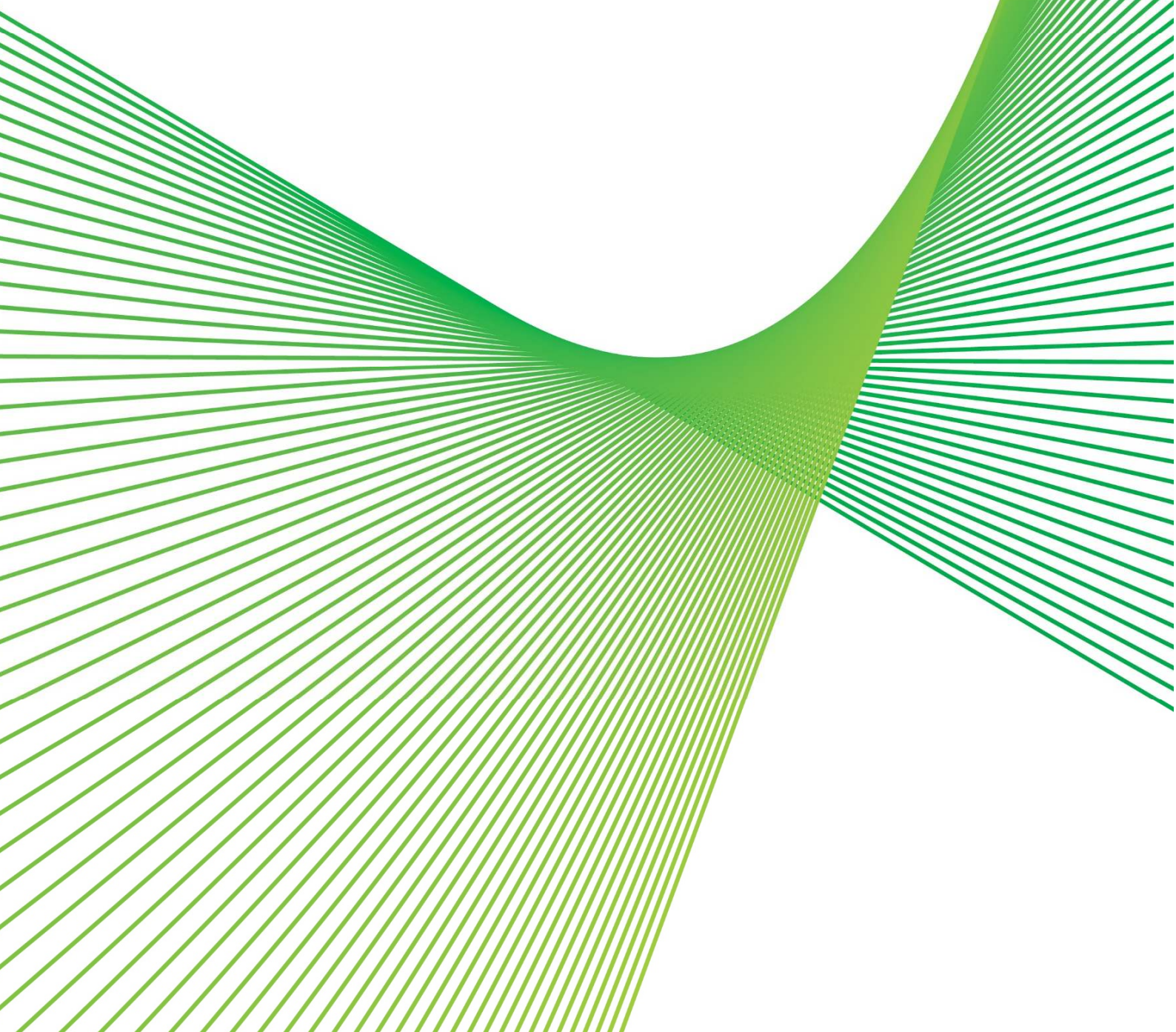


# Maintaining safe and reliable operation of Tamworth substation

RIT-T Project Specification Consultation Report

Region: Northern NSW

Date of issue: 15 August 2024



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## Summary

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We are applying the Regulatory Investment Test for Transmission (RIT-T) to options for maintaining the safe and reliable operation of Tamworth substation. Publication of this Project Specification Consultation Report (PSCR) represents the first step in the RIT-T process.

Tamworth 330 kV substation is located in Transgrid's Northern NSW network. It connects to Transgrid's 330 kV Armidale, Liddell and Muswellbrook substations as well as Transgrid's 132 kV Narrabri, Tamworth and Gunnedah substation, which all support Essential Energy's 66 kV network.

There are three transformers at Tamworth's 330 kV substation. The No.1 and No.2 transformers were commissioned along with the substation in 1967 and the No.3 transformer was commissioned in 1998.

The purpose of this PSCR is to examine and consult on options to address the deterioration of the Tamworth No.1 and No. 2 transformers at Tamworth substation to reduce the likelihood of prolonged and involuntary load shedding in Northern NSW region and reduce the risk of safety and environmental hazards associated with a catastrophic failure.

### **Identified need: ensure the safe and reliable operation of Tamworth substation**

The identified need for this project is to maintain the safe and reliable operation of Tamworth substation and the broader transmission network in NSW by addressing the risk of failure of Tamworth substation's No. 1 and No. 2 power transformers.

The No.1 and No.2 transformers are approaching the end of their serviceable lives and showing signs of deterioration due to the following key factors:

- **Natural age:** The transformers were manufactured in 1966 and commissioned in 1967. The natural age of the transformers will be 58 years in 2023/24. This is well above the 45-year expected useful life of a power transformer.
- **Corrosive sulphur:** The insulating oil has corrosive sulphur, which can form conductive compounds on the insulation paper and tap changer contacts. This can cause an internal flashover and could lead to a catastrophic failure.
- **Oil leaks:** There are leaks from the bushings, pumps, valves, main tank and tap changer allowing moisture ingress and oxygen into the main insulation.
- **Corrosion:** The paint and galvanic protection on the transformer has failed resulting in rusting and deterioration.

These condition issues have been evaluated through the transformer health index methodology<sup>1</sup> to give an effective age of 57 years (2023/24, No.1 and 2), which is only slightly below its chronological age. These condition issues, if not remediated, increase the probability of transformer failure.

The No.3 transformer at Tamworth substation is in satisfactory condition and not part of this need.

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<sup>1</sup> Further details are available in Appendix B, and via our [Network Asset Risk Assessment Methodology](#).

Replacement of the Tamworth transformers will significantly reduce the likelihood of prolonged and involuntary load shedding in the northern region and help Transgrid manage its safety obligations.

The key economic benefits associated with addressing this need are summarised as:

- Reduction of risk as valued as direct impact to Transgrid and consumers including:
  - Changes in involuntary load shedding
  - Safety and environmental hazards associated with a catastrophic failure.
- Avoided operating expenditure related to an escalation of corrective maintenance.

## Two credible network options have been identified

We have identified two credible network options that meet the identified need from a technical, commercial, and project delivery perspective.<sup>2</sup> These options are summarised in the table below.

Table E-1 Summary of the credible options

Option	Description	Capital costs (\$M, 2023/24)	Operating costs (\$/yr, 2023/24)
Option 1	Replacement of the No.1 and No.2 Tamworth transformers	17.76	1,128
Option 2	Refurbishment of the No.1 and No.2 Tamworth transformers	2.44	1,128

The preferred option is Option 1, as it has positive weighted NPV result of the technically and commercially feasible options which have been considered at this stage of the RIT-T.

Four other options were considered but not progressed including increased inspections, elimination of all associated risk, and non-network solutions. The reasons these options were not progressed are outlined in section 3.3 of this PSCR.

## 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. Non-network options will not mitigate the expected lost load, safety risks and environmental risks from failure of the No. 1 and No. 2 transformers.

## Option 1 delivers the highest net economic benefit and will meet NER requirements

We have assessed that Option 1 is the best performing option under all three reasonable scenarios considered in this PSCR. On a weighted basis, where each scenario is weighted equally, Option 1 is expected to deliver net benefits of approximately \$618.5 million.<sup>3</sup>

<sup>2</sup> As per clause 5.15.2(a) of the NER.

<sup>3</sup> Reliability risk makes up over 99 per cent of the total estimated risk cost in present value terms. The relative size of this risk is due to the high voltage transformer at the Tamworth substation having an effective age beyond its technical life. As the asset continues to age the probability of the transformer failing increases. This increased probability of failure combined with a long load restoration time means that there is likely to be significant amounts of unserved energy over the assessment period without replacement or refurbishment of the asset.



## Draft Conclusion

This PSCR finds that Option 1 is the preferred option to address the identified need. Option 1 involves replacement of the No.1 and No. 2 transformer at Tamworth substation.

The capital cost of this option is approximately \$17.76 million (in \$2023/24). The expected project timeframe is 37 months with an expected asset life of 45 years. Routine operating and maintenance costs are estimated at approximately \$1,128 per annum (in \$2023/24).

## Exemption from preparing a Project Assessment Draft Report

Subject to the identification of additional credible options during the consultation period, publication of a Project Assessment Draft Report (PADR) is not required for this RIT-T as we consider that the conditions in clause 5.16.4(z1) of the NER exempting RIT-T proponents from providing a PADR have been met.

Specifically, production of a PADR is not required because:

- the estimated capital cost of the preferred option is less than \$46 million;<sup>4</sup>
- we have identified in this PSCR our preferred option and the reasons for that option, and noted that we will be exempt from publishing the PADR for our preferred option; and
- we consider that the preferred option and any other credible options do not have a material market benefit (other than benefits associated with changes in voluntary load curtailment and involuntary load shedding).

If an additional credible option that could deliver a material market benefit is identified during the consultation period, then we will produce a PADR that includes an assessment of the net economic benefit of each additional credible option.

If no additional credible options with material market benefits are identified during the consultation period, then the next step in this RIT-T will be the publication of a Project Assessment Conclusions Report (PACR) that addresses all submissions received, including any issues in relation to the proposed preferred option raised during the consultation period.<sup>5</sup>

## Submissions and next steps

We welcome written submissions on materials contained in this PSCR.

Submissions are due on 14 November 2024 and should be emailed to our Regulation team via [regulatory.consultation@transgrid.com.au](mailto:regulatory.consultation@transgrid.com.au).<sup>6</sup> In the subject field, please reference 'Tamworth substation renewal 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.

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<sup>4</sup> Varied from \$43m to \$46m based on the [AER Final Determination: Cost threshold review](#), November 2021.

<sup>5</sup> In accordance with NER clause 5.16.4(z2).

<sup>6</sup> 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. 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.

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. Subject to additional credible options being identified, we anticipate publication of a PACR by January 2025.