# Regulatory Investment Test for Distribution (RIT-D)

# Addressing Reliability Requirements in the Gladstone South Network Area

## Final Project Assessment Report

20 March 2023

ERGON ENERGY NETWORK

Part of Energy Queensland

# EXECUTIVE SUMMARY

## About Ergon Energy

Ergon Energy Corporation Limited (Ergon Energy) is part of Energy Queensland and manages an electricity distribution network which supplies electricity to more than 765,000 customers. Our vast operating area covers over one million square kilometres (around 97% of the state of Queensland) from the expanding coastal and rural population centres to the remote communities of outback Queensland and the Torres Strait.

Our electricity network consists of approximately 160,000 kilometres of powerlines and one million power poles, along with associated infrastructure such as major substations and power transformers.

We also own and operate 33 stand-alone power stations that provide supply to isolated communities across Queensland which are not connected to the main electricity grid.

## Identified Need

Gladstone South 132/66/11kV Substation T019 (GLSO) is a bulk supply substation jointly owned by Powerlink and Ergon Energy and is immediately adjacent to Gladstone South 132kV Switching Station T152 (GLSU) owned by Powerlink. GLSO is located to the south of Gladstone city and a major network node that supplies approximately 24,820 customers via the 66kV and 11kV networks in Central Queensland. At GLSO, there are two 132/66kV 100MVA transformers owned by Powerlink, two 66/11kV 20MVA transformers, seven 66kV bays owned by Ergon Energy including four feeder bays, two transformer bays and one Audio Frequency Load Control (AFLC) bay as well as seven 11kV feeders and one spare 11kV feeder bay. One 66kV feeder bay is a spare and the other three 66kV feeders respectively supply Gladstone Friend Street (GLFS), Boyne Residential (BORE), Awoonga (AWOO), Calliope (CALL), Wooderson Pumps (WOPU), Bocoolima Pumps (BOPU), Littlemore (LITT) and Miriam Vale (MIVA) Substations. In addition to these connected substations there are several major customers that are supplied via this network. In 2022, the 66kV load peaked at 50.9MVA and the 11kV load peaked at 25.3MVA.

It has been determined that one 66kV Current Transformer (CT) set is forecast to reach its retirement age in the next five years, one 66kV feeder does not have its dedicated Voltage Transformer (VT) set, fourteen protection relays have already reached their retirement age, fifteen 66kV isolators do not have sufficient fault ratings, there are inadequate Direct Current (DC) supply systems and two Surge Diverter (SD) sets pose safety risks to staff working within the switchyard. In addition, a total of nineteen protection relays for the 66kV bays (inclusive of the fourteen mentioned above) are currently installed inside the masonry control building in poor structural condition owned by Powerlink and these need to be relocated to the prefabricated control building owned by Ergon Energy due to Powerlink's planned decommissioning of the masonry building.

The ongoing operation of these assets beyond their estimated retirement date presents a significant risk to safety and customer reliability. The purpose of this project is to remove the asset condition limitations at GLSO in order to maintain continuity of supply to its customers and to reduce the safety risks SFAIRP (So Far As Is Reasonably Practicable).

## 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). Ergon Energy has determined that network investment is essential in this case for it to continue to provide electricity to the consumers in the GLSO supply area in a reliable, safe and cost-effective manner. Accordingly, this investment is subject to a RIT-D.

One potentially feasible option has been investigated:

- **Option 1:** replacing the individual assets identified as having reached end of life and addressing the secondary systems limitations.

This Final Project Assessment Report (FPAR), where Ergon Energy 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.

Ergon Energy's preferred solution to address the identified need is Option 1: replacing the individual assets identified as having reached end of life and addressing the secondary systems limitations.

# CONTENTS

# 1. INTRODUCTION

This Final Project Assessment Report has been prepared by Ergon Energy 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 GLSO network area.

In preparing this RIT-D, Ergon Energy is required to consider reasonable future scenarios. With respect to major customer loads and generation, Ergon Energy has, in good faith, included as much detail as possible while maintaining necessary customer confidentiality. Potential large future connections that Ergon Energy 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 GLSO area.
- Identifies the need which Ergon Energy 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.

## 1.2. 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 Ergon Energy 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 Ergon Energy. Dispute notifications should be sent to demandmanagement@ergon.com.au

If no formal dispute is raised, Ergon Energy will proceed with the preferred option to replace the individual assets identified as having reached end of life and address the secondary systems limitations.

## 1.3. Contact Details

For further information and inquiries please contact:

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

# 2. BACKGROUND

## 2.1. Geographic Region

GLSO supplies the southern parts of Gladstone city at 11kV. It supplies GLFS via the Gladstone 66kV meshed network and also the regional substations of BORE, CALL, AWOO, WOPU, BOPU, MIVA and LITT via the 66kV network as shown geographically in Figure 1.

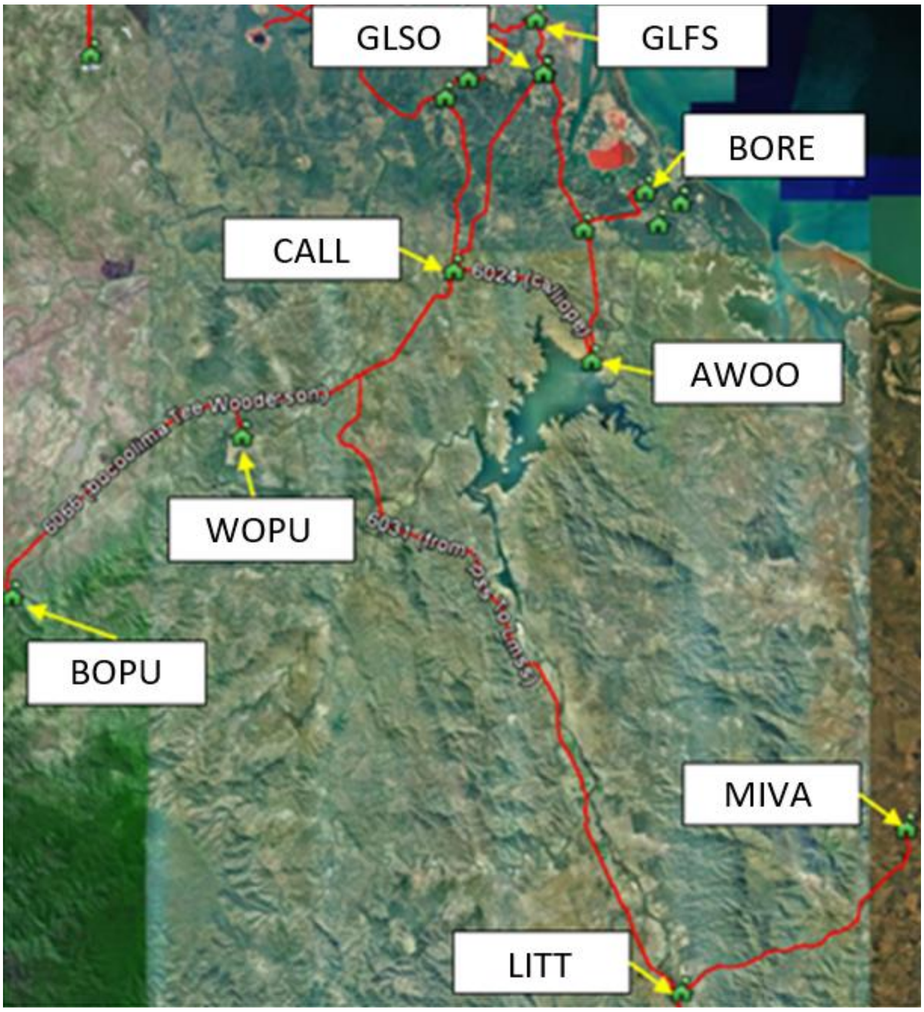



**Figure 1: Existing 66kV network arrangement (geographic view)**

## 2.2. Existing Supply System

GLSO is a bulk supply substation jointly owned by Powerlink and Ergon Energy and is immediately adjacent to GLSU owned by Powerlink. GLSO is located to the south of Gladstone city and a major network node that supplies approximately 24,820 customers via the 66kV and 11kV networks in Central Queensland. At GLSO, there are two 132/66kV 100MVA transformers owned by Powerlink, two 66/11kV 20MVA transformers, seven 66kV bays owned by Ergon Energy including four feeder bays, two transformer bays and one AFLC bay as well as seven 11kV feeders and one spare 11kV feeder bay. One 66kV feeder bay is a spare and there are three 66kV feeders: Boyne Res, Friend St and Calliope. In 2022, the 66kV load peaked at 50.9MVA and the 11kV load peaked at 25.3MVA.

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

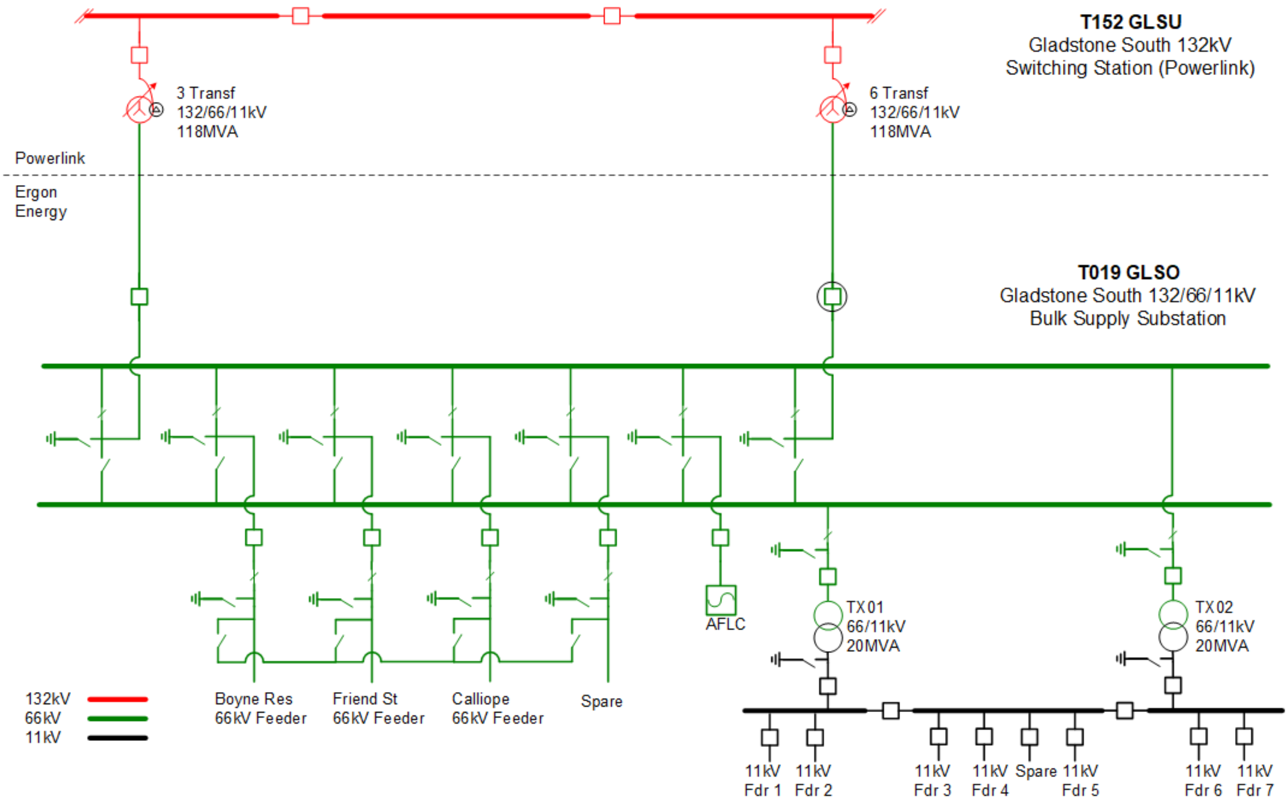



**Figure 2: Existing network arrangement (schematic view)**

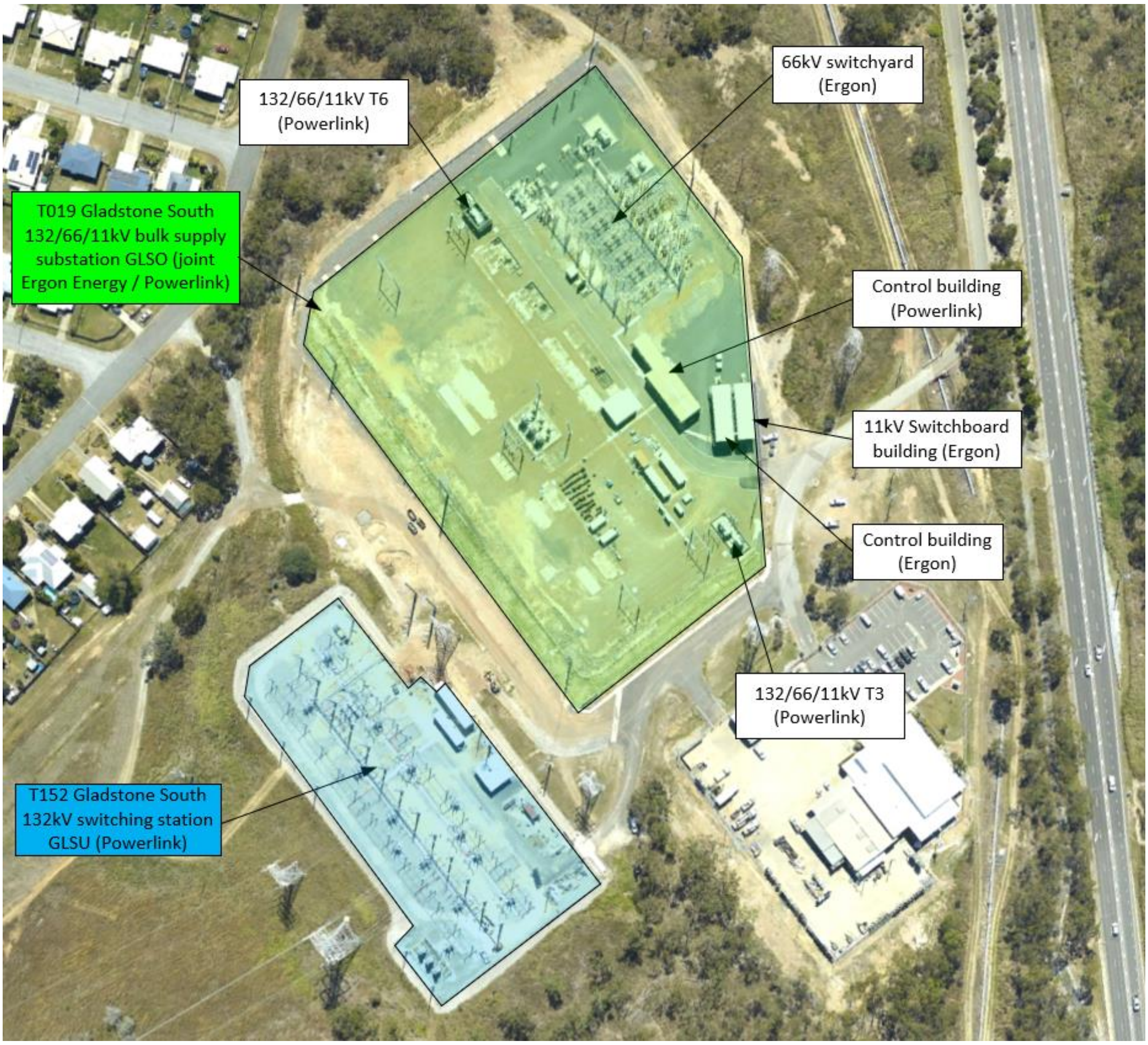



**Figure 3: GLSO and GLSU geographic view**

## 2.3. Load Profiles / Forecasts

The GLSO load is summer peaking. The average load at GLSO comprises a mix of residential (57%), commercial (21%), industrial (22%) which includes significant water pumping load from AWOO, WOPU and BOPU.

### 2.3.1. Full Annual Load Profile

The GLSO full annual load profile for 2022 is shown in Figure 4. It can be noted that the peak load occurs during summer.

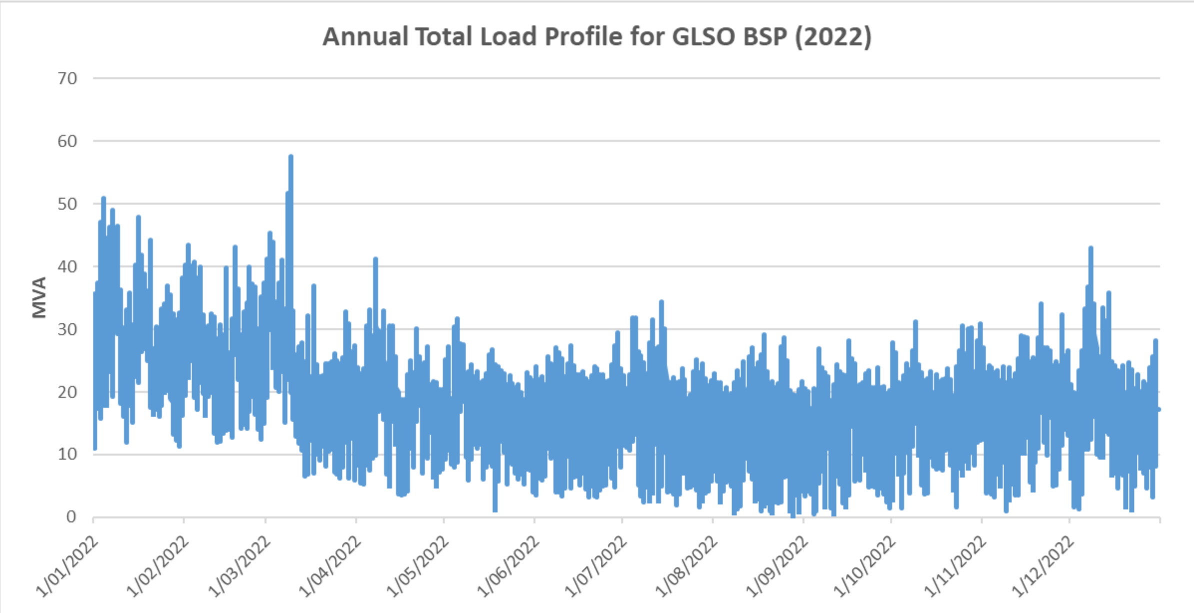



**Figure 4: GLSO annual load profile**

### 2.3.2. Load Duration Curve

The GLSO load duration curve for 2022 year is shown in Figure 5.

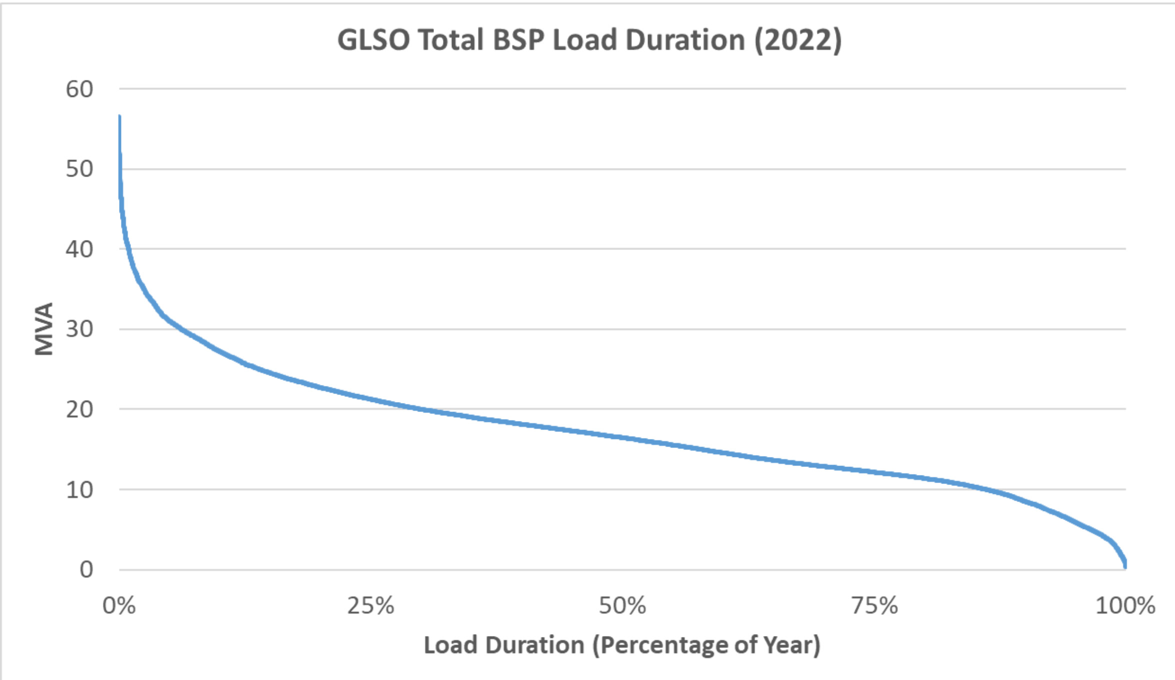



**Figure 5: Substation load duration curve**

### 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 GLSO are historically experienced in the late afternoon and evening however the 2022 peak occurred at 1:30pm. This is attributed to additional load transferred to GLSO via the Gladstone 66kV ring during this time.

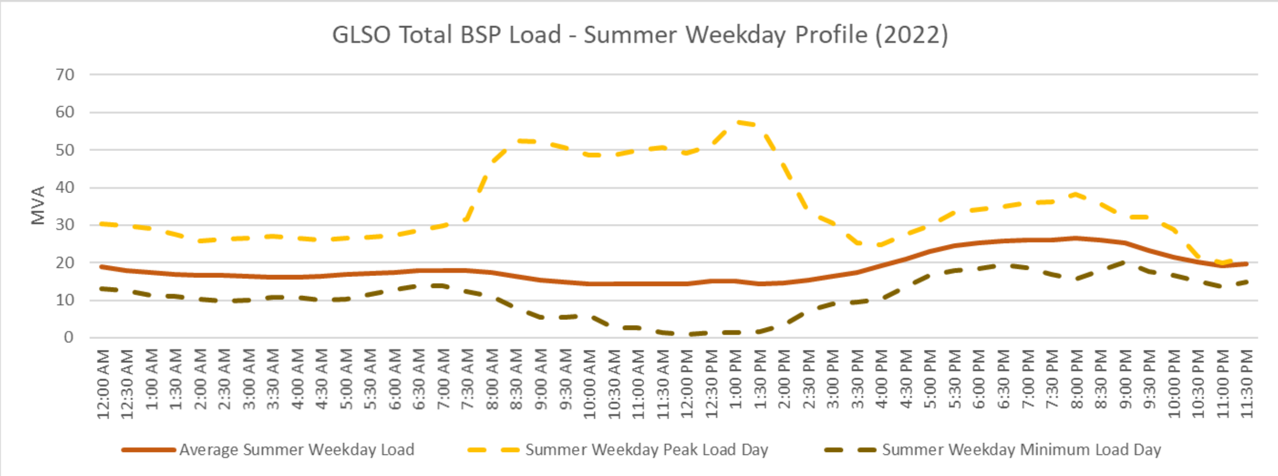



**Figure 6: Substation average and peak weekday load profile (summer)**

### 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 five years has also been included in the graph. It can be noted that the peak load is forecast to increase over the next 10 years under the base case scenario.

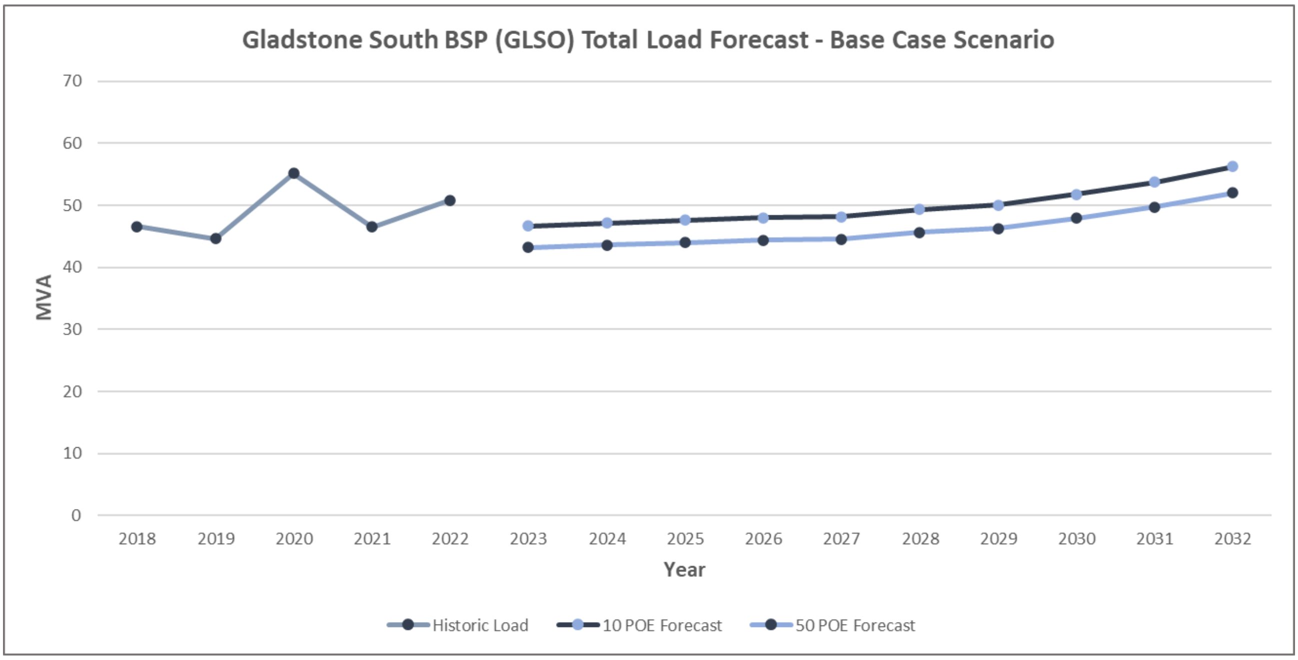



**Figure 7: Substation base case load forecast**

### 2.3.5. High Growth Load Forecast

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

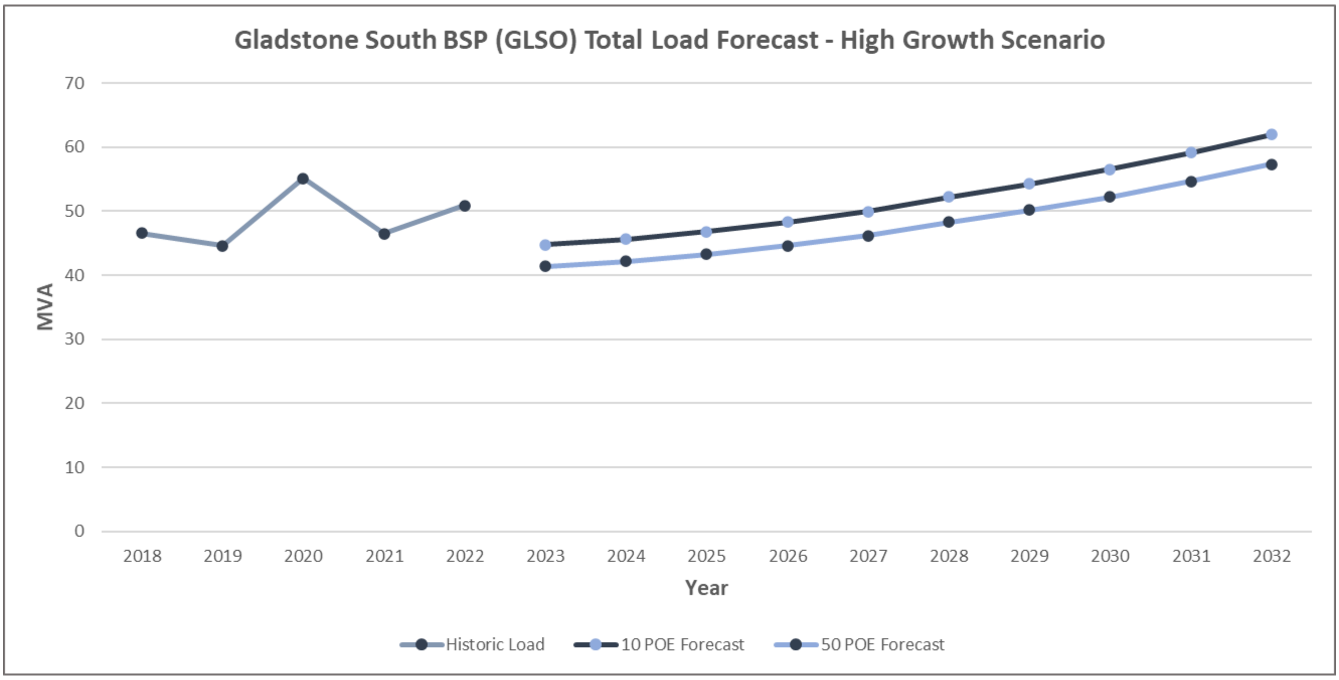



**Figure 8: Substation high growth load forecast**

### 2.3.6. Low Growth Load Forecast

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

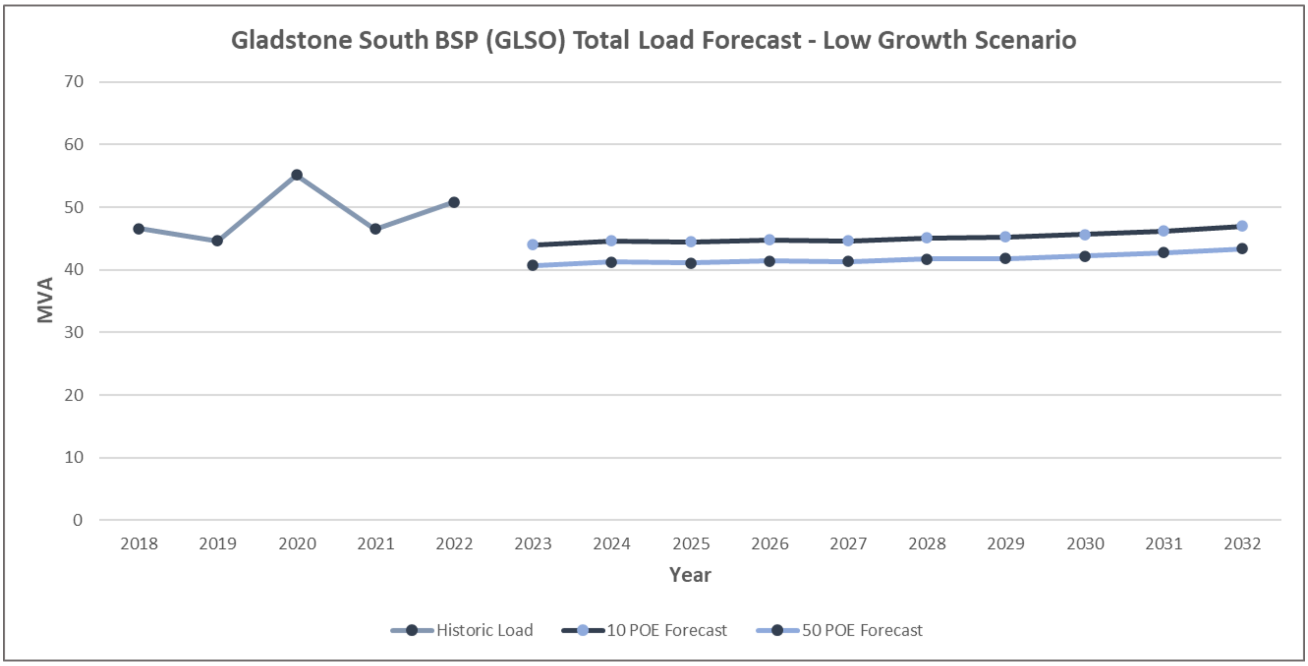



**Figure 9: Substation low growth load forecast**

# 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 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 one 66kV CT set and fourteen protection relays are reaching end of life. Two 66kV porcelain Surge Diverter (SD) sets have been identified as presenting a safety risk.

In addition, a total of nineteen protection relays for the 66kV bays (inclusive of the fourteen mentioned above) are currently installed inside the masonry control building in poor structural condition owned by Powerlink and these need to be relocated to the prefabricated control building owned by Ergon Energy due to Powerlink's planned decommissioning of the masonry building.

### 3.1.2. Assets with Insufficient Fault Rating

A number of 66kV manual isolators have been identified as having fault ratings lower than the prospective maximum fault level at GLSO. In order to manage equipment rating risks, the 66kV Circuit Breaker (CB) of one of the Powerlink owned 132/66kV transformers is normally operated open, however this reduces the reliability of all customers supplied from GLSO.

## 3.2. Quantification of the Identified Need

### 3.2.1. Aged and Poor Condition Assets

A recent condition assessment has highlighted that a number of critical assets 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 one 66kV CT set and fourteen protection relays are reaching end of life. Two 66kV porcelain Surge Diverter (SD) sets have been identified as presenting a safety risk.

In addition, a total of nineteen protection relays for the 66kV bays (inclusive of the fourteen mentioned above) are currently installed inside the masonry control building in poor structural condition owned by Powerlink and these need to be relocated to the prefabricated control building owned by Ergon Energy due to Powerlink's planned decommissioning of the masonry building.

The deterioration of these primary and secondary system assets poses safety risks to staff working within the switchyard. It also poses a safety risk the general public, through the increased likelihood of protection relay mal-operation and catastrophic failure of the surge diverters. 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 GLSO.

Where Ergon Energy 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. Assets with Insufficient Fault Rating

A total of fifteen 66kV manual isolators have been identified with fault rating lower than the prospective maximum fault levels at GLSO (given inTable 1). In order to manage equipment rating risks, the 66kV Circuit Breaker (CB) of one of the Powerlink owned 132/66kV transformers is normally operated open, however this reduces the reliability of all customers supplied from GLSO. For example, when operating with one of the CBs normally open, a protection trip of the in-service transformer CB reduces the capacity available on the Gladstone 66kV meshed network and depending on network loading at the time, would lead to customer load shedding to avoid exceeding plant rating.

**Table 1: Substation prospective maximum fault level**

| Substation | Voltage (kV) | Three Phase | | Phase to Ground | |
|---|---|---|---|---|---|
| | | (MVA) | (kA) | (MVA) | (kA) |
| GLSO | 66 | 1601 | 14.0 | 611 | 16.0 |

### 3.2.3. Risk Quantification Benefit Summary

Risk quantification analysis has been completed for each credible option which includes calculating the value of customer reliability, emergency replacement, safety and customer generation curtailment costs. Figure 10 shows the benefits of Option 1 (described in Section 4.1.1) in comparison to the counter-factual, which in this case is continuing the use of the existing plant and maintenance and operation. The large positive VCR benefits are attributed to the expected decrease in plant failure rate after the proposed asset replacements in 2025. Substation reliability is also expected to increase after the fault rating limitations of the 66kV isolators are removed and the substation can be supplied with both 132/66kV transformers in parallel.

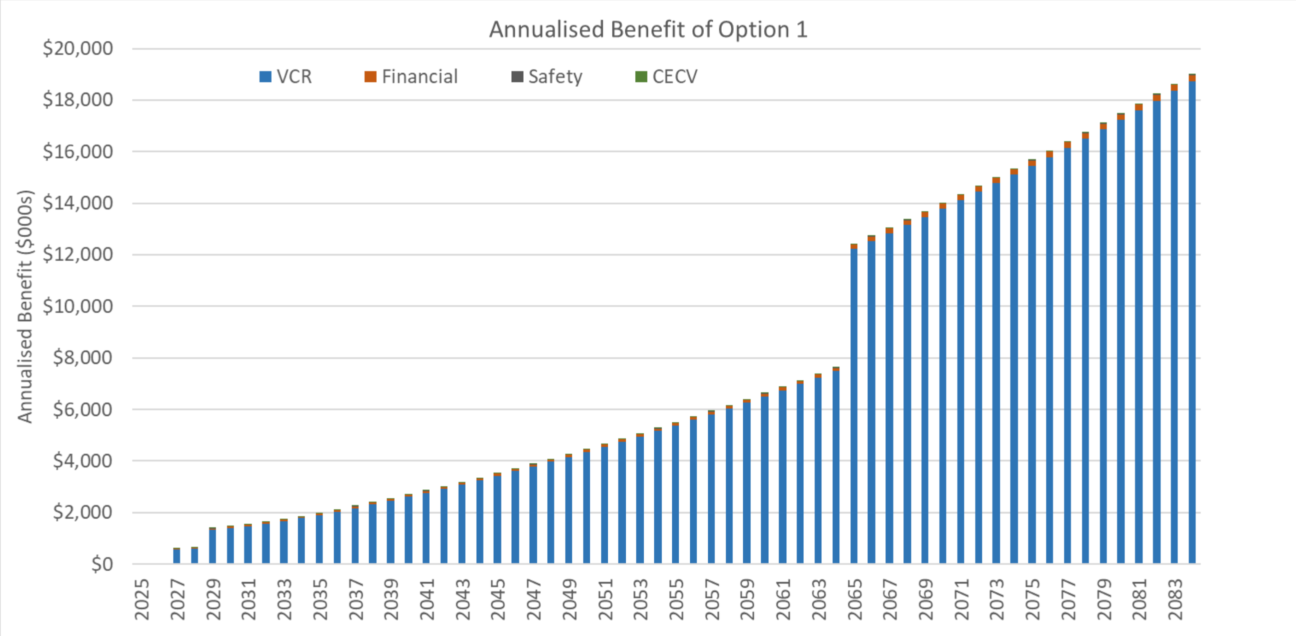



**Figure 10: Annualised Benefits of Option 1 compared with the Counter-factual**

## 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 GLSO 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.

# 4. CREDIBLE OPTIONS ASSESSED

## 4.1. Assessment of Network Solutions

Ergon Energy has identified one credible network option that would address the identified need.

### 4.1.1. Option 1: Replace individual assets

This option involves replacing the individual assets identified as having reached end of life and addressing the secondary systems limitations in order to address the identified need.

The scope of works include:

- Replace two 66kV bus isolators in the transformer T6 bay.
- Replace two 66kV bus isolators and one 66kV feeder isolator in the Awoonga feeder bay.
- Replace two 66kV bus isolators, one 66kV feeder isolator and one 66kV SD set as well as install one 66kV VT set in the Friend Street feeder bay.
- Replace two 66kV bus isolators and one 66kV CT set in the Calliope feeder bay.
- Replace two 66kV bus isolators as well as decommission one 66kV feeder isolator, one 66kV VT set and one 66kV SD set in the Spare feeder bay.
- Replace two 66kV bus isolators in the AFLC bay.
- Install one current standard bus protection scheme for the 66kV bus, one current standard line differential and one current standard distance protection schemes for the 66kV feeders, one current standard protection scheme for the AFLC bay as well as communications equipment and second DC system in the modular control building.
- Decommission and remove all Ergon Energy owned equipment in the existing Powerlink owned control building.
- Perform the following remote end work:
    - Replace two protection relays with the current standard line differential protection scheme for the 66kV Gladstone South feeder and communications equipment at CALL.
    - Replace one protection relay for the 66kV Gladstone South feeder and communications equipment at GLFS.
    - Upgrade fibreoptic cable configurations at Gladstone Depot Communications Site (GLDECS).
    - Replace communications equipment at Clinton Industrial substation (CLIN).

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

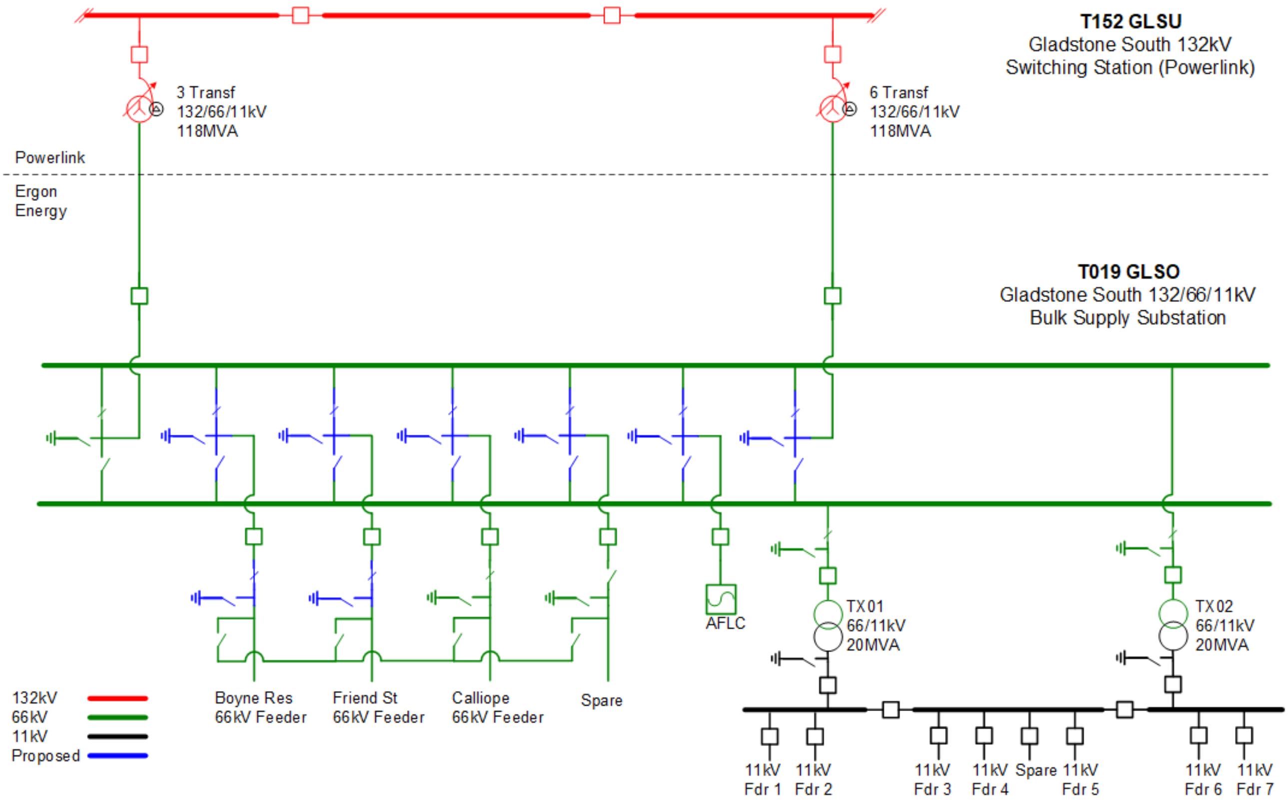



**Figure 11: Option 1 proposed network arrangement (schematic view)**

## 4.2. Assessment of Non-Network Solutions

Ergon Energy'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.

### 4.2.1. Demand Management (Demand Reduction)

The DEM team has completed a review of the GLSO 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 GLSO. 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, commercial and industrial customer loads appear to drive the daily peak demand which generally occurs between 6:00pm and 10:00pm.

There are 9595 customers on tariff T31 and T33 hot water load control (LC). An estimated demand reduction value of 5,757kVA[1] is available.

GLSO LC signals are controlled from the AFLC transmitter connected to the 66kV bus at GLSO. The Tariff 33 and 31 hot water LC channels are dynamic (that is, it responds to exceedance settings not on a timetable) and the current control strategy only calls LC when the load at GLSO exceeds 35MW. Tariff 33 air-conditioning channels are under manual control of the operational control centre and are used as required. This existing strategy works to reduce peak demand at GLSO, however network load control does not sufficiently address the identified need.

### 4.2.2. 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)

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.

[1] Hot water diversified demand saving estimated at 0.6kVA per system

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 8,279 customers have solar photo voltaic (PV) systems for a connected inverter capacity of 43,967kVA.

The residential, commercial and industrial customer loads appear to drive the daily peak demand which generally occurs between 6:00pm and 10:00pm. 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 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.

### 4.2.3. Non-Network Solution Summary

Ergon Energy 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 GLSO supply area to address the identified need.

## 4.3. Preferred Network Option

Ergon Energy’s preferred internal network option is Option 1, replacing the individual assets identified as having reached end of life and addressing the secondary systems limitations.

Upon completion of these works, the asset safety and reliability risks at GLSO 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 inclusive of interest, risk, contingencies and overheads is $6.73 million. Annual operating and maintenance costs are anticipated to be 1.5% of the capital cost. The estimated project delivery timeframe has design commencing in mid-2023 and construction completed by August 2025.

# 5. 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, Ergon Energy has analysed the classes of market benefits required to be considered by the RIT-D.

## 5.1. 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

### 5.1.1. 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. Ergon Energy 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 counter-factual, results in a positive contribution to the market benefits of the credible option being assessed.

Involuntary load shedding benefits of a credible option are derived from the quantity in MWh of involuntary load shedding required assuming that 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.

Ergon Energy has applied a VCR estimate of $36.04/kWh, which has been derived from the AER 2022 Value of Customer Reliability (VCR) values. In particular, Ergon Energy 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 exports (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 AER CECV methodology based on the capacity of DER currently installed and forecast to be installed within the GLSO supply area.

## 5.2. 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

- Option value
- Other Class of Market Benefit

### 5.2.1. 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 within the GLSO area. Therefore, market benefits associated with changes in voluntary load curtailment have not been considered.

### 5.2.2. Changes in Costs to Other Parties

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

### 5.2.3. Differences in Timing of Expenditure

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

### 5.2.4. 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 GLSO area.

### 5.2.5. Changes in Network Losses

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

### 5.2.6. 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].

Ergon Energy 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.

[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

### 5.2.7. Other Class of Market Benefit

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

# 6. DETAILED ECONOMIC ASSESSMENT

## 6.1. Methodology

The Regulatory Investment Test for Distribution requires Ergon Energy 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.

## 6.2. 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. 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.

## 6.3. Net Present Value (NPV) Results

An overview of the initial capital cost and NPV results are provided in Table 2. The only credible option assessed, Option 1, shows a large positive NPV and is considered to provide the optimum solution to address the identified need and is therefore the recommended development option.

**Table 2: Base case NPV ranking table**

| Option | Option Name | Rank | Initial Capital Cost ($000s real) | Net Economic Benefit ($000s real) | PV of Capex ($000s real) | PV of Opex ($000s real) |
|---|---|---|---|---|---|---|
| 1 | Replace individual assets and address secondary systems limitations | 1 | $5,065 | $152,274 | -$5,065 | -$2,291 |

# 7. CONCLUSION

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

Ergon Energy 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.

## 7.1. Preferred Option

Ergon Energy's preferred internal network option is Option 1, replacing the individual assets identified as having reached end of life and addressing the secondary systems limitations.

Upon completion of these works, the asset safety and reliability risks at GLSO 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 inclusive of interest, risk, contingencies and overheads is $6.73 million. Annual operating and maintenance costs are anticipated to be 1.5% of the capital cost. The estimated project delivery timeframe has design commencing in mid-2023 and construction completed by August 2025.

## 7.2. Satisfaction of RIT-D

The proposed preferred option satisfies the RIT-D.

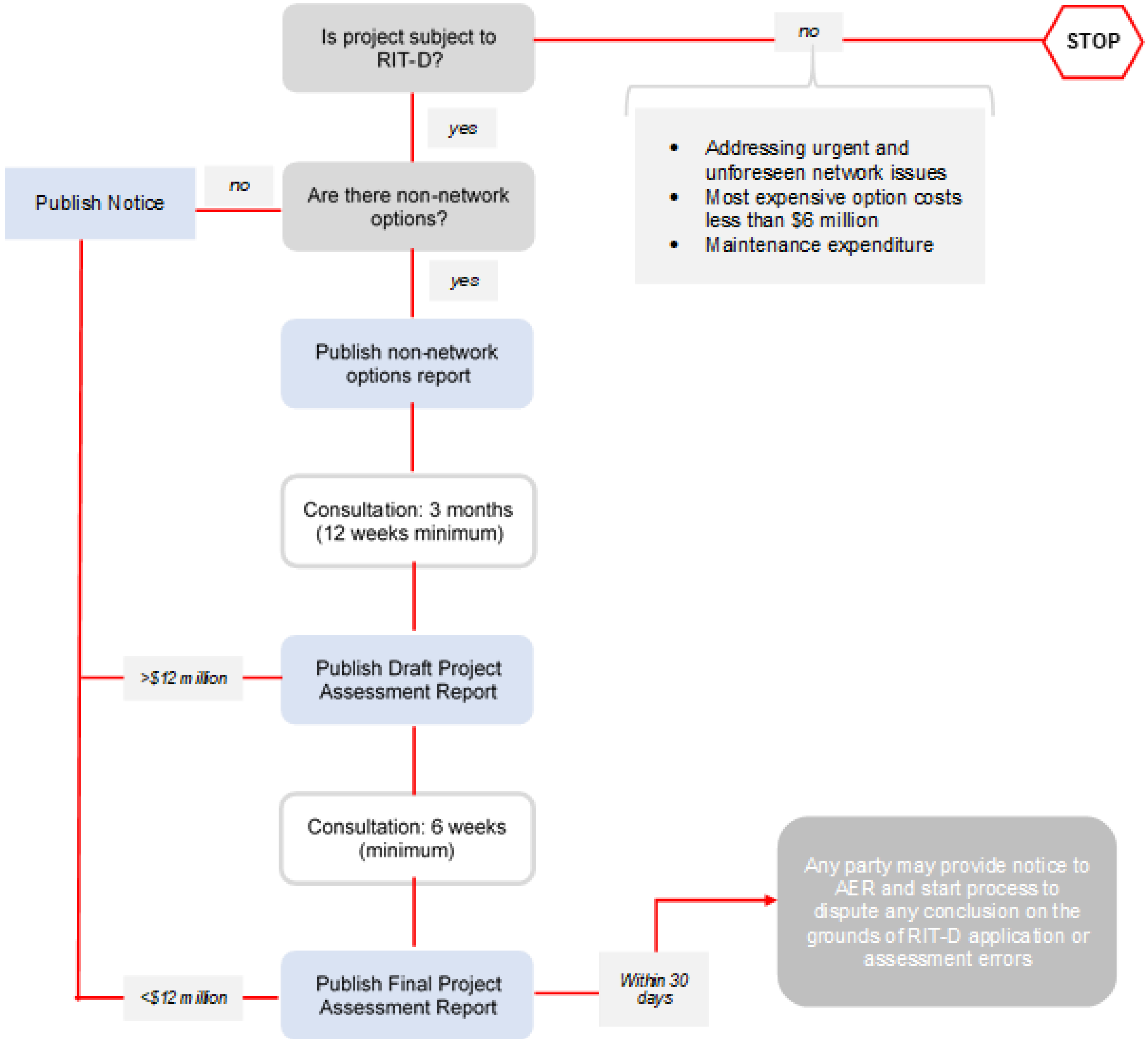
This statement is made on the basis of the detailed analysis set out in this report. The proposed preferred option is the credible option that has the highest net economic benefit under the most likely reasonable scenarios.

# 8. 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; | N/A |
| (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 | 5 |
| (6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure | 6 |
| (7) a detailed description of the methodologies used in quantifying each class of costs or market benefit | 5 |
| (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 | 5.2 |
| (9) the results of a NPV analysis of each credible option and accompanying explanatory statements regarding the results | 6.3 |
| (10) the identification of the proposed preferred option | 7.1 |
| (11) for the proposed preferred option, the RIT-D proponent must provide:<br>(i) details of the technical characteristics;<br>(ii) the estimated construction timetable and commissioning date (where relevant);<br>(ii) the indicative capital and operating costs (where relevant);<br>(iv) a statement and accompanying analysis that the proposed preferred option satisfied the RIT-D; and<br>(v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent | 7.1 & 7.2 |
| (12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the final report may be directed. | 1.3 |

# APPENDIX A – THE RIT-D PROCESS




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