 supply for 30 MW will be provided to KML at a 330 kV voltage level in this stage.

A summary of the agreed Final Supply details is provided in Table 3.

Table 3 Stage 2: Final Supply details

Point of Connection	Three Springs Terminal – 330 kV line disconnector on TST-KRA 330 kV line
CMD	120 MW
Period of Supply	April 2014 onwards
Reliability Provided	N-0

4 Technical Rules Compliance

This section outlines clauses of the Technical Rules that are relevant to the KML connection application, and describes the nature and duration of the exemptions sought for the non-compliances that may exist with the Technical Rules.

4.1 132 kV Contingent and Interim Supply stages

During Stage 1A and Stage 1B the connection arrangements agreed with KML are not compliant with Clause 2.5.2.2: N-1 Criterion of the Technical Rules.

Clause 2.5.2.2 of the Technical Rules requires that any sub-network of the Western Power Transmission System (not otherwise identified as designed to N-0 or N-1-1 level) must be designed to an N-1 planning criterion, and supply must be maintained and load shedding avoided at any load level for an outage of any single transmission element.

The connection arrangements agreed with KML to apply in the Contingent Supply and Interim Supply stages are designed to an N-0 planning criterion, meaning that (as per Clause 2.5.2.1: N-0 Criterion) KML will experience the loss of ability to transfer power to its mine site for loss of a single transmission element supplying that part of the network, and that following such an event the full power transfer capability will not be restored until the transmission element has been repaired or replaced.

For the Interim Supply stage Western Power has provided 10 MW of N-1 supply capability from the existing 132 kV network as sought by KML for the maintenance of essential processing equipment at the mine site. This can be provided without compromising supply quality and reliability to other network users.

In this submission Western Power is seeking an exemption from the requirements of Clause 2.5.2.2 for the duration of the Contingent Supply and Interim Supply stages. This exemption will apply to the KML load facility only as load shedding and load tripping schemes will be installed as part of this connection to ensure other network customers do not experience a reduced quality and reliability of supply. Once Stage 1A and Stage 1B supply are no longer in-service, these exemptions will no longer be required.

The KML connection in these supply stages is considered compliant with the Technical Rules in all other regards.

4.2 330 kV Final Supply stage

During Stage 2 the connection arrangement agreed with KML is not compliant with Clause 2.5.2.3 N-1-1 Criterion of the Technical Rules.

Clause 2.5.2.3 of the Technical Rules requires that any sub-network of the Western Power transmission system including those comprising any 330 kV transmission line, substation or power station, must be designed to an N-1-1 planning criterion. This requires the relevant sub-network to be capable of withstanding the coincident planned and unplanned outages of specified transmission elements when operating at up to 80% of the expected transmission system peak load.

The connection arrangement agreed with KML to apply in the Final Supply stage is designed to an N-0 planning criterion, meaning that (as per Clause 2.5.2.1: N-0 Criterion) KML will experience the loss of ability to transfer power to its mine site for loss of a single 330 kV transmission element supplying the 330 kV Three Springs Terminal, and that following such an event full power transfer capability will not be restored until the transmission element has been repaired or replaced.

For the Final Supply stage Western Power has provided 30 MW of N-1 supply[1] capability (supplied from the 132 kV network during a 330 kV MWEP transmission line outage) which can be provided without compromising supply quality and reliability to other network users.

In this submission Western Power is seeking an exemption from the requirements of Clause 2.5.2.3 for an indefinite period (unless revoked under the provisions of the Electricity Networks Access Code 2004). This exemption will apply to the KML load facility only as load shedding and load tripping schemes will be installed as part of this connection to ensure other network customers do not experience a reduced quality and reliability of supply.

[1] 30MW N-1 is maintained during system under voltage load shedding events and a higher 50MW is permitted during critical fault detection load shedding events. Refer Section 6.3 for further explanation.

5 Scope and Cost of Compliance

5.1 Contingent and Interim Supply Scope

Western Power has not identified any reasonable alternative option under which a fully compliant N-1 supply planning criterion can be met in providing KML with a reference service supply from the existing 132 kV sub-network at Eneabba substation during the Contingent and Interim Supply stages.

Western Power has identified that the existing 132 kV network at Eneabba does not have sufficient capacity to supply the requested CMD of 120 MW as per the N-1 planning criterion. This will be further constrained due to the decommissioning of the existing 132 kV Pinjar to Eneabba (via Regans/Cataby) line during these supply stages, to enable the construction of the new 330 kV Neerabup to Eneabba transmission line. As a result of that the CMD was restricted to 50 MW (contingent) and 95 MW (interim).

No further justification for the exemptions sought for the Contingent and Interim Supply stages is needed nor provided.

5.2 Final Supply Scope

5.2.1 Applicability of N-1-1 rule to KML Final Supply

When the Technical Rules were drafted the intent of Clause 2.5.2.3: N-1-1 Criterion, as is stated in the clause, was to impose a higher standard of service reliability on parts of the Western Power transmission system where the occurrence of a credible contingency during planned maintenance of another related network element would result in the loss of supply to a large number of customers. The N-1-1 criterion was adopted to avoid widespread disruption or broad economic impact of unserved energy arising from major supply interruptions.

The 330 kV network at the time of drafting the Technical Rules was considered to be a “bulk supply” transmission network used to transfer power in bulk to Western Power’s entire SWIS customer base and so was incorporated into the N-1-1 provision as stated in the Section 2.5.2.3 of the Technical Rules. In recent years there has been a progression towards using the 330 kV transmission network to supply power to more remote locations incapable of being serviced by regional 132 kV and 66 kV voltage constrained networks.

Western Power considers an N-1-1 exemption is appropriate at the 330 kV Three Springs Terminal for the Final Supply stage as the occurrence of a credible contingency would not “result in the loss of supply to a large number of customers” as stated in the intent of Clause 2.5.2.3, nor cause widespread disruption or broad economic impact. Existing users will not be impacted. Western Power considers it would not be acting in a prudent and commercial manner if it sought to extend the N-1-1 planning criterion to apply to the proposed KML connection from Three Springs Terminal.

5.2.2 Applicability of N-1 rule to KML Final Supply

Following an exemption from the N-1-1 planning criterion the question arises as to whether an N-1 planning criterion should then apply to the KML connection as a default requirement.

Western Power has identified that conversion of the proposed double circuit 330 kV MWEP transmission line to operate with both circuits at 330 kV voltage level is a potential solution to providing an improved (but still technically non-compliant) N-1 supply planning criterion level at the 330 kV Three Springs Terminal.

In extensive discussions, KML has not sought to achieve this improved N-1 level of supply reliability due to the significant additional costs that would be incurred and a recognition that KML’s own 110 km 330 kV transmission connection asset (from Three Springs to mine site)

provides only an N-0 level of supply reliability, and yet is a significant part of the overall connection arrangement.

As a consequence Western Power is seeking an exemption to the Technical Rules by requesting for an N-0 supply planning criterion to apply to the sub-network comprising the 330 kV Neerabup to Three Springs line and 330 kV Three Springs Terminal.

5.3 Costs of Rule Compliance – Final Supply

This section discusses the costs and merits of providing a fully compliant N-1-1 solution and an N-1 complaint solution to the 330 kV Final Supply arrangement proposed.

5.3.1 Compliance to N-1-1 Criterion

To provide a fully compliant N-1-1 Final Supply connection at Three Springs Terminal the following network augmentation is assumed for the purpose of this analysis:

- MWEP project is delivered as proposed in the Regulatory Test and NFIT submission;
- Conversion of the second circuit of the proposed 330 kV MWEP line to operate with both circuit at 330 kV level
- Construction of a 132 kV cut-in and cut-out transmission line into the Regans substation from the existing Pinjar to Eneabba 132 kV line;
- A second 132/330 kV transformer circuit and a 132 kV switchyard is added to the Three Springs Terminal with 132 kV interconnections made through to the existing Three Springs substation, and
- A new single circuit 330 kV transmission line is approved and constructed along the existing 132 kV Muchea to Moora to Three Springs inland line route.

For this submission Western Power has not undertaken detailed options analysis of all potential alternative network augmentations to achieve an N-1-1 criterion. Such alternative configurations would be considered as part of any future Regulatory Test submission to decide on an actual N-1-1 network arrangement at that time, if such an augmentation was justifiable.

The breakdown of costs for this solution is provided in Attachment 3: Cost Benefit Analysis data. A schematic layout of the configuration assumed for the network under this arrangement is also provided.

The cost of providing the above fully compliant N-1-1 connection at Three Springs Terminal is estimated at $461 million in real 30 June 2010 dollars, which is in addition to the estimated capital cost of the MWEP N-0 solution of $383 million in real 30 June 2010 dollars (noting that the Authority determined a pre-approval cost of $378 million in its final NFIT determination).

5.3.2 Compliance to N-1 Criterion

Providing a solution that complies with the lower level N-1 planning criteria requires conversion of the 330 kV Neerabup to Three Springs Terminal transmission line to operate at double circuit 330 kV. This requires further network augmentations to those delivered under the MWEP, assumed for the purpose of this analysis to include:

- Construction on a new 132 kV cut-in and cut-out transmission line into the Regans substation from the existing Pinjar to Eneabba 132 kV line; and
- Construction of a second 330/132 kV transformer circuit and a 132 kV switchyard at the Three Springs Terminal with 132 kV interconnections made through to the existing Three Springs substation.

The breakdown of costs for this solution is provided in Attachment 3: Cost Benefit Analysis data. A schematic layout of the configuration assumed for the network under this arrangement is also provided. For this submission Western Power has not undertaken detailed options analysis of all potential alternative network augmentations to achieve an N-1 criterion. Such alternative configurations would be considered as part of any future Regulatory Test submission to decide on an actual N-1 network arrangement at that time.

The cost of providing the above N-1-connection at Three Springs Terminal is estimated at $79 million in real 30 June 2010 dollars, which is in addition to the estimated capital cost of the MWEP.

In its final NFIT determination the Authority stated that it was satisfied that the overall net present value of the benefits of the MWEP would be at least $414 million (real dollars at 30 June 2010). Clearly adding an additional estimated $79 million to the MWEP cost for delivering an N-1 solution would result in this not meeting NFIT without a substantial capital contribution from customers.

The Authority also noted that, to the extent that additional major mining or other block loads connect to the MWEP beyond KML operations of 120 MW, or there is additional wind generation in the region beyond the estimated 275 MW assumed for this determination, the benefits could be significantly higher. This supports Western Power's view as stated in its MWEP Regulatory Test submission that conversion of the 330 kV MWEP transmission line to operate at double circuit 330 kV should be appropriately deferred until there is sufficient electricity demand or new generator connections to warrant the conversion of the second circuit to 330 kV.

5.4 Reliability Considerations

Reliability data for the existing 132 kV network as applicable to level of interruptions likely to be experienced in the 132 kV Contingent Supply and Interim Supply stages was provided to KML and is summarised in document DM # 6978882[2].

The following table summarises the theoretical estimated expected levels of supply reliability that could be delivered in the 330 kV Final Supply arrangement under varying planning criterion assumptions, based on historical reliability performance (annual fault data on per km basis) of the Western Power 330 kV network.

[2] Karara Mine Interim Supply Reliability Review, March 2010.

Table 4 Table of Annual Expected Reliability

N-0 Configuration		WP Network NBT-TST (280 km)	KML Connection TST – KRA (110 km)	Total
Est Unavailability of Supply	%	0.09%	0.03%	0.12%
Est Outage Hours	Hrs	7.563	2.982	10.545
Est Unserved Energy	MWhr	907.5	357.8	1265.3

N-1 Configuration		WP Network NBT-TST (280 km)	KML Connection TST – KRA (110 km)	Total
Est Unavailability of Supply	%	0.000075%	0.000012%	0.000087
Est Outage Hours	Hrs	0.006529	0.001015	0.007544
Est Unserved Energy	MWhr	0.7835	0.1218	0.9

N-1-1 Configuration		WP Network NBT-TST (280 km)	KML Connection TST – KRA (110 km)	Total
Est Unavailability of Supply	%	0.000000064%	0.000000004%	0.000000068%
Est Outage Hours	Hrs	0.0000056	0.0000003	0.0000059
Est Unserved Energy	MWhr	0.00068	0.00004	0.00072

Notes:

1. Based on assumed Western Power historical 330 kV line outages as experienced in SWIS of approximately 0.027 outage hours per km per year of 330 kV line. Assumed that tripping of one line is independent of a second circuit (no correlation of double circuit outages as per historical data).
2. As advised by transmission line maintenance, new 330 kV lines are not normally scheduled for planned maintenance outages with the majority of maintenance performed live-line.
3. It was assumed that KRA mine is operating at 120 MW when calculating the unserved energy.

5.5 Cost Benefit Analysis

5.5.1 N-1-1 Criterion

The cost of providing the fully compliant N-1-1 connection at Three Springs Terminal as outlined above is estimated at $461 million in real 30 June 2010 dollars, which is in addition to the estimated capital cost of the MWEP. The estimated level of supply reliability improvement afforded by the N-1-1 planning criterion over an N-1 criterion for the KML connection as outlined above is expected to be immaterial.

Western Power considers the additional $461 million cost of providing a fully complaint N-1-1 solution to be clearly uneconomic to KML and other network users.

5.5.2 N-1 Criterion

The cost of providing the N-1 connection at Three Springs Terminal as outlined above is estimated at $79 million in real 30 June 2010 dollars, which is in addition to the estimated capital cost of the MWEP. There is a material improvement in the estimated level of supply reliability for an N-1 planning criterion over an N-0 planning criterion as outlined above. This improvement is however still limited and must be weighed against the substantial costs of achieving this network configuration. Notably the KML connection asset is a significant contributor to expected supply reliability levels at the KML mine site.

In extensive consultation with KML over an extended period on the proposed supply arrangements KML has confirmed that an N-0 level of supply reliability is acceptable to the KML operation, to avoid the additional costs of providing a higher level of supply reliability for its initial Stage 1 operations. The KML mine site processing operations are inherently sufficiently flexible to accommodate a certain level of supply interruption providing that supply can be maintained to a number of essential plant drives. KML is providing adequate on-site generation to back-up the level of N-1 capability that can be provided from the Western Power network to secure this requirement.

Western Power along with KML consider the additional estimated $79 million cost of providing an improved reliability N-1 solution to be uneconomic for the single KML Stage 1 connection.

6 Impacts on other Network Users

This section sets out the impacts on other network users and describes the technical studies conducted. These studies identified the operational constraints and level of supply available to KML in the respective supply stages whilst ensuring compliance with the power quality and reliability standards of the Technical Rules to ensure no material impacts on other network users occur. The operational constraints will be enforced through relevant provisions in the commercial arrangements between Western Power and KML (and its related entities).

6.1 132 kV Contingent Supply

The following technical studies have been undertaken by Western Power on behalf of KML to identify the relevant technical issues and system constraints that may apply during the 132 kV Contingency Supply stage:

1. Karara Mining Limited's (KML) 132 kV supply to KML Mine (DM 8105762). April 2011. Study of proposed Contingent Supply arrangement via 132 kV network. Steady state, motor starting and dynamic studies performed. Study findings confirmed that 50 MW could be supplied with reactive support of two 8 MVAr STATCOM located at Eneabba and Karara. KML load is curtailed to 0 MW for critical contingencies and planned outages.
2. 132 kV Contingency Supply Option to KML Mine (DM 8445092) July 2011. Steady state and dynamic studies with revised KML transformer parameters. Studies performed by SKM.

Operational constraints will apply to the Contingent Supply arrangement including:

- Under N-1 contingent supply conditions (including the loss of the ENB – KRA 81 line), the entire KML load facility may be fast tripped.
- KML must implement and comply with the protection and control schemes referred to in the Protection and Control Schemes required for Contingent, Interim Supply and Final Connection Arrangements (DM# 7296274).
- KML must comply with the procedures of the Operating Philosophy for Contingent and Interim Supply Connection Arrangements (DM# 8569282).
- In the case of network contingencies or malfunction of the protection schemes, the KML load facility may undergo load tripping.

6.2 132 kV Interim Supply

The following technical studies have been undertaken by Western Power on behalf of KML to identify the relevant technical issues and system constraints that may apply during the 132 kV Interim Supply stage:

1. Interim Supply of Gindalbie Metal's KML Mine Load (DM 634645) Nov 2009. Study performed for 95 MW from existing 132 kV network. Power flow, reactive reserve, dynamic, fault analysis and EMT studies included. Study finding that the KML loads need to be fast tripped under contingency and planned outage events of SWIS.
2. Interim Supply of Gindalbie Metal's KML Mine load (Dynamic Study Phase 1 of North Country Development) (DM 7198962) June 2010. Internal WP study confirming revised connection arrangement. Dynamic studies performed. Study finding identified critical contingencies in network and proposed KML load shedding scheme.
3. Karara Mining Limited's 132 kV Interim Supply to KML Mine Load (DM 8285924) July 2011. Revised power flow and dynamic studies with amended KML load model and network development plans.

Operational constraints will apply to the Interim Supply arrangement including:

- Under N-1 contingent supply conditions (including the loss of the ENB – KRA 81 line), the entire KML load facility may be fast tripped.
- KML must implement and comply with the protection and control schemes referred to in the Protection and Control Schemes required for Contingent, Interim Supply and Final Connection Arrangements (DM# 7296274).
- KML must comply with the procedures of the Operating Philosophy for Contingent and Interim Supply Connection Arrangements (DM# 8569282).
- In the case of network contingencies or malfunction of the protection schemes, the KML load facility may undergo load tripping.
- Western Power will install a Critical Fault Detection System (CFDS) at the Three Springs Terminal to trigger load shedding. Upon receiving the load shedding signal, KML is required to initiate load shedding and subsequent switching of reactors as outlined in the Protection and Control Schemes. During load shedding, the KML load facility will be reduced to 10 MW or less. KML must implement a load management scheme to limit the KML load facility to 10 MW or such other level notified by Western Power from time to time. Failure to achieve the required outcome will result in the entire KML load facility being disconnected.

Western Power has provided a prudent level of N-1 supply capability from the existing 132 kV network as sought by KML for this supply period for the maintenance of essential processing equipment at the mine site, without compromising supply quality and reliability to other network users.

The level of N-0 supply level provided to KML under this arrangement will reduce over time as new loads are connected in the Mid West region.

6.3 330 kV Final Supply

The following technical studies have been undertaken by Western Power on behalf of KML to identify the relevant technical issues and system constraints that may apply during this supply stage (April 2014 onwards):

1. Karara Mining Limited's Supply to KML Mine with Mid West Energy Project in Service (DM 8445919) Sept 2011. Final supply arrangement study. Load flow, reactive reserve, dynamic studies, and fault analysis included. Study findings identified critical contingencies in network and proposed KML load shedding scheme.

Operational constraints will apply to the Final Supply arrangement including:

- KML must implement and comply with the protection and control schemes referred to in the Protection and Control Schemes required for Contingent, Interim Supply and Final Connection Arrangements (DM# 7296274).
- In the case of network contingencies or malfunction of the protection schemes, the entire KML load facility may undergo load tripping.
- Western Power will install a Critical Fault Detection System (CFDS) and an Under Voltage Load Shedding Scheme (UVLS) to trigger load shedding during certain 330 kV disturbances. Upon receiving the load shedding signal, KML is required to initiate load shedding as outlined in the Protection and Control Schemes. For a CFDS event the KML load facility must be reduced to 50 MW or less, and for a UVLS event it must be reduced to 30 MW or less. KML must implement a load management scheme to limit the KML load facility to the respective MW level or such other level as notified by Western Power from time to time. Failure to achieve the required outcome will result in the entire KML load facility being disconnected.

Western Power has provided a prudent level of N-1 supply capability from the network of 30 MW sought by KML for this supply stage without compromising supply quality and reliability to other network users.

The level of N-1 supply level provided to KML under this arrangement will reduce over time as new loads are connected in the Mid West region.

6.4 Future Upgrade by another User

The new MWEP 330 kV Neerabup to Three Springs transmission line will initially operate with one circuit at 330 kV and the other at 132 kV (effectively replacing the decommissioned existing 132 kV lines used to establish the 330 kV line route) until such time as there is sufficient electricity demand or new generator connections to warrant the conversion of the second circuit to 330 kV.

It is possible that a future user (including KML expansion beyond its operations of 120 MW) connecting at the Three Springs Terminal may require a reference supply at a supply reliability level of N-1, and seek the conversion of the 330 kV Neerabup to Three Springs Terminal sub-network to operate at double circuit 330 kV. This may involve some level of capital contribution by the user concerned.

Under this circumstance the applicable criterion at the Three Springs Terminal will be improved to the N-1 level. At that point any exemption provided to Western Power at the Three Springs Terminal could be amended, revoked, or left intact as it applied to the initial KML connection.

7 Consultation with KML

Western Power and KML have progressed KML's 120 MW connection application through an extensive consultation process over an extended period of time. Western Power and KML have proposed staged network solutions that facilitate as far as practicable KML's project timeframes whilst seeking to minimise the cost of network connection and avoid material impacts on the quality and reliability of supply to other network users.

The KML connection assets and MWEP collectively represent in excess of $500 million in new capital invested and have involved complex and extensive technical and commercial discussions between the parties to achieve a workable and successful outcome.

Western Power has taken reasonable steps to comply with the Technical Rules in providing a connection proposal to meet KML's requirements. Western Power has proposed via the MWEP a 330 kV network augmentation that will meet KML's initial Stage 1 capacity needs at the lowest cost, but has the capability to provide both enhanced reliability and capacity to KML and other network users in the future.

Western Power has acted as a prudent network service provider in retaining the level of N-1 supply capability from the existing 132 kV network for all other network users, while meeting the capacity requirement and acceptable supply reliability (N-0) for KML.

Operational constraints, as described in Section 6, will apply to the KML connection arrangements in each supply stage, to ensure that there are no material adverse impacts to other network users. These constraints will be enforced through relevant provisions in the commercial agreements between Western Power and KML (and its related entities).

It must be noted that a condition of the commercial agreements under which network services will be provided to KML is that the Authority grants to Western Power, under sections 12.40 to 12.49 of the Code, any necessary exemptions or derogations to the Technical Rules in respect of the services provided.

KML has provided a letter of support for Western Power's exemption submission acknowledging the extensive consultation that has taken place over an extended period on the proposed supply arrangements. This letter further confirms that KML understands the meaning of the N-0 criterion and its impact on KML's operations and that such criterion is acceptable for KML's operations of 120 MW (see Attachment 4).

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8 Summary of Exemption Justification

8.1 132 kV Contingent Supply and Interim Supply

Western Power considers that the requested exemption for the KML 132 kV Contingent Supply and Interim Supply arrangements is justified on the basis that no other feasible solution is identified that can provide a compliant N-1 criterion to meeting KML's requirements.

The Contingent Supply and Interim Supply arrangements are temporary, limited and contingent arrangements provided from the existing 132 kV ahead of delivery of the 330 kV MWEP connection. Exemptions are sought solely to enable KML's initial connection to transition to the 330 kV Final Supply arrangement in a manner that does not materially impact on other network users.

Western Power has offered prudent arrangements to KML that meet its desired targets for initial production start-up whilst ensuring that the quality and reliability of supply to other users are not impacted.

8.2 330 kV Final Supply

Western Power considers that granting the requested exemption for the KML 330 kV Final Supply arrangement can justified on the basis that:

1. The exemption sought is consistent with the requirement identified in Western Power's MWEP Regulatory Test submission approved by the Authority, and is also consistent with the subsequent pre-approval NFIT determination by the Authority.

2. The intent of the N-1-1 planning criterion covering all 330 kV equipment embedded in the Technical Rules is not reasonably applicable for supply to a distant single customer such as KML. The occurrence of a credible contingency will not "result in the loss of supply to a large number of customers", which is the stated intent of the N-1-1 Criterion clause. Western Power believes it would not have acted in a prudent and commercial manner if it sought to extend the N-1-1 Criterion to apply to the proposed KML connection from Three Springs Terminal.

3. The additional cost of providing a fully compliant N-1-1 connection at Three Springs Terminal, estimated at $461 million in real 30 June 2010 dollars (in addition to the capital cost of the MWEP solution) is considered to be clearly uneconomic to KML and other network users.

4. The additional cost of providing an N-1-connection at Three Springs Terminal as an alternative solution is estimated at $79 million in real 30 June 2010 dollars. The Authority's final determination shows these higher costs would not meet NFIT and would require a major capital contribution from KML without additional major mining or other block loads connecting beyond KML's 120 MW.

5. The potential alternative N-1-1 and N-1 criterion network investments provide limited reliability benefits whilst KML is the single connection customer at Three Springs Terminal. KML is exposed to similar N-0 levels of supply reliability over its 110 km 330 kV transmission connection asset to its mine site.

6. In extensive consultation with KML over an extended period on the proposed supply arrangements KML has confirmed that an N-0 level of supply reliability is acceptable to the KML operation to avoid the additional costs of providing a higher level of supply reliability for its initial operations.

9 Statement of Rules Exemption

Under section 12.40 of the Electricity Networks Access Code 2004, Western Power as the Service Provider for the Western Power Covered Network is seeking exemptions to the requirements of the Technical Rules, as follows:

Exemption No. 1: 132 kV Contingent and Interim Supply to KML

Exemption from Clause 2.5.2.2: N-1 Criterion of the Technical Rules, insofar as it applies to the proposed 132 kV Contingent and Interim Supply connection to KML from the sub-network comprised of the Eneabba Substation, which supply connection shall be designed to an N-0 planning criterion.

Such exemption is to apply for the period during which Karara Mining Limited is supplied from the Western Power Covered Network at a voltage level of 132 kV. This exemption will lapse when Karara Mining Limited takes supply at 330 kV under the proposed Final Supply Arrangement.

Exemption No. 2: 330 kV Final Supply to KML

Exemption from Clauses 2.5.2.2 and 2.5.2.3 of the Technical Rules for the proposed 120 MW CMD connection to KML from the sub-network comprised of the 330 kV Neerabup to Three Springs transmission line and 330 kV Three Springs Terminal, which supply connection shall be designed to an N-0 planning criterion.

Such exemption is to apply for an indefinite period (unless revoked under the provisions of the Electricity Networks Access Code 2004).

Attachment 1: Network Diagrams

Figure 1 Stage 1A: Contingent Supply schematic (late April 2012 –September 2012)

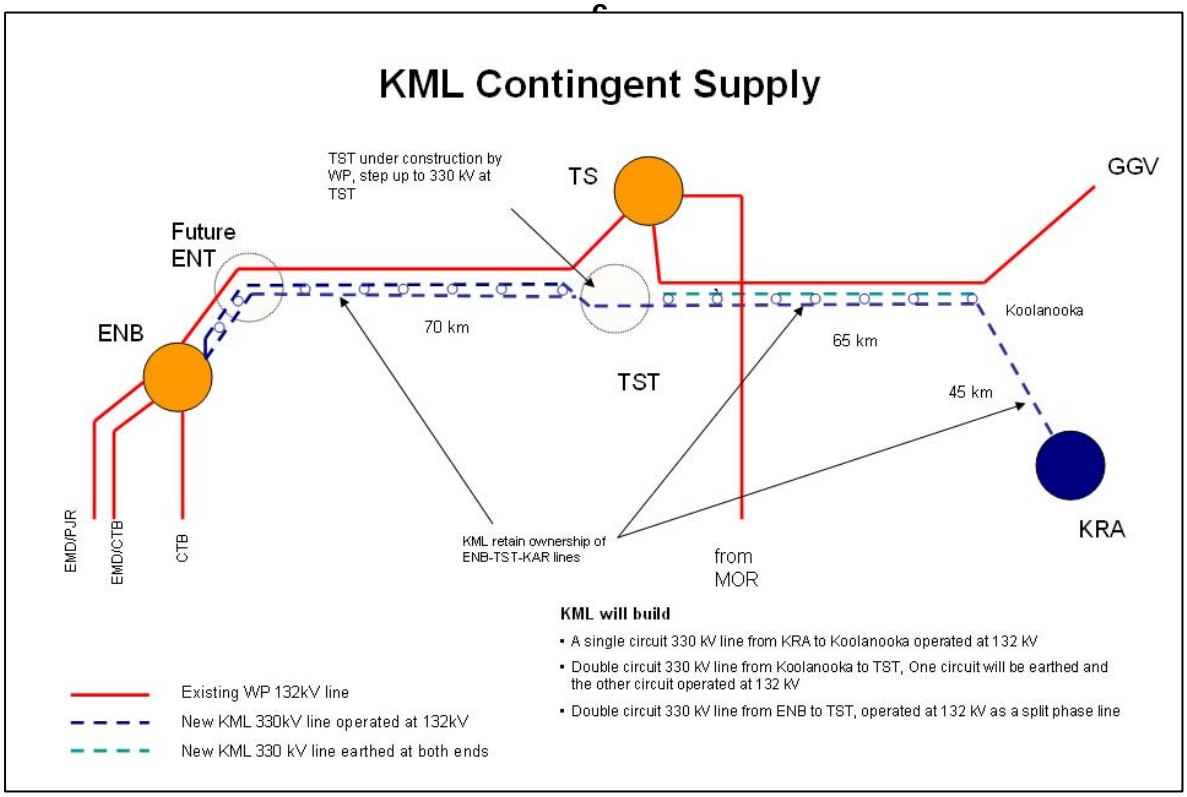


Figure 2 Stage 1B: Interim Supply schematic (September 2012 – April 2014)

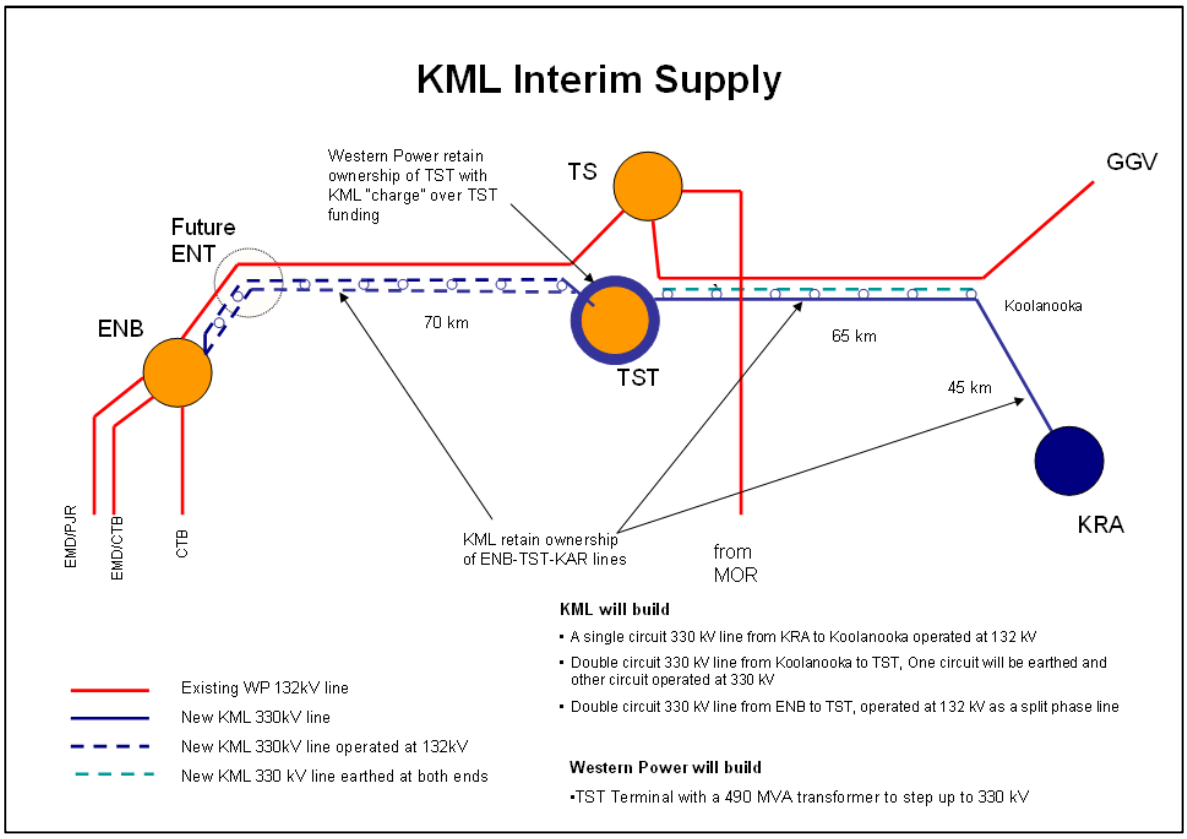
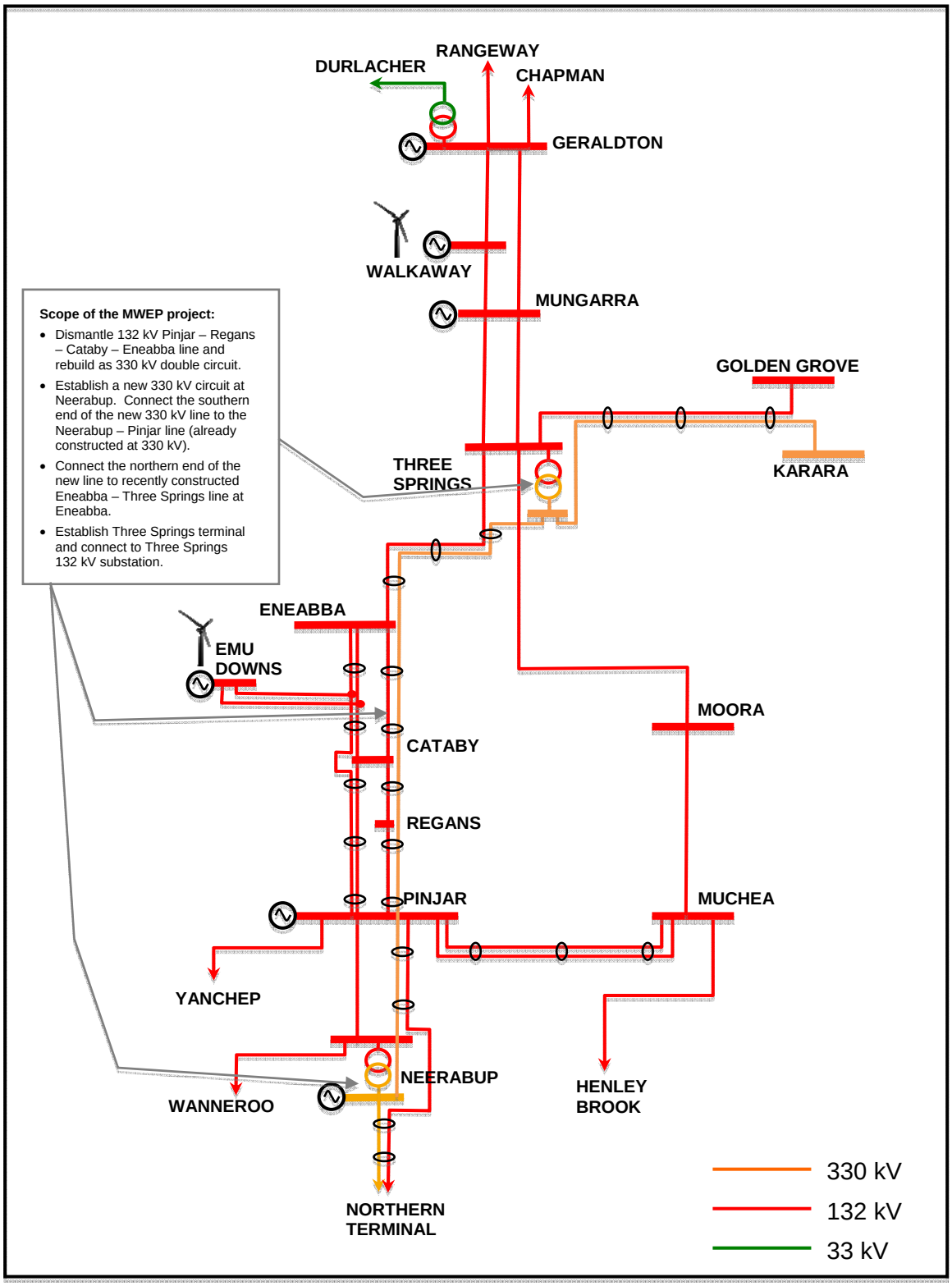


Figure 3 Stage 2 - Final Supply schematic ((April 2014 onwards)



File#: SDV/77/6(156)

Attachment 2: References

Table 5 List of relevant supporting documents

Doc Ref #	Title	Date Issued
DM 7616591	Western Power Major Augmentation Proposal Regulatory Test Submission MWEP and associated attachments and documentation	1 Dec 2010
-	ERA Regulatory Test Determination - Western Power's MWEP (http://www.erawa.com.au/3/954/48/mid_west_energy_project_southern_section_augmentat.pm)	3 Feb 2011
DM 8077655	Western Power NFIT Pre-Approval Application MWEP and associated attachments and documentation	26 Aug 2011
-	ERA NFIT Application for the MWEP - Final Determination (http://www.erawa.com.au/3/1178/48/mid_west_energy_project_southern_section_augmentat.pm)	27 Jan 2012

Table 6 List of relevant Technical Studies undertaken

Doc Ref #	Title	Date Issued
DM 634645	Interim Supply of Gindalbie Metal's Karara Mine Load.	Nov 2009
DM 7198962	Interim Supply of Gindalbie Metal's Karara Mine load (Dynamic Study Phase 1 of North Country Development).	June 2010
DM 8105762	Karara Mining Limited's 132 kV supply to Karara Mine (Steady State, Motor Starting and Dynamic Studies).	April 2011
DM 8445092	132 kV Contingency Supply Option to Karara Mine	July 2011
DM 8285924	Karara Mining Limited's 132 kV Interim Supply to Karara Mine Load.	July 2011
DM 8445919	Karara Mining Limited's Supply to Karara Mine with Mid West Energy Project in Service	Sept 2011
DM 7296274	Protection and Control Schemes required for Contingent, Interim Supply and Final Connection Arrangements.	Dec 2011
DM 8569282	Operating Philosophy for Contingent and Interim Supply Connection Arrangements.	Dec 2011
DM 6978882	Reliability Data for Karara Interim Supply Period	March 2010

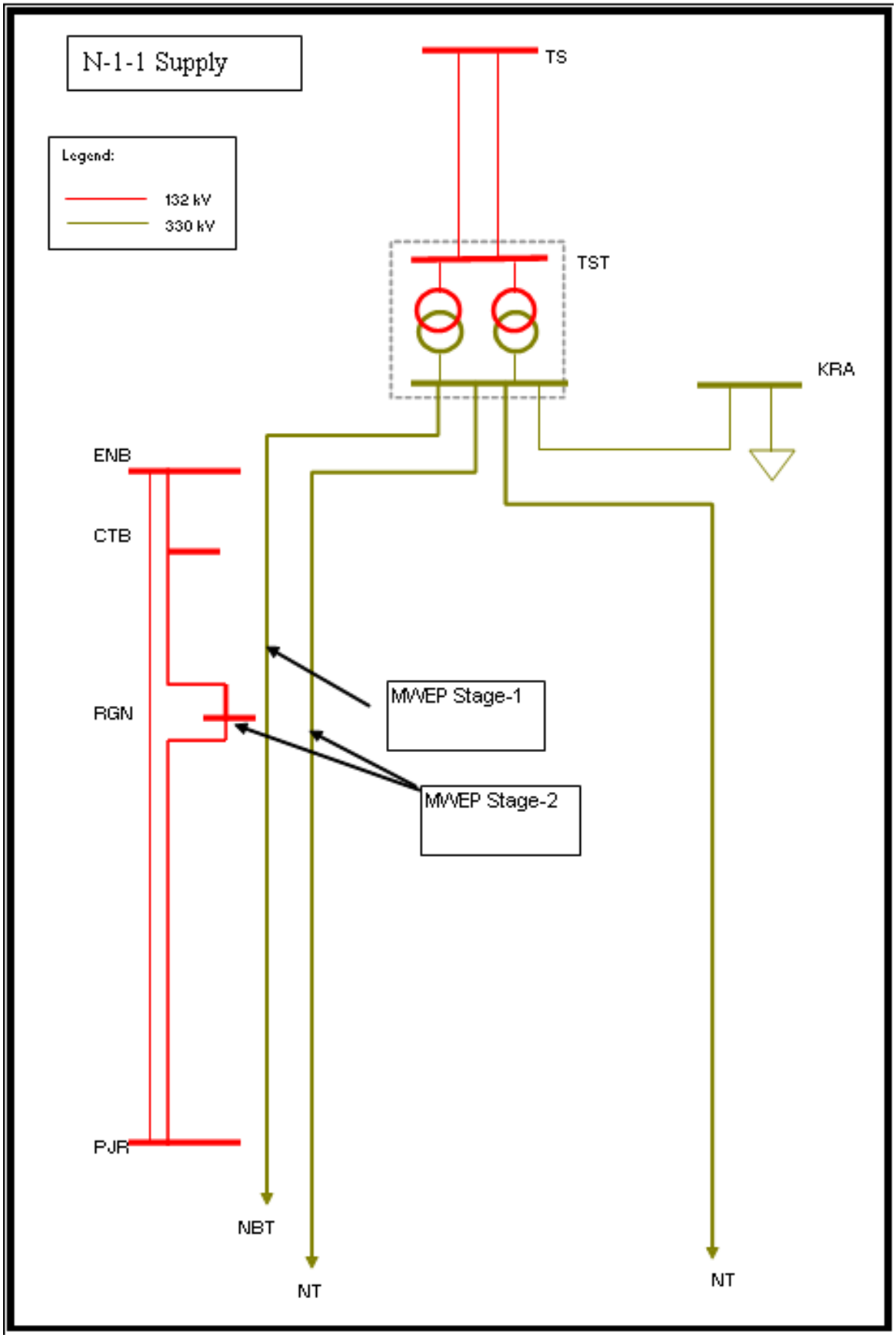
Attachment 3: Cost Benefit Analysis data

[Table 7 Deleted by Western Power]

[Table 8 Deleted by Western Power]

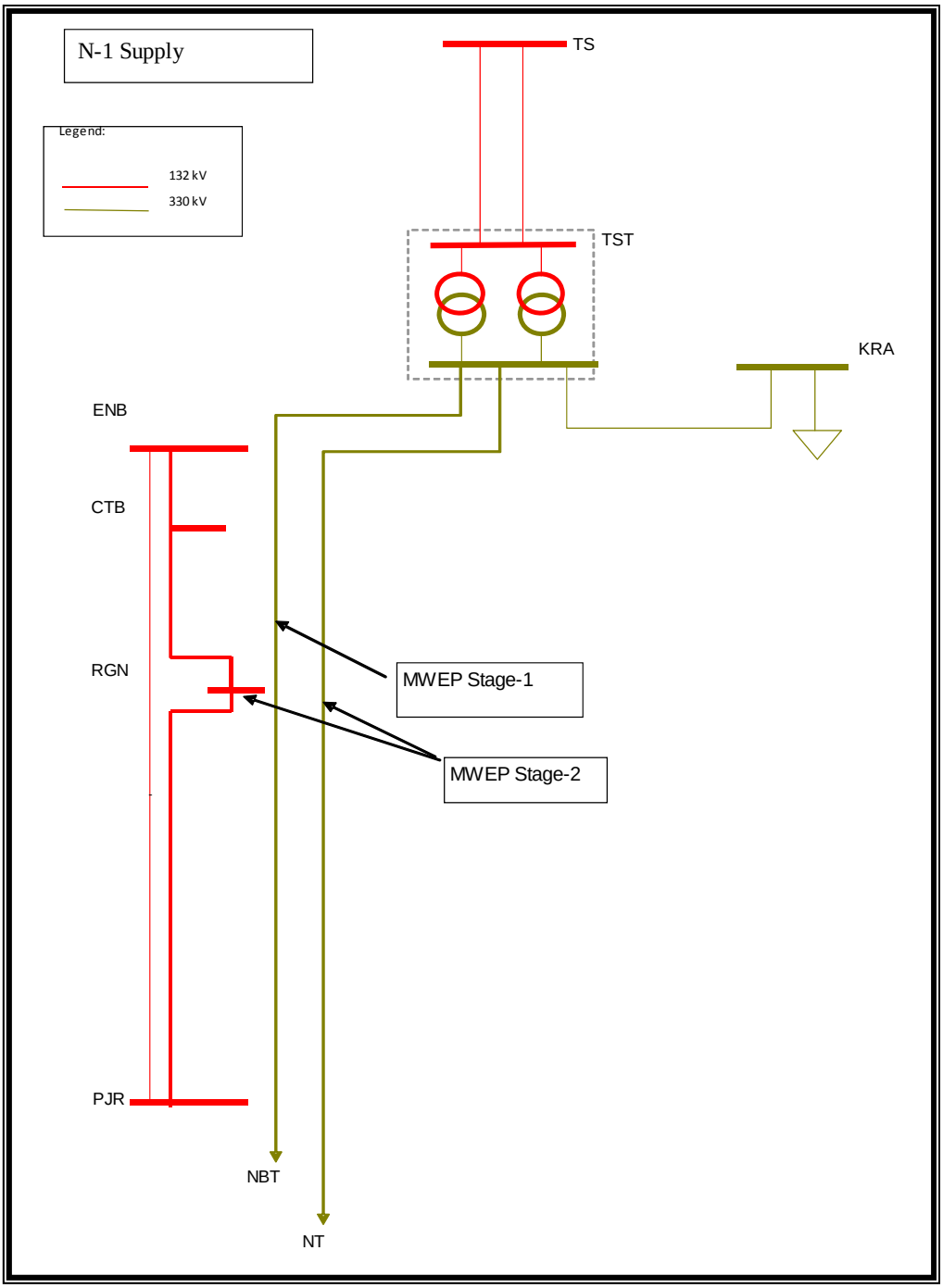
The schematic layout of the assumed configuration of the network under an N-1-1 Criterion at Three Springs Terminal is shown in below.

Figure 4 Assumed N-1-1 network augmentation configuration



The schematic layout of the configuration of the assumed network under an N-1 Criterion at Three Springs Terminal is shown in below.

Figure 5 N-1 Network Augmentation Configuration



File#: SDV/77/6(156)

Attachment 4: KML Letter of Acknowledgement

KARARA
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1 May 2012

Mr Paul Italiano
Chief Executive Officer
Western Power
363 Wellington Street
PERTH WA 6000

Dear Mr Italiano

WESTERN POWER SUBMISSION FOR TECHNICAL RULES EXEMPTION

Western Power has provided Karara Mining Limited (KML) with a copy of its proposed submission to the Economic Regulation Authority (ERA) seeking exemptions from certain provisions of the Technical Rules for the supply connection to the Karara mine site and requested our review and comment.

KML is fully supportive of Western Power's submission for both the 132kV contingent and interim supply stages and also for the final 330kV supply arrangement. This letter of support outlines our position on these matters.

As you are aware KML is currently constructing a 330kV transmission line from Eneabba to its mine site east of Three Springs to connect with the existing Western Power network and ultimately become part of the new 330kV transmission network between Perth and Three Springs.

KML has invested significant resources in the design and development of this power line including conducting discussions with Western Power on both technical and commercial matters over an extended period of time.

KML has designed its 110km 330kV transmission line connection between Three Springs and the mine site with a view to optimising the initial capital expenditure while retaining sensible future expansion options. The KML owned and operated power line between Three Springs and the mine site will be operated single circuit for our initial stage of operation. Whilst most of this line is constructed as double circuit the section of line between Koolanooka and the mine site (approx. 40km) has been built as a single circuit only (although it could be relatively easy to duplicate in the future should KML require this).

KML considers that this single circuit construction will not adversely affect its mine site operations and has provided on-site back-up generation to its most critical equipment and plant.

KML understands the meaning of the N-0 planning criterion as described in Section 2.5.2.1 of the Technical Rules for both the 132kV contingent and interim supply stages, and also the final 330kV supply arrangement for its mine site operations. KML is satisfied with this level of transmission network reliability and agrees with the approach taken by Western Power to minimise the upfront capital costs of the initial MWEP configuration whilst still providing economic options for future flexibility and expansion of the 330kV network.

KML nonetheless retains all rights to reconsider its transmission needs at any future time should expansion of the 330kV network be necessary to meet its onsite power needs.

Should you wish to discuss this matter further with KML please contact Mahendra Kuruppu on 08 6298 1257.

Yours sincerely
KARARA MINING LTD