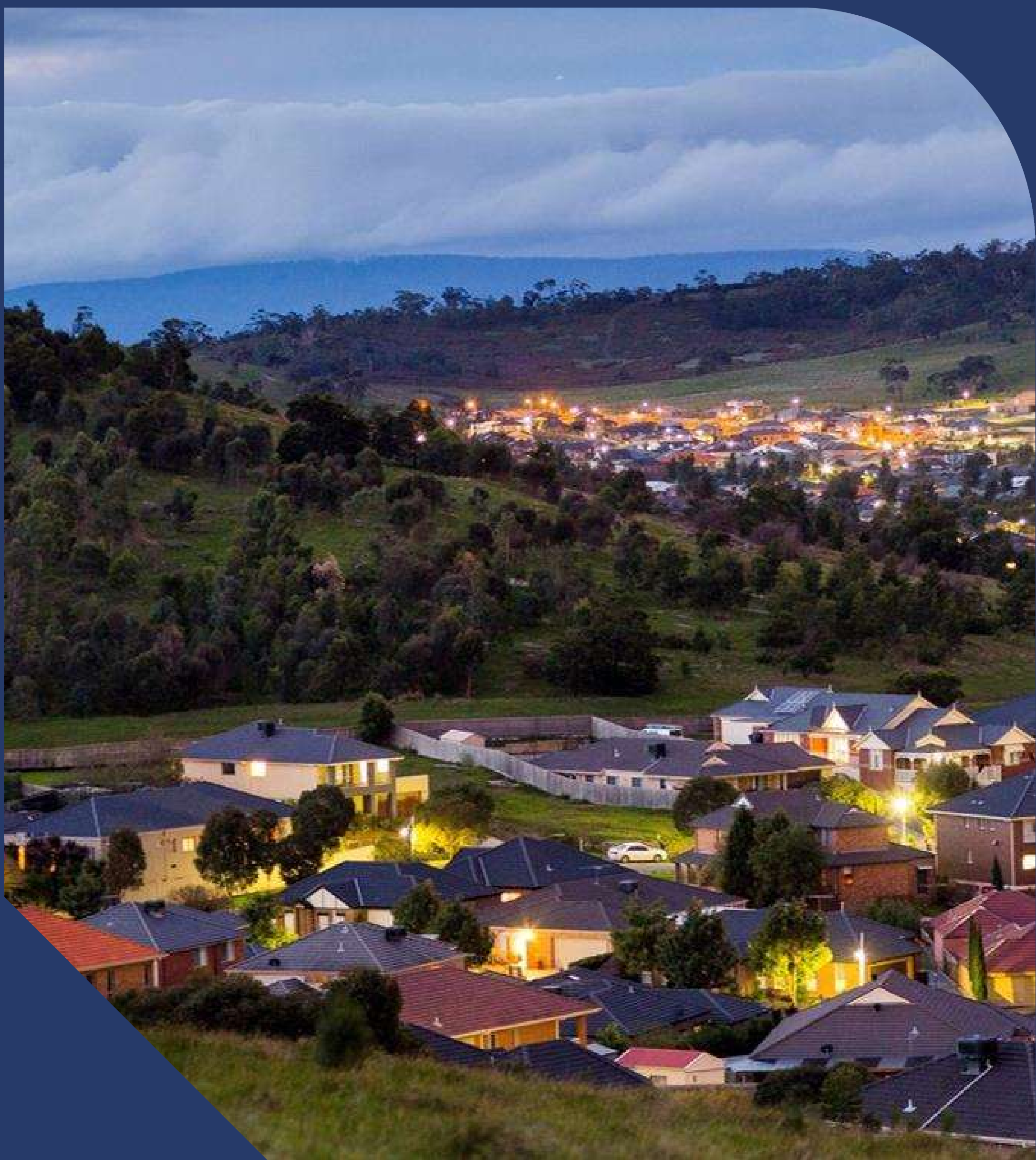
AusNet

Electricity Distribution Price Review (EDPR 2026-31)

Supply security of Baw Baw Shire, West Gippsland

Date: 31 January 2025



AusNet

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1. Executive summary

AusNet Services is a regulated Victorian Distribution Network Service Provider (DNSP) that supplies electrical distribution services to more than 800,000 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 that we operate under, AusNet Services aims to maintain service levels at the lowest possible cost to our customers. To achieve this, we assess the requirements, identify emerging constraints, evaluate options to mitigate constraints and develop plans that aim to maximise the present value of net economic benefit to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

This Executive Summary provides an overview of the proposed investment in the electrical distribution network in the Shire of Baw Baw, West Gippsland. It discusses the underlying need, the key drivers, the options considered to address the identified need, and the recommended solution. The body of the document covers these aspects in detail.

Identified need

Customers' energy requirements are changing due to the ongoing energy transition. Both individual customers and businesses are increasingly inclined to shift away from gas, embrace low-emission transportation and heating choices, and amplify the effectiveness of their household appliances and the presence of distributed energy resources (DERs) such as solar photovoltaic (PV) installations. Continued investments in DER to offset electricity from the grid, doesn't eliminate the need for network capacity augmentations, as the maximum generation or demand typically occurs at different times. The electricity demand growth over the next decade is predicted to occur at a faster pace. This growth is primarily attributed to three key factors:

- population growth,
- decarbonisation through the electrification of transport, and
- the gradual transition from using gas to using electricity in homes and industries.

By 2053, the population growth in the Shire of Baw Baw in West Gippsland will ultimately result in approximately 17,068[1] new residential dwellings as well as 80 hectares of employment land comprising a combination of industrial and commercial developments - town centres, schools, community facilities, future commercial spaces, including a new hospital in the city of Warragul. When fully developed beyond 2053, it is expected that the development areas in the Shire of Baw Baw will result in a new load in the order of 79 MVA being added to AusNet Services' electricity network in West Gippsland.

AusNet Services has already received three industrial/commercial customer applications in the cities of Warragul and Drouin in the last year, resulting in a 10 MVA of additional load, two Electrical Vehicle (EV) charging stations (4MVA), and a connection application for the new hospital (6MVA). All these loads are expected to be fully operational by 2029. Several connection inquiries have also been received for connecting industrial/commercial and residential loads in the same area.

The basis for this business case is the combined growth in demand from existing (brownfield) and newly developed (greenfield) sites in the Shire of Baw Baw, for initial stages of the West Gippsland development area, for which AusNet Services have strong and credible forecast. The future stages, likely to be required after 2031 will be covered in a separate business case when the need or trigger arises.

The Shire of Baw Baw is predominately serviced by 66/22kV Warragul (WGL) zone substation (ZS). A remedial action to replace four transformers with two new 20/33 MVA transformers has started in the 2021-25 Electricity Distribution Price Review (EDPR) period. The first new transformer is expected to be available by mid-2024, with the second available by the end of 2024. This action will result in increased capacity of WGL station. Currently, WGL has nine 22kV feeders. The capacity of existing 22kV distribution feeders is expected to be gradually exceeded by 2029.

AusNet Services has identified a need to increase the ability of the 22kV network to supply the forecast demand in the Shire of Baw Baw and manage the increasing risk of involuntary load shedding (National Electricity Rules (NER) 5.17.1(c)(4)(ii)) on 22kV feeders supplied by WGL station beyond 2029. In addition to the risk of unserved energy to existing customers, the lack of capacity of the 22kV network will prevent connecting new customers to AusNet Services' network in the area supplied by WGL station. This would directly violate AusNet Services' obligation to provide connection services (Section 5.10 of the NER). There are also substantial reputational risks and stakeholder dissatisfaction if AusNet Services cannot meet supply requirements for this high-growth area. An investment into additional electrical capacity in this area is required to reduce these risks.

[1] Source: October 2023, Victoria in Future (planning.vic.gov.au)

Options considered

Based on gathered credible growth information, there is a need for a long-term increase in 22kV capacity in the abovementioned area. Increasing the 22kV capacity requires investment in infrastructure, which:

- enables new customer connections,
- finds the right balance between short-term and long-term needs, and
- provides the choices (network or non-network) for future growth of electricity infrastructure.

As a result, various network topologies based on the ultimate demand were tested, and the costs and benefits of these ultimate configurations were compared over a sensible time horizon (i.e., what is likely to be the demand within 10-15 years). Table 1 below summarises the options that were considered to address the identified need.

Based on the performed quantitative and qualitative analysis (Table 1), the preferred option is **Option 2 (Construct a new 22kV feeder by utilising the existing WGL24 route)** as it has the most significant economic benefit being Net Present Value (NPV) positive **$280.6 Million**. This option provides the greatest benefit by providing the most significant reduction in unserved energy, allowing the 22kV feeders to be offloaded and the greatest number of customers to connect. As a result, Option 2 will provide more long-term benefits than all other options considered.

Table 1: Cost Benefit Analysis (CBA) of credible options

Option	Description	Solution Type	PV Benefits[2] ($M)	PV Cost[3] ($M)	NPV[4,5] ($M)	Rank	Assessment
0	No proactive intervention	Base case	-	-	-	5	Non-preferred as will lead to unacceptable risk and higher customer costs if the opportunity is not captured.
1	Construct a new 22kV feeder by utilising the existing WGL11 route	Network solution	293.5	16.9	276.6	2	Non-preferred as it will not deliver the most optimal long-term configuration of the 22kV network.
2	**Construct a new 22kV feeder by utilising the existing WGL24 route (new WGL31)**	**Network solution**	**293.5**	**12.9**	**280.6**	**1**	**Preferred long-term option as it will deliver the highest net economic benefits and most optimal configuration of the 22kV network.**
3	Construct 5MW/10MWh Battery Energy Storage System (BESS)	Non-network and new-technology solution	285.9	16.8	269.1	3	Non-preferred as it will lead to high upfront investment costs and much shorter operating life compared to the network solution.
4	Contract external network support services to defer network investment	Non-network and new-technology solution	177.1	118.0	59.0	4	Non-preferred as it results in high operating costs and low net benefits from deferring investment in a network solution.

[2,3,4,5] **Notes:**
2: PV of total costs, both capital expenditure (Capex) and operational expenditure (Opex).
3: PV of total quantified benefits, both risks mitigated, and any forecast decrease in Capex or Opex arising from undertaking the investment.
4: NPV represents the difference between PV Benefits and PV Investment Costs.
5: The breakdown of PV is based on the parameters specified for the base case (Section 3.1).

2. Identified Need

2.1. Strategic Context

The Shire of Baw Baw is located approximately 100 kilometres east of Melbourne in the West Gippsland region (Figure 1). It covers the main townships of Drouin and Warragul. The AusNet Services' network supplies approximately 29,679[2] customers in the Shire of Baw Baw.

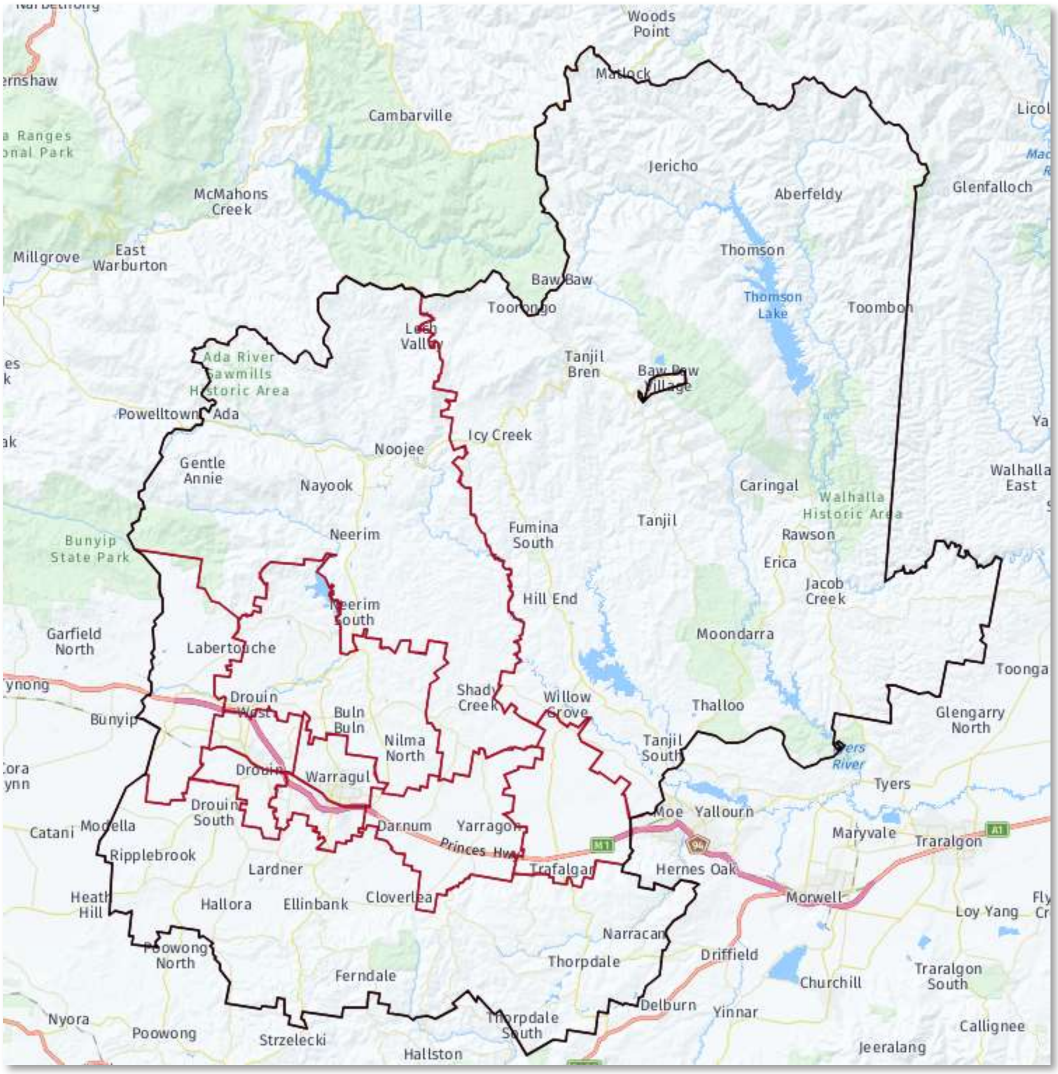

Figure 1: The Shire of Baw Baw – Geographic View

The population of the region is expected to grow fast and large, according to the Department of Transport and Planning's projections[3]. The Baw Baw Local Government Area (LGA) is in the top 5 regional LGAs with the most significant growth expected from 2021 to 2036 and in second place among the top 5 regional LGAs with the fastest growth expected from 2021 to 2036. More than 60,588 people live in the Shire, which is predicted to increase to over 64,965 by 2026 and over 79,529 by 2036.

Given that many services, including electricity, are planned and consumed per household (dwelling) rather than for individuals, the Department of Transport and Planning for Future Urban Development has estimated the number of dwellings needed to house the population. By 2053, the Baw Baw area is expected to have a yield of 17,068[4] residential dwellings as well as 80 hectares of employment land comprising a combination of industrial and commercial developments - town centres, schools, community facilities, future commercial spaces, including a new hospital in the city of Warragul. The largest growth is expected in the Drouin and Warragul areas, as shown in Figure 2.

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[2] Source: Extract from AusNet's internal customer database, January 2024.
[3] Source: Home | Baw Baw Shire | Population forecast (id.com.au)
[4] Source: October 2023, Victoria in Future (planning.vic.gov.au)

This map shows the existing urban area (light pink) and the urban growth zoned areas (darker pink) for future growth. In Warragul, this allows for growth from 14,000 to 44,000 residents and growth from 11,000 to 29,000 in Drouin. With the growing real-estate value in Australia, it is highly probable that development projects decide to increase their yield by increasing the total number of dwellings and commercial spaces available to maximise the projects' Return on Investment (ROI). This tendency has been observed more frequently, especially in the past years.

AusNet Services has already received three industrial/commercial customer applications in the cities of Warragul and Drouin in the last year, resulting in a 10 MVA of additional load, two Electrical Vehicle (EV) charging stations (4MVA), and a connection application for the new hospital (6MVA). All these loads are expected to be fully operational by 2029. Several connection inquiries have also been received for connecting industrial/commercial and residential loads in the area supplied by the same feeders.

As the population grows, so does the demand for electricity from the existing (brownfield) and new customer connections (greenfield). However, customer energy requirements are changing due to the ongoing energy transition. Both individual customers and businesses are increasingly inclined to shift away from gas, embrace low-emission transportation and heating choices, and amplify the effectiveness of their household appliances and the presence of distributed energy resources. Continued investments in DER to offset electricity from the grid, doesn't eliminate the need for network capacity augmentations, as the maximum generation or demand typically occurs at different times. The electricity demand growth over the next decade is predicted to occur at a faster pace. This growth is primarily attributed to three key factors:

- population growth,
- decarbonisation through the electrification of transport, and
- the gradual transition from gas to electricity in households and industry.

All these factors combined will cause an increase in electricity demand, which will add extra load to the electricity network in the Shire of Baw Baw supplied by AusNet Services.

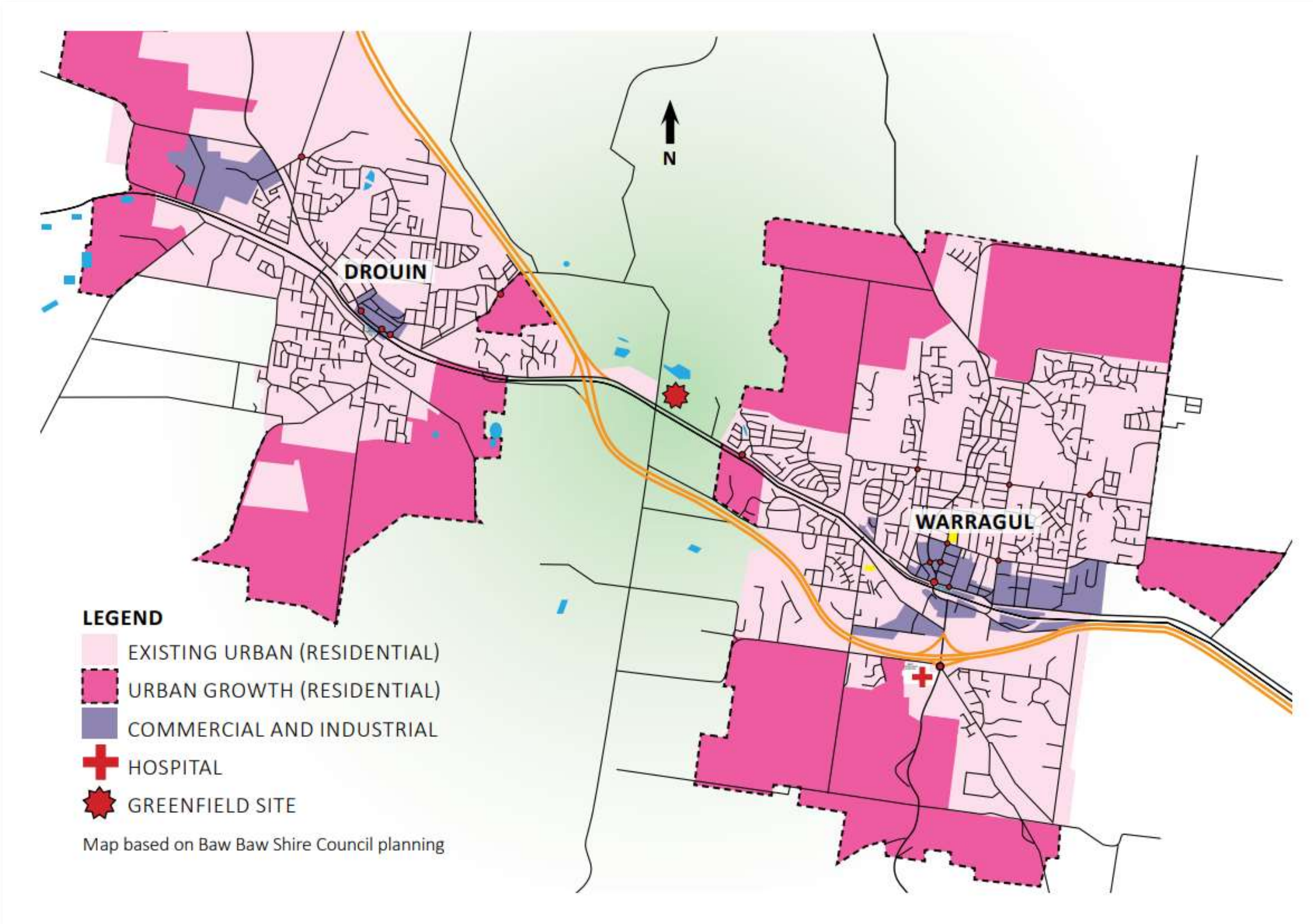

Figure 2: The Shire of Baw Baw - Key growth areas[5]

[5] Source: Adopted - Economic Land Use Strategy (bawbawshire.vic.gov.au)

2.2. Existing supply arrangements

This existing study area is predominately serviced by the 66/22kV Warragul (WGL) zone substation. The WGL station, located approximately 100km southeast of Melbourne, represents the main source of supply for the suburbs of Warragul, Drouin, Longwarry, Bunyip, Darnum, Noojee, and surrounding areas. The existing load at WGL is mostly residential, with some farming, commercial and industrial types of loads.

The WGL ZS was established in 1952. Currently, the WGL ZS has four 10/13.5 MVA transformers and one 20/33 MVA transformer added in 2011. The condition of 10/13.5 MVA transformers has deteriorated significantly, and according to the 2019 asset condition assessment report, all four transformers are in poor condition (C4). To avoid supply risk due to the failure of ageing transformers, a remedial action to replace all four transformers with two new 20/33 MVA transformers has started in the 2021-25 EDPR period. The first new transformer is expected to be available by mid-2024, with the second available by the end of 2024. This action will result in increased capacity of WGL ZS.

Currently, WGL ZS has nine 22kV feeders that supply the load from the abovementioned areas as shown in Figure 3, including two dedicated to Murray Goulburn[6]. The 22kV feeders are with outdoor 66kV and indoor 22kV switchgear in a switched configuration. The 22kV yard is a fully utilised indoor 22kV switchboard.

The 22kV feeders interconnect with feeders from zone substations in Pakenham, Moe, and Leongatha. These interconnections do not allow for a sufficient load transfer from WGL to the other stations. The load transfer limit exists due to the distances from WGL to the other stations, the loadings of the interconnected feeders, and an insufficient number of ties.

This network also provides the connection to one battery energy storage (BESS), Longwarry Battery, that connects at the WGL zone substation via the WGL12 feeder. The BESS was commissioned in late 2023 with an aim to provide network support services for the next three summers. The battery is expected to be charged during low load times and discharged during high load times, such as afternoons and evenings. The project's primary intent was to support the WGL12 22kV feeder in times of peak load anticipated during the summer months.

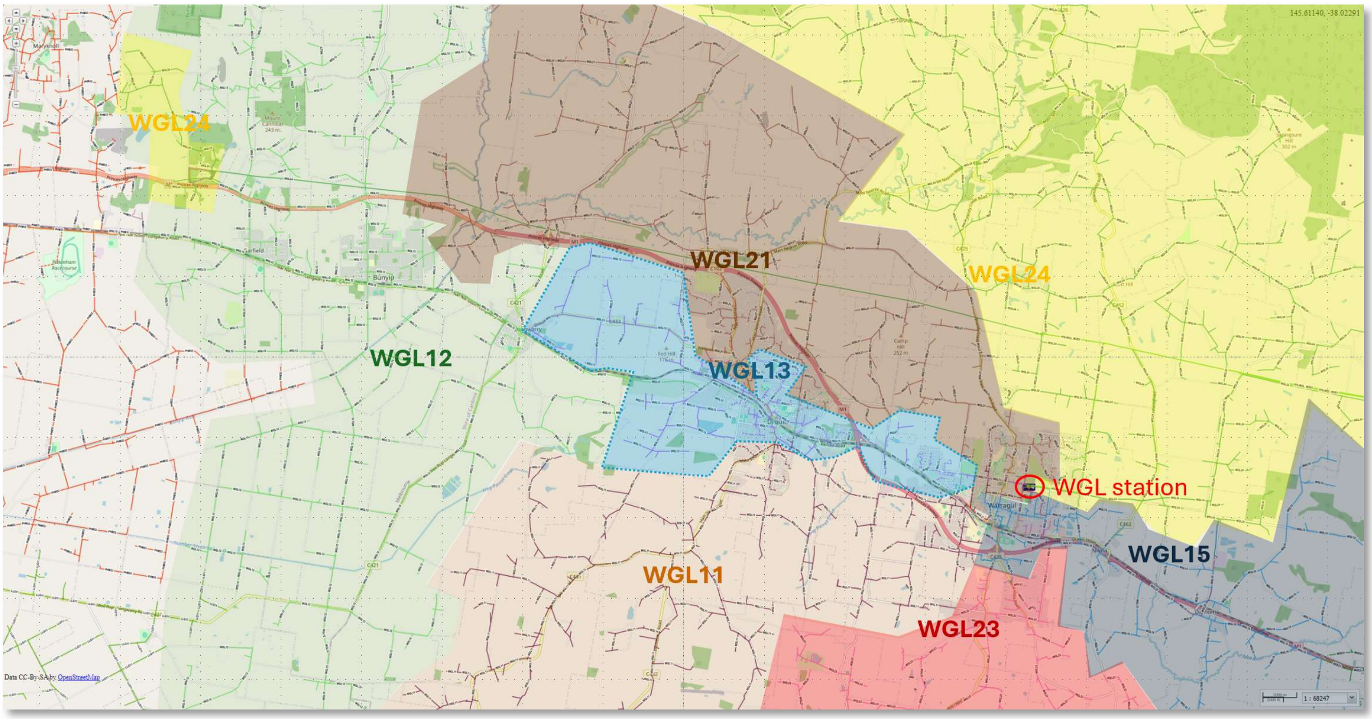

Figure 3: Areas supplied by the key 22kV feeders – WGL11, WGL12, WGL13, WGL15, WGL21, WGL23, WGL24

[6] WGL14 and WGL22 (excluded from this study).

The existing 22kV distribution feeders and their details are presented in Table 2 below:

Table 2: Existing 22kV distribution network in the Shire of Baw Baw

Feeder Name	Voltage (kV)	Length (km)	Winter Design Line Rating (A)	Winter Design Line Rating (MVA)	Summer Design Line Rating (A)	Summer Design Line Rating (MVA)
WGL11	22	176.9	396	15.1	365	13.9
WGL12	22	311.0	396	15.1	365	13.9
WGL13	22	72.2	365	13.9	325	12.4
WGL15	22	118.4	365	13.9	360	13.7
WGL21	22	193.6	396	15.1	365	13.9
WGL23	22	166.0	305	11.6	215	7.8
WGL24	22	461.1	396	15.1	365	13.9

2.1. Demand forecast

According to the Department of Transport and Planning for future urban development, the expected numbers of residential dwellings and industrial and commercial land yields are shown in Table 3 below. Table 3 shows that the Shire of Baw Baw is expected to yield 17,068 residential dwellings and 80 hectares of employment land comprising a combination of industrial and commercial developments.

Table 3: Precinct yields[7]

Precinct	LGA	Number of dwellings	Employment land (hectares)
Warragul	Baw Baw	7,776	10.3
Drouin	Baw Baw	7,312	4.7
Trafalgar	Baw Baw	1,980	33.2
Longwarry	Baw Baw	-	24.3
Yarragon	Baw Baw	-	2.9
Neerim South	Baw Baw	-	1.7
Thorpdale	Baw Baw	-	2.9
	Total	**17,068**	**80**

Based on the total number of residential dwellings and employment land areas, the ultimate demand requirements for Ausnet Services' network are estimated and provided in Table 4 below.

Table 4: Ultimate Load Requirements[3]

Precinct	Number of dwellings	Employment land (hectares)	Demand (MVA)
Warragul	7,776	10.3	34.25
Drouin	7,312	4.7	31.89
Trafalgar	1,980	33.2	10.68
Longwarry	-	24.3	1.56
Yarragon	-	2.9	0.19
Neerim South	-	1.7	0.11
Thorpdale	-	2.9	0.19
Total	**17,068**	**80**	**78.89**

[7] Source: Greenfield land supply in regional Victoria 2021 (planning.vic.gov.au)

[3]Notes:

- 5.4kVA per dwelling is adopted for dwellings.
- 6MVA per km² is adopted for industrial load and 12MVA per km² for commercial load. The employment lands are expected to have 67% of the industrial load and 33% of the commercial load.
- Loads are diversified at 80%.
- Supply of residential lots is 30 years.

When fully developed beyond 2053, it is expected that the development areas in the Shire of Baw Baw will result in a new load in the order of 78.89 MVA being added to AusNet Services' electricity network. The growth areas are highlighted in pink in Figure 4.

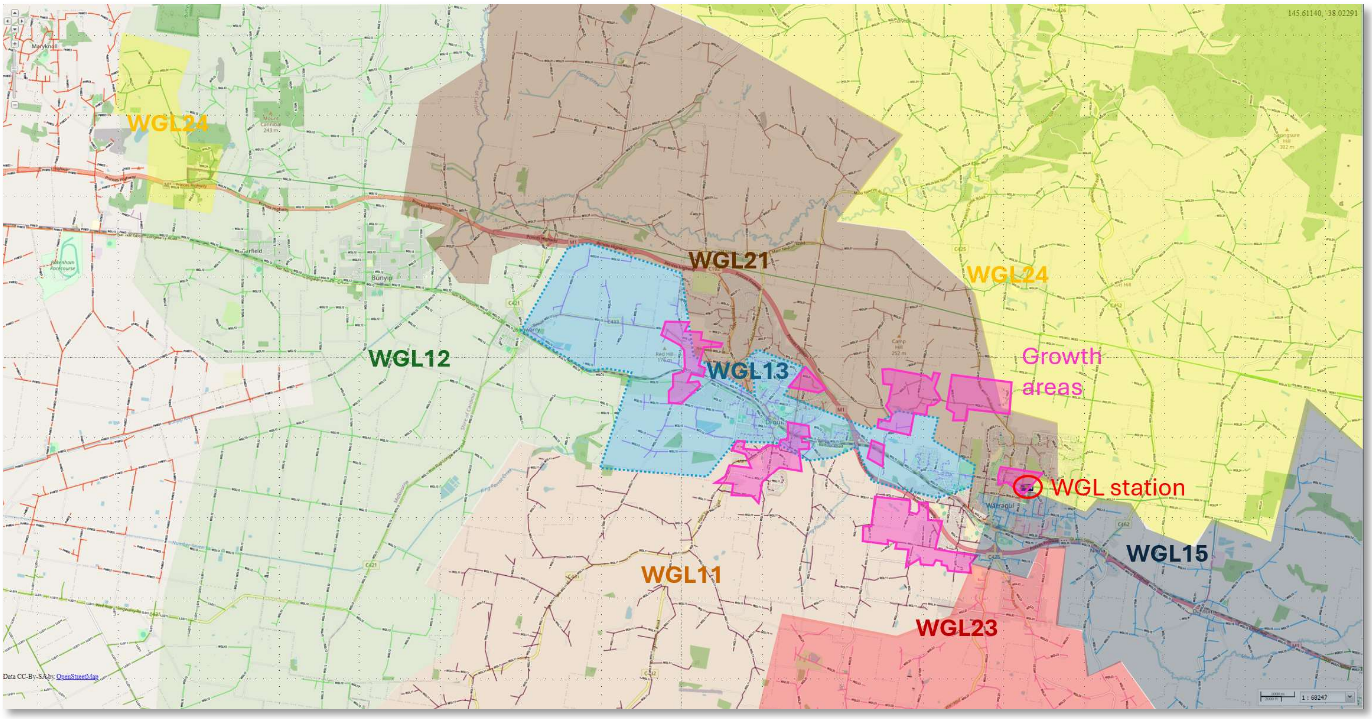

Figure 4: Growth areas (pink)

Based on this load demand growth information of future economic trends in the area, including information from government agencies regarding identified growth areas and other factors, 50% probability of exceedance (POE) and 10% POE summer maximum demand forecasts for the 22kV distribution feeders supplying the Shire of Baw Baw are produced and shown in Table 5 and Table 6.

Table 5: 50% POE Maximum Demand Forecast (MVA) -Summer

22kV feeder	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2053
WGL11	10.0	10.3	10.5	10.8	11.0	11.3	11.6	11.9	12.2	12.5	12.8	13.1	13.4	13.7	13.7	13.7
WGL12	9.7	10.0	11.8	13.6	15.5	17.4	19.3	19.7	20.1	20.4	20.8	21.2	21.6	22.0	22.2	20.8
WGL13	12.3	12.8	13.7	14.5	15.0	15.6	16.3	17.0	17.9	18.8	19.7	19.9	20.1	20.3	20.6	20.6
WGL15	9.7	9.8	9.9	10.0	10.2	10.3	10.4	10.6	10.7	10.9	11.0	11.2	11.3	11.5	11.5	11.5
WGL21	11.1	11.4	11.7	12.1	12.4	12.8	13.2	13.6	13.9	14.3	14.7	15.1	15.5	15.9	15.9	15.9
WGL23	2.9	2.9	2.9	3.0	3.0	3.1	3.1	3.2	3.2	3.3	3.3	3.4	3.4	3.4	3.4	3.4
WGL24	9.9	10.2	10.5	10.9	11.2	11.5	11.9	12.2	12.6	12.9	13.3	13.7	14.0	14.3	14.3	14.3

Table 6: 10% POE Maximum Demand Forecast (MVA) - Summer

22kV feeder	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2053
WGL11	10.8	11.1	11.3	11.6	11.9	12.2	12.5	12.8	13.2	13.5	13.8	14.2	14.5	14.8	14.8	14.8
WGL12	10.8	11.1	12.9	14.8	16.8	18.7	20.6	21.0	21.4	21.8	22.3	22.7	23.2	23.6	23.8	23.8
WGL13	13.3	13.8	14.7	15.6	16.1	16.6	17.3	18.1	19.0	20.0	20.9	21.1	21.4	21.6	21.8	21.8
WGL15	10.6	10.7	10.8	11.0	11.1	11.2	11.4	11.6	11.7	11.9	12.0	12.2	12.4	12.5	12.5	12.5
WGL21	12.3	12.6	12.9	13.3	13.7	14.2	14.6	15.0	15.5	15.9	16.3	16.8	17.2	17.6	17.6	17.6
WGL23	3.1	3.2	3.2	3.3	3.3	3.3	3.4	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.7	3.7

WGL24	10.6	10.9	11.3	11.6	12.0	12.3	12.7	13.1	13.5	13.9	14.3	14.7	15.1	15.4	15.5		15.5

2.2. Limitations of existing infrastructure

To ensure that 22kV feeders capability is maintained, the forecasted maximum demand given in Table 5 and Table 6 should not exceed the 22kV feeder design ratings from Table 2. From this perspective, the most critical 22kV feeder in the area is WGL13. The capacity of the existing WGL13 22kV feeder at times of maximum demand will be entirely utilised by 2025, which will result in a load at risk from 2025 onwards (Table 7 and Figure 5). Furthermore, the capacity of WGL21, WGL12 and WGL24 feeders will gradually decrease.

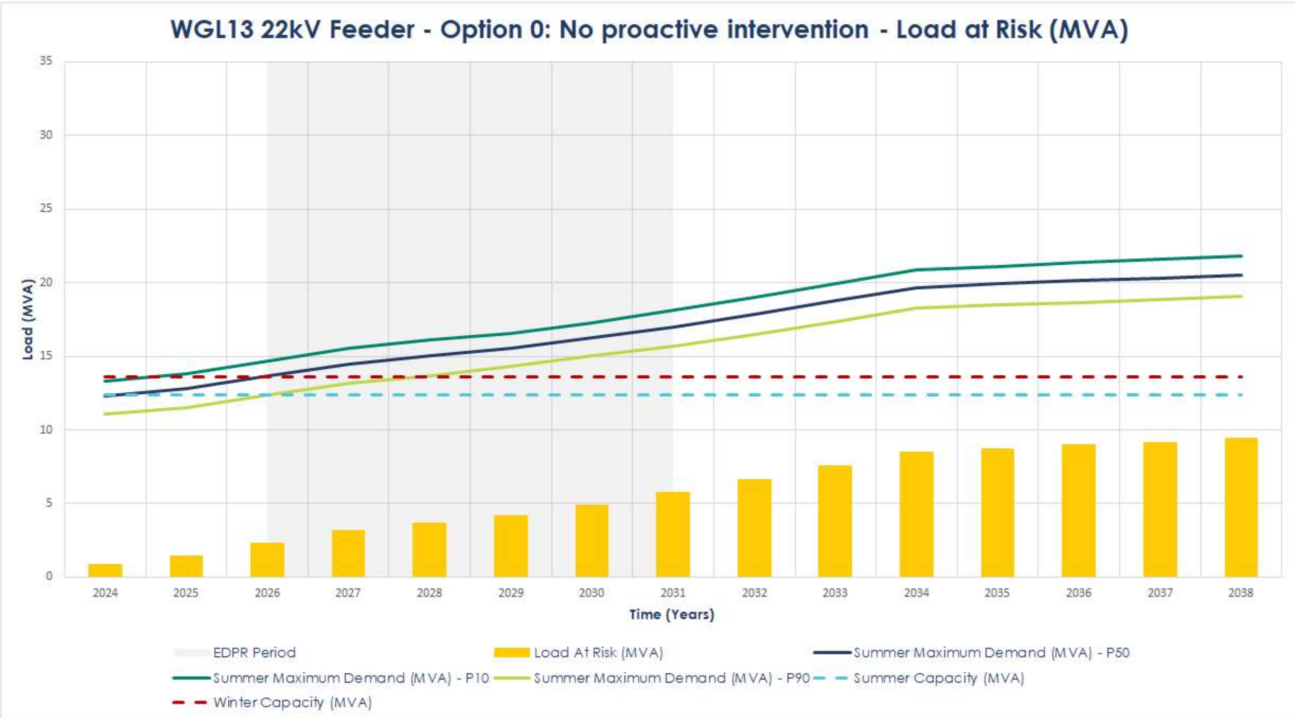

Figure 5: WGL13 - Load at Risk (MVA)

From 2029, there will be a large amount of load at risk and ultimately sustained involuntary load shedding to maintain network loading within network capabilities to avoid damaging assets and risking personnel and public safety, resulting in considerable unserved energy and loss of supply. A long-term solution to address the load at risk at WGL13 and other 22kV feeders in the area will be required from 2029. Extreme weather events and associated incidents, including periods of extreme heat or cold, may cause an exceedance of this capacity earlier than expected.

Table 7: WGL13 - Load @ Risk (MVA) - Tabular view

Timeline	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		2053
WGL13 – POE90 Summer MD (MVA)	11.1	11.6	12.4	13.2	13.7	14.4	15.0	15.7	16.5	17.4	18.3	18.5	18.7	18.9	19.1		19.1
WGL13 - POE50 Summer MD (MVA)	12.3	12.8	13.7	14.5	15.0	15.6	16.3	17.0	17.9	18.8	19.7	19.9	20.1	20.3	20.6		20.6
WGL13 – POE10 Summer MD (MVA)	13.3	13.8	14.7	15.6	16.1	16.6	17.3	18.1	19.0	20.0	20.9	21.1	21.4	21.6	21.8		21.8
Firm Capacity (MVA)	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4		12.4
Total Capacity (MVA)	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6		13.6
Load @ Risk (MVA)	0.9	1.4	2.3	3.2	3.7	4.2	4.9	5.7	6.6	7.6	8.5	8.7	9.0	9.2	9.4		9.4

2.3. Summary of identified need

AusNet Services has identified a need to increase the ability of the 22kV network to supply the forecast demand in the Shire of Baw Baw and manage the increasing risk of load shedding on the 22kV feeders beyond 2029. Meeting this identified need is expected to result in an increase in producer and consumer surplus (a net economic benefit to all those who produce, consume and transport electricity in the NEM), primarily by reducing the cost of expected unserved energy by more than the proposed preferred solution's cost, including implementation, operating and maintenance costs. Consequently, the investment in increased capacity will deliver the market benefit by reducing the amount of involuntary load shedding in line with Section 5.17.1 of the NER. The Expected Unserved Energy (EUE) and community cost are described in Section 3.2.

3. Options considered

This section outlines the options that were considered in the long-term interests of consumers, including a "no proactive intervention" counterfactual option to assist overall comparison. These include all substantially differing commercially and technically credible options, including non-network and new technology solutions. Credible options (or a group of options) are those that meet the following criteria:

- addresses the identified need,
- is (or are) commercially and technically feasible, and
- can be implemented in sufficient time to meet the identified need.

The forecasted load requirements and limitations of existing infrastructure necessitate the investigation of additional supply options to address the loading of assets above their ratings in the West Gippsland area.

The options analysed to address identified need are as follows:

- Option 0: No proactive intervention
- Option 1: Construct a new 22kV feeder by utilising the existing WGL11 route
- Option 2: Construct a new 22kV feeder by utilising the existing WGL24 route
- Option 3: Construct 5MW/10MWh Battery Energy Storage System (BESS)
- Option 4: Contract external network support services to defer network investment

Each credible option is further elaborated in the subsequent chapter.

Options considered but not progressed

A WGL13 feeder exit cable upgrade to a higher rating ("jumbo feeder") has been considered, but it is deemed a non-credible option as approximately 15 km of the WGL13 backbone would have to be upgraded in addition to the feeder exit cable upgrade. Additionally, the WGL12 and WGL13 share the same route.

Large area reconfiguration and building additional ties have also been considered, but it is deemed a non-credible option as all other feeders in the area are capacity-constrained (details provided in Section 2.2).

Construction of a new zone substation in Longwarry has also been considered. Given that the WGL station is currently going through the capacity augmentation, it is expected that there will be sufficient capacity at the station level by FY31.

3.1. Assessment approach

The NER states that quantifiable economic market benefits include changes in involuntary load shedding. The quantified costs and benefits described in this section included this benefit in determining the best option. AusNet Services Distribution Network Planning Standards and Guidelines[8] were used to estimate the involuntary load shedding that can be prevented by proactive action. The estimated involuntary load shedding was utilised by the cost-benefit analysis (CBA) along with a Value of Customer Reliability (VCR) to calculate a market benefit. The VCR is an estimation of the value that customers place on a reliable electricity supply. This value is equivalent to the cost to consumers of having their electricity supply interrupted for a short time. No other identified risks were included in the CBA.

[8] Publicly available in Section 3.8 from Distribution Annual Planning Report (ausnetservices.com.au)

The key assumptions used in the CBA are:

- A study period of 30 years, with FY2024 being the first year of analysis and base year for dollar inputs.
- The commercial discount rate was set to 5.56% based on average of 4.11% and AEMO's IASR central scenario discount rate of 7%.
- A VCR of $43,802 per MWh was used in the analyses, comprising 43% residential, 39% commercial and 15% industrial and 2% agricultural loads. This estimation is based on the WGL13 energy usage profile in the last calendar year (i.e. CY2023).
- Asset life is assumed to be 45 years and battery life 15 years.
- The benefits of options are based on the avoided expected unserved energy.
- NPV is based on the parameters specified for the base case.

3.2. Option 0: No proactive intervention

This chapter analyses the risks and benefits of taking no proactive interventions or maintaining the status quo. The option connects the proposed loads to the existing 22kV distribution feeders and analyses the impact on network capacity and unserved energy. The consequence of not proceeding with any investment in the area supplied by the 22kV WGL feeders will result in significant unserved energy due to the existing feeders being constrained and incapable of supplying the forecast demand, as shown in Figure 6 and Table 8.

In terms of risk/cost assessment, the no proactive intervention option provides a base case, where the risks are valued by applying a VCR to the forecast expected unserved energy.

Without proactive intervention, a risk of unserved energy will remain, as shown in Figure 6 and Table 8, resulting in AusNet Services being unable to provide supply security in the growth area of Warragul and Drouin. In addition to the risk of unserved energy to existing customers, the option of no proactive intervention will also prevent connecting new customers to AusNet Services' network. This would directly violate AusNet Services' obligation to connect customers as per the NER. There are also substantial reputational risks and stakeholder dissatisfaction if AusNet Services cannot meet supply requirements for this high-growth area.

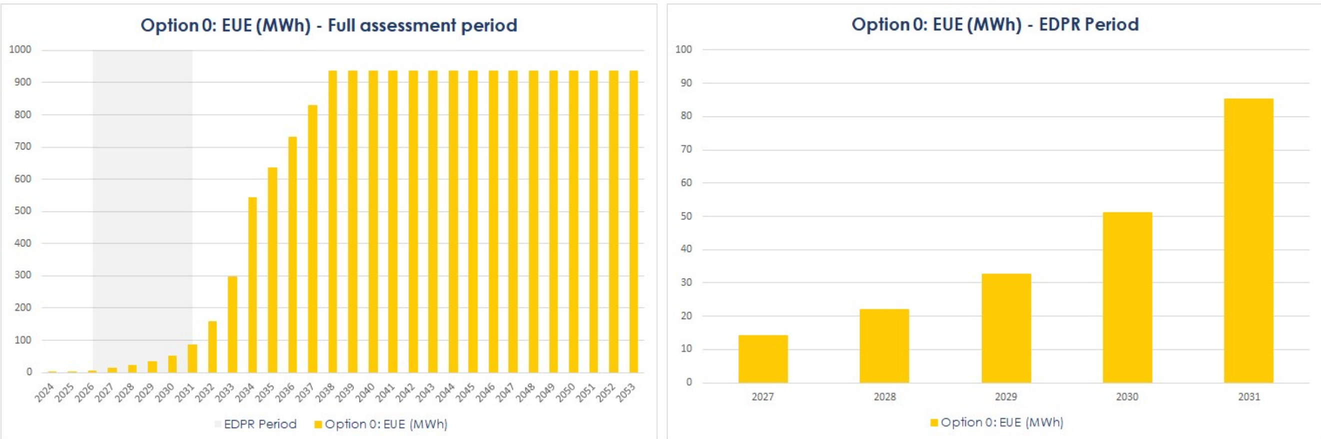

Figure 6: EUE as a result of "no proactive intervention" – Graphical view

Table 8: EUE as a result of "no proactive intervention" – Tabular view

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		2053
EUE (MWh)	0.6	1.6	5.7	14.2	22.0	32.7	51.1	85.3	157.2	297.3	542.0	635.9	730.3	828.0	937.3		937.3
EUE Value ($M)	0.0	0.1	0.2	0.6	1.0	1.4	2.2	3.7	6.9	13.0	23.7	27.9	32.0	36.3	41.1		41.1

3.3. Option 1: Construct a new 22kV feeder by utilising the existing WGL11 route

3.3.1. Scope

Option 1 proposes constructing a new 22kV feeder from the WGL station, which is the nearest to the proposed major development areas. The new feeder is expected to be commissioned by 2029 and will be known as the WGL31 feeder. A feeder route marked can provide a new feeder route using a spur of WGL11. Figure 7 illustrates the proposed feeder route. The new feeder will offload the existing WGL13 feeder and provide additional support to WGL12, WGL21, and WGL24, which are also close to be constrained. The route length of the overhead 22kV feeder from WGL station is approximately 10.6 km.

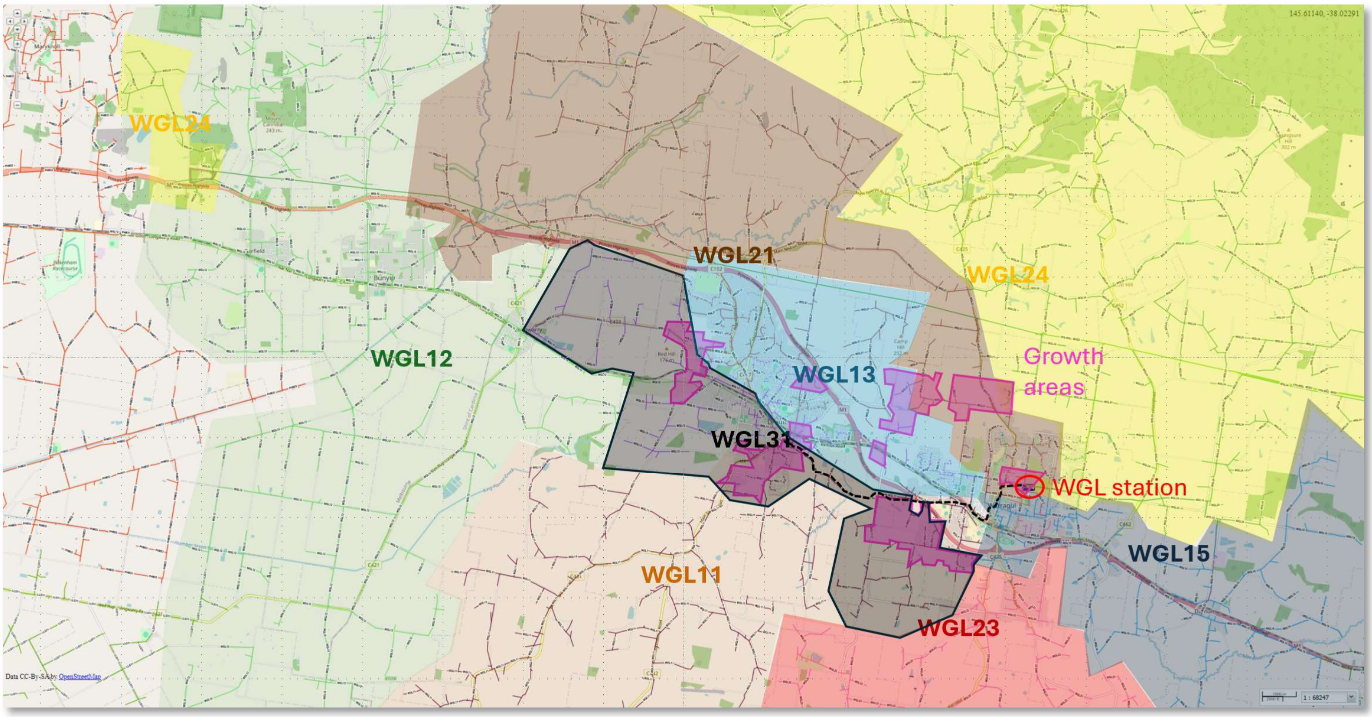

Figure 7: New WGL31 22kV feeder route (dashed black line) and its proposed supply area (black)

Construction of a new 22kV feeder from WGL will provide network benefits by offloading WGL13, as the load from southern and western portions of Drouin precincts can be transferred to the new feeder. The load supplied by WGL13 will be reduced as well as the expected unserved energy (Figure 8). From 2029 onwards, there will be no expected unserved energy on WGL13.

All 22kV feeder bays in WGL station are utilised to supply distribution feeders, with no spare bays available. An extension of the busbar to accommodate a new WGL31 feeder bay will be required, coupled with the installation of a new circuit breaker and a new feeder exit cable of 500 metres. The alternative, low-cost option of consolidating feeders to release a feeder bay for the new 22kV feeder is not recommended due to reliability concerns.

A high-level scope includes:

- Installation of a new 22kV bus, including a new 22kV switch room and required 22kV switchgear, a new 22kV feeder and a capacitor bank.
- Construction of a single 10.6 km of new feeder backbone from WGL substation (new bus feeder) along the existing path of WGL11 (31-39 Main south Rd, Drouin VIC),
- Installation of a new switch/sectionaliser near WL265.

This option provides the required network capacity in full and manages the unserved energy risk using a traditional augmentation solution. The option proposes the construction of a new feeder from WGL ZS in 2029 as per optimal timing analysis. In summary, Figure 9 and Table 9 present a cumulative impact of the investments proposed under this option on expected unserved energy compared to the base case ("no proactive intervention").

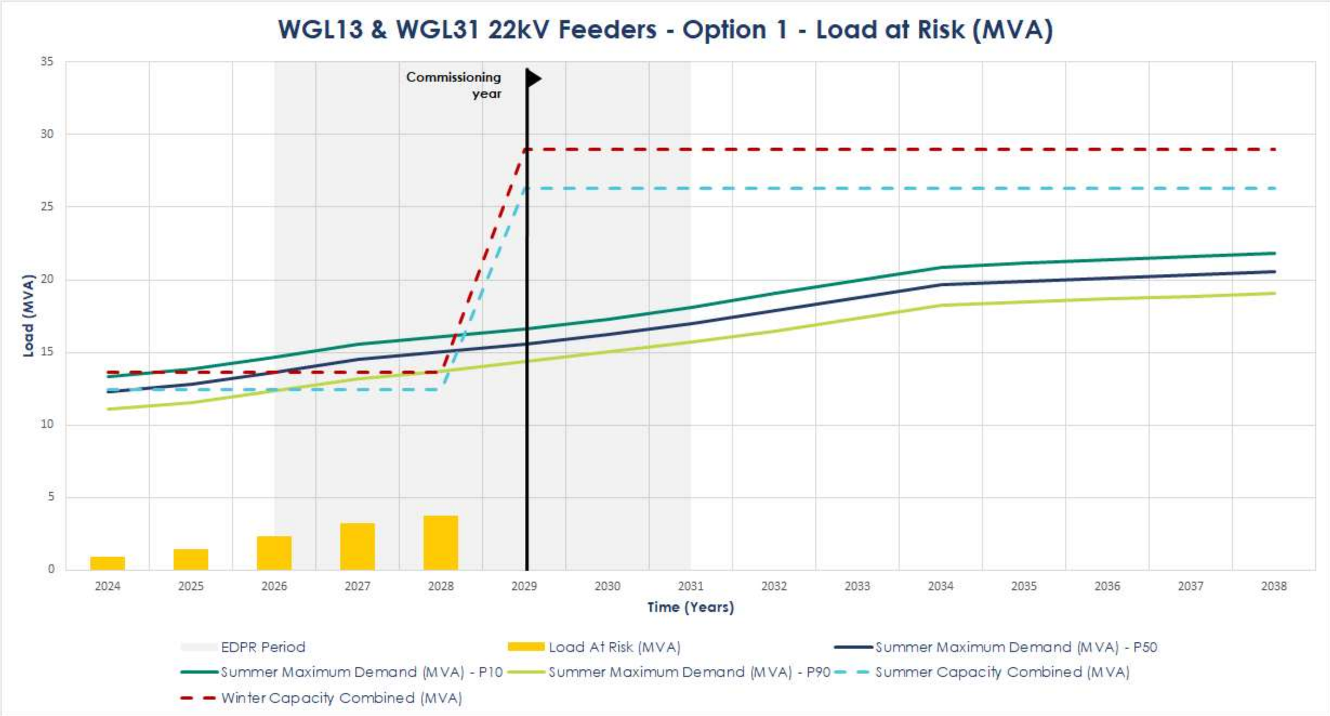

Figure 8: Option 1 - WGL13 & WGL31 - Load @ Risk (MVA) - Graphical view

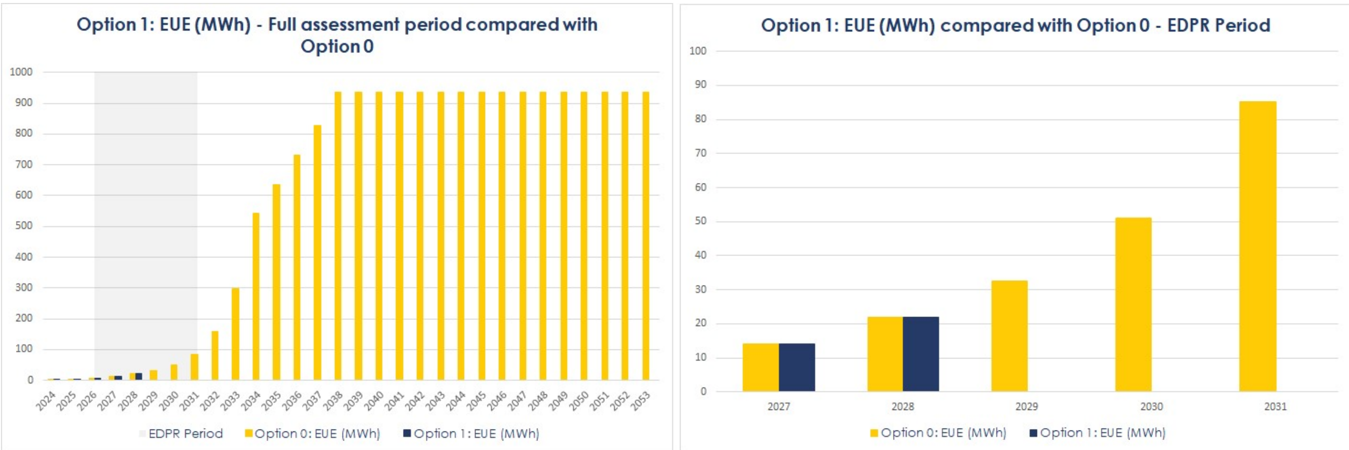

Figure 9: Option 1 - EUE results compared with no proactive intervention – Graphical view

Table 9: EUE as a result of Option 1 intervention – Tabular view

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		2053
WGL13 EUE (MWh)	0.6	1.6	5.7	14.2	22.0	-	-	-	-	-	-	-	-	-	-		-
WGL31 EUE (MWh)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
WGL13 EUE Value ($M)	0.0	0.1	0.2	0.6	1.0	-	-	-	-	-	-	-	-	-	-		-
WGL31 EUE Value ($M)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-

3.3.2. Cost

The total estimated value of the capital cost of Option 1 is **$21.5M**. The cost is spread over two years to align with construction timelines and is based on estimates provided by the estimating team. Commissioning of new equipment from Option 1 is planned for FY29. A summary of the capital cost can be found in Table 10.

Table 10: Capital cost summary (undiscounted, real June 2024 dollars)

Year	FY27	FY28	FY29	FY30	FY31
Option 1	-	$10,750,145	$10,750,145	-	-

3.3.3. Benefits

The quantifiable economic market benefits include changes in involuntary load shedding. Unserved energy was used to estimate the involuntary load shedding that can be prevented because of the proactive action provided by this option.

The total present value of benefits over the full assessment period for Option 1 is **$293.5M**.

3.3.4. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in Table 11:

Table 11: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
1	**16.9**	**293.5**	**276.6**

3.4. Option 2: Construct a new 22kV feeder by utilising the existing WGL24 route

3.4.1. Scope

Option 2 proposes constructing a new 22kV feeder from the WGL station, which is closest to the proposed major development areas. The new feeder is expected to be commissioned by 2029 and will be known as the WGL31 feeder. Figure 8 illustrates the proposed feeder route.

The length of the overhead 22kV feeder from WGL station is approximately 5.5 km. The new feeder is expected to end where the existing WGL24 feeder will be disconnected. This option uses the existing WGL24 line, allowing WGL24 to expand further towards the east. This option also involves building a new connection point between WGL21 and the new WGL31 to relieve WGL21 (near Pole #2702780).

The new feeder will offload the existing WGL13 feeder and provide additional support to WGL12, WGL21, and WGL24, which are also close to be constrained.

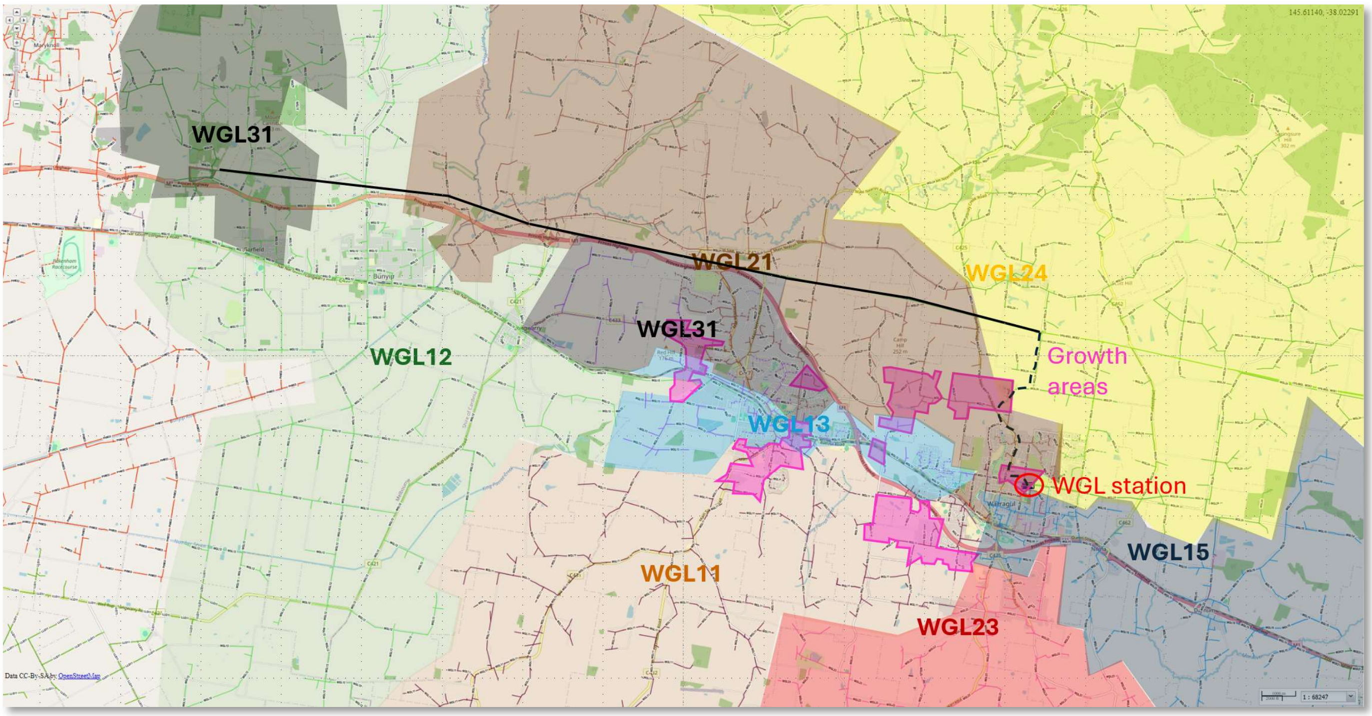

Figure 10: New WGL31 22kV feeder route (dashed black line) and its proposed supply area (black)

All 22kV feeder bays in WGL station are utilised to supply distribution feeders, with no spare bays available. An extension of the busbar to accommodate a new WGL31 feeder bay will be required, coupled with the installation of a new circuit breaker and a new feeder exit cable of 500 metres. The alternative, low-cost option of consolidating feeders to release a feeder bay for the new 22kV feeder is not recommended due to reliability concerns.

A high-level scope includes:

- Installation of a new 22kV bus, including a new 22kV switch room and required 22kV switchgear, a new 22kV feeder and a capacitor bank.
- Construct 5.5 km of new feeder backbone from WGL substation (new bus feeder) along the existing path of WGL21 and WGL24.
- Provide a new switch.
- Install a new line voltage regulator at this termination point.
- Provide a new switch to also augment the connection between WGL21 and WGL24 (near Pole #2702780).

This option provides the required network capacity in full and manages the unserved energy risk using a traditional augmentation solution. The option proposes the construction of a new feeder from WGL ZS in 2029 as per optimal timing analysis. The load supplied by WGL13 will be reduced as well as the expected unserved energy (Figure 11). From 2029 onwards, there will be no expected unserved energy on WGL13.

In summary, Table 9 and Figure 12 present a cumulative impact of the investments proposed under this option on expected unserved energy compared to the base case ("no proactive intervention").

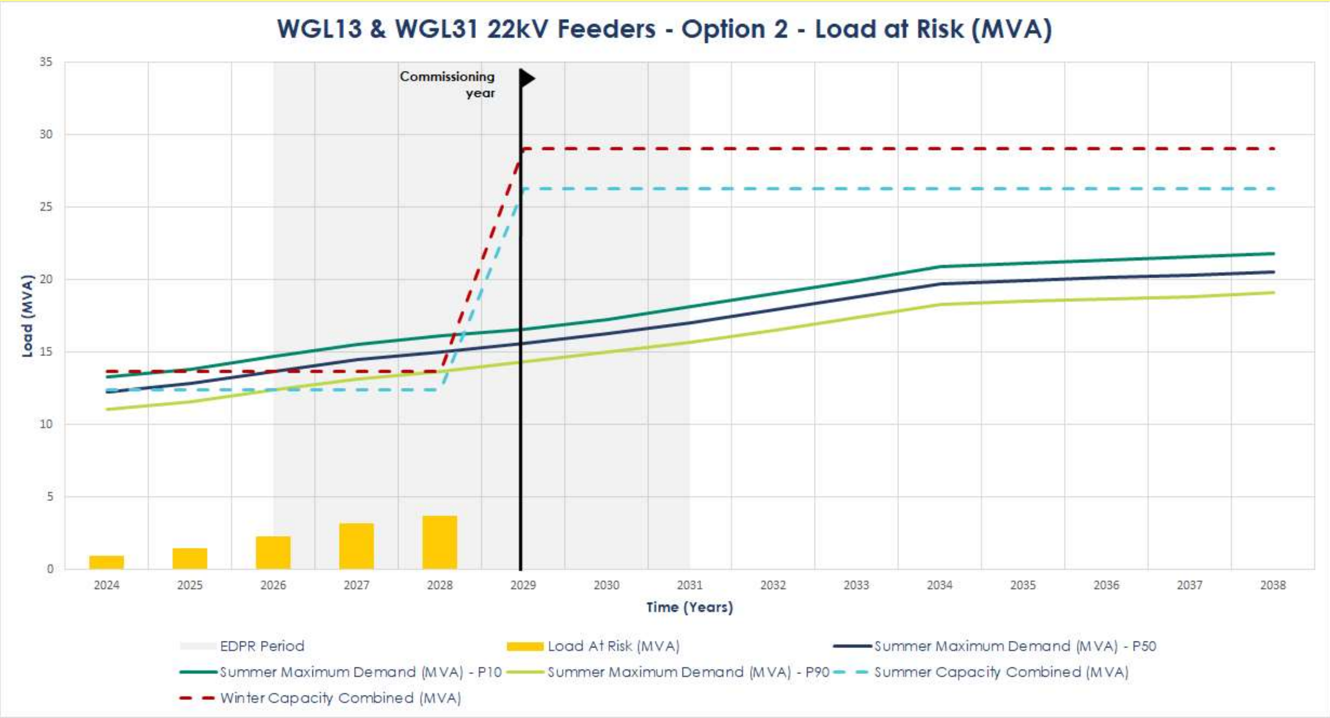

Figure 11: Option 2 - WGL13 & WGL31 - Load @ Risk (MVA) - Graphical view

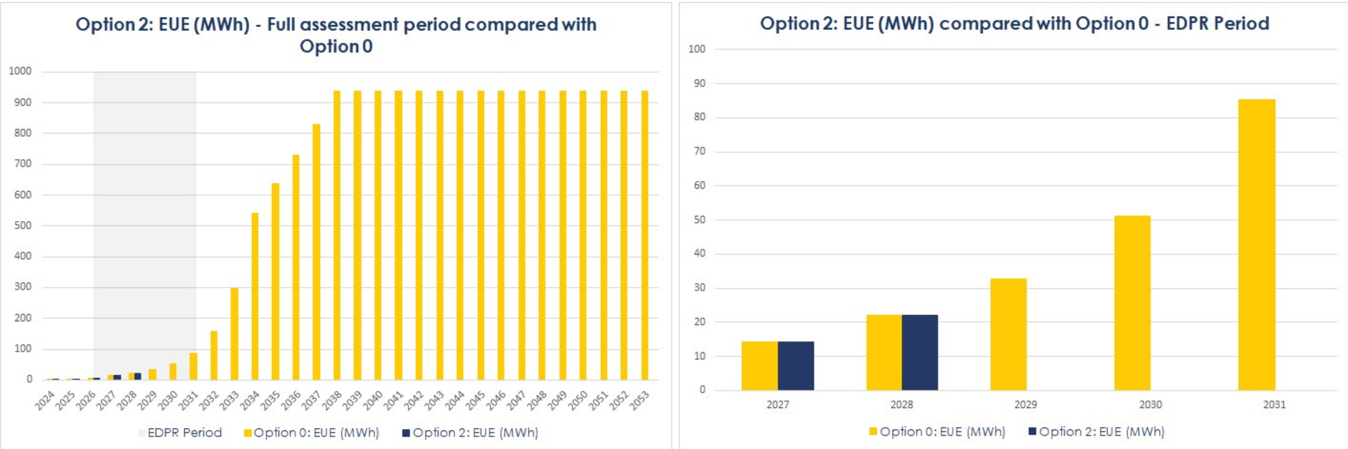

Figure 12: Option 2 - EUE results compared with no proactive intervention – Graphical view

Table 12: EUE as a result of Option 2 intervention – Tabular view

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		2053
WGL13 EUE (MWh)	0.6	1.6	5.7	14.2	22.0	-	-	-	-	-	-	-	-	-	-		-
WGL31 EUE (MWh)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
WGL13 EUE Value ($M)	0.0	0.1	0.2	0.6	1.0	-	-	-	-	-	-	-	-	-	-		-
WGL31 EUE Value ($M)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-

3.4.2. Cost

The total estimated value of the capital cost of Option 2 is **$16.3M**. The cost is spread over 18 months to align with construction timelines and is based on estimates provided by the estimating team. Commissioning of new equipment from Option 2 is planned for FY29. A summary of the capital cost can be found in Table 10.

Table 13: Capital cost summary (undiscounted, real June 2024 dollars)

Year	FY27	FY28	FY29	FY30	FY31
Option 2	-	$11,412,660	$4,891,140	-	-

3.4.3. Benefits

The quantifiable economic market benefits include changes in involuntary load shedding. Unserved energy was used to estimate the involuntary load shedding that can be prevented because of the proactive action provided by this option.

The total present value of benefits over the full assessment period for Option 2 is **$293.5M**.

3.4.4. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in Table 11:

Table 14: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
2	**12.9**	**293.5**	**280.6**

3.5. Option 3: Construct 5MW/10MWh Battery Energy Storage System (BESS)

3.5.1. Scope

Option 3 proposes establishing a 5MW/10MWh Battery Energy Storage System (BESS) by 2030 to defer any investment in the network solution. This option is for AusNet Services to fully own, build and operate a grid-connected battery at the existing WGL zone substation site. Although more expensive than a traditional network solution per MVA basis, BESS has advantages over a conventional network solution, such as being modular and re-deployable.

Figure 13 and Figure 14 present how this option will reduce the load at risk and expected unserved energy at the WGL13 feeder compared to the base case ("no proactive intervention"). This option results in an additional capacity of 5 MW by 2030 and can meet the forecasted demand until 2032, resulting in no to minimal expected unserved energy for this period (). Based on the current demand forecast, a 5MW/10MWh battery will provide two years of the new feeder build deferral.

After 2032, the EUE is expected to grow again, which will require further investment in the area to meet long-term requirements.

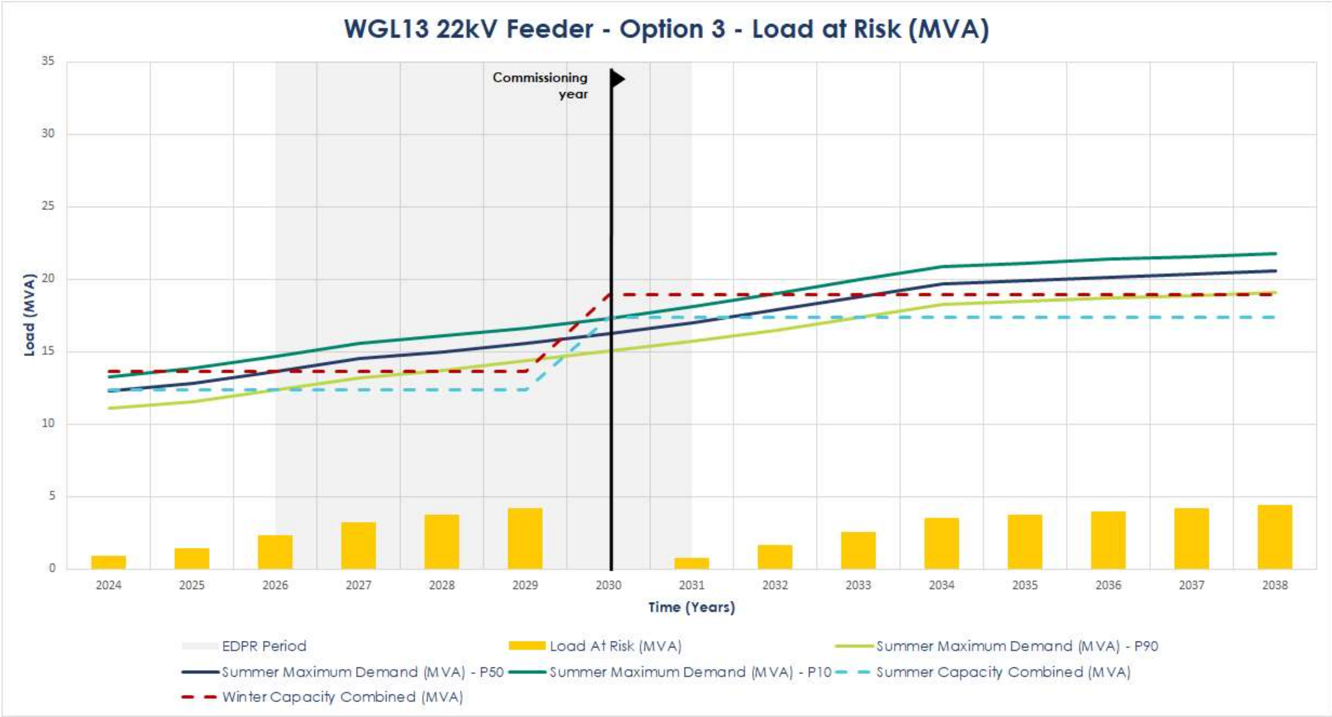

Figure 13: Option 3 - WGL13 - Load @ Risk (MVA) - Graphical view

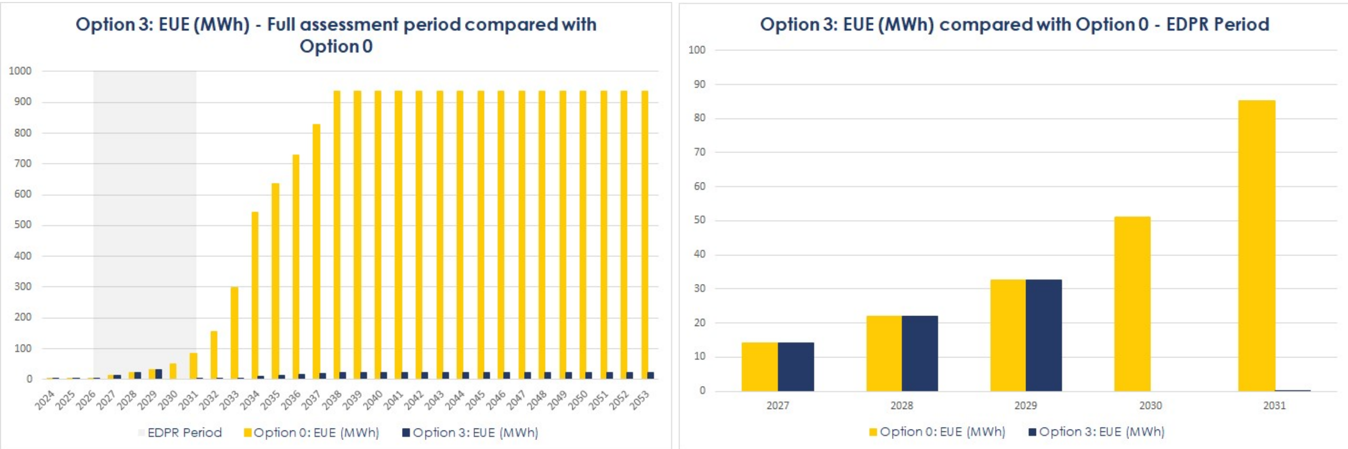

Figure 14: Option 3 -EUE results compared with no proactive intervention – Graphical view

Whilst the battery will be able to provide network support to mitigate load at risk in the short-term, existing regulations and ring-fencing guidelines prevent AusNet Services from accessing the same revenue stack as external unregulated businesses.

Although being modular and re-deployable, BESS can represent a more economic option in an environment of demand uncertainty or where demand is expected to increase for a short period and then decline. Deferring the network augmentation project provides an opportunity to reassess load growth forecasts over the coming financial years before committing to long-term network expenditures such as a new feeder. The Department of Transport and Planning's projections discussed in Section 2.1, and the number of enquiries received by AusNet Services indicate that the population and number of industrial customers in the West Gippsland area will rapidly increase in the upcoming years. A significant portion of land has already been reserved for greenfield developments.

Figure 15: EUE as a result of Option 3 intervention – Tabular view

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		2053
Option 3 EUE (MWh)	0.2	1.6	6.4	17.2	28.1	43.2	-	0.3	1.6	4.8	11.1	13.6	16.1	18.6	21.9		21.9
Option 3 EUE Value ($M)	0.0	0.1	0.2	0.6	1.0	1.4	-	0.0	0.1	0.2	0.5	0.6	0.7	0.8	1.0		1.0

3.5.2. Cost

The total estimated capital cost of Option 3 is **$22.0M**. The cost is spread over three years to align with construction timelines and is based on estimates provided by the estimating team. Commissioning of new equipment from Option 3 is planned for FY30. A summary of the capital cost can be found in Table 15.

Table 15: Capital cost summary (undiscounted, real June 2024 dollars)

Year	FY27	FY28	FY29	FY30	FY31
Option 1	-	$7,333,333	$7,333,333	$7,333,333	-

3.5.3. Benefits

The quantifiable economic market benefits include changes in involuntary load shedding. Unserved energy was used to estimate the involuntary load shedding that can be prevented because of the proactive action provided by this option.

The total present value of benefits over the full assessment period for Option 3 is **$285.9M**.

3.5.4. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in Table 16:

Table 16: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
3	**16.8**	**285.9**	**269.1**

3.6. Option 4: Contract network support services to defer network investment

3.6.1. Scope

The NER require DNSPs to investigate non-network and new-technology options by utilising a consultation process as part of planning for major network augmentations. A credible non-network and new-technology option are those that meet the following criteria:

- able to form a credible stand-alone option (i.e., without being combined with a network solution), or
- able to defer the network investment.

3.6.1.1. Requirements that a non-network option would need to satisfy

This section outlines the technical characteristics of the identified need that a non-network and new technology solution via network support services would be required to deliver, along with an indication of the maximum fee that AusNet Services could pay to a network support proponent to mitigate the identified risks. The specific network support requirements are presented in the Table, which outlines the following:

- Peak load reduction or network support requirement (MVA), which is the MVA network support response that would be required to mitigate the entire risk at the peak risk time, noting that the risk level will vary throughout the year with demand.
- Maximum availability requirement (hours of support).
- Average expected network support response (MWh), which is the average volume of support that is expected to be required each year.

- Potential value of network support ($M), which is based on the probability-weighted annualised service level risk cost of each limitation and represents the maximum fee that AusNet Services could pay to a network support proponent, completely mitigating the associated service level risk.

Table 17: Network support requirements for WGL13 thermal risk mitigation

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		2053
Average expected network support (MWh)	0.6	1.6	5.7	14.2	22.0	32.7	51.1	85.3	157.2	297.3	542.0	635.9	730.3	828.0	937.3		937.3
Potential value of network support ($M)	0.0	0.0	0.1	0.2	0.4	0.6	0.9	1.5	2.8	5.2	9.5	11.1	12.8	14.5	16.4		16.4

3.6.1.2. Qualitative assessment of specific non-network and new technology options

Table 18 summarizes non-network and new technology options for meeting the requirements of Section 3.6.1.1. The analysis outlined in the following sections found at least two credible non-network options (BESS, Commercial Direct Load Control, Behavioural Demand Response). These options need to be further evaluated using the screening test in the RIT-D process.

Table 18 - Non-network and new-technology solutions

Non-network and new-technology option	Potential outcomes	Qualitative assessment	Comments
Grid-Scale Storage (5 MW /10 MWh)	Potentially defers the network investment	✓	A feasible option and should be investigated further as it could defer the network investment into the next regulatory cycle. However, this option requires a large capacity augmentation to enable connection to the NEM and commercial operation. This augmentation would have a similar cost to the network options. The operating life of the BESS (15 years) is much shorter than the network asset life (45 years).
Virtual Power Plant (VPP)	Defers the network investment by one year	✗	Not feasible as the required capacity is large for this solution and requires a significant storage uptake on WGL13, WGL11, WGL12 and WGL21 by 2029.
Residential BESS aggregation	Defer the network investment by two years	✗	Not feasible as the required capacity is large for this solution and requires a significant uptake of residential BESS on WGL13, WGL11, WGL12 and WGL21 by 2029.
Commercial Direct Load Control	Defer the network investment by two years	✓	A feasible option and should be investigated further. There is 39% of commercial and 15% of industrial customers in the area. However, the deferred network investment may still fall within the FY27-31 regulatory cycle.
Behavioural Demand Response	Defer the network investment by one year	✓	Behavioural Demand Response could be a feasible option to defer network investment if there is sufficient participation from existing customers and should be investigated further. However, the deferred network investment may still fall within the FY27-31 regulatory cycle.

3.6.2. Benefits

The quantifiable economic market benefits include changes in involuntary load shedding. Unserved energy was used to estimate the involuntary load shedding that can be prevented because of the proactive action provided by this option.

The total present value of benefits over the full assessment period for Option 4 is **$177.1M**.

3.6.3. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in the following Table 19:

Table 19: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
4	118.0	177.1	59.0

4. Recommended Option

Figure 16 below sets out the credible options considered together with the option Base Case - "no proactive intervention" to assist with the overall comparison. Option 2 represents the highest value (economic benefit), being NPV positive of **$280.6 Million** compared to other options, even with the sensitivity & scenarios considered in Section. This option allows AusNet Services to provide the most efficient, reliable, and safe supply services in the long-term interest of its customers. Hence, Option 2 is the preferred long-term network configuration for the project's overall scope.

Figure 16: CBA of credible options

Option	Description	Solution Type	PV Benefits[2] ($M)	PV Cost[3] ($M)	NPV[4,5] ($M)	Rank	Assessment
0	No proactive intervention	Base case	-295.1	-	-295.1	5	Non-preferred as will lead to unacceptable risk and higher customer costs if the opportunity is not captured.
1	Construct a new 22kV feeder by utilising the existing WGL11 route	Network solution	293.5	16.9	276.6	2	Non-preferred as it will not deliver the most optimal long-term configuration of the 22kV network.
2	**Construct a new 22kV feeder by utilising the existing WGL24 route**	**Network solution**	**293.5**	**12.9**	**280.6**	**1**	**Preferred long-term option as it will deliver the highest net economic benefits and most optimal configuration of the 22kV network.**
3	Construct 5MW/10MWh Battery Energy Storage System (BESS)	Non-network and new-technology solution	285.9	16.8	269.1	3	Non-preferred as it will lead to high upfront investment costs and much shorter operating life compared to the network solution.
4	Contract external network support services to defer network investment	Non-network and new-technology solution	177.1	118.0	59.0	4	Non-preferred as it results in high operating costs and low net benefits from deferring investment in a network solution.

[2,3,4,5] **Notes:**
2: PV of total costs, both capital expenditure (Capex) and operational expenditure (Opex).
3: PV of total quantified benefits, both risks mitigated, and any forecast decrease in Capex or Opex arising from undertaking the investment.
4: NPV represents the difference between PV Benefits and PV Investment Costs.
5: The breakdown of PV is based on the parameters specified for the base case (Section 3.1).

5. Sensitivity analysis

5.1.1. Sensitivity analysis

Sensitivity testing was undertaken to ensure that the NPV calculations of the options were robust to changes in key input parameters. This provides confidence that identifying the preferred option is the most prudent option for the project under changes to key variables.

The key variables included in the sensitivity analysis and shown below were:

- Discount rate used for the discounted cash flow in the evaluation
- Capital cost estimates
- VCR
- Demand forecast

Sensitivity testing was conducted on each of the options assessed under the CBA. Three scenarios were tested around key cost and benefit values ranging from low, baseline, and high benefits cases. The cases differ from the baseline case by +/- percentage. The variables were selected to vary under the scenario due to some uncertainty around the forecast assumption and the importance of the parameter in the calculation.

A summary of sensitivity investigated is provided in Table 20. The sensitivity assessment in Table 21 shows that when each scenario is run, the ranking remains the same, indicating Option 2 is still preferred.

Table 20: Variables

Variable	Base case	Low case (low benefits)	High case (high benefits)
Capital cost	Estimated network capital costs	25% increase in the estimated network capital costs	25% decrease in the estimated network capital costs
VCR	$43,802/MWh	$41,340[9]/MWh	$53,755[9]/MWh
Discount rate	5.56% (WACC)	7.00%	4.11%
Demand Forecast	Demand forecast (Section 2.1)	10% decrease in the demand forecast	10% increase in the demand forecast

Table 21: Weighted NPV for credible options considered

Option	Base Case – NPV ($M)	Low Case – NPV ($M)	High Case - NPV ($M)	Option rank
1	276.6	45.8	1,212.6	2
2	**280.6**	**49.5**	**1,216.1**	**1**
3	269.1	44.2	1,171.6	3
4	59.0	-38.2	-738.3	4

5.1.2. Proposed Investment Timing

Optimal timing analysis is based on the 'crossover' method described by the Australian Energy Regulator (AER). The method identifies the optimal year as the first year when net operating benefits are more significant than the annualised cost of an option (i.e., the 'crossover'). The optimal timing where the value of unserved energy from the 'No Proactive Intervention' scenario exceeds investment costs for Option 2 is 2029, as per Table 22 and Figure 17. This timing aligns with the proposed commissioning date of Option 2.

[9] Based on the AusNet's Customer Willingness to Pay research.

Table 22: Annualised cost and optimal commissioning year for Option 2

Option	Annualised Cost	Optimal Year
2	$993,529	2029

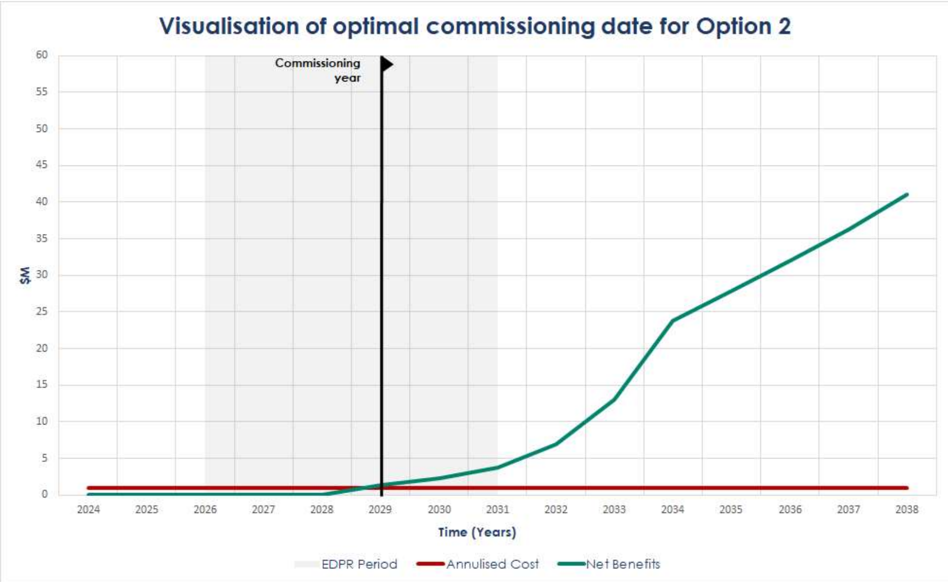

Figure 17: Visualisation of optimal commissioning year for Option 2

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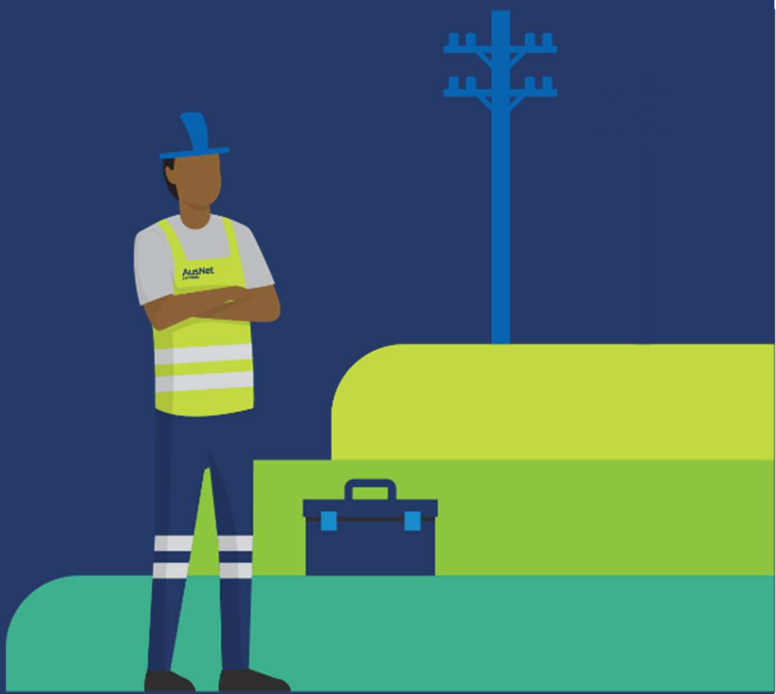

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