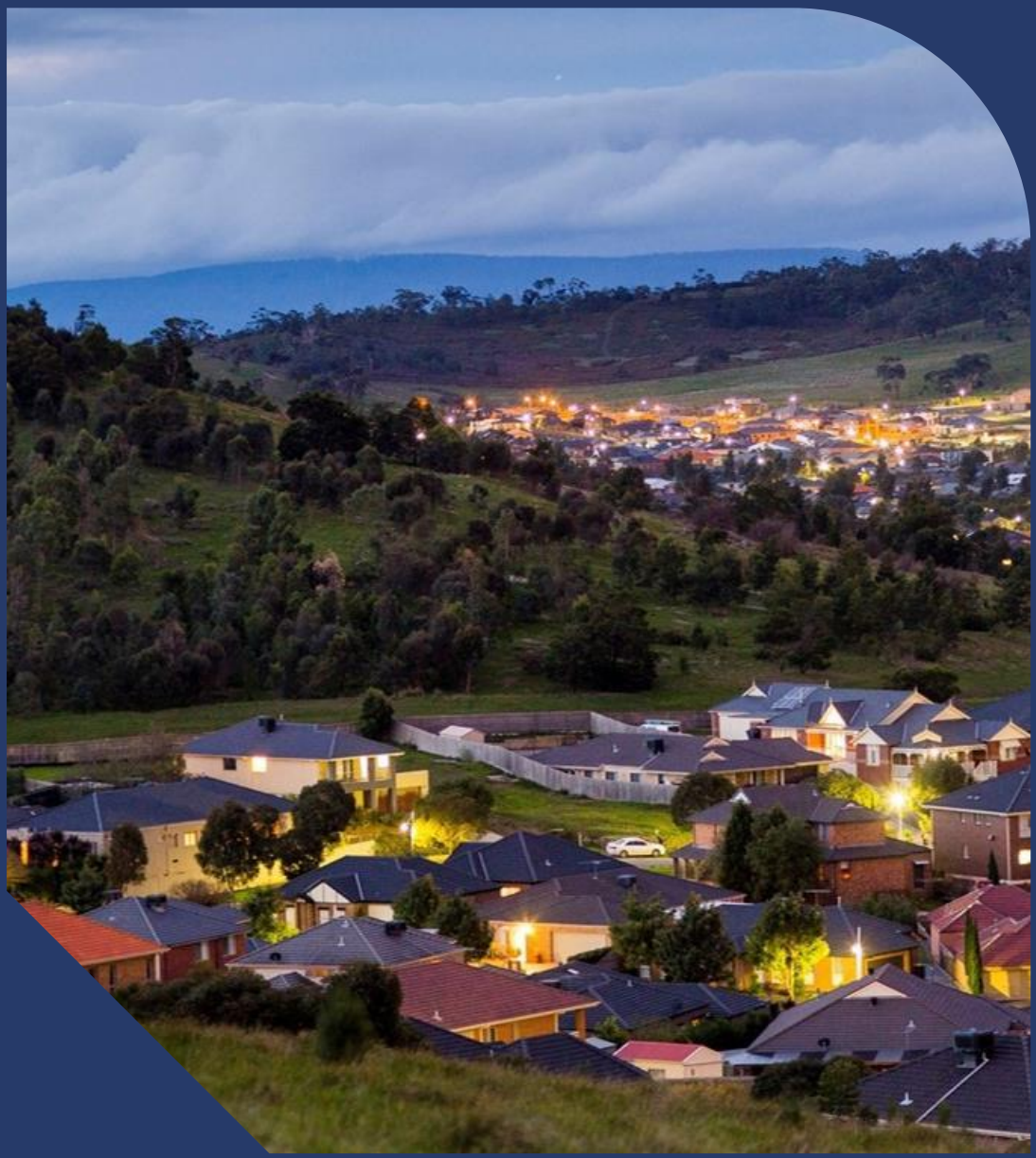
AusNet

Maintaining reliable transmission network services at Keilor Terminal Station

Regulatory Investment Test for Transmission (RIT-T)

Project Assessment Conclusions Report

August 2026



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1. Executive summary

Keilor Terminal Station (KTS) is owned and operated by AusNet and is in Keilor northwest of Melbourne's CBD. It was commissioned in 1970 and forms part of the main Victorian 500 kV and 220 kV transmission system with transformation from 500 kV to 220 kV and 220 kV to 66 kV.

This Regulatory Investment Test for Transmission (RIT-T) investigated options that will allow continued delivery of safe and reliable transmission services. Publication of this Project Assessment Conclusions Report (PACR) represents the last step in the RIT-T process in accordance with clause 5.16 of the National Electricity Rules (NER) and section 4.2 of the RIT-T Application Guidelines.

Identified need

The A2, A3 and A4 500/220 kV, and B4 220/66 kV transformers at KTS are in poor to very poor condition, increasing the risk of failure. Without intervention, these assets will deteriorate faster, leading to prolonged outages and higher market impact risks.

A failure of the red phase of the A2 transformer bank occurred in July 2026. The onsite spare phase was used to return the A2 bank to service and AusNet is now assessing options to reinstate spare phase capability in the event of another transformer failure. The A2 red phase failure further demonstrated that the KTS transformers have reached the end of their technical lives and reinforces both the need for, and the urgency of, the proposed investment at KTS.

This RIT-T describes the best economic solution to maintain reliable transmission network services at KTS. AusNet Services calculated the baseline risk cost at over $18 billion over 45 years, mainly due to involuntary load shedding risks affecting electricity consumers.

Credible options

Three credible network options to replace the A2, A3 and A4 500/220 kV transformers, B4 220/66 kV transformer and 220 kV busbars[1] that are likely to deliver an economical solution to the identified need are considered in this RIT-T.

- Option 1 – Like for like replacement of the A2, A3 and A4 500/220 kV transformers
- Option 2 – Replacement of the A2, A3 and A4 transformers with standard metro 1000 MVA 500/220 kV transformers. This option also requires fault mitigation works on several 220 kV lines (KTS-DPTS, two KTS-GTS, two KTS-WMTS and two KTS-TTS lines) where earth wires do not meet the required fault current rating2.
- Option 3 – Deferred replacement with standard metro 1000 MVA 500/220 kV transformers

Assessment approach

AusNet Services followed the Australian Energy Regulator (AER)'s Industry practice application note for asset replacement planning to analyse and rank the economic cost and benefits of the investment options considered in this RIT-T. The assessment approach includes consideration of the costs and economic benefits for each option, and tests the robustness of the investment decision through:

- the use of scenarios that are consistent with the Australian Energy Market Operator's (AEMO) latest Inputs, Assumptions and Scenarios Report (IASR); and
- sensitivity analysis that involves variation of assumptions around the values used for the central scenario.

Since publication of the PADR, VicGrid has provided AusNet with the 2026 Connection Point Demand Forecast, which includes updated demand projections for the Victorian transmission network. AusNet has incorporated this forecast, along with updated input assumptions such as the Value of Customer Reliability (VCR), into the PACR assessment. The revised demand forecast includes additional data centre loads and higher projected demand at KTS, further supporting the need for the proposed investment.

Project changes since publication of the PADR

AusNet revisited the scope of work for this project since publication of the PADR and identified the following work that must be undertaken as part of the project:

- Fault level mitigation works for seven 220 kV lines connected to KTS 220 kV where ground wires are not rated for the forecast increase in fault level at KTS 220 kV
- DC supply upgrades that can be efficiently undertaken with the larger project

Since publication of the PADR this project has thus seen a change in scope, cost and targeted completion date.

[1] The replacement of the B4 transformer and KTS 220 kV busbars are required for all three options. The KTS 220 kV busbars will need to be replaced to bring the station to a modern standard and for the 220 kV busbars to comply with the fault current rating that applies to metro 220 kV stations.

[2] Replacement with 1000 MVA transformers raises the fault level at KTS 220 kV and nearby stations. The increased single phase to ground fault current exceeds the rating of the earth wires on seven of the 220 kV lines (KTS-DPTS, two KTS-GTS, two KTS- WMTS and two KTS-TTS lines) connected at KTS. Replacement of earth wires and strengthening of towers are included in this option for the sections of line where this work is required.

RIT-T Conclusion

The preferred option to address the asset failure risk at KTS is Option 2 as it has the lowest net present value cost of all options considered. Option 2 includes replacing all three A transformers with 1000 MVA units, the B4 transformer with a 150 MVA 220/66 kV transformer, replacement of the 115 mm OD aluminium busbars with 200 mm OD aluminium busbars, and implementing the identified fault level mitigation works required on all the 220 kV lines connected to KTS, except the Altona and Brooklyn lines, by 2031.

The RIT-T concluded that it is no longer economical to continue to provide transmission network services with the existing assets at KTS as the asset failure risk has increased to a level where investment to replace the selected assets provides the highest long term customer benefit. The recent failure (July 2026) of the red phase of the A2 transformer bank supports AusNet's assessment that these 500/220 kV transformers have reached the end of their technical lives and reinforces both the need for, and the urgency of, the proposed investment at KTS.

No non-network proposals were received during the RIT-T consultation.

The estimated capital cost of this option is $360 million (real 2026) with no material change in operating and maintenance cost. The project is economic by 2027 based on a total investment cost of $360 million and AusNet Services is targeting an in-service date of end 2031.

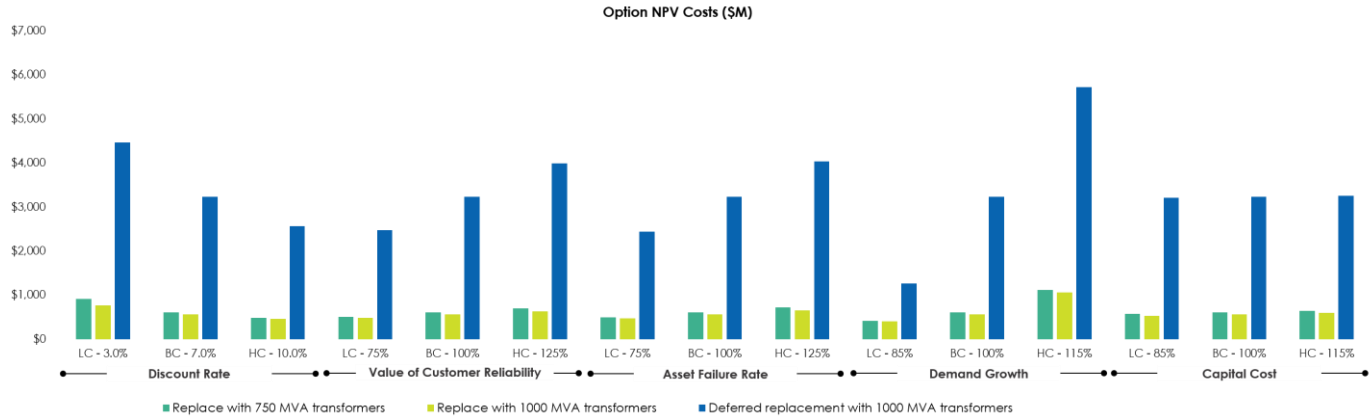


Figure 1 – Preferred option (scenarios and sensitivity analysis)

Next steps

In accordance with clause 5.16B of the NER, within 30 days of the date of publication of this PACR, any party disputing the conclusion made in this PACR should give notice of the dispute in writing setting out the grounds for the dispute (the dispute notice) to the AER. If there are no dispute notices within 30 days of the date of publication of this PACR, AusNet Services expects to implement the preferred option.

2. Introduction

This Regulatory Investment Test for Transmission (RIT-T) evaluated options to maintain reliable transmission network services at Keilor Terminal Station (KTS). Publication of this Project Assessment Conclusions Report (PACR) represents the last step in the RIT-T process in accordance with clause 5.16 of the National Electricity Rules (NER) and section 4.2 of the RIT-T Application Guidelines.

The PACR describes the following:

- the identified need that AusNet Services is seeking to address;
- credible network options that may address the identified need;
- a summary of, and the RIT-T proponent's response to, the submissions received to the PADR, if any;
- the assessment approach and assumptions that AusNet Services employed for this RIT-T assessment, as well as
- the specific categories of market benefits that are unlikely to be material;
- the option evaluation; and
- the identification of the preferred option.

The need for investment to address risks from the deteriorating assets at KTS has been included in AusNet Services' revenue proposal for the 2027 to 2032 regulatory control period.[3] This investment need is also presented in AusNet Services Asset Renewal Plan that will be published as part of VicGrid's 2026 Victorian Transmission Annual Planning Report (VAPR)[4].

[3] Australian Energy Regulator, "AusNet Services - Determination 2027–2032"
4 Australian Energy Market Operator, "Victorian Annual Planning Report".

3. Identified Need

This section of the PACR describes the condition of key assets at KTS, quantify the risk costs of an asset failure and establish the need for investment.

3.1. Transmission network services at Keilor

KTS is owned and operated by AusNet Services and is in the northwest of Greater Melbourne. KTS is one of the major terminal stations in Victoria with three voltage levels – 500 kV, 220 kV and 66 kV. Three 750 MVA 500/220 kV transformer (A2, A3 and A4) and five 150 MVA 220/66 kV transformers (B1, B2, B3, B4 and B5) are in services at KTS. The A transformers at KTS supply the Western Metropolitan 220 kV ring, feeding multiple downstream terminal stations, including Altona, Brooklyn, West Melbourne and Fisherman's Bend. Newport Power Station and Laverton North Power Station are gas generation sources connected within the Western Metropolitan 220 kV network. KTS 66 kV supplies approximately 200K customers in the areas of Sunbury, Sydenham, Tullamarine, Airport West, St. Albans, Woodend, Gisborne, Pascoe Vale, Essendon and Braybrook.

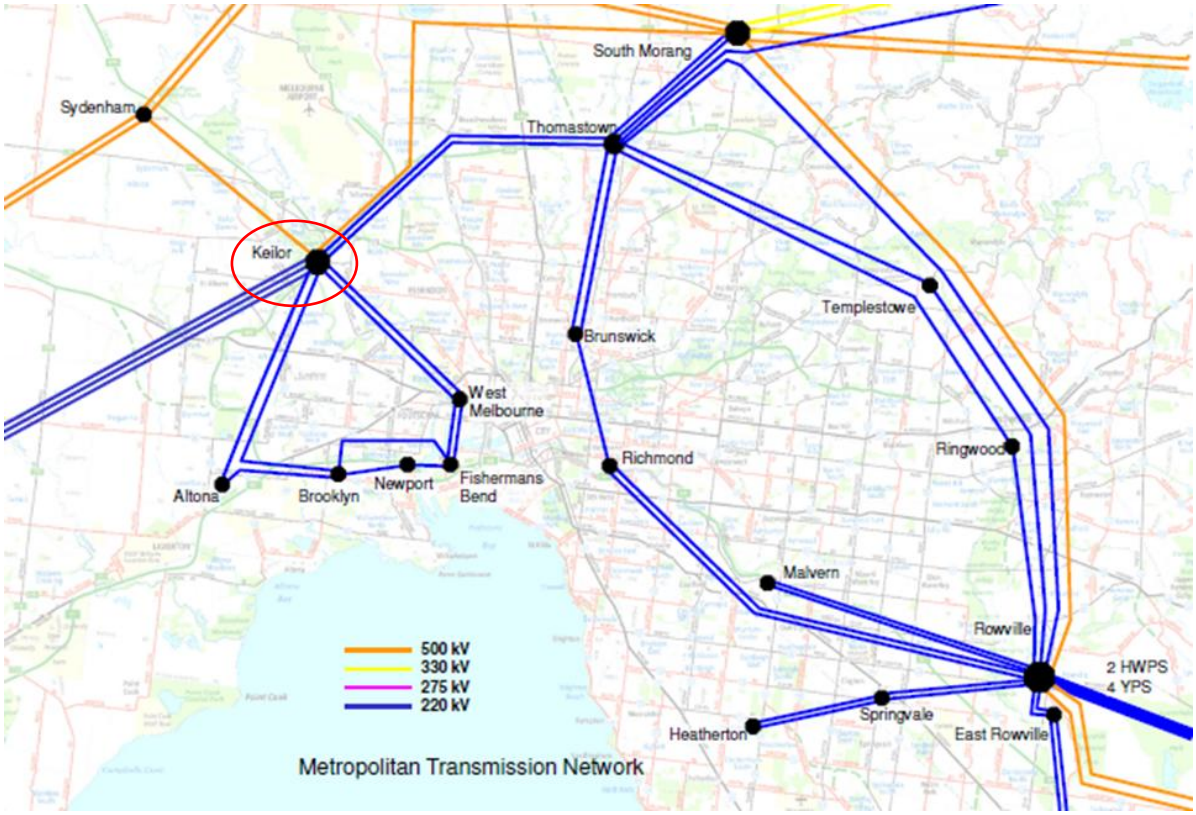


Figure 2 – Metropolitan Transmission Network and KTS

3.2. Asset condition

The condition of the three 500/220 kV transformers (A2, A3 and A4) and one of the 220/66 kV transformers (B4) is in poor[5] to very poor[6] condition with increased risk of failure. Refurbishment is not an option as the core and windings of these transformers have been assessed to be in a poor to very poor condition.

The 220 kV busbars do not comply with the fault current rating standard for metro 220 kV stations and will need to be replaced with new busbars that comply with the fault current standard for metro stations. The new busbars will also have a higher continuous current rating to match the continuous current rating of the new larger 1000 MVA 500/220 kV transformers.

[5] The asset is showing significant signs of ageing and wear. While it continues to operate, it is becoming less reliable and requires increasing maintenance to remain in service.
[6] The asset is approaching the end of its serviceable life. Its condition has deteriorated to the point where the risk of failure is high, maintenance is increasingly difficult and costly, and continued operation presents a growing reliability risk to the electricity network.

The fault current rating of the earth wires of the two Thomastown, two Geelong, two West Melbourne and one Deer Park 220 kV lines connected at KTS is also limited. Fault mitigation works will be triggered options that raise the fault level at KTS 220 kV. The fault mitigation works include earth wire replacements and tower strengthening works.

3.3. Identified need

KTS is part of the main transmission network which provides major transmission network services in Victoria. AusNet Services expects that the services that the terminal station provide will continue to be required given the transmission network developments that are foreshadowed in AEMO's Integrated System Plan and VicGrid's Victorian Annual Planning Report (VAPR), VicGrid's Victorian Transmission Plan (VTP) as well as the Distribution Business' Transmission Connection Planning Report (TCPR).

The poor condition of some of the assets has increased the likelihood of asset failures. Such failures would result in prolonged outages. Without remedial action, other than ongoing maintenance practice (business-as-usual), affected assets are expected to deteriorate further and more rapidly. This will increase the probability of asset failure resulting in a higher likelihood of an impact on users of the transmission network, heightened safety risks, increased environment risks, increased collateral damage risks to adjacent plant, and the risk of increased costs resulting from the need for emergency asset replacements and reactive repairs.

This RIT-T addresses the 'identified need' to maintain reliable transmission network services at KTS and to mitigate risks from asset failures.

AusNet Services calculated the present value of the baseline risk costs to be more than $18 billion over the forty-five year period from 2025. The key risks are shown in Figure 3. The largest component of the baseline risk cost is the involuntary load shedding risk, which is borne by electricity consumers.

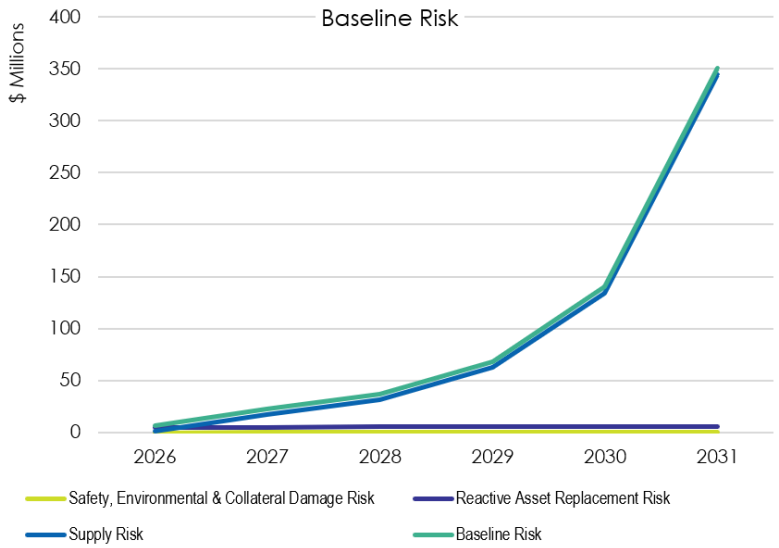


Figure 3 – Baseline risk

By undertaking the options identified in this RIT-T, AusNet Services will be able to maintain reliable 500/220 kV transmission network services at KTS and mitigate safety and environmental risks as required by the NER and Electricity Safety Act 1998[7].

3.4. Assumptions

The identified need is underpinned by several assumptions, including the risk of asset failure (determined by the condition of the assets), the likelihood of relevant consequences, and several assumptions adopted from the latest Inputs Assumptions and Scenarios Report (IASR). These assumptions are outlined below.

Demand Forecast

Since publication of the PADR, VicGrid has provided AusNet with the 2026 Connection Point Demand Forecast, which includes updated demand projections for the Victorian transmission network. AusNet has incorporated this forecast, together with updated input assumptions such as the Value of Customer Reliability (VCR), into the PACR

[7] Victorian State Government, Victorian Legislation and Parliamentary Documents, "Electricity Safe Act 1998"

assessment. The revised demand forecast includes additional data centre loads and higher projected demand at KTS, further supporting the case for the proposed investment.

Network studies using the updated demand forecast shows that the existing 750 MVA 500/220 kV transformers do not have sufficient capacity to support the forecast demand at KTS.

Failure rate and repair time

AusNet uses both quantitative and qualitative analysis to assess the condition of the assets and estimate remaining service life. Table 1 shows the failure rates applied in the economic cost benefit analysis. These rates were determined before the failure of the A2 transformer and have not been reassessed to a higher value as a result of the failure, as the key issue is now the earliest achievable delivery date, rather than the economic timing. Based on the failure rates shown in Table 1, the optimal timing of the preferred option (Option 2) is 2027, while the estimated project completion date is the end of 2031. An increase in transformer failure rates would result in an earlier economic timing and further strengthen the case for accelerating the project; however, it would not change the current delivery constraints or the earliest achievable completion date. AusNet is actively seeking to accelerate the project, recognising the associated risks.

Transformer	2026	2027	2028	2029	2030	2031	2032
A2	7.4%	7.5%	7.7%	7.9%	8.1%	8.3%	8.5%
A3	8.4%	8.6%	8.8%	9%	9.2%	9.4%	9.6%
A4	5.8%	6%	6.2%	6.3%	6.5%	6.7%	6.8%
B4	5.5%	5.7%	5.8%	6%	6.1%	6.3%	6.5%

Table 1 –Transformer failure rates

The assumed mean time to replace a transformer following a major failure is more than 12 months when no spare is available and 1 month when a spare is available. The analysis is undertaken in 12-month intervals over a 45-year period[8]. AusNet is considering several options to reinstate the spare 500/220 kV phase capability at KTS, following the use of the existing spare to return the A2 transformer back to service. Given the magnitude of the risk at KTS without a spare 500/220 kV transformer, the assessment assumes that AusNet will put an asset management strategy in place to manage this risk.

Market impact costs

Network studies are used to assess the market impact of transformer failures at KTS. These studies use the latest assumptions from AEMO's Inputs Assumptions and Scenarios Report (IASR) and VicGrid's Connection point demand forecast.

Involuntary load shedding is valued at the latest Value of Customer Reliability (VCR)[9].

Safety risk costs

The Electricity Safety Act 1998[10] requires AusNet to design, construct, operate, maintain, and decommission the network to minimise hazards and risks to the safety of any person as far as reasonably practicable or until the costs become disproportionate to the benefits from managing those risks.

By implementing this principle for assessing safety risks from explosive failure, AusNet uses:

- a value of statistical life[11] to estimate the benefits of reducing the risk of death;
- a value of lost time injury[12]; and
- a disproportionality factor[13].

AusNet notes that this approach, including the use of a disproportionality factor, is consistent with the RIT-T Industry Practice Notes [14] provided by the AER.

Financial risk costs

There is an ongoing need for the services provided at KTS and emergency asset replacement or repairs would be required to continue the service should a transformer fail. The failure rate weighted emergency asset replacement cost (or undertaking reactive maintenance) is included in the assessment.[15]

8 It is expected that the lead time to replace a transformer when no spare is available will be 24 months or longer but given that the risk assessment is done over 12 month intervals the MTTR is set to 12 months for this scenario.
9 In dollar terms, the Value of Customer Reliability (VCR) represents a customer's willingness to pay for the reliable supply of electricity
10 Victorian State Government, Victorian Legislation and Parliamentary Documents, "Energy Safe Act 1998"
11 Department of the Prime Minister and Cabinet, Australian Government, "Best Practice Regulation Guidance Note: Value of statistical life"
12 Safe Work Australia, "The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community: 2012-13"
13 Health and Safety Executive's submission to the1987 Sizewell B Inquiry suggesting that a factor of up to 3 (i.e. costs three times larger than benefits) would apply for risks to workers; for low risks to members of the public a factor of 2, for high risks a factor of 10. The Sizewell B Inquiry was a public inquiry conducted between January 1983 and March 1985 into a proposal to construct a nuclear power station in the UK.
14 Australian Energy Regulator, "Industry practice application note for asset replacement planning"
15 The assets are assumed to have survived and their condition-based age increases throughout the analysis period.

Environmental risk costs

Environmental risks from plant that contains large volumes of oil, which may be released in an event of asset failure, is valued at $100,000 per event.

Approach to estimating option costs

The cost estimates for each option have been prepared by AusNet's Cost Estimation team using established estimating practices including market testing, informed by detailed scope definition and recent comparable project costs. The preferred option has been subject to additional cost assurance through targeted market engagement and more detailed engineering development to reflect current market conditions, delivery requirements, and project-specific risks. Consequently, the preferred option estimate is considered to have a higher level of confidence than the alternative options. The estimates represent AusNet's best assessment of efficient project costs at the current stage of development and are appropriate for economic evaluation and investment decision-making. Consistent with industry practice for projects of this maturity, the estimated costs are expected to be accurate within approximately ±25% of the final delivered cost.No contingency allowance has been included in the cost estimates.

Social license costs have not been included as they are not expected to be material for this RIT-T as all works are restricted to the KTS site.

Operating and maintenance costs are negligible as far as this RT-T is concerned.

Where capital components have asset lives greater than ten years, we have adopted a residual value approach to incorporating capital costs in the assessment, which ensures that the capital costs of long-lived options are appropriately captured in the assessment period.

Material inter-regional network impact

The proposed asset replacements at KTS will not change the transmission network configuration and none of the network options considered are likely to have a material inter-regional network impact. A 'material inter- regional network impact' is defined in the NER as:

> "A material impact on another Transmission Network Service Provider's network, which may include (without limitation): (a) the imposition of power transfer constraints within another Transmission Network Service Provider's network; or (b) an adverse impact on the quality of supply in another Transmission Network Service Provider's network."

Community engagement

AusNet recognises that effective and proactive engagement with landholders, communities and stakeholders is essential to informing robust planning outcomes under the RIT T and maintaining community trust in network development.

We are committed to undertaking engagement that is early, transparent, and proportionate to the scale and potential impact of the credible options under assessment, and that supports improved decision-making by incorporating local knowledge, stakeholder concerns and community values.

AusNet seeks to engage early in the RIT T process, wherever practicable, to build awareness and understanding of the need for the project, identify potential landholder and community impacts associated with credible options, and incorporate local knowledge into option design and refinement. This early engagement also enables AusNet to identify opportunities to avoid, minimise or mitigate impacts, and to inform realistic assumptions relating to project costs, constructability, timing, and delivery risks. In doing so, early engagement supports more informed options assessment and reduces the risk of delays arising from unforeseen stakeholder concerns or approvals constraints.

Community engagement impact assessments

The level of engagement will be proportionate to the likely impacts of the preferred option:

Higher impact projects (e.g. new lines, major rebuilds, significant changes to infrastructure):

- structured stakeholder and community engagement programs may be implemented
- a dedicated Community and Stakeholder Engagement Plan may be developed
- engagement will inform option refinement prior to finalisation of the PACR
- engagement outcomes may influence timing, design, mitigation measures, and delivery strategy

Lower impact projects (e.g. like-for-like replacements, minor upgrades):

- engagement will typically focus on directly affected landholders
- engagement will occur closer to delivery to manage access and minimise disruption
- practical mitigation measures will be agreed where required (e.g. timing of works, access routes, biosecurity requirements)

Minimal to no impact projects (e.g. works within existing terminal stations or on AusNet-owned land with minimal interface):

- engagement is generally limited to internal stakeholders and, where necessary, targeted notification of relevant external parties
- broader community or landholder engagement is not typically required due to the contained nature of works
- communication may be undertaken to inform nearby stakeholders of planned activities where there is potential for minor or indirect impacts (e.g. noise or increased traffic)
- standard operational procedures are applied to manage any risks, with a focus on minimising disruption and maintaining safe and efficient delivery

Landholder engagement considerations

Where projects require access to private land, AusNet will engage directly with landholders to understand property specific constraints and operational requirements and work collaboratively to minimise disruption to farming, business or residential activities. Clear points of contact will be provided to support timely engagement and issues resolution. Where appropriate, project specific engagement plans or procedures will be developed to guide delivery partners, contractors, including requirements relating to property access protocols, biosecurity measures, environmental protections, and communication requirements.

KTS specific:

The Keilor Terminal Station site sits within a highly developed footprint, and most works are expected to occur within this built up/ brownfield footprint. The preferred option recommended is confined to existing AusNet operational land and does not require new easements, land acquisition or expansion of the existing site footprint. Consequently, landholder and community impacts are expected to be minor and manageable, with engagement focused on communication of construction activities and coordination with directly affected stakeholders.
The immediate surrounding area includes warehouses, commercial businesses and industrial areas to the North and East. Residential areas are located to the south, west and north of the site, with the closest sensitive residents situated outside the immediate industrial precinct.

Key stakeholders in the immediate area include adjacent and nearby industrial and commercial landholders, as well as residential communities located in proximity to the site. Where required engagement will also involve Brimbank City Council, relevant road and transport authorities, utility providers, nearby businesses and other stakeholders that may be affected by project construction activities.

From an engagement perspective, minimising disruption during construction will focus on managing traffic and site access particularly for local businesses and associated traffic movements while addressing potential impacts such as noise, dust and general construction disturbance, especially for nearby residents.

Clear and timely communication of construction activities, including timing and duration, will be essential, along with maintaining access to properties and businesses wherever possible and providing advance notice of any disruptions where applicable.

While impacts are expected to be limited, AusNet recognises the importance of maintaining community trust and social licence for all network development activities. AusNet will continue to monitor potential stakeholder concerns throughout project development and delivery and implement targeted engagement where impacts or stakeholder interest require additional communication. AusNet has considered the potential impacts of the credible options on landholders, communities and other stakeholders as part of this RIT-T assessment. The assessment concluded that impacts are expected to be low because the proposed works are contained within the existing Keilor Terminal Station site and will not require additional land, easements or material changes to the existing network footprint. Any temporary construction impacts are expected to be localised and manageable through standard construction controls and targeted stakeholder engagement.

4. Credible Options

This section describes the credible options that have been considered to address the identified need, including:

- the technical characteristics of each option;
- the estimated construction time and commissioning date; and
- the total indicative capital and operating and maintenance costs.

The purpose of the RIT-T is to identify the credible option that maximises the net market benefit for most scenarios. An important aspect of this task is to consider non-network and network options on an equal footing, to ensure an efficient outcome for all network users. None of the options considered are expected to have an inter-regional impact or result in a change in greenhouse gas emissions.

Refurbishment is not considered a credible option because the core and windings are in poor to very poor condition. These components form the active part of the transformer and their deterioration is largely irreversible. Major refurbishment would require extensive replacement of windings, insulation and associated active-part components, resulting in costs approaching those of a new transformer while still leaving uncertainty regarding the remaining asset life. Industry guidance from CIGRÉ and IEEE indicates that replacement is generally the preferred strategy for EHV transformers in end-of-life condition, as it provides superior reliability, lower life-cycle risk and compliance with modern network requirements.

Replacement with larger than 1000 MVA transformers was also considered but rejected given the transport weight restrictions and misalignment with the long-term plan for KTS and the Victorian Transmission Network. The standard 500/220 kV transformer size for the metropolitan network is 1000 MVA, consistent with CBTS, ROTS and MLTS.

4.1. Option 1: Replace with 750 MVA transformers

Option 1 replaces the three 500/220 kV transformers with the same size and includes one spare phase. The B4 220/66 kV transformer is replaced with the same size transformer. The 220 kV busbars are replaced to match the fault current standard for metro stations.

The estimated capital cost of this option is $305.4 million and the change in operating and maintenance cost is negligible. The estimated project delivery time is 5 years.

4.2. Option 2: Replace with 1000 MVA transformers

Option 2 replaces the three 500/220 kV transformers with standard metro 1000 MVA 500/220 kV transformers. Procurement of a spare phase is not needed, as a shared spare phase is available at Moorabool Terminal Station. The B4 220/66 kV transformer is replaced with the same size transformer. The 220 kV busbars are replaced to match the fault current standard for metro stations. Faul mitigation works are undertaken on seven 220 kV lines connected to KTS (Two GTS, two TTS, two WMTS and one DPTS line) to replace ground wires and strengthen towers because of an increase in the fault levels at KTS 220 kV given the lower impedance of the 1000 MVA transformers compared with the existing transformers.

The estimated capital cost of this option is $360 million and the change in operating and maintenance cost is negligible. The estimated project delivery time is 5 years.

4.3. Option 3: Deferred replacement - 1000 MVA transformers

Option 3 is like Option 2 except it defers the investment by 5 years.

The estimated capital cost of this option is the same as Option 2 ($360 million) and the change in operating and maintenance cost is negligible. The estimated project delivery time is 5 years.

5. Assessment approach

Consistent with the RIT-T requirements and practice notes on risk-cost assessment methodology[16], AusNet Services undertook a cost-benefit analysis to evaluate and rank the net economic benefits of all credible options over a 45-year period.

All options considered have been assessed against a business-as-usual case where no proactive capital investment to reduce the increasing baseline risks is made.

Optimal timing of an investment option is the year when the annual benefit from implementing the option exceeds the annualised investment costs[17].

5.1. Sensitivity analysis and input assumptions

The robustness of the investment decision and the optimal timing of the preferred option have been tested by a sensitivity analysis. This analysis involves variation of assumptions from those employed for the central (most likely) scenario as shown in Table 2.

Parameter	Lower Bound	Most likely (central) assumption or scenario	Upper Bound
VCR	75% of central assumption	Latest AER published VCR	125% of central assumption
Asset failure rate	75% of central assumption	Assessed failure rate	125% of central assumption
Demand Growth	85% of central assumption	VicGrid Connection Point Forecast	115% of central assumption
Discount rate[18]	WACC rate of network business (3.0%)	Latest commercial discount rate from IASR (7%)	Upper Bound (10%)
Project Capital Cost	70% of estimated cost	Estimated cost	130% of estimated cost

Table 2 - Input assumptions used for the sensitivity studies

5.2. Material classes of market benefits

NER clause 5.16.1(c)(4) formally sets out the classes of market benefits that must be considered in a RIT-T. AusNet Services estimates that the only class of market benefits that is likely to be material is the change in involuntary load shedding. AusNet Services' proposed approach to calculate the benefits of reducing the risk of involuntary load shedding is set out in Section 3.4.

The table below discusses our approach to each of the market benefits for each credible option.

Class of Market Benefit	Analysis
(i) changes in fuel consumption arising through different patterns of generation dispatch;	The options assessed do not influence the costs of dispatch materially
(ii) changes in voluntary load curtailment;	Any changes in voluntary load curtailment have been valued in accordance with any applicable network support agreements.
(iii) changes in involuntary load shedding with the market benefit to be considered using a reasonable forecast of the value of electricity to consumers;	All options considered reduce involuntary load shedding by removing asset failure risk. Our approach to estimating this market benefit is explained in Section **Error! Reference source not found.**.
(iv) changes in costs for parties, other than the RIT-T proponent, due to differences in:	There is not expected to be any difference between the credible options.

16 Australian Energy Regulator, "Industry practice application note for asset replacement planning,"
17 The economic investment year is the year in which the investment NPV benefit is at a maximum and NPV cost at the lowest value
18 Discount rates as recommended in the AEMO Inputs, Assumptions and Scenarios Report (IASR)

(A) the timing of new plant; *(B) capital costs; and* *(C) the operating and maintenance costs;*	
(v) differences in the timing of expenditure;	Differences in investment timing have been considered for each option.
(vi) changes in network losses;	None of the options are expected to result in material changes to electrical energy losses.
(vii) changes in ancillary services costs	None of the options will impact ancillary service costs.
(viii) changes in Australia's greenhouse gas emissions	No material change is expected for any of the options considered as there is immaterial direct emissions from generation and sulphur hexafluoride (SF6).
(ix) competition benefits	The options will not provide any competition benefits.
(x) any additional option value (where this value has not already been included in the other classes of market benefits) gained or foregone from implementing the credible option with respect to the likely future investment needs of the National Electricity Market;	There will be no impact on option value in respect of the likely future investment needs of the NEM.
(xi) any other class of market benefit determined to be relevant by the AER.	AusNet Services expects a reduction in safety risk, environmental risk, collateral damage risk, and the risk of increased costs resulting from the need for emergency asset replacements and reactive repairs; and considered it in the assessment.

Table 3: Material classes of market benefits

5.3. Other classes of benefits

Although not formally classified as classes of market benefits under the NER, AusNet Services expects a reduction in safety risk from potential failures that involve explosion and fire of deteriorated assets, environmental risk from possible oil spillage, collateral damage risk to adjacent plant, and the risk of increased cost resulting from the need for emergency asset replacement and reactive repairs and considered these in this RIT-T.

5.4. Classes of market benefits that are not material

The following classes of market benefits are unlikely to be material for the options considered in this RIT-T:

- Changes in costs for parties, other than the RIT-T proponent – there is no other known investment, either generation or transmission, that will be affected by any option considered.
- Changes in ancillary services costs – the options are not expected to impact the demand for and supply of ancillary services.
- Competition benefits – there is no competing generation affected by the limitations and risks to be addressed by the options considered for this RIT-T.
- Option value – as the need for and timing of the investment options are driven by asset deterioration; there is no need to incorporate flexibility in response to uncertainty around any other factor.
- Change in network losses – changes in network losses are small and are not a material class of market benefits for any of the credible options.

6. Economic assessment of options

This section presents the results of the economic cost benefit analysis conducted to determine the preferred option and its economic timing.

All the options considered will deliver a reduction in market impact risk (including supply risk), safety risk, environmental risk, collateral risk and risk cost of emergency replacement in the event of asset failure. The total risk cost reduction or project benefits outweighs the investment cost for all options for all the sensitivities where input variables are varied one at a time as shown in Figure 4.

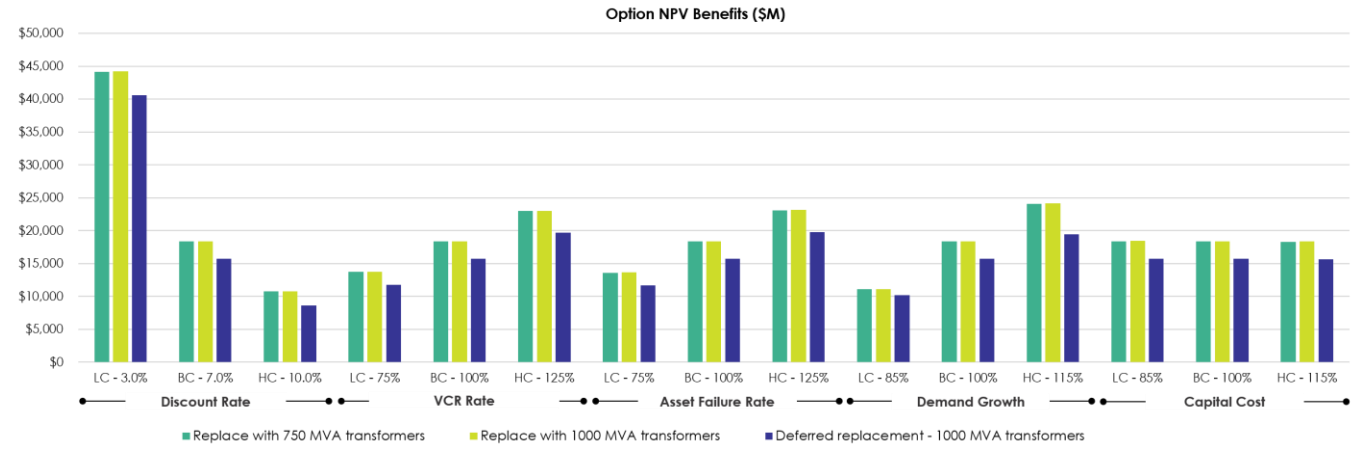


Figure 4 – Option selection and sensitivity study based on NPV benefits

Option 3 (Deferred replacement with 1000 MVA transformers) is clearly much worse that Option 1 and 2 as it delivers much lower NPV benefits for all sensitivities considered. The scale of the graph in Figure 4 makes it hard to compare Options 1 and 2. Figure 5 shows the NPV cost comparison for these two options as it can then be clearly seen that Option 2 (Replace with 1000 MVA transformers) has a material lower NPV cost for all sensitivity studies and is thus the preferred option.

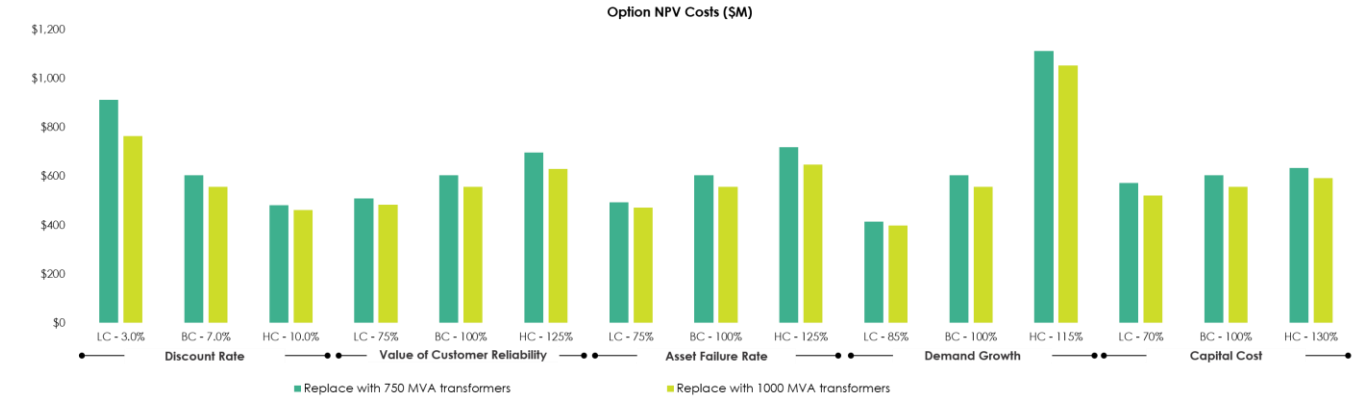


Figure 5 – Option selection and sensitivity study based on NPV cost

6.1. Preferred Option

Option 2 (Replace with standard 1000 MVA transformers) has the highest net economic benefit for all the scenarios and sensitivities considered and is therefore the preferred option. Scenario weighting will not make a difference to the preferred option as Option 2 has the highest net benefits for all sensitivity studies considered.

6.2. Optimal timing of the preferred option

This section describes the optimal investment timing of the preferred option for different assumptions. Figure 6 shows that the optimal timing of the preferred option (Option 2) is 2027 and that investment is needed within the 2027 to 2032 regulatory control period.

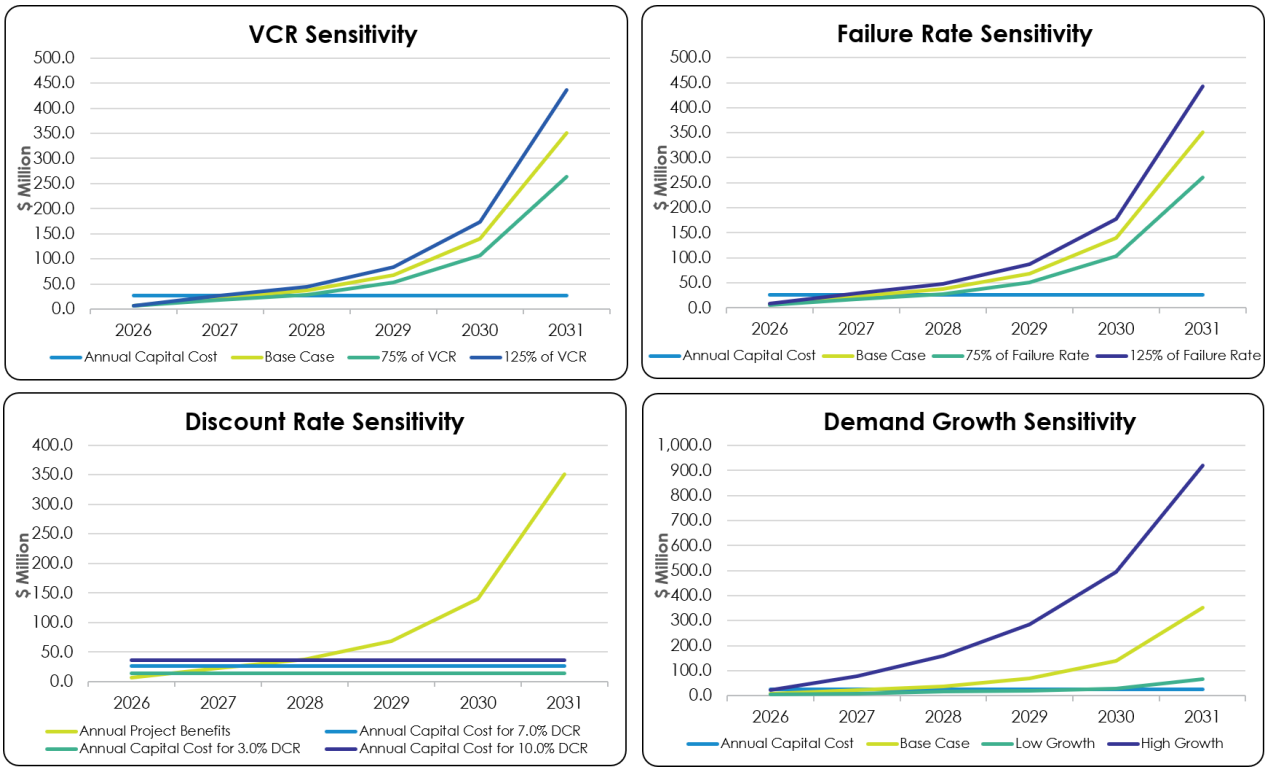


Figure 6 - Optimal investment timing sensitivity study

Figure 7 shows that the investment economic timing is less than one year later for a 30% increase in investment cost.

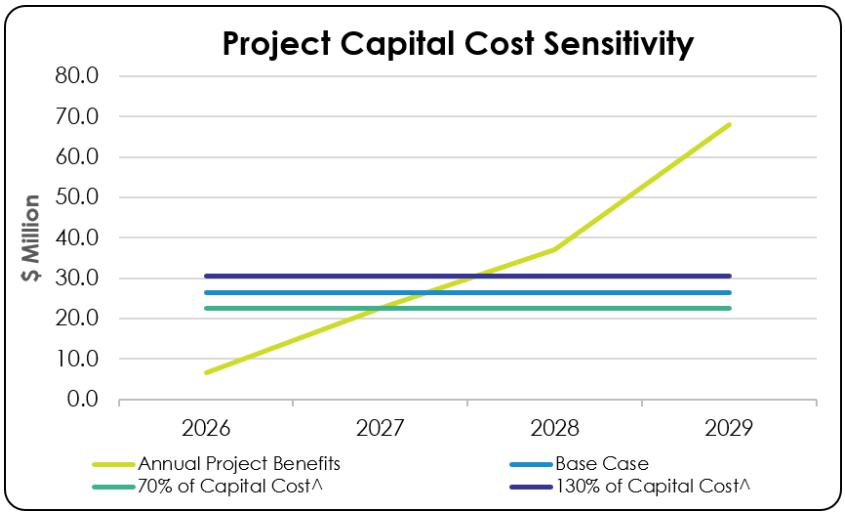


Figure 7 - Optimal investment timing sensitivity study – Capital cost

6.3. Capital and operating cost of the preferred option

The direct capital expenditure of the preferred option (Option 2) is $360 M (real 2026) and the main elements are as follows:

- Design and studies $14.6 million
- Internal labour $22.3 million
- Materials $111.2 million
- Plant and equipment $3.9 million
- Contracts $172.1 million
- Other including overheads and finance charges $35.9 million

6.4. Proposed RIT-T re-opening triggers

Under the updated Rules relating to a Material Change in Circumstance (MCC), AusNet is required to set out re-opening triggers for this RIT-T. Consistent with these new requirements and drawing on the results of the sensitivity assessments outlined, AusNet considered the impact of changes in key underlying assumptions to identify reopening triggers.

AusNet proposes the following re-opening trigger for this RIT-T as the project economic timing is the most sensitive to changes in demand:

- AusNet will reassess the project once the Distribution Business (DB) demand forecasts are published in 2026 and any updates or new forecast made available by VicGrid and AEMO to ensure that the preferred option remains unchanged and that the project economic timing does not move beyond the target project completion date.

Should this occur, AusNet would prepare a letter to the AER advising of actions proposed to take in response and timeframes to take such actions.

Consideration will also be given to any committed and sunk costs should the updated forecasts not be available before the project starts and costs are committed and whether new step loads such as data centres are probable but not included as committed projects in the official demand forecasts.

This project plans to execute contracts for the replacement transformers before the end of 2026 (after the RIT-T process is expected to be finalised) by which time a change in the preferred option can no longer be made without incurring sunk costs.

7. Conclusion

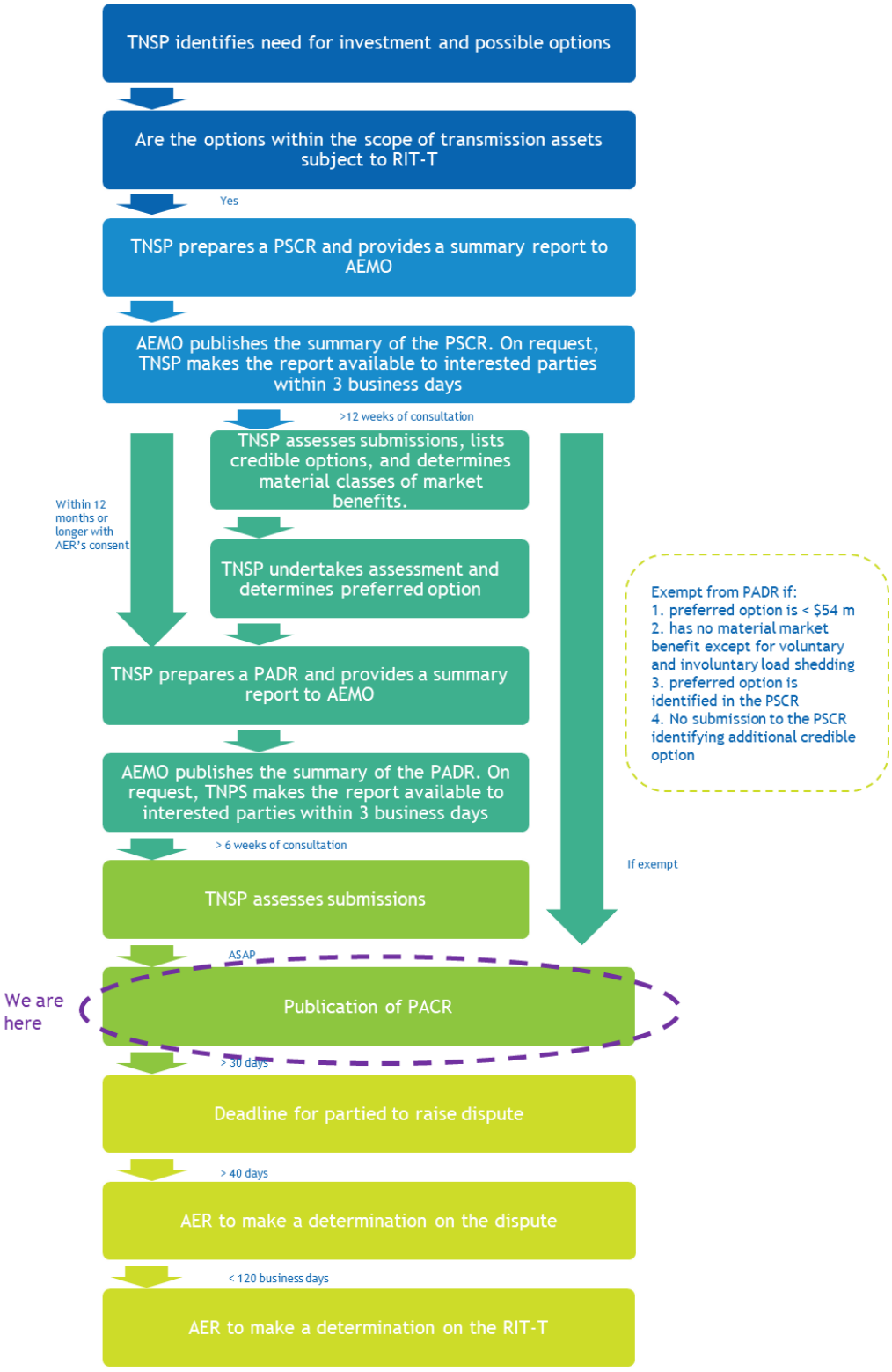
Amongst the options considered in this RIT-T, Option 2 is the most economical option to maintain reliable transmission network services at KTS and manage safety, environmental, collateral and emergency replacement risks. The preferred option involves selective replacement of assets that are in poor condition, including three 500/220 kV transformers, one 220/66 kV transformer and all 220 kV busbars. It also includes fault mitigation works on seven 220 kV lines connected to KTS.

The estimated capital cost of this option is $360 million with no material change in operating and maintenance cost. The project is economic by 2027 based on a total investment cost of $360 million and AusNet Services is targeting a project completion date of end 2031 given the project delivery lead time of 5 years from business case approval.

7.1. Submissions

In accordance with clause 5.16B of the NER, within 30 days of the date of publication of this PACR, any party disputing the conclusion made in this PACR should give notice of the dispute in writing setting out the grounds for the dispute (the dispute notice) to the AER. If there are no dispute notices within 30 days of the date of publication of this PACR, AusNet Services expect to implement the preferred option.

Appendix A – RIT-T assessment and consultation process



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