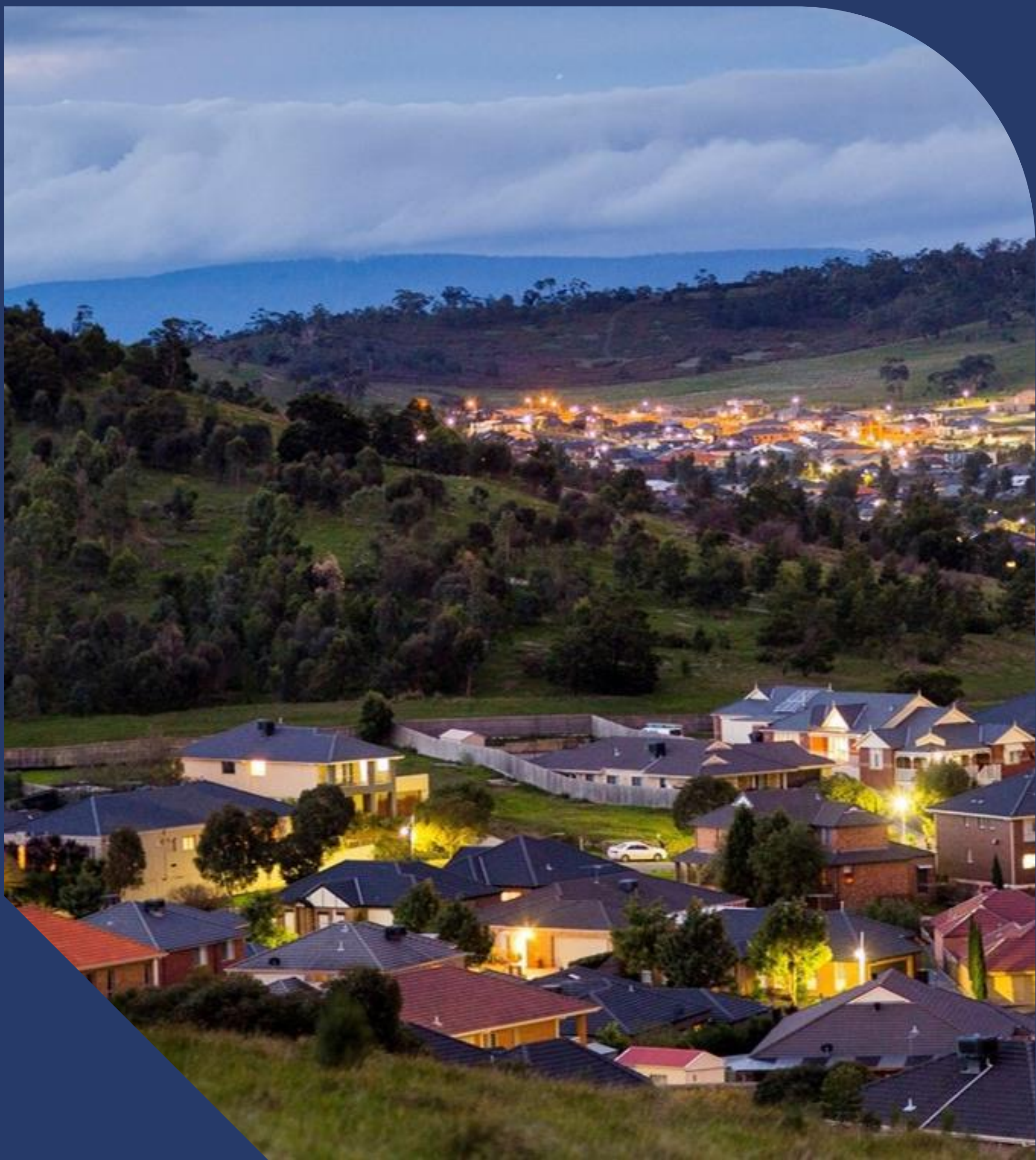
Electricity Distribution Price Review (EDPR 2026-31)

Supply security of Nagambie business case

Date: 31 January 2025



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BUSINESS USE ONLY

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 Nagambie, regional Victoria. 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.

Nagambie township is located in the Strathbogie Shire, approximately 135 kilometres north of Melbourne and 55 kilometres south of Shepparton along the Goulburn Freeway. Nagambie is located in a pastoral and agricultural region between Seymour and Shepparton along the Goulburn River, overlooking Lake Nagambie. The Nagambie Growth Management Strategy (2020) (NGMS)[1] identifies Nagambie as an urban locality that will continue to accommodate some moderate growth, largely as it provides lifestyle opportunities and is located near popular tourist attractions.

The current population of the Nagambie township is approximately 1,700 and is anticipated to grow at an average annual growth rate of 2.9% out to 2036, to a projected population of 4,000, which will result in 1,143 new dwellings. Population growth enables the delivery of supporting infrastructure, such as electricity services.

In addition to the anticipated residential growth, [

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The basis for this business case is the growth in demand from existing (brownfield) sites in the Nagambie for which AusNet Services have strong and credible forecast. Nagambie is served by a radial 22kV distribution feeder, SMR24, with limited interconnections with other distribution feeders.

AusNet Services has identified a need to increase the ability of the 22kV network to supply the forecast demand in Nagambie and manage the increasing risk of involuntary load shedding (National Electricity Rules (NER) 5.17.1(c)(4)(ii)) on SMR24 22kV feeder supplied by SMR station beyond 2030. 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 SMR24. 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.

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:

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[1] Source: https://www.strathbogie.vic.gov.au/images/Planning_strategies_and_reports/20200521_draft_Nagambie_Growth_Management_Strategy.pdf

- 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 to offload SMR24)** as it has the most significant economic benefit being Net Present Value (NPV) positive **$128.4 Million**. This option provides the greatest benefit by providing the most significant reduction in unserved energy, allowing SMR24 feeder to be offloaded and the greatest number of customers to connect. In addition, this option will provide a backup supply to Nagambie, offering reliability benefits. 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	Manage SMR24 capacity with mobile generators	Network solution	138.0	14.7	123.3	3	Not preferred as it will not address the identified need entirely and as it results in high operating costs.
2	**Construct a new 22kV feeder to offload SMR24 (new SMR11 feeder)**	**Network solution**	**137.6**	**9.2**	**128.4**	**1**	**Preferred long-term option as it will deliver the highest net economic benefits and additional reliability benefits.**
3	Construct a 2.5MW/5MWh Battery Energy Storage System (BESS)	Non-network and new-technology solution	136.4	9.6	126.8	2	Not preferred as it will not address the identified need entirely, it will lead to high upfront investment costs and a 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	82.8	55.2	27.6	4	Not preferred as it results in high operating costs and an inability to connect customers from the areas that do not have any Ausnet assets.

[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

Nagambie township (Figure 1) is located in the Strathbogie Shire, approximately 135 kilometres north of Melbourne and 55 kilometres south of Shepparton along the Goulburn Freeway. Nagambie is located in a pastoral and agricultural region between Seymour and Shepparton along the Goulburn River, overlooking Lake Nagambie. The Nagambie Growth Management Strategy (2020) (NGMS)[2] identifies Nagambie as an urban locality that will continue to accommodate some moderate growth, largely as it provides lifestyle opportunities and is located near popular tourist attractions.

The current population of the Nagambie township is approximately 1,700 and is anticipated to grow at an average annual growth rate of 2.9% out to 2036, to a projected population of 4,000, which will result in 1,143 new dwellings. Population growth enables the delivery of supporting infrastructure, such as electricity services.

In addition to the anticipated residential growth, [

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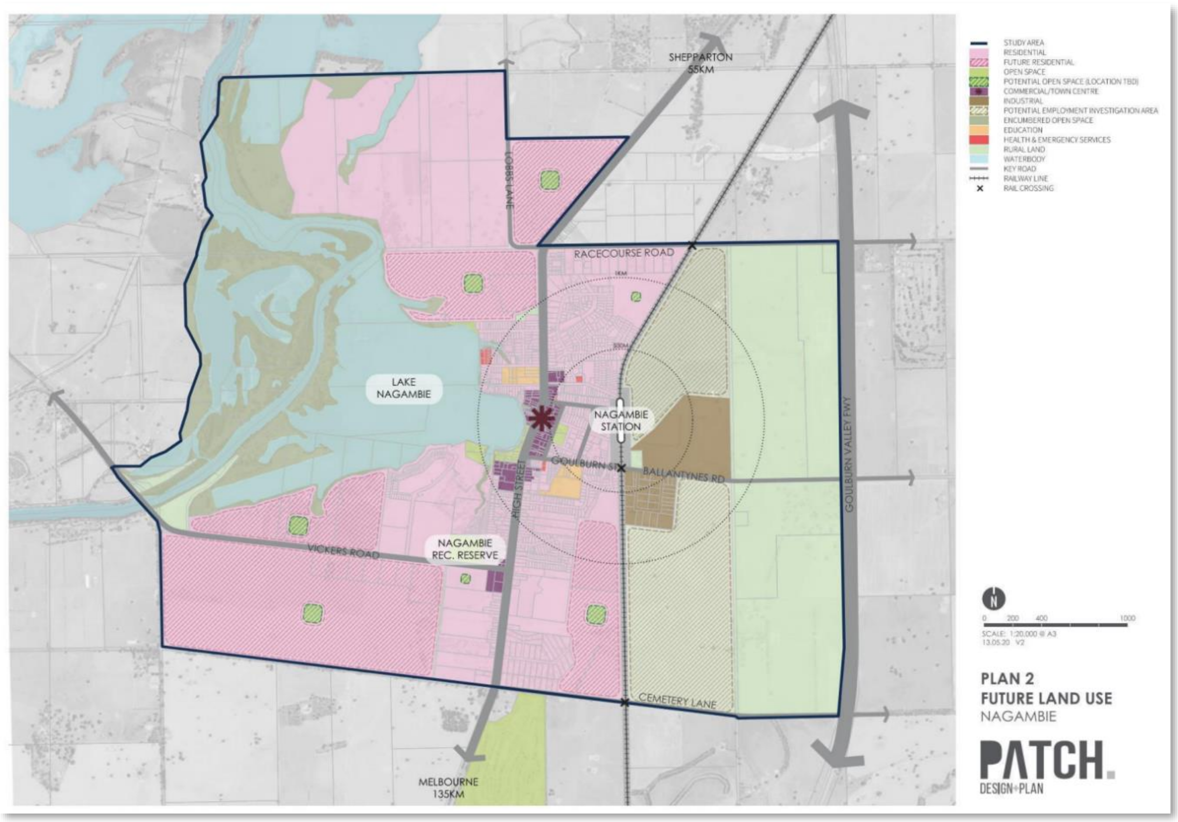

Figure 1: Nagambie – Geographic View[3]

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

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[2] Source: https://www.strathbogie.vic.gov.au/images/Planning_strategies_and_reports/20200521_draft_Nagambie_Growth_Management_Strategy.pdf

[3] Source: https://www.strathbogie.vic.gov.au/images/Planning_strategies_and_reports/20200521_draft_Nagambie_Growth_Management_Strategy.pdf

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 Nagambie supplied by AusNet Services.

2.2. Existing supply arrangements

Seymour Zone Substation (SMR) was established in 1965 and currently has 6 22kV feeders. The 22kV yard is outdoor and has some spare bays but would require new outdoor circuit breakers for new feeders. The load is expected to grow and will require four additional feeders.

Nagambie is served by a radial 22kV distribution feeder, SMR24, with limited interconnections with other, constrained, feeders such as BN11 (Figure 2).

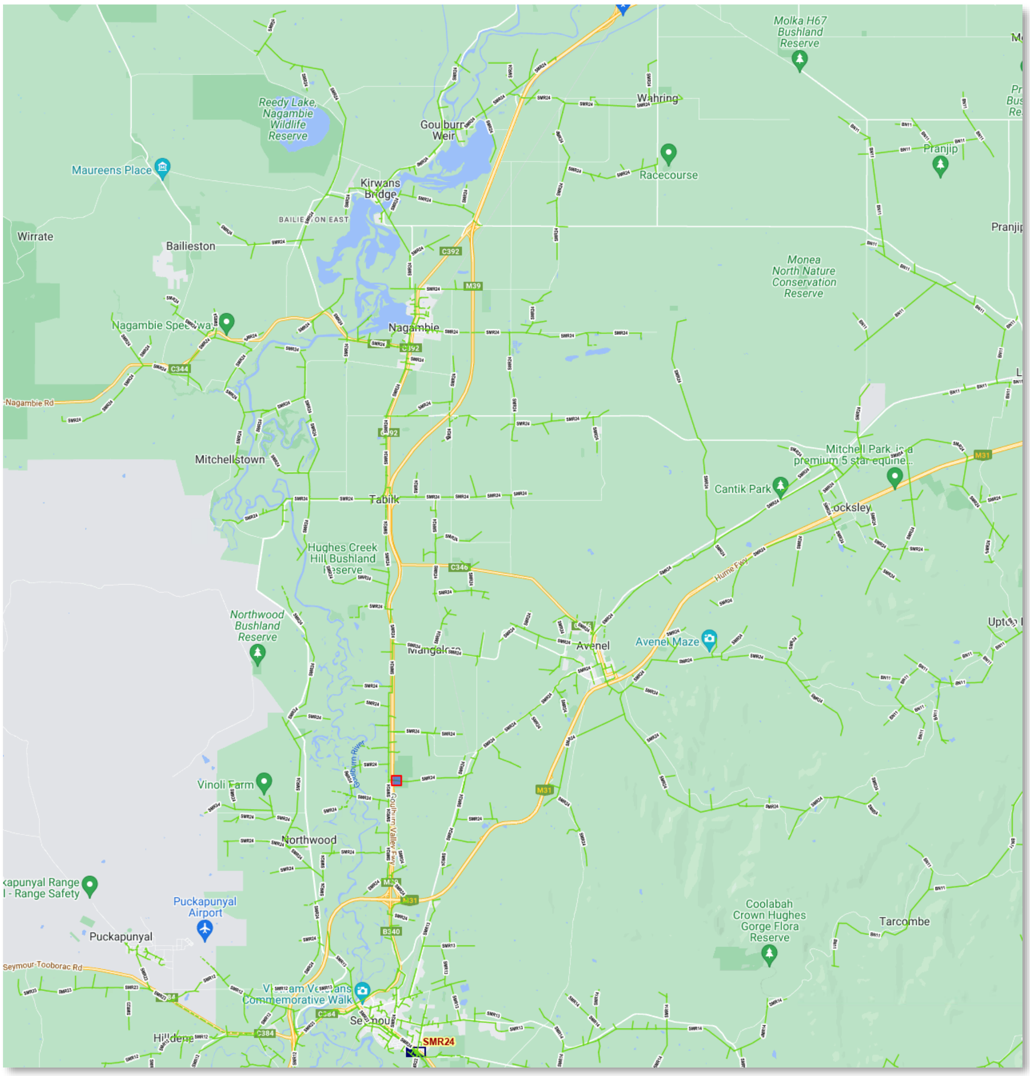

Figure 2: SMR24 22kV feeder

The existing SMR24 22kV distribution feeder and its details are presented in Table 2 below.

Table 2: Existing SMR24 22kV distribution feeder

Feeder Name	Voltage (kV)	Length (km)	Winter Design Line Rating (MVA)	Summer Design Line Rating (MVA)
SMR24	22	~377	13.3	13.3

2.1. Demand forecast

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 SMR24 22kV distribution feeder supplying Nagambie are produced and shown in Table 3 and Table 4.

Table 3: 50% POE Maximum Demand Forecast (MVA) inc. available transfers - Winter

22kV feeder	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2053
SMR24 – POE90 Demand (MVA)	9.1	9.3	9.6	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0	12.3	12.6	12.9	13.2	13.2
SMR24 - POE50 Demand (MVA)	9.6	9.8	10.1	10.4	10.7	11.0	11.3	11.7	12.0	12.3	12.6	12.9	13.2	13.5	13.8	13.8
SMR24 – POE10 Demand (MVA)	10.1	10.4	10.6	11.0	11.3	11.6	11.9	12.3	12.6	12.9	13.3	13.6	13.9	14.2	14.5	14.5

Table 4: 10% POE Maximum Demand Forecast (MVA) inc. available transfers - Summer

22kV feeder	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2053
SMR24 – POE90 Demand (MVA)	10.6	11.2	11.8	12.4	13.0	13.6	14.2	14.8	15.4	16.0	16.6	17.1	17.8	18.4	19.0	19.0
SMR24 - POE50 Demand (MVA)	11.5	12.2	12.8	13.5	14.2	14.9	15.6	16.2	16.9	17.6	18.3	18.9	19.6	20.3	20.9	20.9
SMR24 – POE10 Demand (MVA)	12.3	13.1	13.8	14.6	15.3	16.1	16.9	17.7	18.4	19.2	19.9	20.7	21.5	22.2	23.0	23.0

2.2. Limitations of existing infrastructure

To ensure that 22kV feeder capability is maintained, the forecasted maximum demand given in Table 3 and Table 4 should not exceed the 22kV feeder design ratings under normal (N) operating conditions. The capacity of the existing SMR24 22kV feeder at times of maximum demand will be entirely utilised by 2026, which will result in a load at risk from 2026 onwards (Table 5 and Figure 3).

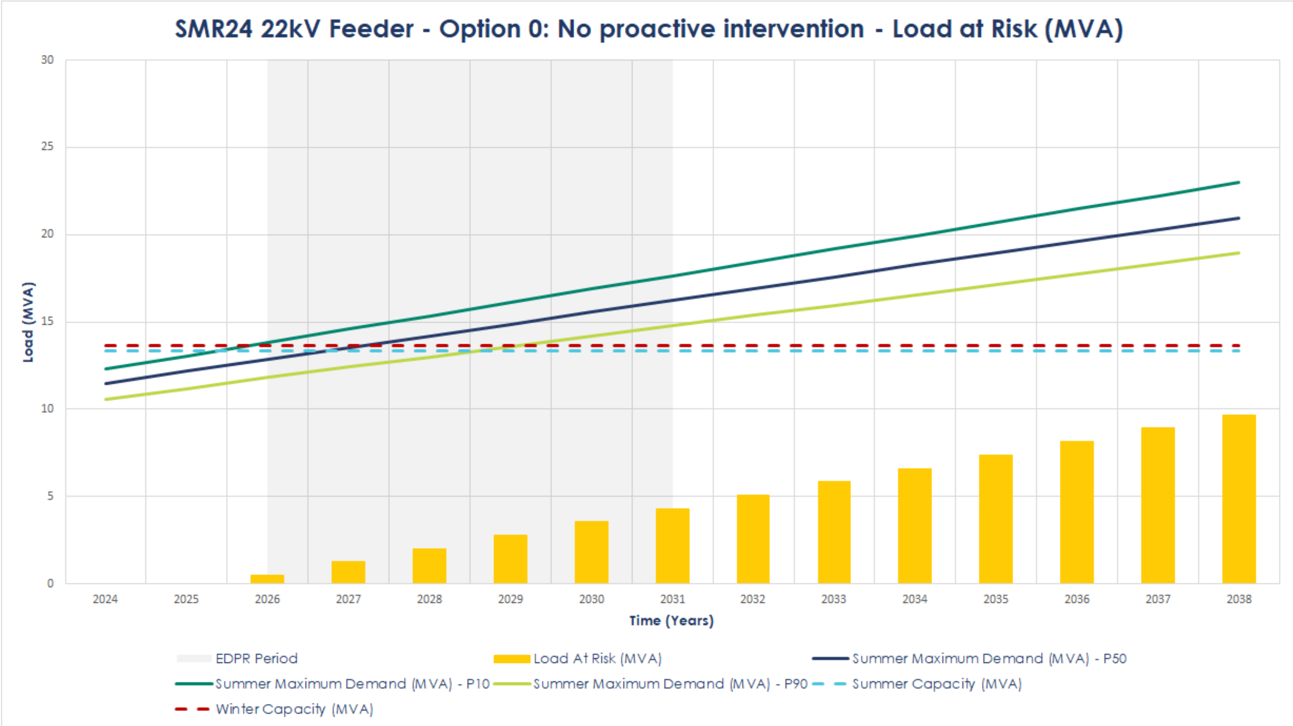

Figure 3: SMR24 22kV Feeder - Load @ Risk (MVA) - Graphical view

From 2030, there will be a large amount of load at risk and ultimately sustained involuntary load shedding to maintain SMR24 loading within its 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 SMR24 will be required from 2030. Extreme weather events and associated incidents, including periods of extreme heat or cold, may cause an exceedance of this capacity earlier than expected.

Table 5: SMR24 - Load @ Risk (MVA) - Tabular view

Timeline	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2053
SMR24 – POE90 Summer MD (MVA)	10.6	11.2	11.8	12.4	13.0	13.6	14.2	14.8	15.4	16.0	16.6	17.1	17.8	18.4	19.0	19.0
SMR24 - POE50 Summer MD (MVA)	11.5	12.2	12.8	13.5	14.2	14.9	15.6	16.2	16.9	17.6	18.3	18.9	19.6	20.3	20.9	20.9
SMR24 – POE10 Summer MD (MVA)	12.3	13.1	13.8	14.6	15.3	16.1	16.9	17.7	18.4	19.2	19.9	20.7	21.5	22.2	23.0	23.0
Winter Capacity (MVA)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Summer Capacity (MVA)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
Load @ Risk (MVA)	0.0	0.0	0.5	1.3	2.0	2.8	3.5	4.3	5.1	5.8	6.6	7.4	8.1	8.9	9.7	9.7

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 Nagambie and manage the increasing risk of involuntary load shedding (National Electricity Rules (NER) 5.17.1(c)(4)(ii) on SMR24 22kV feeder supplied by SMR station beyond 2030. 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 Nagambie area.

The options analysed to address identified need are as follows:

- Option 0: No proactive intervention
- Option 1: Manage SMR24 capacity with mobile generators
- Option 2: Construct a new 22kV feeder to split SMR24
- Option 3: Construct a 2.5MW/5MWh Battery Energy Storage System (BESS)
- Option 4: Contract network support services to defer network investment

Each credible option is further elaborated in the subsequent chapter.

Options considered but not progressed

- Risk manage the feeder: beyond 2026, it is not possible to risk manage SMR24 as the 10%POE forecast exceeds 110% of the feeder rating.
- Feeder reconfiguration: SMR24 is a radial feeder with limited transfer capability, and no reconfigurations are possible to address the identified need. Notably, in 2020, the underground cable beneath the highway failed during the summer, causing Nagambie to be without power for several days with temperatures reaching 40 degrees.
- Building additional feeder ties: other distribution feeders nearby, such as BN11, are also experiencing constraints.
- Uprate the feeder: replacing the current feeder exit cable with a higher capacity cable ("jumbo feeder") would necessitate backbone capacity augmentations, which is considered uneconomical and would not deliver equivalent reliability benefits as the preferred option.

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[4] 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.

The key assumptions used in the CBA for the base case are:

- A study period of 30 years, with FY2024 being the first year of analysis and base year for dollar inputs.
- The discount rate was set to 5.56% based on the average of 4.11% and AEMO's IASR central discount rate of 7%.
- A tailored VCR of $42,795 per MWh was used in the analyses, comprising 42% residential, 37% commercial and 12% industrial and 10% agricultural loads. This estimation is based on the SMR24 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.

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

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 feeder 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 SMR24 feeder will result in significant unserved energy due to the existing feeder being constrained and incapable of supplying the forecast demand, as shown in Figure 4 and Table 6.

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 4 and Table 6, resulting in AusNet Services being unable to provide supply security in the growth area of Nagambie. 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.

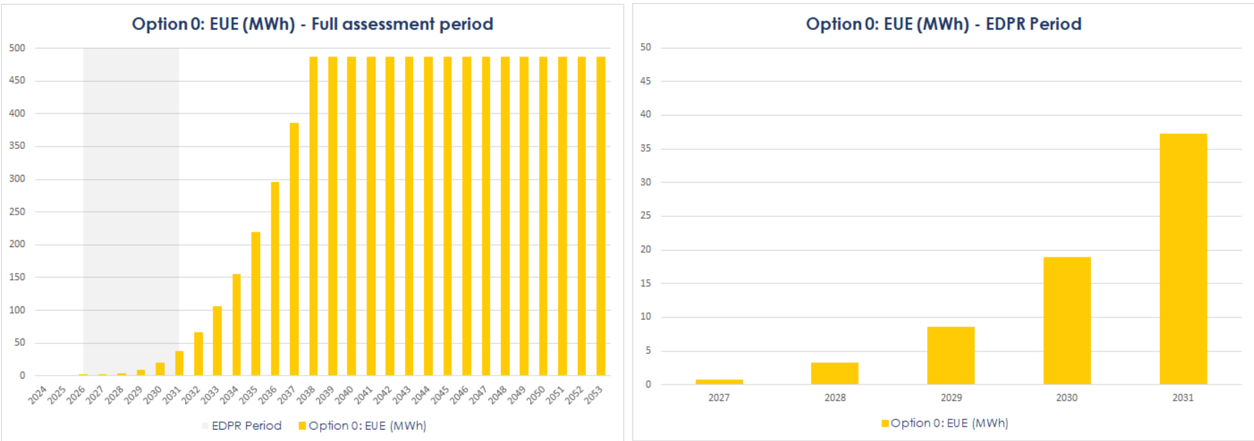

Figure 4: EUE as a result of no proactive intervention – Graphical view

Table 6: 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)	0.0	0.0	0.1	0.8	3.2	8.5	18.8	37.2	65.8	104.8	155.3	218.3	295.1	385.1	487.1		487.1
EUE Value ($M)	0.0	0.0	0.0	0.0	0.1	0.4	0.8	1.6	2.8	4.5	6.6	9.3	12.6	16.5	20.8		20.8

3.3. Option 1: Manage SMR24 capacity with mobile generators

3.3.1. Scope

Option 1 suggests managing SMR24 capacity during peak demand with the assistance of mobile generators, limited to 2MW output power. As a result of the connections from the greenfield development areas of Nagambie, the capacity of the SMR24 feeder under this option is expected to be exhausted by 2029.

Figure 5 and Figure 6 present how this option will reduce the load at risk and expected unserved energy at the SMR24 feeder compared to the base case (no proactive intervention). This option results in an additional capacity from 2026 to 2029 and can meet the forecasted demand until 2029, resulting in no to minimal expected unserved energy from 2026 to 2029. The current demand forecast suggests that choosing this option would lead to a deferral of the new feeder build for three years. However, the EUE is expected to grow again after 2029, requiring further investment to meet the long-term requirements.

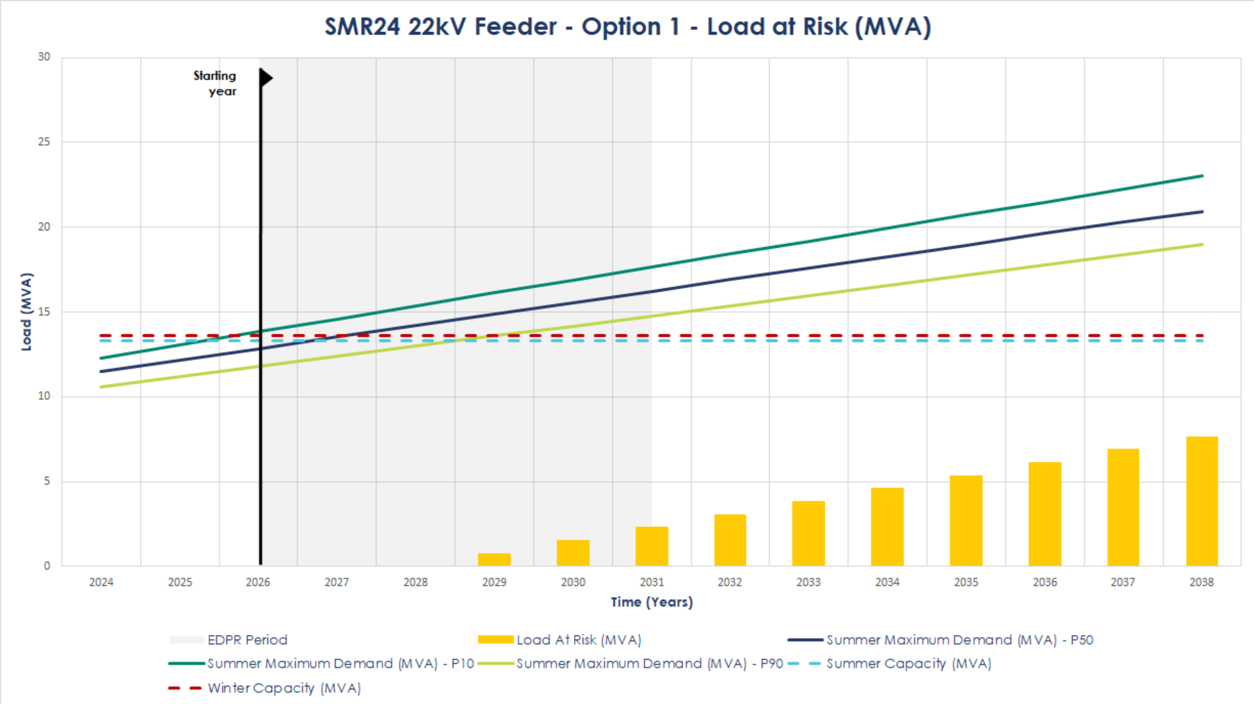

Figure 5: Option 1 – Load @ Risk (MVA) - Graphical view

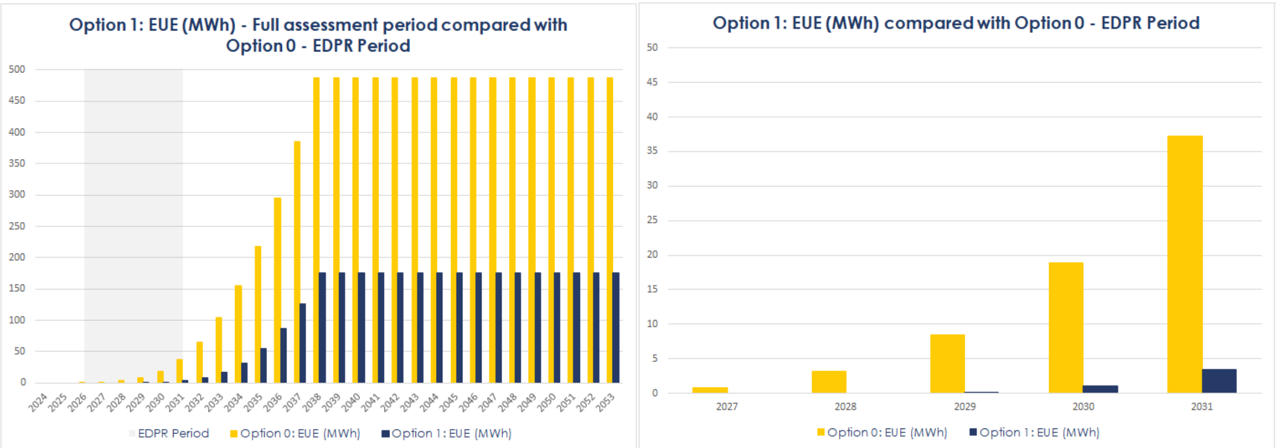

Figure 6: Option 1 - EUE results compared with no proactive intervention – Graphical view

Table 7: 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
SMR24 EUE (MWh)	0.0	0.0	0.0	0.0	0.0	0.2	1.0	3.4	8.2	17.0	31.6	54.5	86.2	126.9	176.1		176.1
SMR24 EUE Value ($M)	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.7	1.4	2.3	3.7	5.4	7.5		7.5

3.3.2. Cost

The total estimated cost in Option 1 is **$14.7M**. Cost are expected to occur every year during summer and winter peaks over the entire assessment period. A summary of the cost for the next regulatory reset period can be found in Table 8.

Table 8: Capital cost summary (undiscounted, real June 2024 dollars)

Year	FY27	FY28	FY29	FY30	FY31
Option 1	$120,059	$193,115	$288,000	$288,000	$288,000

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 for Option 1 for the entire assessment period is **$138M**.

3.3.4. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in Table 9:

Table 9: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
1	14.7	138	123.3

3.4. Option 2: Construct a new 22kV feeder to offload SMR24

3.4.1. Scope

This option involves constructing a new 22kV distribution feeder called SMR11, which will be built from SMR. SMR11 will utilise existing infrastructure, such as shared easements and poles, with the existing feeders along the route. There will be minimal installation of new assets. The main objective is to transfer the township of Avenel to SMR11, which will, in turn, offload SMR24 and create opportunities for Nagambie to grow (Figure 7). The new feeder will also serve as a backup supply for SMR24 and SMR13, with the installation of 2 new open points with these feeders.

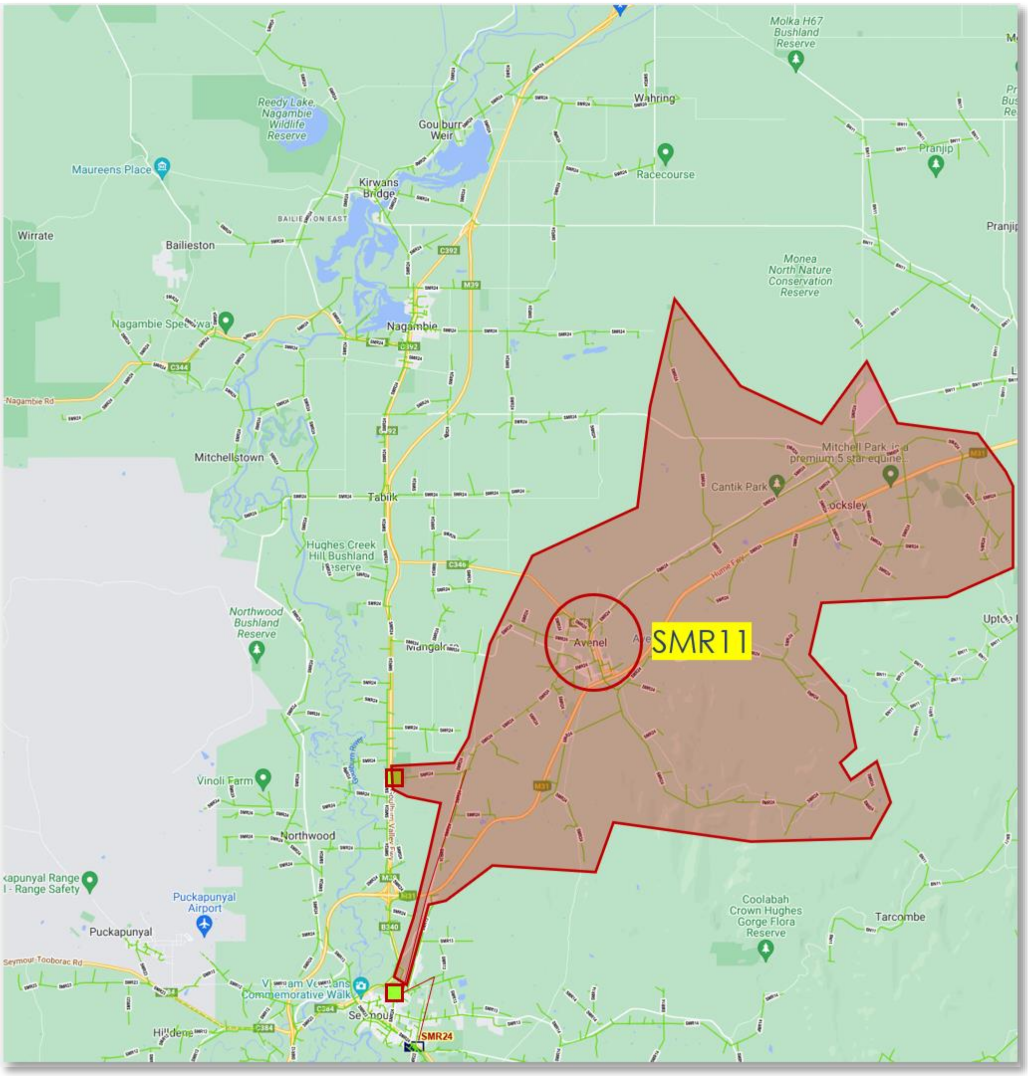

Figure 7: New SMR11 supply area

The scope of this option is to design, procure, install, and commission all necessary primary, civil/structural, line and secondary equipment for 22kV feeder augmentation works at SMR. A high-level scope presented in Figure 8.

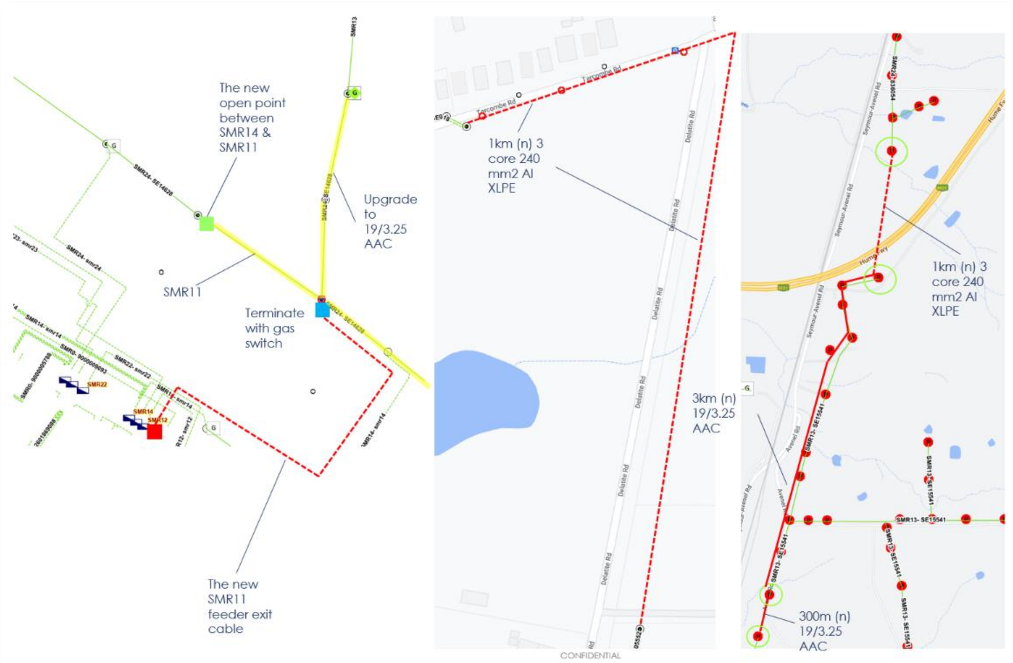

Figure 8: New SMR11 22kV feeder augmentation works

This option provides the required network capacity in full and manages the unserved energy risk using a combination of maximum utilisation of the existing assets and minimal traditional augmentations. The option proposes the construction of a new feeder from SMR in 2030 as per optimal timing analysis. The load supplied by SMR24 will be reduced as well as the expected unserved energy (Figure 9). From 2030 onwards, there will be no expected unserved energy on SMR24.

In summary, Table 7 and Figure 10 present a cumulative impact of the investments proposed under this option on expected unserved energy compared to the base case ("no proactive intervention").

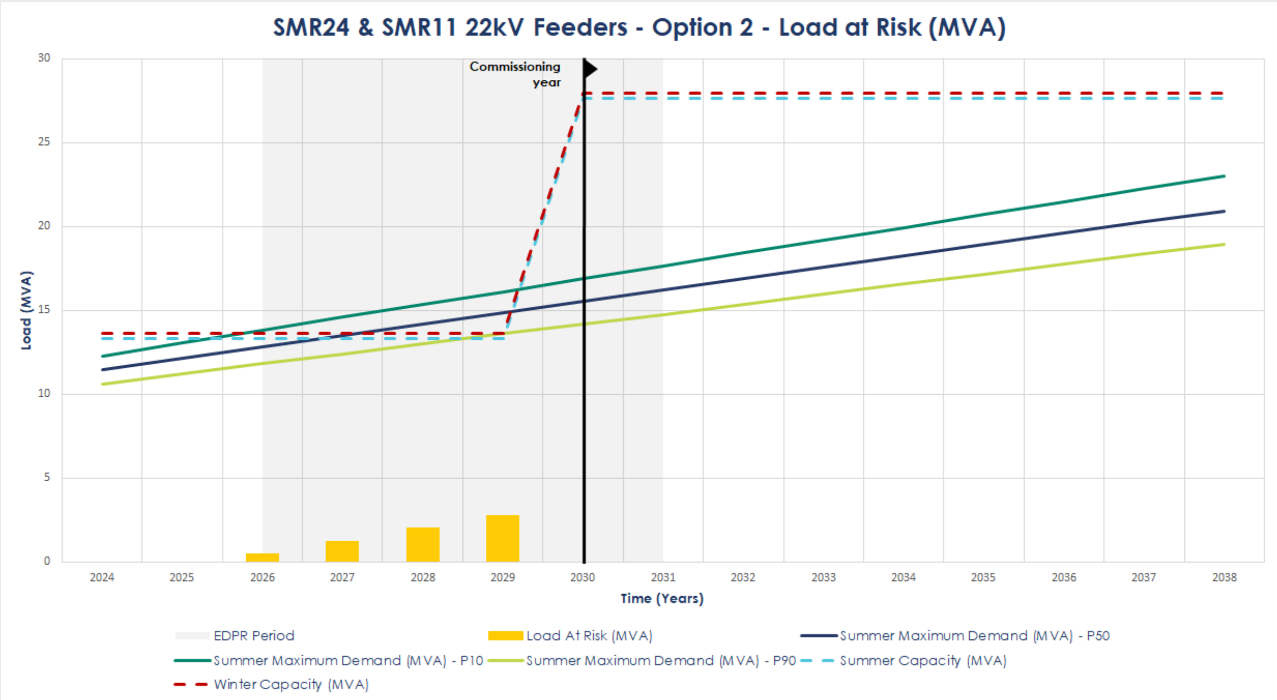

Figure 9: Option 2 - Load @ Risk (MVA) - Graphical view

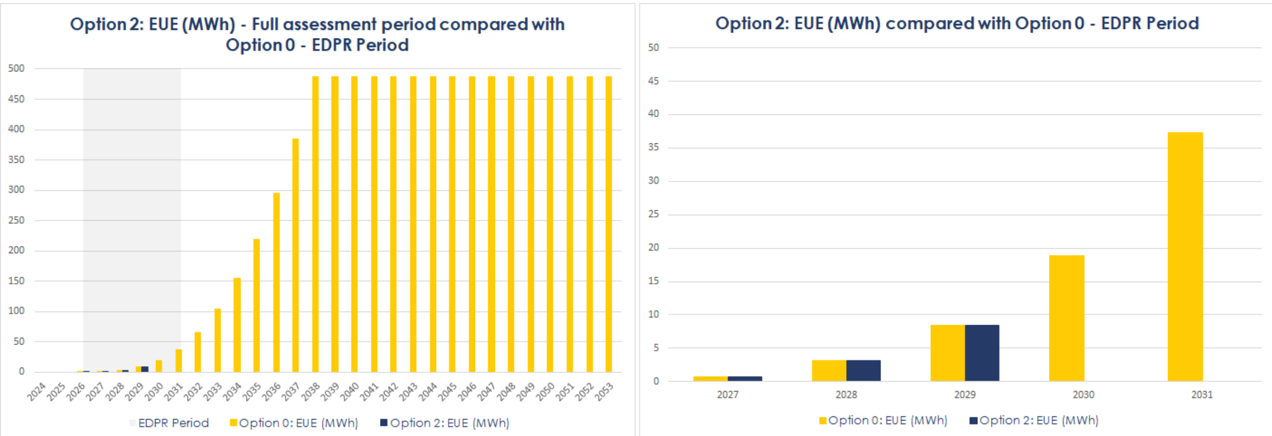

Figure 10: Option 2 - EUE results compared with no proactive intervention – Graphical view

Table 10: 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
SMR24 EUE (MWh)	-	0.0	0.1	0.8	3.2	8.5	-	-	-	-	-	-	-	-	-		-
SMR11 EUE (MWh)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-
SMR24 EUE Value ($M)	-	0.0	0.0	0.0	0.1	0.4	-	-	-	-	-	-	-	-	-		-
SMR11 EUE Value ($M)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-

3.4.2. Cost

The total estimated capital cost of Option 2 is **$12.2 M**. 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 FY30. A summary of the capital cost can be found in Table 8.

Table 11: Capital cost summary (undiscounted, real June 2024 dollars)

Year	FY27	FY28	FY29	FY30	FY31
Option 2	-	-	$8,564,244	$3,670,390	-

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 for Option 2 for the entire assessment period is **$137.6M**.

3.4.4. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in Table 9:

Table 12: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
2	**9.2**	**137.6**	**128.4**

3.5. Option 3: Construct 2.5MW/5MWh Battery Energy Storage System (BESS)

3.5.1. Scope

Option 3 proposes establishing a 2.5MW/5MWh Battery Energy Storage System (BESS) by 2031 to reduce the expected unserved energy and potentially 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 suitable site. Whilst the battery is expected to provide network support to reduce 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.

Figure 11 and Figure 12 present how this option will reduce the load at risk and expected unserved energy at the SMR24 feeder compared to the base case (no proactive intervention). This option results in an additional capacity of 2.5 MW by 2031 and can only reduce the forecasted demand, resulting in reduced expected unserved energy for this period.

Based on the current demand forecast, a 2.5MW/5MWh battery cannot provide feeder build deferral. A larger capacity BESS costs more and based on the optimal timing analysis, cannot be commissioned in the next regulatory reset period.

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 Nagambie area will rapidly increase in the upcoming years, especially after 2030.

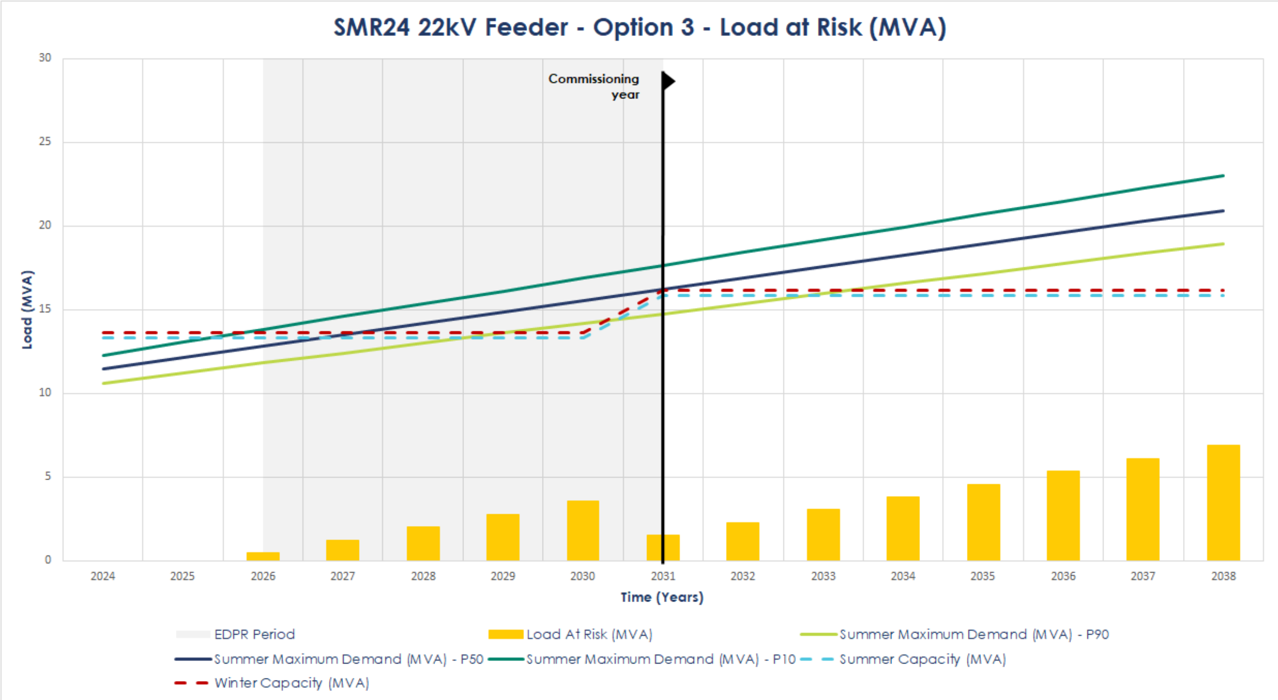

Figure 11: Option 3 - Load @ Risk (MVA) - Graphical view

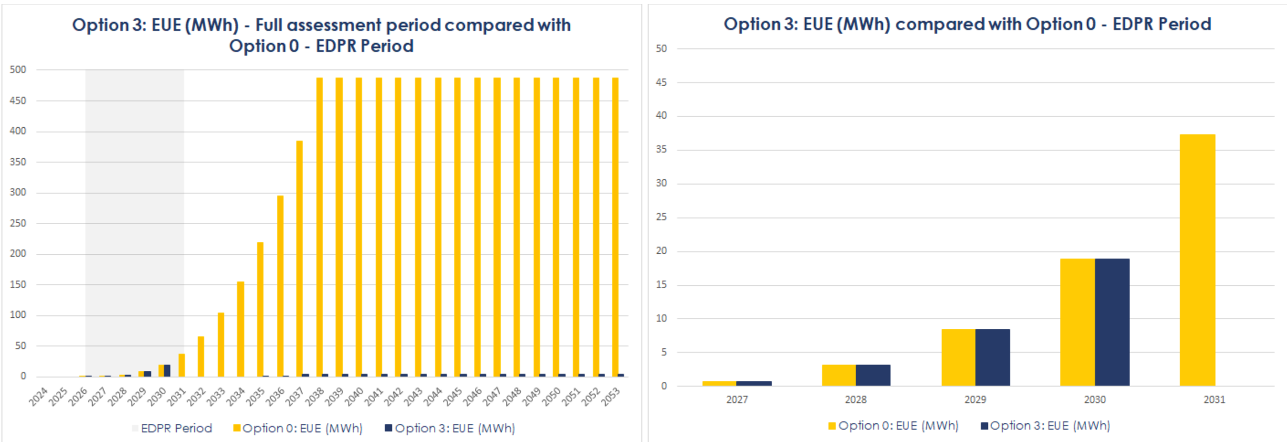

Figure 12: Option 3 -EUE results compared with no proactive intervention – Graphical view

Figure 13: 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)	0.0	0.0	0.1	0.8	3.2	8.5	18.8	0.0	0.0	0.0	0.0	0.3	1.4	4.2	4.2		4.2
Option 3 EUE Value ($M)	0.0	0.0	0.0	0.0	0.1	0.4	0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2		0.2

3.5.2. Cost

The total estimated capital cost of Option 3 is **$8.8M** over the 2026-31 period. The cost is spread over three years to align with construction timelines and is based on estimates provided by the estimating team. A summary of the capital cost can be found in Table 13.

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

Year	FY27	FY28	FY29	FY30	FY31	FY32
Option 1	-	-	-	$4,399,560	$4,399,560	$4,399,560

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 for Option 3 for the entire assessment period is **$136.4M**.

3.5.4. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in Table 14:

Table 14: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
3	**9.6**	**136.4**	**126.8**

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:

- 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 15: Network support requirements for 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)	-	-	0.0	0.3	1.3	3.4	7.5	14.9	26.3	41.9	62.1	87.3	118.0	154.0	194.8	194.8
Potential value of network support ($M)	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.6	1.1	1.8	2.7	3.7	5.1	6.6	8.3	8.3

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

Table 16 summarises 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, and Behavioural Demand Response). These options need to be further evaluated using the screening test in the RIT-D process. AusNet Services will issue a non-network options report before progressing with the Draft Project Assessment Report (DPAR) as part of the RIT-D process.

Table 16 - 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 by 2030.
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 by 2030.
Commercial Direct Load Control	Defer the network investment by two years	✓	A feasible option and should be investigated further. There is 37% of commercial and 12% 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 for Option 4 for the entire assessment period is **$82.8M**.

3.6.3. Summary of CBA assessment

A summary of the cost-benefit assessment is provided in the following Table 17:

Table 17: CBA outputs

Option	PV Cost ($M)	PV Benefits ($M)	NPV ($M)
4	**55.2**	**82.8**	**27.6**

4. Recommended Option

Figure 14 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 **$128.4 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 14: 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	Manage SMR24 capacity with mobile generators	Network solution	138.0	14.7	123.3	3	Not preferred as it will not address the identified need entirely and as it results in high operating costs.
2	**Construct a new 22kV feeder to offload SMR24**	**Network solution**	**137.6**	**9.2**	**128.4**	**1**	**Preferred long-term option as it will deliver the highest net economic benefits and additional reliability benefits.**
3	Construct a 2.5MW/5MWh Battery Energy Storage System (BESS)	Non-network and new-technology solution	136.4	9.6	126.8	2	Not preferred as it will not address the identified need entirely, it will lead to high upfront investment costs and a 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	82.8	55.2	27.6	4	Not preferred as it results in high operating costs and an inability to connect customers from the areas that do not have any Ausnet assets.

[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 18. The sensitivity assessment in Table 19 shows that when each scenario is run, the ranking remains the same, indicating Option 2 is still preferred.

Table 18: 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	$41,522/MWh	$44,613[5]/MWh	$58,125[5]/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 19: Weighted NPV for credible options considered

Option	Base Case – NPV ($M)	Low Case – NPV ($M)	High Case - NPV ($M)	Option rank
1	123.3	21.7	-58.9	3
2	**128.4**	**24.2**	**337.8**	**1**
3	126.8	22.7	321.8	2
4	27.6	-19.9	-207.8	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 2028, as per Table 20 and Figure 15. This timing aligns with the proposed commissioning date of Option 2.

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

Table 20: Annualised cost and optimal commissioning year for Option 2

Option	Annualised Cost	Optimal Year
2	$0.7M	2030

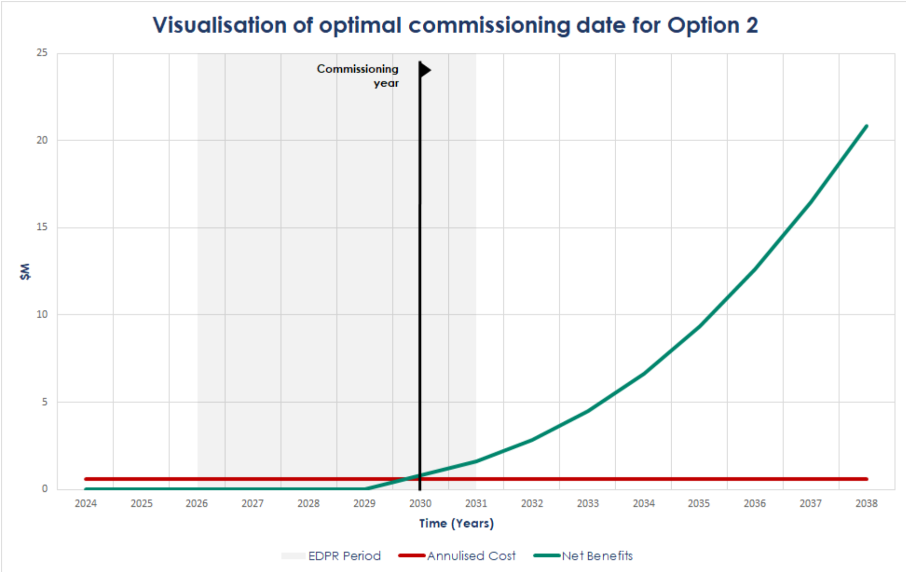

Figure 15: Visualisation of optimal commissioning year for Option 2

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