# Ensuring Reliable Supply for the Adelaide CBD – Hindley Street

Draft Project Assessment Report (DPAR)

15 May 2026

**SA Power Networks**

www.sapowernetworks.com.au

## Disclaimer

This Draft Project Assessment Report (DPAR) has been prepared in accordance with and is limited to the requirements of Clause 5.17.4 of the National Electricity Rules for the purpose of publicly announcing the provisional outcome of SA Power Networks evaluation of options in response to a specific set of identified needs. The DPAR is a summary or general description only of the matters considered by SA Power Networks when evaluating the various options. It is not intended to be used for other purposes, such as making decisions to invest in generation, transmission or distribution capacity. This document has been prepared using information provided by, and reports prepared by, a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts that, by their nature, may or may not prove to be correct. SA Power Networks recommends and advises that anyone proposing to use this information should verify its reliability, accuracy and completeness before committing to any course of action or expenditure. SA Power Networks accepts no responsibility or liability of any nature whatsoever for any loss or damage that may be incurred by any person acting in reliance on the information or assumptions contained in this document. Any use of or reliance upon the information or assumptions contained in this report is at the sole risk of the user. SA Power Networks makes no warranties or representations whatsoever as to the reliability, accuracy and completeness of any information contained in this document. SA Power Networks specifically disclaims any liability or responsibility for any errors or omissions in any of the information contained in this document.

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# Contents

# 1 Introduction

Hindley Street substation is one of four critical zone substations supplying the Adelaide Central Business District (CBD) and is part of the meshed 66kV metropolitan east network. It is supplied via two 66kV cables, one from Whitmore Square and one from North Adelaide / Croydon.

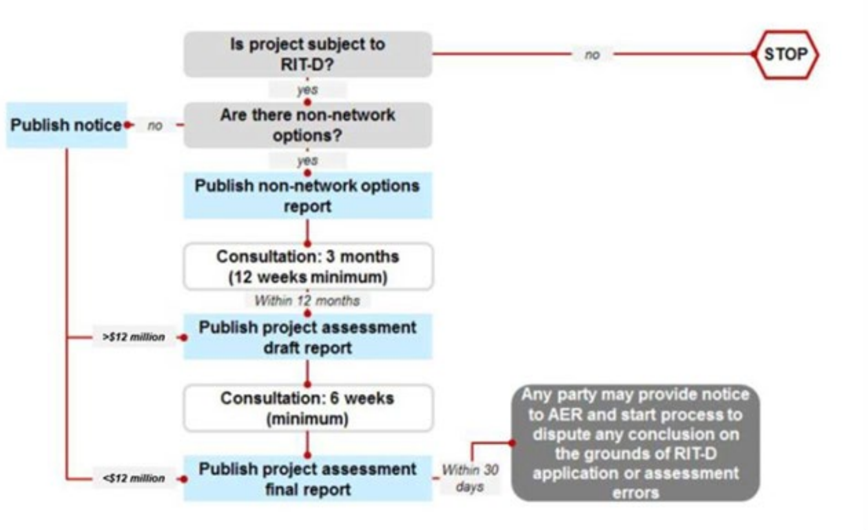
The existing outdoor 66kV yard at Hindley Street is extremely congested, with overhead pipework structures, strung bus and three aged bulk oil Circuit Breakers (CBs) manufactured in 1954. These are the only three of this type of CB remaining in the network.

The age and condition of the existing switchgear poses a significant reliability and safety risk to both SA Power Networks' (SAPN) personnel and the public, with thousands of pedestrians passing every day within a few metres of deteriorated CB bushings and cable terminations. Catastrophic equipment failure, or failure with an explosion or fire, is likely to result in an extended substation outage with approximately 43MW of CBD load at risk. Only 21MW of the 11kV load can be tied away to other CBD feeders. Catastrophic failure is also a significant safety risk from an oil fire and porcelain debris.

SA Power Networks has therefore commenced this Regulatory Investment Test for Distribution (RIT-D) to determine the most efficient means of ensuring reliable supply for Adelaide's CBD in and around Hindley Street. Further, SA Power Networks expects there to be significant market benefits, principally in the form of avoided involuntary load shedding, and considers the identified need for this RIT-D to be delivering market benefits. In addition to market benefits, SA Power Networks expects there will be significant safety and environmental benefits from removing the aged, oil filled equipment.

SA Power Networks has prepared this Draft Project Assessment Report (DPAR) in accordance with the requirements of clause 5.17.4 of the National Electricity Rules (NER). It is the second stage of the formal consultation process set out in the NER in relation to applying the RIT-D – figure 1.1 below. This DPAR follows the publication by SA Power Networks of the options screening notice. SA Power Networks has concluded that there will not be a non-network option, or stand-alone power system (SAPS) option, that could form a potential credible option on a standalone basis, or that could form a significant part of a potential credible option for this RIT-D.

**Figure 1.1: Overview of the RIT-D process**




The purpose of this DPAR is to:

- describe the identified need SA Power Networks is seeking to address, together with the assumptions used in identifying it;

- provide a description of each credible option assessed;
- quantify relevant costs and market benefits for each credible option;
- describe the methodologies used in quantifying each class of cost and market benefit;
- explain why SA Power Networks has determined that classes of market benefits or costs do not apply to the credible options;
- present the results of a net present value analysis of each credible option, including an explanation of the results; and
- identify the proposed preferred option.

The next step of this RIT-D involves publication of a Final Project Assessment Report (FPAR). The FPAR will update the assessment considering any submissions received on this DPAR. SA Power Networks intends to publish the FPAR as soon as practicable after submissions are received on this DPAR.

If you have any comments or enquiries regarding this notice, please send to the following email: requestforproposals@sapowernetworks.com.au.

# 2 Description of the identified need

This section describes the identified need for this RIT-D and sets out the key assumptions and methodologies that underpin this need. SA Power Networks has used these assumptions in making the determination that there will not be a potential credible non-network option or SAPS option on a standalone basis, or that forms a significant part of a potential credible option, capable of meeting this need, in accordance with clause 5.17.4(c) of the NER.

## 2.1 Our performance to date

Hindley Street 66/33/11kV Substation is one of four major zone substations supplying the Adelaide CBD 33kV and 11kV networks and is part of the meshed 66kV metropolitan east network. It is supplied via two 66kV cables, one from Whitmore Square and one from North Adelaide / Croydon. A 66kV cable from Hindley Street supplies the new Royal Adelaide Hospital.

Hindley Street substation consists of three 66/11kV transformers and one 66/33kV transformer. Refer to Figure 1 below for a simplified Single Lind Diagram (SLD). The 66/11 transformers supply an 11kV CBD forecast load of 43.6MVA. Less than half of this load can be offloaded to adjacent substations, leaving 22.7MVA at risk in the event of an entire substation outage. The 66/33kV transformer supplies a meshed 33kV network, with supply also from two transformers at East Terrace substation. The entire 33kV load can be supplied from East Terrace provided both East Terrace transformers remain in service.

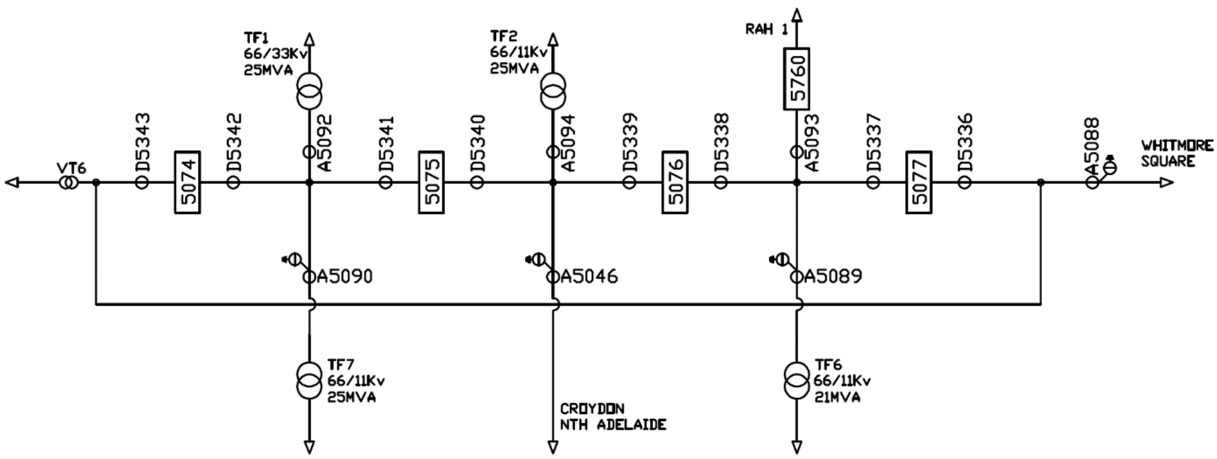



**Figure 1: Simplified SLD of Hindley Street Substation**

The outdoor 66kV switchyard comprises overhead flexible conductors, manually operated disconnectors with ground level operating levers and five 66kV circuit breakers. Three of the circuit breakers are a bulk oil type, in poor condition and have been in service for 70 years. Refer to Figure 2 (left).

The Substation is located close to the center of the Adelaide CBD in Hindley Street, with high pedestrian traffic directly outside the substation wall. Much of the outdoor switchyard is built above the wall height including bushings and cable terminations, posing a significant safety risk in the event of failure. Refer to Figure 2 (right).

**Figure 2: Bulk oil CBs below disconnectors (Left), and close proximity to CBD Street (Right)**

There are currently 15 recorded defects associated with 66kV disconnectors and 5 recorded defects associated with the 66kV bulk oil CBs. Defects include hot joints, cracked insulators, contacts not fully closed and CB oil leaks. The configuration of overhead buswork, congested layout and severely deteriorated disconnectors significantly limits the ability to isolate individual plant items. This results in deferral of maintenance and repairs and a further increase to safety and reliability risk. Accumulation of defects across multiple plant items is causing increasing risk to reliability and safety.

Failure of a single HV asset could rapidly escalate into catastrophic failure of the entire outdoor switchyard with a lengthy outage of the substation and significant CBD load loss. This is also a significant safety risk to both SAPN personnel and the public, being in a busy CBD street.

## 2.2 Drivers for change

The three 66kV bulk oil CBs are in poor condition after 70 years of service and increasingly likely to fail in the next 5 years. Typical service life for a CB in SAPN is around 55 years, refer to Figure 3 below. They already have the highest probability of failure of any High Voltage CB in the network, with a Health Index of 8.3[1].

[1] The Health Index for Circuit Breakers are listed within SAPN Circuit Breaker Asset Plan.

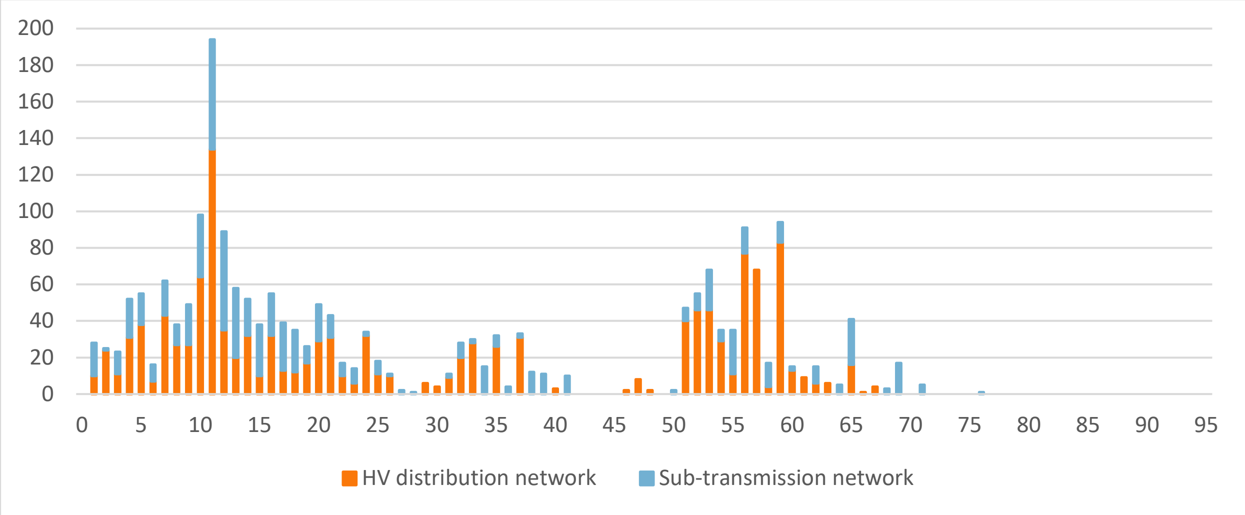



**Figure 3: SAPN CB Age Profile**

The overhead disconnectors are also in very poor condition, with some unable to be switched live. In most cases there is no direct repair or replacement option. Significantly more defects are forecast in the next 5 years, forcing interruptions to supply to access plant for critical defect repair and maintenance. Consequently, defect repair and maintenance are deferred, further increasing the risk of asset failure.

Future augmentation drivers also exist for the Hindley Street outdoor switchyard. These are unquantified owing to the uncertainty of their timing and include:

- enabling a future 66kV connection to a new CBD substation (nominally Eliza Street);
- enabling a future 66kV connection to the East Terrace substation; and
- meeting future 11kV or 33kV demand with additional transformers.

## 2.3 Industry practice

Replacing poor condition high risk CBs is common practice for Network Service Providers (NSPs). Typical service life in the NEM is significantly less than the 70 years of service the Hindley Street CBs have seen. Furthermore, most NSPs have either phased out or are near phasing out their populations of bulk oil circuit breakers; the same type as found at Hindley Street substation.

## 2.4 Safety Impact

Thousands of pedestrians pass by the Hindley Street Substation walls every day within a few metres of deteriorated CB bushings and cable terminations, many of which are above wall height. Catastrophic failure of any of these assets is a significant safety risk to the public from an oil fire and porcelain debris. Furthermore, much of the overhead outdoor switchyard has deteriorated to the point of being unsafe to operate live by SAPN personnel. Operational restrictions provide a means to manage this safety risk but have significant operational impact and do not fully remove the safety risk.

SA Power Networks acknowledges the safety impacts, when quantified with low likelihood, are small compared to reliability risk, though minimising safety risk is a top business priority.

## 2.5 Environmental Impact

All the Hindley Street 66kV bulk oil CBs are currently leaking oil. While the leak rates are slow enough to be manageable with oil top-ups, they're not practical to repair, while the leak rates are likely to increase as the CBs deteriorate further. Retrofit of oil containment is not practical, leaving the leaked oil to enter the soil, albeit in relatively low quantities.

SA Power Networks acknowledges that environmental impacts are not an assessment factor in the RIT-D process, though company policy is to minimise oil leakage.

## 2.6 Failure scenarios for the calculation of unserved energy

If investment is not undertaken, there will be significant unserved energy (USE) risk in SAPN's network because the asset condition will continue to deteriorate increasing the likelihood of CB failure. However, the extent of load at risk depends on the nature of the failure. SAPN has therefore considered two significant failure scenarios.

**Scenario 1 – Non catastrophic failure of a single Hindley St 66kV Circuit Breaker**

A single CB (e.g., CB5076, refer to the SLD of Figure 1) fails in a non-catastrophic manner (i.e., without explosion or fire) that renders it unable to be returned to service. E.g., internal failure with the fault cleared via fast protection. In this example, the two adjacent CBs, CB5075 and CB5077, would operate to clear the fault.

*Consequences*

Immediate loss of 66kV lines to Croydon and RAH1, 66/11kV transformers 2 and 6. Transformer 7 will be the only 66/11kV transformer remaining in service, resulting in immediate loss of 9.91MW of 11kV CBD load.

The initial loss of 11kV load can be restored by staged switching to adjacent substations within 24 hours, leaving Transformer 7 operating at its emergency rating of 33.7MVA. If Transformer 2 or 6 cannot be restored, additional load would need to be transferred to adjacent substations to reduce the load on Transformer 7 to its normal rating.

Restoration of Transformer 2, 6, and the 66kV lines relies on successful isolation of CB5076 via disconnectors. Due to defects and the difficulty in accessing these disconnectors for repairs and maintenance, it may not be possible to operate these disconnectors. In this case, a larger forced interruption would be required to disconnect the CB by unbolting the connections.

**Scenario 2 - Catastrophic failure of a single Hindley St 66kV Circuit Breaker**

Explosive failure of one CB resulting in collateral damage to adjacent equipment, rendering the 66kV yard inoperable.

*Consequences*

Immediate loss of the entire Hindley Street substation; 43.61MW of 11kV CBD load.

The maximum load able to be transferred to adjacent substations is 20.85MW. This will be achieved by staged switching within 24 hours, leaving 22.76MW of unserved energy on the 11kV CBD network. Existing contingency plans will be enacted to establish a temporary overhead 66kV line to Transformer 2 via installation of poles along Hindley Street. Most pole footings for this contingency have already been installed. Estimated construction time to enact this contingency is 2 weeks. Once Transformer 2 is restored there will be no unserved energy at risk.

The two scenarios have been assessed in accordance with SAPN's Risk Assessment Framework and are presented in Table 1 below.

**Table 1: CB failure risk assessment**

| ID | Risk Scenario | Consequence Description | Consequence Category | Consequence | Likelihood | Risk Level |
|---|---|---|---|---|---|---|
| 1 | CB Failure (non catastrophic) | Multiple CBD feeders outage | Network | 3 (Moderate) | 4 (likely) | High |
| 2 | Catastrophic CB Failure resulting in damage to most of the 66kV yard | Entire substation outage, CBD feeder outages >24 hours | Network | 4 (Major) | 2 (unlikely) | Medium |
| | | Multiple injuries to staff or public | Safety | 4 (Major) | 2 (unlikely) | Medium |

## 2.7 Calculation of the unserved energy if action is not taken

The cost of unserved energy has been calculated using the following parameters:

**Common parameters**

- VCR = $55.69/kWh (using the AER's VCR method published December 2025, accounting for location and type of load supplied by the Hindley Street Substation)
- Mean probability of failure = 2038 (i.e. CBs 84 years old at mean time of failure)

**Scenario 1 parameters**

- Weighting of scenario 1 = 95%
- Full restoration of load within 24 hours via staged switching to adjacent substations
- Disconnectors able to be operated to allow isolation of the defective CB (required for restoration of 66kV lines and 66/11kV transformers.

**Scenario 2 parameters**

- Weighting of scenario 2 = 5%
- Restoration of 20.85MW load within 24 hours via staged switching to adjacent substations
- Temporary 66kV line installed in 2 weeks
- No damage to Transformer 2
- No damage to indoor equipment including the protection panels and 11kV switchboard.

**Unserved energy for access, maintenance, and defect repair**

Due to the deteriorating condition of the 66kV disconnectors, it's highly likely they will be unable to be safely operated while energised. This has become a recent increasing trend prompting an increase in Repex for Substation Disconnectors. However, in the case of 66kV disconnectors at Hindley Street substation, there is no direct replacement owing to the bus design and lack of space. There are 15 disconnectors in the 66kV bus with a total of 15 current defect notifications assigned. Typical defects are hot joints, contacts not fully closed and cracked insulators. Consequently, an increasing number of the 66kV disconnectors require de-energisation prior to operating which interrupts supply due to a lack of capacity to transfer load to adjacent substations.

Routine CB maintenance is scheduled every 6 years, with 5 CBs on site. Assuming the maintenance and defect repair of all CBs can be bundled to minimise disruption, this would result in four 8-hour outages every 6 years for maintenance purposes. That is, one outage to isolate and earth a work area for maintenance, and another to restore every 3 years. The cost of unserved energy for these outages is averaged across the period.

The Hindley Street substation load duration curve is presented in Figure 4 below. In estimating the load at risk, SA Power Networks has used the average load from 2018/19 because more recent data does not accurately represent future loads due to the effects of COVID-19 and mild summers. 50% of the time the load is found to be at 37.7% or more of the peak load. This is used in the calculation of unserved energy for access, maintenance and defect repair.

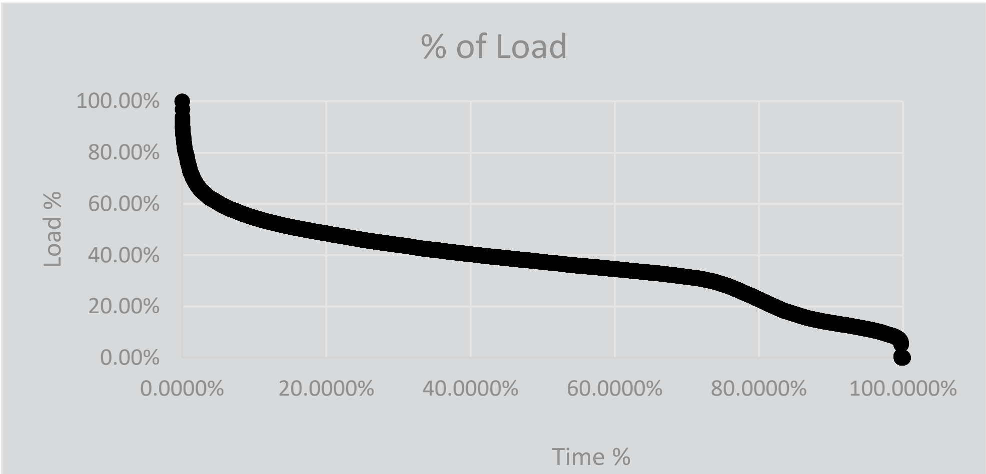



**Figure 4 – Hindley Street Substation load duration curve (2018/2019 data)**

**<u>Summary of Unserved Energy</u>**

A summary of the calculated unserved energy is presented in Table 2 below.

**Table 2: Summary of unserved energy**

| ID | Unserved Energy |
|---|---|
| Scenario 1 | 9.91MW x 24 hours |
| Scenario 2 | 43.61MW x 24 hours<br>22.76MW x 168 hours |
| Access for maintenance and defect repair | 22.76MW x 16 hours x 1/6 years |

## 2.8 Responding to Customer Feedback

The Hindley Street substation 66kV switchyard is in very poor condition, a high failure risk and in need of replacement. The reliability risk is very significant, with up to 21MW of load unable to be supplied from an alternative substation. The safety risk is also very high to both our personnel and the public, being located close to the center of the Adelaide CBD with high pedestrian traffic.

In considering potential responses to this driver, we engaged with our customers on their desired service level outcomes balanced against price outcomes.[2] We also considered our applicable regulatory obligations / requirements. As a result of these considerations, the identified need is described as follows:

a. to respond to customers' concerns,[3] identified through our consumer and stakeholder engagement process, regarding their explicit service level recommendations that we:
   - maintain reliability service performance by geographic region;
   - invest sufficiently to maintain and improve CBD reliability to comply with ESCoSA's jurisdictional network reliability service standard target in 2025-30; and
   - maintain safety service performance in aggregate – driven by a desire to not see deterioration in the safety risk posed by the network;

c. to maintain the reliability service performance of our network; and

d. to maintain the safety performance of our distribution network in relation to the risks of harm to workers, and the community.

[2] This was undertaken in an aggregate way across all of our potential network asset replacement activity, with the specific circumstances of the Hindley Street Substation not covered directly.

[3] This is pursuant to Clause 6.5.7(c)(5A) of the NER, which requires regard to be had to the extent to which forecast capex seeks to address the concerns of distribution service end users identified by the distributor's engagement process.

# 3 Proposed network options to meet the identified need

## 3.1 The options considered

Two options were considered in addition to the base case of recurrent expenditure. Capex is $2026 exclusive of overheads.

**Table 3: Summary of options considered**

| Option | Description |
|---|---|
| **The base case – Business as Usual** | Continue business as usual. Maintain equipment in accordance with established routines. Accept increasing risk of failure and the corresponding consequences of possible long-term loss of supply to a major portion of the CBD and potential serious injury or loss of life.<br><br>Capital Cost: $0 (maintenance and refurbishment costs captured as BAU) |
| **Alternative options** | |
| **Option 1 – New 66kV GIS Switchboard** | Replace all existing outdoor 66kV switchgear and bus arrangement with a modern indoor GIS switchboard. This option will eliminate all the identified reliability and safety risks and provide a foundation for future augmentation, including increased meshing of the 66kV network via connections to East Terrace and the future City Central Eliza Street substation.<br><br>Capital Cost: $33.4M |
| **Option 2 – Discrete CB and Termination Replacement** | This option includes replacement of the three aged CBs and a set of 66kV cable terminations, reducing the reliability and safety risk of a catastrophic failure. It does not remove the operational, safety and failure risks associated with the existing overhead bus and disconnectors, which are not practical to replace with a modern equivalent due to space limitations.<br><br>Capital Cost: $5.4M |

# 4 Assessment of non-network solutions and SAPS

SA Power Networks has determined that there is unlikely to be a non-network option or SAPS option that could form a potential credible option on a standalone basis, or that could form a significant part of a potential credible option for this RIT-D.

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

## 4.1 Requirements that a non-network option or SAPS would need to satisfy

A viable non-network option or SAPS that maintains supply to the CBD must be capable of reducing the estimated shortfall in the supply capability of the network in the event of a failure of the Hindley Street 66kV switchyard. It should also be capable of providing the entire peak demand of the area to provide security of supply to the network as it operates in contingent conditions.

As discussed in section 3.5, there are number of failure scenarios that will affect the size of load reduction or additional supply required from a non-network option or SAPS option. SA Power Networks considers that any non-network option or SAPS option must be capable of alleviating the shortfall in supply in the worst-case scenario, i.e. Catastrophic CB Failure resulting in damage to most of the 66kV yard (Scenario 2). Non-network options or SAPS options must therefore be able to address this failure scenario to be able to address the identified need. Being able to address the complete loss of the Hindley Street 66kV switchyard would also ensure that any non-network or SAPS option could manage the other failure scenarios.

This section therefore focuses on the requirements that a non-network option or SAPS would need to satisfy in the event of a complete loss of the Hindley Street 66kV switchyard.

#### 4.1.1 Requirements to address complete loss of the Hindley Street 66kV switchyard

Under Scenario 2, there will be an immediate loss of 43.61 MW of 11 kV CBD load and 22.76MW of unserved energy after staged switching over 24 hours. Any non-network or SAPS solution would need to be located within or geographically very close to the Hindley Street substation to have access to the 11kV cable network. This area of the CBD is highly congested and surrounded by universities, public buildings and high residential traffic sensitive to noise and other pollution.

#### 4.1.2 Consideration of SAPS options

Recent changes to the NER, RIT-D and RIT-D application guidelines require SA Power Networks to consider whether a SAPS option can fully or partly address an identified need. In practice, this relates to consideration of whether an identified need could be fully or partly addressed by converting part of SA Power Networks' distribution network forming part of the interconnected national electricity system to a regulated SAPS.[4] Regulated SAPS are set out in section 6B of the National Electricity Law (NEL), which defines a SAPS as a system that:[5]

- generates and distributes electricity; and
- does not form part of the interconnected national electricity system.

SA Power Networks considers that there is not a 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 this RIT-D. In particular, the load requirements of the Adelaide CBD interconnected network are significant in a very small area where land is premium. This load could not be supported by a network that is not part of the interconnected national electricity system with the ability to draw on grid-connection generation services.

# 5 How the options have been assessed

This section outlines the methodology that SA Power Networks has applied in assessing market benefits and costs associated with the credible options considered in this RIT-D.

## 5.1 Overview of the assessment framework

All costs and benefits for each credible option have been measured against a 'business as usual' base case. Under this base case, SA Power Networks will escalate regular and corrective maintenance activates as the probability of failure and outages increases over time in the absence of an asset replacement program.

The RIT-D analysis has been undertaken over a 20-year period, from 2026 to 2045. SA Power Networks considers that a 20-year period considers the size, complexity and expected life of the relevant credible option to provide a reasonable indication of the market benefits and costs of the option. While the capital components of the credible option have asset lives greater than 20 years, SA Power Networks has taken a terminal value approach to incorporate capital costs in the assessment, which ensures that the capital cost of long-lived options is appropriately captured in the 20-year assessment period.

[4] See definition of 'SAPS option' in the NER.
[5] Section 6B(6) of the NEL.

The Pre-tax real WACC has been used as the central discount rate, currently 3.91%. The high benefit discount rate has been set at 2.61%, and low benefit discount rate is 5.86%

## 5.2 Approach to estimating project costs

SA Power Networks has estimated capital costs through formal estimations conducted by estimation experts within the business. Where possible, SA Power Networks has also estimated capital costs using supplier quotations or other pricing information.

Operating and maintenance costs have been determined for each option by comparing these costs with the option in place to the costs without the option in place. These costs are included for each year in the analysis period. If operating and maintenance costs are reduced with an option in place, the cost savings are treated as a benefit in the assessment from the commissioning date.

Operating costs have been estimated for the credible option and the base case by considering:

- the probability and expected level of asset faults, which translates to the level of corrective maintenance costs; and
- the level of regular maintenance required to maintain network assets in good working order.

All options reduce the incidence of asset failures relative to the base case, and hence the expected operating and maintenance costs associated with restoring supply.

## 5.3 Benefits expected from avoided involuntary load shedding

SA Power Networks considers the relevant categories of market benefits prescribed under the NER for this RIT-D relate to changes in involuntary load shedding. Other market benefits are considered immaterial to this RIT-D in comparison to involuntary load shedding.

The approach SA Power Networks has made to estimating reductions in involuntary load shedding are outlined in Section 5.3.1

### 5.3.1 Avoided involuntary load shedding

Involuntary load shedding occurs when a customer's load is interrupted from the network without warning or their agreement. This can occur due to unavailability of network elements and the resulting reduction in network capacity to supply the load.

The Unserved Energy (USE) is the probability weighted average amount of load that customers request to utilise but would need to be involuntarily curtailed due to loss of network connectivity or a network capacity limitation. SA Power Networks has forecast load over the assessment period and has quantified the USE 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 market benefits of the credible option being assessed.

The market benefit that results from reducing the involuntary load shedding with a network solution is estimated by multiplying the quantity of USE in MWh by the Value of Customer Reliability (VCR). The VCR is measured in dollars per MWh and is used as proxy to evaluate the economic impact of USE on customers under the RIT-D.

SA Power Networks has applied a central VCR estimate of $55,690/MWh, which is the value calculated for Climate Zone 5 CBD & Suburban SA by the AER in its 2025 VCR Annual Adjustment

Summary. Values of ± 30% of the base case VCR are used for testing how sensitive investment decisions are to the VCR input. A lower VCR of $38,983/MWh and a higher VCR of $72,397/MWh have been chosen for the low and high benefit scenarios, as a result.

## 5.4 Scenarios to address uncertainty

RIT-D assessments are required to be based on cost-benefit analysis that includes an assessment of 'reasonable scenarios', which are designed to test alternate sets of key assumptions and whether they affect identification of the preferred option.

SA Power Networks has elected to assess three alternative future scenarios – namely:

- Central Benefits Scenario – the central scenario consists of assumptions that reflect SA Power Networks' central set of variable estimates which, in SA Power Networks' opinion, provides the most likely scenario;
- Low Benefits Scenario – SA Power Networks has adopted a number of assumptions that give rise to a lower bound estimate for each credible option, in order to represent a conservative future state of the world with respect to potential market benefits that could be realised under the credible option; and
- High Benefits Scenario – this scenario reflects an optimistic set of assumptions, which have been selected to investigate an upper bound on reasonably expected market benefits.

A summary of the key variables in each scenario is provided in Table 5.1.

**Table 5.1: Summary of three scenarios investigated; Central, Low and High Benefits**

| Variable | Central Scenario | Low Scenario | High Scenario |
|---|---|---|---|
| Discount Rate | 3.91% | 5.86% | 2.61% |
| VCR | $55,690/MWh | $38,983/MWh | $72,397/MWh |
| Capital Costs | 100% of capital cost estimate | 125% of capital cost estimate | 75% of capital cost estimate |
| Unplanned Corrective Maintenance | 100% of unplanned corrective maintenance estimate | 75% of unplanned corrective maintenance estimate | 125% of unplanned corrective maintenance estimate |
| Avoided Involuntary Load Shedding | 100% of avoided involuntary load shedding estimate | 75% of avoided involuntary load shedding estimate | 125% of avoided involuntary load shedding estimate |

SA Power Networks considers that the Central Scenario is the most likely, since it is based on a set of central assumptions. SA Power Networks has therefore assigned this scenario a weighting of 50 per cent, with the other two scenarios being weighted equally with 25 per cent each. SA Power Networks notes, however, that the identification of the preferred option is the same across all three scenarios, i.e., the result is insensitive to the different scenario weights.

# 6 Assessment of the credible options

This section provides a description of the credible network options SA Power Networks has identified as part of its network planning activities to date. The option is compared against a base case option.

## 6.1 Gross market benefits estimated for the credible options

Table 6.1 below summarises the gross benefit of the credible options relative to the base case in present value terms. The gross market benefit for each option has been calculated for each of the three scenarios outlined in Section 5.

**Table 6.2: Present value of Benefits of credible options relative to the base case, $m 2026**

| Variable | Central Scenario | Low Scenario | High Scenario |
|---|---|---|---|
| Scenario Weighting | 50% | 25% | 25% |
| Option 1: New 66kV GIS Switchboard | 59 | 5 | 488 |
| Option 2: Piecemeal CB & termination replacement | -478 | -244 | -443 |

### 6.1.1 Unquantified benefits

SA Power Networks has also identified the following unquantified benefits which have not been included within the present value summary of benefits in Table 6.1 – namely:
Option 1 – New 66kV GIS switchboard

- Eliminate safety risk due to catastrophic CB failure
- Avoid unplanned interruption due to failure of outdoor 66kV buswork & disconnectors
- Provide operational support to access, maintain & upgrade the 66kV network
- Provide for future connections to East Tce & Eliza St substations
- Provide for future additional 66/33kV transformers
- Facilitate future replacement of the 11kV & 33kV switchboards

Option 1 – Piecemeal CB and termination replacement

- Eliminate safety risk due to catastrophic CB failure

## 6.2 Estimated costs for the credible options

Table 6.2 below summarises the costs of the credible options relative to the base case in present value terms. The cost of each option has been calculated for each of the three scenarios, in accordance with the approaches outlined in Section 5.

**Table 6.2: Present value of Costs of credible options relative to the base case, $m 2026**

| Variable | Central Scenario | Low Scenario | High Scenario |
|---|---|---|---|
| Scenario Weighting | 50% | 25% | 25% |
| Option 1: New 66kV GIS Switchboard | -21 | -29 | -14 |
| Option 2: Piecemeal CB & termination replacement | -4 | -6 | -3 |

## 6.3 Net present value assessment outcomes

Table 6.3 below summarises the net market benefit in Net Present Value (NPV) terms for the credible options under each scenario. The net market benefit is the gross market benefit (as set out in Table 6.1) minus the cost of the option (as set out in Table 6.2), all in present value terms. Overall, Option 1 exhibits the highest estimated net market benefit.

**Table 6.3: Present value of weighted net benefits relative to the base case, $m 2026**

| Option | Weighted PV of costs | Weighted PV of gross benefits | Weighted NPV | Ranking |
|---|---|---|---|---|
| Option 1: New 66kV GIS Switchboard | -21.8 | 152.7 | 130.9 | 1 |
| Option 2: Piecemeal CB & termination replacement | -4.3 | -411.2 | -415.5 | 2 |

## 6.4 Sensitivity analysis results

SA Power Networks has undertaken a sensitivity testing exercise with two steps to understand the robustness of the RIT-D assessment to underlying assumptions of key variables:

- Step 1 - testing the sensitivity of the optimal timing of the project to different assumptions in relation to key variables, and
- Step 2 - once the optimal timing year has been determined in step 1, testing the sensitivity of the NPV associated with the investment proceeding in that year.

That is, SA Power Networks has undertaken sensitivity analysis to first determine the optimal timing of the project, and to then confirm the NPV of Option 1 is insensitive to the range of other variables tested.

### 6.4.1 Step 1 - Sensitivity testing of the assumed optimal timing for the credible option

SA Power Networks has estimated the optimal timing for each option based on the commissioning year in which the NPV of each option is maximised. This process was undertaken for both the baseline set of assumptions and a range of alternative assumptions for key variables – namely:

- low and high discount rates
- probability for each scenario
- mean failure year
- full restoration time
- low and high VCR

It was found that for the baseline and each of the above alternative assumptions, the optimal commissioning year is in 2028.

### 6.4.2 Step 2 - Sensitivity of the net market benefit

SA Power Networks has also conducted sensitivity analysis on the NPV of the net market benefit, based on the assumed option timing established in step 1. The same key variables listed in step 1 have been used.

It was found that the NPV of the net market benefit is insensitive to all other variables once the optimal timing year has been determined.

# 7 Proposed preferred option

SA Power Networks proposes Option 1, to construct a new 66kV GIS switchboard, is the preferred option which satisfies the RIT-D. This option involves constructing a new 66kV indoor GIS on property adjacent to the Western boundary of Hindley St substation.

Construction of the new GIS building would commence in 2027 with completion in 2029.

SA Power Networks considers that detailed analysis within this DPAR identifies Option 1 as the preferred option and that this satisfies the RIT-D. SA Power Networks is the proponent for Option 1.