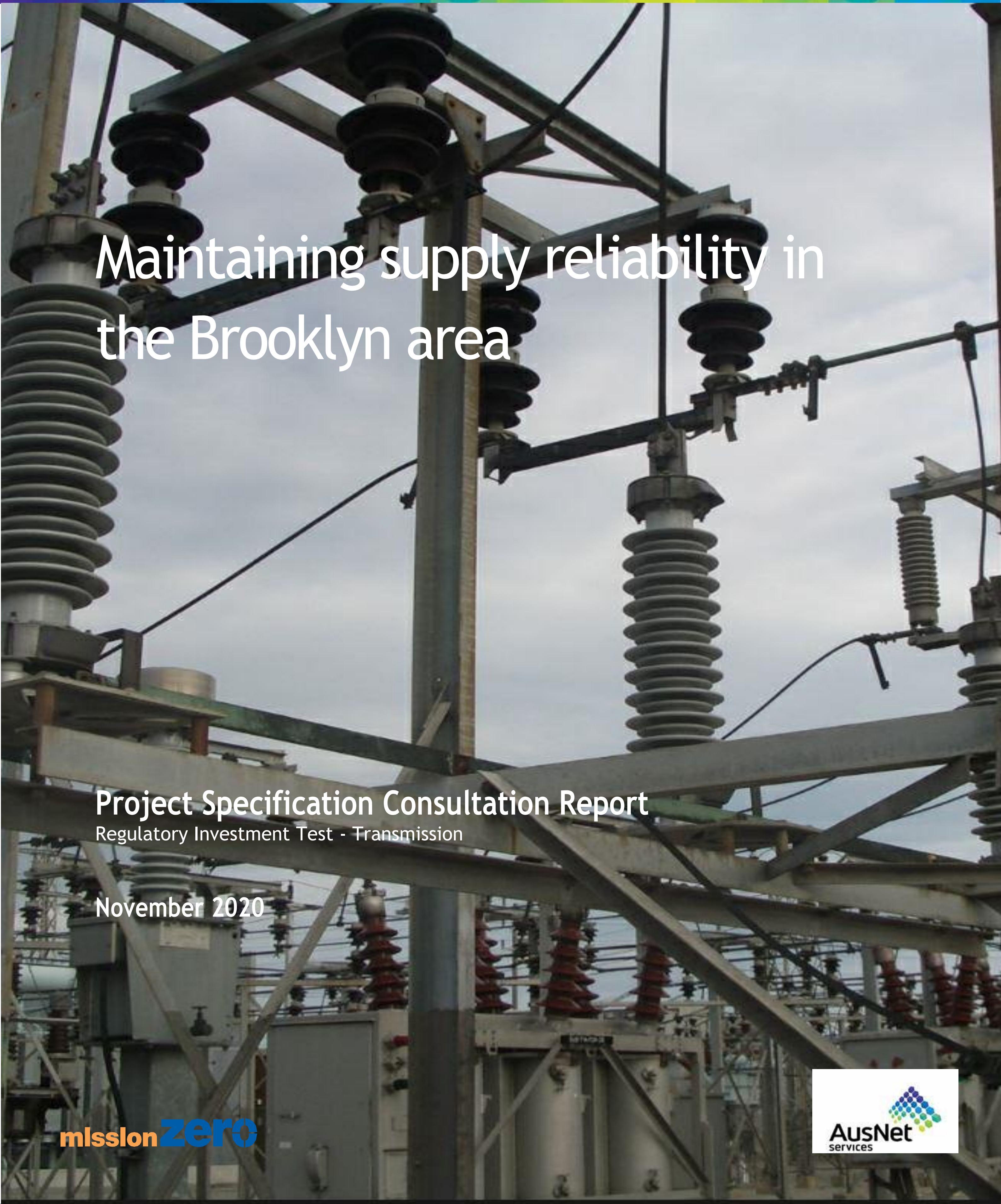

Maintaining supply reliability in the Brooklyn area

Project Specification Consultation Report

Regulatory Investment Test - Transmission

November 2020

Important notice

Purpose

AusNet Services has prepared this document to provide information about potential limitations in the Victoria transmission network and options that could address these limitations.

Disclaimer

This document may or may not contain all available information on the subject matter this document purports to address. The information contained in this document is subject to review and may be amended any time.

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Executive summary

AusNet Services is initiating this Regulatory Investment Test for Transmission (RIT-T) to evaluate options for maintaining supply reliability in the Brooklyn area. Options investigated in this RIT-T are intended to mitigate the risk of an asset failure at Brooklyn Terminal Station (BLTS).

Publication of this Project Specification Consultation Report (PSCR) represents the first step in the RIT-T process in accordance with clause 5.16 of the National Electricity Rules (NER)[1] and section 4.2 of the RIT-T Application Guidelines[2]. AusNet Services is also exploring opportunities to accelerate the RIT-T process for this project as allowed by NER clause 5.16.4(z1).

Brooklyn Terminal Station is owned and operated by AusNet Services and is located approximately 10 km west from Melbourne's CBD. It was commissioned in the early 1960's and serves as the main transmission connection point for distribution of electricity to approximately 56,650 customers via 220/66 kV transformers and approximately 7,530 customers via 220/22 kV transformers. Peak demand of the BLTS 66 kV load during the summer of 2018/19 reached 244.0 MW while the peak demand of the BLTS 22 kV load during the summer of 2018/19 reached 60.4 MW.

Identified need

As expected of assets that have been in service for an extended time, the condition of the circuit breakers and associated switchgear at Brooklyn Terminal Station has deteriorated to a level where there is a material risk of asset failure, which could have an impact on electricity supply reliability, safety, environment, and potential costs of emergency replacements. Therefore, the 'identified need' this RIT-T intends to address is to maintain supply reliability in the Brooklyn area and mitigate risks from asset failures.

AusNet Services estimates that the present value of the baseline risk costs associated with maintaining the existing assets in service is around $20 million – the biggest component of which comes from the supply interruption risks borne by electricity consumers. AusNet Services is therefore investigating options that could allow continued delivery of safe and reliable electricity supply to the customers supplied by the Brooklyn Terminal Station.

Credible options

AusNet Services estimates that network or non-network investments are likely to deliver more economical and reliable solutions to maintain supply reliability in the Brooklyn area, compared with keeping the existing assets in service. AusNet Services has identified the following credible network solutions that could meet the identified need:

- Option 1 – Replace selected 66 kV circuit breakers and switchgear that are in poor condition; or
- Option 2 – Deferring the replacement of selected 66 kV circuit breakers and switchgear that are in poor condition.

AusNet Services welcomes proposals from proponents of non-network options (stand-alone or in conjunction with a network solution), that may meet the identified need, such as options that allow for one or more of the 66 kV distribution feeders to become self-sufficient in islanded operation by providing local supply or demand curtailment in conjunction with local supply options.

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[1] Australian Energy Market Commission, *"National Electricity Rule version153,"* available at https://www.aemc.gov.au/regulation/energy-rules/national-electricity-rules/current, viewed on 17 November 2020.

[2] Australian Energy Regulator, *"RIT-T and RIT-D application guidelines 2018,"* available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rit-t-and-rit-d-application-guidelines-2018, viewed on 17 November 2020.

Assessment approach

AusNet Services will investigate the costs, economic benefits, and ranking of options in this RIT-T assessment. The robustness of the ranking and optimal timing of options will be investigated through sensitivity analysis which involves variation of assumptions around the base case values.

Options assessment and draft conclusion

AusNet Services' cost-benefit assessment confirms that an integrated replacement project that includes replacement of selected 66 kV circuit breakers and switchgear that are in poor condition (Option 1) is the most economic option and provides the highest present value of net economic benefits. This option will not only maintain supply reliability, but also mitigates safety, environmental, and emergency replacement risk costs from deteriorating assets at Brooklyn Terminal Station.

The optimal timing of delivery of the preferred option is as soon as possible for all sensitivities studied, including for the sensitivity that models the project cost 15% higher than the base case. Therefore, AusNet Services concludes that delivery of Option 1 as soon as possible is the most economical and thus the preferred option to address the identified need at BLTS.

Submissions

AusNet Services welcomes written submissions on the topics and the credible options presented in this PSCR and invites proposals from proponents of potential non-network options.

Submissions should be emailed to rittconsultations@ausnetservices.com.au on or before 15 February 2021. In the subject field, please reference 'RIT-T PSCR Brooklyn Terminal Station.'

Next steps

AusNet Services intends to invoke an exemption from publication of a Project Assessment Draft Report (PADR) as per NER clause 5.16.4(z1) and produce a Project Assessment Conclusions Report (PACR) before 31 March 2021 should no additional credible options that could deliver a material market benefit be identified during the 12-week consultation period. Otherwise, in accordance with NER clause 5.16.4(z1)(4), this exemption will no longer apply and AusNet Services will aim to produce a PADR before 31 March 2021.

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Tables

1. Introduction

AusNet Services is initiating this Regulatory Investment Test for Transmission (RIT-T) to evaluate options to maintain supply reliability in the Brooklyn area, in response to the deterioration of assets at Brooklyn Terminal Station.

Publication of this Project Specification Consultation Report (PSCR) represents the first step in the RIT-T process[3] in accordance with clause 5.16 of the National Electricity Rules (NER)[4] and section 4.2 of the RIT-T Application Guidelines.[5]

This document describes:

- the identified need that AusNet Services is seeking to address, together with the assumptions used in identifying this need;
- credible network options that may address the identified need;
- the technical characteristics that would be required of a non-network option to address the identified need;
- the assessment approach and scenarios AusNet Services is intending to employ for this RIT-T assessment; and
- the specific categories of market benefits that are unlikely to be material in this RIT-T.

The need for investment to address risks from the deteriorating assets is presented in AusNet Services Asset Renewal Plan that is published as part of AEMO's 2020 Victorian Transmission Annual Planning Report (VAPR)[6].

1.1. Making submissions

AusNet Services welcomes written submissions on the credible options presented in this PSCR and invites proposals from proponents of potential non-network options. Submissions should be emailed to rittconsultations@ausnetservices.com.au on or before 15 February 2021. In the subject field, please reference 'RIT-T PSCR Brooklyn Terminal Station.'

Submissions will be published on AusNet Services' and AEMO's websites. If you do not wish for your submission to be made public, please clearly stipulate this at the time of lodgment.

[3] A RIT-T process will assess the economic efficiency and technical feasibility of proposed network and non-network options.
[4] Australian Energy Market Commission, *"National Electricity Rule version153,"* available at https://www.aemc.gov.au/regulation/energy-rules/national-electricity-rules/current, viewed on 17 November 2020.
[5] Australian Energy Regulator, *"RIT-T and RIT-D application guidelines 2018,"* available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rit-t-and-rit-d-application-guidelines-2018, viewed on 17 November 2020.
[6] Australian Energy Market Operator, *"Victorian Annual Planning Report,"* available at https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Victorian-transmission-network-service-provider-role/Victorian-Annual-Planning-Report, viewed on 17 November 2020.

2. Identified need

The role of the Brooklyn Terminal Station in providing electricity supply services and the condition of key assets is discussed below. Quantification of the risk costs associated with the deterioration of these assets, and the need for the investments is also presented.

2.1. Electricity Supply to the Brooklyn area

The Brooklyn Terminal Station (BLTS) is owned and operated by AusNet Services and is located approximately 10 km west of Melbourne's CBD. Since it was commissioned in the early 1960's, Brooklyn Terminal Station has served the inner western residential area of Melbourne, commercial areas on the Western side of the Yarra River, a steel mill induction furnace at Laverton and sewerage pumping stations.[7]

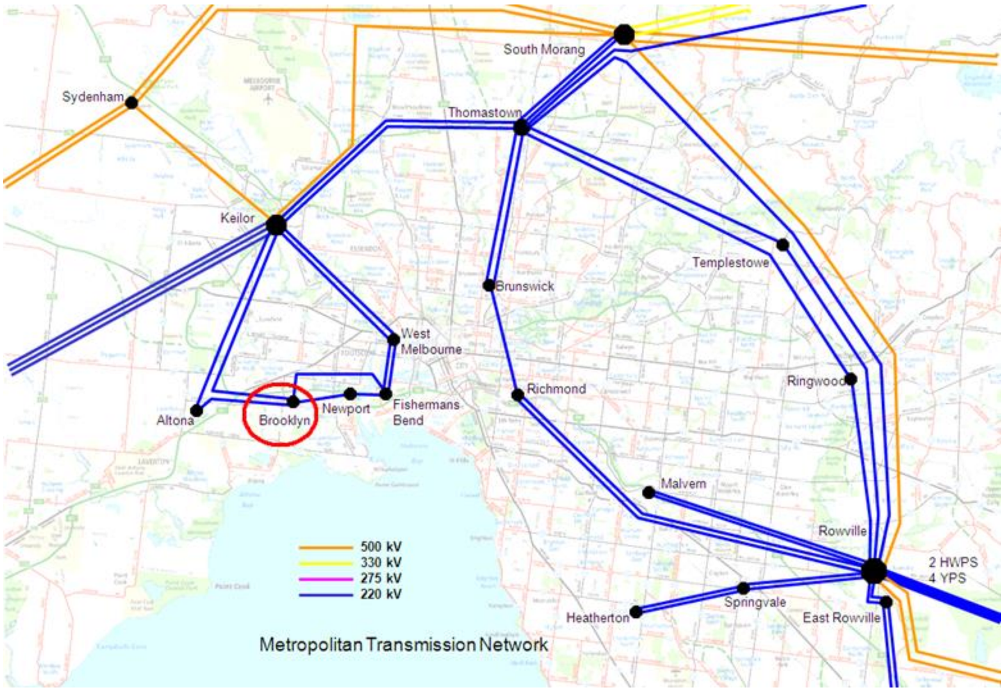

Figure 1 – Metropolitan transmission network and Brooklyn Terminal Station

Electricity demand

Approximately 56,650 customers are supplied from the 220/66 kV transformers. The load composition at BLTS 66 kV consists of 62.25% commercial and 19.42% residential customers as illustrated in Table 1.

Table 1 - Demand composition at BLTS

Customer type	Share of consumption (%) - 66 kV
Commercial	62.25%
Residential	19.42%
Industrial	18.26%

[7] Distribution of electricity to relevant communities is supported by Powercor and Jemena.

Customer type	Share of consumption (%) - 66 kV
Agricultural	0.07%
Total	100%

During the summer of 2018/19 the peak demand on the 66 kV at BLTS reached 244.0 MW.

According to the Australian Energy Market Operator's (AEMO) latest demand forecast[8], a slight decrease is forecast for the BLTS 66 kV peak demand over the years beyond 2025. Figure 2 shows the 10% probability of exceedance (POE10)[9] and the 50% probability of exceedance (POE50)[10] forecasts for peak demand during summer and winter periods.[11]

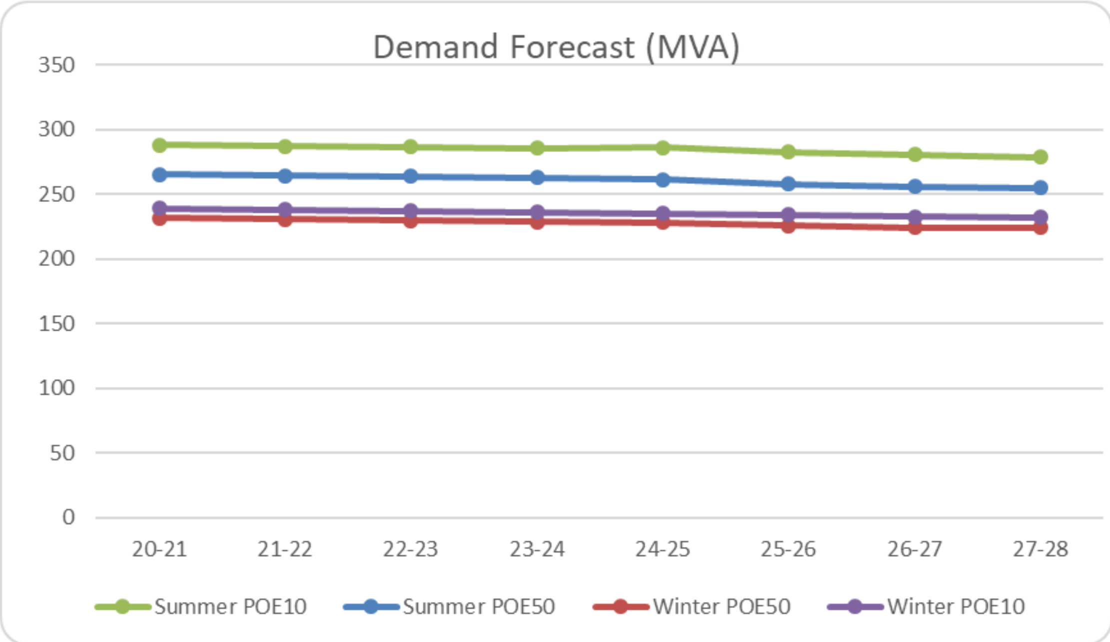

Figure 2 - Demand forecasts for BLTS 66 kV network

AEMO and the relevant Distribution Network Service Providers (DNSPs) recognize there is an ongoing need for electricity supply services to communities in the Brooklyn area as reflected in the official demand forecasts for BLTS 66 kV.

Embedded generation

There are no embedded generators connected to BLTS at 66 kV.

Electricity network

Brooklyn Terminal Station sources its electricity supply from the Keilor Terminal Station (KTS) and is connected in the western metropolitan 220 kV ring as shown in Figure 1.

The 66 kV switchyard supplies eleven 66 kV feeders (owned by Powercor and Jemena) and a dedicated

[8] Australian Energy Market Operator (AEMO), *"2019 Transmission Connection Point Forecast for Victoria,"* available at https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting/Victoria, viewed on 17 November 2020.

[9] A POE10 forecast indicates a level where there is 10 % likelihood that actual peak demand will be greater.

[10] A POE50 forecast indicates a level where there is 50 % likelihood that actual peak demand will be greater.

[11] Victorian electricity demand is sensitive to ambient temperature. Peak demand forecasts are therefore based on expected demand during extreme temperature that could occur once every ten years (POE10) and during average summer condition that could occur every second year (POE50).

feeder for a steel mill induction furnace at Laverton as shown in Figure 3. The zone substations supplied from Brooklyn Terminal Station include Altona (AL), Air Trunk (ATD), Bacchus Marsh (BMH), Smorgans Consolidated Ind (SCI), Toyota (TYA), Laverton North (LVN), Footscray West (FW), Tottenham (TH), Newport (NT) and Yarraville (YVE).

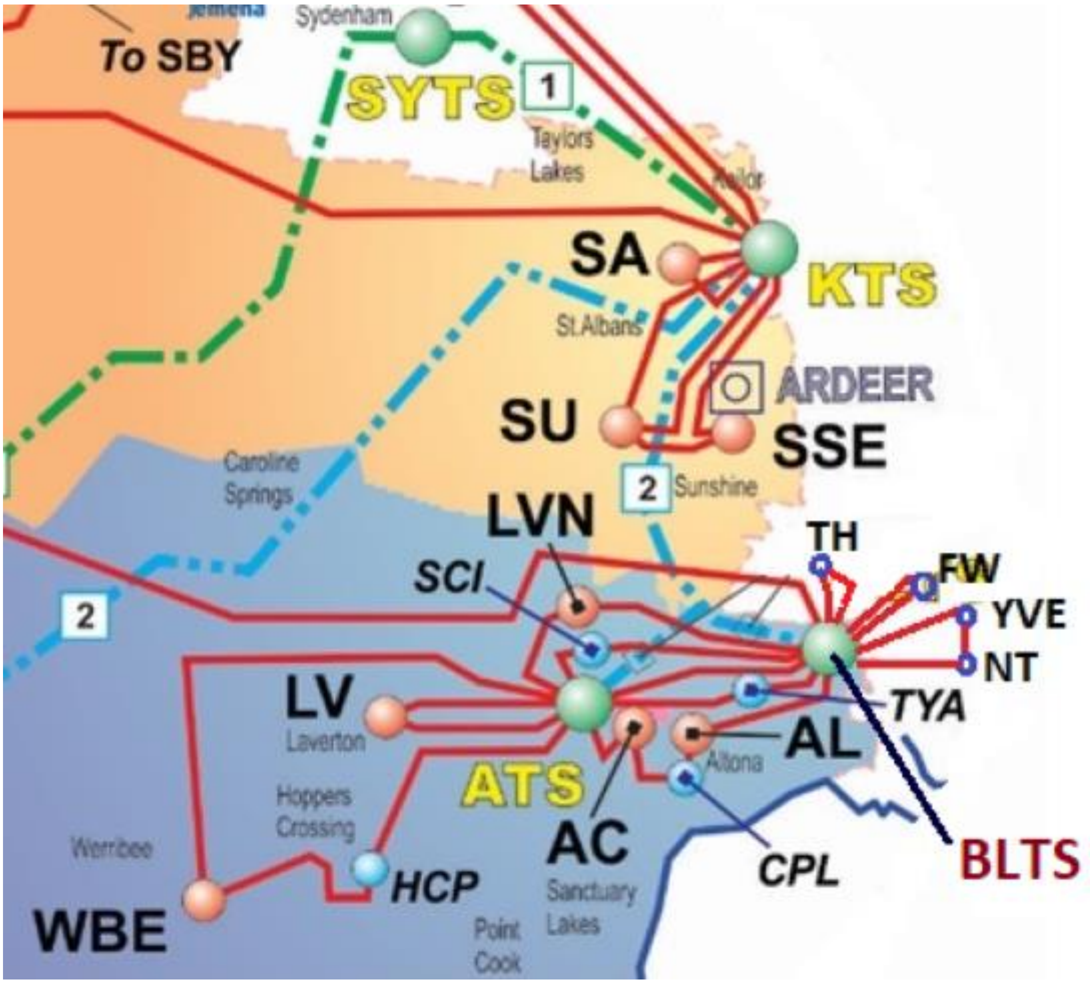

Figure 3 - Distribution network supplied from BLTS

2.2. Asset condition

Several primary (circuit breakers and associated switchgear) and secondary (protection and control) assets at BLTS are in poor condition as expected of assets that have been in service for a long time.

AusNet Services classifies asset conditions using scores that range from C1 (initial service condition) to C5 (very poor condition) – as set out in Appendix C. The latest asset condition assessment for BLTS was conducted in 2019 and reveals some assets at the terminal station are in poor condition (C4) or very poor condition (C5). For the affected assets, the probability of failure is high, and is likely to increase further if no remedial action is taken. Table 2 provides a summary of the condition of relevant major equipment.

Table 2 - Summary of 66 kV major equipment condition scores

Asset class	Condition scores				
	C1	C2	C3	C4	C5
66 kV circuit breakers	1	2		3	13

Asset class	Condition scores				
	C1	C2	C3	C4	C5
66 kV current transformers					12
66 kV voltage transformers			9	7	2

66 kV circuit breakers

Sixteen of the nineteen 66 kV circuit breakers, including all four bus tie circuit breakers, are in poor condition or have suffered extreme deterioration and are approaching their end of economic and technical life[12]. This is expected of assets that have been in service for a long time. One of the 66 kV feeder circuit breakers will be replaced by another committed project therefore this RIT-T proposes to address the remaining fifteen 66 kV circuit breakers.

With condition scores of C4 and C5, these circuit breakers present challenges due to duty-related deterioration including erosion of arc control devices, bushing oil leakages, and wear of operating mechanisms and drive systems; intensive maintenance; lack of spares and manufacturer support; and lack of oil containment bunding.

66 kV instrument transformers

Several instrument transformers at BLTS are assessed to be in poor condition and in an advanced deterioration phase (C4 and C5). Management of safety risks from potential explosive failures of instrument transformers is costly due to the need for regular oil sampling and partial discharge condition monitoring.

2.3. Description of the identified need

Brooklyn Terminal Station provides electricity supply to the inner western residential area of Melbourne, commercial areas on the Western side of the Yarra River, a steel mill induction furnace at Laverton and sewerage pumping stations. AusNet Services expects that the services that BLTS provide will continue to be required as the demand for electricity is forecast to remain approximately at present levels over the next ten-year period. However, the poor and deteriorating condition of some of the components at the terminal station has increased the likelihood of asset failures. Such failures would result in prolonged terminal station 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 failure, resulting in a higher likelihood of electricity supply interruptions, heightened safety risks due to potential explosive failure of the assets, environmental risks from possible oil spillage, collateral damage risks to adjacent plant, and the risk of increased costs resulting from the need for emergency asset replacements and reactive repairs.

Therefore, the 'identified need' this RIT-T intends to address is to maintain supply reliability in the Brooklyn area and to mitigate risks from relevant asset failures.

AusNet Services calculated the present value of the baseline risk costs to be around $20 million over the forty-five-year period from 2020/2021. The key elements of these risk costs are shown in Figure 4. The largest component of the baseline risk costs comes from the supply interruption risk, borne by electricity consumers, from the potential failure of assets.

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[12] Australian Energy Regulator, *"Industry practice application note for asset replacement planning,"* available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning, viewed on 17 November 2020.

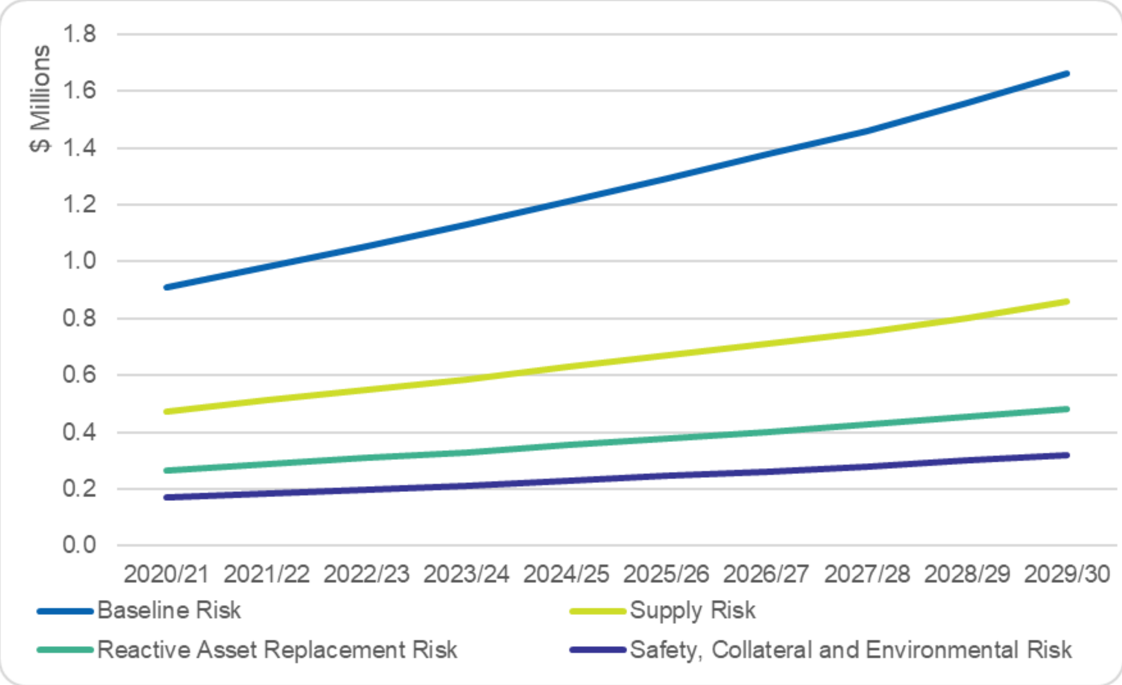

Figure 4 - Baseline risk costs

By undertaking the options identified in this RIT-T, AusNet Services will be able to maintain supply reliability in the Brooklyn area and mitigate safety and environmental risks, as required by the NER and Electricity Safety Act 1998[13].

2.3.1. Assumptions

Aside from the failure rates (determined by the condition of the assets) and the likelihood of relevant consequences, AusNet Services has adopted further assumptions to quantify the risks associated with asset failure. These assumptions are detailed in the following subsections.

Supply risk costs

In calculating the supply risk costs, AusNet Services has estimated the unserved energy based on the most recent AEMO demand forecasts for Brooklyn Terminal Station,[14] and has valued this expected unserved energy at an appropriate Value of Customer Reliability (VCR)[15]. The choice of VCR value is based on those published by the AER and the composition of customers supplied by the terminal station. The resulting estimate of the weighted VCR applicable for affected customers at Brooklyn Terminal Station is $43,549/MWh.

The total supply risk cost is calculated by estimating the impacts of different combinations of relevant forced outages to reliability of supply and weighting them by their probabilities of occurrence.

[13] Victorian State Government, Victorian Legislation and Parliamentary Documents, *"Electricity Safety Act 1998,"* available at https://www.legislation.vic.gov.au/in-force/acts/electricity-safety-act-1998/079, viewed on 17 November 2020.

[14] Australian Energy Market Operator (AEMO), *"2019 Transmission Connection Point Forecast for Victoria,"* available at https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Transmission-Connection-Point-Forecasting/Victoria, viewed on 17 November 2020.

[15] In dollar terms, the Value of Customer Reliability (VCR) represents a customer's willingness to pay for the reliable supply of electricity. The values produced are used as a proxy, and can be applied for use in revenue regulation, planning, and operational purposes in the National Electricity Market (NEM).

Safety risk costs

The Electricity Safety Act 1998[16] requires AusNet Services to design, construct, operate, maintain, and decommission its network to minimize 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 asset failures, AusNet Services uses:

- a value of statistical life[17] to estimate the benefits of reducing the risk of death;
- a value of lost time injury[18]; and
- a disproportionality factor[19].

AusNet Services notes this approach, including the use of a disproportionality factor, is consistent with the practice notes[20] provided by the AER.

Financial risk costs

As there is a lasting need for the services that Brooklyn Terminal Station provides, the failure rate-weighted cost of replacing failed assets (or undertaking reactive maintenance) is included in the assessment.[21]

Environmental risk costs

Environmental risks from plant that contains large volumes of oil, such as Bulk oil circuit breakers, which may be released in an event of asset failure, is valued at $30,000 per event.

[16] Victorian State Government, Victorian Legislation and Parliamentary Documents, *"Electricity Safety Act 1998,"* available at https://www.legislation.vic.gov.au/in-force/acts/electricity-safety-act-1998/079, viewed on 17 November 2020.
[17] Department of the Prime Minister and Cabinet, Australian Government, *"Best Practice Regulation Guidance Note: Value of statistical life,"* available at https://www.pmc.gov.au/resource-centre/regulation/best-practice-regulation-guidance-note-value-statistical-life, viewed on 17 November 2020.
[18] Safe Work Australia, "The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community: 2012-13," available at https://www.safeworkaustralia.gov.au/system/files/documents/1702/cost-of-work-related-injury-and-disease-2012-13.docx.pdf, viewed on 17 November 2020.
[19] 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 public inquiry conducted between January 1983 and March 1985 into a proposal to construct a nuclear power station in the UK.
[20] Australian Energy Regulator, *"Industry practice application note for asset replacement planning,"* available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning, viewed on 17 November 2020.
[21] The assets are assumed to have survived and their condition-based age increases throughout the analysis period.

3. Credible network options

AusNet Services will consider both network and non-network options to address the identified need at BLTS. All options considered will be assessed against a business-as-usual option where no proactive capital investment to reduce the increasing baseline risks is made.

The network options AusNet Services has identified are presented below and the technical requirements that a non-network option would have to provide are detailed in the next chapter.

3.1. Option 1 – Replace selected 66 kV switchgear in an integrated project

Option 1 involves replacement of selected 66 kV circuit breakers and associated switchgear that are in poor condition, and secondary assets in a single integrated project. It includes replacement of fifteen 66 kV circuit breakers and associated primary and secondary equipment.

The estimated capital cost of this option is $15.5 million.

AusNet Services' preliminary analysis shows that the optimal timing is to deliver a solution as soon as possible based on the estimated project cost of $15.5 million as well as for the sensitivity study where it is assumed that the project cost could be 15% higher than the base case assumption. Allowing for construction and equipment lead time, the earliest commissioning date is in 2023/24.

3.2. Option 2 –Integrated replacement deferred by five years

Option 2 defers the replacement of selected 66 kV circuit breakers and associated primary switchgear and secondary equipment by 5 years. During this time poor condition assets would be maintained in a similar manner as the "Business as Usual" option.

The estimated capital cost of this option is $15.5 million and the investment year is deferred to 2028/29.

There is no significant change in operation and maintenance cost for both network options considered.

3.3. Options considered and not progressed

Retirement of aging plant: Though it may avoid emergency reactive replacement, environment, and safety risk costs; retiring selected assets will reduce the terminal station's capacity to supply and will increase supply risk costs. Therefore, any option that reduces the terminal stations' capability is not progressed further.

Refurbishment options do not significantly reduce the failure rates and the risks from asset failure and are therefore not progressed further for this RIT-T.

3.4. Material inter-regional network impact

As the 66 kV supply from BLTS is electrically radial, and the network impact is confined to the Brooklyn area, none of the network options being 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."*

4. Non-network options

AusNet Services welcomes proposals from proponents of non-network options that could be implemented on a stand-alone basis or in conjunction with a network option to meet or contribute to meeting the identified need for this RIT-T. AusNet Services will evaluate non-network options based on their economic and technical feasibility.

Table 3 lists some of the potential non-network services that AusNet Services considers may assist in meeting the identified need:

Table 3 - Potential services that could be provided by non-network options

Non-network option	High-level requirements	Supplementary network requirements
Supply to Brooklyn area	Permanent supply that meets a peak demand of about 360 MVA and total annual energy of more than 1,000 GW. This service must also be expandable to meet forecast growth in the service area.	As this service would avoid the need for the 220/66 kV and 220/22 kV connection station, transmission lines could bypass BLTS and the terminal station could be retired.
Supply to at least one 66 kV feeder that is connected to BLTS	Supply for the entire service requirement of any of the 66 kV feeders to allow the supply area to become self-sufficient.	This service allows selective-replacement of assets, disconnection of the relevant 66 kV feeder, and retirement of relevant feeder circuit breakers but will require reconfiguration of the distribution network. Depending on the size and which feeder the non-network option is offered at, this service could reduce the scope of the replacement project and allow deferral of investment while mitigating the failure risks from deteriorating assets.

4.1. Required technical characteristics of a non-network option

A suitable non-network solution should be capable of either removing the need to replace a 66 kV feeder/ bus tie/ transformer circuit breaker/s or postpone the replacement of circuit breaker/s. This could be achieved by providing the non-network support to supply the full load of the feeder/s or part of the load.

Figure 5 demonstrates the BLTS 66 kV feeder arrangement. There are three 66 kV feeder loops as shown and the circuit breakers that are in poor condition needing replacement are marked with yellow boxes.

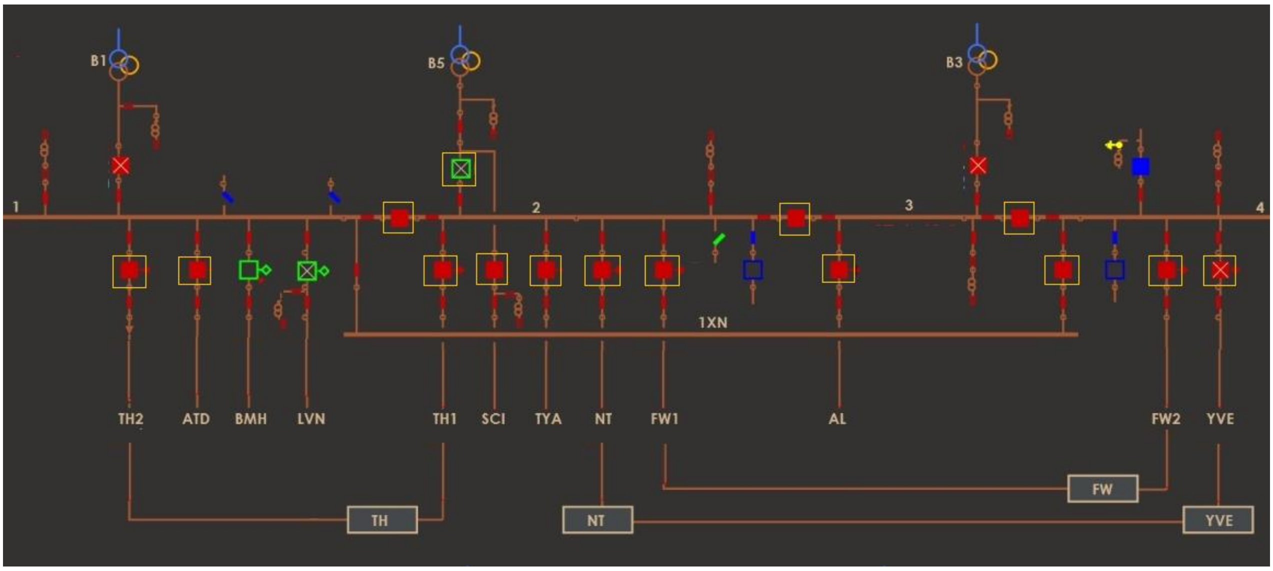

Figure 5 - BLTS 66 kV feeder arrangement and circuit breakers that need to be replaced

The Table 4 below shows 66 kV feeder demand information for 2019.

Table 4 - BLTS 66 kV feeder demand information - 2019

66 kV Feeder Name	Average Demand (MW)	Maximum Demand (MW)
TH2	7.2	25.9
ATD (ATS)	2.8	14.2
TH1	4.1	23.7
SCI	37.9	96.5
TYA	6.2	30.5
NT	20.6	62.2
FW1	9.2	34.7
AL	3.3	13.0
FW2	9.8	26.1
YVE	16.8	42.4

Figure 6, Figure 7 and Figure 8 show the 2019 annual demand profile, summer and winter demand duration curves and typical summer weekly demand profiles respectively, for the BLTS 66 kV network. Using this information, any non-network option would need to be able to reliably defer or avoid the need for one or more 66 kV circuit breaker replacements at BLTS.

Whilst this section provides basic information that proponents of non-network solutions could use to evaluate their proposals, AusNet Services invites a collaborative approach to explore how the potential benefits of non-network options could be maximized.

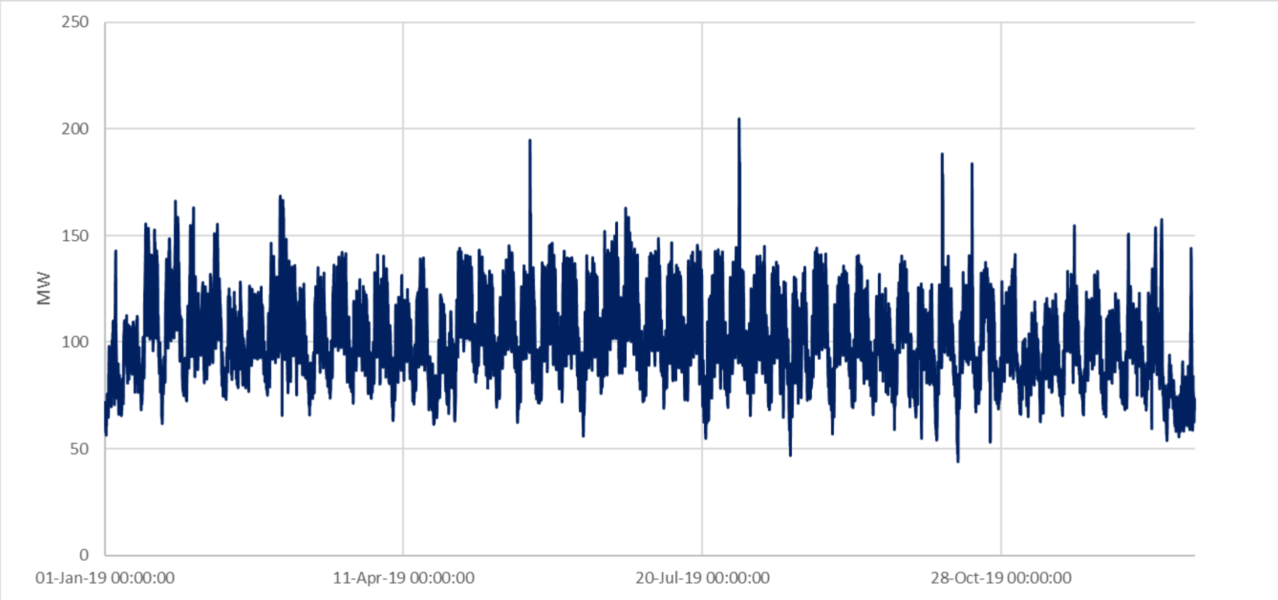

Figure 6 - BLTS demand profile (MW) - 2019

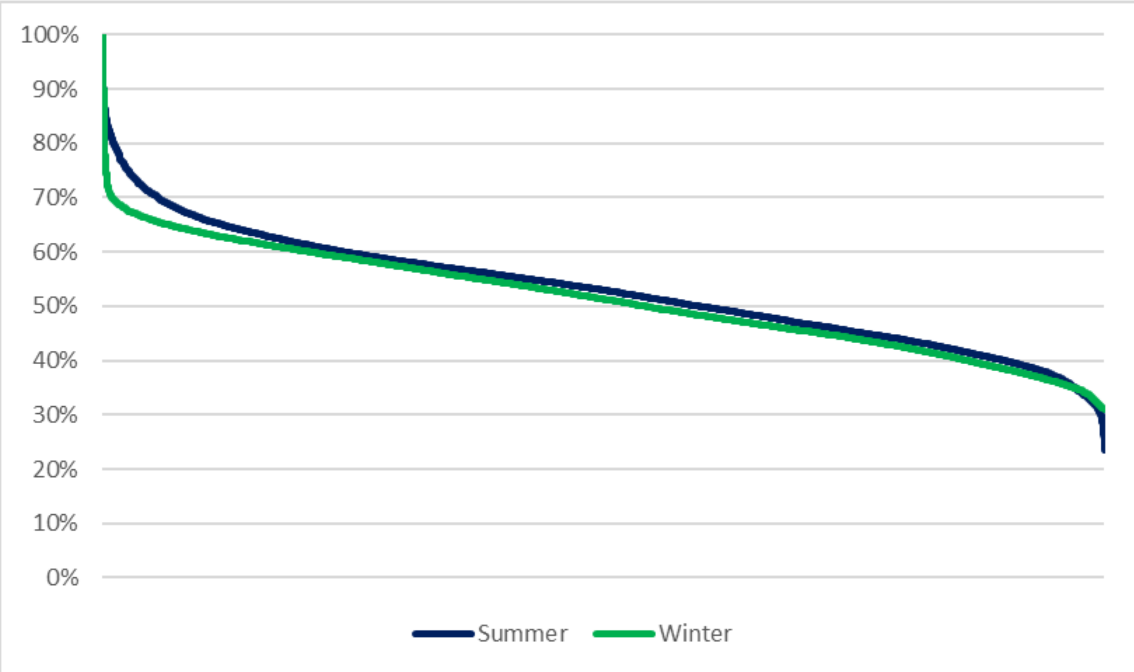

Figure 7 - BLTS summer and winter annual load duration curves

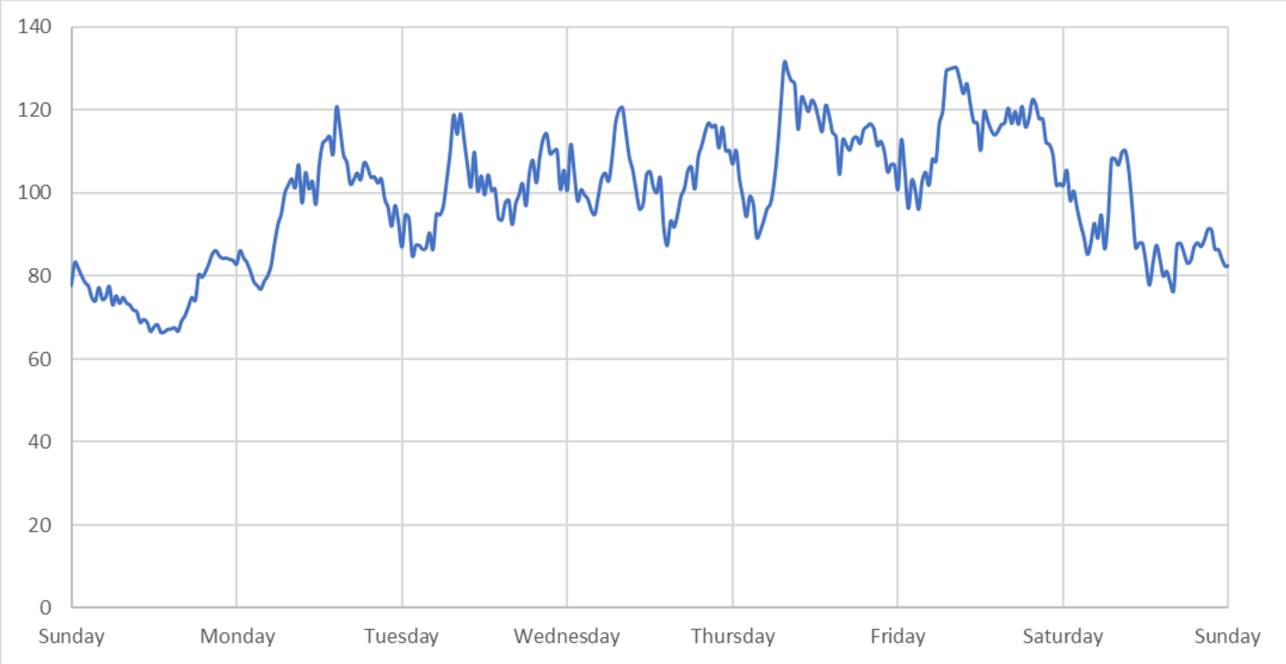

Figure 8 - BLTS typical summer weekly demand profile (MW)

More information on the BLTS 66 kV distribution network is available from Powercor and Jemena's Distribution Annual Planning Reports (DAPR)[22].

4.2. Location of non-network option

Non-network options connected to any of the 66 kV feeders supplied from BLTS could be effective in addressing the supply shortfall risk.

4.3. Information to be included in non-network solution proposals

To manage a complex portfolio of demand management of sufficient scale, proposals for non-network solutions would be preferably at least 3 MW in size and of proven technology which may include embedded generation, energy storage (including battery system) that injects power into the 66 kV network down stream of feeder circuit breakers as required, voluntary curtailment of customer demand, and permanent reduction of customer demand (including energy efficiency).

Table 5 shows the relevant parameters that must be included in any proposal for non-network solution.

Table 5 - Required information that a proponent of non-network option must submit

Parameter	Description
Block ID	Block Identifier (e.g. Block 1) of non-network solution
Block capacity	Discrete amount of the non-network option (reduced demand or additional supply) capacity in MW. Sum of block capacities must meet a minimum requirement of 3 MW. AusNet Services may choose

[22] Powercor DAPR report - https://media.powercor.com.au/wp-content/uploads/2020/01/22153352/Final-Powercor-Distribution-Annual-Planning-Report-2019.pdf
Jemena DAPR report - https://jemena.com.au/documents/electricity/jen-2019-dapr-v1-0.aspx

Parameter	Description
	to select a subset of blocks it determines that is most economical and reliable to dispatch.
Location	For new generation solutions, details of the proposed sites for the new generators
Availability period	Time periods the blocks are available (months/days/hours)
Call notice period	Minimum period of time before the block can be dispatched
Establishment fee	Setup payment that applies to a block
Availability fee	A fee per month for a block to be made available to be dispatched
Indicative dispatch fee	Fee for a block to be dispatched per MWh
Dispatch lead time	Time required (in hours) to activate the non-network service
Timeframe for project delivery	When the block of DR will be available for dispatch
Communications	Proposed dispatch communications protocol with AusNet Services' control room
Metering	Metering equipment installed or to be installed to measure and record the data to be verified
Any other special technical requirements	e.g. terms of commitment and length of service.

Proposals for non-network solutions should be emailed to rittconsultations@ausnetservices.com.au by 15 February 2021.

5. Assessment approach

Consistent with the RIT-T requirements and practice notes on risk-cost assessment methodology[23], AusNet Services will undertake a cost-benefit analysis to evaluate and rank the net economic benefits from various credible options. AusNet Services proposes to undertake this assessment over a 45-year period.

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

Optimal timing of an investment option will be the year when the annual benefits from implementing the option exceeds the annualised investment costs.

5.1. Proposed sensitivity analysis and input assumptions

The robustness of the investment decision and the optimal timing of the preferred option will be tested by a sensitivity analysis. This analysis involves variation of assumptions from those employed under the base case.

Table 6 - Input assumptions used for the sensitivity studies

Parameter	Lower Bound	Base Case	Higher Bound
Asset failure rate	AusNet Services assessment – 25%	AusNet Services assessment	AusNet Services assessment + 25%
Demand forecast	AEMO 2019 Transmission Connection Point Forecasts - 15%	AEMO 2019 Transmission Connection Point Forecasts	AEMO 2019 Transmission Connection Point Forecasts + 15%
Value of customer reliability	Latest AER VCR figures - 25%	Latest AER VCR figures	Latest AER VCR figures + 25%
Discount rate	2.58% - a symmetrical adjustment downwards	4.68% - the latest commercial discount rate	6.78% - a symmetrical adjustment upwards

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 a change in involuntary load shedding. AusNet Services' proposed approach to calculate the benefits of reducing the risk of load shedding is set out in section 2.3.

5.3. Other classes of benefits

Although not formally classified as classes of market benefits under the NER, AusNet Services expects material reduction in: safety risks from potential explosive failure of deteriorated assets, environment risks from possible oil spillage, collateral damage risks to adjacent plant, and the risk of increased costs resulting from the need for emergency asset replacements and reactive repairs by implementing

[23] Australian Energy Regulator, *"Industry practice application note for asset replacement planning,"* available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning, viewed on 17 November 2020.

any of the options considered in this RIT-T.

5.4. Classes of market benefits that are not material

AusNet Services estimates that the following classes of market benefits are unlikely to be material for any of the options considered in this RIT-T:

- Changes in fuel consumption arising through different patterns of generation dispatch - as the network is sufficiently radial to the extent that asset failures cannot be remediated by re-dispatch of generation and the wholesale market impact is expected to be the same for all options.
- 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 on the demand for and supply of ancillary services.
- Change in network losses –while changes in network losses are considered in the assessment, they are estimated to be small and unlikely to be a material class of market benefits for any of the credible options.
- Competition benefits – there is no competing generation affected by the limitations and risks being 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.

AusNet Services notes that non-network options of significant size and duration may impact the wholesale electricity market and the materiality of several of the classes of market benefits mentioned above. Where appropriate, AusNet Services will assess the materiality of these market benefits as part of the next step in the evaluation process.

6. Options assessment

This section details the analysis of the costs and benefits from the network options considered in this RIT-T. Any credible option that may arise from submissions in response to this PSCR will be assessed and presented as part of the next step of this RIT-T. If there are no new credible options to assess, AusNet Services intends to progress to the final stage (PACR) of the RIT-T.

All the options considered in this RIT-T will deliver a reduction in supply risk, safety risk, environmental risk, collateral risk and emergency asset replacement risk cost.

6.1. Sensitivity analysis

This section describes the sensitivity of the net economic benefits, ranking of options, and optimal timing of the preferred option for different assumptions of key variables.

Sensitivity of net economic benefits

Using the Central scenario as the reference, the net economic benefits from implementing an option changes for different assumptions of key variables. While the benefits are sensitive, the net economic benefits are positive for all sensitivities studied and the ranking of options remains the same. The sensitivity analysis confirms that Option 1 presents the most robust investment decision and is also the most economical investment option for all sensitivities tested, as shown in Figure 9.

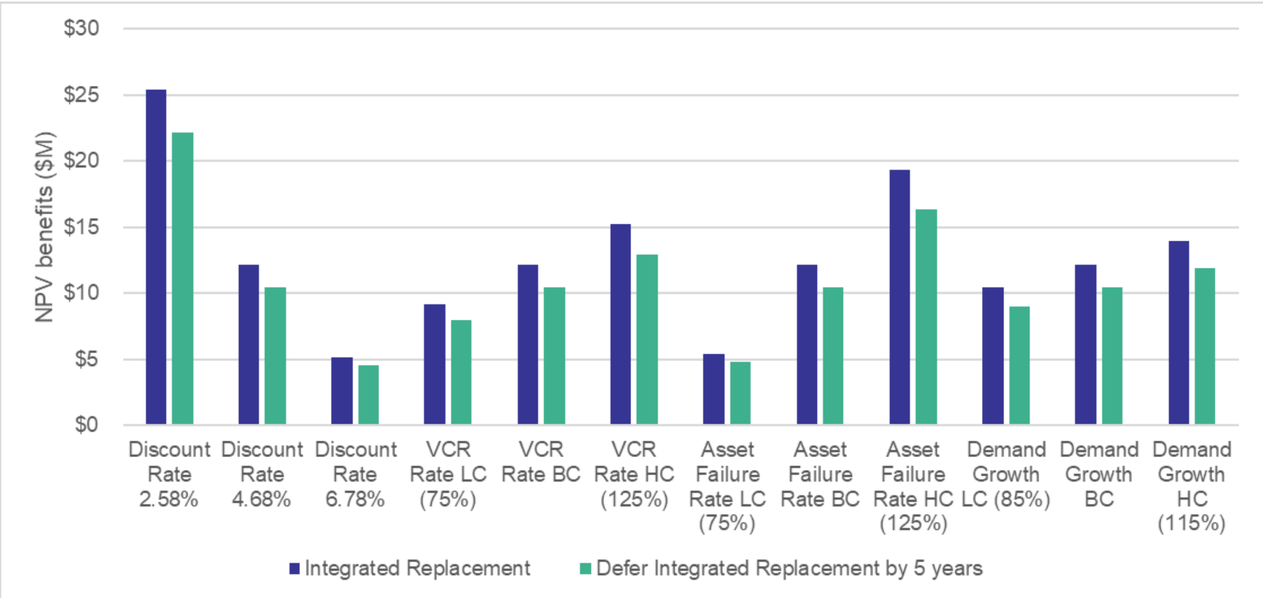

Figure 9 - Sensitivity of net economic benefits with respect to variation of key parameters

Sensitivity of optimal timing

Figure 10 shows that for most of the sensitivities investigated, the optimal timing of the preferred option is as soon as possible. However, to allow for construction and equipment lead time, the earliest this option is expected to be commissioned is 2023/24.

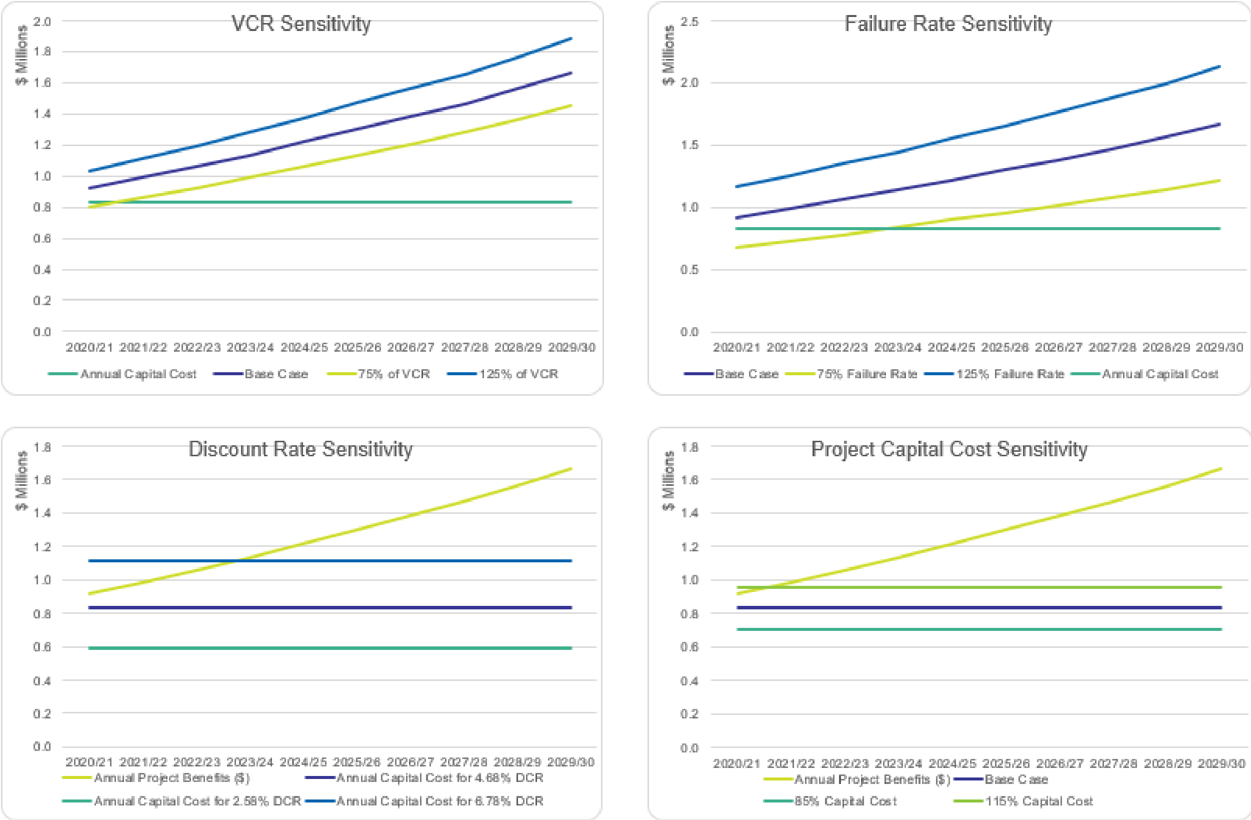

Figure 10 - Sensitivity of the optimal timing with respect to variation of key parameters

7. Draft conclusion and next steps

Amongst the options considered in this RIT-T, Option 1 is the most economical option to maintain supply reliability in the Brooklyn supply area and to manage safety, environmental and emergency replacement risks at BLTS.

This preferred option involves replacement of fifteen 66 kV circuit breakers and associated primary and secondary equipment in a single integrated project.

The estimated capital cost of this option is $15.5 million.

Based on AusNet Services' preliminary analysis, this option is economical to proceed as soon as possible, even should the cost be 15% higher than the base case assumption. However, to allow for construction and equipment lead time, this option is expected to be commissioned in 2023/24.

Submissions

AusNet Services welcomes written submissions on the topics and the credible options presented in this PSCR and invites proposals from proponents of potential non-network options.

Submissions should be emailed to rittconsultations@ausnetservices.com.au on or before 15 February 2021. In the subject field, please reference 'RIT-T PSCR Brooklyn Terminal Station.'

Exemption from preparing a PADR

Subject to receipt of technically and economically-feasible network or non-network options, publication of a Project Assessment Draft Report (PADR) may not be required for this RIT-T as:

- the preferred option (Option 1) has a capital cost of less than $43 million and addresses the identified need and is also the most economically option;
- all credible options will not have a material class of market benefits except for those specified in NER clause 5.16.1(c)(4)(ii), and 5.16.1(c)(4)(iii); and
- this project has the benefit of NER clause 5.16.4(z1);

Should AusNet Services consider that no additional credible options were identified during the 12-week consultation period, AusNet Services intends to produce a Project Assessment Conclusions Report (PACR) before 31 March 2021.

In accordance with NER clause 5.16.4(z1)(4), the exemption from producing a PADR will no longer apply if AusNet Services considers that an additional credible option that could deliver a material market benefit has been identified during the consultation period. Accordingly, AusNet Services will aim to produce a PADR which will include assessment of the net economic benefits from each additional credible option before 31 March 2021.

Appendix A - RIT-T assessment and consultation process

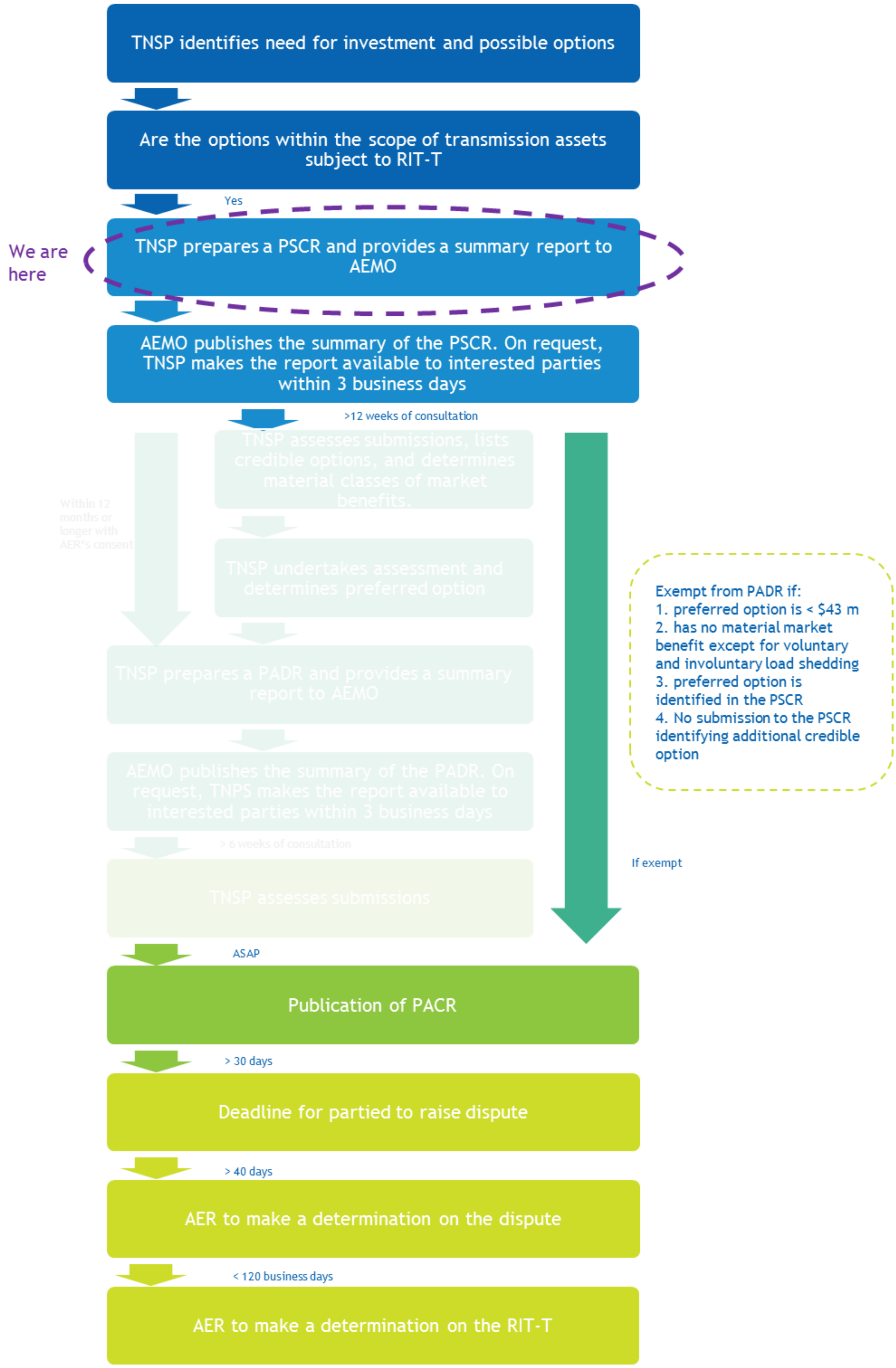

Figure 11 - RIT-T Process

Appendix B - Asset condition framework

AusNet Services uses an asset health index, on a scale of C1 to C5, to describe asset condition. The condition range is consistent across asset types and relates to the remaining service potential. The table below provides an explanation of the asset condition scores used.

Table 7 - Condition scores framework

Condition score	Likert scale	Condition description	Recommended action	Remaining service potential (%)
C1	Very Good	Initial service condition	No additional specific actions required, continue routine maintenance and condition monitoring	95
C2	Good	Better than normal for age		70
C3	Average	Normal condition for age		45
C4	Poor	Advanced deterioration	Remedial action or replacement within 2-10 years	25
C5	Very Poor	Extreme deterioration and approaching end of life	Remedial action or replacement within 1-5 years	15

Asset failure rates

AusNet Services uses the hazard function of a Weibull two-parameter distribution to estimate the probability of failure of an asset in a given year. The asset condition scores are used to establish a condition-based age which is used to calculate the asset failure rates using a two-parameter Weibull Hazard function (h(t)), as presented below.

$$h(t) = \beta.\frac{t^{\beta-1}}{\eta^{\beta}}$$

Equation 1: Weibull Hazard Function

where:

t = Condition-based age (in years)

η = Characteristic life (Eta)

β = Shape Parameter (Beta)

Hazard functions are defined for the major asset classes including power transformers, circuit breakers, and instrument transformers. All assets in the substation risk-cost model use a Beta (β) value of 3.5 to calculate the failure rates. The characteristic life represents that average asset age at which 63% of the asset class population is expected to have failed.

The condition-based age (t) depends on the specific asset's condition and characteristic life (η).