Regulatory Investment Test for Distribution (RIT-D)

Addressing Reliability Requirements in the Rosewood Network Area

Notice of No Non-Network Options

3 May 2022

energex
Part of Energy Queensland

EXECUTIVE SUMMARY

About Energex

Energex Limited (Energex) is a subsidiary of Energy Queensland Limited and manages the electricity distribution network in the growing region of South East Queensland which includes the major urban areas of Brisbane, Gold Coast, Sunshine Coast, Logan, Ipswich, Redlands and Moreton Bay. Our electricity distribution area runs from the NSW border north to Gympie and west to the base of the Great Dividing Range.

Our electricity network consists of approximately 54,200 kilometres of powerlines and 680,000 power poles, along with associated infrastructure such as major substations and power transformers.

Today, we provide distribution services to more than 1.4 million domestic and business connections, delivering electricity to a population base of around 3.4 million people.

Identified Need

Rosewood Zone Substation (SSRWD) is supplied from Abermain Bulk Supply Substation (SST136) via a 33kV ring network, which also supplies Karrabin Zone Substation (SSKBN), Marburg Zone Substation (SSMBG) and Amberley Zone Substation (SSABY). SSRWD provides electricity supply to approximately 2,331 predominately domestic customers in the Rosewood, Lower Mount Walker, Ebenezer, Mount Forbes, Mount Walker, Mount Albert, Rosevale, Moorang and Mount Mort areas.

SSRWD has two 33/11kV transformers. It also consists of 33kV and 11kV outdoor switchgear and a control room.

The purpose of the project is to remove a significant risk to safety and customer reliability from the ongoing operation of the problematic 33kV duro-roll goose neck and 11kV braided vertical drop isolators. It is not possible to replace them in-situ because parts of the 11kV bus does not meet the required clearance to the boundary fence and the fence cannot be moved since it is on the property boundary. Under this project expulsive drop out fuses will also be removed and 33kV and 11kV outdoor switchgear will be replaced with indoor switchgear.

Preferred Network Option

Energex have only identified one feasible option, which is to replace the problematic plant items and replace the 33kV and 11kV outdoor switchgear with indoor switchgear.

The completion of this work will provide the greatest reliability benefit for customers, whilst also reducing expenditure on obsolete, high maintenance assets. The estimated capital cost of this option inclusive of interest, risk, contingencies, and overheads is $10.3 million. Annual operating and maintenance costs are anticipated to be the same as the existing network as a result of this option. The estimated project delivery timeframe has design commencing in September 2022 and construction completed by October 2024.

Approach

The National Electricity Rules (NER) require that, subject to certain exclusion criteria, network business investments for meeting service standards for a distribution business are subject to a Regulatory Investment Test for Distribution (RIT-D). Energex has determined that network investment is essential in this case for it to continue to provide electricity to the consumers in the Rosewood supply area in a reliable, safe and cost-effective manner. Accordingly, this investment is subject to a RIT-D. An internal assessment has been conducted and it has been determined that there is not a non-network option that is potentially credible, or that forms a significant part of a potential credible option that will meet the identified need or form a significant part of the solution. This Notice has hence been prepared by Energex in accordance with the requirements of clause 5.17.4(d) of the NER.

Energex Limited ABN 40 078 849 055

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1. BACKGROUND

1.1. Geographic Region

SSRWD provides electricity supply to predominately domestic customers in the Rosewood, Lower Mount Walker, Ebenezer, Mount Forbes, Mount Walker, Mount Albert, Rosevale, Moorang and Mount Mort areas. The substation and associated 110kV feeders and 33kV feeders are shown in **Error! Reference source not found.**.

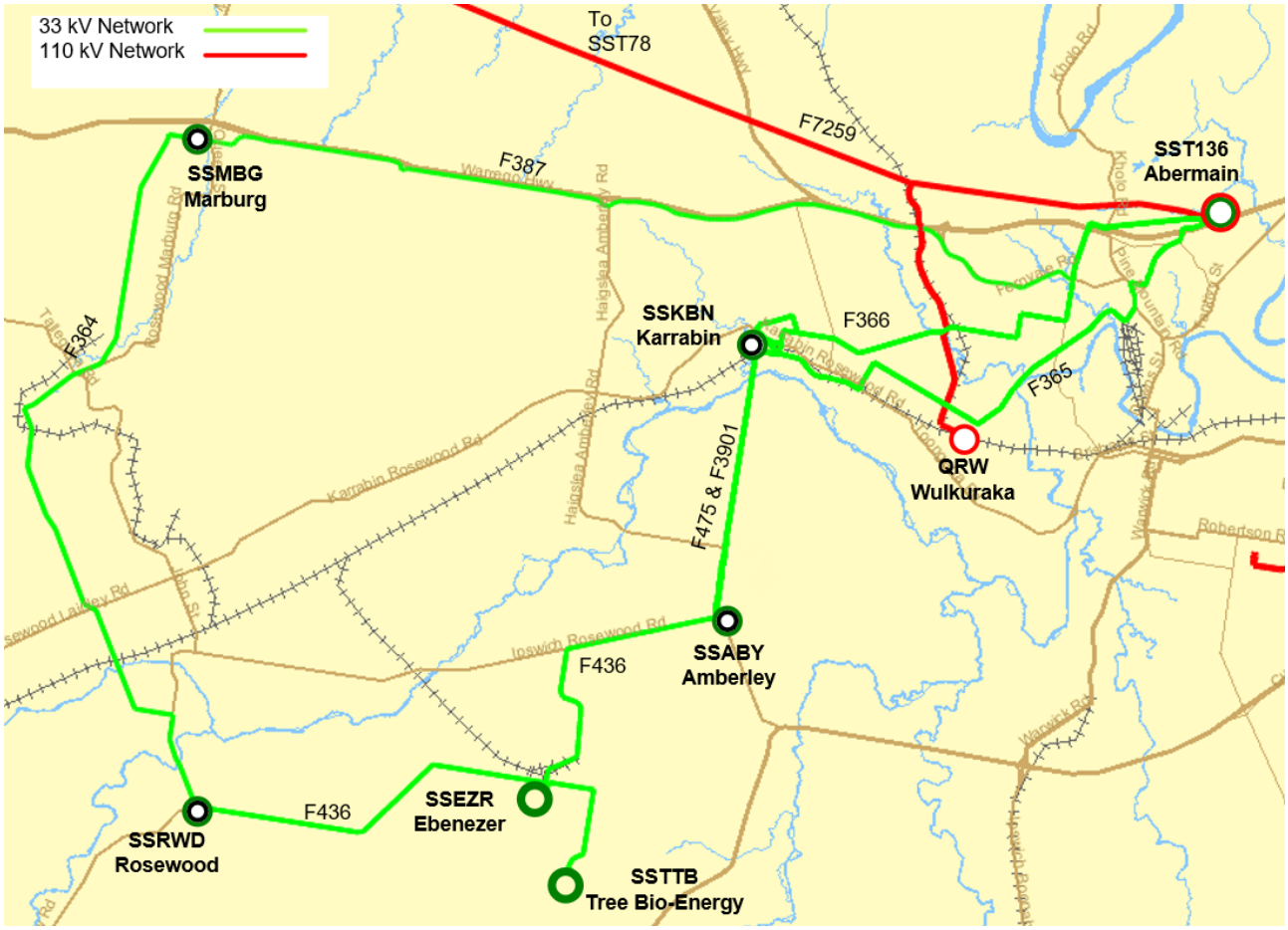


Figure 1: SSRWD, 110kV and33kV Feeders, Existing Network Arrangement (Geographic View)

1.2. Existing Supply System

SSRWD is supplied from SST136 via a 33kV ring network, which also supplies SSKBN, SSMBG and SSABY. SSRWD is supplied from 33kV feeders 364 (SSRWD-SSMBG) and 436 (SSRWD-SSEZR-SSABY). SSRWD has an outdoor 33kV and 11kV switchgear and a control room and 2 x 5MVA 33/11kV transformers (TR1 & TR3). The 11kV bus has three (3) active feeders which supplies a total of 2,331 residential, industrial, commercial, and rural customers, with a peak of 6.93MVA in 2020/21.

A schematic view of the existing sub-transmission network arrangement and general arrangement is shown in **Error! Reference source not found.**, Figure 3 and Figure 4 below.

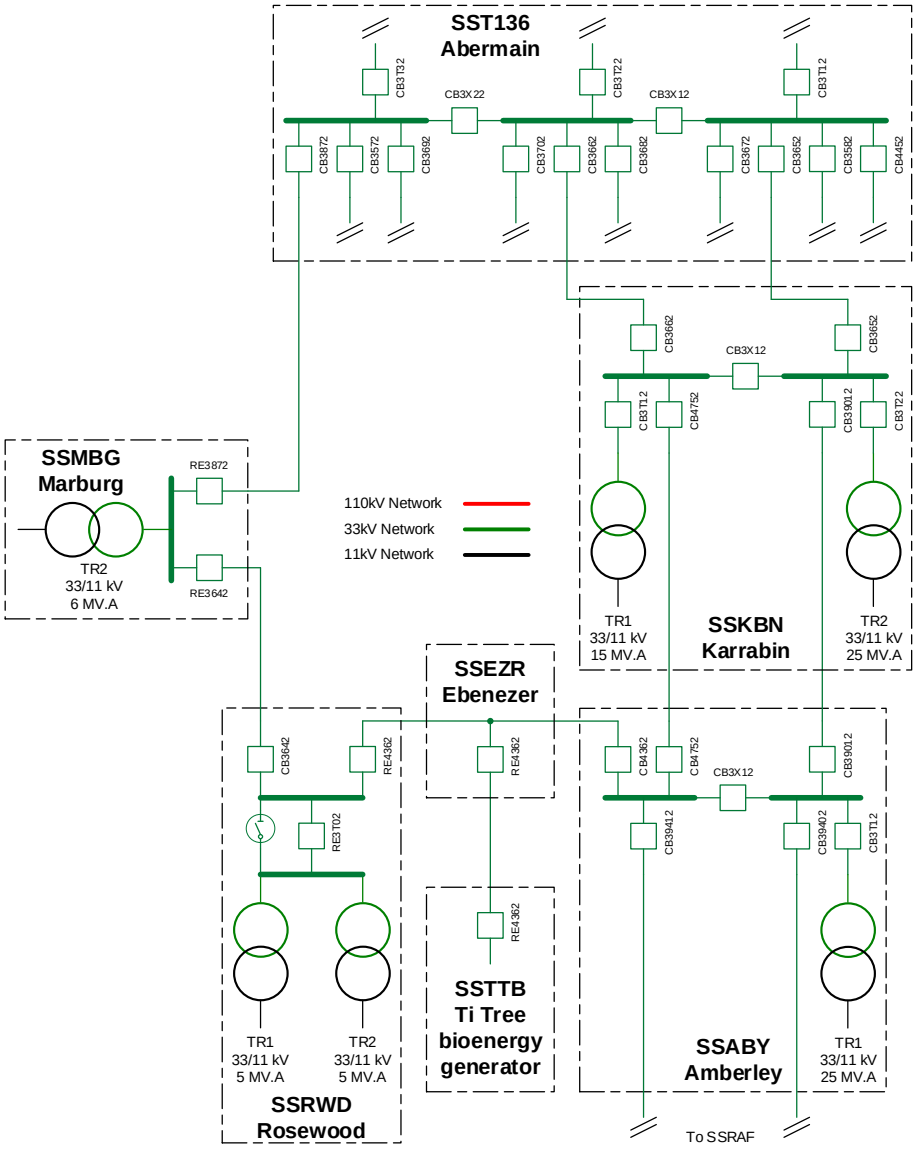


Figure 2: Existing area network arrangement (schematic view)

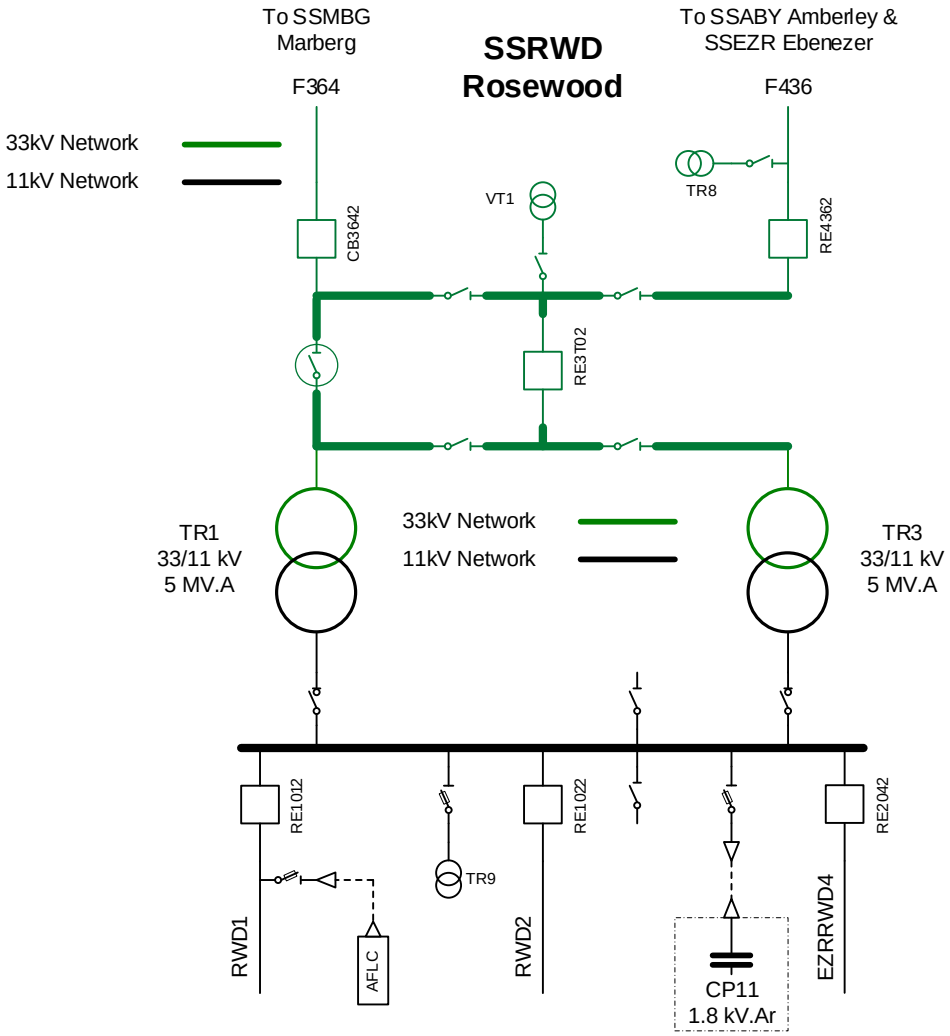


Figure 3: Existing network arrangement (schematic view)

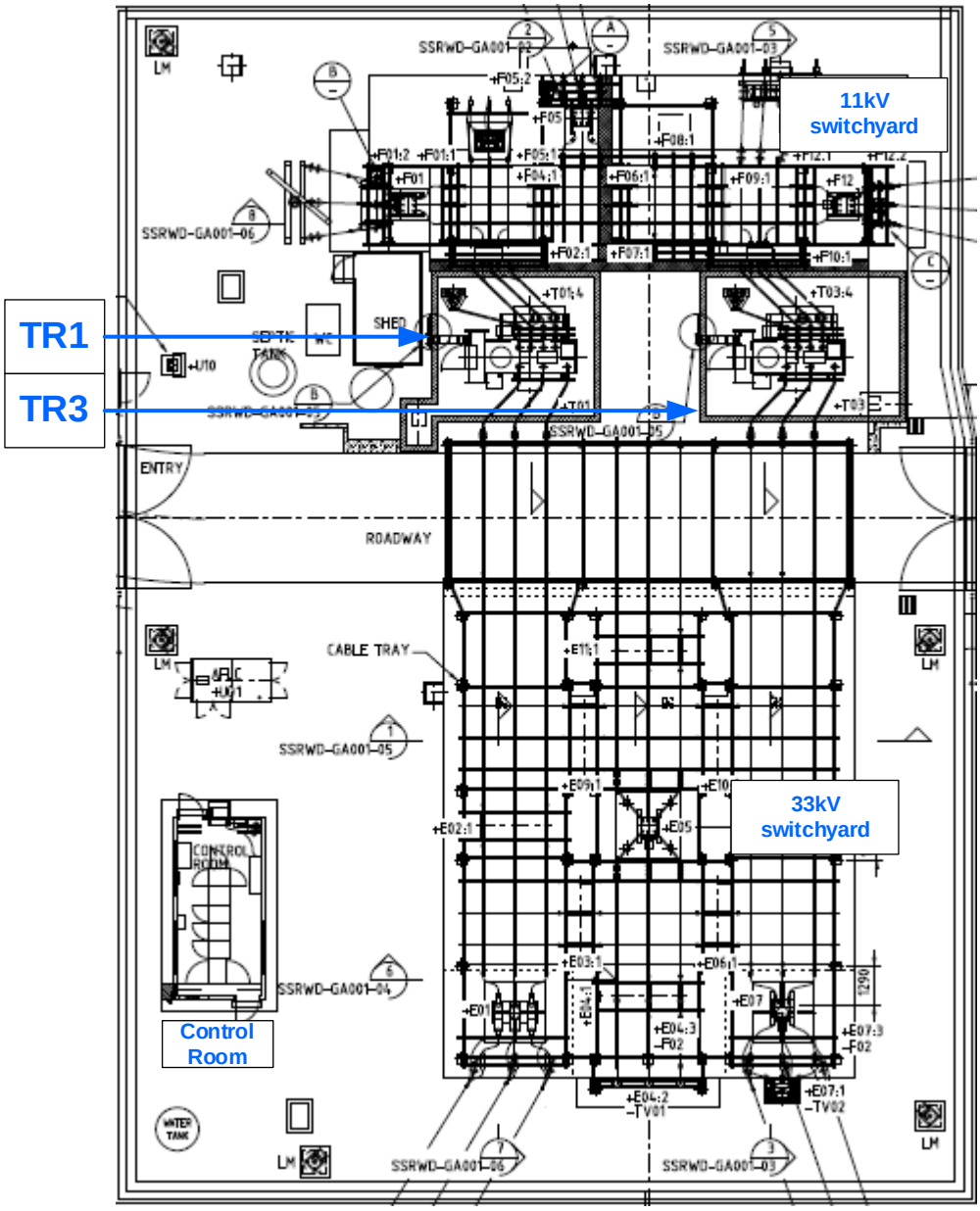


Figure 4: Rosewood Substation (general arrangement)

1.3. Load Profiles / Forecasts

The load at SSRWD comprises a mix of residential and commercial/industrial customers. The load is summer peaking, and the annual peak loads are predominantly driven by residential customers.

1.3.1. Full Annual Load Profile

The full annual load profile for Rosewood 33/11kV zone substation for 2020/21 financial year is shown in **Error! Reference source not found.**. The peak occurs through the summer period; however it does not exceed the N-1 capacity of 9.1MVA.

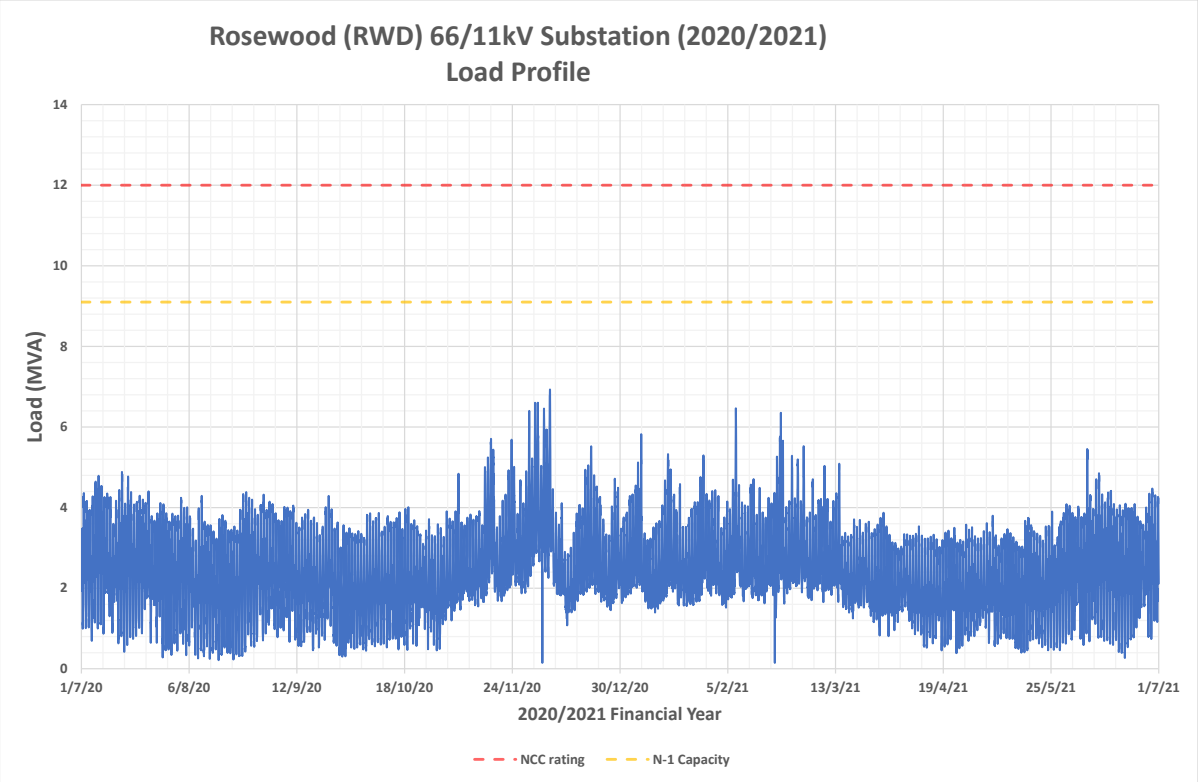


Figure 5: SSRWD actual annual load profile

1.3.2. Load Duration Curve

The load duration curve for SSRWD load for 2020/21 is shown in **Error! Reference source not found.Error! Reference source not found.**. The load does not exceed the N-1 capacity of 9.1MVA.

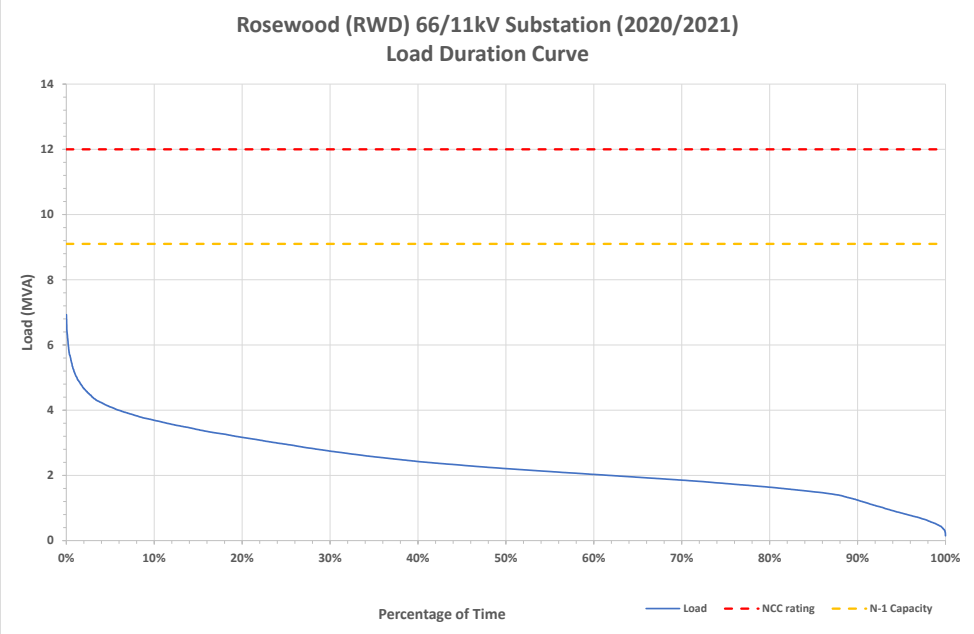


Figure 6: Substation load duration curve for SSRWD

1.3.3. Average Peak Weekday Load Profile (Summer)

The daily load profile for the average and peak weekday during summer is illustrated below in **Error! Reference source not found.Error! Reference source not found.**. The summer peak loads for SSRWD are historically experienced in the late afternoon and evening.

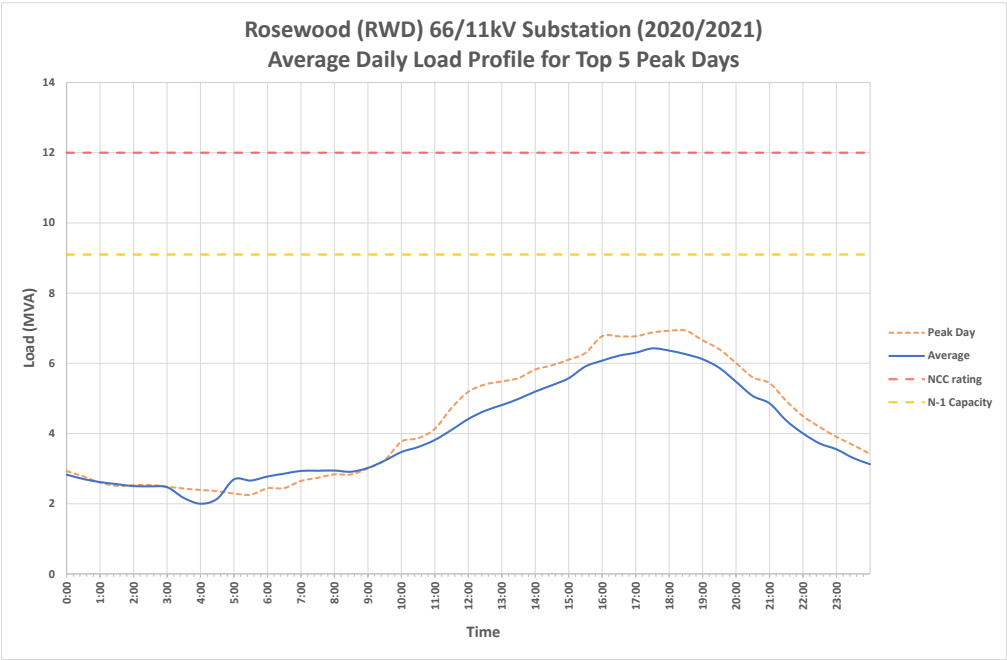


Figure 7: Average Daily and Maximum Load Profiles (Summer)

1.3.4. Base Case Load Forecast

The 10 PoE and 50 PoE load forecasts for the base case load growth scenario are illustrated in **Error! Reference source not found.**. The historical peak load for the past six years has also been included in the graph. It can be seen that the 50% POE forecast load growth in the base case scenario does not exceed the N-1 rating of 9.1MVA and the 10% POE forecast load growth in the base case scenario does not exceed the NCC rating of 12MVA. It can also be noted that the peak load is forecast to increase over the next 10 years under the base case scenario.

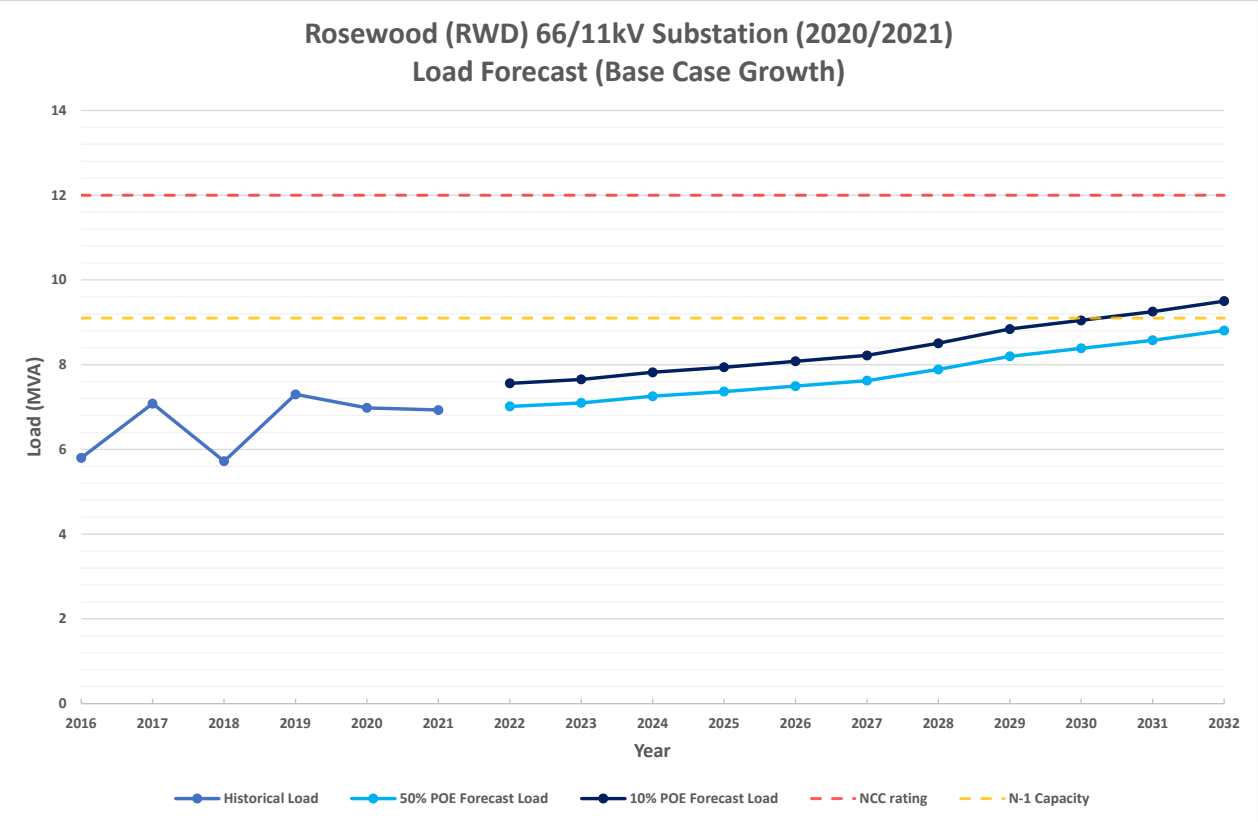


Figure 8: Network Base case load forecast

1.3.5. High Growth Load Forecast

The 10 PoE and 50 PoE load forecasts for the high load growth scenario are illustrated in Figure 9. With the high growth scenario, the peak load is forecast to increase over the next 10 years.

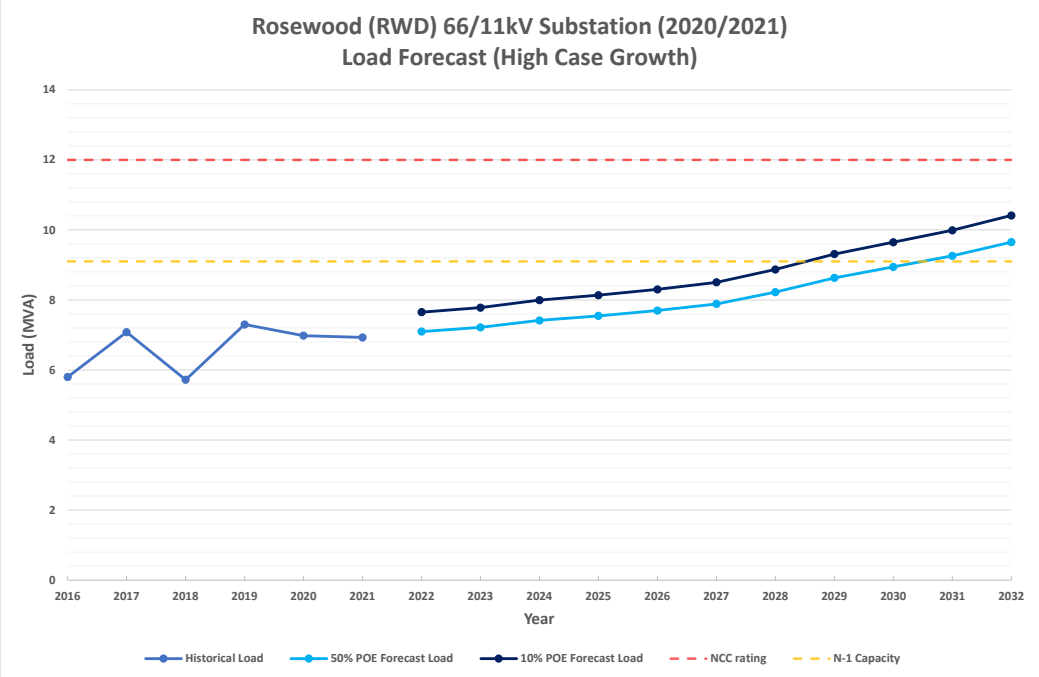


Figure 9: Network High Growth Load Forecast

1.3.6. Low Growth Load Forecast

The 10 PoE and 50 PoE load forecasts for the low load growth scenario are illustrated in Figure 10. With the low growth scenario, the peak load is forecast to remain relatively steady over the next 10 years.

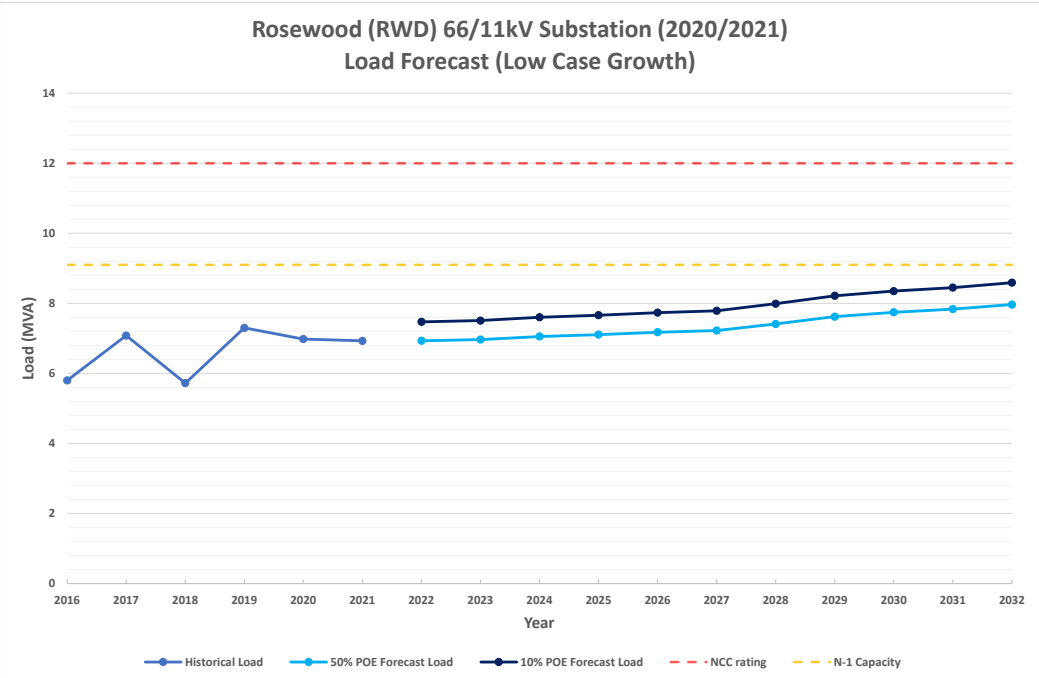


Figure 10: Network Low Growth Load Forecast

2. IDENTIFIED NEED

2.1. Description of the Identified Need

2.1.1. Poor Condition Assets

A recent condition assessment and substation works have highlighted a number of critical assets are at the end of their serviceable life, are in poor condition or are targeted for removal. The condition of these assets presents considerable safety and customer reliability risk. These assets include:

- Two (2) 33kV Surge Arrestors
- Five (5) 33kV Isolators
- Seven (7) 11kV Isolators
- Two (2) Expulsive drop out fuses
- Four (4) Controller for Reclosers
- One (1) Protection Relay
- One (1) 33kV VT Marshalling Box
- One (1) recloser lead
- One (1) 33kV insulator

The deterioration of these primary and secondary system assets poses safety risks to staff working within the switchyard. It also poses a safety risk to the general public, through the increased likelihood of protection relay mal-operation. Without remediation, Energex views that the safety risk to the public and its staff to not be reduced to So Far As Is Reasonably Practicable.

Additionally, the problematic isolators and the poor condition of the assets significantly increases the likelihood of outages, resulting in a reduction in the level of reliability experienced by the customers supplied from Rosewood Substation.

3. INTERNAL OPTIONS CONSIDERED

3.1. Non-Network Options Identified

Energex has not identified any viable non-network solutions internally that will provide a complete or a hybrid (combined network and non-network) solution to provide the magnitude of network support required in the Rosewood area to address the identified need.

3.2. Network Options Identified

Energex has identified one (1) credible network option that will address the identified need. The option of replacement of the problematic and end of life assets in-situ was considered but rejected, because of the following:

- Parts of the 11kV bus do not meet the required clearance to the boundary fence and the fence cannot be moved since it is on the property boundary.
- The galvanised steel "pipework" structure is not expected to last the life of the problematic isolators once they are replaced, as the pipework structure is already 70 years old.
- Clearance between the 11kV feeder bays is inadequate, thus, to replace the isolators most of the bus would have to be out of service. Therefore, replacement in-situ would require significant load transfers and generation.
- Back-up reach for some 11kV feeders is below requirements and duplicate relays cannot be installed due to the lack of current transformers.

3.2.1. Option 1: Remove problematic plant items and replace the 33kV and 11kV outdoor switchgear with indoor switchgear

This option involves the following works:

- Construct a building to suit 33kV switchgear, 11kV switchgear, control panels, protection panels, telecommunications panels, standard ancillaries, space for a future AFLC coupling cell and space for future control/protection/telecommunications panels.
- Install indoor 33kV and 11kV switchgear as shown in the proposed network arrangement schematic in Figure 11 below. Install bus, transformer and feeder protection panel. Install sensitive earth fault protection. Install a 110V dc battery bank, 110V battery charger, dc panels, ac panels, telecommunications panel, security panel and standard ancillaries.
- Install an outdoor three-way ring main unit and connect to the indoor 11kV switchgear.
- Install a padmount 11kV station service transformer with ring main unit and low voltage switch-fuse board. Connect to the indoor 11kV switchgear and new ac main board. Install a low voltage generator connection board and connect to the new ac board.

A schematic diagram of the proposed network arrangement for Option 1 is shown in Figure 11.

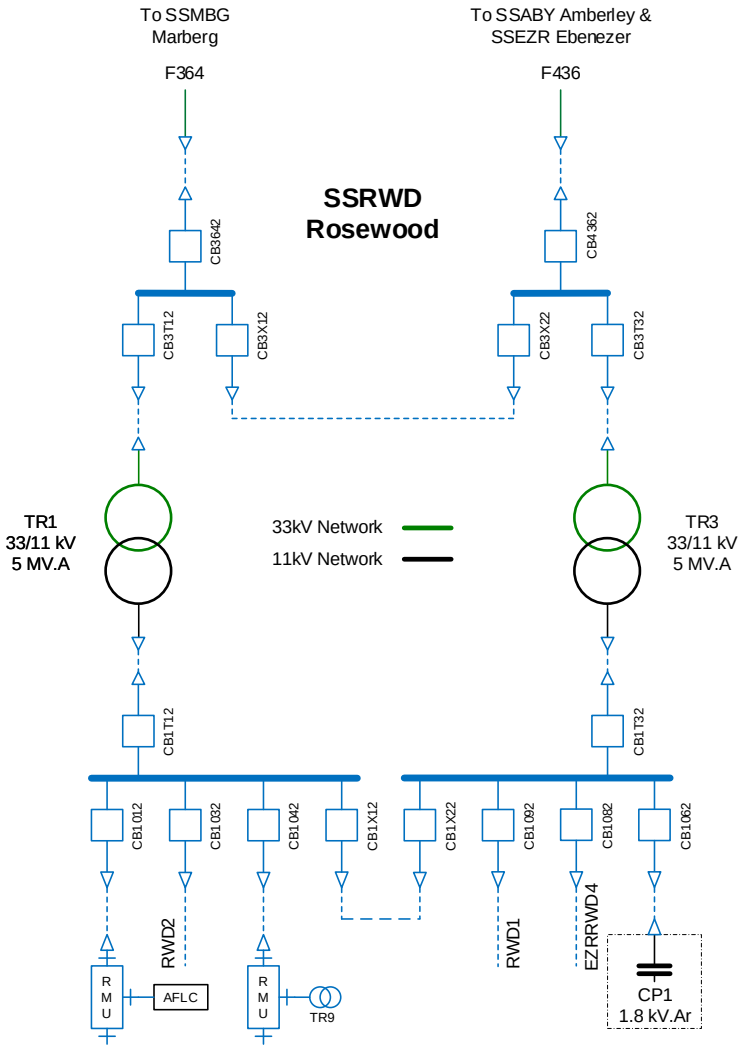


Figure 11: Option 1 proposed network arrangement (schematic view)

3.3. Preferred Network Option

Energex's preferred internal network option is Option 1: Replace problematic plant items and replace the 33kV and 11kV outdoor switchgear with indoor switchgear.

Upon completion of these works, the asset safety and reliability risks at SSRWD Substation will be addressed. The preferred option will provide the greatest reliability benefit for customers, whilst also reducing expenditure on obsolete, non-compliant and high maintenance assets, while ensuring more efficient use of design and construction resources.

The estimated capital cost of this option inclusive of interest, risk, contingencies and overheads is $10.3 million. Annual operating and maintenance costs are anticipated to be the same as the existing network as a result of this option. The estimated project delivery timeframe has design commencing in September 2022 and construction completed by October 2024.

4. ASSESSMENT OF NON-NETWORK SOLUTIONS

Energex's Demand & Energy Management (DEM) team has assessed the potential non-network alternative (NNA) options required to defer the network option and determine if there is a viable demand management (DM) option to replace or reduce the need for the network options proposed.

Credible options must be technically and commercially viable and must be able to be implemented in sufficient time to satisfy the identified risk to the public and/or the network due to the identified constraints.

Once the aged/ problematic, identified 11kV and 33kV assets at SSRWD reach their retirement age and can no longer be safely operated, the existing load would need to be supplied via non-network alternative solutions while satisfying the Service Safety Net Targets as specified in the Distribution Authority issued to Energex.

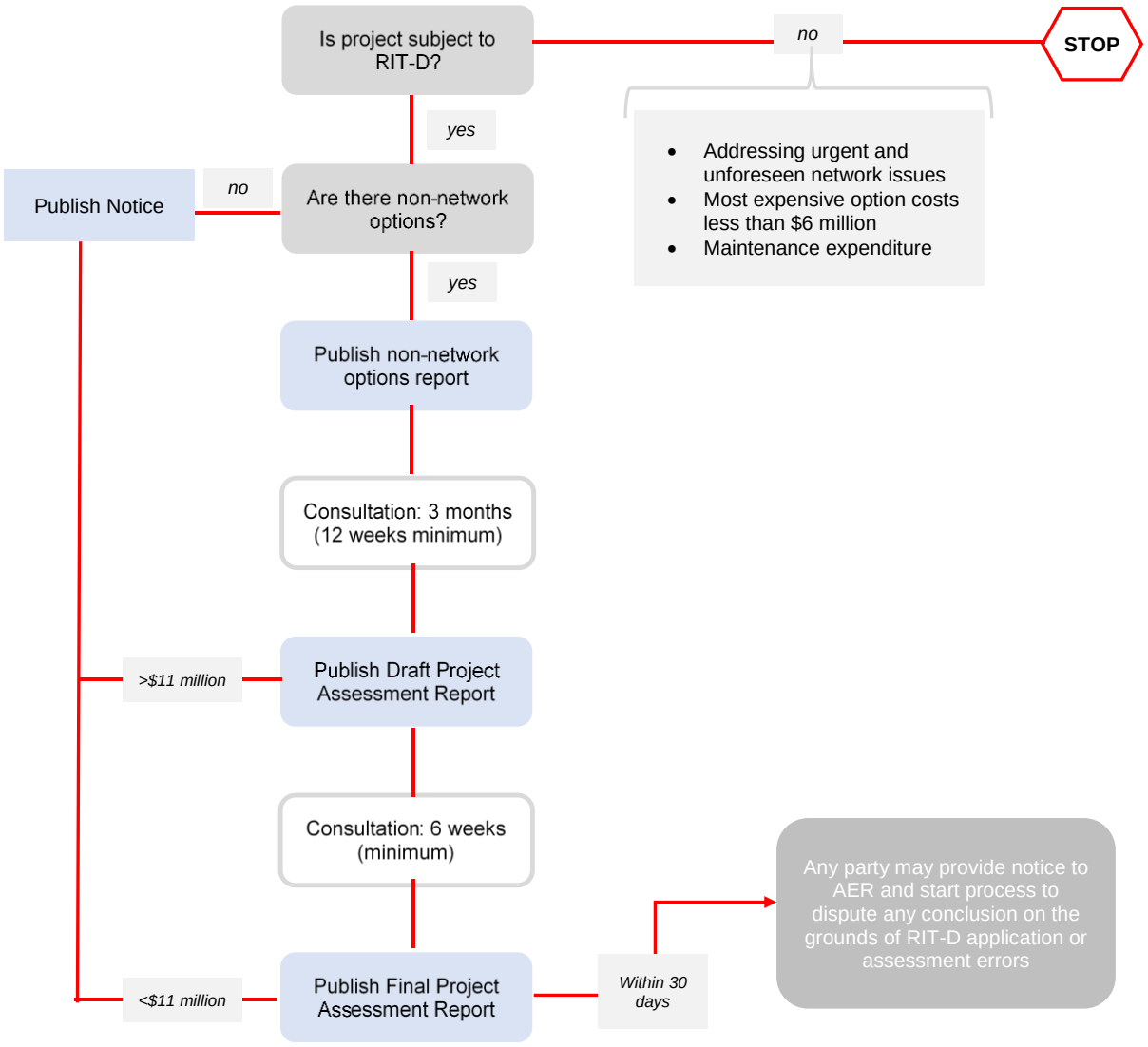
It is considered that no available demand management products or strategies can provide sufficient demand support at SSRWD to address the identified need. It is evident that an economically feasible non-network option would not be available to defer or eliminate the requirement to remove the problematic plant items and replace the 33kV and 11kV outdoor switchgear with indoor switchgear at SSRWD and continue to provide a safe, sufficient and reliable supply to customers in the Rosewood Area.

5. CONCLUSION AND NEXT STEPS

Considering the nature of the project, being the safety risk from failure of aged assets and as per clause 5.17.4(c) of the NER, Energex has determined that there are no credible non-network options to address the identified need at SSRWD.

The preferred network option is Option 1: Remove problematic plant items and replace the 33kV and 11kV outdoor switchgear with indoor switchgear. This Notice of No Non-Network Options is therefore published in accordance with rule 5.17.4(d) of the NER. As the next step in the RIT-D process, Energex will now proceed to publish a Final Project Assessment Report.

APPENDIX A – THE RIT-D PROCESS



Source: AEMC, *Rule determination: National Electricity Amendment (Replacement expenditure planning arrangements) Rule 2017*, July 2017, p. 64.