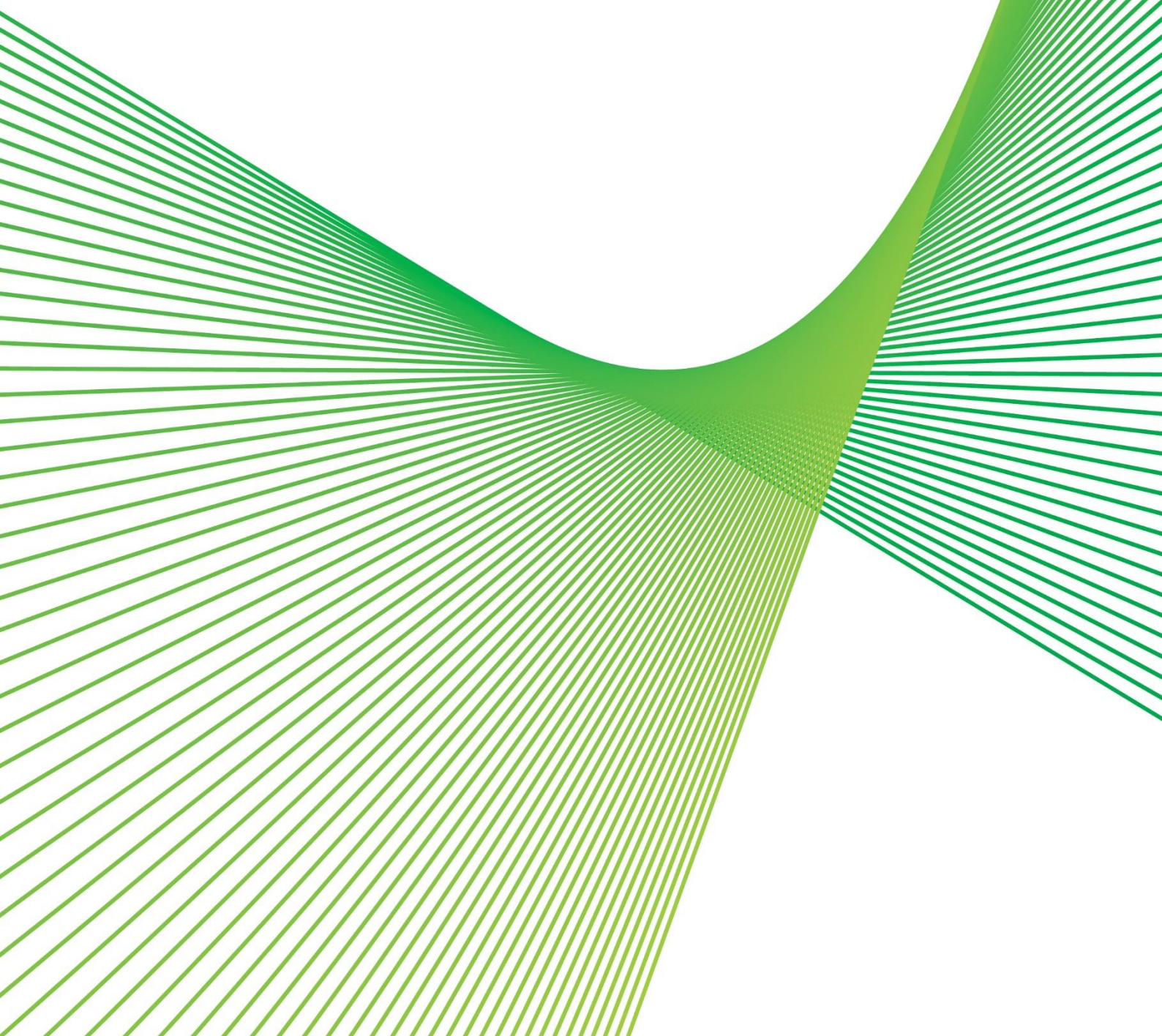


Summary: Managing risk on Lines 21, 22, 959 & 92Z (conductor condition)

RIT-T Project Assessment Conclusions Report

Issue date: 30 May 2024



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Summary

We are applying the Regulatory Investment Test for Transmission (RIT-T) to options for remediating deteriorating conductor condition on four transmission lines in the Transgrid overhead transmission network (Line 21, Line 22, Line 959 and Line 92Z). Publication of this Project Assessment Conclusions Report (PACR) represents the final step in the RIT-T process.

Transgrid's overhead transmission network contains sections where the condition of conductors is deteriorating such that they have reached, or are close to reaching, end of life. The deteriorated condition of conductors can be caused by a variety of mechanisms such as:

- annealing due to bushfire exposure;
- corrosion initiated by bushfire exposure; and
- corrosion at mid-span joint locations.

We have undertaken analysis of conductor condition and deterioration mechanisms across its network, which identified approximately 1,100 km circuit length of conductors that have condition issues that require attention.

We have also undertaken analysis of bushfire impact history and mid-span joint locations, mapped against corrosion zones, and identified the locations that were likely exposed to the degradation mechanisms described above. Various inspections¹ have identified visual indicators of degradation such as broken strands, bushing, visible corrosion product, out of lay strands and discolouration.

Identified need: managing risks on Line 21, Line 22, Line 959 and Line 92Z

If action is not taken, the conductor deterioration is expected to expose us and our customers to increasing level of risks going forward, as the likelihood of failure increases. There are 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 risk'). The proposed investment will enable us to manage safety, bushfire and financial risks on the selected lines.

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 conductors would mean an increase in safety and bushfire risks as the likelihood of failure increases. If left untreated, conductor deterioration could result in incidents such as conductor drop. Such incidents could have considerable safety consequences for nearby residents and members of the public near the assets. These incidents also pose environmental risks through potential bushfires.

We manage and mitigate safety and environmental risk to ensure they are below risk tolerance levels or 'As Low As Reasonably Practicable' ('ALARP'), in accordance with our obligations under the *New South*

¹ Inspections include Smart Aerial Image Processing (SAIP), and ground and aerial based inspections.

Wales Electricity Supply (Safety and Network Management) Regulation 2014 and our Electricity Network Safety Management System (ENSMS).²

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, consistent with our obligations. Consequently, we consider it to be 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 were received in response to the PSCR

We published a Project Specification Consultation Report (PSCR) on 14 February 2024 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.

One credible option has been considered

We consider that there is only one feasible option from a technical, commercial, and project delivery perspective that can be implemented in sufficient time to meet the identified need.

Option 1 involves a targeted replacement of existing conductors along Lines 21, 22, 959 and 92Z, which have been identified as priority lines based on expected NPV per kilometre and outage constraints. The cumulative length of all segments contained within this option is 51 km. The remediation includes replacement of all conductor compression fittings, suspension clamps/Armour Grip Suspension Units (AGSU), jumper connections, spacers and vibration dampers on relevant sections of lines.

The estimated capital cost of Option 1 is approximately \$36.6 million. Table E-1 sets out the build period, year of commissioning, and cost of conductor replacement for each line under Option 1.

Table E-1 Build period, commissioning, and cost of each line under Option 1

Line	Build period	Commissioning	Capital expenditure
Line 21	2024/25 to 2025/26	2025/26	7.7
Line 22	2024/25 to 2026/27	2026/27	9.3
Line 959	2025/26 to 2026/27	2027/28	8.2
Line 92Z	2027/28 to 2029/30	2029/30	11.4
Total			36.6

Although the timeline for replacement varies for each line, the overall project is expected to commence in 2024/25 and conclude by 2029/2030.

² Our ENSMS follows the International Organization for Standardization’s ISO31000 risk management framework which requires following a hierarchy of hazard mitigation approach.

Option 1 will not affect annual routine operating costs since it does not affect the frequency of inspections.

There is no expectation of needing to uprate the lines at this point in time

The proposed replacement works under Option 1 is focused on condition-based, like-for-like replacement. We do not expect the conductors included in this RIT-T need to be uprated at this point in time as we do not expect the line loadings to exceed their existing line ratings in the near future.

Lines 21 and 22, along with Lines 25, 26, 5A1 and 5A2, are the main transmission lines connecting generation in the Hunter and Central Coast regions to Sydney. The 500 kV lines (Line 5A1 and 5A2) will continue to take the majority of the flow from the Central Coast to Sydney. The line utilisation data in our 2023 Transmission Annual Planning Report shows Line 21 (330 kV) has a maximum utilisation rate of 34% and Line 22 (330 kV) has a maximum utilisation rate of 88% under credible contingency. Lines 959 and 92Z (both 132 kV lines) are in parallel with Line 27 and 28 (both 330 kV lines) between Sydney North and Sydney East. Lines 959 and 92Z have a maximum utilisation rate of 42% and 22% under credible contingency, respectively.³

Specifically, we consider that uprating would cost significantly more than Option 1 and not add a commensurate increase in estimated market benefit. Uprating is therefore not considered commercially feasible at this point in time.

Non-network options are not expected to be able to assist with 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, environmental and financial risks posed as a result of asset deterioration.

The option has been assessed against three reasonable scenarios

The credible option has been assessed under three scenarios as part of this PACR 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 assume the expected most likely scenario for the 2024 ISP (ie, the 'Step Change' scenario). The scenarios differ by the assumed level of risk costs. Risk cost assumptions do not form part of AEMO's ISP assumptions and have been based on Transgrid's analysis.

³ Transgrid, *Transmission Annual Planning Report 2023*, p.155

Table E-2 Summary of scenarios

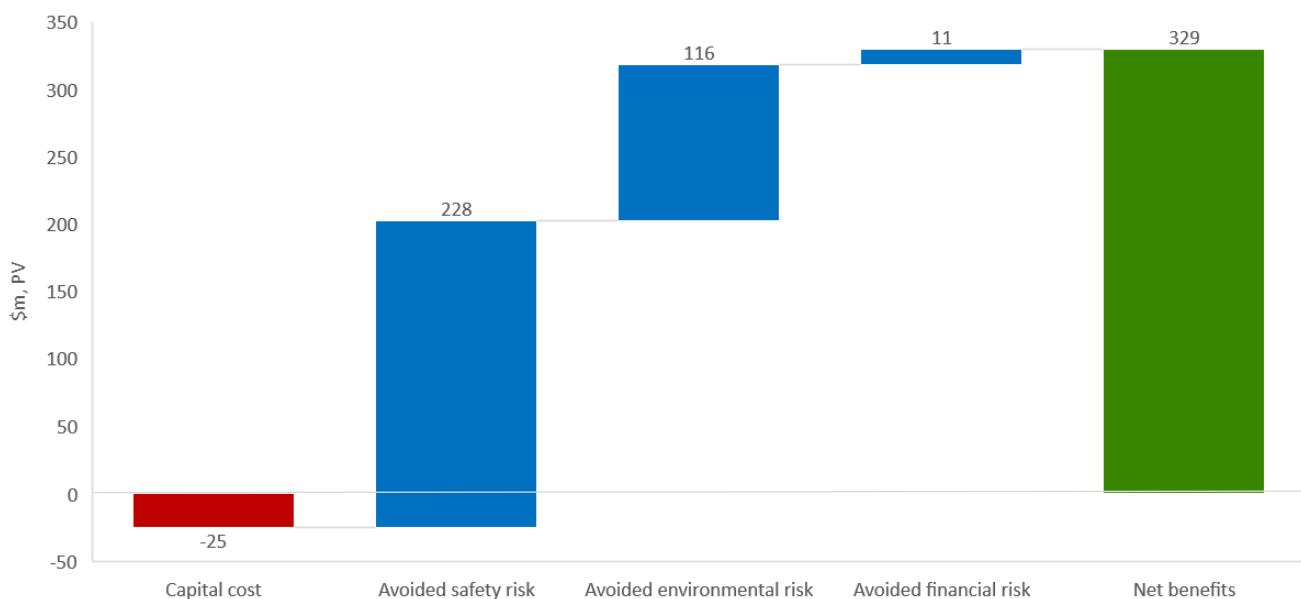
Variable / Scenario	Central	Low risk cost scenario	High risk cost scenario
Scenario weighting	1/3	1/3	1/3
Discount rate	7.0%	7.0%	7.0%
Network capital costs	Base estimate	Base estimate	Base estimate
Operating and maintenance costs	Base estimate	Base estimate	Base estimate
Safety, environmental, and financial risk benefit	Base estimate	Base estimate – 25%	Base estimate +25%

We have weighted the three scenarios equally given there is nothing to suggest an alternate weighting would be more appropriate.

Option 1 delivers significant net benefits

The costs under Option 1 are found to be significantly outweighed by the expected benefit of avoiding the risks in each scenario investigated. On a weighted basis, Option 1 is found to deliver net economic benefits of \$329.5 million in present value terms.

Figure E-1 Net economic benefits of Option 1 (\$m, PV)



Conclusion

This PACR has found that Option 1 is the preferred option coming out of this RIT-T. Option 1 involves the replacement of approximately 51 kilometres of conductors on Lines 21, 22, 959 and 92Z. Moving forward with this option is the most prudent and economically efficient solution to manage and mitigate safety and bushfire risk to ALARP. Consequently, it will ensure our obligations under the *New South Wales Electricity Supply (Safety and Network Management) Regulation 2014* and our ENSMS are met.

The estimated capital expenditure associated with the option is \$36.6 million (in 2023/24 dollars) and the works are estimated to take place between 2024/25 and 2029/30.

Option 1 is found to have positive net benefits under all three scenarios investigated and, on a weighted basis, will deliver \$329.5 million in net economic benefits (in present value terms).

Transgrid considers this conclusion to be robust to changes in capital cost inputs, estimated risk costs and underlying discount rates, noting that there would need to be unrealistic changes to these key assumptions for there to be no expected net benefits. Transgrid will however continue to monitor these key assumptions and will notify the AER if such changes do occur (or appear likely), which would constitute a material change in circumstance.

Next steps

This PACR represents the final step of the consultation process in relation to the application of the RIT-T process undertaken by Transgrid.

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 (noting that no issues have been raised).

Parties wishing to raise a dispute notice with the AER may do so prior to 3 July 2024 (30 days after publication of this PACR).⁴ 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 'Conductor condition on Lines 21, 22, 959 and 92Z PACR'.

⁴ Additional days have been added to cover public holidays