

Summary: Managing risk on Southern Sydney transmission lines

RIT-T Project Assessment Conclusions Report

Issue date: 26 July 2023



Disclaimer

This suite of documents comprises Transgrid's application of the Regulatory Investment Test for Transmission (RIT-T) which has been prepared and made available solely for information purposes. It is made available on the understanding that Transgrid and/or its employees, agents and consultants are not engaged in rendering professional advice. Nothing in these documents is a recommendation in respect of any possible investment.

The information in these documents reflect the forecasts, proposals and opinions adopted by Transgrid at the time of publication, other than where otherwise specifically stated. Those forecasts, proposals and opinions may change at any time without warning. Anyone considering information provided in these documents, at any date, should independently seek the latest forecasts, proposals and opinions.

These documents include information obtained from the Australian Energy Market Operator (AEMO) and other sources. That information has been adopted in good faith without further enquiry or verification. The information in these documents should be read in the context of the Electricity Statement of Opportunities, the Integrated System Plan published by AEMO and other relevant regulatory consultation documents. It does not purport to contain all of the information that AEMO, a prospective investor, Registered Participant or potential participant in the National Electricity Market (NEM), or any other person may require for making decisions. In preparing these documents it is not possible, nor is it intended, for Transgrid to have regard to the investment objectives, financial situation and particular needs of each person or organisation which reads or uses this document. In all cases, anyone proposing to rely on or use the information in this document should:

1. Independently verify and check the currency, accuracy, completeness, reliability and suitability of that information
2. Independently verify and check the currency, accuracy, completeness, reliability and suitability of reports relied on by Transgrid in preparing these documents
3. Obtain independent and specific advice from appropriate experts or other sources.

Accordingly, Transgrid makes no representations or warranty as to the currency, accuracy, reliability, completeness or suitability for particular purposes of the information in this suite of documents.

Persons reading or utilising this suite of RIT-T-related documents acknowledge and accept that Transgrid and/or its employees, agents and consultants have no liability for any direct, indirect, special, incidental or consequential damage (including liability to any person by reason of negligence or negligent misstatement) for any damage resulting from, arising out of or in connection with, reliance upon statements, opinions, information or matter (expressed or implied) arising out of, contained in or derived from, or for any omissions from the information in this document, except insofar as liability under any New South Wales and Commonwealth statute cannot be excluded.

Privacy notice

Transgrid is bound by the *Privacy Act 1988 (Cth)*. In making submissions in response to this consultation process, Transgrid 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.

Under the National Electricity Law, there are circumstances where Transgrid may be compelled to provide information to the Australian Energy Regulator (AER). Transgrid will advise you should this occur.

Transgrid's Privacy Policy sets out the approach to managing your personal information. In particular, it explains how you may seek to access or correct the personal information held about you, how to make a complaint about a breach of our obligations under the Privacy Act, and how Transgrid will deal with complaints. You can access the Privacy Policy here (<https://www.transgrid.com.au/Pages/Privacy.aspx>).

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 Assessment Conclusions Report (PACR) represents the final 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.

No submissions received in response to the Project Specification Consultation Report

We published a Project Specification Consultation Report (PSCR) on 14 March 2023 and invited written submissions on the material presented within the document. No submissions were received in response to the PSCR.

No material developments since publication of the PSCR

No additional credible options were identified during the consultation period following publication of the PSCR. In addition, no material changes have occurred since the PSCR that have made an impact on the preferred option.

Credible options considered

We consider there are 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.

Table E-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	-

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.

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 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 a single point of failure risk 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.

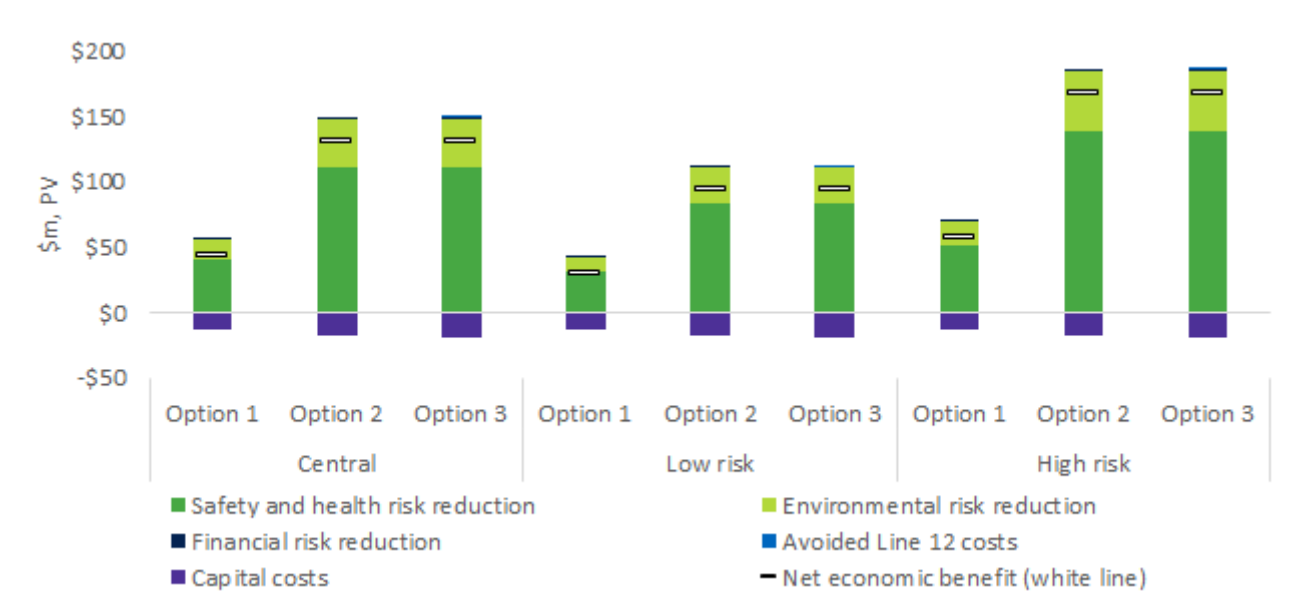
Non-network options are not expected to assist in this RIT-T

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. In addition, we did not receive any submissions from proponents of these solutions in response to the PSCR.

Conclusion: line refurbishment plus installation of OPGW fibre is optimal

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 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).

Option 3 (line refurbishment addressing all components with condition issues plus the installation of Optical Ground Wire (OPGW) fibre on Line 12) is therefore the preferred option to meet the identified need for this 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 +/- 25 per cent. 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, will be undertaken between 2022/23 and 2025/26. All works will 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 will be planned appropriately in order to complete the works with minimal impact on the network.

Next steps

This PACR represents the final step of the consultation process in relation to the application of the Regulatory Investment Test for Transmission (RIT-T) process undertaken by Transgrid. It follows a PSCR released in March 2023. No submissions were received in response to the PSCR.

The second step of the RIT-T process, production of a Project Assessment Draft Report (PADR), was not required as Transgrid considers its investment in relation to the preferred option to be exempt from that part of the RIT-T process under NER clause 5.16.4(z1). Production of a PADR is not required due to:

- the estimated capital cost of the preferred option being less than \$46 million;
- the PSCR stating:

- the proposed preferred option, together with the reasons for the proposed preferred option;
- the RIT-T is exempt from producing a PADR; and
- the proposed preferred option and any other credible options will not have a material market benefit for the classes of market benefit specified in clause 5.15A.2(b)(4), with the exception of market benefits arising from changes in voluntary and involuntary load shedding;
- no PSCR submissions identifying additional credible options that could deliver a material market benefit; and
- the PACR addressing any issues raised in relation to the proposed preferred option during the PSCR consultation.

Parties wishing to raise a dispute notice with the AER may do so prior to 28 August 2023 (30 days after publication of this PACR). Any dispute notices raised during this period will be addressed by the AER within 40 to 120 days, after which the formal RIT-T process will conclude.

Further details on the RIT-T can be obtained from Transgrid's Regulation team via regulatory.consultation@transgrid.com.au. In the subject field, please reference 'Southern Sydney Transmission Lines PACR'.