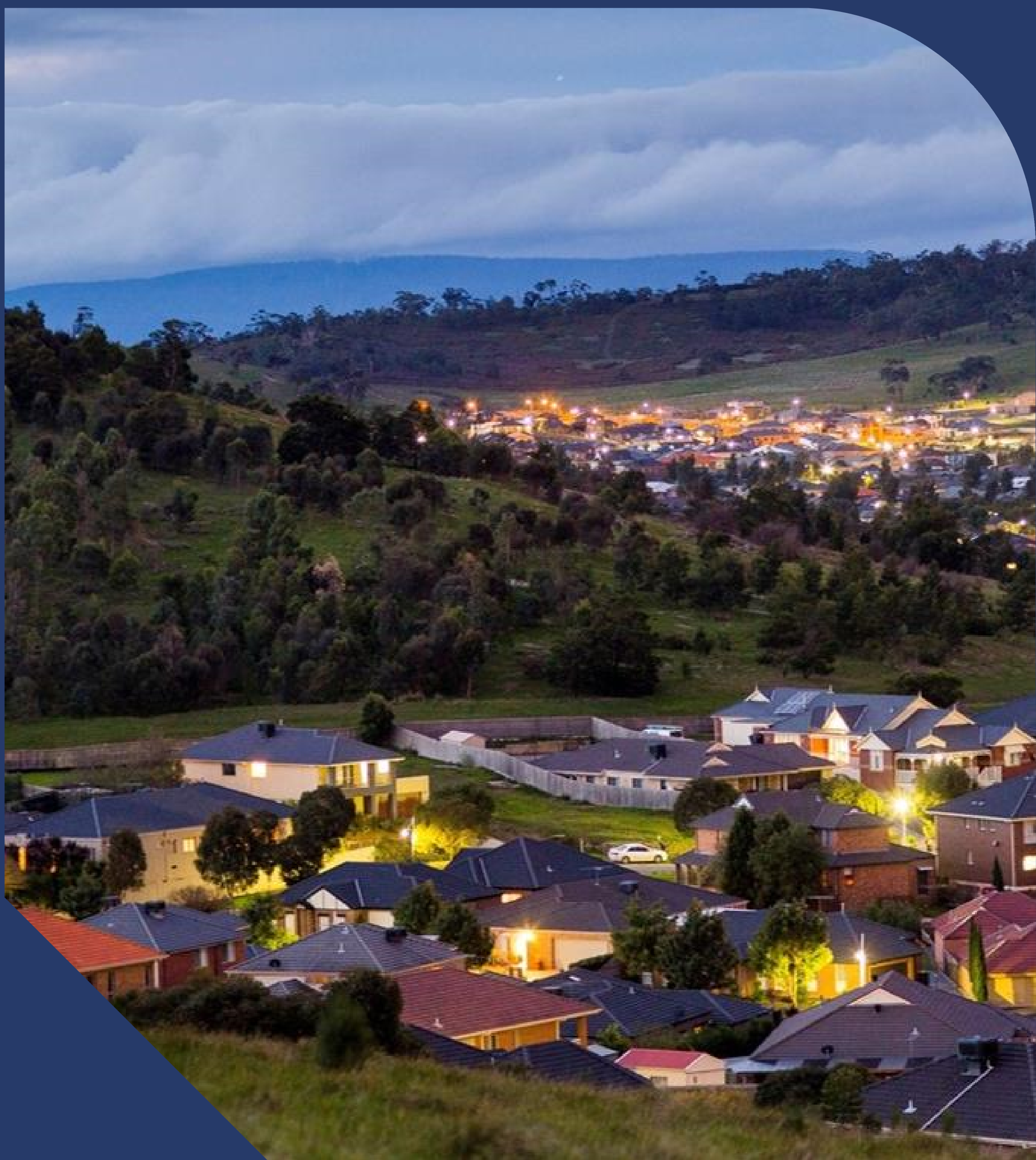
AusNet

Secure supply and enable connections: East Cranbourne

Regulatory Investment Test for Distribution (RIT-D)

Draft Project Assessment Report

Friday, 25 July 2025



AusNet

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1. Executive summary

AusNet Electricity Services Pty Ltd (AusNet) is a regulated Victorian Distribution Network Service Provider (DNSP) that supplies electrical distribution services to more than 809,000 customers. Our electricity distribution network covers eastern rural Victoria and the fringe of the northern and eastern Melbourne metropolitan area.

As expected by our customers and required by the various regulatory instruments under which we operate, AusNet aims to maintain service levels at the lowest possible cost to our customers. To achieve this, we develop plans that aim to maximise the present value of economic benefit to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

1.1. Overview of the identified need

The Eastern Cranbourne 66kV sub-transmission loop, supplying over 114,000 customers, is supplied by the Cranbourne Terminal Station (CBTS) and consists of seven zone substations—Lysterfield (LYD), Narre Warren (NRN), Pakenham (PHM), Officer (OFR), Berwick North (BWN), Lang Lang (LLG) and Clyde North (CLN). A new Pakenham South ZSS is expected to be commissioned by 2029. AusNet has identified increasing energy at risk in this network due to rapid demand growth in the South-East Growth Corridor. Forecasts indicate that maximum demand will exceed loop capacity by 2026 under summer 10% Probability of Exceedance (PoE) conditions and by 2028 under summer 50% PoE. The network's thermal constraints are expected to escalate, with demand reaching 332 MVA in 2026 and 390 MVA in 2027 under PoE10 conditions, exceeding the loop's firm capacity (N-1) of 255 MVA, which was exceeded in 2023.

The most critical constraint is associated with the CBTS-BWN and CBTS-LYD 66kV segments, with the worst-case scenario being the loss of the CBTS-LYD 66kV line, leading to an overload of the CBTS-BWN segment under peak demand conditions. The network's N rating is 322 MVA in summer, after accounting for all possible transfers, but projected demand growth (surpassing the loop's N capacity by 153 MW in 2038) will further exacerbate the situation. The expected unserved energy resulting from these capacity constraints has an estimated present value of $501.14 million over the assessment period, underscoring the urgency of network reinforcements to mitigate supply risks. AusNet initiated this RIT-D to investigate and evaluate options to address the constraints in the Eastern Cranbourne 66kV sub-transmission loop, which are limiting the reliability of supply to existing customers served by the loop and limiting the potential for new connections.

The Regulatory Investment Test for Distribution (RIT-D) is an economic cost-benefit assessment designed to identify the most credible option that addresses an identified need while maximizing net economic benefits for stakeholders in the National Electricity Market (NEM). This involves a probabilistic planning methodology to account for rare but possible scenarios, such as extreme demand or outages, ensuring all credible options are considered.

AusNet initiated this RIT-D by publishing an Options Screening Report (OSR) in February 2025 in accordance with clause 5.17 of the National Electricity Rules (NER) and section 4.2 of the AER's RIT-D Application Guidelines to investigate and evaluate options to cater for the rising demand in the Cranbourne sub-transmission network. Publication of this Draft Project Assessment Report (DPAR) represents the second step in the RIT-D process.

AusNet received one non-network proposal in response to the OSR. The proponent proposed a 10-year battery option at LLG ZSS for the Summer period (1st December – 28th February each year for the period of 2029-2039) to address the identified need, which AusNet evaluated along with the other credible options proposed in the OSR.

AusNet followed the AER's RIT-D application guidelines to analyse and rank the economic cost and benefits of the investment options considered in this RIT-D. The robustness of the ranking was investigated through sensitivity analysis that involve variations in the input assumptions and other parameter values.

1.2. Summary of credible options considered

AusNet evaluated the following network and non-network options to select the option that provides the highest net economic benefits:

1. Network Option 1: Install a new Cranbourne Terminal Station to Officer (CBTS-OFR) 66kV line

2. Network Option 2: Install a new Cranbourne Terminal Station to Pakenham (CBTS-PHM) 66kV line
3. Network Option 3: Install a new Cranbourne Terminal Station to Pakenham South (CBTS-PSH) and new PSH-PHM 66kV lines
4. Network Option 4: Install a new Cranbourne Terminal Station to Lang Lang (CBTS-LLG) 66kV line
5. Non-Network Option 1: Install a new 25MW/100MWh battery at OFR zone substation
6. Non-Network Option 2: Connecting a 50MW / 200MWh utility BESS connected to 66 kV bus at LLG ZSS

The economic analysis demonstrated that Option 1 "Install a new Cranbourne Terminal Station to Officer (CBTS-OFR) 66kV line with 37/3.75 AAC conductor" provides the highest net economic benefits, as shown in the Table 1. Further information on the scenario selection is provided in section 7 of this DPAR.

The following points should be noted in relation to the data provided in the table below:

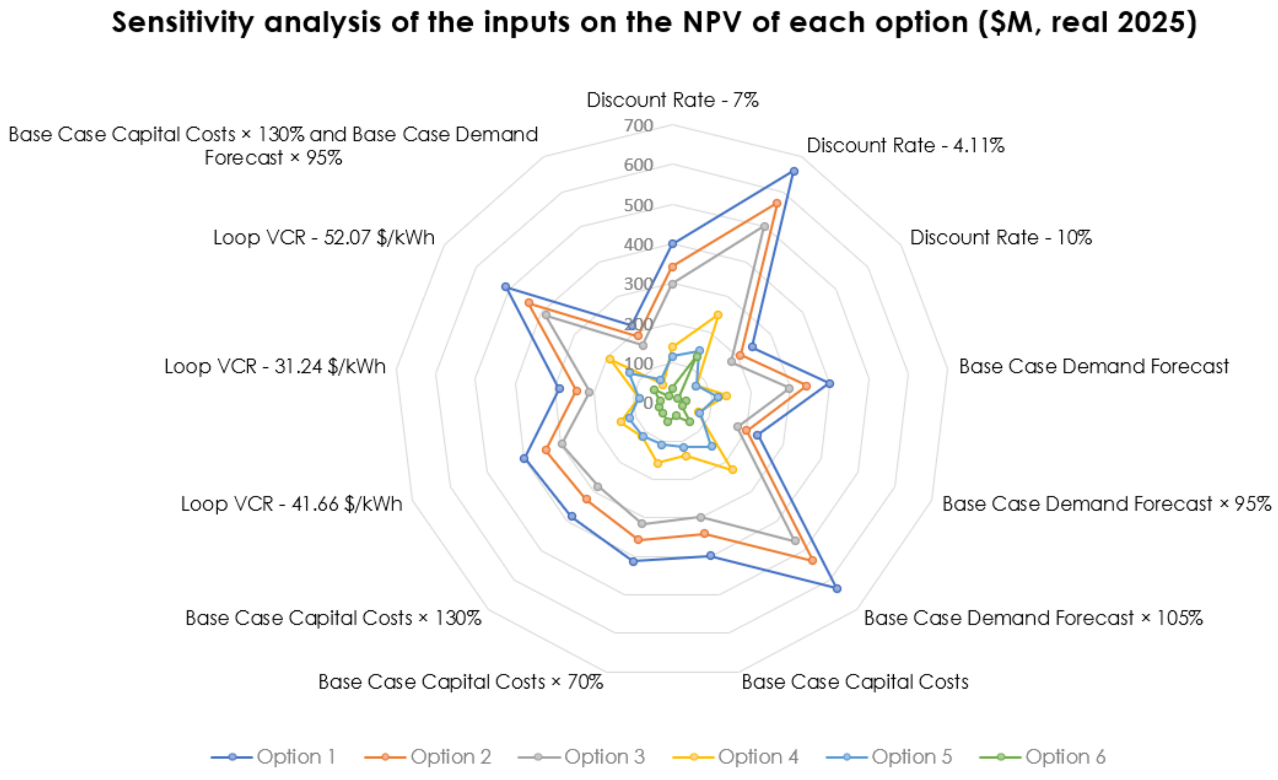
- Financial data are expressed in present value terms and $M, real 2025 prices; and
- The assessment period is over 15 years (2025/26 to 2039/40) with an asset life of 45 years.

Table 1: Net economic benefit of each option in present value terms ($M, real 2025)

Option	Present value ($M, real 2025)
Option 1: Install new 66kV line between CBTS and OFR	398.82
Option 2: Install new 66kV line between CBTS and PHM	341.22
Option 3: Install new 66kV line between CBTS-PSH and PSH-PHM	297.81
Option 4: Install new 66kV line between CBTS-LLG	138.40
Option 5: Construct a 25MW/100MWh Battery Energy Storage System	115.95
Option 6: Connecting a 50MW / 200MWh utility BESS connected to 66 kV bus at LLG ZSS	36.08

AusNet tested the robustness of the investment decision against four inputs in the sensitivity analysis. As shown in the Figure 1, Option 1 provides the highest net economic benefit for almost all the sensitivities considered.

Figure 1 Sensitivity analysis of the inputs on the NPV of each option ($M, real 2025)



1.3. Preferred option and rationale

On the basis of the analysis presented in this DPAR, AusNet concludes that Option 1 "Install a new Cranbourne Terminal Station to Officer (CBTS-OFR) 66kV line with 37/3.75 AAC conductor" is the preferred option to address the identified need described in this RIT-D. The estimated capital cost of this option is $51.7 million (nominal). The construction would commence in December 2026, with project completion expected by December 2029.

1.4. Invitation for stakeholder submissions

AusNet welcomes written submissions on the credible options evaluation and draft conclusion presented in this DPAR.

Submissions should be emailed to ritdconsultations@ausnetservices.com.au on or before 05th September 2025.

In the subject field, please reference 'RIT-D DPAR LD CBTS OFR'. AusNet's preference is that these submissions would be published on its website and AEMO's website. If you do not want your submission to be made public, please clearly stipulate this at the time of lodgement.

AusNet expects to publish the Final Project Assessment Report (FPAR) with the responses to the submissions received, in November 2025.

2. Introduction

2.1. Purpose of the DPAR

The purpose of the Draft Project Assessment Report (DPAR) under the Regulatory Investment Test for Distribution (RIT-D) is to transparently present the detailed economic assessment of all credible options—including network and non-network solutions—investigated to address the identified need. It identifies the preferred option based on the net economic benefit to all those who produce, consume, and transport electricity in the National Electricity Market (NEM), and invites stakeholder submissions to ensure robust consultation. As required by clause 5.17.4(j) of the National Electricity Rules (NER) and outlined in Section 5.3 of the AER RIT-D Application Guidelines (August 2024), the DPAR facilitates stakeholder engagement, supports accountability, and improves decision-making by incorporating feedback prior to finalising the investment decision.

2.2. Background on the RIT-D process.

AusNet published an Options Screening Report (OSR) in February 2025 in relation to the identified need arising from forecast demand growth in the East Cranbourne area, in compliance with clause 5.17 of the National Electricity Rules (NER) and Section 4.2 of the AER's RIT-D Application Guidelines. During the consultation period following the OSR's publication, AusNet received a non-network proposal, which has been considered as part of this assessment.

Publication of this Draft Project Assessment Report (DPAR) represents the second step in the RIT-D process. It outlines:

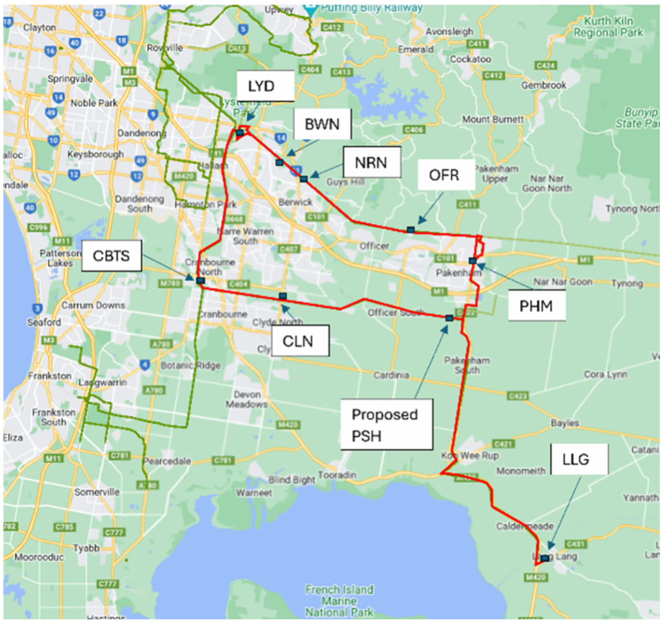
- the identified need that AusNet is seeking to address;
- credible network and non-network options that may address the identified need;
- a summary of submissions received in response to the OSR;
- the assessment approach and assumptions applied in this RIT-D assessment, including categories of market benefits deemed unlikely to be material; and
- the identification of the proposed preferred option.

Appendix A provides an overview of the RIT-D assessment and consultation process.

3. Background

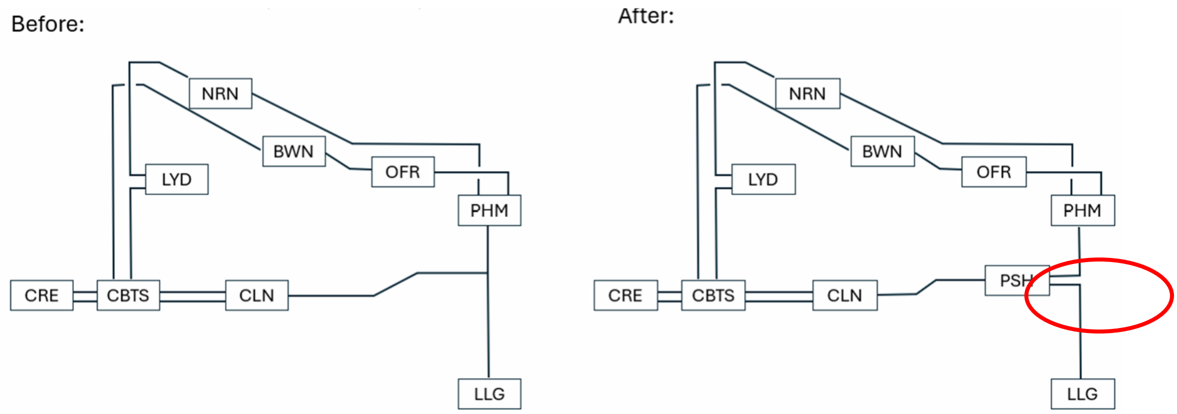
Eastern Cranbourne 66 kV sub-transmission loop is supplied by the Cranbourne terminal station (CBTS) and is comprised of seven zone substations, including, Lysterfield (LYD), Narre Warren (NRN), Pakenham (PHM), Officer (OFR), Berwick North (BWN), Lang Lang (LLG), Clyde North (CLN) and the proposed Pakenham South (PSH), as shown by Figure 2.

Figure 2 - Eastern Cranbourne 66kV network loop



The Eastern Cranbourne 66kV network loop supplies over 114,000 customers, including residential (52.4%), commercial (40%), industrial (3.8%), and agricultural (3.8%) users. Demand growth, driven by residential expansions and commercial/industrial developments, is significant in Clyde North, Officer South, and Pakenham, which also host the region's major shopping centre at Fountain Gate. To address capacity constraints, AusNet has already proposed a new Pakenham South zone substation (PSH), which is expected to be operational by Summer 2028/29.

Figure 3 - Comparison of Eastern Cranbourne 66kV network loop after installation of PSH zone substation



As shown in Figure 3 with current configuration of CBTS loop, Lang Lang (LLG) is a single transformer zone substation connected radially to the main loop and relies heavily on the availability of 22kV load transfers under single contingency conditions. One of the major transfers available to PHM is via the same pole line as the connecting 66kV line. This poses the risk that significant damage to a single 66kV pole along the route will also significantly reduce the availability of transfers back into the loop if the 22kV tie to PHM also failed.

The Eastern Cranbourne 66kV loop has:

- a maximum (N) capacity of 322MVA and firm capacity of 255MVA under (N-1) conditions; and
- transfer capacity and demand management of 63.7 MVA, however most of the transferable load can only be transferred from Clyde North and as a result, the transfer does not provide sufficient benefits to the northern section of the loop (LYD, BWN, NRN or OFR).

A summary of transfer capacity on the Eastern Cranbourne network loop is provided in Table 2.

Table 2 Summary of transfer capacity of zone substations

FROM ZONE SUBSTATION	TO ZONE SUBSTATION	TRANSFER AMOUNT (MW)
Berwick North	Belgrave	3.01
Berwick North	Narre Warren	2.2
Berwick North	Officer	3.5
Clyde North	Cranbourne	16.13
Clyde North	Hampton Park	5.46
Clyde North	Demand Management Reduction	1.65
Clyde North	Officer	2.31
Officer	Belgrave	3.3
Officer	Pakenham	1.7
Lang Lang	Leongatha	1
Lang Lang	Wonthaggi	1.5
Narre Warren	Lysterfield	13
Pakenham	Lang Lang	9

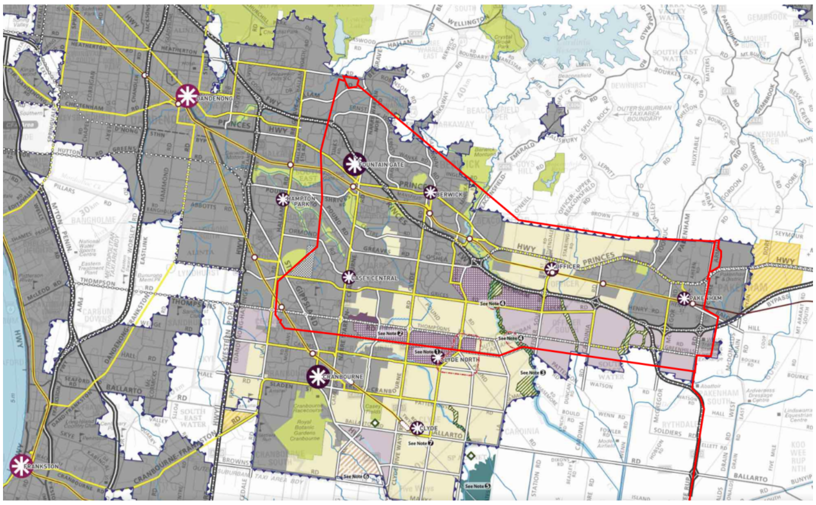
NOTE: Transfer amounts are based on 2025 summer contingency plan

4. Identified need

4.1. Description

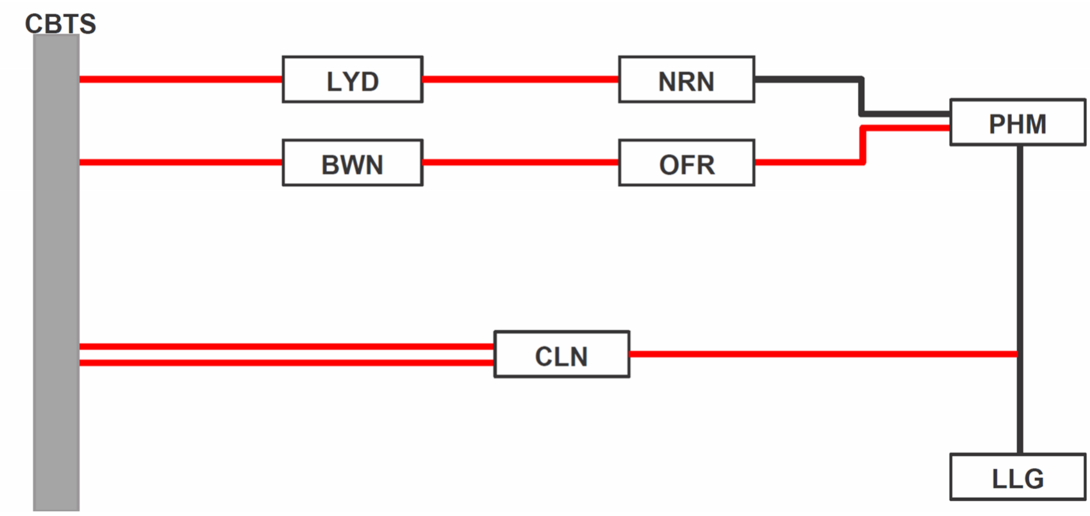
The Eastern Cranbourne 66kV network loop is experiencing significant demand growth driven by the Melbourne South-East Growth Corridor, one of four metropolitan growth corridors defined by the Victoria Planning Authority. This loop, shown in Figure 4 services key growth towns, including Cranbourne, Berwick, Clyde, Clyde North, Pakenham, and Officer. The corridor is expected to generate 86,000–110,000 new jobs across various sectors, with Clyde and Clyde North as major town centres and an industrial business corridor at Officer-Pakenham.[1]

Figure 4 - South-East Growth Corridor[2]



The establishment of the South-East Growth Corridor will create capacity constraints on the Eastern Cranbourne 66kV network loop, with maximum demand exceeding capacity by 2027 under the summer POE50 scenario. Driven by thermal limitations, demand is expected to increase by 153MW by 2038, surpassing the loop's N rating of 322MVA and its firm (N-1) capacity of 255MVA. Demand is projected to reach 333MVA in 2027 and 349MVA in 2028, under POE50 scenario. The worst-case outage is the loss of the CBTS-LYD 66kV line, leading to overloading of the CBTS-BWN segment. These segments as depicted in Figure 5 are the primary capacity risk points, and the projected overloads exceed the transfer capacity to adjacent 66kV loops.

Figure 5 Constrained segments of the Eastern Cranbourne 66kV network loop under single order contingency events



Our Distribution Annual Planning Report (DAPR) 2025-2029, has identified energy at risk on the Eastern Cranbourne 66kV sub-transmission loop over the summer period from December to March. Economic modelling shows these

[1] See, The South East Growth Corridor Plan for more details.
[2] Victoria Planning Authority, The South-East Growth Corridor Plan Map, https://vpa.vic.gov.au/metropolitan/growth-corridor-plans/

conditions result in a material expected cost to customers from energy not supplied and material risk to network reliability risk.

4.2. Thermal Capacity Limitations

The Eastern Cranbourne 66kV network should not exceed its secure summer planning limit of 255MVA, as overloading risks pushing 66kV lines above their normal rating after an outage. Due to conductor thermal inertia, such overloading limits the time available for network controllers to restore safe load levels, potentially causing irreversible conductor damage and cascading failures. Additionally, supply to the region is constrained by the thermal capacity of key 66kV lines under outage condition as highlighted in Table 3.

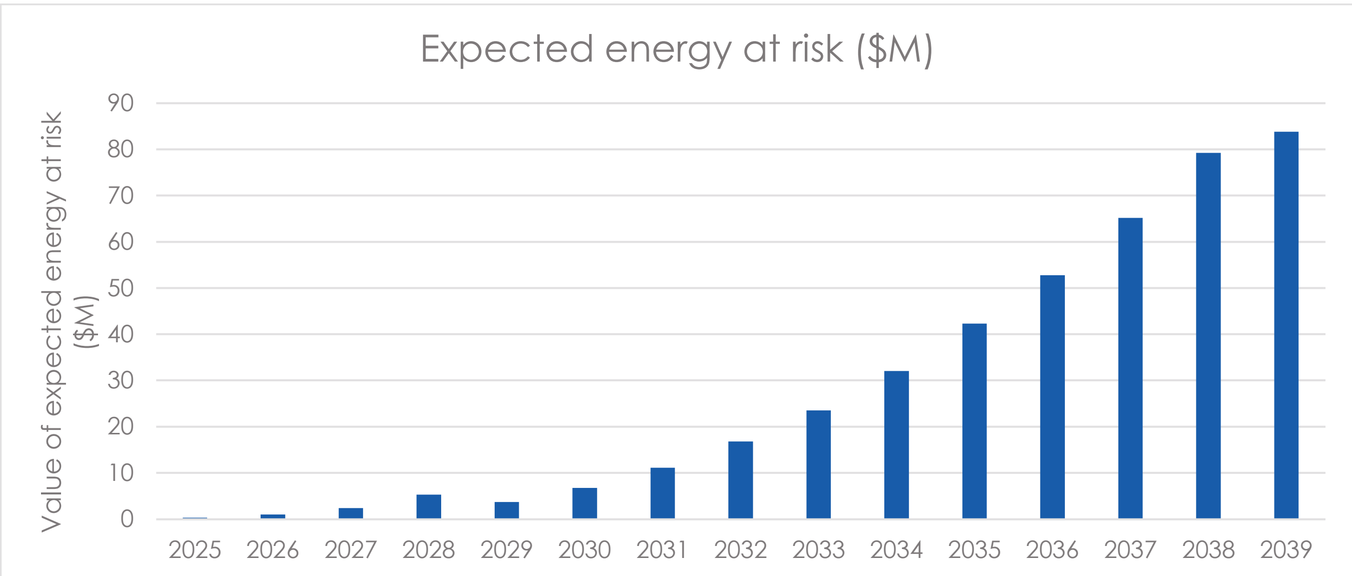
Table 3- Exceedance of thermal ratings on key 66kV lines on the Eastern Cranbourne network loop

Eastern Cranbourne 66kV line	Conditions in which thermal ratings will be exceeded
CBTS-BWN 66kV line	When all lines are in service and net load in the East Cranbourne loop exceeds 322MVA.
CBTS-BWN 66kV line	When the CBTS-LYD 66 kV line is out of service and net load in the East Cranbourne region exceeds 293 MVA.
CBTS-CLN No.2 66 kV line	When the CBTS-CLN No.1 66 kV line is out of service and net load in the East Cranbourne region exceeds 274 MVA
CBTS-CLN No.1 66 kV line	When the CBTS-CLN No.2 66 kV line is out of service and net load in the East Cranbourne region exceeds 274 MVA.
CBTS-BWN 66 kV line	When the CLN-PHM-LLG 66 kV line is out of service and net load in the East Cranbourne region exceeds 255 MVA.

4.3. Risk assessment

The forecast expected unserved energy on the Eastern Cranbourne 66kV network has an estimated cost of $501.14 million in present value terms, based on the Value of Customer Reliability (VCR) published by AER in December 2024. AusNet is committed to supporting Victoria Planning Authority's South-East Growth Corridor by ensuring the network can meet growing demand. Using a probabilistic planning approach, AusNet has assessed the energy at risk and the economic viability of mitigation measures. Analysis indicates that energy at risk will rise from 2027, exceeding $20 million by 2033 and surpassing $40 million by 2035–2039. This is shown in Figure 6.

Figure 6 – Energy at risk on Eastern Cranbourne 66kV network loop



The Pakenham South (PSH) ZSS project, which will install a new zone substation connected to the East Cranbourne 66kV network loop, will support the 22kV distribution system within this region by increasing the 22kV distribution capacity in the Pakenham and Clyde North areas. While this will assist in addressing 22kV capacity constraints in the region, it will not adequately address the forecast peak demand growth and overloading issues on the 66kV network loop. Our analysis indicates that to avoid network augmentation, approximately 105MW additional capacity or a reduction of 105MW is required to mitigate energy at risk on the Eastern Cranbourne network loop.

The PSH project will address 22kV capacity constraints in the region by creating additional 66/22kV transformation and 22kV feeders. Additionally, it will shift some load away from the northern segment of the loop to the higher capacity lines on the south, which reduces a portion of energy at risk in 2029 (as reflected by the drop in energy at risk in Figure 6 (in 2029). However, this alone is not sufficient to completely address the anticipated loading increase expected on the loop.

AusNet's analysis of forecast demand coupled with existing thermal limits indicate that mitigation actions are required to address the increasing risk to the provision of reliable electricity supply to our customers.

4.4. Summary of identified network need

Our network planning indicates that to avoid network augmentation, approximately 105MW additional capacity or a reduction of 105MW through non-network approaches are required to enable AusNet to maintain reliable supply to customers served by the Eastern Cranbourne 66kV network. Addressing this identified capacity constraint will help to ensure that AusNet is able to prudently and efficiently meet forecast load growth from the South-East Growth Corridor to:

- support economic growth anticipated for this region;
- support the electrification of homes, businesses and transport[3]; and
- meet our customers' expectations that AusNet should provide a reliable electricity supply and take prudent and efficient actions to minimise unplanned outages.

Feedback from our customer engagement has highlighted the importance of ensuring that we provide a reliable electricity supply, with minimal unplanned disruptions. Customers have expressed concern regarding the impacts of poor reliability given customers' increasing reliance on electricity to meet a range of different needs such as transport, telecommunications, working from home, maintaining comfort during extreme weather conditions, and to meet health needs.

4.5. Assumptions underpinning the identified need

Key factors underpinning the identified need include:

- Demand forecast – the POE10 demand is forecast to exceed the thermal capacity of the line and the POE50 is already exceeded under N-1 conditions. The demand forecast is based on AusNet's standard forecasting methodology and accounts for organic growth and spot loads.
- Asset data used in the network modelling to identify capacity constraints.
- Pakenham South ZSS is commissioned by summer 2028/29.
- Unavailability rates of sub transmission line segments are calculated based on 5 years of historic unplanned outage data from internal outage logs for the Eastern Cranbourne Loop.
- Average unplanned outage time for this sub transmission loop is calculated based on 5 years of historic unplanned outage data from internal outage logs for the Eastern Cranbourne Loop.
- All available 22kV transfers are exhausted in the determination of loop limits.
- Availability of 22kV transfers diminish over time as loading at transferring zone substations increases.

[3] Refer to Victoria State Government, 'Gas Substitution Roadmap – Update: Victoria's Electrification Pathway.'

- In the case of an N-1 event on the loop, where the loading is above the limit for voltage collapse, all load on the loop is assumed to be lost for a duration of 1 hour.
- Rooftop solar has been considered as a demand reducer at the time of maximum demand and is incorporated in the demand forecasts for each individual zone substation on the Eastern Cranbourne 66kV sub-transmission loop.

5. Summary of Submissions to the OSR

Following the publication of the OSR in February 2025, AusNet received one submission proposing a non-network solution to address the identified need in the East Cranbourne 66kV sub-transmission loop. The proponent proposed a 50MW/200 MWh BESS to be connected at LLG ZSS, offering network support during the summer period (1 December to 28 February) each year from 2029 to 2039. The proposed service includes a dispatch allowance of up to 125MWh per day and 11,250MWh per Summer, with operation between 5:00 PM and 9:00 PM AEDT. A minimum annual availability of 95% is expected, and dispatch must be triggered no later than 6:30 PM AEDT on the day of service, with a 24-hour notice period required to enable battery charging.

AusNet has treated this submission as an additional credible option and evaluated it alongside other credible options in this DPAR. In accordance with the proponent's request, all project identifiers and company references have been excluded from public disclosure in this report.

6. 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 timetable and commissioning date; and
- the total indicative capital and operating and maintenance costs.

The purpose of this RIT-D is to identify the credible option for addressing the identified need that maximises the net market benefit. An important aspect of this task is to consider non-network and network options on an equal footing, so that the optimal solution can be identified, evaluated and determined.

6.1. Network Option 0: Do Nothing

The Do Nothing or business as usual (BAU) option assumes that AusNet would not undertake any investment, outside of normal operational and planning processes for managing peak demand and thermal overloading. This option is the counterfactual to the other options considered and establishes the base level of risk (base case) and basis for comparing other credible options.

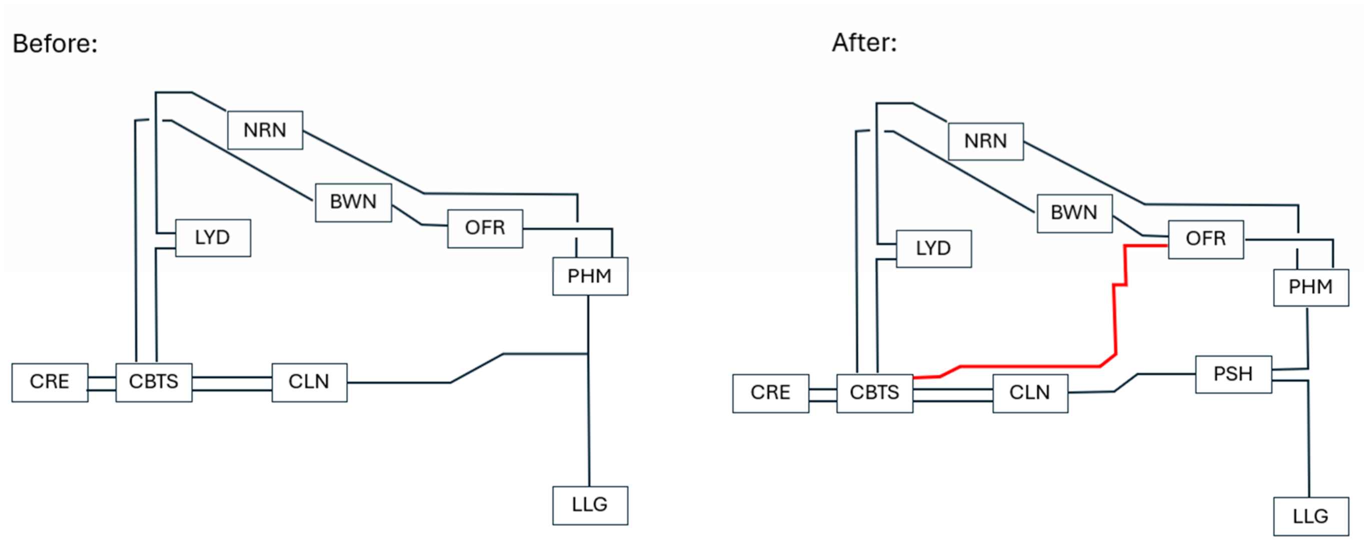
While this option does not entail any upfront capital costs, it exposes customers to the continuing risk of network outages as it does not address the identified need, which is the risk of unserved energy because of the available capacity being exceeded. AusNet has quantified the expected value of unserved energy to be $501.14 million in present value terms over the evaluation period.

This option does not meet our customers' expectations of a reliable electricity supply, which requires investment to avoid unplanned network outages. Furthermore, this option does not align with AusNet's asset management objectives of being future ready and meeting customer needs by maintaining the long-term reliability of our distribution network.

6.2. Network Option 1: Establish a new CBTS-OFR 66kV line

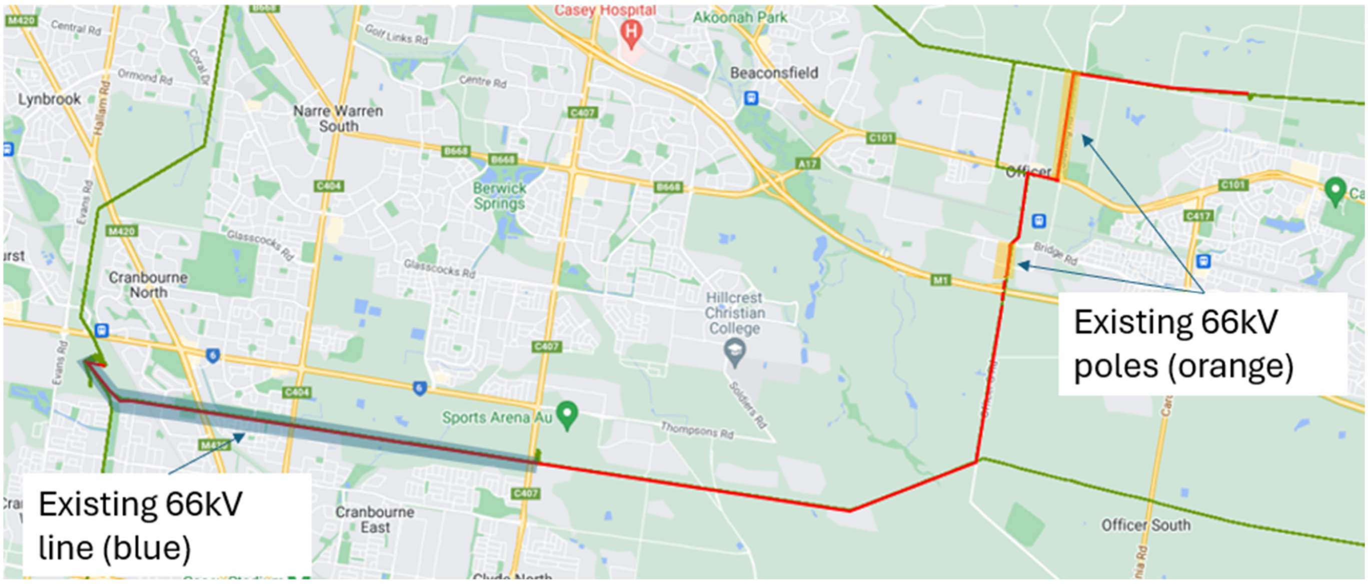
This option involves installing a new 66kV line from CBTS to OFR (as indicated by the red line in Figure 7) to provide additional capacity to the northern section of the Eastern Cranbourne sub-transmission loop.

Figure 7 – Comparison of Eastern Cranbourne 66kV loop after the installation of the new CBTS-OFR line



The installation of the new line will require approx. 22km of new 37/3.75 AAC line thermally designed to 100 degrees Celsius and enabling works to the Cranbourne Terminal Station and Officer zone substation to accommodate the new 66kV line. Under this option 7.1km of existing 66kV conductor will be utilised to achieve a minimum summer cyclic rating of 117.17 MVA (shown in blue in Figure 8) and 66kV poles along the Officer South Road and Starling Road (shown in orange in Figure 8).

Figure 8 – Map indicating new CBTS-OFR 66kV line route



The following benefits are associated with establishing a new CBTS-OFR 66kV line:

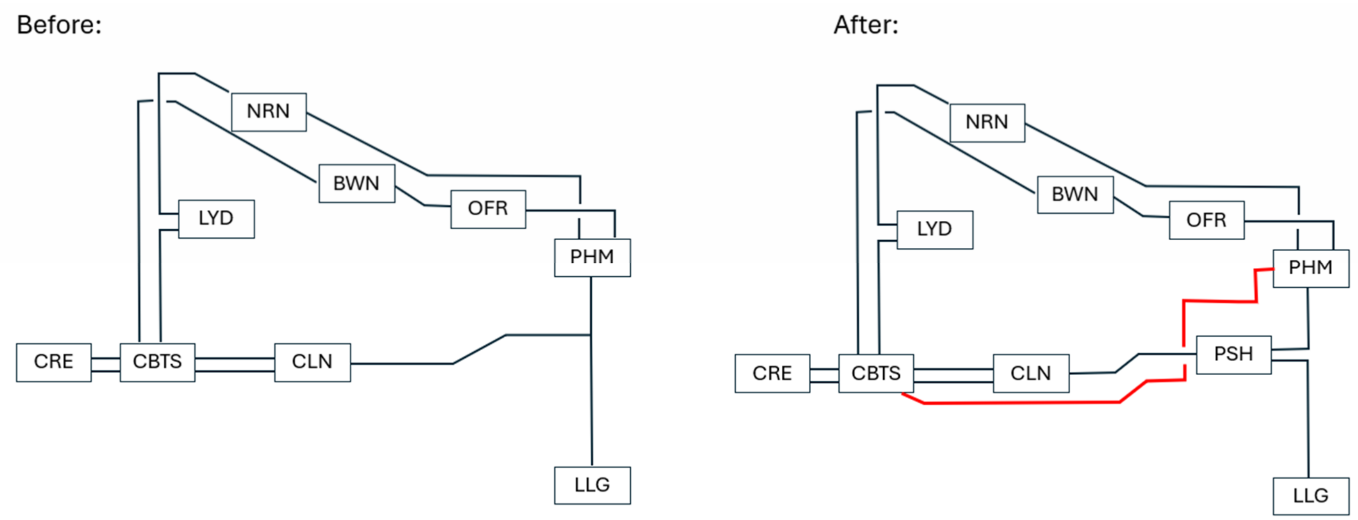
- It will significantly increase thermal capacity of the Eastern Cranbourne sub-transmission loop.
- It provides additional support to the Northern portion (CBTS-LYD and CBTS -BWN), which have older and lower capacity conductors.
- It utilises existing infrastructure (66kV conductor route to Officer and spare 66kV conductors between CBTS-CLN) to minimise costs.
- Is the shortest line route for installing an additional 66kV line on the Eastern Cranbourne sub-transmission loop to alleviate constrained parts of the network.
- The addition of this line will assist in supporting future growth at Officer South associated with the new industrial corridor between Officer and Pakenham under the South-East Growth Corridor.

The construction would commence in December 2026, with project completion expected by December 2029. The estimated capital cost of this option is $51.72 million. In relation to O&M expenditure, annual routine maintenance expenditure would be $0.52 million.

6.3. Network Option 2: Install a new CBTS-PHM line

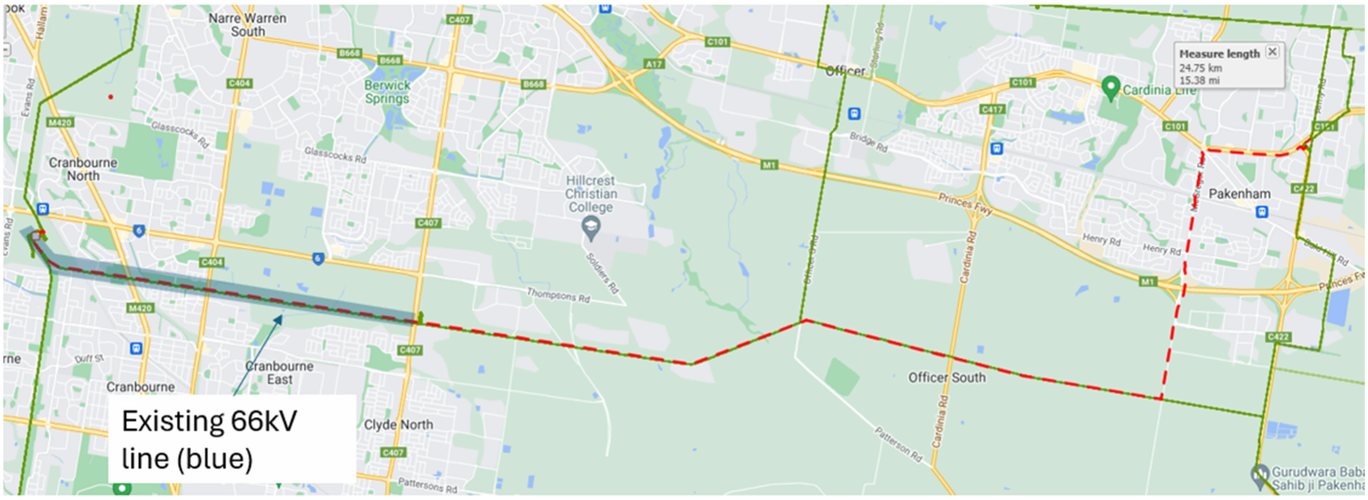
This option involves installing a new 66kV line from CBTS to PHM (as indicated by the red line in Figure 9) to provide additional capacity to the Pakenham area of the Eastern Cranbourne sub-transmission loop, which is experiencing rapid growth.

Figure 9 - Comparison of Eastern Cranbourne 66kV loop after the installation of the new CBTS-OFR line



The installation of the new line will require 25.5km of new 37/3.75 AAC line thermally designed to 100 degrees Celsius and enabling works to the Cranbourne Terminal Station and Pakenham zone substation to accommodate an additional 66kV feeder. Under this option 7.1km of existing 66kV conductor will be utilised to achieve a minimum summer cyclic rating of 117.17 MVA (shown in blue in Figure 10).

Figure 10 – Map indicating new CBTS-PHM 66kV line



Key benefits associated with this option include:

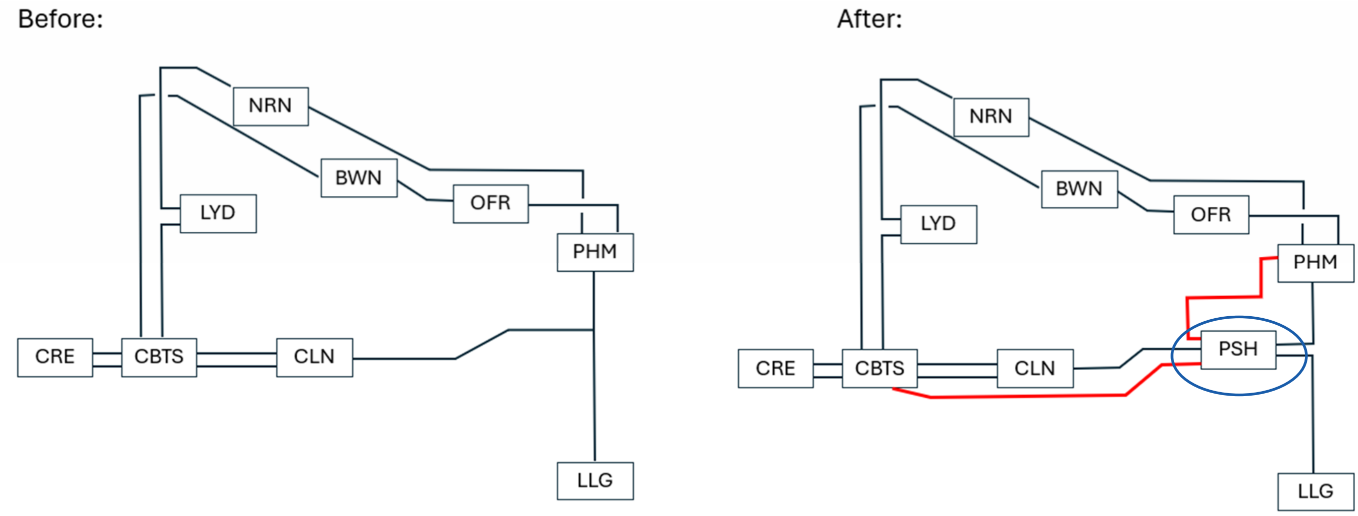
- It significantly increases thermal capacity of the Eastern Cranbourne sub-transmission loop.
- It provides additional support to the furthest major load centre on the network loop (PHM and OFR).
- It utilises existing spare 66kV conductors between CBTS-CLN to minimise costs.
- It provides additional optionality for managing constraints in the future, as it can be easily configured to enable a tie into Pakenham South should a tie become required (1km of additional line).
- The line route is mostly within existing transmission easement, which helps in reducing implementation time and costs, and also minimises impact on the nearby community.

The construction would commence in December 2026, with project completion expected by December 2029. The estimated capital cost of this option is $58.82 million. In relation to O&M expenditure, annual routine maintenance expenditure would be $0.59 million.

6.4. Network Option 3: Establish a new CBTS-PSH and PSH-PHM 66kV lines

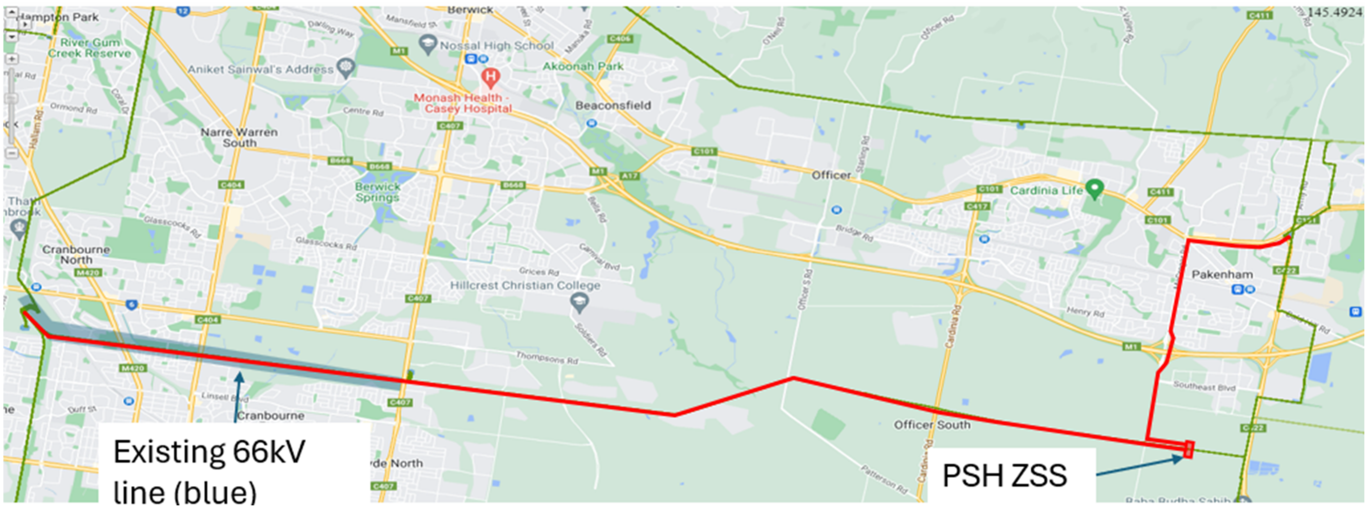
This option involves installing a new 66kV line from CBTS to PSH and a new 66kV line from PSH-PHM (as indicated by the red line in Figure 11). This will help to provide additional support to the Pakenham area, which is the furthest major load centre on the loop and is set to be part of a new industrial corridor under the South-East Growth Corridor.

Figure 11 - Comparison of Eastern Cranbourne loop after the installation of the new CBTS-PSH and PSH-PHM 66kV line



The installation of the new line will require 26.5km of new 37/3.75 AAC line thermally designed to 100 degrees Celsius and enabling works to the Cranbourne Terminal Station and Pakenham South zone substation to connect the new CBTS-PSH and PSH-PHM lines. Under this option 7.1km of existing 66kV conductor will be utilised to achieve a minimum summer cyclic rating of 117.17 MVA (shown in blue in Figure 12). This option is a variation to Option 2, with the key difference between the two options is that Option 3 includes a tie into the Pakenham South zone substation, as circled in Figure 11 above), which entails approximately 1km of additional conductor and associated switchgear at PSH zone substation.

Figure 12 - Map indicating new CBTS-PSH and PSH-PHM 66kV lines



Key benefits associated with this option include:

- It significantly increases thermal capacity of the Eastern Cranbourne sub-transmission loop.

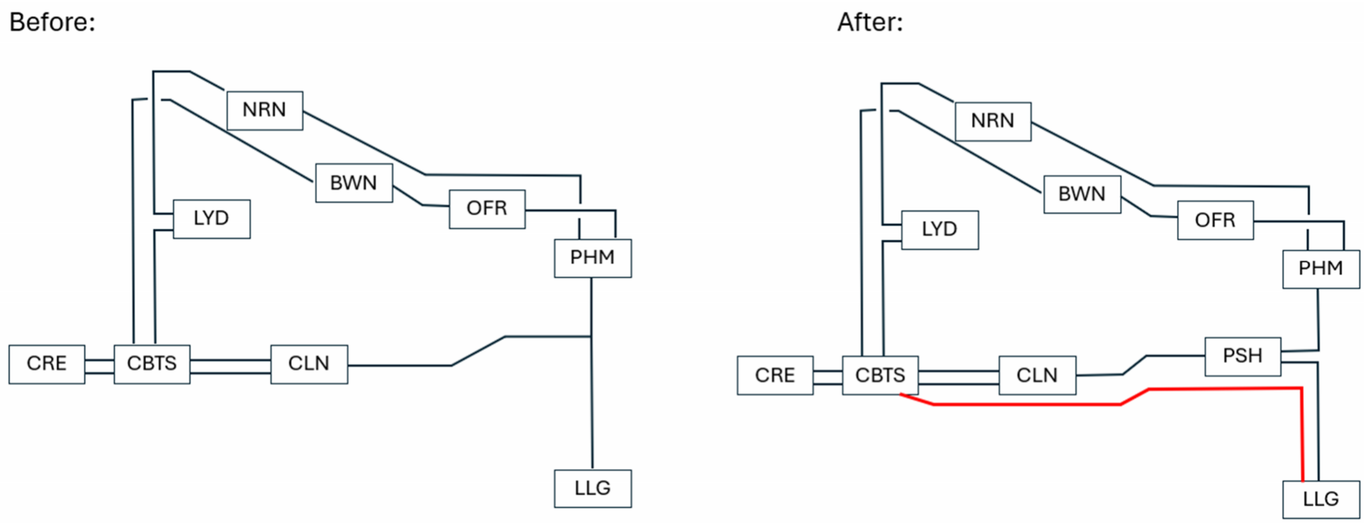
- It provides additional support to the highest growth part of the loop and supports the furthest major load centre.
- It utilises existing spare 66kV conductors between CBTS-CLN to minimise costs and deliver greater affordability to customers.
- The line route is mostly within existing transmission easement, which helps in reducing implementation time and costs, and minimises impact on the nearby community.

The construction would commence in December 2026, with project completion expected by December 2029. The estimated capital cost of this option is $64.14 million. In relation to O&M expenditure, annual routine maintenance expenditure would be $0.64 million.

6.5. Network Option 4: Install a new CBTS-LLG 66kV line

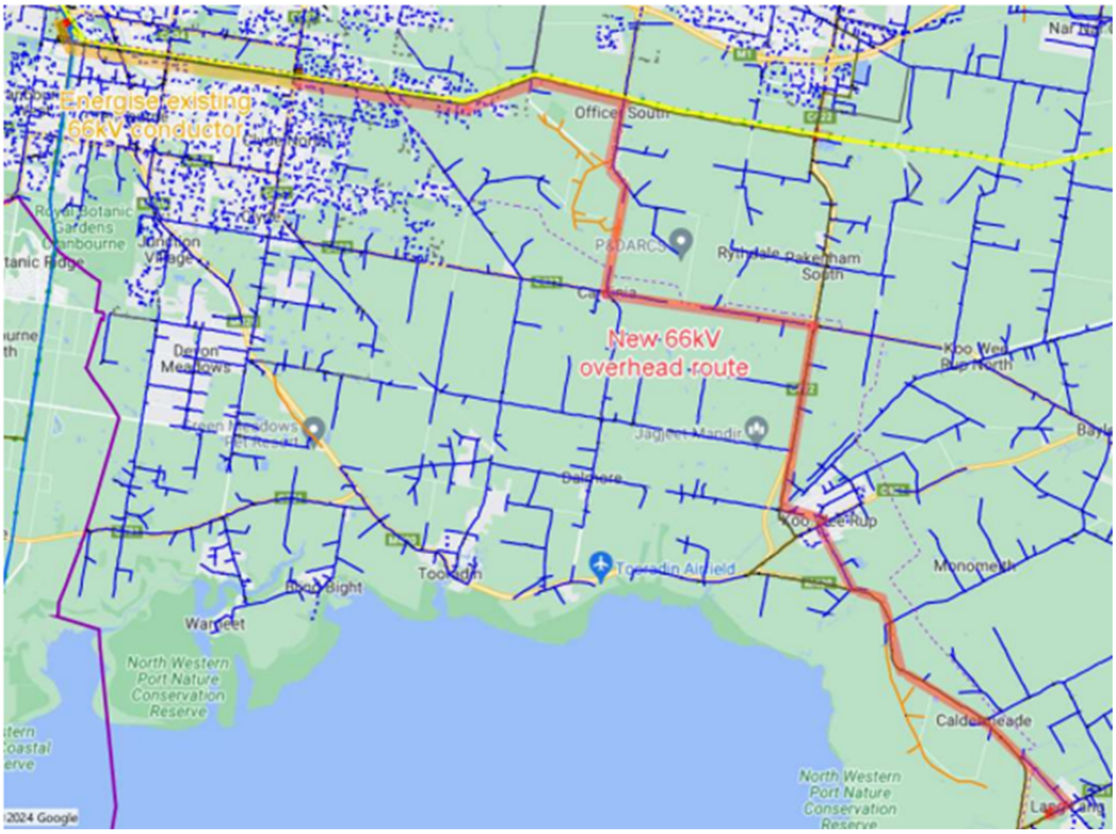
This option involves installing a new 66kV line between CBTS to LLG (as indicated by the red line in Figure 13) to provide additional capacity on the Eastern Cranbourne sub-transmission loop.

Figure 13- Comparison of Eastern Cranbourne loop after the installation of the new CBTS-LLG 66kV line



The installation of the new line will require 43.5km of new 37/3.75 AAC line thermally designed to 100 degrees Celsius and enabling works to the Cranbourne Terminal Station and Lang Lang zone substation to connect the new CBTS-LLG line. Under this option 7.1km of existing 66kV conductor between CBTS-CLN will be utilised to achieve a minimum summer cyclic rating of 117.17 MVA. Figure 14 shows the existing 66kV conductor marked in orange, while the red line indicates the route of the new overhead 66kV line.

Figure 14 - Map indicating new CBTS-LLG 66kV line



The key benefits associated with this option is that it increases thermal capacity of the Eastern Cranbourne sub-transmission loop. It also significantly increases reliability to customers in Lang Lang, which are currently radially supplied, by bringing them into the Eastern Cranbourne network loop.

While Network Option 4 utilises existing 66kV conductors between Cranbourne Terminal Station and Clyde North, which helps in reducing costs, it requires significantly more 66kV line to be installed than Options 1 and 2 and as a result is the second most expensive option for addressing the identified network need.

The construction would commence in December 2028, with project completion expected by December 2030. The estimated capital cost of this option is $95.88 million. In relation to O&M expenditure, annual routine maintenance expenditure would be $0.96 million.

6.6. Non-Network Option 1: Install a new 25MW/100MWh battery at Officer zone substation

This option involves installing a new 25MW/100MWh battery at Officer zone substation to support the Eastern Cranbourne network loop during peak loading. This option is technically feasible with a cost of $50 million and an annual routine maintenance expenditure of $0.5 million. The construction would commence in August 2027, with project completion expected by December 2030. This option is considered the least preferred option for addressing the identified need and has been assessed as only partially addressing customer expectations and AusNet's asset management objectives.

6.7. Non-Network Option 2: Install a new 50MW/200MWh battery at Lang Lang zone substation

A non-network option was proposed involving a 50 MW / 200 MWh BESS to be located at LLG ZSS. The project is not yet committed or anticipated under the RIT-D framework. Accordingly, AusNet has treated this option as a neither committed nor anticipated project and included it as a credible option in the economic assessment.

The proponent anticipates construction commencement in Q1 2028 and commercial operation by Q2 2029. A capital cost of $69 million[4] and an annual routine maintenance expenditure of $0.69 million were considered in the assessment.

6.8. Options considered and not progressed

6.8.1. Demand management

There is limited ability for demand reductions to reduce peak demand on the Eastern Cranbourne 66kV sub-transmission loop as demand growth in the region far outweighs any demand management opportunities identified to date. Most notably, there are no connected 66kV customers or generators on this network. Further, while there are three customers which have active support agreements that are connected to Clyde North, these agreements only deliver a reduction of 1.65MW which is insufficient to meet the identified need.

6.8.2. Reconductor the CBTS-BWN with 37/3.75AAC

An initial assessment was completed to determine the feasibility of reconductoring aged conductor on the existing CBTS-BWN 66kV line, with high capacity 37/3.75AAC with a projected capital cost of $15 million for the construction material and labour. Whilst this would be a technically feasible option to increase some capacity within the Eastern Cranbourne 66kV loop, it was found to be not credible due to the very high costs and constructability issues associated with the full reconstruction of the existing tower assets within the transmission easement and scheduling interruptions. Additionally, this option only would have partially assisted in addressing the anticipated line overloads after PSH is established, leaving a large residual risk unaddressed.

6.8.3. Adding a second circuit to the existing CBTS-BWN with 37/3.75AAC

An initial assessment was completed to determine the feasibility of installing a second line on the existing CBTS-BWN 66kV line, with high capacity 37/3.75AAC with a projected capital cost of $25 million for the construction materials and labour. Whilst this would be a technically feasible option to increase some capacity within the Eastern Cranbourne 66kV loop, it was found to be not credible due to the very significant costs and constructability issues associated with the full reconstruction of the existing tower assets within the transmission easement and scheduling interruptions. Additionally, this option only would again have only partially assisted in addressing the anticipated line overloads after PSH is established, leaving a large residual risk unaddressed.

6.8.4. Reconductor the CBTS-BWN & BWN-OFR with 37/3.75AAC

The option of augmenting the entire line section from CBTS - OFR with high capacity 19/4.75 AAC or 37/3.75 AAC was considered but was not progressed further. In the absence of augmenting the lines (CBTS-BWN-OFR-PHM of the loop, this option would not provide any additional benefits as these line sections are operating in parallel. Under this option, the existing line ratings of 77.7MVA would be the constraining factor.

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[4] Refer to Build cost for a Battery storage (4hrs storage), Draft 2025 Stage 2 Inputs and Assumptions Workbook

6.8.5. Material inter-regional network impact

The proposed augmentations in the East Cranbourne loop 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."

7. Economic assessment of the credible options

7.1. Assessment approach

Consistent with the RIT-D requirements and RIT-D Application guidelines by the AER, AusNet undertook a cost-benefit analysis to evaluate and ranked the net economic benefits of the credible options over a 15-year period while assuming a 45-year asset life for network options.

All options considered has been assessed against a business-as-usual or base case where no proactive capital investment to address the identified need is made.

7.2. Material classes of market benefits

Clause 5.17.4 (j)(5) of the NER requires the RIT-D proponent to consider whether each credible option provides the classes of market benefits described in clause 5.17.1(d). To address this requirement, Table 4 discusses AusNet approach to each of the market benefits listed in that clause for each credible option.

Table 4 Analysis of Market Benefits

CLASS OF MARKET BENEFIT	ANALYSIS
(i) changes in voluntary load curtailment;	Any changes in voluntary load curtailment will be valued in accordance with any applicable network support agreements that may be in place.
(ii) changes in involuntary load shedding and customer interruptions caused by network outages, using a reasonable forecast of the value of electricity to customers;	The credible options reduce involuntary load shedding, by increasing network capacity or sharing the load between the ZSSs.
(iii) changes in costs for parties, other than the RIT-D proponent, due to differences in: *(A) the timing of new plant;* *(B) capital costs; and* *(C) the operating and maintenance costs;*	There is no expected significant differences between the credible options.
(iv) differences in the timing of expenditure;	There is no expected significant differences between the credible options.
(v) changes in load transfer capacity and the capacity of distribution connected units to take up load	Available load transfers out of the loop was considered during the analysis.
(vi) 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 NEM	There will be no impact on the option value in respect of the likely future investment needs of the NEM.
(vii) changes in electrical energy losses;	The credible options are not expected to result in material changes to electrical energy losses.
(viii) changes in Australia's greenhouse gas emissions	The credible options are not expected to result in material changes to greenhouse gas emissions.

CLASS OF MARKET BENEFIT	ANALYSIS
(ix) any other class of market benefit determined to be relevant by the AER.	There are no other classes of market benefit that are relevant to the credible options.

7.3. Methodology

The purpose of this section is to provide a high-level explanation of AusNet methodology for identifying the preferred option. As a general principle, it is important that the methodology takes account of the identified need and the factors that are likely to influence the choice of the preferred option. As such, the methodology is not a 'one size fits all' approach, but one that is tailored to the circumstances under consideration.

For this project, there is a significant market benefit component, which is mainly generated by reducing the risk of Unserved Energy and calculated based on the Value of Customer Reliability.

The preferred option is the one that delivers the highest Net present Value (NPV) to the NEM, which is the Present Value of the sum of the net benefits of implementing that option. The identification of the preferred option is complicated by the fact that the future is uncertain and that various input parameters are 'best estimates' rather than known values. Therefore, the RIT-D analysis must be conducted in the face of uncertainty.

To address uncertainty in our assessment of the credible options, we use sensitivity analysis and scenario analysis in our cost benefit assessment. As recommended by the AER's application guidelines, we use sensitivity analysis to assist in determining a set of reasonable scenarios. The relationship between sensitivity analysis and scenarios is best explained by the AER's practice note:[5]

> *Scenarios should be constructed to express a reasonable set of internally consistent possible future states of the world. Each scenario enables consideration of the prudent and efficient investment option (or set of options) that deliver the service levels required in that scenario at the most efficient long run service cost consistent with the National Electricity Objective (NEO).*
>
> *Sensitivity analysis enables understanding of which input values (variables) are the most determinant in selecting the preferred option (or set of options). By understanding the sensitivity of the options model to the input values a greater focus can be placed on refining and evidencing the key input values. Generally, the more sensitive the model output is to a key input value, the more value there is in refining and evidencing the associated assumptions and choice of value.*
>
> *Scenario and sensitivity analyses should be used to demonstrate that the proposed solution is robust for a reasonable range of futures and for a reasonable range of positive and negative variations in key input assumptions. NSPs should explain the rationale for the selection of the key input assumptions and the variations applied to the analysis.*

In applying sensitivities and scenarios to our cost benefit assessment, we have regard to the different circumstances that may eventuate that would affect the choice of the preferred option. Where our analysis shows that an option is clearly preferred, we will not undertake further testing. This approach is consistent with clause 5.17.1(c)(2) of the Rules, which states that the RIT–D must not require a level of analysis that is disproportionate to the scale and likely impact of each credible option considered.

In preparing the RIT-D, AusNet has also had regard to Draft 2025 Inputs Assumptions and Scenarios Consultation, February 2025.

Findings and scenario selection in discussed in detail under Section 7.5.

7.4. Key variables and assumptions

Table 5 lists the key variables and assumptions applied in the economic assessment, which are essential inputs to our methodology for the purpose of this DPAR. The table also sets out the upper and lower bounds of the range of forecasts adopted for each of these variables. The lower bound and upper bound estimates are used to undertake sensitivity testing and scenario analysis. The detailed results of this modelling are provided in the next section.

In relation to the discount rate, we have adopted central, upper and lower bound estimates that are consistent with AEMO and AER preferences. We note that discount rates are subject to change, particularly in the current economic

5 AER, Asset replacement planning, January 2019, page 36.

climate. As such, the rates employed in this DPAR are considered reasonable in exploring the impact of different rates on the cost-benefit assessment of the competing options to address the identified need.

Table 5: Input assumptions used for sensitivity studies

Parameter	Lower Boundary	Central (Base) Case	Higher Bound
Project Cost	AusNet estimate × 70%	AusNet estimate	AusNet estimate × 130%
Loop VCR	Loop VCR × 75%	Loop VCR	Loop VCR × 125%
Discount Rate	4.11%	7.0%	10 %
Demand Forecast	95% of AusNet Demand Forecast	AusNet Demand Forecast	105% of AusNet Demand Forecast

In addition to the above scenarios, varying demand and cost at the same time (i.e. low demand, high cost) to check realistic boundaries under the worst condition was studied.

7.5. Cost benefit analysis

The economic analysis allows comparison of the economic cost and benefits of each option to rank the options and to determine the optimal timing of the preferred option. It quantifies the capital costs and the cost of the residual risk for each option, to determine a total cost for each option. The net economic benefit for each credible option is the total cost associated with that option minus the costs of the Do Nothing/BAU option.

AusNet considered the following 4 network options and 2 non-network options in the evaluation to select the preferred option to address the identified need.

Option 1. Network Option 1: Install a new Cranbourne Terminal Station to Officer (CBTS-OFR) 66kV line

Option 2. Network Option 2: Install a new Cranbourne Terminal Station to Pakenham (CBTS-PHM) 66kV line

Option 3. Network Option 3: Install a new Cranbourne Terminal Station to Pakenham South (CBTS-PSH) and new PSH-PHM 66kV lines

Option 4. Network Option 4: Install a new Cranbourne Terminal Station to Lang Lang (CBTS-LLG) 66kV line

Option 5. Non-Network Option 1: Install a new 25MW/100MWh battery at OFR zone substation

Option 6. Non-Network Option 2: Connecting a 50MW / 200MWh utility BESS connected to 66 kV bus at LLG ZSS

As already explained, each of these options will provide additional network capacity to enable more customers to connect, deliver positive market benefits and reduce the expected unserved energy, in accordance with the National Electricity Objective (NEO).

Table 6 presents the costs and benefits for the different scenarios considered. The data presented is expressed in present value terms and in $M real 2025 prices. The economic assessment period is 15 years covering the period from 2025/26 to 2039/40.

Table 6 Capital expenditure and net economic benefits for each option in present value terms ($M, real 2025)

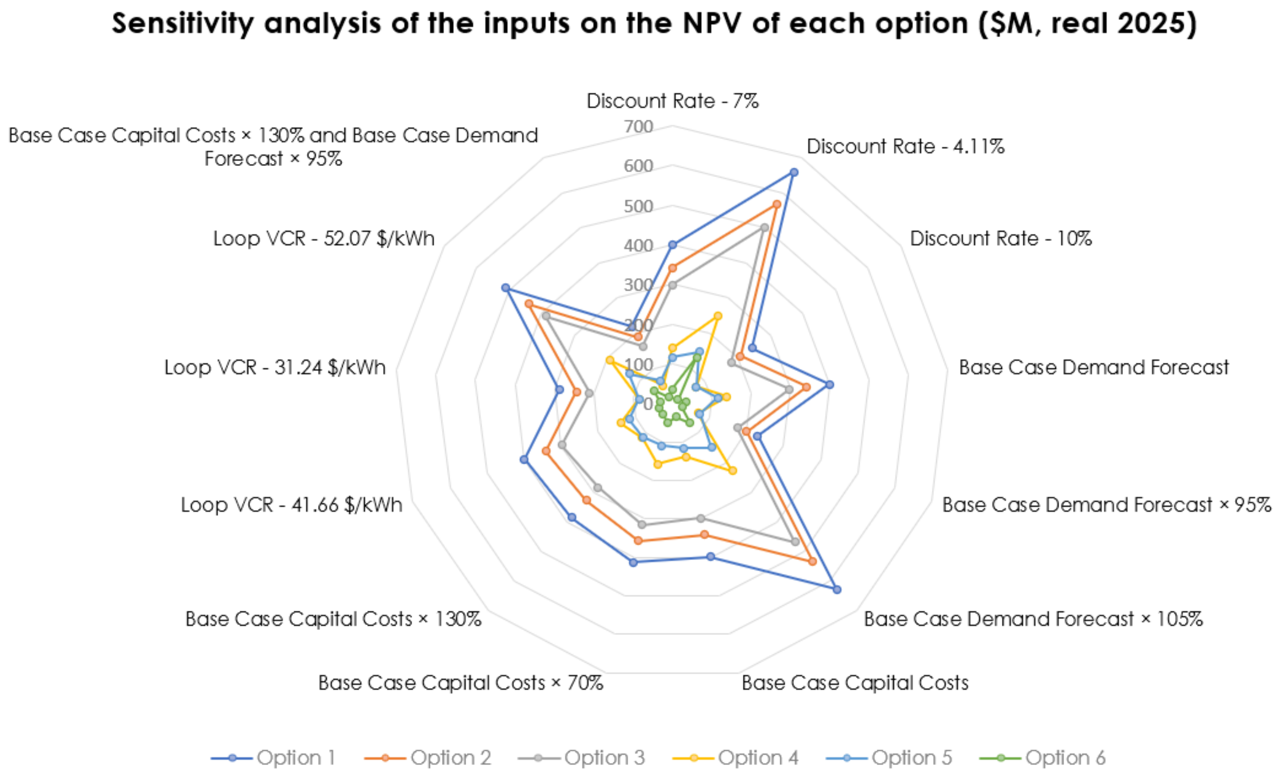
	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Capital Expenditure ($M)	51.72	58.82	64.14	95.88	50.00	69.00
Net Present Value of total benefits ($M)	398.82	341.22	297.81	138.40	115.95	36.08

Table 6 shows the net economic benefit for each of the five network options and the non-network option compared to the 'do nothing/BAU' option. Option 1 is the most economical from all the options.

7.6. Sensitivity analysis

AusNet has tested the robustness of the investment decision by varying four inputs mentioned in Table 5, and the results are shown in Figure 15. The sensitivity study results show that Option 1 "Install a new Cranbourne Terminal Station to Officer (CBTS-OFR) 66kV line" provides the highest net economic benefits in all cases.

Figure 15 Sensitivity analysis of the inputs on the NPV of each option ($M, real 2025)



8. Preferred option

The preferred option (Option 1) is:

- Installation of a new approx. 22km 66kV line of new 37/3.75 AAC line thermally designed to 100 degrees Celsius and enabling works to the Cranbourne Terminal Station and Officer zone substation to accommodate the new 66kV line. Under this option approx. 7.1km of existing 66kV conductor will be utilised to achieve a minimum summer cyclic rating of 117.17 MVA and 66kV poles along the Officer South Road and Starling Road, including the installation of conductor, poles and associated equipment.

The construction would commence in December 2026, with project completion expected by December 2029. The estimated capital cost of this option is $51.7 million (nominal).

In accordance with the RIT-D, this option is expected to maximise the present value of the net economic benefit to all those who produce, consume and transport electricity in the NEM.

8.1. Capital and operating costs of the preferred option

The direct capital expenditure of the preferred option (Option 1) is $51.7 million. The principal direct capital expenditure elements, expressed in nominal terms, are:

- Design and internal labour, $ 5.76 million;
- Materials, plant and equipment, $ 8.94 million;
- Contracts, $ 31.48 million;
- Other $ 5.54 million;

AusNet expects a 1% of the capital cost as future annual O&M costs for the preferred option.

9. Next steps

9.1. Request for submissions

AusNet invites written submissions, on the matters set out in this report, from Registered Participants, AEMO, interested parties, non-network providers and those registered on our demand-side engagement register.

All submissions and enquiries should be directed to:

Email: ritdconsultations@ausnetservices.com.au

Submissions are due on or before 05th September 2025 and should refer to 'RIT-D DPAR LD CBTS OFR' in the subject heading.

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

9.2. Next stage of RIT-D process

Following the conclusion of the consultation period for this report, AusNet will, having regard to any submissions received, prepare and publish the FPAR which will include:

- A summary of, and commentary on, any submissions received;
- Preferred option to meet the identified need.

AusNet expects to publish the FPAR in November 2025.

10. Compliance with NER

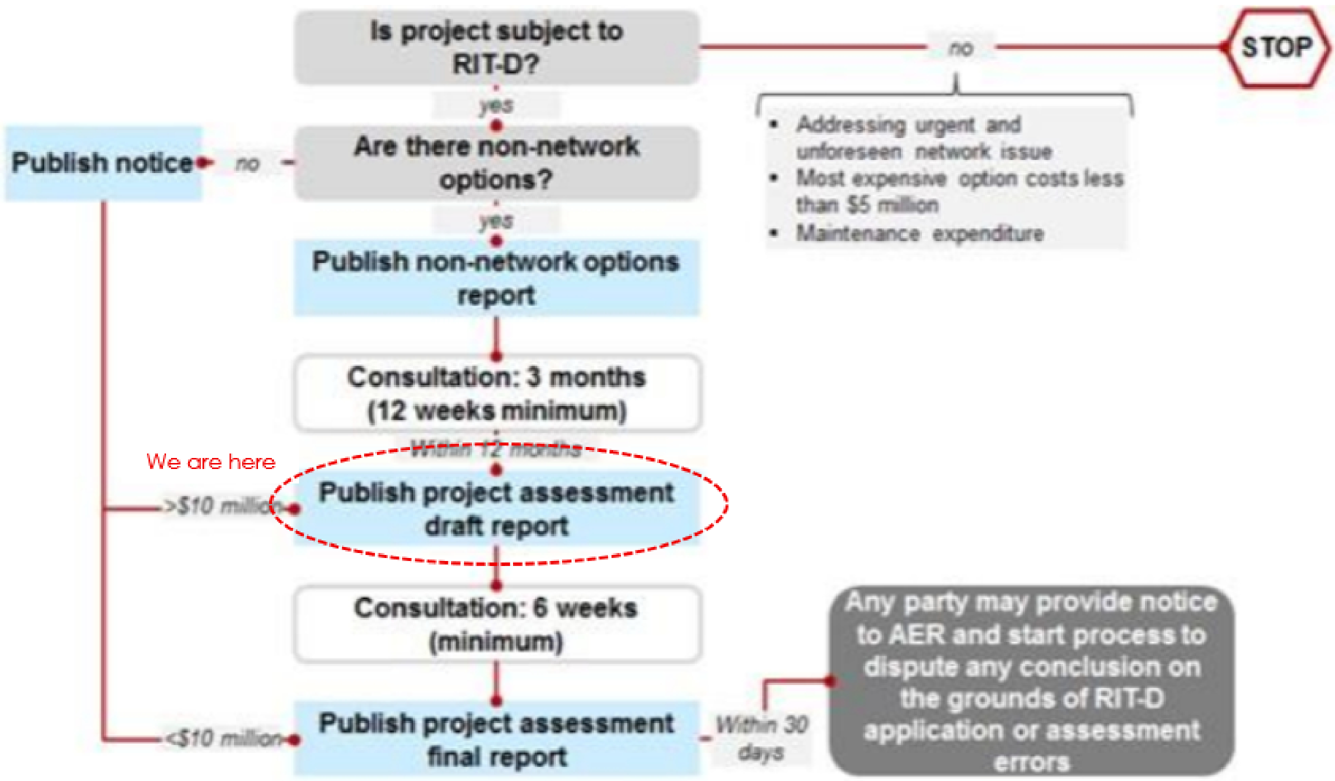
In accordance with clause 5.17.4 of the NER, we certify that the screening for non-network options satisfy the first stage of regulatory investment test for distribution. Table 7 shows how each of these requirements have been met by the relevant section of this report.

Table 7 Compliance with NER

REQUIREMENT	SECTION
Clause 5.17.4(j) of the NER - The draft project assessment report must include the following:	Noted. See details below.
(1) a description of the identified need for the investment;	Section 4.
(2) the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, reasons that the RITD proponent considers reliability corrective action is necessary);	Section 4.5.
(3) if applicable, a summary of, and commentary on, the submissions on the options screening report;	Section 5.
(4) a description of each credible option assessed;	Section 6.
(5) where a Distribution Network Service Provider has quantified market benefits in accordance with clause 5.17.1(d), a quantification of each applicable market benefit for each credible option;	Section 7.5.
(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure;	Section 6.
(7) a detailed description of the methodologies used in quantifying each class of cost and market benefit;	Sections 7.1, 7.2 and 7.3.
(8) where relevant, the reasons why the RIT-D proponent has determined that a class or classes of market benefits or costs do not apply to a credible option;	Section 7.2
(9) the results of a net present value analysis of each credible option and accompanying explanatory statements regarding the results;	Section 7.5
(10) the identification of the proposed preferred option;	Section 7.6
(11) For the proposed preferred option, the RIT-D proponent must provide:	
(i) details of the technical characteristics;	Section 6.2 and 8.1
(ii) the estimated construction timetable and commissioning date;	Section 6.2 and 8.1
(iii) the indicative capital and operating cost (where relevant);	Section 8.1
(iv) a statement and accompanying detailed analysis that the proposed preferred option satisfies the regulatory investment test for distribution; and	Section 7.5, 7.6 and 8

REQUIREMENT	SECTION
(v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent;	Not applicable as the preferred option is not for reliability corrective action
(12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the draft report may be directed; and	Section 9.1
(13) if the estimated capital cost of the proposed preferred option is greater than $103 million (as varied in accordance with a cost threshold determination), include the RIT reopening triggers applying to the RIT-D project	Not applicable as the capital cost of the proposed preferred option is less than $103 million.

Appendix A -RIT-D assessment and consultation process[6]



[6] Australian Energy Regulator, "*Regulatory investment test for distribution, Application guidelines*", *Section 4*, November 2024.

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