Powerlink Queensland

Project Assessment Conclusions Report

4 March 2019

Maintaining reliability of supply to the Brisbane metropolitan area

Document Purpose

For the benefit of those not familiar with the National Electricity Rules (the Rules) and the National Electricity Market (NEM), Powerlink offers the following clarifications on the purpose and intent of this document:

1. The Rules require Powerlink to carry out forward planning to identify future reliability of supply requirements and consult with interested parties on the proposed solution as part of the Regulatory Investment Test for Transmission (RIT-T). This includes replacement of network assets in addition to augmentations of the transmission network.
2. Powerlink must identify, evaluate and compare network and non-network options (including, but not limited to, generation and demand side management) to identify the '*preferred option*' which can address future network requirements at the lowest net cost to electricity consumers. This assessment compares the net present value (NPV) of all credible options to identify the option that provides the greatest economic benefits to the market.
3. This document contains the results of this evaluation, and a final recommended solution to address the condition risks associated with the West Darra to Rocklea and South Pine to Upper Kedron transmission lines by December 2020.

Contents

Executive Summary

The West Darra to Rocklea and South Pine to Upper Kedron transmission lines are 110kV double circuit lines that form part of the Greater Brisbane transmission network in the Moreton transmission zone[1], with the South Pine and Rocklea Substations providing the high voltage injection points for the western part of the Greater Brisbane area. Originally commissioned in 1963 the lines consist of 68 galvanised steel lattice towers with a combined route length of 22.5 kilometres.

Under the *Electricity Act 1994*, Powerlink is required to "operate, maintain (including repair and replace if necessary) and protect its transmission grid to ensure the adequate, economic, reliable and safe transmission of electricity". The West Darra to Rocklea and South Pine to Upper Kedron transmission lines are nearing the end of their technical service lives, with the majority of structures exhibiting signs of degradation. The presence of advanced corrosion on the lines' earth wire attachment points and hardware, as well as the total loss of sacrificial galvanising to the foundation interfaces on 30% of the tower legs, have increased the risk of mechanical failure, particularly in storm and severe wind conditions. The earth wires are also not sufficiently rated to cater for the continued growth in fault levels over time.

The condition of the West Darra to Rocklea and South Pine to Upper Kedron transmission lines presents Powerlink with a range of safety, reliability of supply and compliance risks requiring resolution. Since consideration for this investment is driven by an obligation in the National Electricity Rules (the Rules), it is a 'reliability corrective action' under the Regulatory Investment Test for Transmission (RIT-T).

This Project Assessment Conclusions Report (PACR) represents the final step of the RIT-T process prescribed under the Rules undertaken by Powerlink to address the condition risks arising from the ageing West Darra to Rocklea and South Pine to Upper Kedron transmission lines. It contains the results of the planning investigation and cost-benefit analysis of credible options. In accordance with the RIT-T, the credible option that maximises the present value of net economic benefits is recommended for implementation.

Credible options considered

Powerlink identified three credible network options to address the identified need, as presented in Table 1.

[1] This relates to the standard geographic definitions (zones) identified within the Powerlink's Transmission Annual Planning Report, (TAPR) which is published annually by 30 June.

Table 1: Summary of credible options

Option	Description	Indicative capital cost ($million, 2018/19)	Indicative annual O&M costs ($million, 2018/19)
Base Option: Two stage refit by 2028, replacement by 2043	Repair or replace selected components, by December 2020*	4.55*	0.037
	Repair or replace selected components, including members, by December 2028†	8.47†	
	Rebuild lines by December 2043†	22.53†	
Option 1: Refit by 2020, replacement by 2043	Repair or replace selected components, including members, by December 2020*	10.25*	0.038
	Rebuild lines by December 2043†	22.53†	
Option 2: Minor refit by 2020, replacement by 2028	Repair or replace selected components, by December 2020*	4.55*	0.043
	Rebuild lines by December 2028†	22.53†	

* Proposed RIT-T project
† Modelled projects

Evaluation and conclusion

The RIT-T requires that the proposed preferred option maximises the present value of net economic benefit, or minimises the net cost, to all those who produce, consume and transport electricity in the market.

In accordance with the expedited process for this RIT-T, the Project Specification Consultation Report (PSCR), published in November 2018, made a draft recommendation to implement the Base Option, staged refit of the transmission lines in 2020 and 2028 followed by a full rebuild of the lines in 2043. The RIT-T project for the Base Option involves the refit of selected components including 54 tower legs, 6% of structure nuts and bolts, all earth wires and climbing step bolts, and earthing improvements to 48 structures by December 2020 and has an estimated capital cost of $4.55 million in 2018/19 prices. Powerlink is the proponent of the proposed network project.

There were no submissions received in response to the PSCR.

As the outcomes of the economic analysis contained in this PACR remain unchanged from those published in the PSCR, the draft recommendation has been adopted without change as the final recommendation and will now be implemented. In addition, Powerlink will:

- review and refine the timing of subsequent stages of this option, if required, based on future condition assessments of the risks arising from these lines remaining in service
- review and realign the strategy of the anticipated subsequent stages of this option, if required, based on future network topology requirements to meet forecast demand in the Brisbane metropolitan area
- undertake any necessary additional regulatory consultations at the appropriate time for future investments if required.

1. Introduction

This Project Assessment Conclusions Report (PACR) represents the final step of the RIT-T process[2] prescribed under the Rules undertaken by Powerlink to address the condition risks arising from the ageing West Darra to Rocklea and South Pine to Upper Kedron transmission lines. It follows the publication of the Project Specification Consultation Report (PSCR) published in November 2018 that adopted the expedited process for this RIT-T, as allowed for under the Rules for investments of this nature. The Project Specification Consultation Report:

- described the identified need that Powerlink is seeking to address, together with the assumptions used in identifying this need
- set out the technical characteristics that a non-network option would be required to deliver in order to address the identified need
- described the credible options that Powerlink considered may address the identified need
- discussed specific categories of market benefit that in the case of this specific RIT-T assessment are unlikely to be material
- identified the preferred option and that Powerlink was claiming an exemption from producing a Project Assessment Draft Report (PADR).

Powerlink identified the Base Option, staged refit of the transmission lines in 2020 and 2028 followed by a full rebuild of the lines in 2043, as the preferred option to address the identified need. The RIT-T project for the Base Option, involves the refit of selected components and earthing improvements by December 2020 and has an estimated capital cost of $4.55 million in 2018/19 prices. NER clause 5.16.4(z1) provides for a Transmission Network Service Provider (TNSP) to claim exemption from producing a PADR for a particular RIT-T application if all the following conditions are met:

- the estimated capital cost of the preferred option is less than $41 million
- the preferred option has been identified in the PSCR noting exemption from publishing a PADR
- the preferred option, or other credible options, do not have a material market benefit
- submissions to the PSCR did not identify additional credible options that could deliver a material market benefit.

There were no submissions received in response to the PSCR that closed on 19 February 2019. As a result, no additional credible options that could deliver a material market benefit have been identified as part of this RIT-T consultation. As all of the conditions are now satisfied, Powerlink has not issued a PADR for this RIT-T and is now publishing this PACR, which:

- describes the identified need and the credible options that Powerlink considers may address the identified need
- provides a quantification of costs and reasons why specific classes of market benefit are not material for the purposes of this RIT-T assessment
- provides the results of the net present value (NPV) analysis for each credible option assessed, together with accompanying explanatory statements
- identifies the preferred option for investment by Powerlink and details the technical characteristics and estimated commissioning date of the preferred option
- describes the consultation process followed for this RIT-T together with the reasons why Powerlink is exempt from producing a PADR.

Since this investment is driven by an obligation in the Rules, it is a ‘reliability corrective action’ under the RIT-T.

[2] This RIT-T consultation has been prepared based on the following documents: *National Electricity Rules, Version 113*, 5 October 2018 and AER, *Final Regulatory Investment Test for Transmission Application Guidelines*, September 2017.

2. Identified need

This section provides an overview of the existing 110kV supply arrangements in the Brisbane metropolitan area, Powerlink's statutory obligations in relation to the supply of electricity and details of the most recent condition assessment of the West Darra to Rocklea and South Pine to Upper Kedron transmission lines.

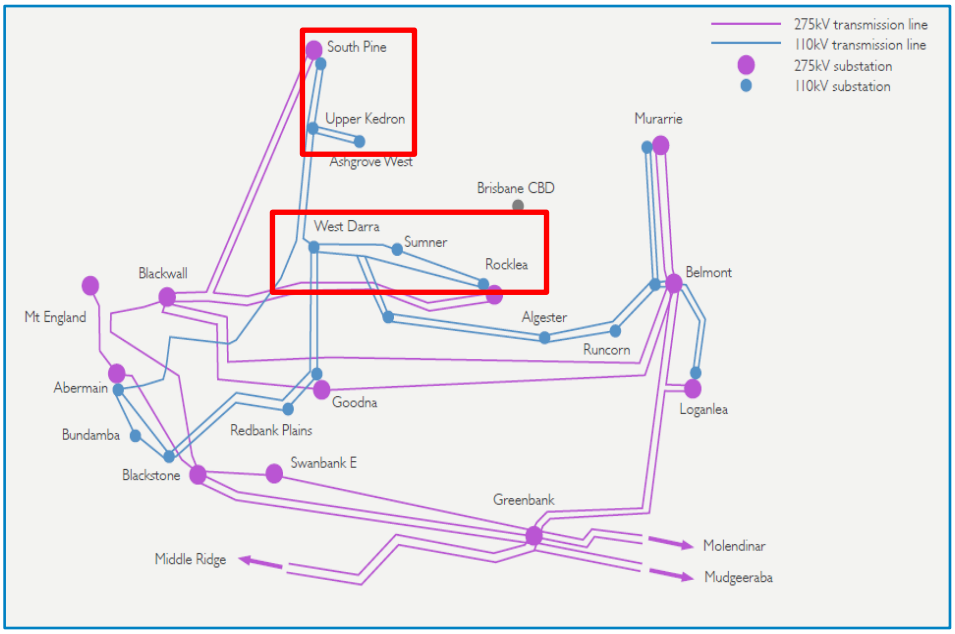
2.1 Geographical and network overview

The West Darra to Rocklea and South Pine to Upper Kedron transmission lines are 110kV double circuit lines that form part of the Greater Brisbane transmission network in the Moreton transmission zone[3], with the South Pine and Rocklea Substations providing the high voltage injection points for the western part of the Greater Brisbane area.

Originally commissioned in 1963 the West Darra to Rocklea and South Pine to Upper Kedron lines consist of 68 galvanised steel lattice towers with a combined route length of 22.5 kilometres. They traverse a mixture of semi-rural, suburban and industrial land uses, as well as crossing the Centenary Highway and the Ipswich train line.

The relevant transmission network is shown in Figure 2.1.

Figure 2.1: Greater Brisbane transmission network



2.2 Description of identified need

With peak demand in the areas serviced by these lines forecast to remain steady for the next 10 years[4], it is critical that supply is maintained in the Brisbane metropolitan area, and for Powerlink to continue to meet its reliability of supply obligations.

Powerlink's condition assessment of the transmission lines has highlighted that at over 50 years of age, the majority of structures are exhibiting signs of degradation, which if not addressed will lead to increased safety and network risks.

2.3 Assumptions underpinning the identified need

The need to invest is driven by the risks arising from the condition of ageing structures on the West Darra to Rocklea and South Pine to Upper Kedron transmission lines, for which Powerlink has legal compliance obligations under the Rules and jurisdictional instruments.

[3] This relates to the standard geographic definitions (zones) identified within the Powerlink's Transmission Annual Planning Report, (TAPR) which is published annually by 30 June.
[4] Powerlink Transmission Annual Planning Report 2018

Planning studies have confirmed an enduring need for the West Darra to Rocklea and South Pine to Upper Kedron transmission lines to ensure Powerlink is able to meet its jurisdictional reliability standards within the Greater Brisbane transmission network.

At over 50 years of age the West Darra to Rocklea and South Pine to Upper Kedron transmission lines are exhibiting signs of degradation; presenting a potential risk to the ongoing safe, reliable and economic supply of electricity into the Brisbane metropolitan area.

The consequence of not addressing these condition-based risks is that the asset condition will continue to decline at an accelerated rate. In the short term, this leads to additional works to rectify the condition and address the resulting risks. Under the worst case scenario, components of the asset will ultimately fail with the potential to result in public safety and network reliability risks.

It follows that the consequences of failure combined with the increasing cost of remedial action compels Powerlink to undertake reliability corrective actions on the West Darra to Rocklea and South Pine to Upper Kedron transmission lines if it is to continue to meet the reliability standards set out in the Rules and Powerlink's Transmission Authority[5].

2.4 Description of asset condition and risks

The 110kV West Darra to Rocklea and South Pine to Upper Kedron transmission lines were constructed in the early 1960s to service a growing demand for electricity supply in the greater Brisbane area. Today much of the original easement is bordered by urban development, with the lines now crossing a number of major urban roads, business premises and large car parks.

The transmission lines are located in a semi-tropical environment and subject to the conditions of both a highly industrial and dense urban environment bordering major road and rail corridors.

Advanced corrosion to the overhead earth wire attachment points and hardware is increasing the risk of these transmission lines failing, potentially heightening the risk to public safety and causing the lines to trip. Depending upon the location of the failure, emergency repairs could require the closure of major transport corridors.

The earth wires are also not sufficiently rated to cater for the continued growth in fault levels over time, increasing the risk of the earth wires failing during a fault condition.

The sacrificial galvanised coating on several low lying foundation interfaces has also completely broken down, exposing the underlying steel to the environment. If not addressed, this exposed steel will corrode at an accelerated rate, losing cross-sectional area and structural strength. This ultimately renders the foundation interfaces far more susceptible to failure during severe wind conditions.

The structures' original nuts and bolts, conductor hanger brackets and approximately 0.5% of light members will also reach the end of their technical service lives within the next 5 years. Beyond this time they will begin to deteriorate to the point where they become a structural risk or less suitable for remedial work. A failure of a hanger bracket can lead to a conductor dropping resulting in electricity transmission failure and high risk safety consequences for the public.

Climbing step bolts are also exhibiting corrosion and fail to meet current requirements as an attachment point for fall arrest devices. The heavy tower members remain in good condition.

The lines' conductors are in good condition and are appropriately rated when considered against the current demand forecast. They are expected to reach the end of their technical service life in 2043, triggering the need to replace the structures as they do not meet the current design standards[6] with respect to the loads and stresses applied during conductor re-stringing.

[5] Schedule 5.1a System Standards and 5.1.2 Network Reliability of the Rules, and Queensland Transmission Authority T01/98
[6] AS/NZS 7000:2010 Australia/New Zealand Standard, Overhead line design – Detailed procedures

3. Submissions received

Powerlink published a PSCR in November 2018 calling for submissions from Registered Participants, AEMO and interested parties on the credible options presented, including alternative credible non-network options that could address the risks arising from the deteriorated condition of the West Darra to Rocklea and South Pine to Upper Kedron transmission lines. Members of Powerlink's Non-network Engagement Stakeholder Register were also advised of the PSCR publication.

There were no submissions received in response to the PSCR that was open for consultation until 19 February 2019. As a result, no additional credible options that could deliver a material market benefit have been identified as part of this RIT-T consultation.

4. Credible options assessed in this RIT-T

Powerlink has developed three credible network options to address the identified need for maintaining the reliability of supply to the Brisbane metropolitan area.

- Base Option – Two stage refit by 2028, replacement by 2043
- Option 1 - Refit by 2020, replacement by 2043
- Option 2 - Minor refit by 2020, replacement by 2028

Table 4.1 Summary of Credible Options

Option 2 – Minor refit by 2020, replacement by 2028Option	Description	Indicative capital cost ($million, 2018/19)	Indicative annual O&M costs ($million, 2018/19)
Base Option: Two stage refit by 2028, replacement by 2043	Repair or replace selected components, by December 2020*	4.55*	0.037
	Repair or replace selected components, including members, by December 2028†	8.47†	
	Rebuild lines by December 2043†	22.53†	
Option 1: Refit by 2020, replacement by 2043	Repair or replace at risk components, including members, by December 2020*	10.25*	0.038
	Rebuild lines by December 2043†	22.53†	
Option 2: Minor refit by 2020, replacement by 2028	Repair or replace selected components, by December 2020*	4.55*	0.043
	Rebuild lines by December 2028†	22.53†	

* Proposed RIT-T project
† Modelled project

The work to be committed under each option as a result of this RIT-T is identified as a 'proposed RIT-T project'; while future planned projects included in the economic analysis to provide a complete view of the options are identified as 'modelled projects'.

All of the credible options address the identified need and are technically and economically feasible. They address the identified need in a timely manner and avoid a situation where corrective maintenance of ageing assets is no longer practical.

None of these options has been discussed by the Australian Energy Market Operator (AEMO) in its most recent National Transmission Network Development Plan (NTNDP)[7].

[7] Clause 5.16.4(b)(4) of the Rules requires Powerlink to advise whether the identified need and or solutions are included in the most recent NTNDP. The 2016 NTNDP is currently the most recent NTNDP.

Additional options that have been considered but not progressed, due to not being either economically or technically feasible, are listed in Appendix 1 of the PSCR.

4.1 Base Option: Two stage refit by 2028, replacement by 2043

Powerlink is the proponent of this option.

This option involves remedial repair of 54 low-lying and corroded tower leg-foundation interfaces along with the replacement of 6% of structure nuts and bolts, as well as all overhead earth wires and all climbing step bolts, plus earthing improvements to 48 structures, by December 2020.

Repairs are then made to 26 low-lying and corroded tower leg-foundation interfaces, along with the replacement of the balance of all nuts and bolts, 0.5% of light members and 400 hanger brackets by December 2028.

The lines are then rebuilt in 2043.

This option maximises the technical service life of the existing structures and addresses the immediate risks arising from those components with the highest possibility of failure with a minimal upfront cost.

Table 4.2: Main project components for the Base Option

Option Stage	Description	Indicative cost ($million, 2018/19)
RIT-T project		
Refit by December 2020	Repair selected components, including 54 tower legs; replace 6% of structure nuts and bolts, plus all earth wires and all climbing step bolts. Upgrade earthing of 48 structures.	4.55
Modelled capital projects		
Refit by December 2028	Repair 26 tower legs; replace 0.5% of light members and balance of structure nuts and bolts, plus 400 hanger brackets	8.47
Rebuild by December 2043	Rebuild lines	22.53
TOTAL		**35.55**

4.2 Option 1: Refit by 2020, replacement by 2043

Powerlink is the proponent of this option.

Option 1 involves the repair of selected components, including 80 tower legs, along with the replacement of all nuts and bolts, 0.5% of light members, all earth wires and all climbing step bolts, along with earthing improvements to 48 structures, by December 2020.

The lines, including conductors, are then replaced by December 2043.

This option seeks to optimise the life of existing structures and reduce the number of mobilisations required to complete all future required work.

Table 4.3 Main project components for Option 1

Option Stage	Detailed Description	Indicative cost ($million, 2018/19)
RIT-T project		
Refit by December 2020	Repair selected components, including 80 tower legs; replace all structure nuts and bolts, all earth wires, all climbing step bolts, 400 hanger brackets and 0.5% of light members. Upgrade earthing of 48 structures.	10.25
Modelled capital project		
Rebuild by December 2043	Rebuild lines	22.53
TOTAL		**32.78**

4.3 Option 2: Minor refit by 2020, replacement by 2028

Powerlink is the proponent of this option.

Option 2 involves an initial repair of selected components of the lines by December 2020 to address the immediate risks arising from the most degraded components. This work includes the repair of 54 tower legs, along with the replacement of 6% of the most corroded nuts and bolts on the lines, all earth wires and all climbing step bolts, along with earthing improvements to 48 structures.

This is then followed by a full line rebuild to be completed by December 2028.

This option seeks to address the immediate risks arising from those components with the highest possibility of failure with a minimal upfront cost and reduces the number of mobilisations required to complete all future required work.

Table 4.4: Main project components for Option 2

Option Stage	Detailed Description	Indicative cost ($million, 2018/19)
RIT-T project		
Minor refit by December 2020	Repair selected components, including 54 tower legs; replace 6% of structure nuts and bolts, all earth wires and all climbing step bolts. Upgrade earthing of 48 structures.	4.55
Modelled capital project		
Rebuild by December 2028	Rebuild lines	22.53
TOTAL		**27.08**

4.4 Material inter-network impact

Powerlink does not consider that any of the credible options being considered will have a material inter-network impact, based on AEMO's screening criteria.[8]

[8] In accordance with Rules clause 5.16.4(b)(6)(ii). AEMO has published guidelines for assessing whether a credible option is expected to have a material inter-network impact.

5. Materiality of Market Benefits

Powerlink does not consider that the proposed West Darra to Rocklea and South Pine to Upper Kedron transmission line projects would provide any material market benefits due to the nature of the asset.

5.1 Market benefits that are not material for this RIT-T assessment

None of the replacement options will have an impact on wholesale market outcomes. The Australian Energy Regulator (AER) has recognised that if the proposed investment will not have an impact on the wholesale market, then a number of classes of market benefits will not be material in the RIT-T assessment[9]. Consequently, no market benefits have been estimated as part of this RIT-T.

More information on consideration of individual classes of market benefits can be found in the PSCR.

6. General modelling approach adopted to assess net benefits

6.1 Analysis period

The RIT-T analysis has been undertaken over a 30-year period, from 2019 to 2048. A 30-year period takes into account the size and complexity of the transmission line refit and replacement program.

As the replacement assets will have differing residual values by 2048 under each option, terminal values have been calculated to offset these variations.

6.2 Discount rate

Under the RIT-T, a commercial discount rate is applied to calculate the net present value (NPV) of costs and benefits of credible options. Powerlink has adopted a real, pre-tax commercial discount rate of 7.04%[10] as the central assumption for the NPV analysis presented in this report.

Powerlink has tested the sensitivity of the results to changes in this discount rate assumption, and specifically to the adoption of a lower bound discount rate of 3.47%[11] and an upper bound discount rate of 10.61% (i.e. a symmetrical upwards adjustment).

6.3 Description of reasonable scenarios

The RIT-T analysis is required to incorporate different reasonable scenarios to estimate market benefits. The scenarios must be appropriate to the credible options under consideration.

The choice of reasonable scenarios must reflect any variables or parameters that are likely to affect the ranking of the credible options, where the identified need is reliability corrective action[12].

Powerlink has considered capital costs and discount rate sensitivities individually and in combination and found that only the discount rate affects option rankings. Powerlink has therefore adopted three scenarios based on high, low and central estimates of the discount rate.

[9] AER, *Final Regulatory Investment Test for Transmission Application Guidelines,* September 2017, version 2, page 13.
[10] The indicative commercial discount rate is calculated on the assumption that a private investment in the electricity sector would hold an investment grade credit rating, a return on equity and a debt gearing ratio equal to an average firm on the Australian stock exchange.
[11] A discount rate of 3.47 per cent is based on the AER's Final Decision for Powerlink's 2017-2022 transmission determination, which allowed a nominal vanilla WACC of 6.0 per cent and forecast inflation of 2.45 per cent that implies a real discount rate of 3.47 per cent. See AER, *Final Decision: Powerlink transmission determination 2017-2022 | Attachment 3 – Rate of return*, April 2017, p 9.
[12] AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 16, p. 7

As all cash-flows being discounted relate to regulated network costs and there are no material market benefits or non-network options identified, Powerlink has applied weightings to the final NPV ranking that reflect that the low discount rate scenario is the most appropriate for the discounting of costs.

Table 6.1: Reasonable scenarios adopted

Key variable/ parameter	Low discount rate scenario	Central discount rate scenario	High discount rate scenario
Discount rate	3.47%	7.04%	10.61%
NPV Weighting	0.6	0.3	0.1

7. Cost-benefit analysis and identification of the preferred option

7.1 Net present values

Table 7.1 outlines the NPV for each credible option under the high, central and low discount rate scenarios as well as under the weighted scenario.

Table 7.1: NPV for each credible option ($m, 2018/19)

Option	Description	High Scenario	Central Scenario	Low Scenario	Weighted
Base Option	Two stage refit by 2028, replacement by 2043	-8.58	-10.83	-13.92	-12.46
Option 1	Refit by 2020, replacement by 2043	-10.17	-11.49	-13.17	-12.37
Option 2	Refurbishment by 2020, replacement by 2028	-12.37	-14.77	-16.66	-15.66

The Base Option is ranked first in NPV terms for the high and central scenarios, while Option 1 is ranked first for the low and weighted scenarios.

Table 7.2 shows more detail on the comparison of the NPVs under the weighted scenario for each option relative to the Base Option as well as the corresponding ranking of each option.

Table 7.2: Weighted NPV for each credible option, NPV relative to the Base Option (NPV $m, 2018/19) and Option Ranking

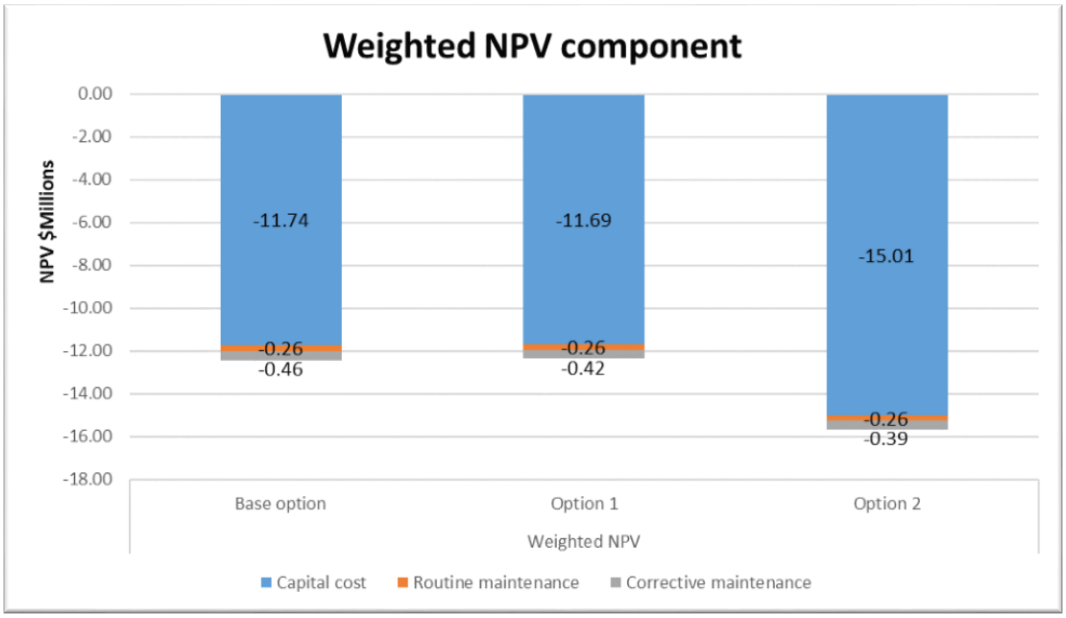
Option	Description	Weighted NPV	NPV relative to Base Option	Ranking
Base Option	Two stage refit by 2028, replacement by 2043	-12.46	-	**2**
Option 1	Refit by 2020, replacement by 2043	-12.37	+0.09	**1**
Option 2	Refurbishment by 2020, replacement by 2028	-15.66	-3.20	**3**

Under the weighted scenario, Option 1 is ranked first in NPV terms, followed closely by the Base Option. The difference between the Base Option and Option 1 under the weighted NPV is $0.09 million, which represents less than 1% of the capital expenditure estimates for these options. This is significantly within the expected margin of accuracy of the estimates (of around 25%).

The magnitude of the NPV difference between the Base Option and Option 1 is not material in comparison to the capital cost of the options. This indicates that both options are effectively equally ranked under the RIT-T.

Figure 7.1 provides a breakdown of capital, maintenance and operational costs for each option under the weighted scenario. It can be seen that all options have similar maintenance costs while the overall weighted NPV of the Base Option and Option 1 is significantly less than the weighted NPV of Option 2.

Figure 7.1: Weighted NPV component for each credible option (NPV $m, 2018/19)



7.2 Sensitivity analysis

Powerlink has investigated the following sensitivities on key assumptions:

- a lower discount rate of 3.47% as well as a higher rate of 10.61% (see Figure 7.2)
- a 25% increase/decrease in capital costs (see Figure 7.3).

Sensitivity analysis for the NPV relative to the Base Option shows that varying the capital cost has no impact on the preferred option, whereas varying the discount rate impacts the ranking. For a discount rate of less than 5.25%, Option 1 ranks first and for discount rates greater than 5.25%, the Base Option ranks first.

Figure 7.2: Sensitivity Analysis for Discount Rate

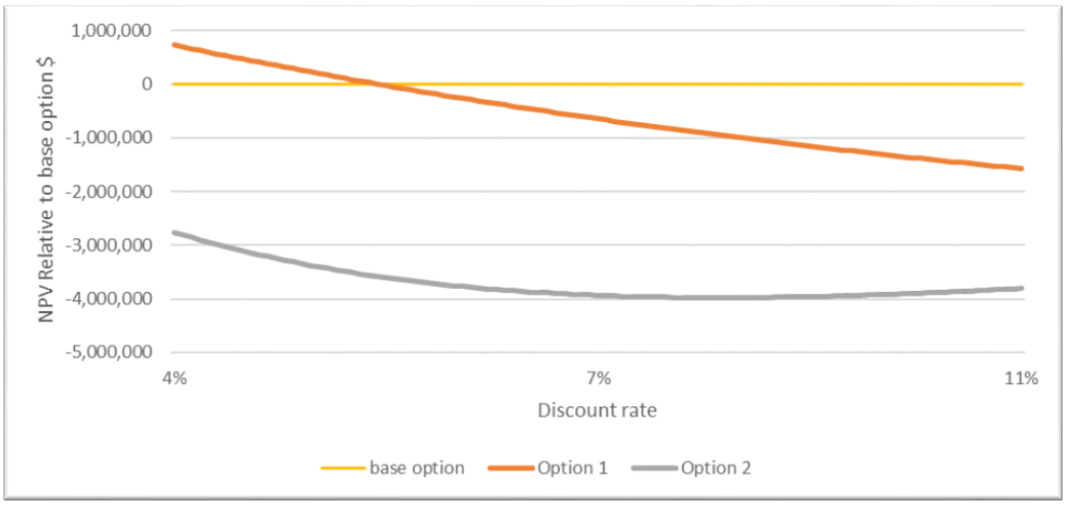
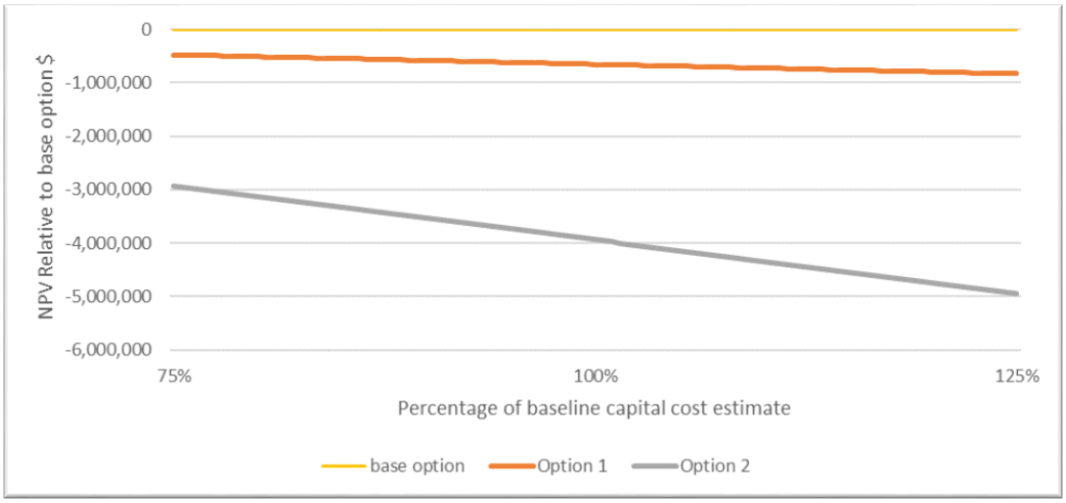


Figure 7.3: Sensitivity Analysis for Capital Cost



7.3 Preferred option

As shown in Figure 7.1, the net present value of the Base Option and Option 1 are almost identical.

Option 1 is only $0.09 million less expensive than the Base Option under the weighted discount scenario. This difference is immaterial given it represents less than 1% of the capital expenditure of these options in NPV terms, and is well within the margin of accuracy of the estimates. In addition, the Base Option:

- leads the NPV ranking across a broader range of scenarios (both the high and central scenarios) compared to the other credible options considered
- optimises the life of existing assets
- provides for a minimum upfront investment to address the risks arising from the condition of ageing assets while delivering greater flexibility for potential future investments (network or non-network).

On balance, taking into consideration the results of the sensitivity analysis and reasons stated, the Base Option has been identified as the preferred option for implementation and which satisfies the requirements of the RIT-T.

The staged approach of this option also allows for a further review of the risks arising from the condition of the lines remaining in service prior to the second stage. This will confirm the need for remedial action is still required at that point in time.

8. Conclusions

The following conclusions have been drawn from the analysis presented in this report:

- Powerlink has identified condition risks arising from the ageing West Darra to Rocklea and South Pine to Upper Kedron transmission lines requiring action.
- TNSPs must maintain (including repair and replace if necessary) their transmission network to ensure the adequate, economic, reliable and safe transmission of electricity, including the ability to meet peak demand if a major element of the network was to fail.
- The increasing likelihood of faults arising from the condition of the ageing West Darra to Rocklea and South Pine to Upper Kedron transmission lines compels Powerlink to undertake reliability corrective actions on these lines if it is to continue meeting the reliability standards set out in the Rules.
- Studies were undertaken to evaluate three credible options. All three credible options were evaluated in accordance with the AER's RIT-T.

- Powerlink published a PSCR in November 2018 requesting submissions from Registered Participants, AEMO and interested parties on the credible options presented, including alternative credible non-network options which could address the risks arising from the deteriorated condition of the West Darra to Rocklea and South Pine to Upper Kedron transmission lines.
- The PSCR also identified the preferred option and that Powerlink was adopting the expedited process for this RIT-T, claiming exemption from producing a PADR as allowed for under NER clause 5.16.4(z1) for investments of this nature.
- There were no submissions received in response to the PSCR which was open for consultation until 19 February 2019. As a result, no additional credible options that could deliver a material market benefit have been identified as part of this RIT-T consultation.
- The conditions specified under the Rules for exemption have now been fulfilled.
- The result of the cost-benefit analysis demonstrates that both the Base Option and Option 1 provide a similar net benefit solution over the 30-year analysis period. Compared to the other credible options considered, the Base Option leads the ranking across a broader range of scenarios considered under this RIT-T and is considered to satisfy the RIT-T.
- The Base Option is the recommended option as it optimises the life of the existing assets, minimises the upfront investment while addressing the 'identified need' and due to its staged approach provides for further review of the risks arising from the condition of the transmission lines to confirm the timing and need of the second stage of investment.
- The outcomes of the economic analysis contained in this PACR remain unchanged from those published in the PSCR. Consequently, the draft recommendation has been adopted without change as the final recommendation and will now be implemented.

9. Final Recommendation

Based on the conclusions drawn from the NPV analysis and the Rules requirements relating to the proposed replacement of transmission network assets, it is recommended that the Base Option be implemented to address the condition risks arising from the ageing West Darra to Rocklea and South Pine to Upper Kedron transmission lines. The Base Option provides for the staged refit of the transmission lines in 2020 and 2028, followed by a full rebuild of the lines in 2043. The RIT-T project for the Base Option involves the refit of selected components including 54 tower legs, 6% of structure nuts and bolts, all earth wires and climbing step bolts, and earthing improvements to 48 structures by December 2020 and has an estimated capital cost of $4.55 million in 2018/19 prices.

Powerlink is the proponent of the proposed network project.

Powerlink will now proceed with the necessary processes to implement this recommendation.

In addition, Powerlink will:

- review and refine the timing of subsequent stages of this option, if required, based on future condition assessments of the risks arising from these lines remaining in service
- review and realign the strategy of the anticipated subsequent stages of this option, if required, based on future network topology requirements to meet forecast demand in the Brisbane metropolitan area and
- undertake any necessary additional regulatory consultations at the appropriate time for future investments if required.

Contact us

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