



TransGrid

Summary: Maintaining a reliable Upper Tumut substation

RIT-T – Project Assessment Conclusions Report

Region: Southern New South Wales

Date of issue: 16 September 2019

Summary

TransGrid is applying the Regulatory Investment Test for Transmission (RIT-T) to options for maintaining a reliable Upper Tumut substation. Publication of the Project Assessment Conclusions Report (PACR) represents the final step in the RIT-T process.

Upper Tumut substation:

- > connects approximately 616 MW of renewable hydro-electric energy generation
- > supports four transmission lines in the southern New South Wales network
- > provides electricity flow paths between the Snowy Mountains, Canberra and Sydney.

At Upper Tumut substation, gantries support high voltage connections between switchbays and busbars. They are mainly used to support the power conductor in both directions between the transmission tower closest to the substation and the equipment within the substation. Gantries are connected to concrete footings by concrete plinths, holding down bolts and baseplates. They also support overhead earthwires that protect the substation equipment from direct lightning strikes and are essential for the safe and reliable operation of the substation.

Corrosion has been found on a large portion of gantries at Upper Tumut substation. The corrosion of holding down bolts and structural components, or 'members', ranges from initial development through to loss of steel thickness (cross-sectional area). Corrosion of holding down bolts is the key issue at this site and has been accelerated by the cracking of the concrete base plate plinths resulting from the repeated freezing and thawing of water inside cracks in the concrete.

TransGrid's analysis indicates that the holding down bolts and several of the gantry members will reach the end of serviceable life by 2020/21. After this time, the loss of physical cross-sectional area from corrosion will decrease their capacity to provide structural support. This reduces structural integrity and significantly increases their probability of structural failure, especially during high wind events. Deterioration of holding down bolts has occurred across the site and action is required on the majority of structure footings.

If unaddressed, these issues may cause tower collapse; failure of steelwork, holding down bolts or baseplates; or failure of the whole substation.

Table 1 outlines the condition issues identified at Upper Tumut substation and the potential consequences if not remediated.

Table 1 – Condition issues at Upper Tumut substation and their consequences

Issue	Consequences if not remediated
Corrosion of gantry steel members	Steel corrosion, particularly of critical members, can lead to structural failure of tower
Corrosion of holding down bolts and base plates	Structural failure
Cracking of concrete plinths	Structural failure
Corroded fasteners	Structural failure
Corrosion of earth wire attachment fittings	Conductor drop

No submissions received in response to Project Specification Consultation Report

TransGrid published a Project Specification Consultation report (PSCR) on 26 March 2019 and invited written submissions on the material presented within the document. No submissions were received in response to this PSCR.

The PSCR presented a range of credible network options that would meet the identified need from a technical, commercial, and project delivery perspective.¹ The options are summarised in the table below.

Table 2 – Summary of the four credible options considered (\$2019/20)

Option	Description	Capital costs (\$m)	Operating costs (\$ per year)	Remarks
Option 1	Refurbishment of holding down bolts and identified corroded steel members as required	8.36 ± 25%	409	Most economic and preferred option
Option 2	Staged delivery of Option 1 over multiple years	greater than 8.36 ± 25%	409	Cost-inefficiencies by spreading the work across multiple years (eg site establishment costs, etc) Requires outages over multiple years and is impacted by snow during winter annually.
Option 3	Replacement of all substation gantries	greater than 50	409	Significant project costs
Option 4	Decommissioning of substation gantries	Not progressed	Not progressed	Significant reduction in southern NSW network capacity. Disconnection of at least 616 MW of low-cost, zero-emission hydro-electric generation from the NEM.

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

The PSCR noted that non-network options are not considered to be commercially and technically feasible to assist with meeting the identified need for this RIT-T.

TransGrid did not receive any responses from proponents of non-network options to the PSCR.

Conclusion: refurbishment of holding down bolts and corroded steel members is optimal

The optimal commercially and technically feasible option presented in the PSCR — Option 1, the refurbishment of holding down bolts and identified corroded steel members as required — remains the

¹ As per clause 5.15.2(a) of the NER.

preferred option to meet the identified need. Option 1 involves in-situ repair of holding down bolts and in-situ gantry steelwork renewal by removing corrosion, painting and replacing identified components.

Moving forward with this option is the most prudent and economically efficient solution to maintain a reliable Upper Tumut substation.

The estimated capital expenditure associated with this option is \$8.36 million $\pm$ 25% (weighted present value of \$7.04 million), and depends on the extent of corrosion, works required to address corrosion and the final selected remediation methods across the site.

The works will be undertaken between 2018/19 and 2020/21. Planning and procurement (including completion of the RIT-T) will occur between 2018/19 and 2019/20, while project delivery and construction will be completed by 2020/21. All works will be completed in accordance with the relevant standards by 2020/21 with minimal modification to the wider transmission assets.

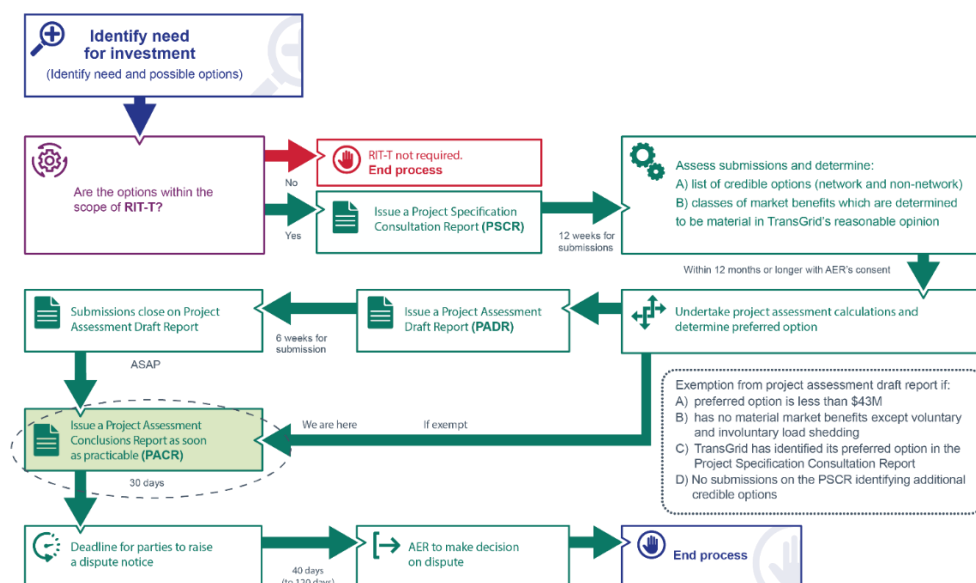
Necessary outages of affected line(s) in service will be planned appropriately in order to complete the works with minimal impact on the network.

Next steps

This PACR represents the third step in a formal Regulatory Investment Test for Transmission (RIT-T) process undertaken by TransGrid. It follows a Project Specification Consultation Report (PSCR) released in March 2019. The second step, production of a Project Assessment Draft Report (PADR), was not required as the investment in relation to the preferred option is exempt from this part of the RIT-T process under NER clause 5.16.4(z1). Production of a PADR is not required due to:

- > preferred option being less than \$43 million
- > no market benefits except voluntary and involuntary load shedding
- > preferred option has been identified in the PSCR
- > no submissions on the PSCR identifying additional credible options.

Figure 1 This PACR is the third stage of the RIT-T process²



² Australian Energy Regulator, "Final determination on the 2018 cost thresholds review for the regulatory investment tests," accessed 15 March 2019. <https://www.aer.gov.au/communication/aer-publishes-final-determination-on-the-2018-cost-thresholds-review-for-the-regulatory-investment-tests>

Parties wishing to raise a dispute notice with the AER may do so prior to 15 October 2019 (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 project can be obtained from TransGrid's Regulation team via RIT-TConsultations@transgrid.com.au. In the subject field, please reference "PACR Upper Tumut substation project."

TransGrid intends to undertake refurbishment works between 2018/19 and 2020/21. Planning and procurement will occur between 2018/19 and 2019/20 and project delivery and construction will be completed by 2020/21. All works will be completed by 2020/21.

To read the full Project Assessment Conclusions Report visit the [Regulatory Investments Test page](#) on TransGrid's website.