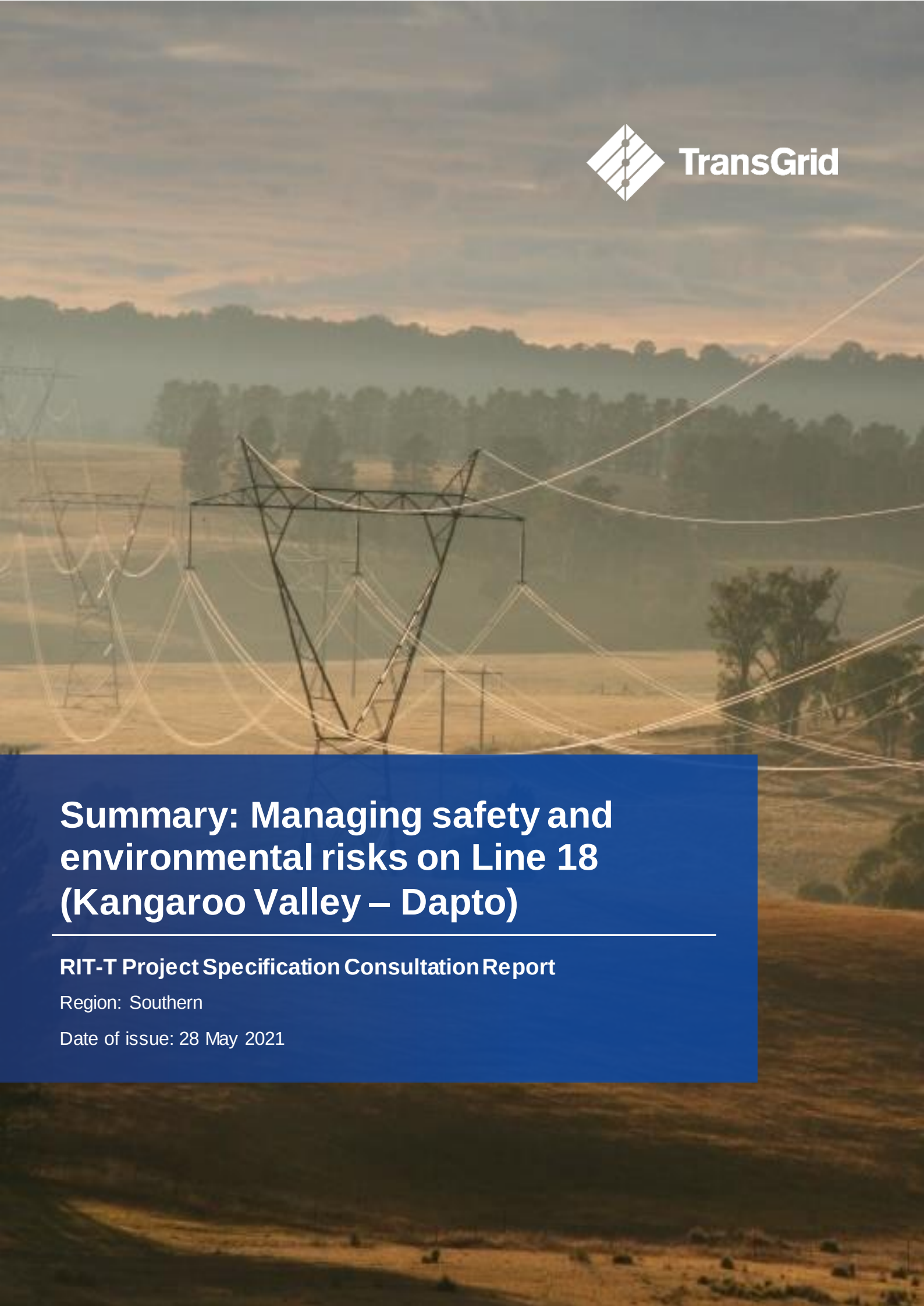

Summary: Managing safety and environmental risks on Line 18 (Kangaroo Valley – Dapto)

RIT-T Project Specification Consultation Report

Region: Southern

Date of issue: 28 May 2021

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Summary

TransGrid is applying the Regulatory Investment Test for Transmission (RIT-T) to options for mitigating safety and environmental risks caused by the deteriorating condition of Line 18. Publication of this Project Specification Consultation Report (PSCR) represents the first step in the RIT-T process.

Commissioned in 1974, the 43 km single circuit 330 kV transmission line is comprised of 107 steel tower structures between Kangaroo Valley switching station and Dapto 330 kV substation. The section from Kangaroo Valley to Robertson was built in 1974 whilst the remaining section to Dapto substation was built in 1962, previously part of a Yass-Dapto connection. Line 18 forms a key link between the Shoalhaven and Wollongong regions and supports the transmission of electricity from existing generators in southern NSW to the major load centres of Sydney, Newcastle and Wollongong.

The line will continue to play a central role in supporting the flow of energy to take advantage of naturally diverse weather patterns, and in the safe and reliable operation of the power system throughout and after the transition to a low-carbon electricity future.

The transmission line mainly traverses farmland and Morton National Park – after leaving Dapto, it climbs from the coastal plain up the Illawarra Escarpment.

Condition issues that will impact the safe and reliable operation of the network have been found on the line. These raise a number of risks associated with asset failure, including safety and environmental (bushfire) risks.

Table 1 Condition issues along Line 18 and their consequences

Issue	Consequences if not remediated
Corrosion of tower steel members	Steel corrosion, particularly of critical members, can lead to structural failure of tower
Corroded fasteners	Structural failure
Corroded insulators and conductor attachment fittings	Conductor drop
Corrosion of earth wire and earthwire attachment fittings	Public safety risk increase in case of fault
Condition of conductor and earthwire vibration dampers	Accelerated conductor fatigue due to vibration
Condition of conductor spacers	Damaged spacers can lead to conductor clashing
Buried legs and ground level steel corrosion	Foundation failure

As the asset condition deteriorates over time the likelihood of failure and subsequent risks will increase should these issues not be addressed.

Identified need: managing safety and environmental risks from corrosion on Line 18

The proposed investment will enable TransGrid to manage safety and environmental risks on Line 18. Options considered under this RIT-T were assessed relative to a base case. Under the base case, no proactive capital investment is made and the condition of Line 18 will continue to deteriorate.

TransGrid calculates that the safety and environmental risk costs associated with the condition deterioration and corrosion of Line 18 are approximately $0.7 million per year. Condition deterioration of the affected assets due to corrosion would mean an increase in bushfire and safety risks along Line 18 as the likelihood of failure increases. If left untreated, corrosion of some of the vital components of the steel towers could result in incidents such as conductor drop and tower collapse. Such incidents could have serious safety consequences for nearby residents and members of the public, as well as TransGrid field crew members who may be working on or near the assets.

TransGrid manages and mitigates bushfire and safety risks to ensure they are below risk tolerance levels or 'As Low As Reasonably Practicable' ('ALARP'), in accordance with TransGrid's obligations under the New South Wales Electricity Supply (Safety and Network Management) Regulation 2014 and TransGrid's Electricity Network Safety Management System (ENSMS). [1]

Using TransGrid's Risk Assessment Methodology[2], the risks on safety and environment are sufficient such that their mitigation is warranted. The safety and environmental risk costs from corrosion of steel components of the structures, or 'members', insulators and fittings are estimated to be approximately $0.7 million per year.[3]

Under the ALARP test with the application of a gross disproportionate factor[4], the weighted benefits are expected to exceed the cost. TransGrid's analysis concludes that the costs are less than the weighted benefits from mitigating bushfire and safety risks. The proposed investment will enable TransGrid to continue to manage and operate this part of the network to a safety and risk mitigation level of ALARP. Consequently, it is considered a reliability corrective action under the RIT-T.

Applying the ALARP principle to manage and mitigate bushfire and safety risks, TransGrid determines that its obligations under the New South Wales *Electricity Supply (Safety and Network Management) Regulation 2014* and TransGrid's ENSMS will be met by implementing Option 1 by 2022/23. Under this principle, risks are mitigated unless it is possible to demonstrate that the costs involved in further reducing the risk would be grossly disproportionate to the benefits gained. Using the ALARP principle, all scenarios under Option 1 are NPV positive.

The proposed investment will enable TransGrid to continue to manage and operate this part of the network to a safety and risk mitigation level of ALARP. Consequently, it is considered 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.

Credible options considered

In this PSCR, TransGrid has put forward for consideration credible options that would meet the identified need from a technical, commercial, and project delivery perspective.[5]

These are summarised in the following table.

[1] TransGrid's ENSMS follows the International Organization for Standardization's ISO31000 risk management framework which requires following hierarchy of hazard mitigation approach

[2] Appendix B provides an overview of the risk assessment methodology adopted by TransGrid.

[3] This determination of yearly risk costs is based on TransGrid's Network Asset Risk Assessment Methodology and incorporates variables such as likelihood of failure/exposure, various types of consequence costs and corresponding likelihood of occurrence.

[4] In accordance with the framework for applying the ALARP principle, a disproportionality factor of 6 has been applied to risk cost figures. The values of the disproportionality factors were determined through a review of practises and legal interpretations across multiple industries, with particular reference to the works of the UK Health and Safety Executive. The methodology used to determine the disproportionality factors in this PSCR is in line with the principles and examples presented in the AER Replacement Planning Guidelines and is consistent with TransGrid's Revised Revenue Proposal 2018/19- 2022/23.

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

Table 2 Summary of credible options

Option	Description	Capital costs ($m 2020/21)	Operating costs ($ per year)	Remarks
Option 1	**Line refurbishment**	**8.66 (+/- 25%)**	**25,000**	**Most economical and preferred option**
Option 2	Line dismantling	~12.8	0	Not progressed due to technical infeasibility. Dismantling Line 18 will reduce the supply capability from the Southern network to Greater Sydney significantly, which may lead to reliability of supply issues.
Option 3	New transmission line from Kangaroo Valley switching station to Dapto substation	> 100	Not considered	Due to significant costs of this option, a new 330 kV transmission line from Kangaroo Valley switching station to Dapto substation is not commercially feasible.

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

TransGrid does 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 and environment risk posed as a result of corrosion-related asset deterioration.

Implementing Option 1 will meet relevant regulatory obligations

Applying the ALARP principle to manage and mitigate bushfire and safety risks, TransGrid determines that its obligations under the New South Wales Electricity Supply (Safety and Network Management) Regulation 2014 and TransGrid's ENSMS will be met by implementing Option 1 by 2022/23. Under this principle, risks are mitigated unless it is possible to demonstrate that the costs involved in further reducing the risk would be grossly disproportionate to the benefits gained.

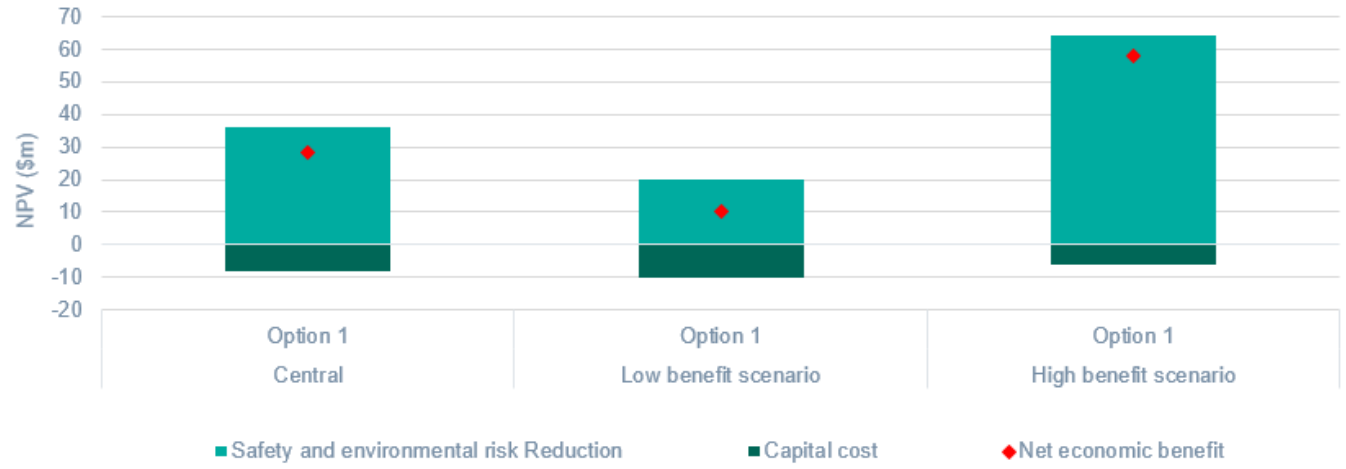
Option 1 delivers highest net economic benefits

Only the high benefit scenario and sensitivities under Option 1 are NPV positive. Figure 1 shows that the costs of mitigating the bushfire and safety risks for Option 1 in only one of three scenarios is less than the benefit of avoiding those risks. The total weighted net economic benefit assessment is negative.

Figure 1 Net economic benefits, present value ($m 2020/21)

Using the ALARP principle, where disproportionality factors have been applied on the bushfire and safety risks, the disproportionate benefits from the risk reduction outweigh the costs under all scenarios. This is shown in Figure 2. It is noted that, in accordance with the ALARP principle, the disproportionality factors have been selected to a level just below where the community, government and law would consider risk reduction expenditure to be grossly disproportionate.

Figure 2 Net economic benefits, present value with ALARP applied ($m 2020/21)



Draft conclusion

The optimal commercially and technically feasible option presented in this PSCR – Option 1 (line refurbishment) – is the preferred option to meet the identified need.

Moving forward with this option is the most prudent and economically efficient solution to manage and mitigate safety and environmental risk to ALARP. Consequently, it will ensure TransGrid's obligations under the New South Wales Electricity Supply (Safety and Network Management) Regulation 2014 and TransGrid's Electricity Network Safety Management System (ENSMS) are met.

The estimated capital expenditure associated with this option is $8.66 million +/- 25 per cent. Routine operating and maintenance costs relating to planned checks by TransGrid field crew are approximately $25,000 per year

– similar to the cost under the base case. TransGrid calculates that the avoided risk cost by undertaking Option 1 is approximately $3.4 million[6] per year.

This preferred option, Option 1, is found to have positive net benefits only for the high benefit scenario at $4.4 million. Using the ALARP principle, where disproportionality factors have been applied on the bushfire and safety risks, the disproportionate benefits from the risk reduction outweigh the costs under all scenarios for Option 1 and on a weighted basis will deliver $30.9 million in net economic benefits. TransGrid also conducted sensitivity analysis on the net economic benefit to investigate the robustness of the conclusion to key assumptions. TransGrid finds that under all sensitivities, positive net benefits are expected from refurbishing Line 18.

The works will be undertaken between 2020/21 and 2021/22. Planning and procurement (including completion of the RIT-T) commenced in 2020/21 and is due to conclude in 2021/22, while project delivery and construction will occur in 2022.

All works will be completed in accordance with the relevant standards by 2022 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.

Exemption from preparing a Project Assessment Draft Report

Subject to additional credible options being identified during the consultation period, publication of a Project Assessment Draft Report (PADR) is 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 process under NER clause 5.16.4(z1). Production of a PADR is not required due to:

- the estimated capital cost of the proposed preferred option being less than $43 million[7];
- the PSCR states:
  - the proposed preferred option (including reasons for the proposed preferred option)
  - RIT-T is exempt from producing a PADR
  - the proposed preferred option and any other credible option will not have material market benefits[8] except for voluntary load curtailment and involuntary load shedding
- RIT-T proponent considers that there were no PSCR submissions identifying additional credible options that could deliver a material market benefit; and
- the PACR must address any issues raised in relation to the proposed preferred option during the PSCR consultation.

Submissions and next steps

The purpose of this PSCR is to set out the reasons TransGrid proposes that action be taken, present the options that address the identified need, outline the technical characteristics that non-network options will need to provide, and allow interested parties to make submissions and provide input to the RIT-T assessment.

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6 Including the ALARP disproportionality factor.

7 Varied from $35m to $43m based on the AER Final Determination: Cost threshold review November 2018.14. Accessed 20 May 2020 https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/cost-thresholds-review-for-the-regulatory-investment-tests-2018

8 As per clause 5.16.1(c)(6)

TransGrid welcomes written submissions on materials contained in this PSCR. Submissions are particularly sought on the credible options presented and from potential proponents of non-network options that could meet the technical requirements set out in this PSCR. Submissions are due on 21 August 2021[9].

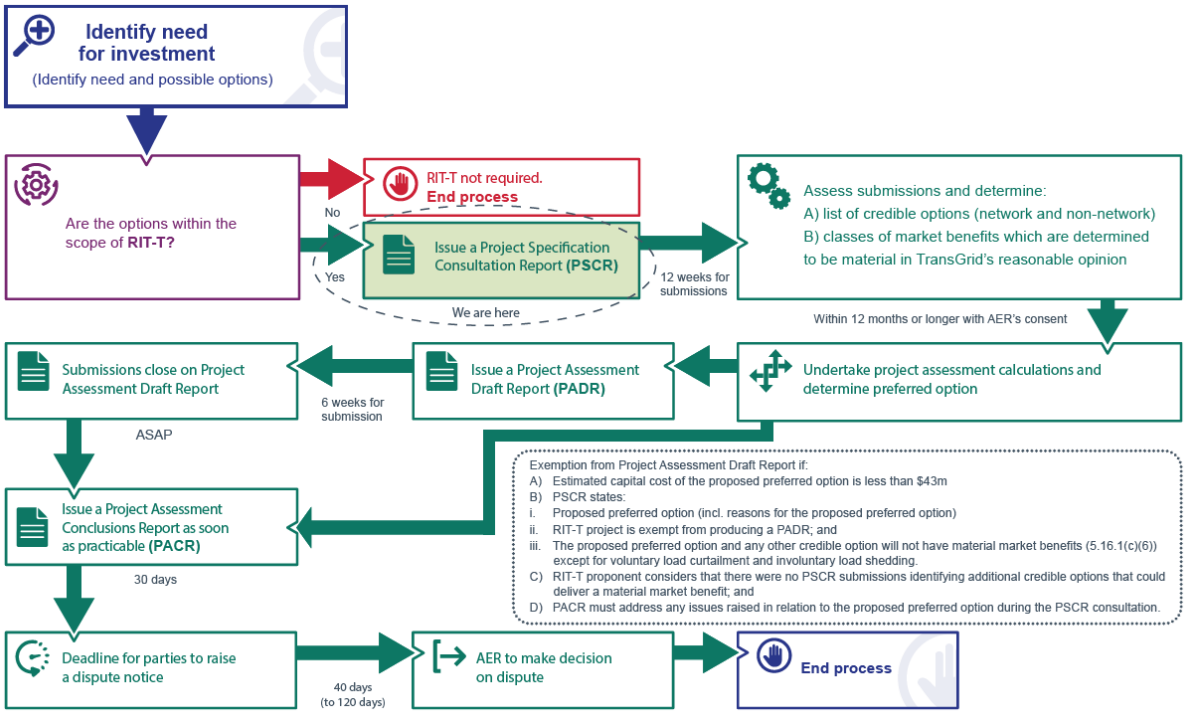
Submissions should be emailed to TransGrid's Regulation team via RIT-TConsultations@transgrid.com.au.[10] In the subject field, please reference 'Line 18 PSCR.'

At the conclusion of the consultation process, all submissions received will be published on TransGrid's website. If you do not wish for your submission to be made public, please clearly specify this at the time of lodgement.

Should TransGrid consider that no additional credible options were identified during the consultation period, TransGrid intends to produce 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. Subject to additional credible options being identified, TransGrid anticipates publication of a PACR by October 2021.

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

Figure 3 This PSCR is the first stage of the RIT-T process[11]



[9] Consultation period is for 12 weeks, additional days have been added to cover public holidays.

[10] 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.

[11] Australian Energy Market Commission. "*Replacement expenditure planning arrangements, Rule determination*". Sydney: AEMC, 18 July 2017.65. Accessed 14 May 2020. https://www.aemc.gov.au/sites/default/files/content/89fbf559-2275-4672-b6ef-c2574eb7ce05/Final-rule-determination.pdf