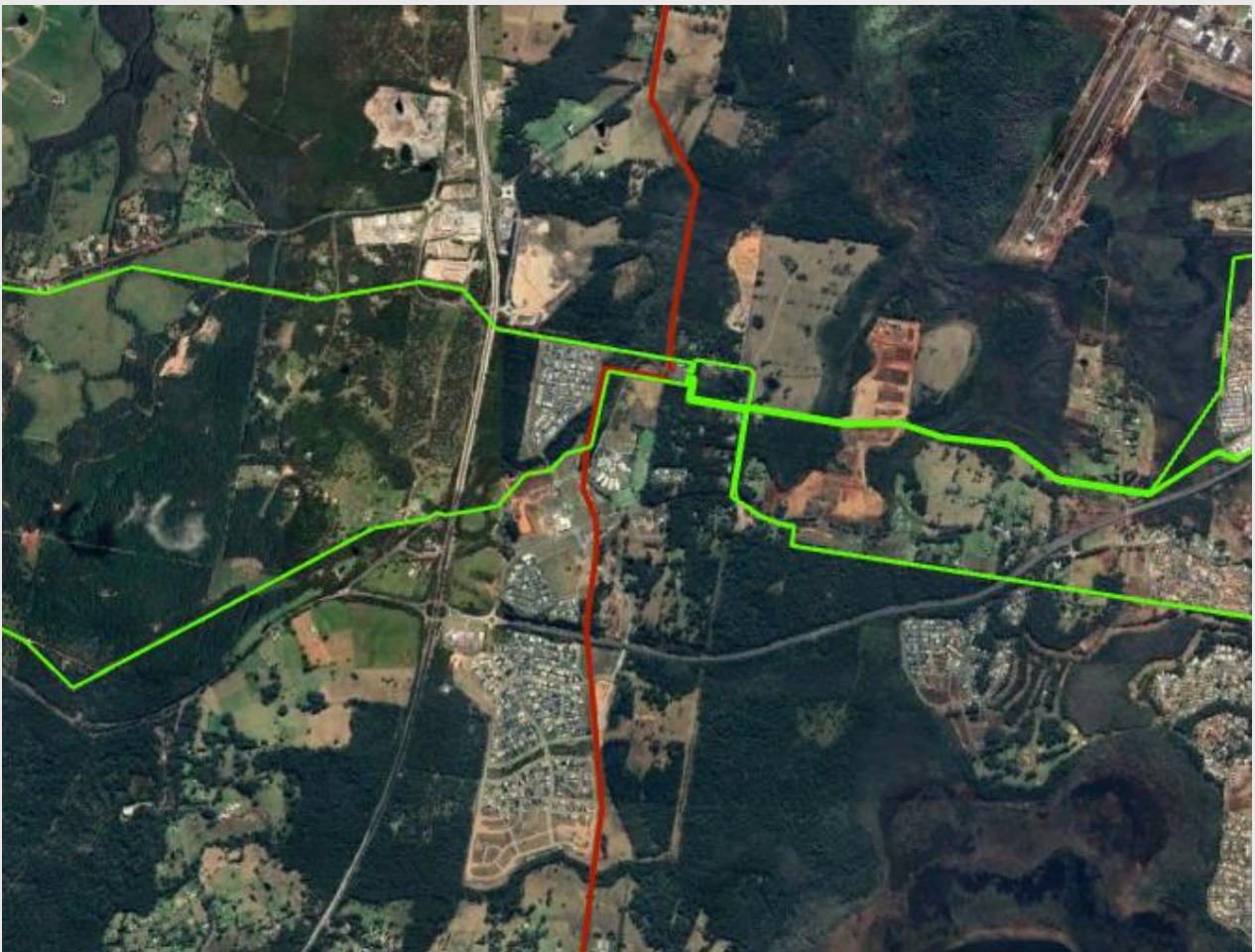


Non-Network Options Screening Report

Providing Supply to the Sovereign Hills Area



9 June 2023

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Disclaimer

Essential Energy is registered as a Distribution Network Service Provider. This notice on screening for non-network options has been prepared and published by Essential Energy under clause 5.17 of the National Electricity Rules to notify Registered Participants and Interested Parties of the results of the regulatory investment test for distribution and should only be used for those purposes.

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Glossary

Acronym	Full name
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ASP	Accredited Service Providers
BESS	Battery Energy Storage System
CAPEX	Capital Expenditure
DPAR	Draft Project Assessment Report
FPAR	Final Project Assessment Report
NEM	National Electricity Market
NER	National Electricity Rules
NMI	National Metering Identifiers
NPV	Net Present Value
OPEX	Operational Expenditure
POE	Probability of Exceedance
PV	Photovoltaic
RIT-D	Regulated Investment Test for Distribution
SAPS	Stand-Alone Power System
STPIS	Service Target Performance Incentive Scheme

1 Introduction

This document is Essential Energy's Non-network options report that sets out reasons why we would consider that there are no non-network or SAPS options, that could form a credible option on a standalone basis. EE believes that a non-network solution may provide limited deferral of a network solution for supply to the Sovereign Hills area.

Sovereign Hills is a residential and commercial development area in the Mid North Coast, 8km west of the centre of Port Macquarie, four hours north of Sydney. Ultimately incorporating over 4,000 new dwellings, it will become a satellite township with shopping centre, schools and several industrial/commercial areas. The area will require significant augmentation of electricity infrastructure to meet customer supply needs over the long term.

In accordance with NER clause 5.17.4(c), this document represents the first formal stage of the RIT-D process in assessing how to provide supply most efficiently to the Sovereign Hills area. The second formal stage of the RIT-D process is publication of a Draft Project Assessment Report (DPAR), which includes further detail of non-network options and NPV assessment of network options.

1.1 About Essential Energy.

Essential Energy is a state-owned electricity infrastructure company which owns, maintains, and operates the electrical distribution networks for much of New South Wales, covering 95 percent of the state's geographical area. It also owns the reticulated water network in Broken Hill through Essential Water, formerly Australian Inland Energy and Water.

1.2 Identified need.

We have initiated a Regulatory Investment Test for Distribution (RIT-D) to investigate and consult on how to provide supply most efficiently to customer connections in the Sovereign Hills area.

Essential Energy is required to connect customers under section 5.2.3 and Schedule 5.1 of the National Electricity Rules (NER), which in summary states that a Distribution Network Service Provider must:

Comply with power system performance and quality of supply standards required to achieve adequate levels of network power transfer, capability and quality of supply for the common good of all, or a significant number of registered participants or those required to achieve a specific level of network service at an individual connection point.

We therefore consider the identified need for this investment to be 'providing adequate customer supply' under the RIT-D, as the investment is required to comply with the above NER obligations. The timing of the identified need for this RIT-D, and so the required timing for credible options to address the need, is determined by when the expected customer's demand will exceed the existing network capacity. This is currently anticipated to be 2024/25, based on proposed connection enquiries received to date.

1.3 Possible solutions to address identified need.

The possible network solutions to address the identified need are:

- Augment existing distribution network.
- Establish Sovereign Hills 33/11kV zone substation.

Essential Energy has determined that to provide adequate long-term customer supply a 33/11kV zone substation should be established in the Sovereign Hills area. A draft project assessment report will be prepared and published in relation to the Sovereign Hills supply area.

1.4 Submissions

Any questions or submissions regarding this report or requests for further information should be directed to:

Email: reginvestment@essentialenergy.com.au

Essential Energy
Buller Street
Port Macquarie 2444.
Attention: Timothy Ronan.

Submissions are to be received by the date shown in Table 6: Next Steps Summary.

Non-Network Options screening Report | Providing Supply to The Sovereign Hills Area | 9-Jun-23

Approved by: **Essential Energy**

2 Background

2.1. Location

Port Macquarie Hastings Council (PMHC) is a local government area in the Mid North Coast region of New South Wales, four hours north of Sydney. The area has a population of 87,000, with the major population centre at Port Macquarie and smaller centres at Wauchope, Camden Haven, Lake Cathie and Kendall.

Beyond Port Macquarie and Wauchope there are three main urban growth areas within the PMHC region as shown in Figure 1.

Area 13 - Thrumster/Sovereign Hills, Area 14 - Lake Cathie/Bonny Hills and Area 15 - Camden Haven. The three areas were endorsed by the then NSW Dept of Urban Affairs and Planning in 2001 via PMHC's 'Hastings Urban Growth Strategy'. The Council's strategy has been further reinforced in their 2011 and 2017 'Urban Growth Management Strategy' documents.

Area 13, 8kms west of the centre of Port Macquarie, is the largest of the three, incorporating several residential/commercial developments, mostly to the east of the Pacific Highway and industrial developments in the northern pocket as shown in Figure 2. The area is being independently developed by several developers and remained relatively stagnant with small releases of residential lots in early years. In recent years, the last three years in particular, the release and uptake of residential lots has increased rapidly, and commercial/industrial releases are subsequently following. As with other coastal regions, the rapid expansion is fuelled by preference for coastal lifestyles, new-found working from home environment, high metropolitan house prices and relatively low interest rates.

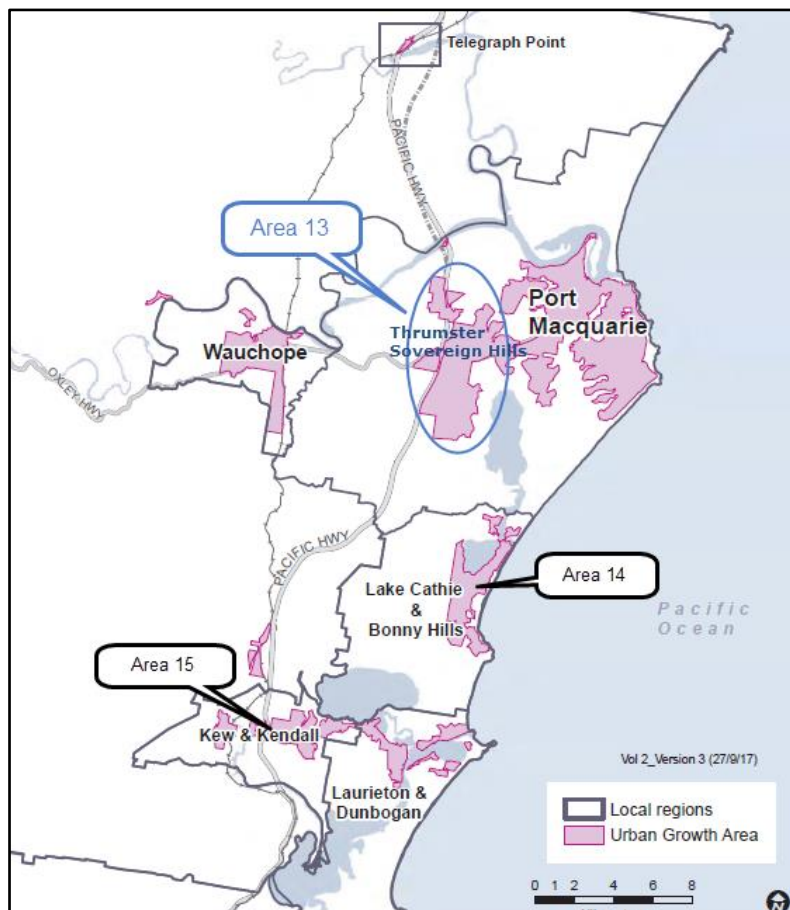
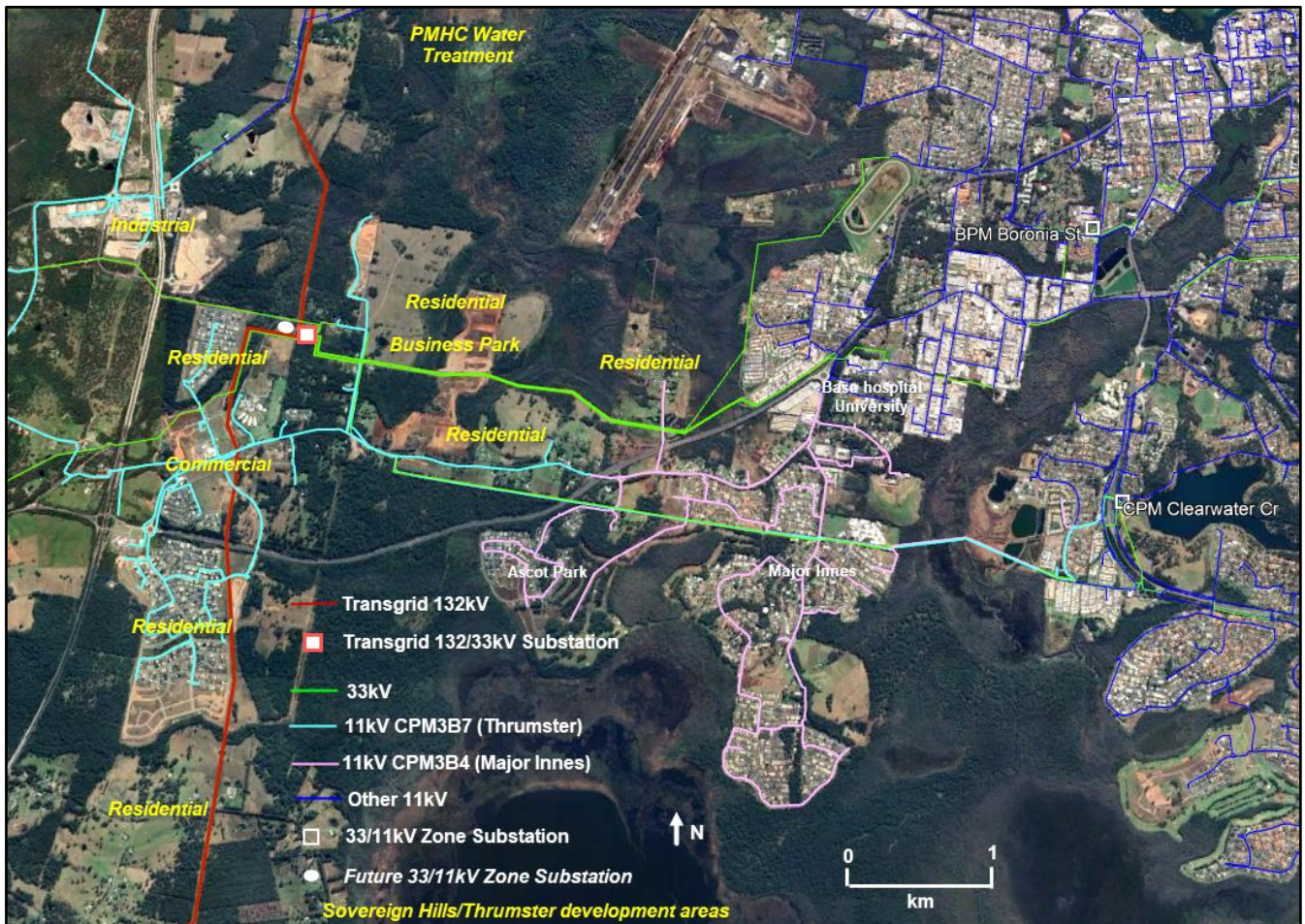


Figure 1: Port Macquarie Hastings Council Urban Growth Areas

2.2. Network overview

Port Macquarie and immediate surrounding areas are supplied by an 11kV distribution network that emanates from three 33/11kV zone substations. The three zone substations are supplied by a 33kV subtransmission feeder network that emanates from TransGrid's Thrumster 132/33kV substation as shown in Figure 2.



Only two (Boronia St and Clearwater Cr) of three Port Macquarie area 33/11kV zone substations shown above.

Figure 2: Subtransmission / Distribution Network

The Sovereign Hills area is supplied by a direct 11kV feeder (CPM3B7) that emanates from Clearwater Crescent 33/11kV zone substation, some 7km's east of Sovereign Hills. Another 11kV feeder (CPM3B4) that provides supply to other areas (Port Macquarie base hospital, Major Innes, Ascot Park) to the east of Sovereign Hills, also emanates from Clearwater Cr zone substation.

2.3. Quantification of Identified Need: Load characteristics and demand forecast.

The area demand will be a combination of new residential, commercial and industrial developments and individual spot loads. The peak demand is expected to reach 20MVA in 2035 (high scenario). Figure 3 below is forecast peak demand (MVA) for the area up to 2035. The peak demand forecast, energy and demand profile data used in the analysis are a best estimate of use in the area, based on residential connection history, recent developers' proposals, and PMHC growth strategy dwelling estimates.

The following spot loads, which will connect in the short-medium term have been added into peak demand forecasts;

- Data centre (ramping up to peak 2MVA flat profile)
- PMHC water treatment plant (ramping up to peak 2MVA profile based on other plants in area)
- Electric vehicle chargers 20 posts (ramping up to profile based on existing chargers)

New residential dwellings have significant household PV penetration. The load characteristics of the area can change considerably during the day, influenced by high solar radiance days, storm and heavy cloud days. The daily peak load profiles (Figures 4 and 5) assume worst-case heavy cloud day with minimal household PV generation.

Given other coming changes in patterns of customer consumption, in particular uptake of electric vehicles and household battery storage, the demand profiles and peak demand will change in the medium-long term. These changes in usage have not been considered in the load forecast analysis.

The system normal network constraint as indicated by the dashed line is a simplified representation of the network capacity with all existing 11kV distribution elements in service. The system abnormal network constraint as indicated by the dotted line is a simplified representation of a level where an element of the existing 11kV distribution network is out of service and the network is constrained at peak times.

Further detail of network constraints are detailed below in Section 2.4.

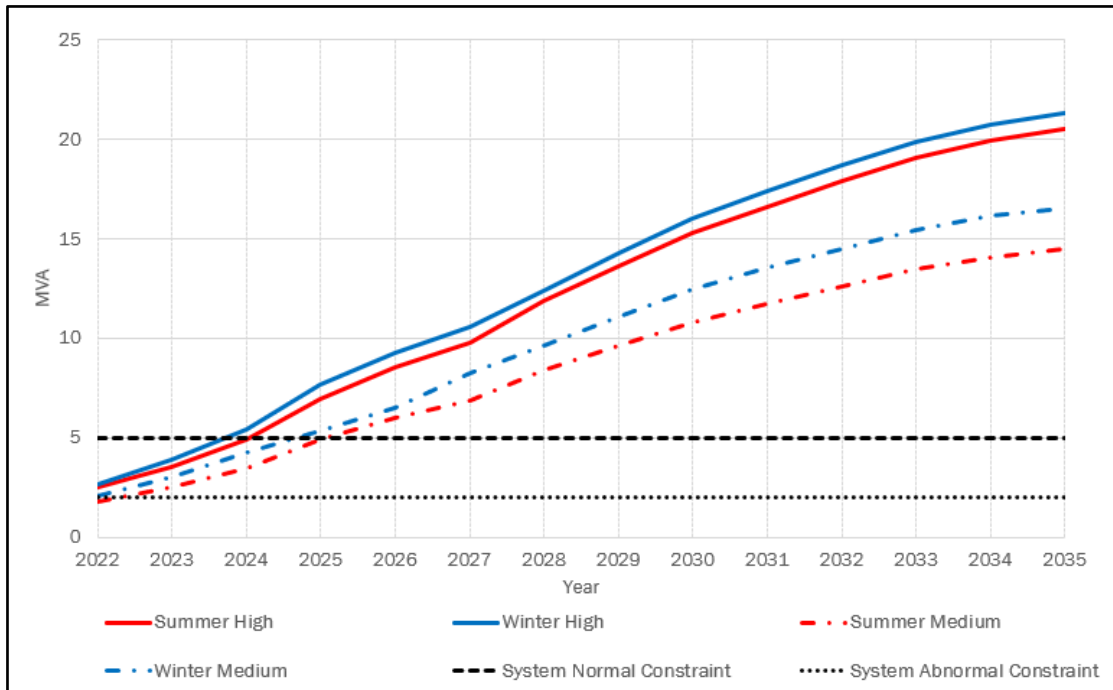


Figure 3: Sovereign Hills area maximum demand forecast 2023 - 2035.

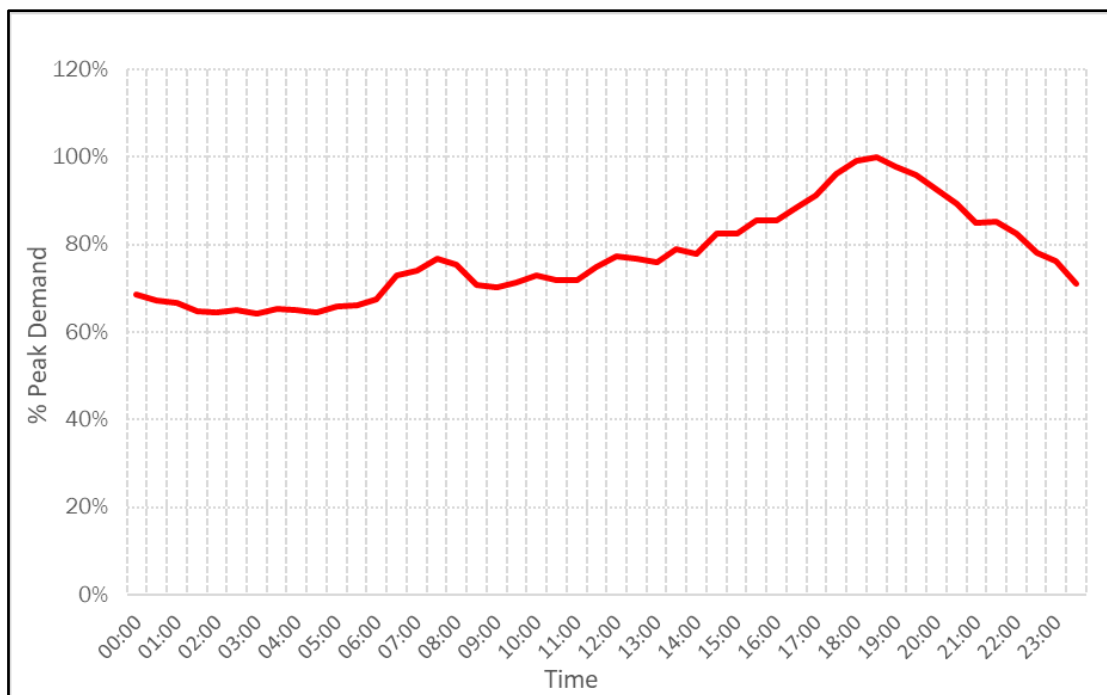


Figure 4: Summer day profile.

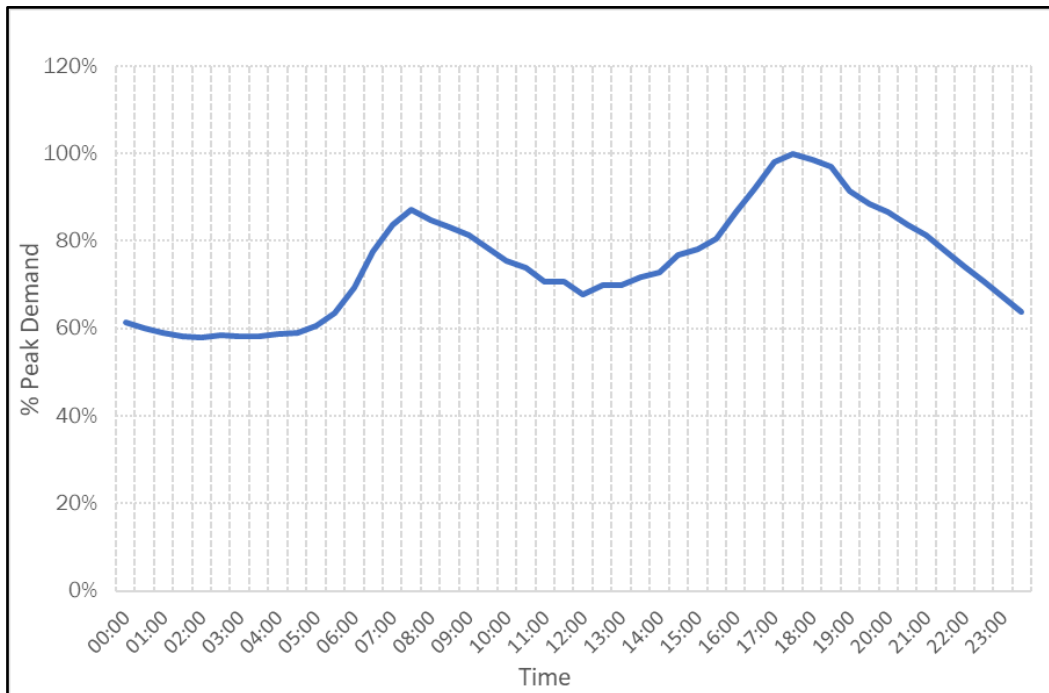


Figure 5: Winter day profile.

2.4 Quantification of Identified Need: Network risk

The Sovereign Hills area as shown in Figure 2, is supplied by a direct 11kV feeder (CPM3B7 Thrumster) that emanates from Clearwater Cr 33/11kV zone substation, some 7km's east of Sovereign Hills. The feeder, up to Sovereign Hills, is mostly underground construction and there are no customer connections along the feeder until it reaches just east of Sovereign Hills. It provides supplies beyond Sovereign Hills to the west across the Pacific Highway and to the north. With recent three years of very high growth, feeder CPM3B7 has reached 80% of its capacity.

A second 11kV feeder (CPM3B4 Major Innes) provides supply to the areas east of Sovereign Hills. These areas (Ascot Park, Major Innes, Base Hospital/University) have seen significant development in the last ten years. Somewhat similar to CPM3B7, this feeder is mostly underground with no customer connections until it reaches Base Hospital/University and Major Innes area. With ten years of high growth in these areas, feeder CPM3B4 has reached 90% of its capacity.

As shown above in the peak demand forecast (Figure 3), growth in the Sovereign Hills area is expected to continue into the medium term. As peak demand increase, spare capacity on the CPM3B7 feeder will be eroded to a point where connection and supply of customer load would result in Essential Energy not meeting required quality of supply standards during system normal configuration. The capacity on feeder CPM3B7 will be limited initially by low customer supply voltage levels and then by thermal capacity. In the case of the system abnormal (outage of one of the two 11kV feeders), a constraint already exists during peak times and for limited time (supply restoration), customers will be without supply.

Without investment in the Sovereign Hills network, future customers are at risk of not being able to connect and existing customers will suffer poor supply quality.

Table 1 details NNO support required, forecast as 2MWH in 2024/25 and increasing to 2335MWH by 2027/28 under system normal (Medium).

Network Capacity (MVA)	Year	Medium forecast (MVA)	Load at risk (MVA)	Days above limit	Annual hours above limit	Annual MWH above limit	Max daily MWH above limit
5	2023/24	4.2	0.0	0	0	0	0
	2024/25	5.8	0.8	7	8	2	1
	2025/26	6.6	1.6	58	86	25	3
	2026/27	8.2	3.2	257	872	505	12
	2027/28	9.8	4.8	364	2746	2335	29

Table 1: Forecast duration load will be at risk under System Normal (Medium).

Table 2 details NNO support required, forecast as 127MWH in 2024/25 and increasing to 6483MWH by 2027/28 under system Normal (High).

Network Capacity (MVA)	Year	High forecast (MVA)	Load at risk (MVA)	Days above limit	Annual hours above limit	Annual MWH above limit	Max daily MWH above limit
5	2023/24	4.5	0.0	0	0	0	0
	2024/25	6.6	1.6	73	127	40	4
	2025/26	7.7	2.7	147	488	262	9
	2026/27	9.7	4.7	357	2015	1699	25
	2027/28	11.8	6.8	365	5308	6483	54

Table 2: Forecast duration load will be at risk under System Normal (High).

2.5 Potential credible network options

The network risk as detailed above in Section 2.4 must be addressed. Not addressing the risk would lead to customers not being connected. Essential Energy would not meet its DNSP requirements as stipulated under section 5.2.3 and Schedule 5.1 of the NER, in regard to providing adequate customer supply. The following table is a summary of the two network options that were investigated to address the risk;

Option	Description	Comment	Capex
1	Augment existing distribution network	<ul style="list-style-type: none"> Extensive long term underground distribution feeder network Significant zone substation brownfield augmentation Distribution source away from load centre Energy wheeled away from source and back to source (TransGrid supply point) Lesser long term supply reliability Overall greater energy loss 	\$28.6M
2	Establish Sovereign Hills 33/11kV zone substation	<ul style="list-style-type: none"> Lower overall cost Greenfield site, ease of zone substation and distribution feeder construction (reduced construction safety risk) Zone substation site adjacent existing electricity infrastructure Long term supply reliability (less infrastructure, less failures) Distribution source within close proximity to load centre (minimal energy loss) 	\$12.1M

Table 3: Network Options

Option 2 - Establish Sovereign Hills 33/11kV zone substation is the preferred network option. It provides a least cost and straightforward solution that will deliver appropriate levels of capacity and quality of supply for present and future customers, meeting the ultimate need in the Sovereign Hills and surrounding area. It will also provide supply backup capabilities to existing customers in other areas, mostly to the east of Sovereign Hills. The new 33/11kV zone substation will have minimal visual impact and be constructed on a site adjacent to TransGrid's 132/33kV Thrumster substation. Further aspects of both network options and NPV assessments will be detailed in the second stage of the RIT-D, within the 'Providing Supply to the Sovereign Hills Area' Draft Project Assessment Report.

3 Assessment Methodology and Assumptions

3.1. Demand Forecasts

Please refer to Section 2.2 (Network Forecasting) of the latest Essential Energy DAPR publication for in-depth details regarding the methods and assumptions behind Essential Energy's demand forecasts and details contained above in Section 2.3. (Quantification of Identified Need: Load characteristics and demand forecast)

3.2. Discount Rate

Calculations for annual deferral values of projects are based on Essential Energy's regulated pre-tax real Weighted Average Cost of Capital (WACC). This value is prescribed by the AER for a specific regulatory period. The identified need described in this Non-Network Options Report occurs in the 2024-2029 AER period, where the WACC is 3.04%.

3.3. Cost Estimates

Project costs are calculated using standard estimate components which are developed & evaluated by estimation teams in Essential Energy. The costs are 2022/23 real and estimated to fall within $\pm 25\%$ accuracy of the stated cost.

3.4. Evaluation Test Period

Consideration of network options is assessed over an evaluation period of 40 years.

4 Potential Deferred Augmentation Charge

Essential Energy have estimated the capital cost of the network options to within $\pm 25\%$ of estimation accuracy. Using these costs as a guide, a deferral of the preferred network option by a year represents a deferral saving of approximately \$330k per annum, assuming the same reliability outcomes are maintained as with the preferred network option. While this should not be considered as the precise deferral cost available to a non-network proponent, it serves as a guide for interested parties to determine the viability of their proposal.

Essential Energy will work with non-network proponents based on the specifics of what the proponents offer and any necessary further works that Essential Energy may have to undertake to ensure the reliability, security and safety of the network are maintained. Timing required for any non-network options to defer the network solution is detailed in Tables 1 & 2 and section 2.4 commentary.

5 Assessment of Non Network Options

Essential Energy has considered expected long-term demands of the Sovereign Hills development area, the nature of the existing load and network capability to determine that there is not a non-network option, or SAPS option, that could form a credible option on a standalone basis to replace the network solution. There may be a non-network option that could provide short term deferral of the network solution.

This section sets out the assessment behind this determination, which draws on the assumptions outlined in the sections above and considers the required technical characteristics that a non-network option would need to meet or defer the identified need.

5.1 Non-Network option requirements

The requirements for a viable non-network option to address the benefits provided by a network solution would be as follows;

- maintain supply to all customers;
- be capable of alleviating estimated capacity shortfalls on the existing infrastructure during system normal and credible system abnormal (feeder outage) scenarios.

As a result, the non-network option should provide a cost-effective method of postponing the network solution, for the capacity and timeframe for the support required in Table 1 & 2. Network constraints are expected to occur by 2024/25. A non-network solution to meet the support requirements in Tables 1 & 2 is required by the summer of 2024/2025.

5.2 Consideration of Non-Network Options

This investment is driven by rapidly increasing customer connections. For Sovereign Hills development area RIT-D, we have assessed individual non-network technologies and is summarised in table 5.

Rating	Colour Coding
Does not meet the criterion	Red
Does not fully meet the criterion (or uncertain)	Yellow
Clearly meets the criterion	Green

Table 4: Non-network option criteria

Options	Assessment against Criteria			
	Meets Need	Technical	Commercial	Timing
1.0 Generation and Storage				
1.1 Gas turbine power station				
1.2a Generation (Solar) including battery storage				
1.2b Generation (Wind) including battery storage				
1.3 Dispatchable generation (large customer)				
1.5 Battery Energy Storage System				
2.0 Demand management				
2.1 Customer power factor correction				
2.2 Customer solar power systems				
2.3 Customer energy efficiency				
2.4 Demand response (curtailment of load)				

Table 5: Non-Network Option Summary.

In considering the feasibility of generation options, Essential Energy investigated an indicative estimate on the cost of a stand-alone gas-fired generator and renewable generation combination battery solutions that as standalone long-term basis would provide level of supply reliability and capacity comparable to the network options. It was found that;

- embedded generation incorporating the use of batteries would not be cost effective in this location given the estimated capital cost and amount of land purchase required to cater for the peak load requirements;
- the cost of embedded generation exceeds the cost of the preferred network option, and there is in any event, limited space for implementing a local generation option large enough to meet current and forecast demand within the area;
- the high-level annualised capital cost of a stand-alone gas fired generation option was higher;
- there is no gas pipeline to supply the standalone gas generator in the area;
- high-level annualised capital cost of a stand-alone renewable generation/battery option was higher.

In considering demand management, customer power factor correction, customer energy efficiency were considered, and these non-network options are unfavourable when compared to the long-term network options.

6 Non-Network Options Summary

Essential Energy considers that there are no non-network or SAPS options, that could form a credible option on a standalone basis and replace the network solution to establish a new 33/11kV zone substation at Sovereign Hills.

It may be possible that a non-network solution such as a BESS, could provide limited deferral benefit to the network solution and as such Essential Energy will publish a Draft Project Assessment Report (DPAR), which includes further detail and Net Present Value assessments of network options utilising Market Benefit Analysis from the RIT-D guidelines. The DPAR will be open to public consultation for three months.

In accordance with NER clause 5.17.4(c), this document represents the first stage of the RIT-D process in assessing how to provide supply most efficiently to the Sovereign Hills area. The next stage of this RIT-D process is publication of a draft project assessment report (DPAR).

7 Submission Requirements

Essential Energy invites written submissions to address the identified need in this report from registered participants and interested parties. With reference to Section 5, all submissions should include sufficient technical and financial information to enable Essential Energy to undertake comparative analysis of the proposed solutions against alternative options. The proposals should include, but are not limited to, the following:

- Full costs of completed works including delivery and installation where applicable;
- Whole of life costs include operational costs;
- Project execution strategy including design, testing and commissioning plans;
- Engineering network system studies and study reports.

Essential Energy will not be legally bound or otherwise obligated to any person who may receive this RIT-D report or to any person who may submit a proposal. At no time will Essential Energy be liable for any costs incurred by a proponent in the assessment of this RIT-D report, any site visits, obtainment of further information from Essential Energy or the preparation by a proponent of a proposal to address the identified need specified in this RIT-D report.

The RIT-D process is aimed at identifying a technically feasible non-network alternative to the internal network option that has greater net economic benefits. However, the selection of the solution provider to implement the preferred option will be done in accordance with Essential Energy’s standards for procurement.

Submissions in response to the report may be submitted to reginvestment@essentialenergy.com.au and are due by the date listed in the Next Steps Summary in Table 6.

8 Next steps

Essential Energy intends to carry out the following process to assess what action should be taken to address the identified need in the Sovereign Hills supply area:

Next Steps	Description	Released, Due or Completed	Date
Step 1	Publish Non-Network Options Report (this report) inviting non-network options from interested participants.	Released:	Friday, 9 June 2023
Step 2	Submissions in response to the Non-Network Options Report.	Due date:	Friday, 8 September 2023
Step 3	Review and analysis of proposals by Essential Energy This is likely to involve further consultation with proponents and additional data may be requested.	Anticipated to be completed:	Friday, 20 October 2023
Step 4	Release of Draft Project Assessment Report (DPAR)	Anticipated to be released:	Friday, 27 October 2023
Step 5	Submissions in response to the Draft Project Assessment Report.	Due date:	Friday, 8 December 2023
Step 6	Review and analysis by Essential Energy. This is likely to involve further consultation with proponents and additional data may be requested.	Anticipated to be completed:	Friday, 15 December 2023
Step 7	Release of Final Project Assessment Report (FPAR) including summary of submissions received	Anticipated to be released:	Friday, 22 December 2023

Essential Energy reserves the right to revise this timetable at any time. The revised timetable will be made available on the Essential Energy website.

Table 6: Next Steps Summary

Essential Energy will use its reasonable endeavours to maintain the consultation program listed above. However, due to changing power system conditions or other circumstances beyond the control of Essential Energy, this consultation schedule may change. Up-to-date information will be available on the RIT-D webpage which can be accessed by the following link: <https://www.essentialenergy.com.au/our-network/network-projects/rit-d-projects>

During the consultation period, Essential Energy will review, compare and analyse all internal and external solutions. At the conclusion of the consultation process, Essential Energy will publish a final report which will detail the most feasible option. Essential Energy will then proceed to take steps to progress the recommended solution to ensure any statutory non-compliance is addressed and undertake appropriately justified network reliability improvement, as necessary.

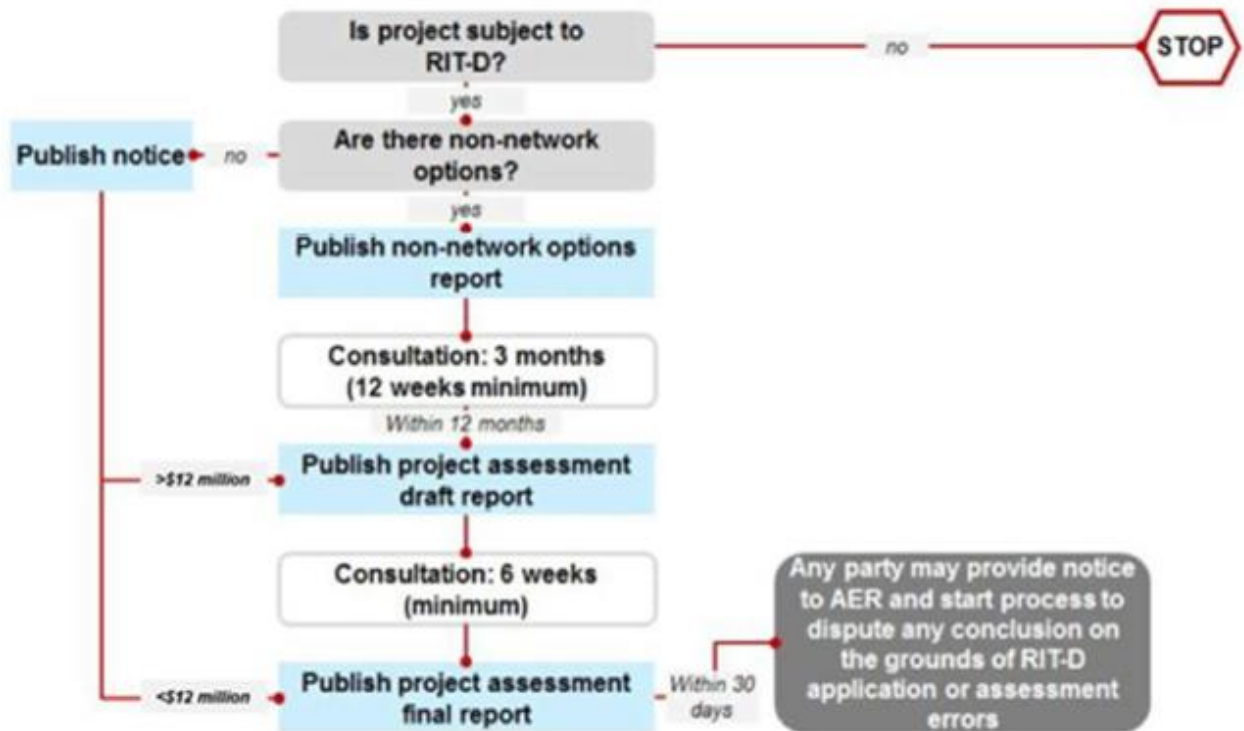
9 Compliance Statement

This Non-Network Options Report complies with the requirements of NER section 5.17.4(e) as demonstrated below:

Number	Requirement	Report Section
1	description of the identified need;	1.2.
2	the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, why the RIT-D proponent considers reliability corrective action is necessary;	3.
3	if available, the relevant annual deferred augmentation charge associated with the identified need;	4.
4	the technical characteristics of the identified need that a non-network option would be required to deliver, such as: (i) the size of load reduction or additional supply; (ii) location; (iii) contribution to power system security or reliability; (iv) contribution to power system fault levels as determined under clause 4.6.1; and (v) the operating profile;	2.2, 2.3, 2.4.
5	a summary of potential credible options to address the identified need, as identified by the RIT-D proponent, including network options and non-network options;	2.5.
6	for each potential credible option, the RIT-D proponent must provide information, to the extent practicable, on: (i) a technical definition or characteristics of the option; (ii) the estimated construction timetable and commissioning date (where relevant); and (iii) the total indicative cost (including capital and operating costs); and	2.4.
7	information to assist non-network providers wishing to present alternative potential credible options including details of how to submit a non-network proposal for consideration by the RIT-D proponent.	5, 6, 7.

Table 7: Compliance Statement Summary

10 Appendices



Appendix A – The RIT-D Process