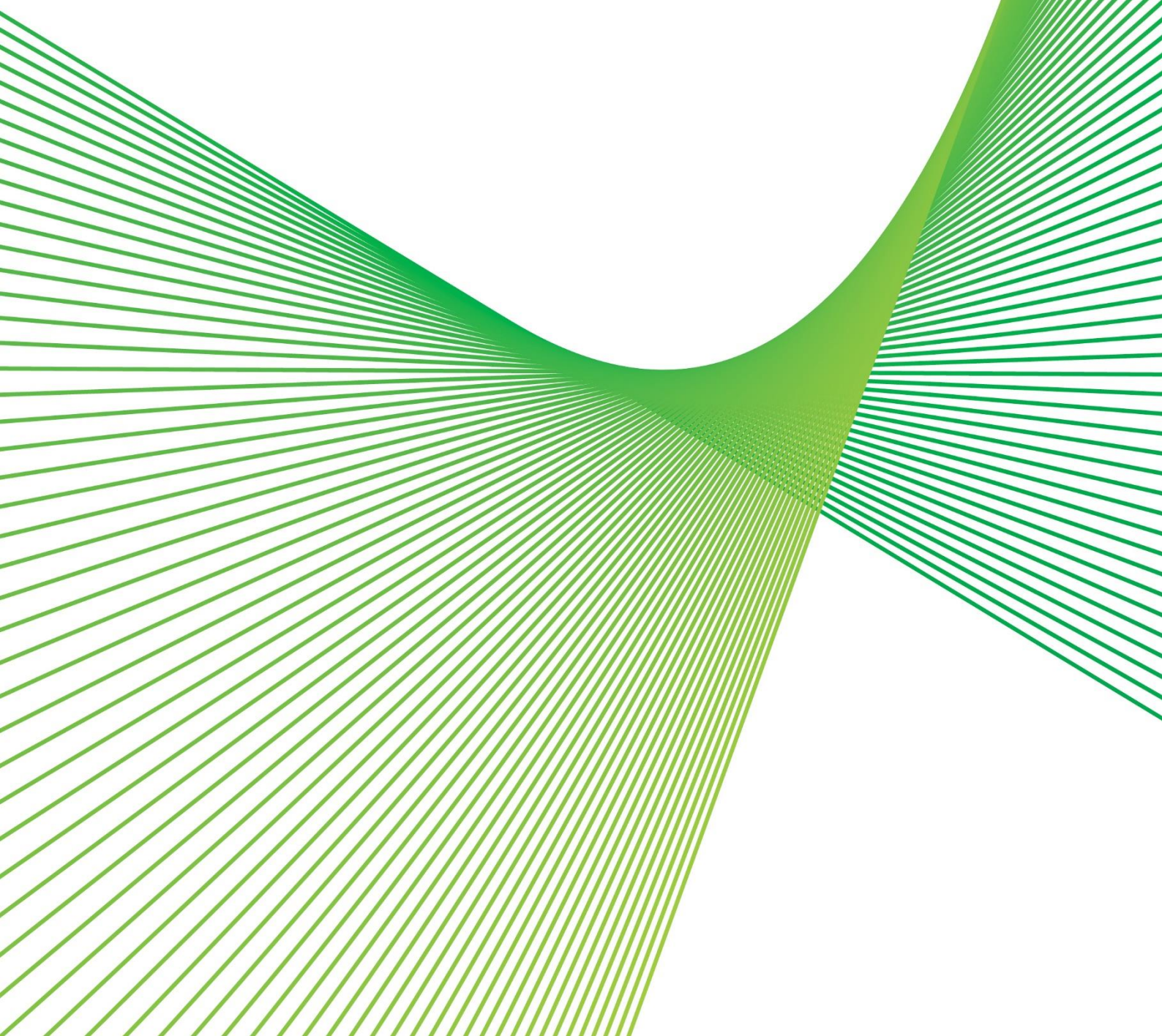


Summary: Managing risk on Southern Sydney transmission lines

RIT-T Project Specification Consultation Report

Issue date: 14 March 2023



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Summary

We are applying the Regulatory Investment Test for Transmission (RIT-T) to options for mitigating safety, environmental (bushfire) and financial (high reactive maintenance) risks caused by the deteriorating condition of four transmission lines in southern Sydney. These transmission lines link our Liverpool, Kemps Creek and Ingleburn 330 kV substations in south-west Sydney with the Sydney South 330 kV substation. Publication of this Project Specification Consultation Report (PSCR) represents the first step in the RIT-T process.

The four 330 kV transmission lines covered by this RIT-T are:

- Line 12 – spanning a route of 17.5km between Liverpool and Sydney South substations;
- Line 13 – spanning a route of 24.2km between Kemps Creek and Sydney South substations; and
- Line 76 and 78 – each spanning a route of 21.3km between Ingleburn and Sydney South substations.

Each of these lines shares a section with at least one other line and, in total, there are five distinct sections of lines covered by this RIT-T. Specifically, these sections are referred to as lines 12, 13, 13/78, 12/76, and 76/78 (where a dash denotes a shared section).

The Liverpool, Ingleburn and Sydney South substations linked by these transmission lines are customer connection points supplying the Ausgrid and Endeavour Energy networks across Southern Sydney from Macquarie Fields to Cronulla and the Sydney CBD.

Condition assessment performed through our routine maintenance program between 2017 and 2021 identified a number of condition issues across these lines. Laboratory testing has also identified that some insulators have reached end of life due to deteriorated insulation resistance. A significant proportion of the steel transmission structures are impacted by various levels of deterioration and corrosion. The affected components include tower steelwork, foundations, insulators, conductor and earthwire fittings, earthwire, and deteriorated tower earthing.

Corrosion greatly increases the likelihood of conductor drops and presents consequent safety and bushfire risk to our personnel and the public, as well as resulting in reactive maintenance costs to repair the failed elements. While this is the case for any corroded elements of the transmission network, the bushfire risks are exacerbated for the lines in question as they traverse substantial sections of bushland, much of which surrounds residential and urban areas.

As asset conditions deteriorate over time, the likelihood of failure and subsequent risks will increase should these issues not be addressed.

Identified need: managing risks on southern Sydney transmission lines

If action is not taken, the condition of the lines is expected to expose us and our customers to increasing levels of risk going forward, as the likelihood of failure increases. There are significant safety and bushfire risks under the 'do nothing' base case, as well as higher expected costs associated with reactive maintenance that may be required under emergency conditions ('financial risks').

The proposed investment will enable us to manage these risks on lines 12, 13, 13/78, 12/76 and 76/78.

Options considered under this RIT-T have been assessed relative to a base case. Under the base case, no proactive capital investment is made and the condition of the lines will continue to deteriorate.

Further condition deterioration of the affected assets due to corrosion would mean an increase in safety and bushfire risks as the likelihood of failure increases. If left untreated, corrosion of some of the vital components of the steel towers could result in incidents such as conductor drop and tower collapse. Such incidents could have serious safety consequences for nearby residents and members of the public, as well as our field crew who may be working on or near the assets.

We manage and mitigate risks to ensure they are below risk tolerance levels or 'As Low As Reasonably Practicable' ('ALARP'), in accordance with our obligations under the *New South Wales Electricity Supply (Safety and Network Management) Regulation 2014* and our Electricity Network Safety Management System (ENSMS).¹

The proposed investment will enable us to continue to manage and operate this part of the network to a safety and risk mitigation level of ALARP. Consequently, it is considered a reliability corrective action under the RIT-T. A reliability corrective action differs from a 'market benefits'-driven RIT-T in that the preferred option is permitted to have negative net economic benefits on account of it being required to meet an externally imposed obligation on the network business.

We note that the risk cost estimating methodology adopted for this RIT-T aligns with that used in our recently submitted Revised Revenue Proposal for the 2023-28 period. It reflects feedback from the Australian Energy Regulator (AER) on the methodology initially proposed in our initial Revenue Proposal.

Credible options considered

We have considered three credible options that would meet the identified need from a technical, commercial, and project delivery perspective.² These are summarised in Table E-1-1.

Table E-1-1 Summary of credible options, \$2021/22

Option	Description	Capital costs, \$m	Operating costs (per year), \$	Line 12 communications-related costs (per year), \$
Option 1	Line refurbishment limited to components with the greatest deterioration	16.3	82,848	117,600
Option 2	Line refurbishment addressing all components with condition issues	22.8	82,848	117,600
Option 3	Option 2 plus installation of OPGW fibre on Line 12	24.0	82,848	-

The options are not expected to affect annual routine operating costs (i.e., the amounts shown above are the same under the base case) since they do not affect the frequency of inspections. They do however affect the reactive maintenance costs relative to the base case (which are reflected in reduced 'financial risk costs').

Option 3 involves installing Optical Ground Wire (OPGW) fibre on Line 12 that allows for approximately \$117,600/year in communications-related costs to be avoided. These costs include annual microwave licencing fees that would otherwise need to be incurred, as well as minor expected replacement costs for

¹ Our ENSMS follows the International Organization for Standardization's ISO31000 risk management framework which requires following a hierarchy of hazard mitigation approach.

² As per clause 5.15.2(a) of the NER.

defective microwave and other associated communications equipment and their associated operating costs (such as security call outs and investigations).

Line 12 is the only line covered by the scope of this RIT-T where the installation of OPGW would provide benefits, since one of the substations it connects (Liverpool) is currently connected to Transgrid communications network through microwave-only link. This presents single point of failure due to lacking communication route diversity and sensitivity to weather conditions. The other substation connected to Line 12, Sydney South, and the substations connected to the other lines covered by this RIT-T (eg, Line 13) already have at least one communication path on the OPGW network.

Non-network options are not expected to assist in this RIT-T

We do not consider non-network options to be commercially and technically feasible to assist with meeting the identified need for this RIT-T, as non-network options will not mitigate the safety and environment (bushfire) risk posed as a result of corrosion-related asset deterioration.

The options have been assessed against three reasonable scenarios

The credible options have been assessed under three scenarios as part of this PSCR assessment, which differ in terms of the key drivers of the estimated net market benefits (ie, the estimated risk costs avoided).

Given that wholesale market benefits are not relevant for this RIT-T, the three scenarios implicitly assume the most likely scenario from the 2022 ISP (ie, the ‘Step Change’ scenario). The scenarios differ by the assumed level of risk costs, given that these are key parameters that may affect the ranking of the credible options. Risk cost assumptions do not form part of AEMO’s ISP assumptions, and have been based on Transgrid’s analysis.

Table E-1-2 Summary of scenarios

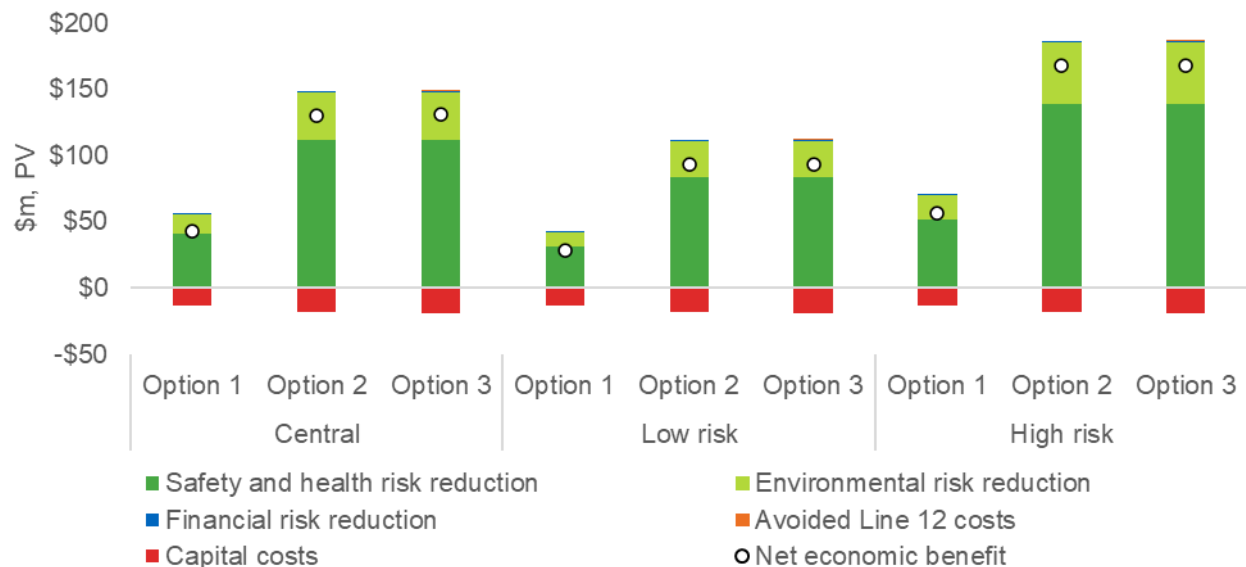
Variable / Scenario	Central	Low risk cost scenario	High risk cost scenario risk
<i>Scenario weighting</i>	33%	33%	33%
Discount rate	5.50%	5.50%	5.50%
Network capital costs	Base estimate	Base estimate	Base estimate
Operating and maintenance costs	Base estimate	Base estimate	Base estimate
Safety, environmental and financial risk benefit	Base estimate	Base estimate – 25%	Base estimate +25%

How the NPV results are affected by changes to other variables (including the discount rate and capital costs) has been investigated in sensitivity analysis.

Option 3 is the draft preferred option

Under all scenarios, the costs of mitigating the risks under all options are found to be significantly outweighed by the expected benefit of avoiding the risks. Option 2 and Option 3 are found to be effectively ranked equal first overall – the estimated net benefits of Option 3 are only 0.14 per cent greater than Option 2 on a weighted basis.

Figure E-1.1 Net economic benefits (\$m, PV)



Option 2 and Option 3 differ only by the installation of OPGW fibre on Line 12, which features in Option 3 and is found to be net beneficial to include in the scope of the option. Specifically, the additional capital cost of Option 3 compared to Option 2 of \$1.2 million (\$0.9 million in present value terms on a weighted basis) is outweighed by the additional benefits expected from avoiding the annual \$117,600 Line 12 communications-related costs (\$1.1 million in present value terms on a weighted basis).

Sensitivity testing finds the conclusion that Option 3 has marginally greater net benefits than Option 2 to be mildly sensitive to both the assumed avoided annual Line 12 communications-related costs and network capital costs more generally. Specifically, a 17 per cent decrease, or 20 increase, in these assumptions, respectively, results in Option 2 and Option 3 having the same estimated net benefits. However, on balance, Option 3 is considered the preferred option at this stage of the RIT-T given the unquantified communications resilience benefits it provides by bringing our Liverpool substation’s communications systems in-line with elsewhere in our network, i.e., moving away from a single point of failure (which lacks communications route diversity and provides a sensitivity to weather conditions).

Draft conclusion

Option 3 (line refurbishment addressing all components with condition issues plus the installation of Optical Ground Wire (OPGW) fibre on Line 12) is the preferred option to meet the identified need at this stage of the RIT-T. Moving forward with this option is the most prudent and economically efficient solution to manage and mitigate safety and environmental risk to ALARP. Consequently, it will ensure our obligations under the *New South Wales Electricity Supply (Safety and Network Management) Regulation 2014* and our Electricity Network Safety Management System (ENSMS) are met.

The estimated capital expenditure associated with this option is \$24 million. Routine operating and maintenance costs relating to planned checks by our field crew are estimated at approximately \$83,000 per year (which is the same as under the base case and the other two options considered). We calculate that the avoided risk cost from undertaking Option 3 ranges from approximately \$5.3 million per year to \$32.0 million per year in real terms over the assessment period.

Option 3 is found to have positive net benefits under all scenarios investigated and, on a weighted basis, will deliver \$130.5 million in net economic benefits over the assessment period.

The required works for Option 3, including preparation works, would be undertaken between 2022/23 and 2025/26. All works would be completed in accordance with the relevant standards by 2025/26 with minimal modification to the wider transmission assets. Necessary outages of affected line(s) in service would be planned appropriately in order to complete the works with minimal impact on the network.

Exemption from preparing a PADR

NER clause 5.16.4(z1) provides for a TNSP to be exempt from producing a Project Assessment Draft Report (PADR) for a particular RIT-T application, in the following circumstances:

- if the estimated capital cost of the preferred option is less than \$46 million;
- if the TNSP identifies in its PSCR its proposed preferred option, together with its reasons for the preferred option and notes that the proposed investment has the benefit of the clause 5.16.4(z1) exemption; and
- if the TNSP considers that the proposed preferred option and any other credible options in respect of the identified need will not have a material market benefit for the classes of market benefit specified in clause 5.16.1(c)(4), with the exception of market benefits arising from changes in voluntary and involuntary load shedding.

We consider the investment in relation to Option 3 meets these criteria and therefore that we are exempt from producing a PADR under NER clause 5.16.4(z1).

In accordance with NER clause 5.16.4(z1)(4), the exemption from producing a PADR will no longer apply if we consider that an additional credible option that could deliver a material market benefit is identified during the consultation period.

Accordingly, if we consider that any additional credible options are identified, we will produce a PADR which includes an NPV assessment of the net market benefit of each additional credible option.

Should we consider that no additional credible options were identified during the consultation period, we intend to produce a PACR that addresses all submissions received, including any issues in relation to the proposed preferred option raised during the consultation period, and presents our conclusion on the preferred option for this RIT-T.

Submissions and next steps

The purpose of this PSCR is to set out the reasons we propose that action be taken, present the options that address the identified need, outline the technical characteristics that non-network options will need to provide, and allow interested parties to make submissions and provide input to the RIT-T assessment.

We welcome written submissions on materials contained in this PSCR. Submissions are due on 15 June 2023³.

Submissions should be emailed to our Regulation team via regulatory.consultation@transgrid.com.au.⁴ In the subject field, please reference 'Southern Sydney Transmission Lines PSCR'.

At the conclusion of the consultation process, all submissions received will be published on our website. If you do not wish for your submission to be made public, please clearly specify this at the time of lodgement.

Subject to additional credible options being identified during consultation, we anticipate publication of a PACR in July 2023.

³ Consultation period is for 12 weeks, additional days have been added to cover public holidays.

⁴ We are bound by the *Privacy Act 1988 (Cth)*. In making submissions in response to this consultation process, we will collect and hold your personal information such as your name, email address, employer and phone number for the purpose of receiving and following up on your submissions. If you do not wish for your submission to be made public, please clearly specify this at the time of lodgement. See Privacy Notice within the Disclaimer for more details.