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Summary: Maintaining safe and reliable operation of Tamworth substation

RIT-T Project Assessment Conclusions Report

Region: Northern NSW

Date of issue: 6 December 2024

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Summary

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 Assessment Conclusions Report (PACR) represents the final 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 RIT-T 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 2024/25. 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 to give an effective age of 58 years (2024/25, 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.

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 power transformer.

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.

No submissions received in response to the Project Specification Consultation Report

We published a Project Specification Consultation Report (PSCR) on 15 August 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.

Credible options considered

We consider that there are two credible network options that meets the identified need from a technical, commercial, and project delivery perspective.[1] These options are summarised in the table below.

Table E-1 Summary of the credible options

Option	Description	Capital costs ($M, 2024/25)	Operating costs ($/yr, 2024/25)
Option 1	Replacement of the No.1 and No.2 Tamworth transformers	20.32	1,141
Option 2	Refurbishment of the No.1 and No.2 Tamworth transformers	2.51	1,128

No submissions received in relation to non-network options

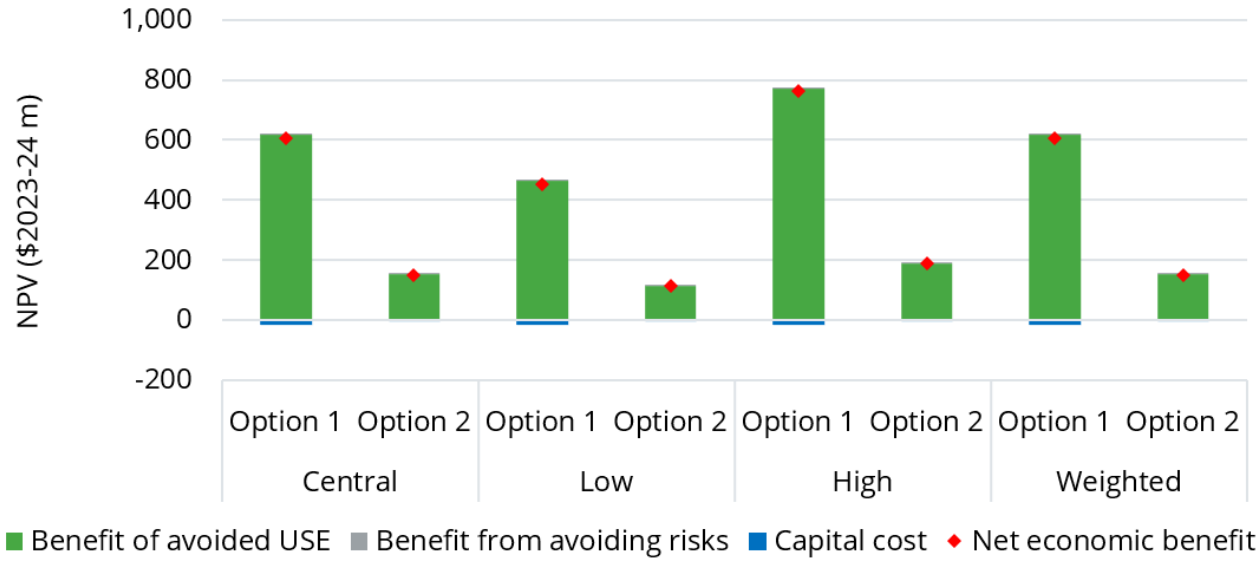
In the PSCR, we noted that we do not consider non-network options to be commercially and technically feasible to assist with meeting the identified need for this RIT-T. Non-network options will not mitigate the expected lost load, safety risks and environmental risks from failure of the No. 1 and No. 2 transformers. No submissions were received in response to the PSCR in relation to non-network options.

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 PACR. On a weighted basis, where each scenario is weighted equally, Option 1 is expected to deliver net benefits of approximately $618.5 million.

[1] As per clause 5.15.2(a) of the NER.

Figure E-1 NPV of net economic benefits ($2024/25 m)



Conclusion

This PACR 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 due to the transformer having reached the end of its technical life.

The capital cost of this option is approximately $20.32 million (in $2024/25). The expected project timeframe is 48 months with an expected asset life of 45 years. Routine operating and maintenance costs are estimated at approximately $1,141 per annum (in $2024/25).

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. It follows a PSCR released on 15 August 2024. 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 $54 million;[2]
- 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;

[2] Varied from $43m to $54m based on the AER Final Determination: Cost threshold review, November 2024.

- 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 17 January 2025 (30 days after publication of this PACR). Any dispute notices raised during this period will be addressed by the AER within 40 to 100 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 'Tamworth substation renewal PACR'.