Regulatory Investment Test for Distribution (RIT-D)

Addressing Reliability Requirements in the Pimpama East and Stapylton Network Area

Final Project Assessment Report

10 March 2023

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

Pimpama East Zone Substation (SSPPE) is supplied from Coomera Bulk Supply Substation (SSCMA) via 33kV feeders F3641 and F3642. SSPPE provides electricity supply to approximately 11,652 predominately domestic customers in the surrounding suburbs

Stapylton Zone Substation (SSSTT) is supplied from Beenleigh Bulk Supply Substation (SST108) via 33kV feeders F426 and F3601. SSSTT provides electricity supply to approximately 248 mixed industrial and residential customers in the surrounding suburbs.

The 33kV feeders F3641 and F3642 supplying Pimpama East Zone Substation from Coomera Bulk Supply Substation are constructed as a double circuit line sharing the same poles, with parts of these feeders traversing along road corridors, which exposes the network to an increased likelihood of losing both feeders with a single pole failure. Similarly, the 33kV feeders F426 and F3601 supplying Stapylton Zone Substation are also constructed as a double circuit line sharing the same poles along road corridors, which again exposes the network to an increased likelihood of losing both feeders with a single pole failure.

The assessment identified that Energex will experience three upcoming network limitations due to the load growth in the area, of which only one limitation is being addressed by this report:

- Both the 33kV feeder networks supplying SSPPE (F3641 & F3642) and SSSTT (F426 & F3601) are double circuit, single pole arrangements. The route of these feeders traverses along road corridors, which increases the likelihood of pole damage and failure. As such, the risk of a double circuit outage with a single pole failure is considered credible.

  Should such an event occur, the only option to restore supply to customers is to utilise manual transfers to adjacent substations.

  Under this credible contingency event, Energex will not be able to restore all supply to Stapylton or Pimpama East zone substation until the defect is repaired. The energy required to resolve the outage at SSPPE and SSSTT is summarised in Table 1 and .

Year	Forecast peak unsupplied energy (kWh)
2023	136359
2024	140568
2025	159337
2026	164956
2027	171117
2028	179151
2029	187500
2030	196950
2031	206645
2032	218086
2033	230478

Table 1: Energy required to resolve the outage at SSPPE after the loss of F3641 & F3642

Year	Forecast peak unsupplied energy (kWh)
2023	33882
2024	35028
2025	34703
2026	34590
2027	34396
2028	34631
2029	34860
2030	35304
2031	35750
2032	36739
2033	37556

Table 2: Energy required to resolve the outage at SSSTT after the loss of F426 & F3601

The following network limitations are being addressed in a separate project:

- The 10% POE load at SSPPE ZS is forecast to exceed Substation system normal cyclic capacity (NCC) in summer 2030/31. The system normal condition is assessed against the 10%PoE load forecast.

- Under a credible contingency event (such as for an outage of the 33/11kV transformer at SSPPE ZS) benchmarked against 50% POE load, Energex will not be able to meet Safety Net restoration times to supply the Pimpama East area from 2024/25 onwards. This limitation exists even after installing POPs at SSPPE.

There is a proposed project to establish a new substation at Pimpama to resolve the above NCC and N-1 limitations at SSPPE. The proposed substation will be supplied by the same double circuit feeders currently supplying SSPPE, therefore the load at risk resulting from a double circuit outage will remain the same. The project to establish a new substation at Pimpama has already had an open consultation which is now closed.

The purpose of this project is to restore supply to the SSPPE and SSSTT loads following a double contingency event occurring (loss of F3641 & F3642 or loss of F426 & F3601).

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 Pimpama East and Stapylton supply area in a reliable, safe and cost-effective manner. Accordingly, this investment is subject to a RIT-D.

Energex published a Notice of No Non-Network Options Report for the above-described network constraint on 23 February 2023.

Two feasible options have been investigated are as follows:

- **Option 1:** Establish new 33kV Feeder between SSSTT and SSPPE
- **Option 2:** Establish new 33kV feeder between SSCMA and SSPPE and between SSSTT and SSYTA and build a new switchgear building at SSYTA

This Final Project Assessment Report (FPAR), where Energex provides both technical and economic information about possible solutions, has been prepared in accordance with the requirements of clause 5.17.4(o) of the NER.

Energex's preferred solution to address the identified need is Option 1 – Establish new 33kV Feeder between SSSTT and SSPPE.

CONTENTS

1 INTRODUCTION

This Final Project Assessment Report has been prepared by Energex in accordance with the requirements of clause 5.17.4(o) of the NER.

This report represents the final stage of the consultation process in relation to the application of the RIT-D on potential credible options to address the identified need for the Pimpama East and Stapylton network area.

In preparing this RIT-D, Energex is required to consider reasonable future scenarios. With respect to major customer loads and generation, Energex has, in good faith, included as much detail as possible while maintaining necessary customer confidentiality. Potential large future connections that Energex is aware of are in different stages of progress and are subject to change (including outcomes where none or all proceed). These and other customer activity can occur over the consultation period and may change the timing and/or scope of any proposed solutions.

1.1 Response to the DPAR

Energex published a Notice of No Non-Network Options for the identified need in the Pimpama East and Stapylton network area on the 23rd February 2023.

1.2 Structure of the Report

This report:

- Provides background information on the network capability limitations of the distribution network supplying the Pimpama East and Stapylton area.
- Identifies the need which Energex is seeking to address, together with the assumptions used in identifying and quantifying that need.
- Describes the credible options that are considered in this RIT-D assessment.
- Quantifies costs and classes of material market benefits for each of the credible options.
- Describes the methods used in quantifying each class of market benefit.
- Provides details of classes of market benefits that are not considered material to this RIT-D assessment and provides explanations as to why these classes of market benefits are not considered material.
- Provides the results of Net Present Value (NPV) analysis of each credible option and accompanying explanatory statements regarding the results.
- Identifies the proposed preferred option, including detailed characteristics, estimated commissioning date, indicative costs, and noting that it satisfies the RIT-D.
- Provides contact details for queries on this RIT-D.

1.3 Dispute Resolution Process

In accordance with the provisions set out in clause 5.17.5(a) of the NER, Registered Participants or Interested Parties may, within 30 days after the publication of this report, dispute the conclusions made by Energex in this report with the Australian Energy Regulator. Accordingly, Registered Participants and Interested Parties who wish to dispute the conclusions outlined in this report based on a manifest error in the calculations or application of the RIT-D must do so within 30 days of the publication date of this report. Any parties raising a dispute are also required to notify Energex. Dispute notifications should be sent to demandmanagement@energex.com.au

If no formal dispute is raised, Energex will proceed with the preferred option to establish new 33kV Feeder between SSSTT and SSPPE.

1.4 Contact Details

For further information and inquiries please contact:

E: demandmanagement@energex.com.au
P: 13 74 66

2 BACKGROUND

2.1 Geographic Region

SSPPE provides electricity supply to 11,652 customers, of which 68.5% are residential and 31.5% are commercial, agricultural and industrial, in the Pimpama, Coomera and Jacobs Well areas.

SSSTT provides electricity supply to 248 customers, of which 97.4% residential and 2.6% are commercial, agricultural and industrial, in the Stapylton, Ormeau and surrounding areas.

The geographical location of Energex's sub-transmission network and substations in the area is shown in Figure 1.

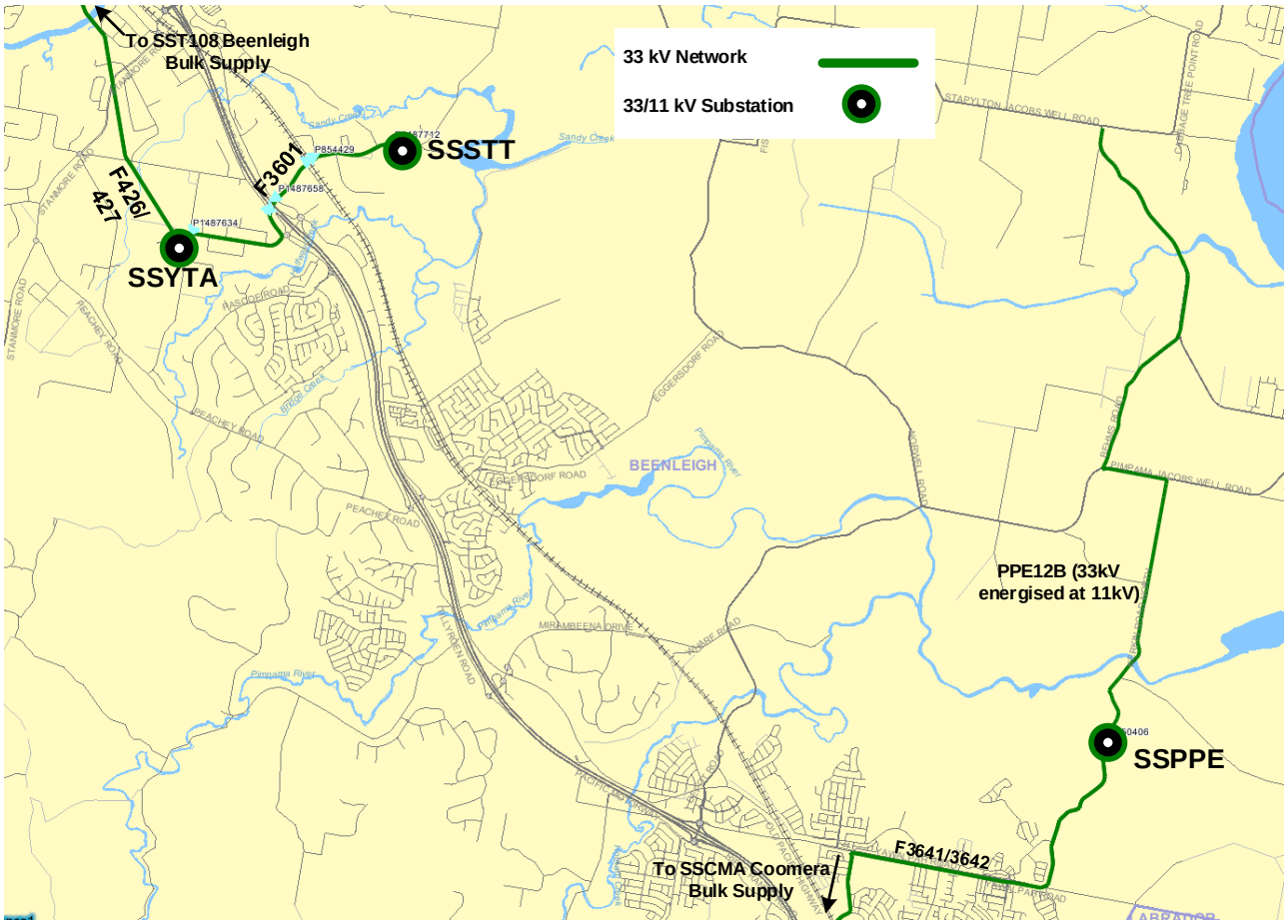


Figure 1: Existing 33kV network arrangement (geographic view)

2.2 Existing Supply System

SSPPE is supplied from SSCMA (Coomera Bulk Supply) via 33kV feeders F3641 and F3642. The substation has two indoor 33 and 11kV switchgear and control room buildings, and two 25MVA 33/11kV transformers. The 2 x 11kV bus has twelve (12) active feeders which supplies a total of approximately 11,652 residential, industrial, commercial, and rural customers, with a peak of 36.82MVA in 2021/22.

SSSTT is supplied from SST108 (Beenleigh Bulk Supply) via 33kV feeders F426 and F3601 (Yatala to Stapylton). The substation has two indoor 33 and 11kV switchgear and control room buildings, and two 15/25MVA 33/11kV transformers. The 2 x 11kV bus has five (5) active feeders which supplies a total of approximately 248 residential, industrial, commercial, and rural customers, with a peak of 10.82MVA in 2021/22.

A schematic view of the existing sub-transmission network arrangement is shown in Figure 2 and the general arrangement of Pimpama East Substation is illustrated in Figure 3 and the general arrangement of Stapylton Substation is illustrated in Figure 4.

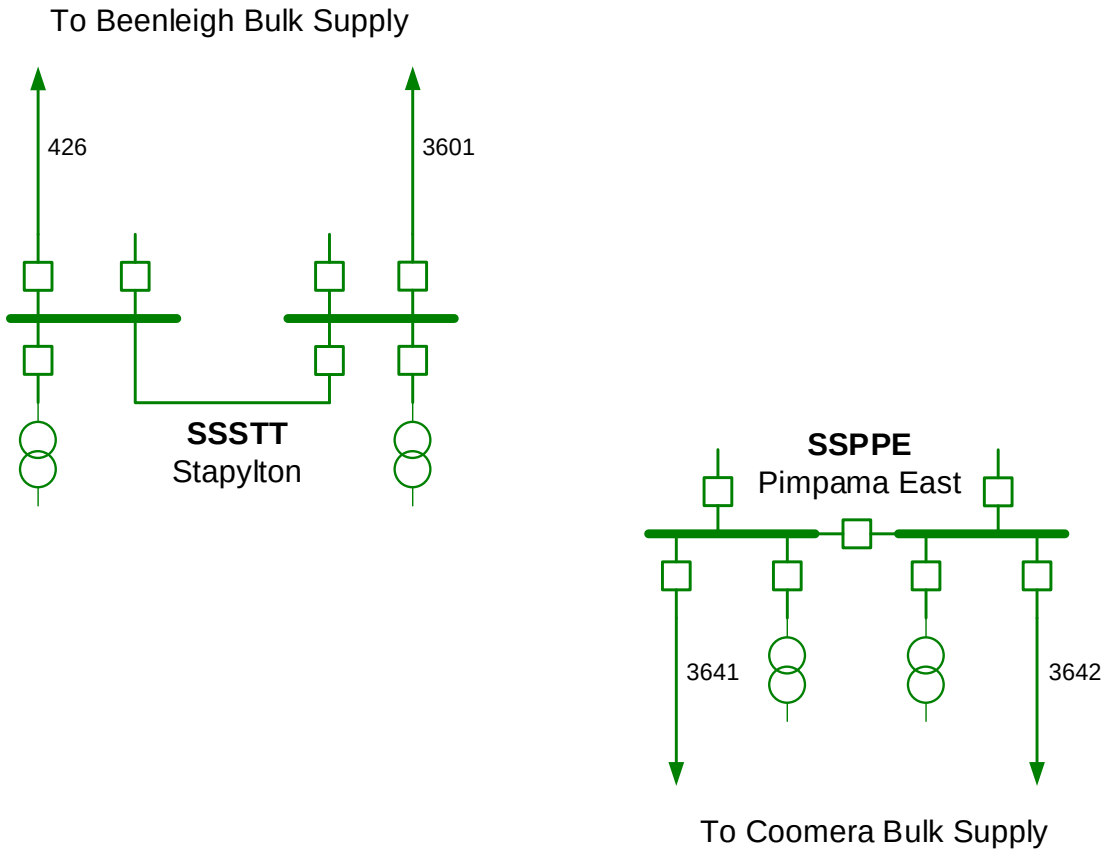


Figure 2: Existing 33kV network arrangement (schematic view)

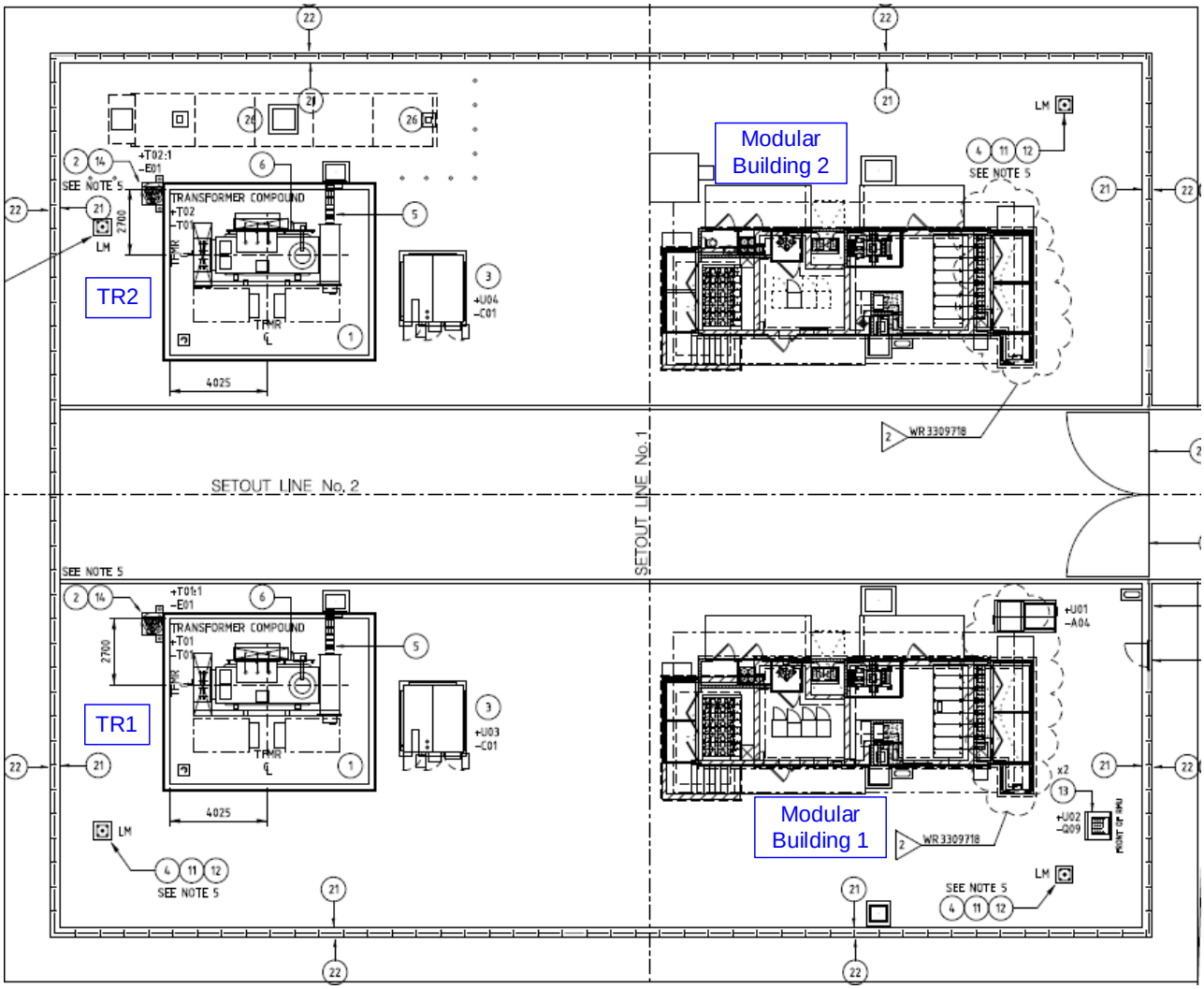


Figure 3: Pimpama East Substation (general arrangement)

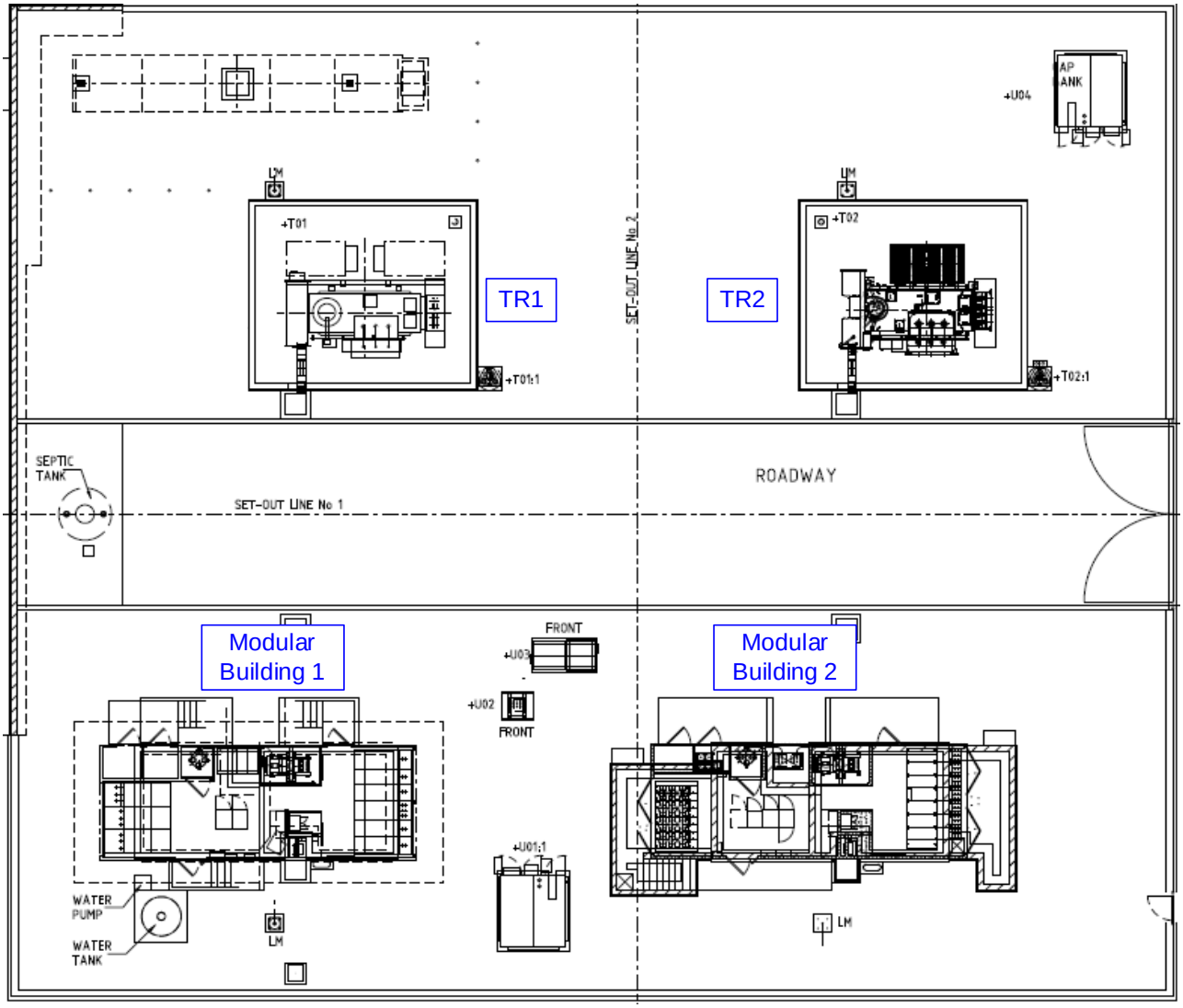


Figure 4: Stapylton Substation (general arrangement)

2.3 Load Profiles / Forecasts

The load at Pimpama East comprises of predominantly residential customers and is summer peaking.

The load at Stapylton comprises of predominantly industrial/commercial customers with a small proportion of residential customers and is summer peaking.

2.3.1 Full Annual Load Profile

The full annual load profile for Pimpama East 33/11kV zone substation for 2021/22 financial year is shown in Figure 5. The peak occurs through the summer period.

The full annual load profile for Stapylton 33/11kV zone substation for 2021/22 financial year is shown in Figure 6. The peak occurs through the summer period.

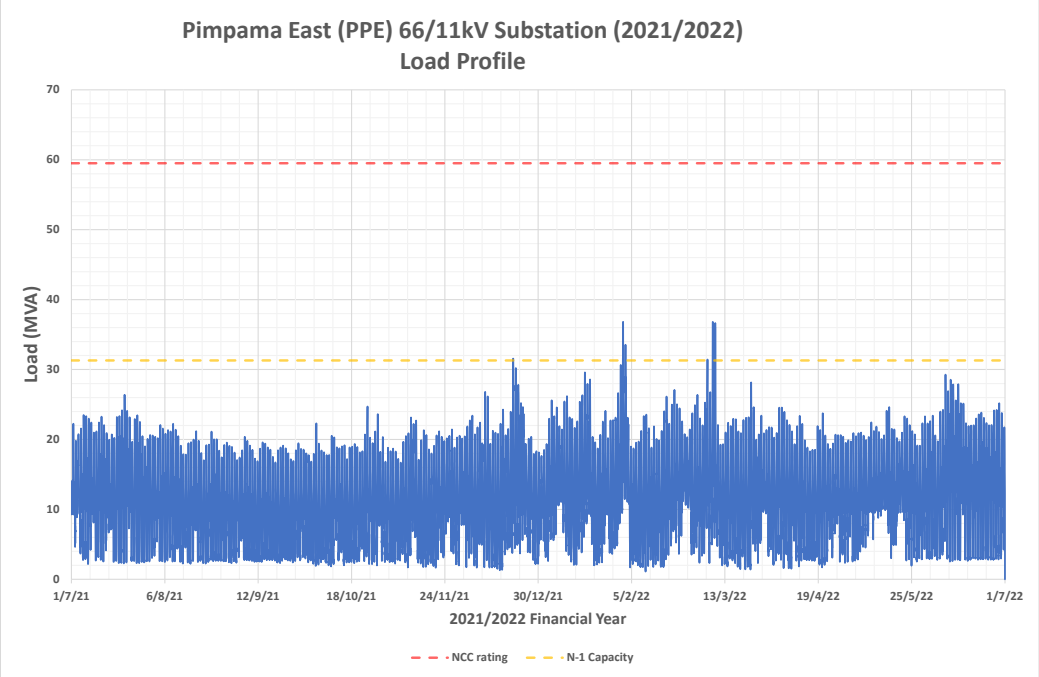


Figure 5: Pimpama East Zone Substation actual annual load profile

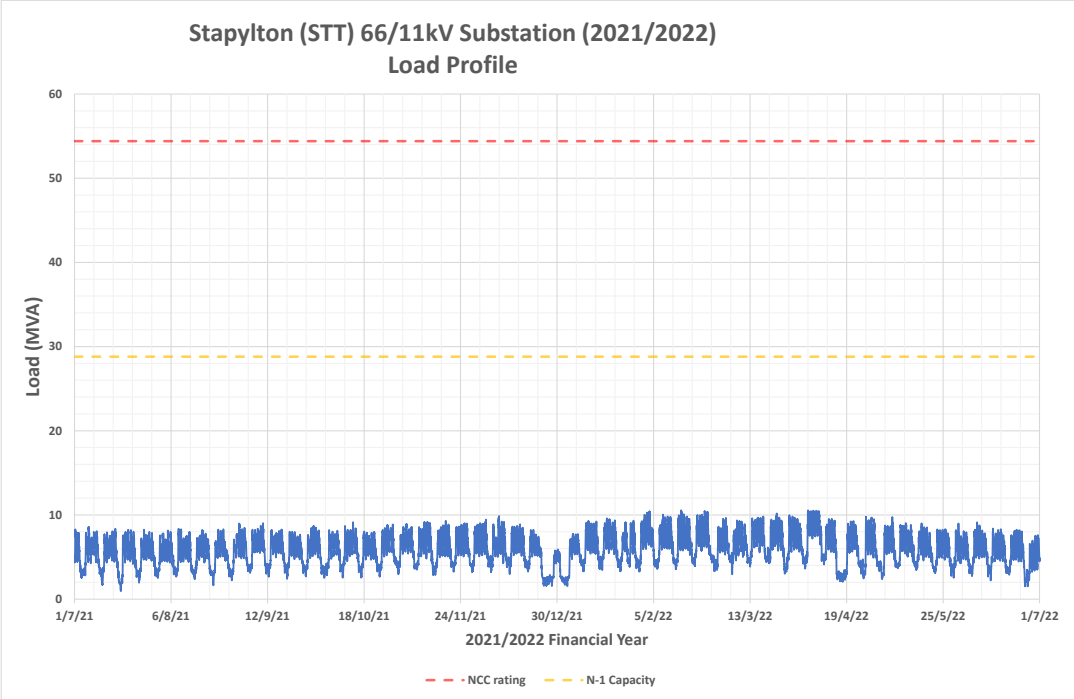


Figure 6: Stapylton Zone Substation actual annual load profile

2.3.2 Load Duration Curve

The load duration curve for Pimpama East Zone Substation for 2021/22 is shown in Figure 7. The load does not exceed the NCC capacity of 59.5MVA.

The load duration curve for Stapylton Zone Substation for 2021/22 is shown in Figure 8. The load does not exceed the NCC capacity of 54.4MVA.

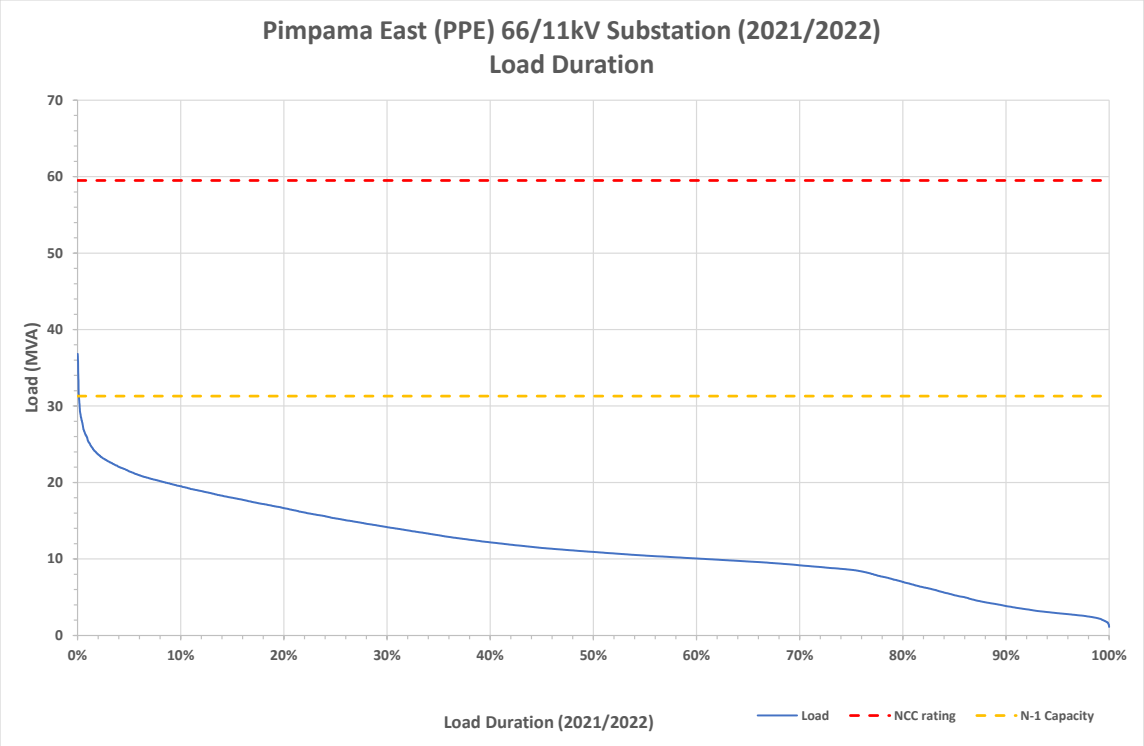


Figure 7: Substation load duration curve for SSPPE

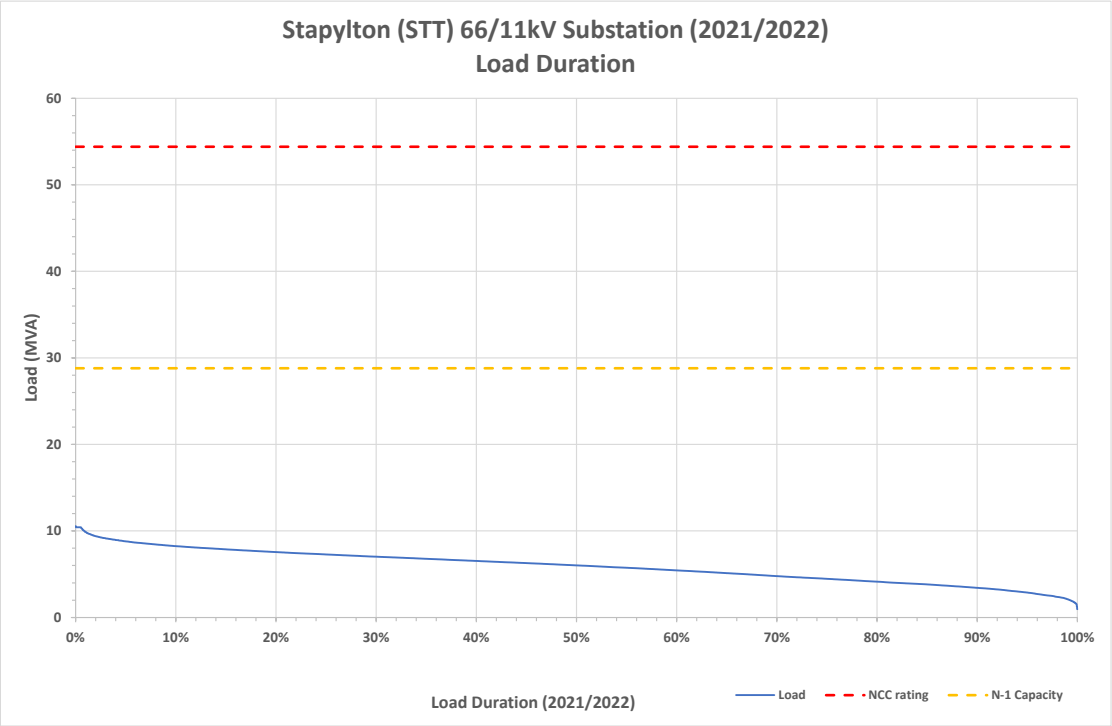


Figure 8: Substation load duration curve for SSSTT

2.3.3 Average Peak Weekday Load Profile (Summer)

The daily load profile for the average and peak weekday during summer is illustrated below in Figure 9. The summer peak loads for Pimpama East Zone Substation are historically experienced in the late afternoon and evening.

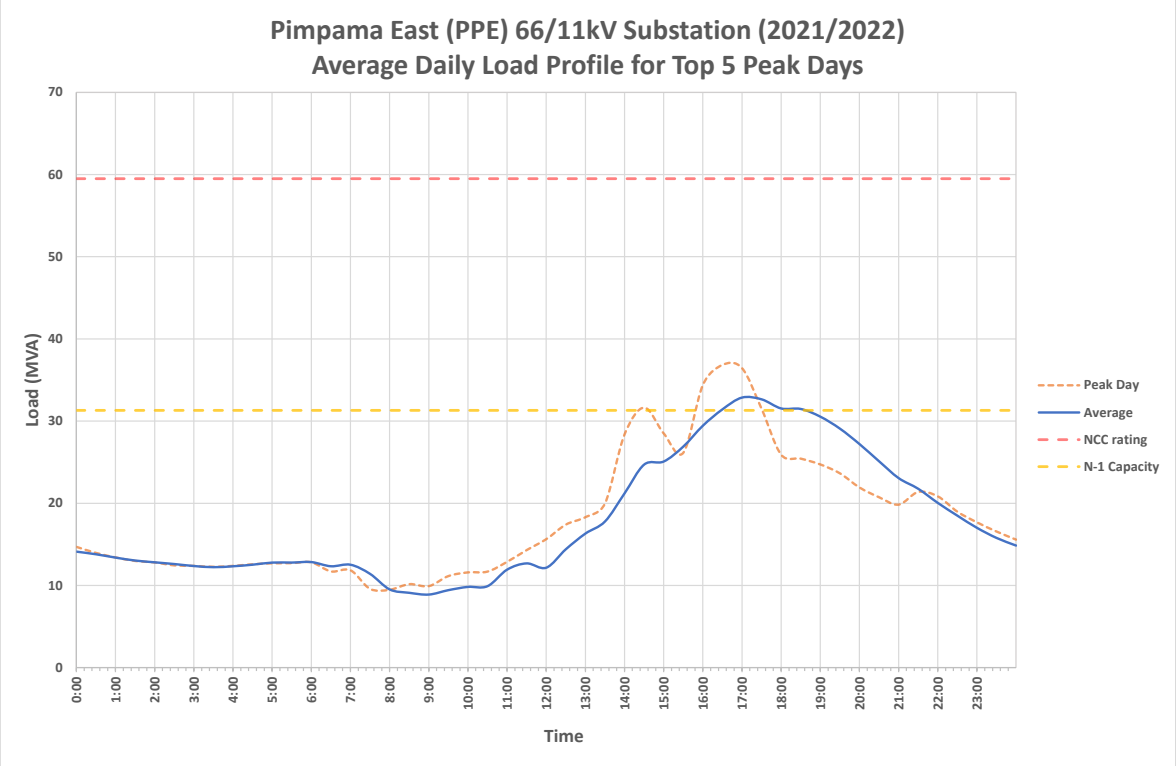


Figure 9: Average Daily and Maximum Load Profiles (Summer)

The daily load profile for the average and peak weekday during summer is illustrated below in Figure 10. The summer peak loads for Stapylton Zone Substation are historically experienced in the early morning.

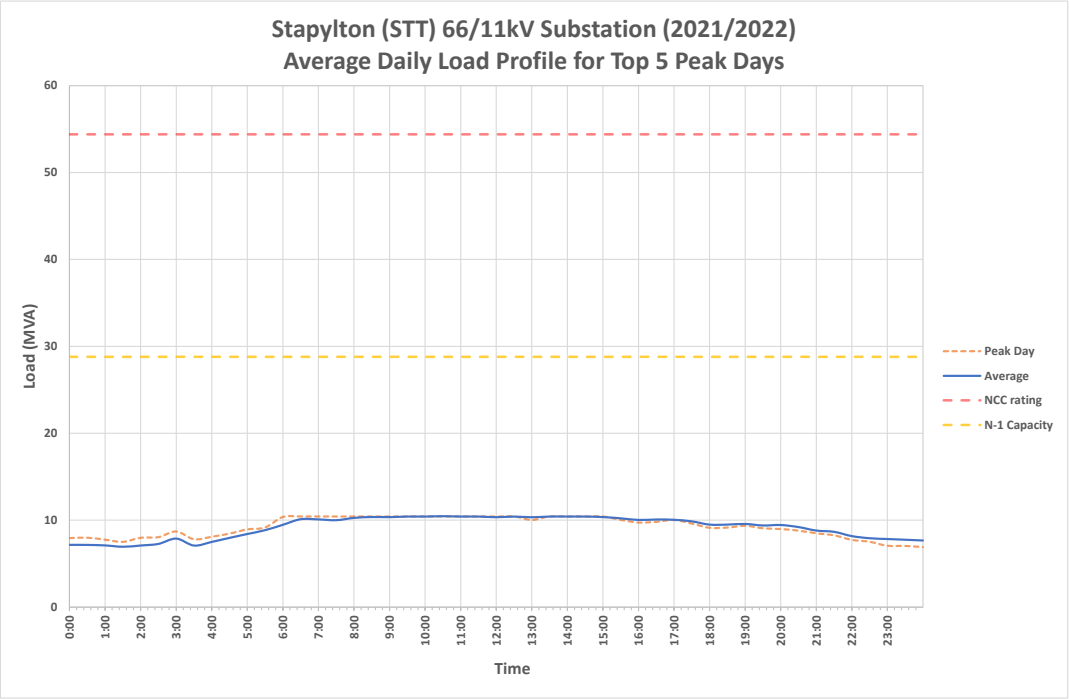


Figure 10: Average Daily and Maximum Load Profiles (Summer)

2.3.4 Base Case Load Forecast

The 10 PoE and 50 PoE load forecasts for the base case load growth scenario for Pimpama East Zone Substation are illustrated Figure 11. The historical peak load for the past six years has also been included in the graph.

It can be noted that the historical annual peak loads for Pimpama East Zone Substation have increased over the past six years. It can also be noted that the peak load is forecast to increase over the next 10 years under the base case scenario.

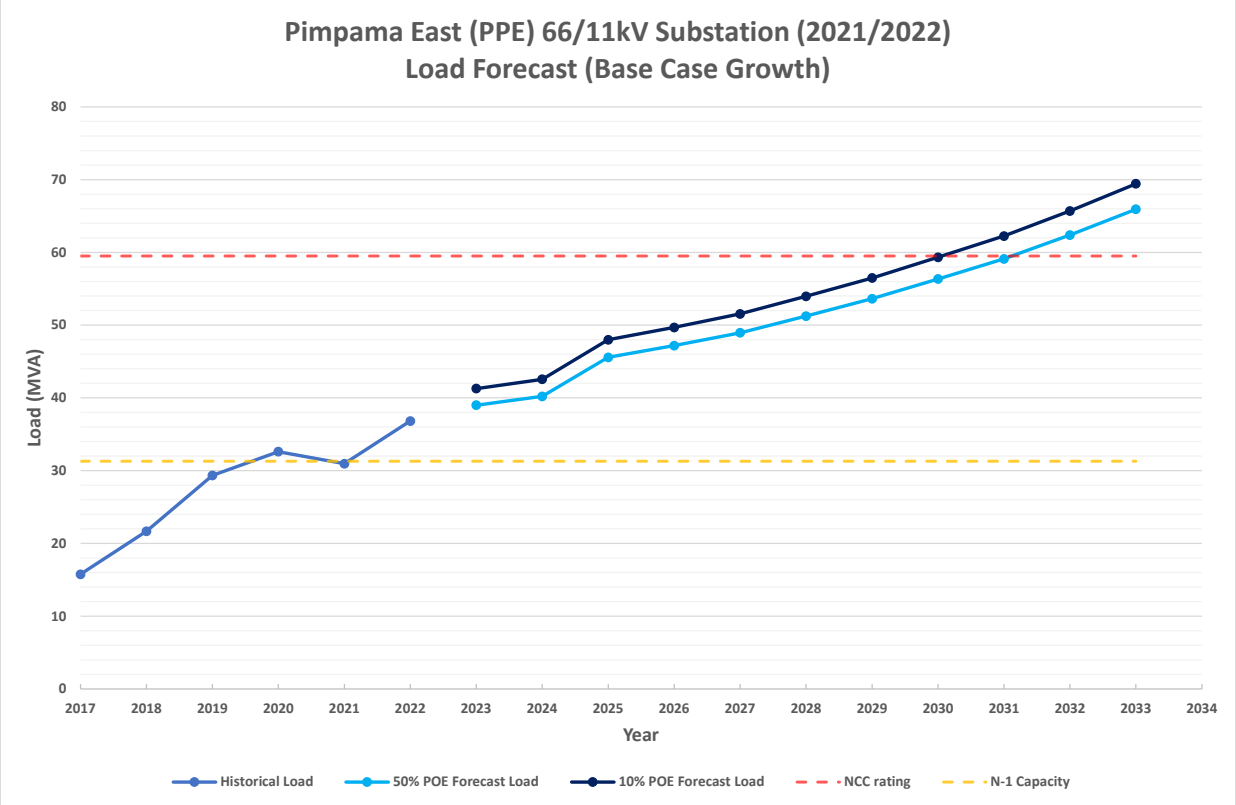


Figure 11: Pimpama East Zone Substation Base case load forecast

The 10 PoE and 50 PoE load forecasts for the base case load growth scenario for Stapylton Zone Substation are illustrated Figure 12. The historical peak load for the past six years has also been included in the graph.

It can be noted that the historical annual peak loads for Stapylton Zone Substation have been flatline over the past six years. It can also be noted that the peak load is forecast to flatline over the next 10 years under the base case scenario.

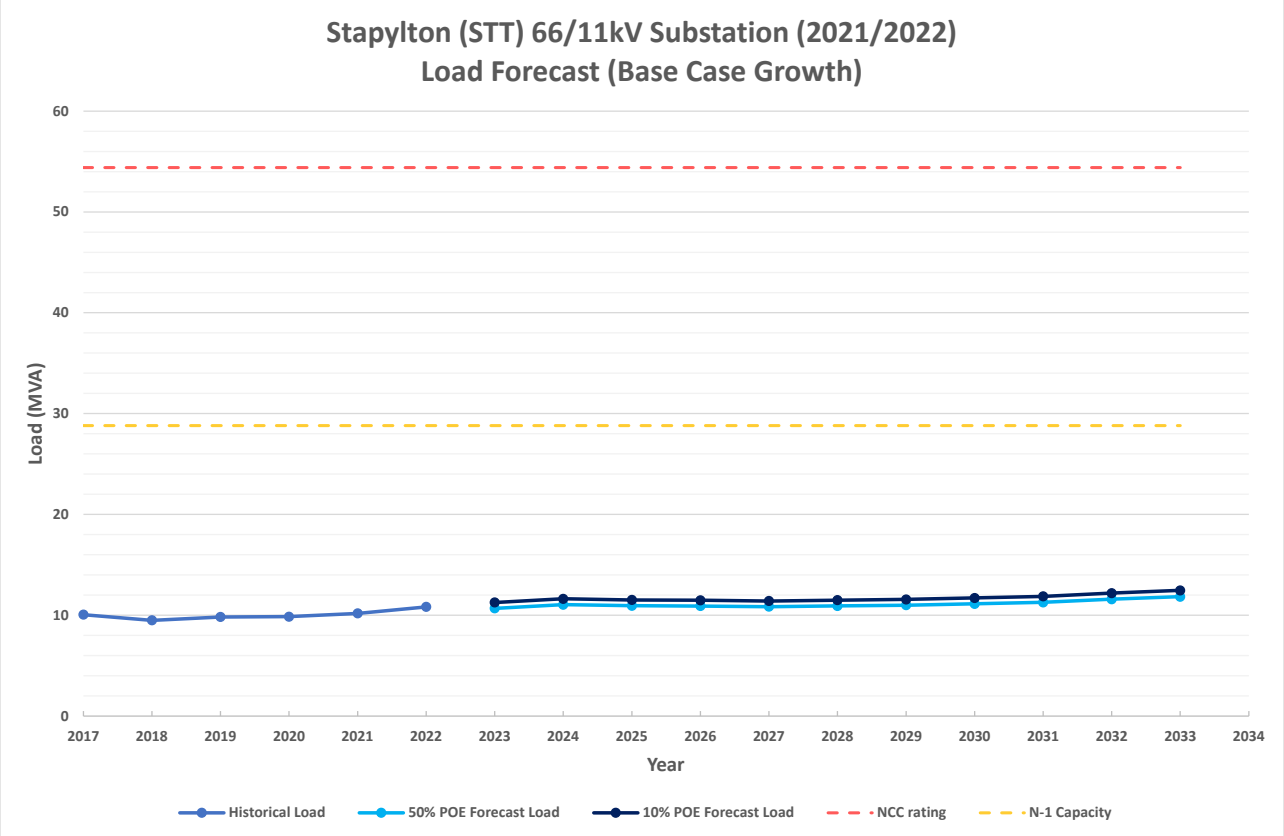


Figure 12: Stapylton Zone Substation Base case load forecast

2.3.5 High Growth Load Forecast

The 10 PoE and 50 PoE load forecasts for the high load growth scenario for Pimpama East Zone Substation and Stapylton Zone Substation are illustrated in Figure 13 and Figure 14. With the high growth scenario, the peak load for Pimpama East Zone and Stapylton Zone Substation is forecast to increase over the next 10 years.

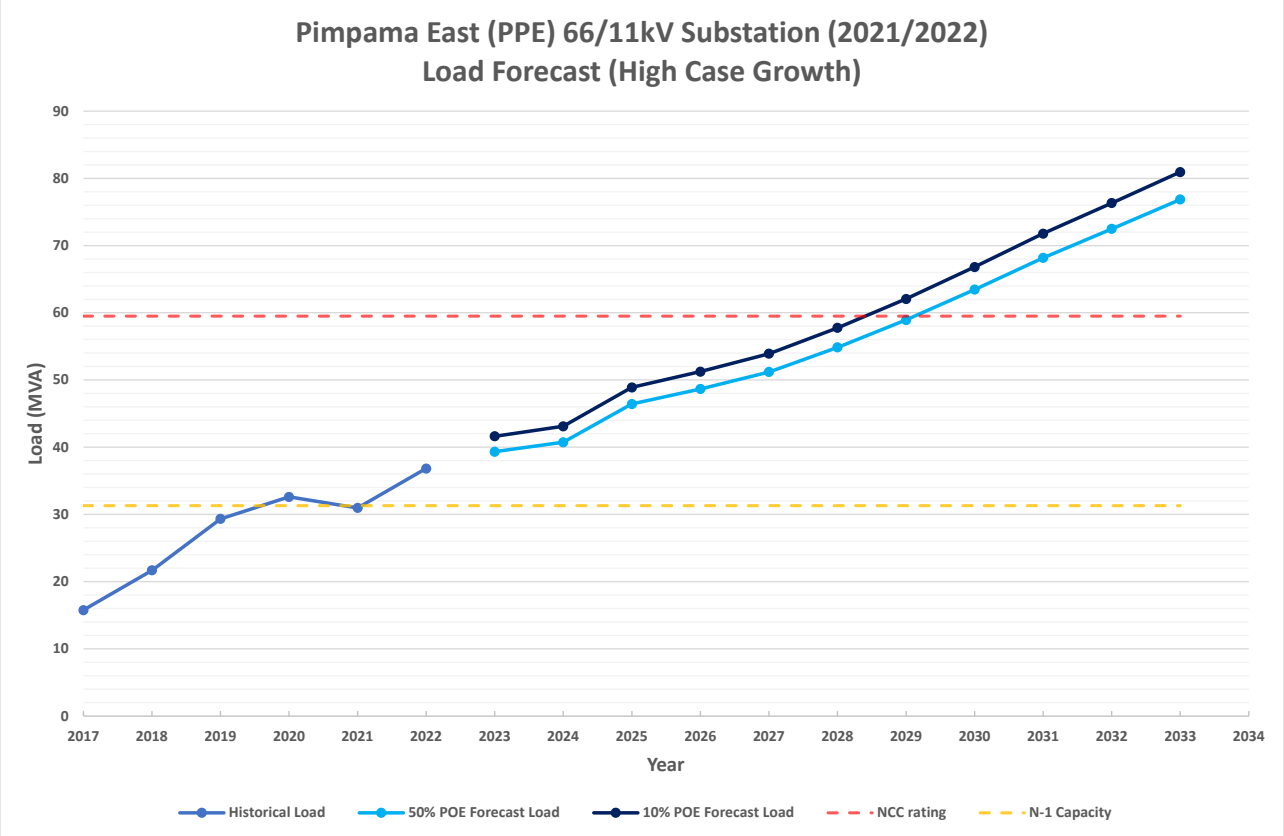


Figure 13: Pimpama East Zone Substation Network High Growth Load Forecast

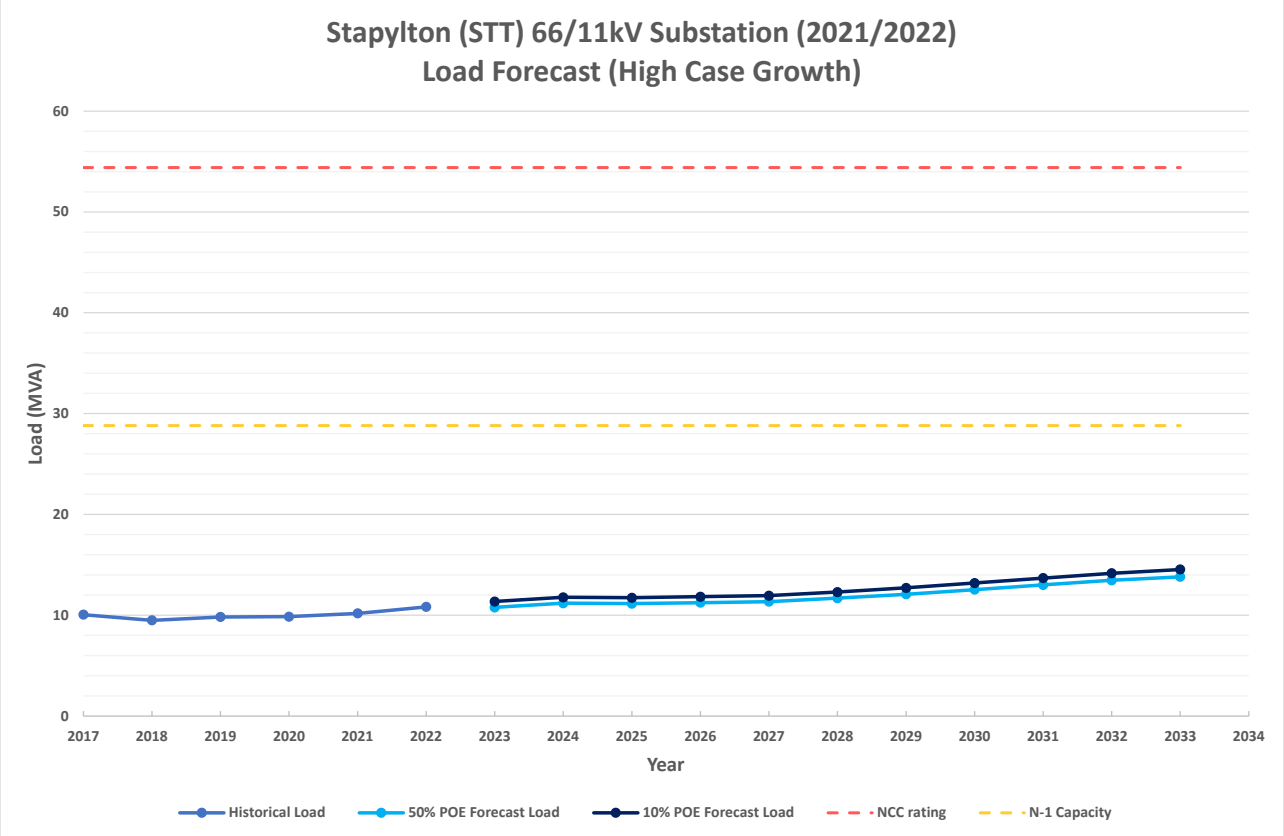


Figure 14: Stapylton Substation Zone High Growth Load Forecast

2.3.6 Low Growth Load Forecast

The 10 PoE and 50 PoE load forecasts for the low load growth scenario for Pimpama East Zone and Stapylton Substation are illustrated in Figure 15 and Figure 16. With the low growth scenario, the peak load is forecast to flatline over the next 10 years for Stapylton Substation.

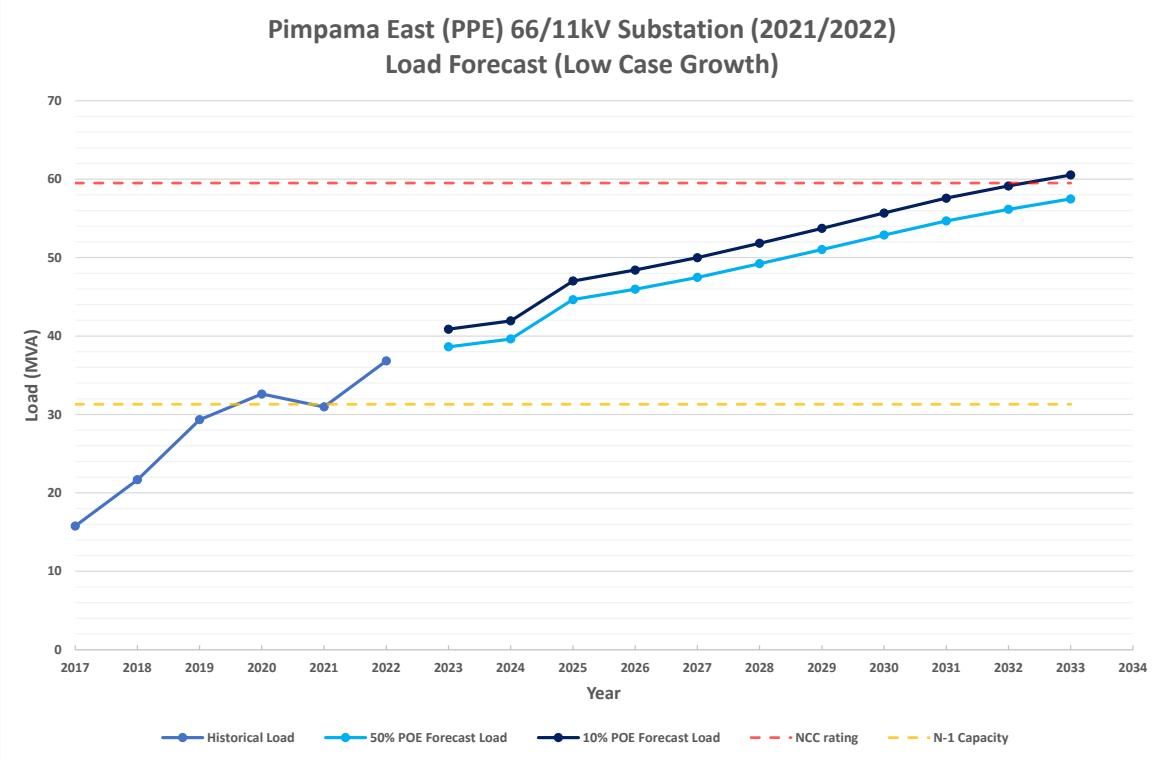


Figure 15: Pimpama East Zone Low Growth Load Forecast

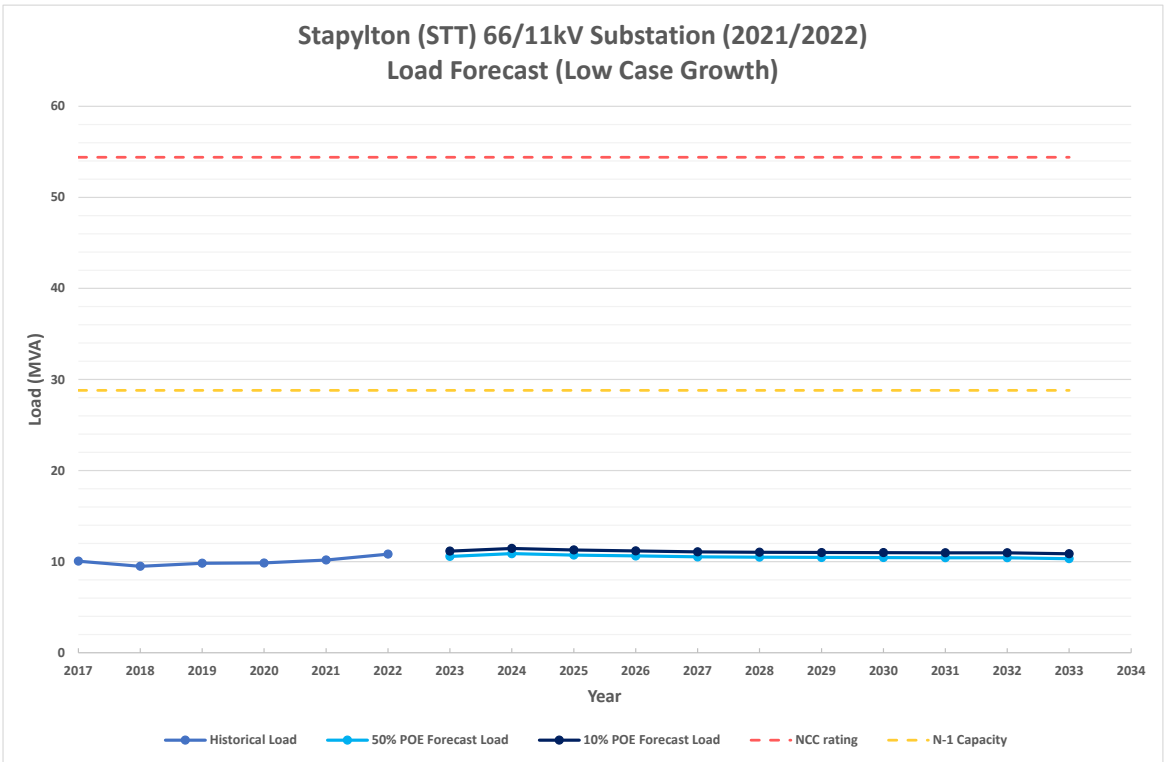


Figure 16: Stapylton Substation Zone Low Growth Load Forecast

3 IDENTIFIED NEED

3.1 Description of the Identified Need

3.1.1 Safety Net Non-Compliance

Energex has the obligations to meet and report on Safety Net measures that are listed in the Distribution Authority. The purpose of the service safety net is to effectively mitigate the risk of low probability - high consequence network outages to avoid unexpected customer hardship and/or significant community or economic disruption.

The 33kV feeders F3641 and F3642 supplying Pimpama East Zone Substation (SSPPE) are approximately 9km long. They are constructed as a double circuit line sharing the same poles, with parts of these feeders traversing along road corridors, which increases the likelihood of a double feeder contingency occurring due to pole failure. Similarly, the 33kV feeders F426 and F3601 supplying Stapylton Zone Substation (SSSTT) are also constructed as a double circuit line sharing the same poles with a length of approximately 3.8km long. As such, the risk of a double circuit outage on these feeders is considered credible.

Under a credible double feeder contingency event for an outage of F3641 & F3642 or F426 & F3601, Energex will not be able to restore supply to Pimpama East Zone Substation or Stapylton Zone Substation. Energex will utilise the manual transfers to adjacent substations via the 11kV feeders and deploy its fleet of mobile generators to partially restore supply to customers, which will result in customer outage times exceeding the Safety Net requirements. Energex has not identified any other suitable alternative supply arrangements to alleviate the outage and maintain supply to these customers should the above event occur.

The peak load at risk are as per the base case load forecast of SSPPE or SSSTT as shown on Figure 11 and Figure 12. The energy required to resolve the outage are summarised in Table 3 and below.

Year	Forecast peak unsupplied energy (kWh)
2023	136359
2024	140568
2025	159337
2026	164956
2027	171117
2028	179151
2029	187500
2030	196950
2031	206645
2032	218086
2033	230478

Table 3: Energy required to resolve the outage at SSPPE after the loss of F3641 & F3642

Year	Forecast peak unsupplied energy (kWh)
2023	33882
2024	35028
2025	34703
2026	34590
2027	34396
2028	34631
2029	34860
2030	35304
2031	35750
2032	36739
2033	37556

Table 4: Energy required to resolve the outage at SSSTT after the loss of F426 & F3601

3.1.2 Reliability

The existing configuration of the 33kV feeders SSSTT and SSPPE presents an increased risk to the reliability of supply at Pimpama East and Staypylton area. Figure 17 shows that the value of customer reliability by constructing the proposed the assets is $238,535 in 2025 for Option 1 and Option 2, which increases to $334,367 in 2033. The scenarios that have been considered are:

- F3601 & F426 failure – a failure of these feeders results in loss of supply of all load at SSSTT; however it is assumed that 7.4 MVA load could be supplied by transfers within 3 hours
- F3641 & F3642 failure – a failure of these feeders results in loss of supply of all load at SSPPE; however it is assumed that 7.4 MVA load could be supplied by transfers within 3 hours

3.2 Quantification of the Identified Need

3.2.1 Risk Quantification Benefit Summary

Risk quantification analysis has been completed for option 1 and Option 2 which includes the VCR. Figure 17 shows the benefits of Option 1 and Option 2 in comparison to the counter-factual, which in this case is accepting the risk of a double contingency outage resulting in a total outage to either substation (SSSTT, SSPPE). The benefit of this Option 1 and Option 2 is $208,208 in 2023 and increases to $334,367 in 2033.

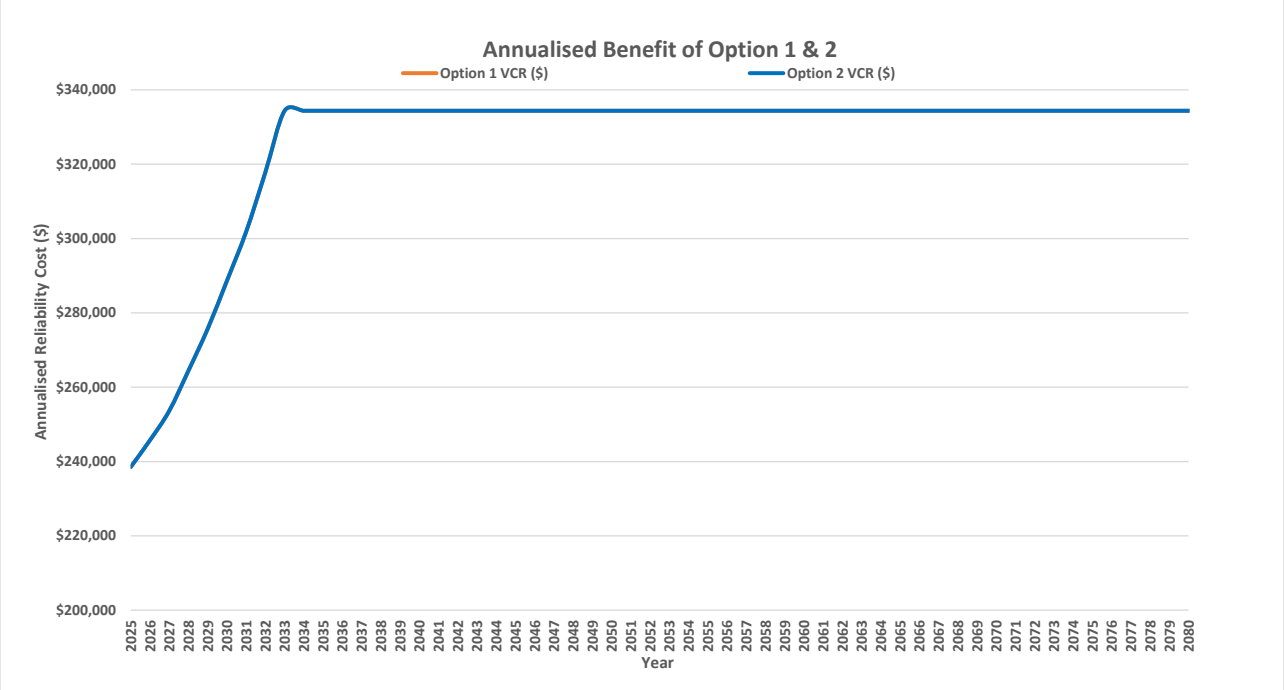


Figure 17: Annualised Benefits of Option 1 & Option 2 compared with Counterfactual

3.3 Assumptions in Relation to Identified Need

Below is a summary of key assumptions that have been made when the identified need has been analysed and quantified.

It is recognised that the below assumptions may prove to have various levels of correctness, and they merely represent a 'best endeavours' approach to predict the future identified need.

3.3.1 Forecast Maximum Demand

It has been assumed that forecast peak demand at Pimpama East and Stapylton Substation will be consistent with the base case forecast outlined in Section 2.3.4.

Factors that have been taken into account when the load forecast has been developed include the following:

- load history;
- known future developments (new major customers, network augmentation, etc.);
- temperature corrected start values (historical peak demands); and
- forecast growth rates for organic growth.

3.3.2 Future Load Profile

Characteristic average day load profiles shown in Section 2.3.3 are unlikely to change significantly from year to year and the shape of the load profile is assumed to remain virtually the same with increasing maximum demand.

4 CREDIBLE OPTIONS ASSESSED

4.1 Assessment of Network Solutions

Energex has identified two (2) credible network options that will address the identified need.

4.1.1 Option 1: Establish new 33kV Feeder between SSSTT and SSPPE

To address the limitations at SSPPE and SSSTT, it is proposed to establish a new 33kV feeder between SSPPE and SSSTT. Works include:

- Convert existing 11kV feeder PPE12B energised at 33kV to become part of the new 33kV feeder
- Establish approximately 11km of 33kV feeder between SSSTT and PPE12B
- Underground existing 11kV feeder along Burnside Road to SSSTT to accommodate retrofit of 33kV feeder to existing poles.
- Terminate 33kV feeder to existing 33kV CBs at SSSTT and SSPPE

The total estimation cost for Option 1 is detailed below:

Works	Estimate
New 33kV Feeder between SSSTT and SSPPE	$6.383M
OPEX	$27.56k

A geographic and schematic diagram of the proposed network arrangement for Option 1 is shown in Figure 18 and Figure 19.

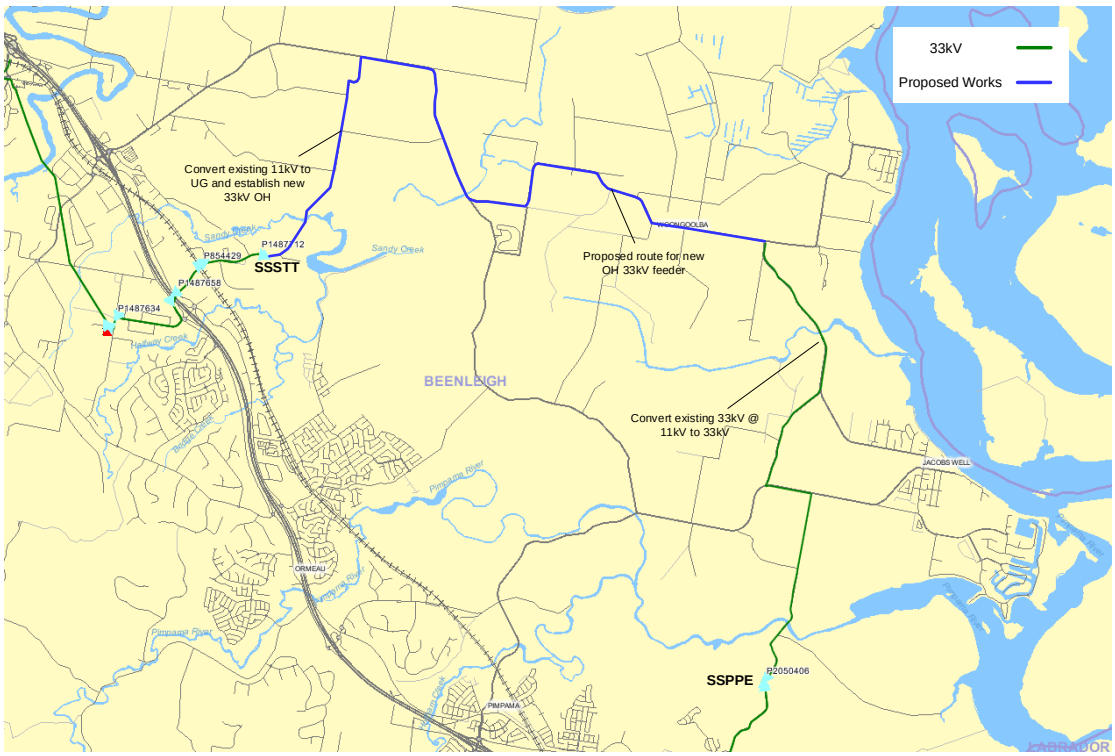


Figure 18: Option 1 proposed network arrangement (geographic view)

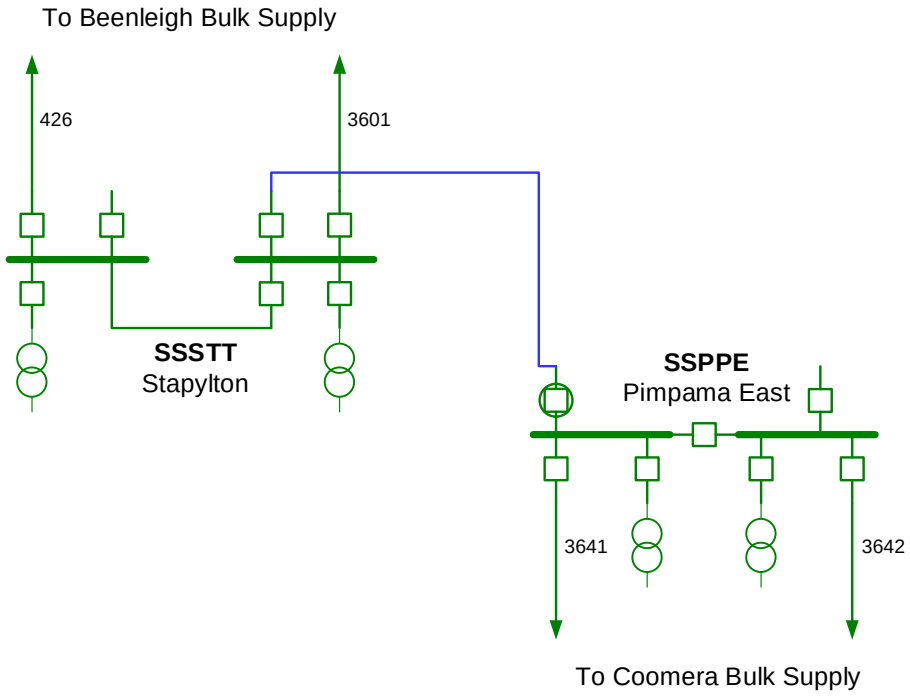


Figure 19: Option 1 proposed network arrangement (schematic view)

4.1.2 Option 2: Establish new 33kV feeder between SSCMA and SSPPE and between SSSTT and SSYTA and build a new switchgear building at SSYTA

This option involves the following works:

Establish new 33kV Feeder between SSCMA and SSPPE (10kms), SSSTT and SSYTA (4kms) and switchgear building with 1 x 33kV bus switchboard as there is no spare 33kV circuit breaker at SSYTA. A schematic diagram of the proposed network arrangement for Option 2 is shown in Figure 20.

The total estimation cost for Option 1 is detailed below:

Works	Estimate
New 33kV Feeder between SSCMA and SSPPE and between SSSTT and SSYTA	$9.785M
OPEX	$42.4k

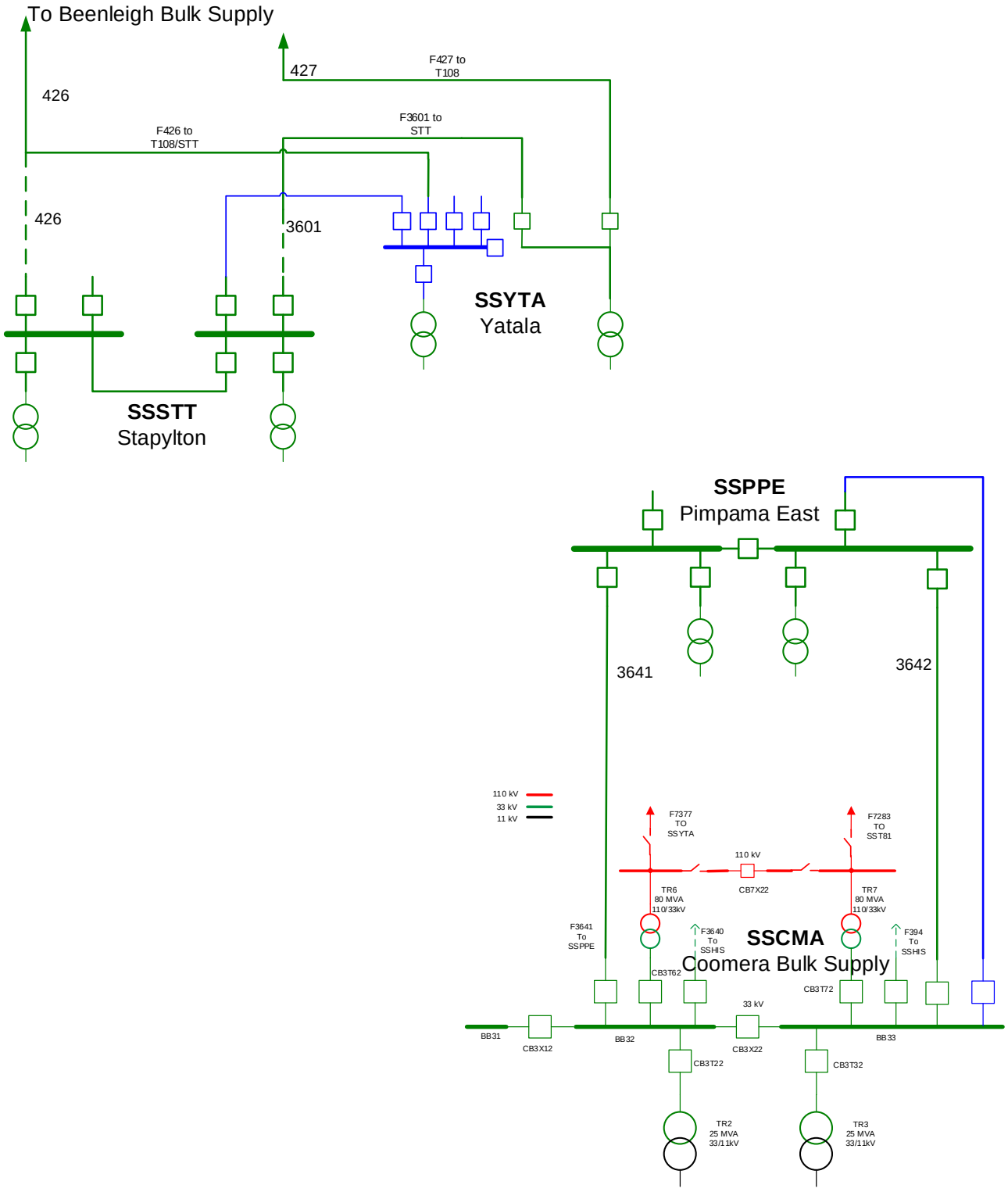


Figure 20: Option 2 proposed network arrangement (schematic view)

5 ASSESSMENT OF NON-NETWORK SOLUTIONS

A Notice of no non-network options was published as Energex did not identify any credible non-network solutions.

5.1.1 Demand Management (Demand Reduction)

A non-network investigation Energex normally undertakes is to assess the potential of Demand and Energy Management (DEM) and demand response technology. However, for this project to be deferred, the 11kV load would need to be reduced to be zero (0) MVA, therefore demand reduction is not applicable.

5.1.2 Non-Network Solution Summary

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 Pimpama East and Stapylton areas to address the identified need.

5.2 Preferred Network Option

Energex's preferred internal network option is Option 1: Establish new 33kV Feeder between SSSTT and SSPPE.

Upon completion of these works, the reliability risks at SSPPE and SSSTT Substation will be addressed.

The estimated capital cost of this option inclusive of interest, risk, contingencies and overheads is $6.383 million and an annual operating cost of approximately $27,560. This provides the most economically efficient network option, with the lowest NPV cost to address the network limitations. The estimated project delivery timeframe has design commencing in September 2023 and construction completed by October 2025.

6 SUMMARY OF SUBMISSIONS RECEIVED IN RESPONSE TO DRAFT PROJECT ASSESSMENT REPORT

As per the RIT-D process (Appendix A), a DPAR is not required for this project.

7 MARKET BENEFIT ASSESSMENT METHODOLOGY

The purpose of the RIT-D is to identify the option that maximises the present value of net market benefits to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

In order to measure the increase in net market benefit, Energex has analysed the classes of market benefits required to be considered by the RIT-D.

7.1 Classes of Market Benefits Considered and Quantified

The following classes of market benefits are considered material, and have been included in this RIT-D assessment:

- Changes in involuntary load shedding

7.1.1 Changes in Involuntary Load Shedding and customer interruptions caused by network outages

Involuntary load shedding is where a customer's load is interrupted from the network without their agreement or prior warning. Energex has forecast load over the assessment period and has quantified the expected unserved energy by comparing forecast load to network capabilities under system normal and network outage conditions. A reduction in involuntary load shedding expected from an option, relative to the base case, results in a positive contribution to the market benefits of the credible option being assessed.

Involuntary load shedding of a credible option is derived by the quantity in MWh of involuntary load shedding required assuming the credible option is completed multiplied by the Value of Customer Reliability (VCR). The VCR is measured in dollars per MWh and is used as a proxy to evaluate the economic impact of unserved energy on customers under the RIT-D.

Energex has applied a VCR estimate of $30.86/kWh (SSPPE) and $45.60/kWh (SSSTT), which has been derived from the AER 2020 Value of Customer Reliability (VCR) values. In particular, Energex has weighted the AER estimates according to the make-up of the specific load considered.

In addition, Energex has investigated how a reduced VCR forecast going forward changes the expected net market benefits under the options. In particular, we have undertaken a reduced VCR customer economic sensitivity cost analysis to review the impact upon the credible options. The results of this sensitivity analysis are illustrated in Section 7.

7.2 Classes of Market Benefits not Expected to be Material

The following classes of market benefits are not considered to be material for this RIT-D, and have not been included in this RIT-D assessment:

- Changes in voluntary load curtailment
- Changes in costs to other parties
- Changes in timing of expenditure
- Changes in load transfer capability and the capacity of embedded generating units to take up load
- Changes in network losses
- Option value
- Other class of market benefit determined to be relevant by the AER

7.2.1 Changes in Voluntary Load Curtailment

The credible options presented in this RIT-D assessment do not include any voluntary load curtailment as there are no customers on voluntary load curtailment agreements in the Pimpama

East and Stapylton areas. Therefore, market benefits associated with changes in voluntary load curtailment have not been considered.

7.2.2 Changes in Costs to Other Parties

Energex does not anticipate that any of the credible options included in this RIT-D assessment will affect costs incurred by other parties.

7.2.3 Changes in Timing of Expenditure

The credible options included in this RIT-D assessment are not expected to affect the timing of other distribution investments for unrelated identified needs.

7.2.4 Changes in Load Transfer Capability and the capacity of Embedded Generators to take up load

The credible options included in this RIT-D assessment are not expected to have an impact on the load transfer capacity or the capacity of embedded generators to take up load between the zone substations in the Pimpama East and Stapylton areas.

7.2.5 Changes in Network Losses

Energex does not anticipate that any of the credible options included in the RIT-D assessment will lead to any significant change in network losses.

7.2.6 Option Value

The AER's view is that option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change, and the credible options considered by the RIT-D proponent are sufficiently flexible to respond to that change[2].

Energex does not consider that the identified need for the options included in this RIT-D would be affected by uncertain factors about which there may be more clarity in future.

7.2.7 Other class of market benefit determined to be relevant by the AER

Energex has not identified any other class of market benefits in this RIT-D.

[2] AER "Regulatory Investment Test for Distribution Application Guidelines", Section A6. Available at: http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/regulatory-investment-test-for-distribution-rit-d-and-application-guidelines

8 DETAILED ECONOMIC ASSESSMENT

8.1 Methodology

The Regulatory Investment Test for Distribution requires Energex to identify the credible option that maximises the present value of net economic benefit to all who produce, consume and transport electricity in the National Electricity Market.

Accordingly, a base case Net Present Value (NPV) comparison of the alternative development options has been undertaken. A sensitivity analysis was then conducted on this base case to establish the option that remained the lowest cost option in the scenarios considered.

Further to the scenarios considered, a Monte-Carlo analysis simulation was undertaken on the base case project timings to assess the projects sensitivity to a change in the parameters of the NPV model.

8.2 Key Variables and Assumptions

The economic assessment contains anticipated costs of providing, operating and maintaining the options as well as expected costs of compliance and administration associated with each option.

The present value comparison summary includes all costs directly associated with constructing and providing the option. This includes the cost of land and easements currently owned or to be acquired for network augmentation.

Interest on borrowings is not included as a cost in the comparison of options as it represents a cost of project financing, and as such is accounted for in present value calculations through the discounting of the project cash flows at the regulated weighted average cost of capital (WACC). The interest on borrowings is included in the Total Project Cost for which approval is being sought as it represents a legitimate cost of network augmentation.

Table 5 outlines the major sensitivities analysed within the Monte-Carlo analysis which was undertaken to assess the sensitivity to a change in parameters of the NPV model.

Parameter	Mode Value	Lower Bound	Upper Bound
Project Costs	Standard estimates	-40%	+40%
Project Costs	Preferred option estimates	-40%	+40%
Opex Costs	Calculated Opex	-10%	+10%

Table 5: Economic parameters and sensitivity analysis factors

8.3 Scenarios Adopted for Sensitivity Testing

A sensitivity analysis was conducted on the base case to establish the option that remained the lowest cost option in the scenarios considered.

The monte carlo analysis conducted shows that Option 1 remains the most beneficial option in the majority of the scenarios.

8.4 Net Present Value (NPV) Results

An overview of the initial capital cost and the base case NPV results are provided in Table 6.

Option	Option Name	Rank	Initial Capital Cost	Net Economic Benefit ($ real)	PV of Capex ($ real)	PV of Opex ($ real)	PV of Benefits ($ real)
1	Establish new 33kV Feeder between SSSTT and SSPPE	1	$6,383,393	$2,179,000	-$5,496,000	-$726,000	$8,401,000
2	Establish new 33kV feeder between SSCMA and SSPPE and between SSSTT and SSYTA and build a new switchgear building at SSYTA	2	$9,784,615	-$1,140,000	-$8,425,000	-$1,116,000	$8,401,000

Table 6: Base case NPV ranking table

9 CONCLUSION

The Final Project Assessment Report (FPAR) represents the final stage of the consultation process in relation to the application of the RIT-D.

Energex intends to take steps to progress the proposed preferred option to ensure any statutory non-compliance is addressed and undertake appropriately justified network reliability improvements, as necessary.

9.1 Preferred Option

Energex's preferred internal network option is Option 1: Establish new 33kV Feeder between SSSTT and SSPPE.

Upon completion of these works, the asset safety and reliability risks at SSPPE and SSSTT 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 $6.383 million and an annual operating cost of approximately $27,560. This provides the most economically efficient network option, with the lowest NPV cost to address the network limitations. The estimated project delivery timeframe has design commencing in September 2023 and construction completed and commissioning by October 2025.

9.2 Satisfaction of RIT-D

The proposed preferred option satisfies the RIT-D.

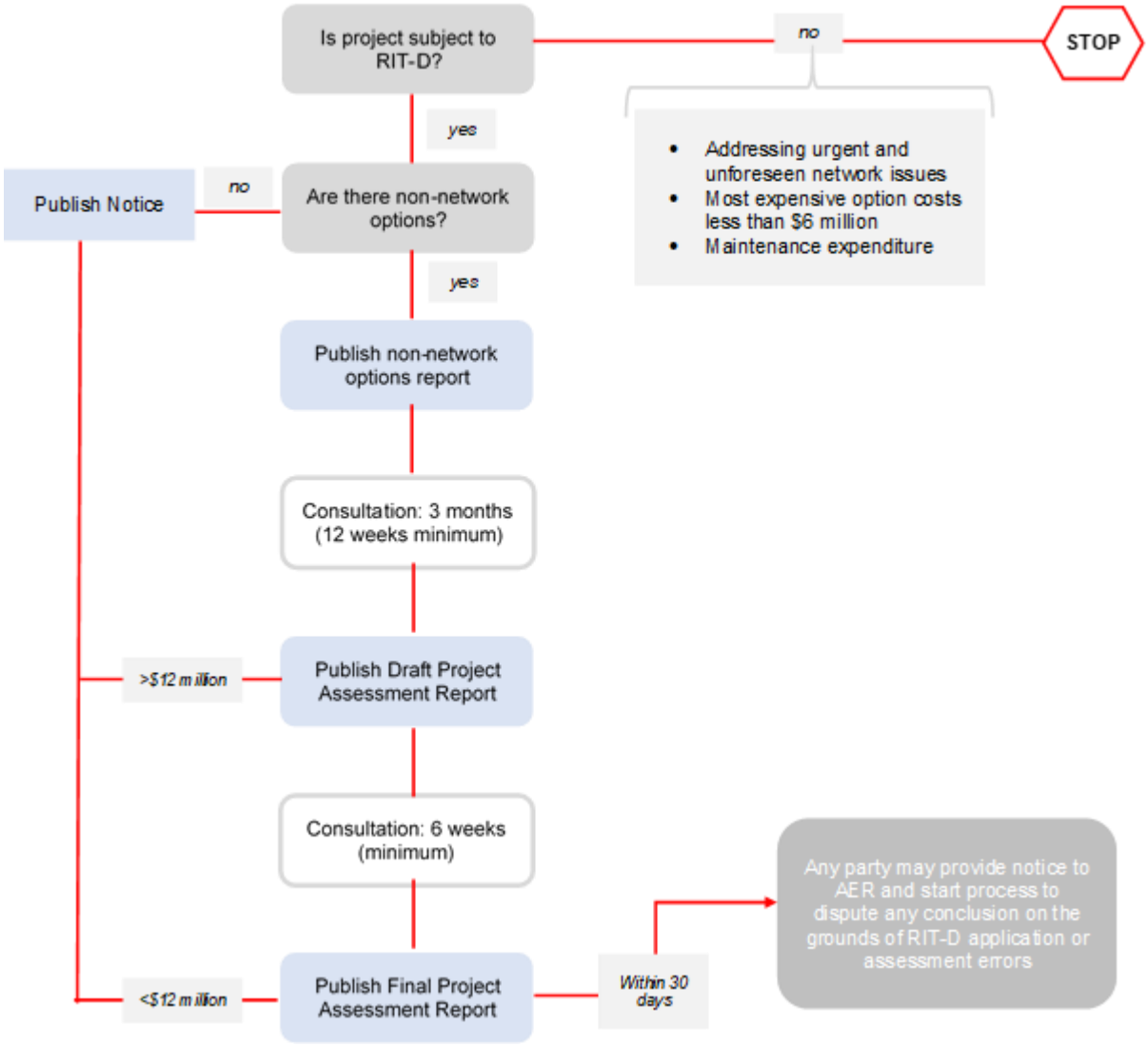
This statement is made on the basis of the detailed analysis set out in this report. The proposed preferred option is the credible option that has the highest net economic benefit under the most likely reasonable scenarios.

10 COMPLIANCE STATEMENT

This Final Project Assessment Report complies with the requirements of NER section 5.17.4(j) as demonstrated below:

Requirement	Report Section
(1) a description of the identified need for investment;	3
(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
(3) if applicable, a summary of, and commentary on, the submissions received on the DPAR;	6
(4) a description of each credible option assessed	4
(5) where a *Distribution Network Service Provider* has quantified market benefits in accordance with clause 5.17.1(d), a quantification of each applicable market benefit of each credible option	7
(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure	4
(7) a detailed description of the methodologies used in quantifying each class of costs or market benefit	7
(8) where relevant, the reasons why the RIT-D proponent has determined that a class or classes of market benefits or costs do not apply to a credible option	7.2
(9) the results of a NPV analysis of each credible option and accompanying explanatory statements regarding the results	8.4
(10) the identification of the proposed preferred option	9.1
(11) for the proposed preferred option, the RIT-D proponent must provide: (i) details of the technical characteristics; (ii) the estimated construction timetable and commissioning date (where relevant); (ii) the indicative capital and operating costs (where relevant); (iv) a statement and accompanying analysis that the proposed preferred option satisfied the RIT-D; and (v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent	9.1&9.2
(12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the final report may be directed.	1.4

APPENDIX A – THE RIT-D PROCESS



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