Summary: Meeting demand growth in the Greater Macarthur area

RIT-T – Project Assessment Conclusions Report

Region: Greater Sydney

Date of issue: 11 September 2020

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Summary

TransGrid is applying the Regulatory Investment Test for Transmission (RIT-T) to options for meeting forecast demand growth in the Greater Macarthur area in Sydney's south-west going forward. Publication of this Project Assessment Conclusions Report (PACR) represents the final step in the RIT-T process.

The Endeavour Energy 66 kV network in the Greater Macarthur area is currently supplied by:

> one 250 MVA 330/66 kV transformer at TransGrid's Macarthur substation
> two 120 MVA 132/66 kV transformers at Endeavour Energy's Nepean substation.

A single 375 MVA 330/132 kV transformer at TransGrid's Macarthur substation also provides 132 kV supply to Endeavour Energy's Nepean substation via the tail-ended high capacity 9L1 Macarthur to Nepean 132 kV circuit.

In addition, the normally open 9L4/93X and 9L5/93Y 132 kV circuits provide a limited level of backup to Nepean at 132 kV from Sydney West and Liverpool. The level of backup available from these feeders is progressively being reduced as load growth in the South West Priority Growth Area materialises.

Identified need: meeting demand growth in the Greater Macarthur area

Endeavour Energy has experienced unprecedented growth in new customer connections in the last five years driven by the growth in the greenfield housing market. Continued growth in demand within the Greater Macarthur area is forecast to result in network constraints that, if unaddressed, will result in significant involuntary load shedding to end consumers.

A summary of these constraints, and their network implications, are as follows:

> A forced outage of the Macarthur 330/66 kV transformer at times of peak demand would cause:
  – Endeavour Energy's Nepean 132/66 kV transformers to exceed their contingency rating of 127 MVA
  – Endeavour Energy's 132 kV 9L1 line to Nepean to exceed its thermal contingency rating of 358 MVA
  – TransGrid's Macarthur 330/132 kV transformer to exceed its contingency rating of 412.5 MVA
> A forced outage of the Macarthur 330/132 kV transformer at times of peak demand would cause TransGrid's Macarthur 330/66 kV transformer to exceed its short-time step rating.

For the constraints relating to a forced outage of the Macarthur 330/132 kV transformer, transfer of Campbelltown load to Ingleburn would provide some relief to this constraint in the next few years.

These constraints are forecast to result in significant Expected Unserved Energy (EUE) if nothing is done. Avoiding this EUE is the key driver for this RIT-T.

While there are several embedded generators in the area, these sources are not considered to be an effective means of reducing the EUE in light of both response capability and forecast load growth. Generation predominantly occurs using gas that is created from coal mining activity, with very limited gas storage capability that would enable the generators to adequately respond to periods of high demand and/or loss of infrastructure.

No submissions received in response to Project Specification Consultation Report

TransGrid published a Project Specification Consultation Report (PSCR) on 3 June 2020 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.

The following changes have occurred since the PSCR which have not made an impact on the preferred option:

- updated the discount rates used
- inflation escalation update
- updated operating costs

Option 1 remains the preferred option at this stage of the RIT-T process.

Installation of a second 330/66 kV transformer at Macarthur substation remains the most efficient way to meet forecast demand growth

In the PSCR TransGrid put forward for consideration two feasible network options from a technological and project delivery perspective:

- **Option 1** – installation of a second 330/66 kV transformer at Macarthur substation; and
- **Option 2** – permanent transfer of the Campbelltown load to the Ingleburn BSP.

Option 1 is the preferred option in accordance with NER clause 5.16.1(b) because it is the credible option that maximises the net present value of the net economic benefit to all those who produce, consume and transport electricity in the market.

TransGrid expects coronavirus (COVID-19) to impact its suppliers and disrupt their supply chains. TransGrid has preliminary advice that this is already occurring, although at this time the extent of the current or future impact is unknown. Consequently, some of the costs associated with the works outlined in this document may be affected.

All costs presented in this PACR are in 2020/21 dollars. The options are summarised in the table below.

Table 1 Options considered

Option	Description	Capital cost ($m 2020/21)	Operating cost ($ per year)	Remarks
1	**Installation of a second 330/66 kV transformer at Macarthur substation**	**9**	**10,000**	**Preferred option and provides the highest net economic benefit**
2	Permanent transfer of the Campbelltown load to the Ingleburn BSP	~35	15,000	Technically and commercially feasible but provides less net economic benefits.

No credible non-network options were identified during the PSCR consultation period

In the PSCR TransGrid noted the objective of any non-network solution for this RIT-T should be to obtain a sufficient net peak demand reduction in the target area supplied by the Macarthur BSP and Nepean substation to manage the load at risk in order to defer or avoid the network option of installing a second 250 MVA 330/66 kV transformer at Macarthur BSP (preferred option). This PSCR provided detail on the technical characteristics that any non-network solutions would need to provide to help meet the identified need.

Proponents of non-network options were encouraged to make submissions on any non-network option they believe can address, or contribute to, the identified need. No submissions were received regarding non-network options throughout the consultation period.

The proposed investment delivers positive net benefits

The table below summarises the net economic benefit in NPV terms for the options considered across the three scenarios, as well as on a weighted basis. The net economic benefit is the gross less the costs, all expressed in present value terms.

The table below demonstrates that the options considered provides an expected net economic benefit under the central and high benefits scenario, as well as on a weighted basis.

On a weighted basis, Option 1 is estimated to deliver approximately $120.3 million in net benefits and is considered the preferred option.

Table 2 Estimated net economic benefit for each option, present value ($m 2020/21)

Option	Central scenario	Low benefit scenario	High benefit scenario	Weighted	Ranking
Option 1 – Installation of a second 330/66 kV transformer at Macarthur substation	78.3	0.7	323.8	120.3	1
Option 2 - Permanent transfer Campbelltown load to the Ingleburn BSP	57.5	-27.6	311.2	99.7	2

Sensitivity testing finds that, while the results are most sensitive to the assumed discount rate and adjustments to expected unserved energy estimates, Option 1 is still found to deliver strongly positive net benefits over a range of alternate assumptions regarding key parameters. Option 1 delivers the most benefit under all scenarios and sensitivities.

Conclusion: installation of a second 330/66 kV transformer at Macarthur substation is optimal

The optimal commercially and technically feasible option presented in the PSCR – Option 1 (installation of a second 330/66 kV transformer at the Macarthur substation) – remains the preferred option to meet the identified need.

The estimated capital cost of this option is approximately $9 million.

The works will be undertaken between 2020/21 and 2021/22. Planning (including commencement of the RIT-T) commenced in 2019/20 and is due to conclude in 2020/21. The detailed design will commence in 2020/21 with procurement and delivery of the identified assets planned to occur in 2021/22. All works will be completed by 2021/22.

Necessary outages of relevant assets in service will be planned appropriately in order to complete the works with minimal impact on the network.

Option 1 is the preferred option in accordance with NER clause 5.16.1(b) because it is the credible option that maximises the net present value of the net economic benefit to all those who produce, consume and transport electricity in the market.

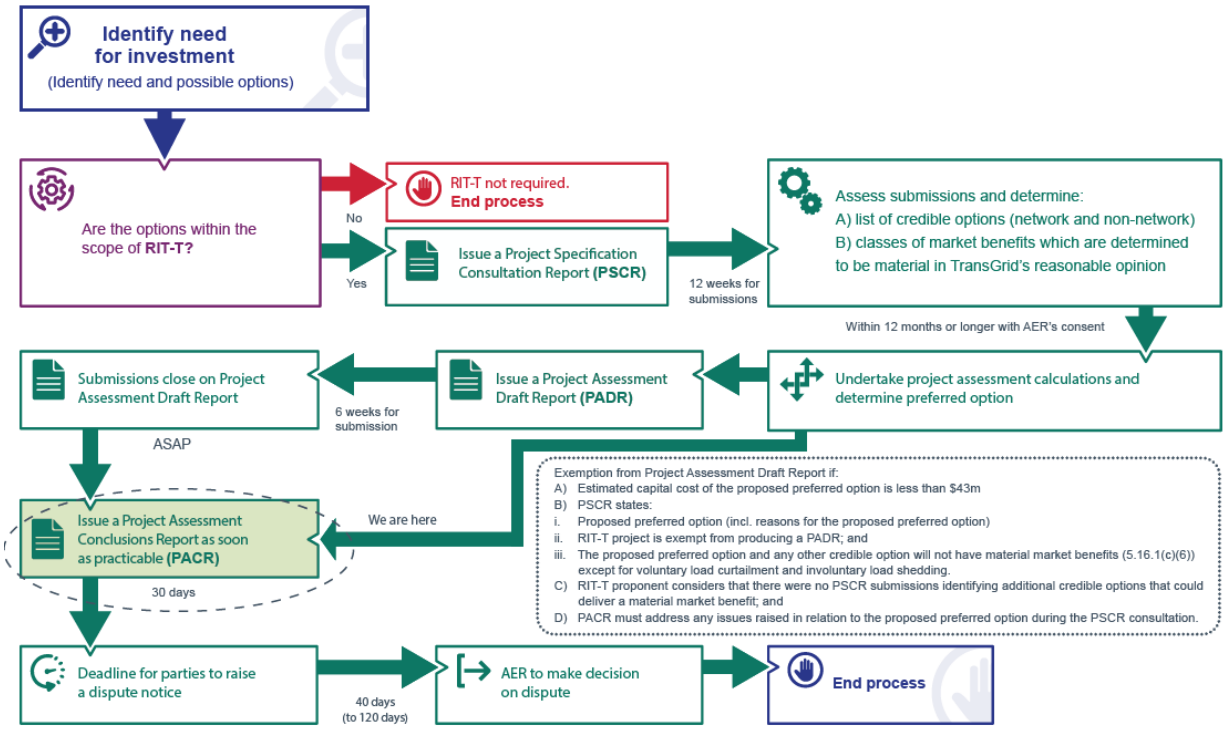
Next steps

This PACR represents the third and 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 Project Specification Consultation Report (PSCR) released in June 2020. No submissions were received in response to the PSCR.

The second step, production of a Project Assessment Draft Report (PADR), was not required for this RIT-T 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[1] due to:

- the estimated capital cost of the proposed preferred option being less than $43 million;
- the PSCR stating:
  - the proposed preferred option (including reasons for the proposed preferred option)
  - the RIT-T is exempt from producing a PADR
  - the proposed preferred option and any other credible option will not have material market benefits[2] except for voluntary load curtailment and involuntary load shedding
- the RIT-T proponent considers that there were 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.

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



Parties wishing to raise a dispute notice with the AER may do so prior to 12 October 2020 (30 days after publication of this PACR). Any dispute notices raised during this period[3] will be addressed by the AER within 40 to 120 days, after which the formal RIT-T process will conclude.

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1 In accordance with NER clause 5.16.4(z1)(4), the exemption from producing a PADR will no longer apply if TransGrid considers that an additional credible option that could deliver a material market benefit is identified during the consultation period. No additional credible options were identified.

2 As per clause 5.16.1(c)(6)

3 Additional days have been included to cover public holidays.

Further details on the RIT-T can be obtained from TransGrid's Regulation team via RIT-TConsultations@transgrid.com.au. In the subject field, please reference 'Greater Macarthur Area PACR'.

To read the full Project Assessment Conclusions Report visit the Regulatory Investments Test page on TransGrid's website.