



# **Regulatory Investment Test for Distribution (RIT-D)**

## **Addressing Reliability Requirements in the Capalaba Network Area**

### **Draft Project Assessment Report**

13 August 2024

# Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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## 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

Capalaba 33/11kV Zone Substation (SSCPB) is located approximately 15km South-East of Brisbane city. The substation is supplied by three 33kV feeders from Cleveland 110/33kV Bulk Supply Substation (SSCVL) via Capalaba South 33/11kV Zone Substation (SSCPS), Birkdale 33/11kV Zone Substation (SSBKD) and Raby Bay 33/11kV Zone Substation (SSRBY). SSCPB provides electricity to approximately 3,300 predominantly residential customers and 700 commercial/industrial customers in the surrounding area.

SSCPB is equipped with two 33/11kV transformers, 33kV outdoor switchgear, 11kV indoor switchgear and control building.

An engineering assessment of Capalaba zone substation has identified that the 33/11kV power transformer TR1, 33kV outdoor type circuit breakers, 33kV outdoor type isolators, 11kV indoor switchgear, protection relays and two station transformers are at the end of their serviceable life.

The deterioration of these primary and secondary system assets poses safety risks to staff working within the substation and the general public, as well as reliability risk to the customers supplied from Capalaba zone substation.

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

Energex published a Notice of Screening for Options report for the above described network constraint on 01 July 2024.

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Three potentially feasible options have been investigated:

- **Option A:** Replace end of life TR1, 33kV and 11kV switchgear
- **Option B:** Recover TR1, replace 33kV and 11kV switchgear with new indoor switchgear and establish new 11kV tie to SSCPS
- **Option C:** Establish four new 11kV feeders from SSCPS to feed SSCPB 11kV area and recover SSCPB

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

Energex's preferred solution to address the identified need is Option A – Replace end of life TR1, 33kV and 11kV switchgear.

The DPAR seeks information from interested parties about possible alternate solutions to address the need for investment.

Submissions in writing are due on the **27 September 2024** by 4pm and must be lodged to [demandmanagement@energex.com.au](mailto:demandmanagement@energex.com.au)

For further information and inquiries please contact:

E: [demandmanagement@energex.com.au](mailto:demandmanagement@energex.com.au)

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## 1 INTRODUCTION

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

This report represents the second 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 Capalaba 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 Structure of the Report

This report:

- Provides background information on the network capability limitations of the distribution network supplying the Capalaba 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.
- Is an invitation to registered participants and interested parties to make submissions.

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## 1.2 Contact Details

Submissions in writing are due by 4pm on **27 September 2024** and should be lodged to [demandmanagement@energex.com.au](mailto:demandmanagement@energex.com.au).

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## 2 BACKGROUND

### 2.1 Geographic Region

Capalaba 33/11kV Zone Substation (SSCPB) is located approximately 15km South-East of Brisbane city. The substation provides electricity supply to approximately 3,300 predominantly residential customers and 700 commercial/industrial customers in the Capalaba, Capalaba West, Chandler and Birkdale areas, the maximum recorded demand was 16.5 MVA in Summer 2022/23.

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

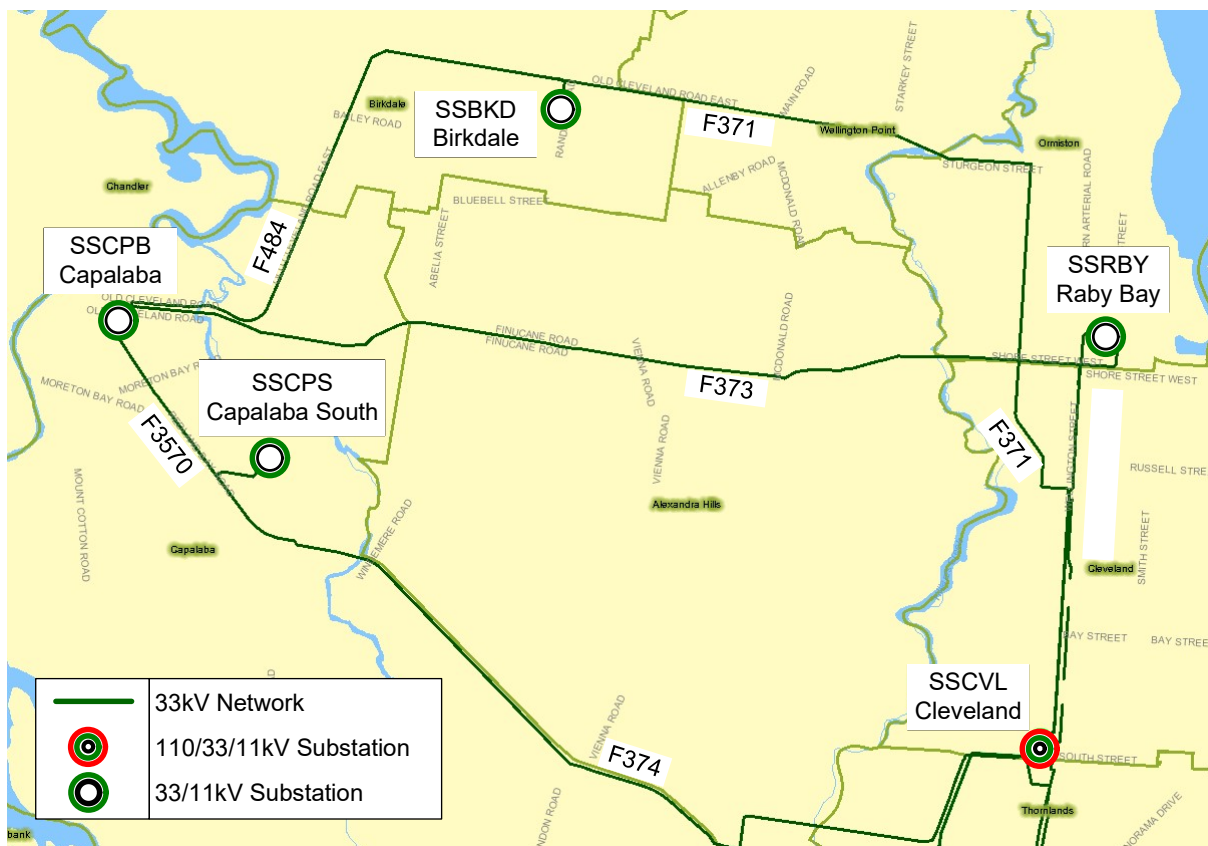


Figure 1: Existing network arrangement (geographic view)

### 2.2 Existing Supply System

The substation is supplied by Cleveland 110/33kV Bulk Supply Substation (SSCVL) via three 33kV feeders, F373, F484 and F3570 from Raby Bay 33/11kV Zone Substation (SSRBY), Birkdale 33/11kV Zone Substation (SSBKD) and Capalaba South 33/11kV Zone Substation (SSCPS), respectively.

SSCPB is equipped with a 12.5MVA 33/11kV transformer TR1, 25MVA 33/11kV transformer TR3, 33kV outdoor switchyard with steel structures, 11kV indoor switchgears and control building.

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33kV outdoor switchyard contains two transformer CBs, three feeder CBs, four VTs and ten isolators. The 11kV indoor switchgear contains three 11kV transformer CBs, nine feeder CBs and two bus section CBs.

There are two 50kVA 33/0.415kV station transformers supplied off the 33kV bus at Capalaba zone substation.

A schematic view of the existing sub-transmission network arrangement is shown in Figure 2 and the geographic view of Capalaba zone substation is illustrated in Figure 3.

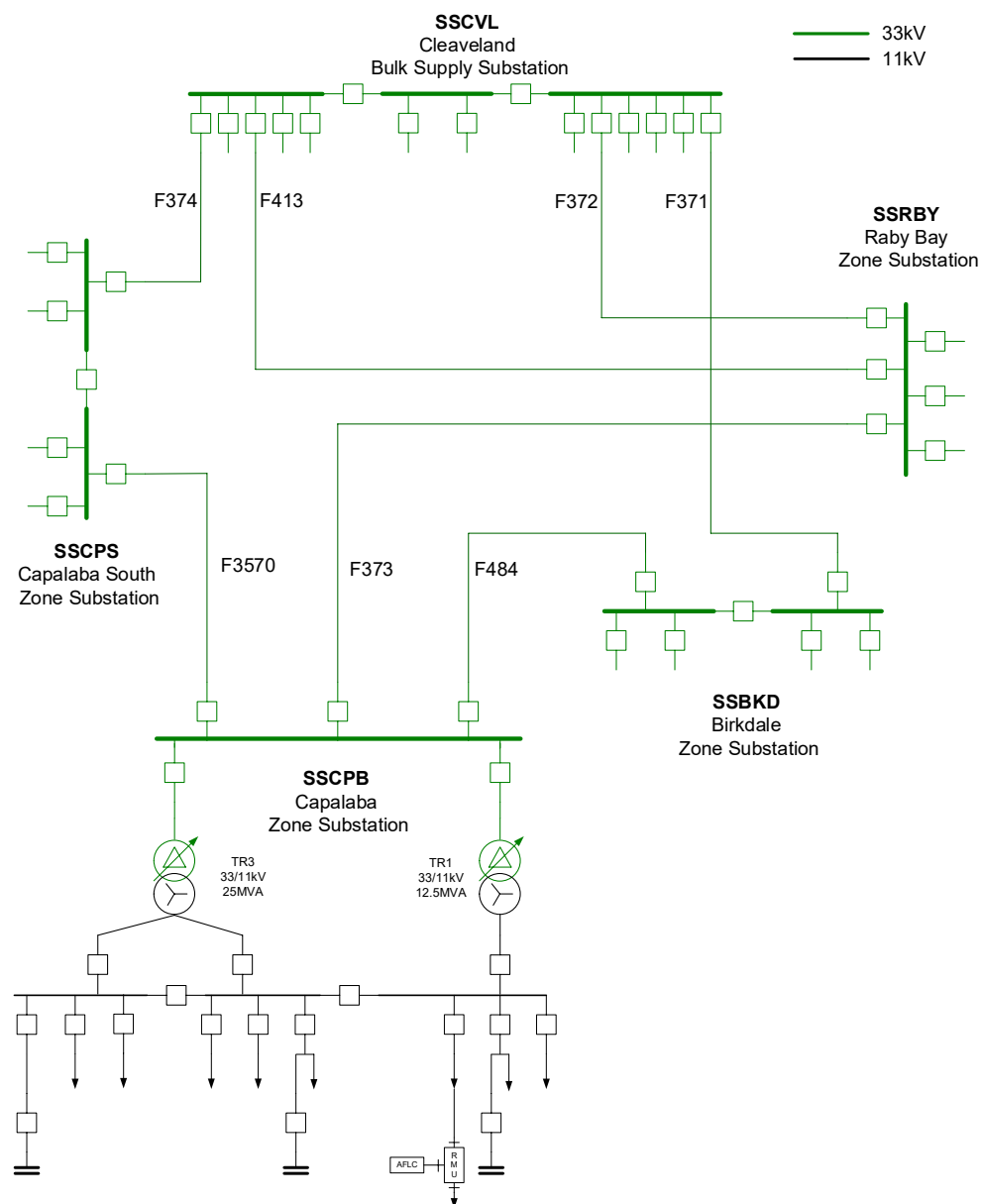


Figure 2: Existing network arrangement (schematic view)

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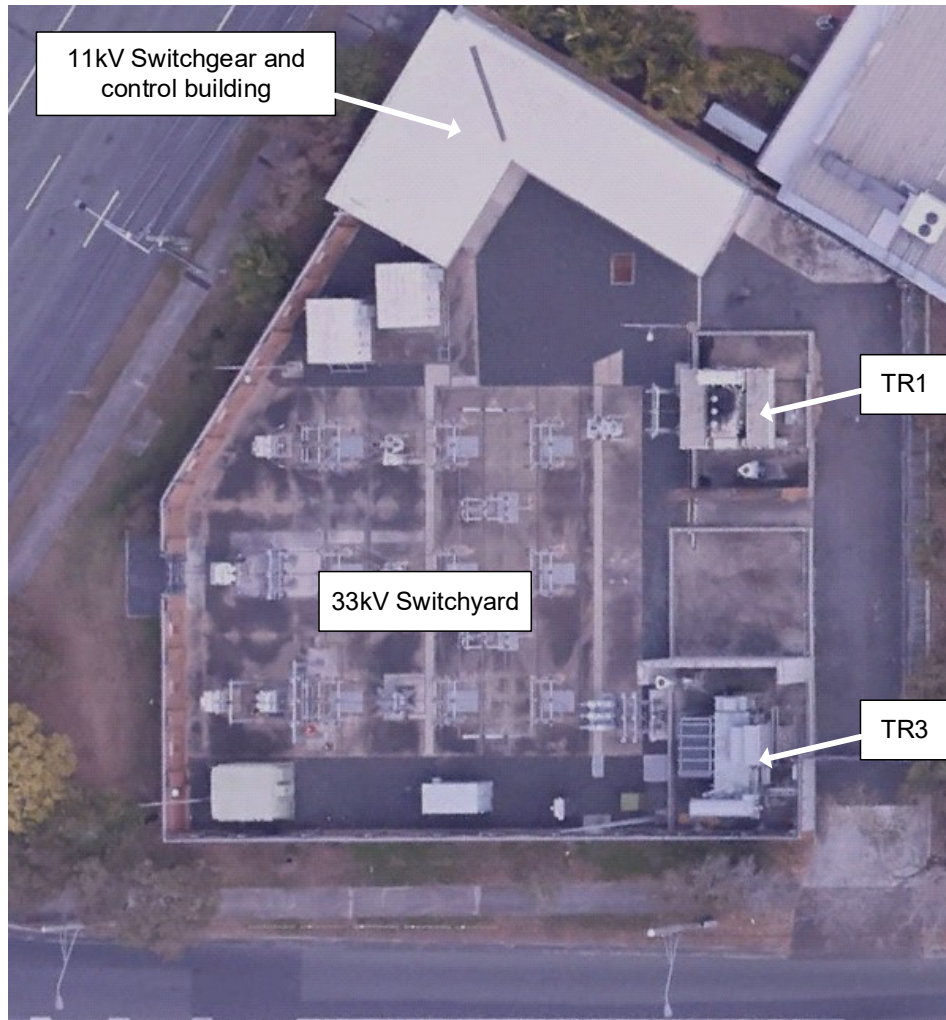


Figure 3: Capalaba zone substation (geographic view)

### 2.3 Load Profiles / Forecasts

The load at Capalaba zone substation comprises a mix of residential and business customers. The load is summer peaking, and the annual peak loads are predominantly driven by residential loads.

#### 2.3.1 Full Annual Load Profile

The full annual load profile for Capalaba zone substation over the 2022/23 financial year is shown in Figure 4. It can be noted that the peak load occurs during summer.

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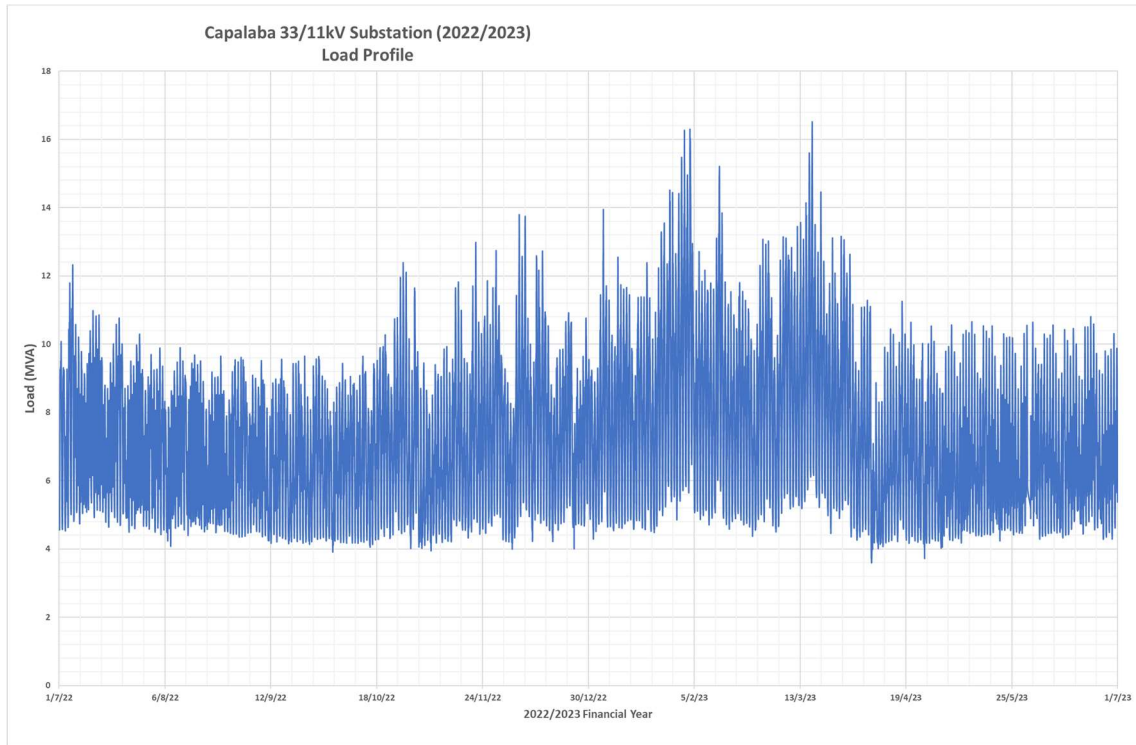


Figure 4: Substation actual annual load profile

### 2.3.2 Load Duration Curve

The load duration curve for Capalaba zone substation over the 2022/23 financial year is shown in Figure 5.

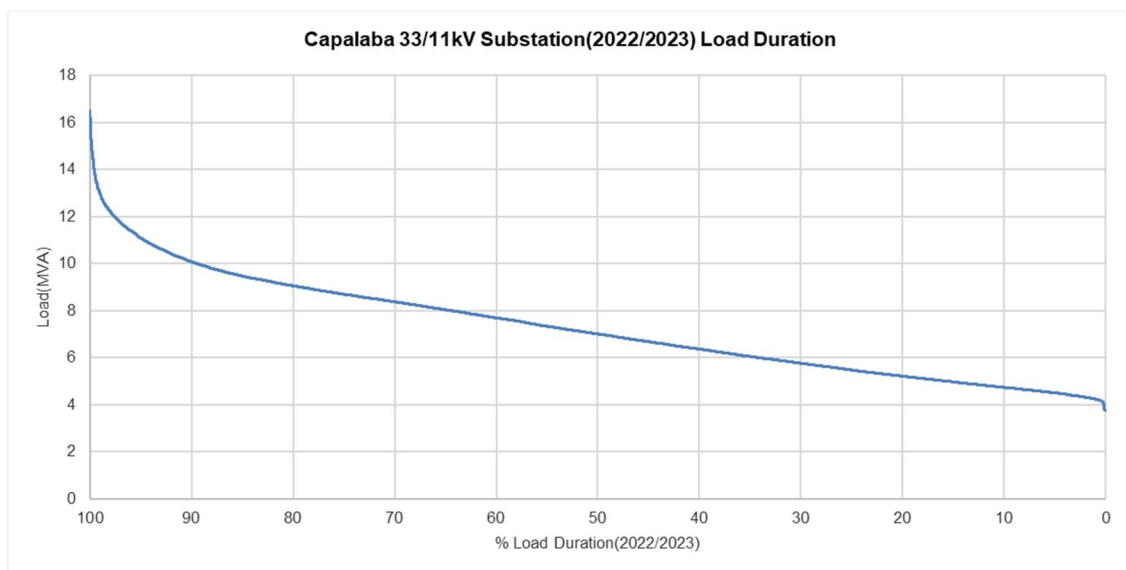


Figure 5: Substation load duration curve

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### 2.3.3 Average Peak Weekday Load Profile (Summer)

The daily load profile for an average peak weekday during summer is illustrated below in Figure 6. It can be noted that the summer peak loads at Capalaba zone substation are historically experienced in the late afternoon and evening.

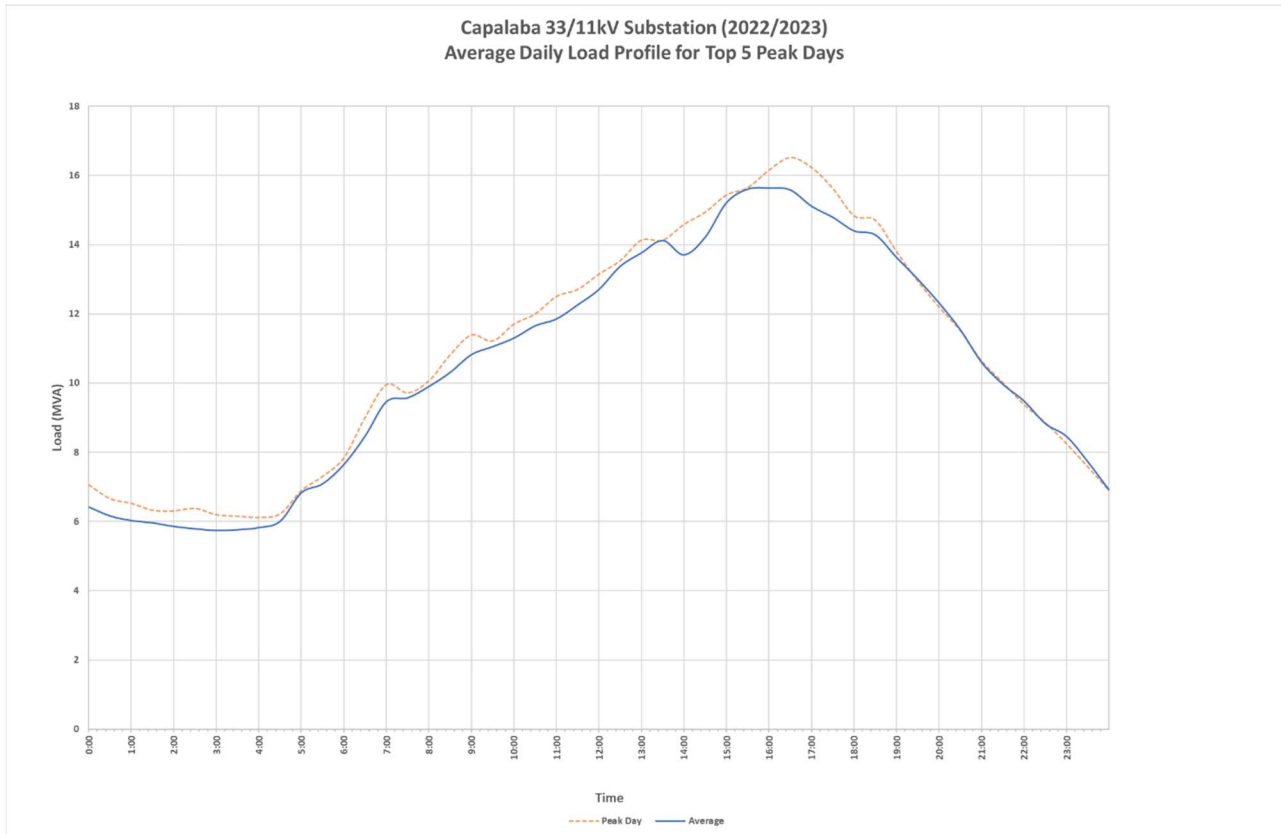


Figure 6: Substation average peak weekday load profile (summer)

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## 2.3.4 Base Case Load Forecast

The 10 PoE and 50 PoE load forecasts for the base case load growth scenario are illustrated in Figure 7. 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 have remained relatively steady over the past six years. It can also be noted that the peak load is forecast to remain relatively steady over the next 10 years under the base case scenario.

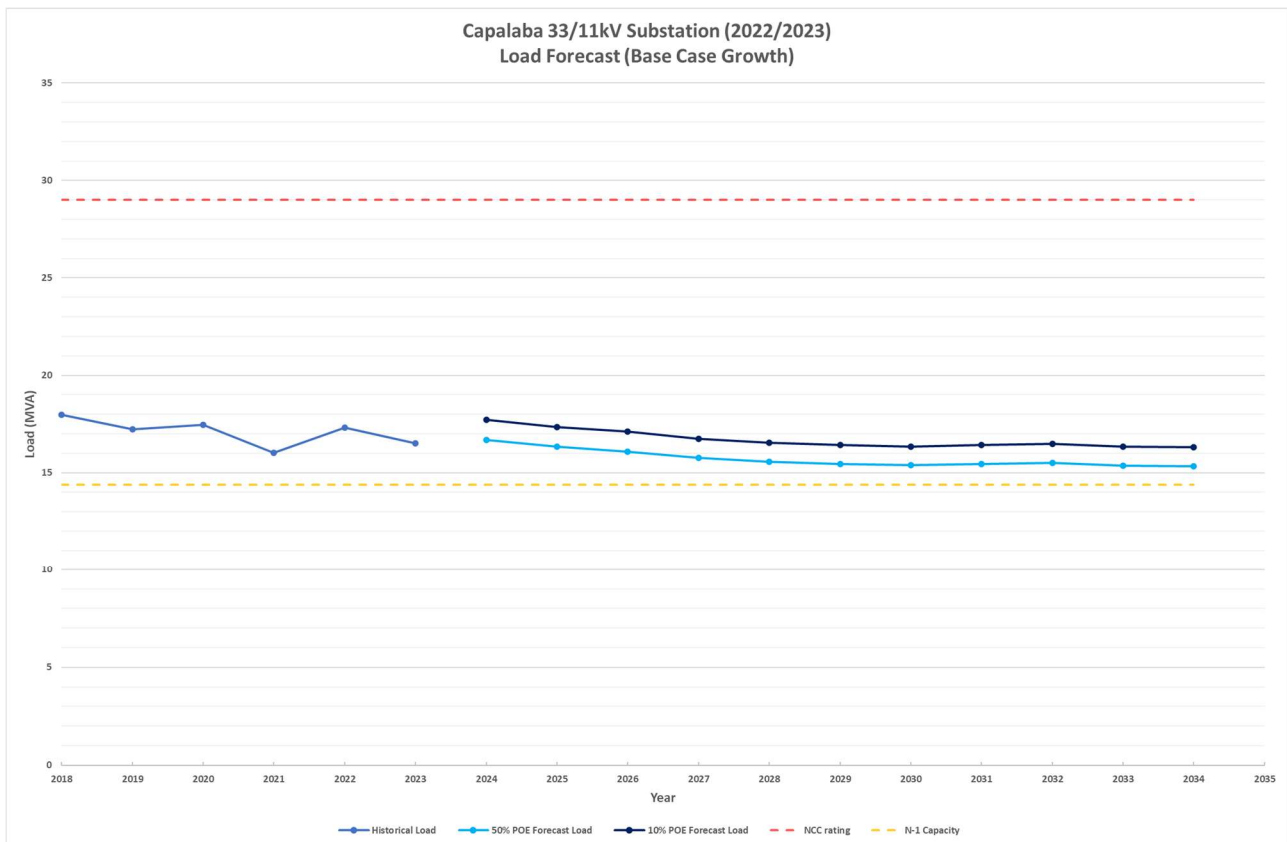


Figure 7: Substation base case load forecast



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## 2.3.5 High Growth Load Forecast

The 10 PoE and 50 PoE load forecasts for the high load growth scenario are illustrated in Figure 8. With the high growth scenario, the peak load is forecast to remain relatively steady over the next 10 years.

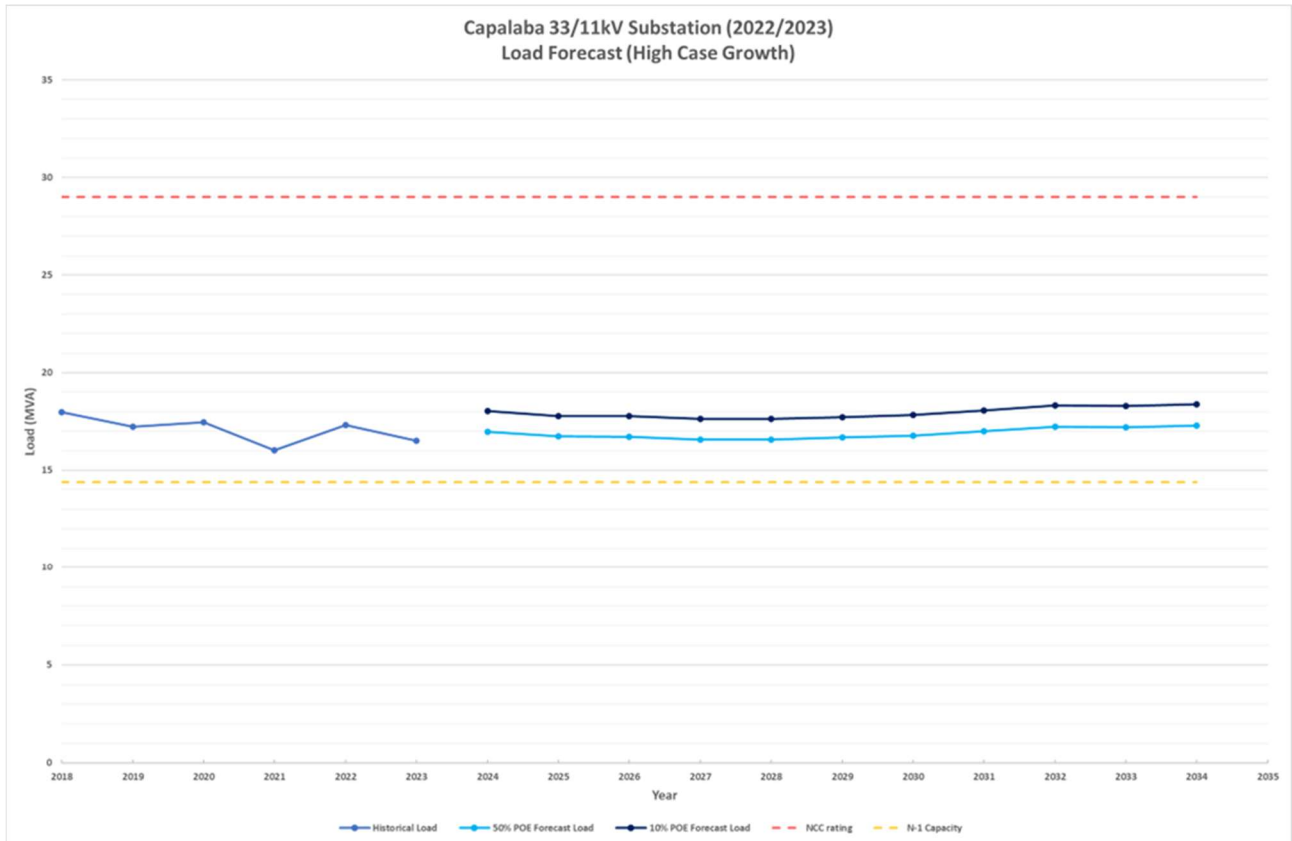


Figure 8: Substation high growth load forecast



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## 2.3.6 Low Growth Load Forecast

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

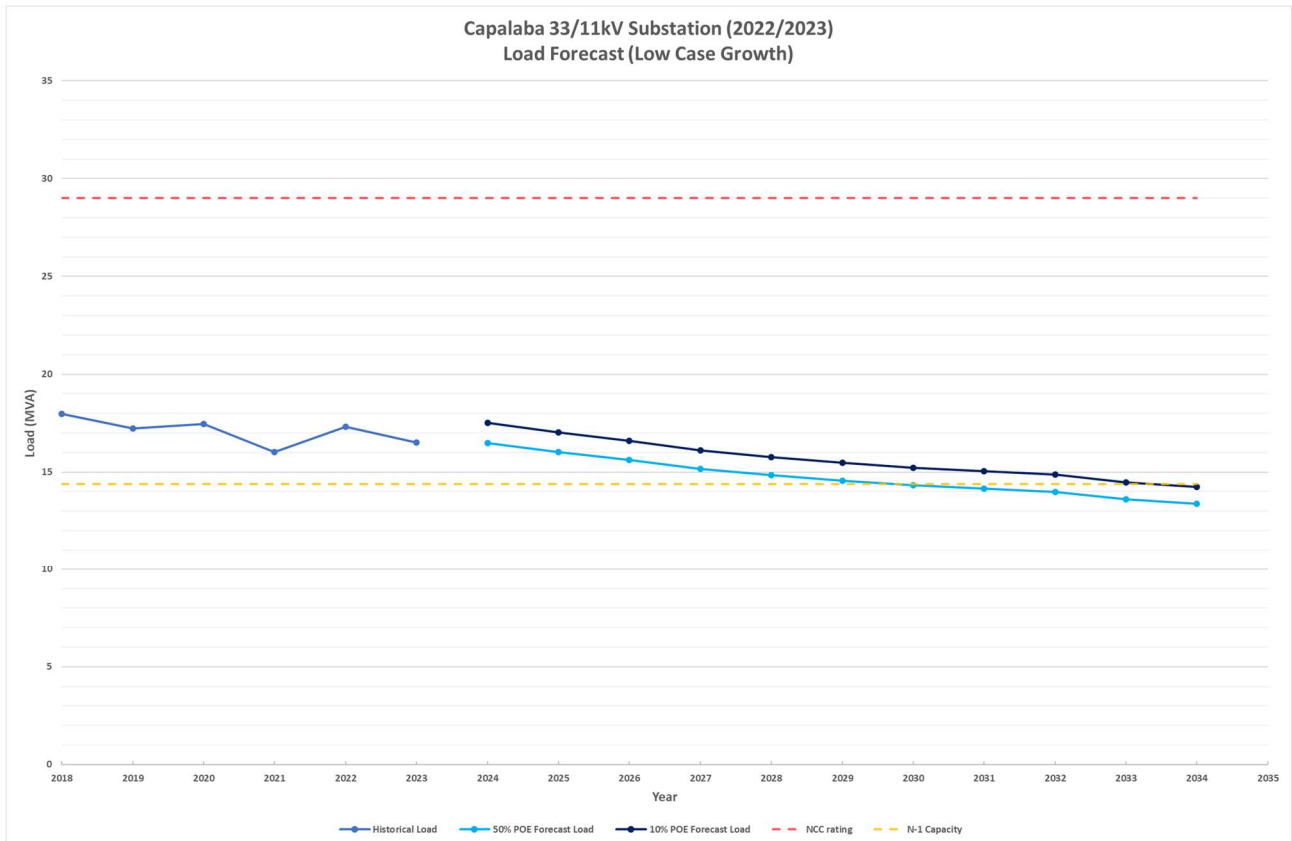


Figure 9: Substation low growth load forecast

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## 3 IDENTIFIED NEED

### 3.1 Description of the Identified Need

#### 3.1.1 Aged and Poor Condition Assets

A recent condition assessment has highlighted that a number of critical assets at SSCPB are at end of life and are in poor condition. The condition of these assets presents a considerable safety and reliability risk.

Condition data indicates that the following assets are reaching end of life:

- One 33/11kV transformer
- Three 33kV circuit breaker
- Seven 33kV isolators
- Six 11kV circuit breakers
- Two station service transformers
- Twenty-one protection relays
- One battery charger

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 relays mal-operation and catastrophic failure of the power transformers. Additionally, the poor condition of these assets significantly increases the likelihood of outages, resulting in a reduction in the level of reliability experienced by the customers supplied from Capalaba zone substation.

### 3.2 Quantification of the Identified Need

#### 3.2.1 Aged and Poor Condition Assets

The poor condition of a number of critical assets at SSCPB poses safety risks to people and reduces the level of reliability experienced by the customers supplied from Capalaba zone substation.

Where Energex identifies an imminent asset safety risk, immediate temporary measures are put in place to ensure safety of staff and public until permanent remediation can be performed.

#### 3.2.2 Risk Quantification Benefit Summary

Risk quantification analysis has been completed for the counter-factual scenario, which in this case is continuing the use of the existing assets with ongoing maintenance and operation. The risks include the Value of Customer Reliability (VCR), Customer Export Curtailment Value (CECV), cost of emergency replacement and safety. Figure 10 shows the annualised risks of continuing operation of the existing assets with ongoing maintenance and replacement on failure.

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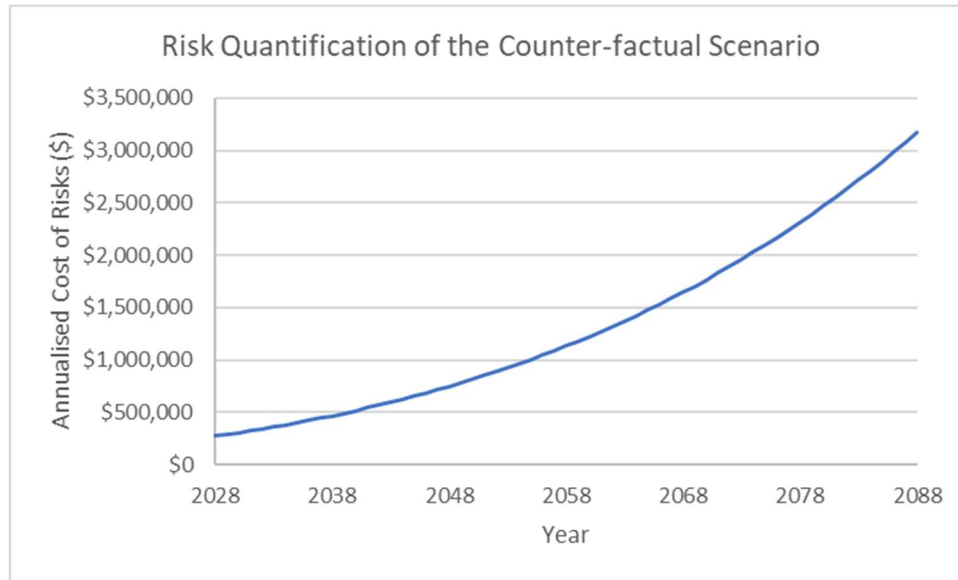


Figure 10: Risk Quantification of the Counter-factual

### 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 Capalaba 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 Load Profile

Characteristic peak 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.

# Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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## 4 TECHNICAL CHARACTERISTICS OF SAPS AND NON-NETWORK OPTIONS

This section describes the technical characteristics of the identified need that a Stand-alone Power System (SAPS) or a non-network option would be required to comply with.

### 4.1 Complete and Hybrid Options

Non-network providers are invited to present alternative options that is either a complete solution that would negate the need for network investment or a hybrid (combined network and non-network) solution that would reduce the scope of the network project by providing the magnitude of network support required in the Capalaba area to addresses the identified need.

### 4.2 Location

The location where network support and load restoration capability will be measured / referenced is on the 11kV bus at Capalaba zone substation; however alternative options may be located downstream on the 11kV network, so long as they can be operationally utilised when required.

### 4.3 Size

#### 4.3.1 Complete solution

To meet Energex's ongoing operational needs, it is expected that any alternate solution must provide stand-alone supply to the distribution network that supports a load up to the values listed in the table below.

Year	Demand Reduction Required
2028	16.6 MVA
2029	16.5 MVA
2030	16.4 MVA
2031	16.5 MVA
2032	16.5 MVA
2033	16.4 MVA
2034	16.3 MVA

Table 1: Demand reduction required for a complete solution

#### 4.3.2 Hybrid (combined network and non-network) solution

To meet Energex's ongoing operational needs, it is expected that any alternate hybrid solution must provide load reduction or additional supply to the distribution network that supports at least the level of load listed in the table below.

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Year	Demand Reduction Required
2028	4 to 6 MVA
2029	4 to 6 MVA
2030	4 to 6 MVA
2031	4 to 6 MVA
2032	4 to 6 MVA
2033	4 to 6 MVA
2034	4 to 6 MVA

**Table 2: Demand reduction required for a hybrid solution**

### 4.4 Timing

#### 4.4.1 Implementation Timeframe

In order to ensure compliance with Energex's planning criteria and the National Electricity Rules, a non-network solution will need to be implemented by February 2029.

#### 4.4.2 Time of Year

For a complete solution, the capacity must be available continuously twenty-four hours a day, all year round.

For a hybrid solution, load restoration capability (for Service Safety Net Targets) may be required at any time of the year. Following a fault on the 33/11kV transformer or 33kV circuit breaker or 11kV circuit breaker at Capalaba zone substation, the network support may be called upon for a duration of up to six months. Specific timing will be agreed with providers as part of the contract negotiations. Energex envisages that there may be in the order of one event per year where project proponents must supply the demand management reductions required.

#### 4.4.3 Duration

For a complete solution, the capacity must be available continuously twenty-four hours a day, all year round.

For a hybrid solution, network support may be required for 12 hours per day for a duration of up to six months, although the required magnitude will be significantly lower during seasons with low to moderate daily peak loads (e.g. late autumn, winter and early spring).

### 4.5 Compliance with Regulations and Standards

As a distribution network service provider (DNSP), Energex must comply with regulations and standards, including the Queensland Electricity Act and Regulation, Distribution Authority, National Electricity Rules and applicable Australian Standards.

These obligations must be taken in consideration when choosing a suitable solution to address the identified need at Capalaba as discussed in this RIT-D report.

## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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### 4.6 Longevity

Proposed non-network options will typically be required to provide solutions to the identified need for a period of at least 10 years. However, alternative solutions that can defer additional network investment for a smaller number of years may also be considered.

### 4.7 Potential Deferred Augmentation Charge

The annual deferred augmentation charge associated with the identified need is approximately \$350k per year for a complete solution and is approximately \$11k per year for a hybrid solution.

### 4.8 Feasible vs Non-Feasible Options

#### 4.8.1 Potentially Feasible Options

The identified need presented in this RIT-D is driven by the capability and reliability of the existing sub-transmission network that supplies Capalaba. As such, solutions that cost-effectively provide increased contingency load restoration capability are likely to represent reasonable options.

A non-exhaustive list of potentially feasible options includes:

- New embedded dispatchable network generation
- Existing customer generation
- Embedded energy storage systems
- Load curtailment or “Call-off-load” opportunities (this refers to contracting existing customers to be partially or fully curtailed when called upon by Energex)

#### 4.8.2 Options that are Unlikely to be Feasible

Without attempting to limit a potential proponent’s ability to innovate when considering opportunities, some technologies / approaches are unlikely to represent a technically or financially feasible solution.

A non-exhaustive list of options that are unlikely to be feasible includes:

- Renewable generation not coupled with energy storage and/or dispatchable generation
- Unproven, experimental or undemonstrated technologies

#### 4.8.3 Timing of Feasible Options

In order to ensure compliance with Energex’s planning criteria and the National Electricity Rules, a non-network solution will need to be implemented by February 2029.

# Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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## 5 CREDIBLE OPTIONS ASSESSED

### 5.1 Assessment of Network Solutions

Energex has identified three credible network options that will address the identified need.

#### 5.1.1 Option A: Replace end of life TR1, 33kV and 11kV switchgear

This option includes the following works to address the identified need:

- Recover the existing 12.5MVA 33/11kV transformer
- Recover the existing 33kV outdoor oil circuit breakers, isolators and bus
- Recover the existing 11kV indoor switchgear
- Recover the existing two station transformers
- Establish a new switchgear and control building
- Install a new 25MVA 33/11kV transformer
- Install new 33kV and 11kV indoor switchgear
- Install a 33/0.4kV station transformer and 11/0.4kV station transformer

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



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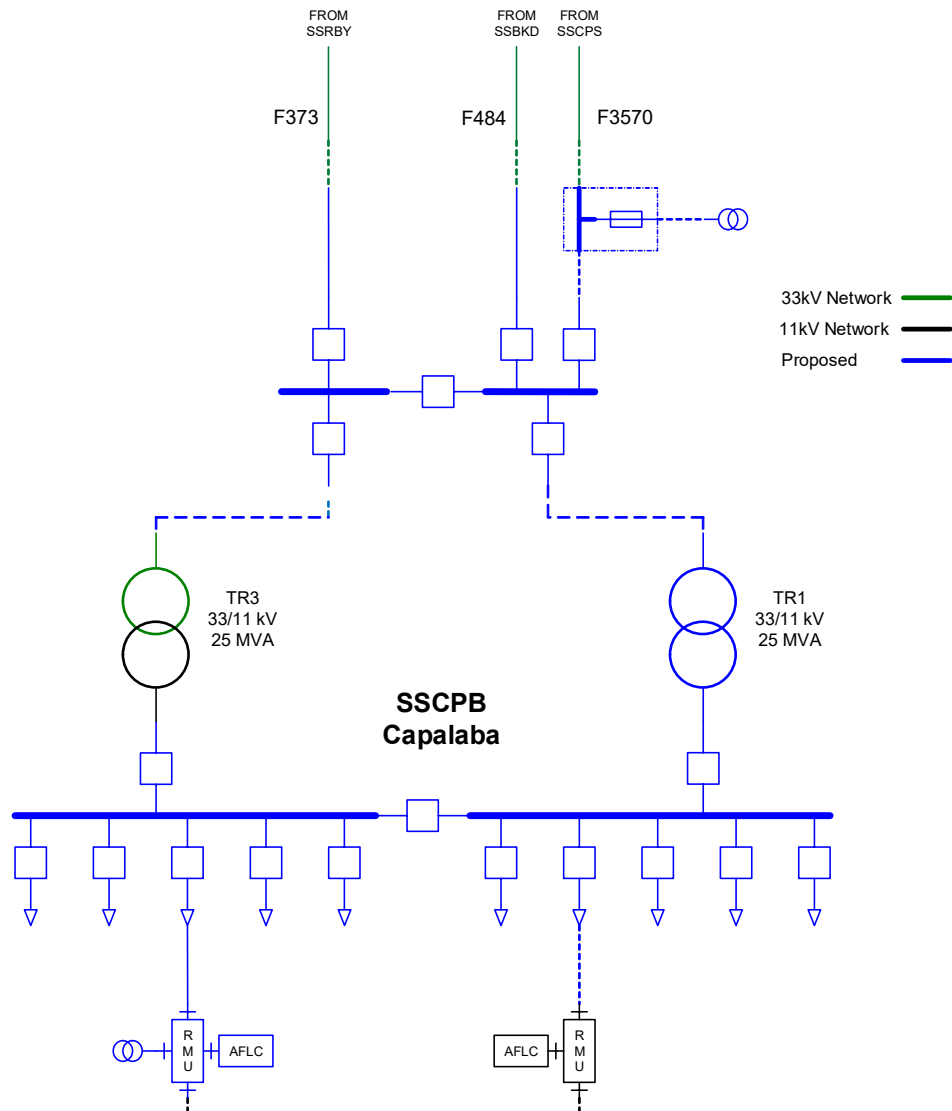


Figure 11: Option A proposed network arrangement (schematic view)

### 5.1.2 Option B: Recover TR1, replace 33kV and 11kV switchgear with new indoor switchgear and establish new 11kV tie to SSCPS

This option includes the following works to address the identified need:

- Recover the existing 12.5MVA 33/11kV transformer
- Recover the existing 33kV outdoor oil circuit breakers and bus
- Recover the existing 11kV indoor switchgear
- Recover the existing two station transformers
- Establish a new switchgear and control building
- Install new 33kV and 11kV indoor switchgear

## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

- Install a mobile substation connection kiosk
- Install a 33/0.4kV station transformer and 11/0.4kV station transformer
- Install an AFLC.
- Establish a new 11kV feeder from SSCPS

A schematic diagram of the proposed network arrangement for Option B is shown in Figure 12.

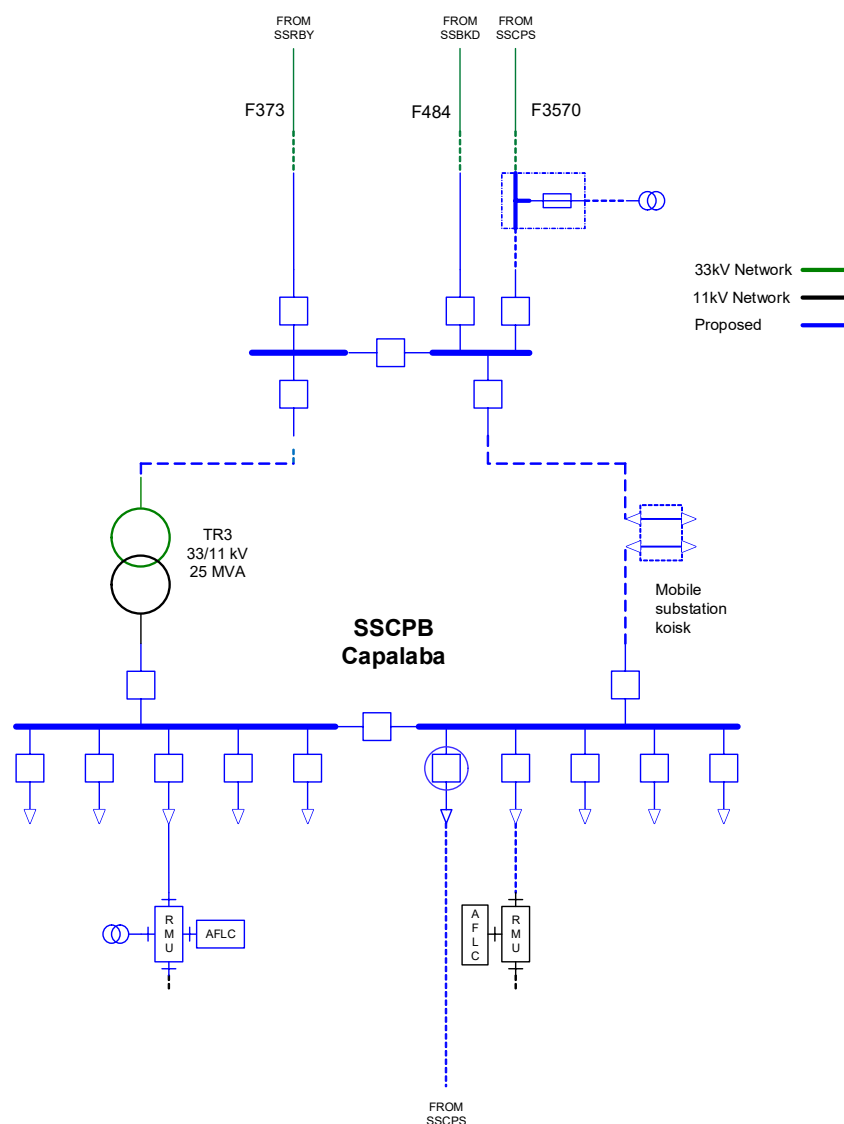


Figure 12: Option B proposed network arrangement (schematic view)

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### 5.1.3 Option C: Establish four new 11kV feeders from SSCPS to feed SSCPB 11kV area and recover SSCPB

This option includes the following works to address the identified need:

- Recover the existing 12.5MVA 33/11kV transformer
- Recover the existing 33kV outdoor oil circuit breakers and bus
- Recover the existing 11kV indoor switchgear
- Recover the existing two station transformers
- Establish new 33kV bus work to tie F373, F484, F3570 together at SSCPB to form a 3-ended tee-feeder.
- Establish four new 11kV feeders from SSCPS

This option will require the re-establishment of SSCPB in the future due to load growth.

A schematic diagram with the proposed network arrangement for Option C is shown in Figure 13.

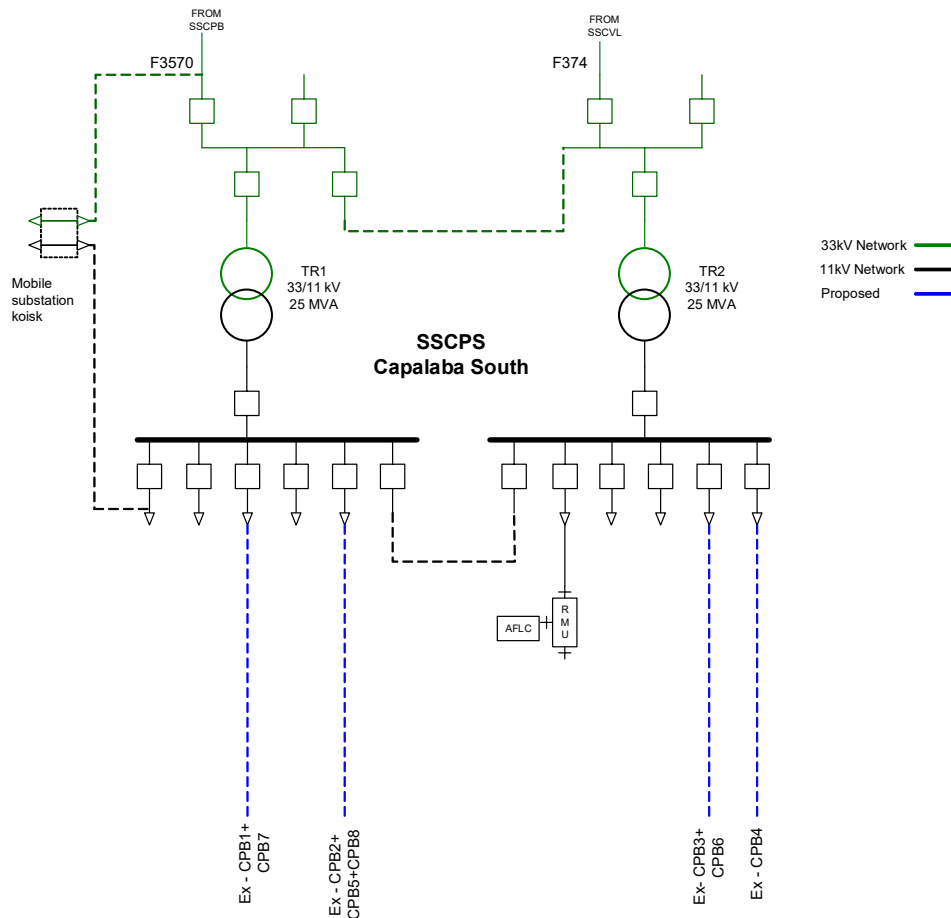


Figure 13: Option C proposed network arrangement (schematic view)

## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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### 5.2 Assessment of SAPS and Non-Network Solutions

Energex has considered Standalone Power Systems (SAPS) and demand management solutions to determine their feasibility to meet the identified need. Each of these are considered below.

#### 5.2.1 Consideration of SAPS Options

Energex considers there is no SAPS option that could form a potential credible option on a standalone basis, or that could form a significant part of the credible option. In particular the load requirements, per the forecast in the Capalaba region could not be supported by a network that is not part of the interconnected national electricity system.

#### 5.2.2 Demand Management (Demand Reduction)

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.

The DEM team has completed a review of the Capalaba customer base and considered a number of demand management technologies. Asset safety and performance risks are the key project drivers (i.e. the need) at Capalaba. It has been determined that most demand management options will not be viable propositions and have been explored in the following sections.

#### Network Load Control

The residential customers load appear to drive the daily peak demand which generally occurs between 3:00pm and 8:00pm.

There are 2,117 customers on tariff T31 and T33 hot water load control (LC). An estimated demand reduction value of 1,270kVA<sup>1</sup> is available.

Therefore, network load control would not sufficiently address the identified need.

#### 5.2.3 Demand Response

Four methods utilising demand response technology for deferring network investment are: Call Off Load (COL), Customer Embedded Generation (CEG), Large Scale Customer Generation (LSG) and customer solar power systems.

#### Customer Call Off Load (COL)

COL is an effective technique for deferring network investment where the need is for a short time period. However, in this instance, the need is required on a long-term permanent basis. There are a small number of large customers in the catchment area but the \$/kVA funding available for demand reduction is low therefore customer call off load has been assessed as not a viable proposition as it will not address the identified need, nor benefit the community.

#### Customer Embedded Generation (CEG)

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CEG is an effective technique for deferring network investment where the need is for a short time period. The primary driver for investment in this instance is asset safety and performance. A short-term deferral of network investment by using CEG is not a technically or financially feasible option (due to the number of contracts required to be negotiated and managed).

This option has been assessed as technically not viable as it will not address the identified network requirement.

### **Large-Scale Customer Generation (LSG)**

LSG sites such as renewable energy generation, solar or wind farms of multiple MW's capacity constitute an opportunity to support substation investment by reducing demand on, and potentially providing reactive power support for substation assets.

This option could potentially address the identified need, however, has been assessed as technically not viable as there is no known existing or proposed LSG demand response available.

### **Customer Solar Power Systems**

A total of 1,283 customers have solar photo voltaic (PV) systems for a connected inverter capacity of 7,995kVA.

The daily peak demand is driven by residential customer demand and the peak generally occurs between 3:00pm and 8:00pm. As such customer solar generation does not coincide with the peak load period.

Business customers with large solar arrays are deemed to present a significant opportunity for targeted load control or load curtailment if coupled with a Battery Energy Storage System (BESS). Contracting such customers is attractive as they represent a larger load across a fewer customers and therefore are cheaper and easier to engage and contract.

However, only a small percentage of customers in this supply area have solar PV systems and possibly none have a BESS. PV systems with BESS present a future portfolio opportunity for potential demand response but currently this supply area has a very limited solar/BESS. Solar customers without a BESS will not meet the technical needs of the demand reduction as their solar contribution may not be available when the network un-met need is required.

### **5.2.4 SAPS and Non-Network Solution Summary**

Energex has not identified any viable SAPS or 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 Capalaba area to address the identified need.

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### 5.3 Preferred Network Option

Energex's preferred internal network option is Option A, to replace existing end of life transformers, 33kV and 11kV switchgear at Capalaba zone substation.

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

The estimated capital cost of this option is \$13.6 million. Annual operating and maintenance costs are anticipated to be 0.5% of the capital cost. The estimated project delivery timeframe has design commencing in February 2025 and construction completed by February 2029.

# Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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## 6 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.

### 6.1 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 and customer interruptions caused by network outages

#### 6.1.1 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 \$44.7/kWh, which has been derived from the AER 2023 Value of Customer Reliability (VCR) values. In particular, Energex has weighted the AER estimates according to the make-up of the specific load considered.

Customer export Curtailment value (CECV) represents the detriment to all customers from the curtailment of DER export (e.g. rooftop solar PV systems). A reduction in curtailment due to implementing a credible option results in a positive contribution to the market benefits of that option. These benefits have been calculated according to the AER CECV methodology based on the capacity of DER currently installed and forecast to be installed within the Capalaba supply area.

#### 6.1.2 Quantification of Market Benefits

The market benefits from changes in involuntary load shedding and customer interruptions caused by network outages for each option have been quantified as shown in the figure below:



## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

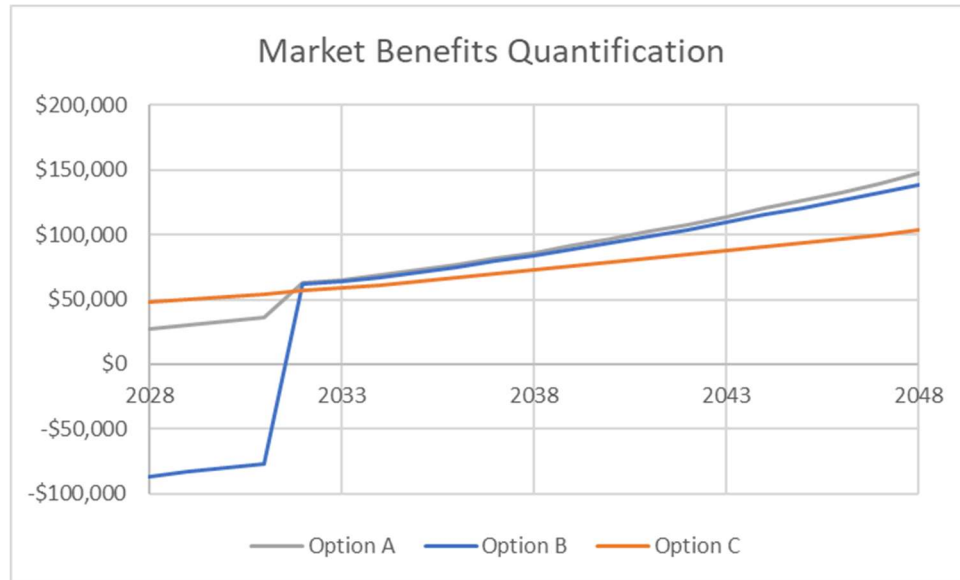


Figure 14: Market benefits quantification for each option

### 6.2 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
- Differences in timing of expenditure
- Changes in load transfer capacity and the capacity of Embedded Generators to take up load
- Changes in network losses
- Changes in Greenhouse Gas Emissions
- Option value
- Other Classes of Market Benefit

#### 6.2.1 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 Capalaba area. Therefore, market benefits associated with changes in voluntary load curtailment have not been considered.

#### 6.2.2 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.

## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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### 6.2.3 Differences 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.

### 6.2.4 Changes in Load Transfer Capacity 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 Capalaba area.

### 6.2.5 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.

### 6.2.6 Changes in Greenhouse Gas Emissions

Energex does not anticipate that the credible options included in the RIT-D assessment will lead to any significant changes in greenhouse gas emissions.

### 6.2.7 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<sup>1</sup>.

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.

### 6.2.8 Other Class of Market Benefit

Energex has not identified any other relevant class of market benefit for this RIT-D.

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<sup>1</sup> 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>

# Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

## 7 DETAILED ECONOMIC ASSESSMENT

### 7.1 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.

### 7.2 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 WACC.

Table 3 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 3: Economic parameters and sensitivity analysis factors**

### 7.3 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. In this instance, the scenarios that have been considered are:

## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

1. **Medium demand** – under this scenario the existing load remains around the same as it currently is. This is consistent with the base case load forecast provided in SIFT. This scenario has been assigned a likelihood of 80% in the weighted average NPV.

2. **High demand** – under this scenario the only change from the Medium Growth scenario is that the high growth load forecast provided from SIFT has been used. This scenario has been assigned a likelihood of 20% in the weighted average NPV.

Low demand was not considered because the staging of projects and VCR benefit would be very similar to that of the Medium demand scenario.

### 7.4 Net Present Value (NPV) Results

An overview of the initial capital cost and the base case NPV results are provided in Table 4.

Option	Option Name	Rank	Initial Capital Cost	Net Economic Benefit (\$ real)	PV of Capex (\$ real)	PV of Opex (\$ real)
A	Replace end of life TR1, 33kV and 11kV switchgear	1	\$13.6Mn	\$7.4Mn	-\$11.9Mn	-\$0.99Mn
B	Recover TR1, replace 33kV and 11kV switchgear with new indoor switchgear and establish new 11kV tie to SSCPS	2	\$12.8Mn	\$1.1Mn	-\$12.8Mn	-\$0.99Mn
C	Establish four new 11kV feeders from SSCPS to feed SSCPB 11kV area and recover SSCPB	3	\$6.25Mn	\$4.4Mn	-\$12.1Mn	-\$0.61Mn

**Table 4: Base case NPV ranking table**

A sensitivity analysis was conducted on this base case to establish the option that remained the lowest cost option in the scenarios considered. Table 5 provides the results of the sensitivity analysis.

Option Number	Option Name	Weighted Rank	Weighted Net Economic Benefit	Weighted Capex PV	Weighted Opex PV	Initial Capex (\$)
A	Replace end of life TR1, 33kV and 11kV switchgear	1	\$7.5Mn	-\$11.9Mn	-\$0.99Mn	\$13.6Mn
B	Recover TR1, replace 33kV and 11kV switchgear with new indoor switchgear and establish new 11kV tie to SSCPS	2	\$1.8Mn	-\$12.8Mn	-\$0.99Mn	\$12.8Mn
C	Establish four new 11kV feeders from SSCPS to feed SSCPB 11kV area and recover SSCPB	3	\$4.1Mn	-\$12.4Mn	-\$0.63Mn	\$6.25Mn

**Table 5: Scenario Analysis - Comparison of Options**

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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. The Monte-Carlo analysis undertook 1000 simulations of all the variables. Table 6 shows the percentage of times each option was the most economical across the simulations and also the average NPV cost of all the simulations.

Option Number	Option Name	Rank 1	Rank 2	Rank 3	Average NPV
A	Replace end of life TR1, 33kV and 11kV switchgear	88.5%	10.5%	1.0%	\$7.6Mn
B	Recover TR1, replace 33kV and 11kV switchgear with new indoor switchgear and establish new 11kV tie to SSCPS	6.0%	33.8%	60.2%	\$2.8Mn
C	Establish four new 11kV feeders from SSCPS to feed SSCPB 11kV area and recover SSCPB	5.6%	55.5%	38.9%	\$3.8Mn

**Table 6: Monte Carlo Analysis for Base Case Forecast**

Option A is the lowest cost option in the weighted average results across the three scenarios. Option A also has the lowest average cost and is the most economical in 88.5% of cases in the Monte-Carlo simulations.

Based on the detailed economic assessment, Option A is considered to provide the optimum solution to address the forecast limitations and is therefore the recommended development option.

### 7.5 Selection of Preferred Option

Energex's preferred internal network option is Option A, to replace existing end of life transformers, 33kV and 11kV switchgear at Capalaba zone substation.

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

The estimated capital cost of this option is \$13.6 million. Annual operating and maintenance costs are anticipated to be 0.5% of the capital cost. The estimated project delivery timeframe has design commencing in February 2025 and construction completed by February 2029.

### 7.6 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.

# Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

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## 8 SUBMISSION AND NEXT STEPS

### 8.1 Submissions from Solution Providers

Energex invites written submissions to address the identified need in this report from registered participants and interested parties.

Energex will not be legally bound in any way 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 Energex 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 Energex 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 option that has greater net economic benefits. However, the selection of the solution provider to implement the preferred option will be done after the conclusion of the Final Project Assessment Report (FPAR) and in accordance with Energex's standards for procurement.

Submissions in writing are due by 4pm on the **27 September 2024** and should be lodged to [demandmanagement@energex.com.au](mailto:demandmanagement@energex.com.au)

### 8.2 Next Steps

Following Energex's consideration of submissions received in response to this report, the preferred option, and a summary of and commentary on any submissions received will be included as part of the Final Project Assessment Report (FPAR). The FPAR represents the final stage of the consultation process in relation to the application of the RIT-D.

Energex intends to publish the FPAR no later than 31 October 2024. Energex will use its reasonable endeavours to publish the FPAR by the above date. This may however not be achievable due to changing power system conditions or other circumstances beyond the control of Energex.

At the conclusion of the consultation process, Energex intends to take steps to progress the recommended solution(s) to ensure any statutory non-compliance is addressed and undertake appropriately justified network reliability improvement(s), as necessary.

Please note that at the conclusion of the Final Project Assessment Report (FPAR), for Energex to act on a submission from a non-network proponent, Energex will need to enter into a legally binding contract with that non-network proponent for delivery of the non-network solution within a timeframe satisfactory to Energex to ensure timely completion of the project. Failure to enter into a contract within a satisfactory timeframe will result in Energex reverting to the next preferred credible option identified as part of the preferred option published in the FPAR.

## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

Step 1	Publish Notice of Screening for Options Report advising no non-network options.	Date Released: <b>01 July 2024</b>
Step 2	Consultation period	<b>Concluded</b>
Step 3	Release of Draft Project Assessment Report (DPAR)	Date Released: <b>16 August 2024</b>
Step 4	Consultations in response to the DPAR	<b>Minimum of 6 weeks</b>
Step 5	Publish the Final Project Assessment Report (FPAR)	Anticipated to be released by: <b>31 October 2024</b>
Energex reserves the right to revise this timetable at any time. The revised timetable will be made available on the Energex RIT-D website.		

Energex will take all reasonable efforts to maintain the consultation schedule listed above. Due to various circumstances the schedule may change, however, up-to-date information will be available on the Energex website.

During the consultation period, Energex will review, compare and analyse all internal and external solutions. Detailed economic options analysis and comparisons of expected market benefits will be undertaken during this time. At the end of the consultation and review process Energex will publish a final report which will detail the most feasible option and proceed to implement that option.



## Addressing Reliability Requirements in the Capalaba Network Area Draft Project Assessment Report

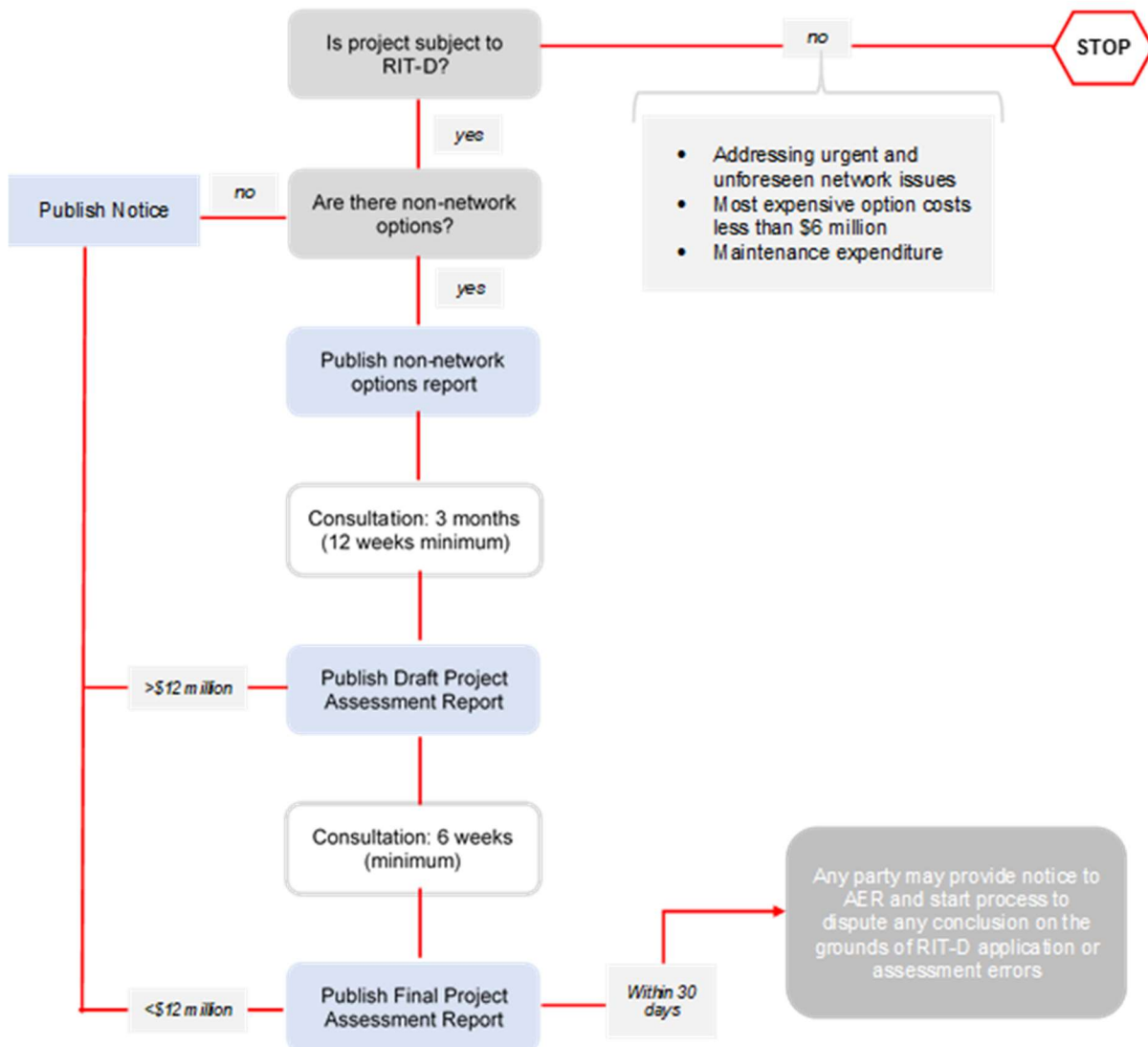
### 9 COMPLIANCE STATEMENT

This Draft 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 Options Screening Report;	NA
(4) a description of each credible option assessed	5
(5) where a <i>Distribution Network Service Provider</i> has quantified market benefits in accordance with clause 5.17.1(d), a quantification of each applicable market benefit of each credible option	6
(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure	7
(7) a detailed description of the methodologies used in quantifying each class of costs or market benefit	6
(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	6.2
(9) the results of a NPV analysis of each credible option and accompanying explanatory statements regarding the results	7
(10) the identification of the proposed preferred option	7.5
(11) for the proposed preferred option, the RIT-D proponent must provide: <ul style="list-style-type: none"> <li>(i) details of the technical characteristics;</li> <li>(ii) the estimated construction timetable and commissioning date (where relevant);</li> <li>(iii) the indicative capital and operating costs (where relevant);</li> <li>(iv) a statement and accompanying analysis that the proposed preferred option satisfied the RIT-D; and</li> <li>(v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent</li> </ul>	5.1, 7.5 & 7.6
(12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the draft report may be directed.	8.1

# Addressing Reliability Requirements in the Capalaba Network Area Draft 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.