Transgrid

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Maintaining compliance with performance standards applicable to Sydney East substation secondary systems

Notification of MCC Assessment

Region: Greater Sydney

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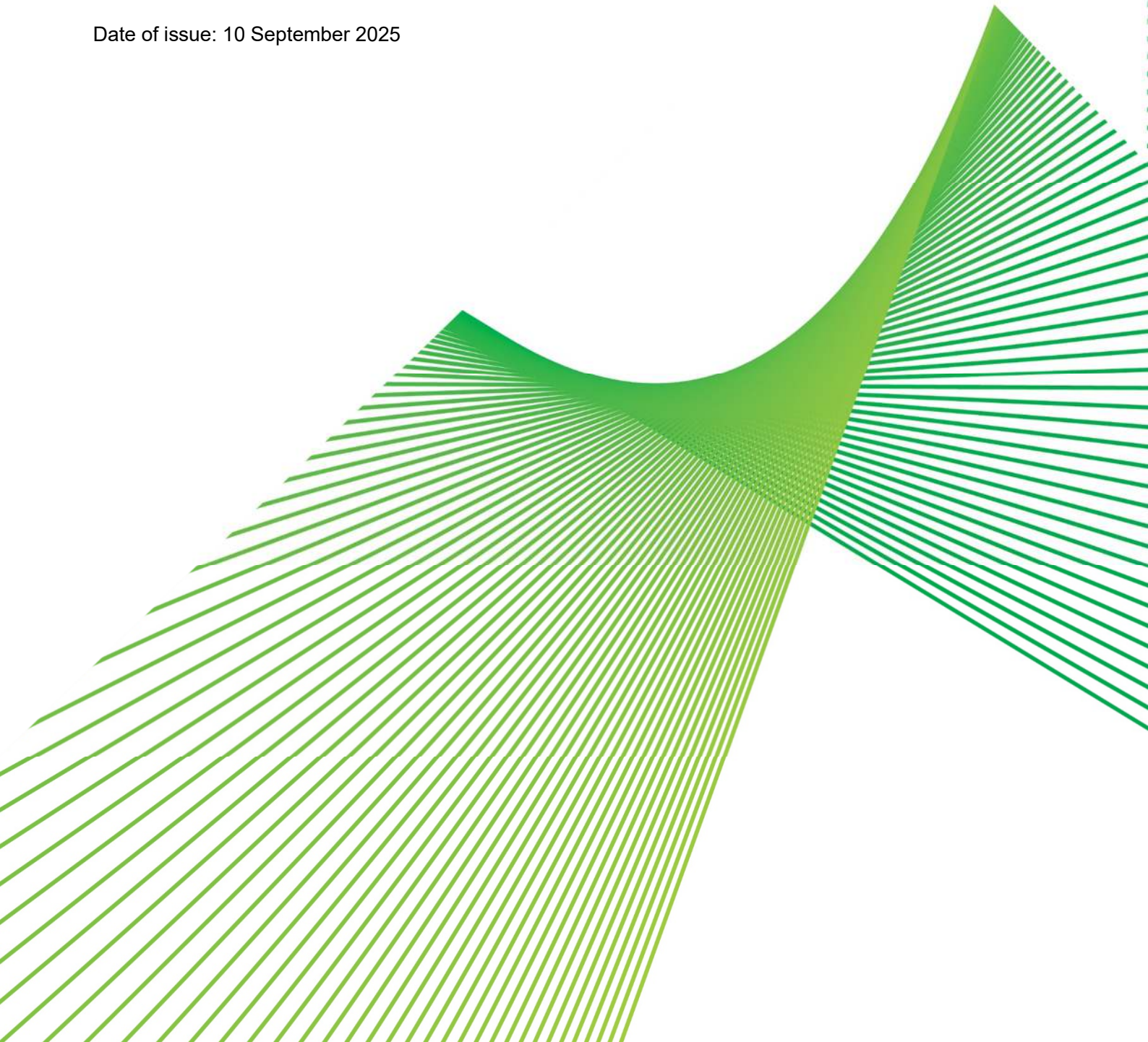

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Executive Summary

On 24 April 2024 we completed the Regulatory Investment Test for Transmission (RIT-T) for maintaining compliance with performance standards applicable to Sydney East substation secondary systems. This RIT-T considered two credible options:

- Option 1 – Replacement of individual assets
- Option 2 – Complete in-situ replacement

The RIT-T identified Option 2 as the preferred option. The planned timing to deliver the project has not changed and the work will be undertaken in stages over a five-year period with all works expected to be completed by 2027/28. However, capital costs for both Option 1 and Option 2 have increased since completion of the RIT-T.

We have performed a Material Change in Circumstance (MCC) Assessment to ascertain whether this increase constitutes a MCC as contemplated in the National Electricity Rules (NER).[1] More specifically, this assessment examined whether the change in capital costs resulted in a material change in circumstances, relating to the preferred option identified in the final RIT-T document, our Project Assessment Conclusions Report (PACR). In this MCC Assessment we refer to this as whether an 'MCC event' has occurred.

The Net Present Value (NPV) results (which determine which option is preferred) are presented below. Option 2 remains the preferred option, despite its NPV falling from 0.35 million in the PACR to -10.8 million in this MCC Assessment. This outcome is robust to changes in discount rates, capital costs and risks costs.

As a reliability corrective action-driven RIT-T, the preferred option (Option 2) is permitted to have negative net economic benefits on account of it being required to meet an externally imposed obligation on the network business.[2]

Table E-1 Original and revised NPV of economic benefits relative to the base case ($m, 2021/22)

Assessment	Option 1	Option 2	Preferred Option
Original (as presented in the PACR)	-0.06	0.35	Option 2
Revised (MCC Assessment)	-13.5	-10.8	Option 2

For comparison purposes, the benefit is presented in $2021/22 which is what was used in the PACR. The current benefit converted to $2024/25[3] is -$15.3 million for Option 1 and -$12.2 million for Option 2.

This MCC Assessment confirms that Option 2 remains the preferred option for maintaining compliance with performance standards applicable to Sydney East substation secondary systems. We therefore have concluded that an MCC event has not occurred. This MCC Assessment includes a statement that the preferred option remains the preferred option and sets out supporting information necessary to

[1] As per clause 5.16A.4(o2)(2) of the NER
[2] As per clause 5.15A.1(c) of the NER
[3] Values de-escalated from 2024/25 to 2021/22 values in accordance with ABS actual All Group June CPI data.

demonstrate that the preferred option identified remains the preferred option in section 4 (MCC Assessment results).[4]

[4] As per clause 5.16A.4(o2)(2) of the NER

2. Context and purpose of this report

On 24 April 2025 Transgrid completed the RIT-T for maintaining compliance with performance standards applicable to Sydney East substation secondary systems. This RIT-T considered two credible options:

Option 1 – Replacement of individual assets

This option involves individual replacements of identified assets from FY 2024 to FY 2037. The option is based on a like-for-like approach whereby the asset is replaced by its modern equivalent. Additional system modifications or additional functionalities would not be deployed under this option. This option will lock Transgrid to a system architecture than cannot be expanded to match modern technology capabilities into the future.

This option would deliver the least benefits to consumers and the network by only affecting the probability of failure of targeted assets. This option will not provide any additional benefits such as improved capabilities for remote interrogation and predictive activities.

Option 2 – Complete in-situ replacement

This option involves replacement of all secondary systems assets at the site. This option will adopt an automation philosophy consistent with current design standards and practices. This option also includes replacement of Direct Current (DC) supplies to account for an increase in secondary systems power requirements and remediation of the 415V Alternating Current (AC) distribution in the building and the switchyard.

The condition of various categories of automation assets such as protection relays, control systems, AC distribution, DC supply systems, and market meters creates a need for modernisation. This will deliver benefits such as reduced preventative maintenance requirements, improved operational efficiencies, better utilisation of our high-speed communications network, improved visibility of assets using modern technologies and reduced reliance on routine maintenance and testing. There are also additional operational benefits available due to improved remote monitoring, control and interrogation, efficiency gains in responding to faults, and phasing out of obsolete and legacy systems and protocols.

2.1. Background to the RIT-T

Sydney East substation was commissioned in 1976 and forms part of our network that serves the Greater Sydney area. It is supplied via two 330 kV feeders (Line 27 and 28) and two 132 kV feeders (Line 92Z and 959) from Sydney North substation, and feeds ten customer 132 kV lines operated by Ausgrid, along with two Ausgrid 132/66 kV transformer tie lines. These 132 kV feeders run between Sydney East substation and Ausgrid substations in the surrounding area, including Kuringai, Linfield, Warringah, and Willoughby. The Sydney East substation is comprised of three 330/132 kV transformers, two 330kV capacitors, one 132 kV reactor, and two 132 kV capacitor banks.

Secondary systems are used to control, monitor, protect and provide secure communication to facilitate safe and reliable network operation.[5]They are necessary to ensure the secure operation of the transmission network and prevent damage to primary assets when adverse events occur.

[5] As per Schedule 5.1 of the NER.

The secondary system assets are subject to technological obsolescence. This means that the technology is no longer being manufactured or supported. Reactive replacement of failed secondary systems component is not sustainable and impacts our ability to meet the requirements of the National Electricity Rules (NER).

Redundant protection schemes are required to ensure the transmission system is adequately protected as outlined in the Network Performance Requirement under Schedule 5.1 of the National Electricity Rules (NER), therefore the condition issues affecting the identified protection relays at Sydney East substation must be addressed. The Network Performance Requirements, set out in Schedule 5.1 of the NER, place an obligation on Transmission Network Service Providers (TNSPs) to provide redundant protection schemes to ensure the transmission system is adequately protected. Clause 5.1.9(c) of the NER requires a TNSP to provide sufficient primary and back-up protection systems (including breaker fail protection systems), to ensure that a fault of any type anywhere on its transmission system is automatically disconnected.

Additionally, TNSPs are required to disconnect the unprotected primary systems where secondary systems fault lasts for more than eight hours (for planned maintenance) or 24 hours (for unplanned outages). TNSPs must also ensure that all protection systems for lines at a voltage above 66 kV are well-maintained so as to be available at all times other than for short periods (less than eight hours), while the maintenance of protection systems is being carried out.[6]In the event of an unplanned outage, AEMO's Power System Security Guidelines require that the primary network assets must be taken out of service within 24 hours[7].

Furthermore, as per clause 4.11.1 of the NER, remote monitoring and control systems are required to be maintained in accordance with the standards and protocols determined and advised by AEMO.

A failure of the secondary systems would involve replacement of the failed component or taking the affected primary assets, such as lines and transformers, out of service. Though replacement of failed secondary systems component is a possible interim measure, the approach is not sustainable as the stock of spare components will deplete due to the technology no longer being manufactured or supported. Once all spares are used, interim replacement will cease to be a viable option to meet performance standards stipulated in clause 4.6.1 of the NER.

If the failure to provide functional secondary systems due to technology obsolescence is not addressed by a technically and commercially feasible credible option in sufficient time (by 2027/28), the likelihood of not recovering from secondary systems faults and not maintaining compliance with NER performance requirements will increase.

The proposed investment will enable us to continue to meet the standards for secondary systems availability set out in the NER, and to avoid the impacts of taking primary assets out of service. 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.

2.2. Capital cost changes since RIT-T completion

Table 1 shows that the capital costs for both Option 1 and Option 2 have changed substantially since the PACR.

[6] As per clause 5.1.2.1(d) of the NER.
[7] AEMO, *Power System Security Guidelines*, 3 June 2024. Melbourne: AEMO, 2024. pp.25.

Table 1 Original and revised capital cost relative to the base case ($m, 2021/22)

Cost	Option 1	Option 2
Original (as presented in the PACR)	17.55	26.53
Revised (MCC Assessment)	36.69	37.64

For comparison purposes, the costs are presented in $2021/22, which is what was used in the PACR. The current costs escalated to $2024/25[8] are $41.2m for Option 1 and $42.3m for Option 2.

- The underlying factors driving these cost changes include:
  - Significant increase in procurement and contract costs from the RIT-T estimate.
  - Increases in internal management and commissioning costs from the RIT-T estimate.

2.3. Material change in circumstance provisions in the NER

The NER covers the situation where there has been a material change in circumstance following the publication of a PACR. It is important to note that the increase in the capital cost estimate for the Project, whilst substantial, does not in itself mean that an MCC event has occurred for the purposes of the NER. The NER refers to a material change in circumstance as including, but not being limited to, a change to:

- key inputs and assumptions;
- the identified need described in the PACR; or
- the credible options assessed in the PACR.

Pursuant to these NER provisions, Transgrid has undertaken an MCC Assessment to evaluate whether the change in the capital cost for both options represent an MCC event.

[8] Values de-escalated from 2024/25 to 2021/22 values in accordance with ABS actual All Group June CPI data.

3. Approach to the MCC Assessment

This section outlines the inputs and assumptions used to complete the MCC Assessment with updated capital costs for both Option 1 and Option 2.

3.1. Assessment against the base case

Under this base case, no proactive capital investment is made to remediate the condition of the secondary systems assets at Sydney East substation, or to address the technological obsolescence, spares unavailability, and discontinued manufacturer support. We incur regular and reactive maintenance costs, and environmental, safety and financial related risks costs, that are caused by the failure of assets at Sydney East substation.

We note that this course of action is not expected in practice. However, this approach has been adopted since it is consistent with AER guidance on the base case for RIT-T applications.[9]

3.2. Assessment period and discount rate

The MCC Assessment makes use of a 15-year assessment period from 2024/25 to 2038/39. This period takes into account the size, complexity and expected asset life of the options.

Where the capital components of the credible options have asset lives extending beyond the end of the assessment period, the NPV modelling includes a terminal value to capture the remaining asset life. This ensures that the capital cost of long-lived options over the assessment period is appropriately captured, and that all options have their costs and benefits assessed over a consistent period, irrespective of option type, technology or asset life. The terminal values have been calculated based on the undepreciated value of capital costs at the end of the analysis period. As a conservative assumption, we have effectively assumed that there are no additional cost and benefits after the analysis and period.

A real, pre-tax discount rate of 7 per cent has been adopted as the central assumption for the NPV analysis. We have additionally tested the sensitivity of the NPV results to a lower bound discount rate of 3 per cent and an upper bound discount rate of 10.0 per cent[10].

3.3. Approach to estimating option costs

We have estimated the capital and operating costs of the options based on the scope of works necessary together with costing experience from previous projects of a similar nature.

The cost estimates are developed using our ‘MTWO’ cost estimating system. This system utilises historical average costs, updated by the costs of the most recently implemented project with similar scope. All estimates in MTWO are developed to deliver a ‘P50’ portfolio value for a total program of works (i.e., there is an equal likelihood of over- or under-spending the estimate total).[11]

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[9] Transgrid notes that the AER RIT-T Guidelines state that the base case is where the RIT–T proponent does not implement a credible option to meet the identified need, but rather continues its 'BAU activities'. The AER define 'BAU activities' as ongoing, economically prudent activities that occur in the absence of a credible option being implemented. (See: AER, *Regulatory Investment Test for Transmission Application Guidelines*, November 2024, pp.21).

[10] AEMO *2025 Inputs, Assumptions and Scenarios Report*, August 2025, pp.158.

[11] For further detail on our cost estimating approach refer to section 7 of our Augmentation Expenditure Overview Paper submitted with our 2023-28 Revenue Proposal.

We estimate that actual costs will be within +/- 25 per cent of the central capital cost estimate. An accuracy of +/- 25 per cent for cost estimates is consistent with industry best practice and aligns with the accuracy range of a 'Class 4' estimate, as defined in the Association for the Cost Engineering classification system.

All cost estimates are prepared in real, 2024/25 dollars based on the information and pricing history available at the time that they were estimated. The cost estimates do not include or forecast any real cost escalation for materials.

Routine operating and maintenance costs are based on works of similar nature. Given that there is an incremental routine operating and maintenance costs saving in the options compared to the base case, this is a net benefit in the assessment.

3.4. Value of customer reliability

We have applied a NSW-wide VCR value from AEMO's latest Inputs, Assumptions and Scenarios Report (IASR)[12]. We consider that a state-wide VCR is likely to reflect the weighted mix of customers that will be affected by these options.

3.5. The options have been assessed against three reasonable scenarios

The RIT-T is focused on identifying the top ranked credible option in terms of expected net benefits. However, uncertainty exists in terms of estimating future inputs and variables (termed future 'states of the world').

To deal with this uncertainty, the NER requires that costs and market benefits for each credible option are estimated under reasonable scenarios and then weighted based on the likelihood of each scenario to determine a weighted ('expected') net benefit. It is this 'expected' net benefit that is used to rank credible options and identify the preferred option.

The credible options have been assessed under three scenarios as part of this MCC Assessment, which differ in terms of the key drivers of the estimated net market benefits (ie, the estimated risk costs avoided).

Given that wholesale market benefits are not relevant for this RIT-T, the three scenarios implicitly assume the most likely scenario from the 2025 IASR (ie, the 'Step Change' scenario). The scenarios differ by the assumed level of risk costs and unserved energy, given that these are key parameters that may affect the ranking of the credible options. Risk cost assumptions do not form part of AEMO's IASR assumptions, and have been based on Transgrid's analysis.

We developed the Central Scenario around a static model of demand scenarios, described further in Section A.3 of our Network Asset Criticality Framework. We consider that this approach is appropriate since it materially reduces the computational effort required, and since differences in demand forecasts will not materially affect the ranking of the credible options.

How the NPV results are affected by changes to other variables (including the discount rate and capital costs) has been investigated in the sensitivity analysis. We consider this is consistent with the latest AER

[12] AEMO *2025 Inputs, Assumptions and Scenarios Report*, August 2025, pp. 159.

guidance for RIT-Ts of this type (ie, where wholesale market benefits are not expected to be material).[13,14,15]

A summary of the key variables in each scenario is provided in Table 2 below.

Table 2 Summary of scenarios

Variable / Scenario	Central scenario	Low risk costs scenario	High risk costs scenario
Scenario weighting	1/3	1/3	1/3
Discount rate	7%	7%	7%
VCR ($2024-25)[16]	$ 31,428 /MWh	$ 31,428 /MWh	$ 31,428 /MWh
Network capital costs	Base estimate	Base estimate	Base estimate
Avoided unserved energy	Base estimate	Base estimate - 25%	Base estimate +25%
Safety, environmental and financial risk benefit	Base estimate	Base estimate - 25%	Base estimate +25%
Avoided routine operating and maintenance costs	Base estimate	Base estimate	Base estimate

We have weighted the three scenarios equally given there is nothing to suggest an alternate weighting would be more appropriate.

3.6. Sensitivity analysis

In addition to the scenario analysis, we have considered the robustness of this MCC Assessment outcome through undertaking various sensitivity testing.

The range of factors tested as part of the sensitivity analysis are:

- lower and higher assumed capital costs; and
- alternate commercial discount rate assumptions.

[13] AER, *Application Guidelines Regulatory Investment Test for Transmission*, November 2024, pp.44.
[14] We consider the approach to scenarios and sensitivities to be consistent with the AER guidance provided in November 2022 in the context of the disputes of the North West Slopes and Bathurst, Orange and Parkes RIT-Ts. See: AER, *Decision: North West Slopes and Bathurst, Orange and Parkes Determination on dispute - Application of the regulatory investment test for transmission*, November 2022, pp.18-20 & 31-32, as well as with the AER's RIT-T Guidelines.
[15] AEMO *2025 Inputs, Assumptions and Scenarios Report*, August 2025, pp.159
[16] AEMO *2025 Inputs, Assumptions and Scenarios Report*, August 2025, pp.159

In addition, we have also sought to identify the ‘boundary value’ for key variables beyond which the outcome of the analysis would change, including the amount by which capital costs would need to increase for the preferred option to no longer be preferred.

4. MCC Assessment results

4.1. Original NPV results from the PACR

Original results presented within the PACR are shown in Table 3 below.

Table 3 Original NPV of economic benefits relative to the base case ($m, 2021/22) as presented in the PACR

Option	Central scenario
Option 1	-0.06
Option 2	0.35

4.2. Revised NPV results from this MCC Assessment

NPV results from our MCC Assessment are presented within Table 4 below.

As a reliability corrective action-driven RIT-T, the preferred option (Option 2) is permitted to have negative net economic benefits on account of it being required to meet an externally imposed obligation on the network business.[17]

Table 4 NPV of economic benefits relative to the base case ($m, 2024/25) as presented in this MCC Assessment

Option	Central scenario
Option 1	-15.2
Option 2	-12.2

Sensitivity testing additionally identified the following:

- If the discount rate were to increase to 10.58% or higher, this would cause Option 1 to be preferred over Option 2.
- When capital costs are 30% higher, this would cause Option 1 to be preferred over Option 2.
- When risk costs are 31% lower, this would cause Option 1 to be preferred over Option 2.
- The option ranking for each VCR sensitivity does not change compared to the main results.

[17] As per clause 5.15A.1(c) of the NER

5. Conclusion and recommendation

The MCC Assessment has found that Option 2 (complete in-situ replacement) remains the preferred option, despite its NPV falling from $0.35 (real FY2022) million in PACR to -$12.2 (real FY2025) million in this MCC Assessment. This outcome is robust to changes in discount rates, capital costs and risk costs.

As a result, an MCC event has not occurred. Therefore, it is recommended that Transgrid continue to deliver the project using Option 2, complete in-situ replacement.