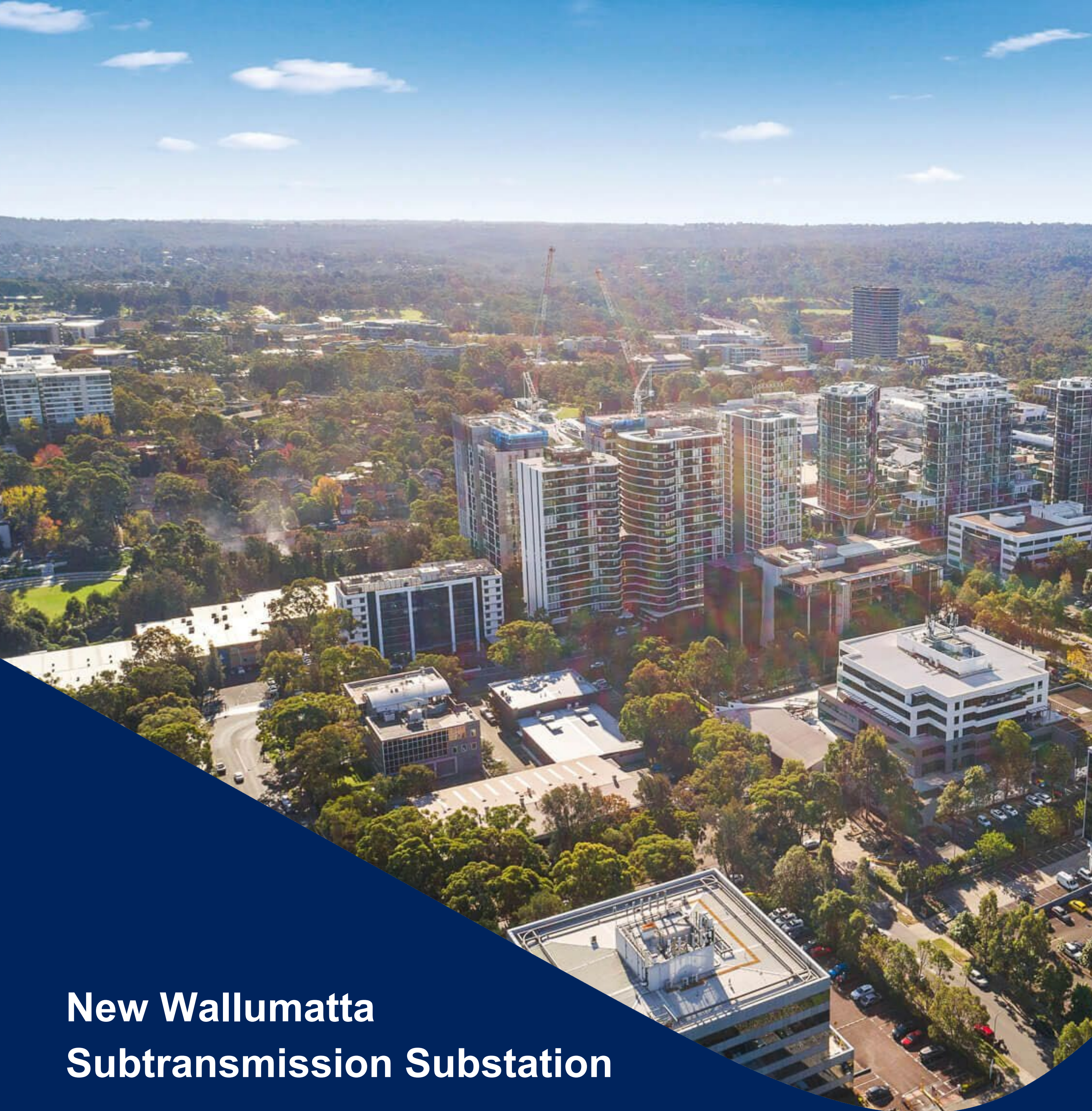

New Wallumatta Subtransmission Substation

Addressing increased demand requirements in the Macquarie Park area

REVISED **FINAL PROJECT ASSESSMENT REPORT**

26 September 2025

Ausgrid

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New Wallumatta Subtransmission Substation

Addressing increased customer demand requirements in the Macquarie Park area

Revised Final Project Assessment Report – 26 September 2025

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Executive Summary

This is a revised version of the Final Project Assessment Report published in October 2024 to address increased large customer demand requirements in the Macquarie Park area

Ausgrid has received a lot of interest from new major load customers to connect in the Macquarie Park area in recent years and has expanded the network to accommodate these loads, by commissioning a new Macquarie subtransmission substation (STS) in July 2021 and adding a third 120 MVA transformer unit, currently under construction.

Physical site restrictions mean that new loads cannot be accommodated at the existing STS. Further network investment would be required to accommodate any additional major loads in the area.

We have received a further five connection applications from major customers seeking to connect at Macquarie Park and have therefore undertaken a Regulatory Investment Test for Distribution (RIT-D) assessment to investigate options for facilitating these connections. Each of these applications have requested connection by 2028/29[1]. If action is not taken, Ausgrid will fail to meet requirements to connect customers under the National Electricity Rules (NER).

A Draft Project Assessment Report (DPAR) was published on 16 August 2024 and presented four credible options for addressing the identified need, assessed in accordance with the RIT-D framework and concluded that the preferred option was the construction of a second STS in Macquarie Park. We have labelled this second STS the 'Wallumatta STS', in recognition of the original name given to the area and acknowledging its indigenous history.

The DPAR was accompanied by a separate notice that provided an assessment of non-network or stand-alone power system solutions to assist in meeting the identified need, reporting that such solutions were not viable for this RIT-D. The DPAR called for submissions from parties by 27 September 2024. No submissions were received on either the DPAR or the separate screening notice. A Final Project Assessment Report (FPAR) for this RIT-D was published on 11 October 2024, re-presenting the assessment proposed in the DPAR. No disputes were raised on this FPAR.

Following publication of the FPAR, Ausgrid submitted a Contingent Project Application (CPA) to the Australian Energy Regulator (AER) on 07 February 2025 to enable the construction and commissioning of the proposed Wallumatta STS.

Feedback provided by the AER indicated that it considers that customer connection costs should be excluded when assessing whether an option is credible. The AER expressed concern that Ausgrid's consideration of customers' connection costs had prevented consideration of lower cost 132kV supply options as credible network options. Taking this guidance into account, Ausgrid has revised the FPAR to exclude behind-the-meter connection costs and revisit the options analysis.

This report presents an updated assessment of network credible options

We have assessed eleven options over the course of this RIT-D reflecting different supply arrangements, including differences in connection to the upstream network, substation configuration and physical location. This has been narrowed down to four credible options considered for Net Present Value (NPV) assessment.

The four credible options considered have been updated since the original FPAR. In particular, following discussions with the AER, we have now excluded consideration of customer connection costs and made adjustments to align the number of feeder bays and reduce the land footprint required for 132kV subtransmission switching substations (STSS). This has resulted in two of the 132kV options now being considered as credible options (i.e., Options 10 and 11).

In addition, recent market reports indicate that site 1 acquisition costs will be higher than the value considered in the original FPAR. Consequently, Options 4 and 6 (which were included in the original FPAR and used site 1) are no longer considered credible options.

The four credible options considered in this revised FPAR are summarised in Table E.1.

[1] One of these applications was received after publication of the original FPAR and is seeking initial temporary supply in 2026/27, with full supply in 2029/30.

Table E.1 – Credible network options assessed and capital cost ($2023/24m)

Option	Description	Network capital cost
5	New 132/33kV STS at site 2 tee connected to 132kV Feeders 92G & 92J	$162.3
7	New 132/33kV STS with expanded 132kV busbar at 'site 2' tee connected to Feeders 92G & 92J	$169.8
10	New 132kV STSS at 'site 2' tee connected to Feeders 92G & 92J	$147.3
11	New 132kV STSS at 'site 3' looped into 132kV Feeder 92B	$184.1

Throughout this FPAR, the locations of the sites have been redacted to not affect the procurement process and, instead, we only refer to 'site 1', 'site 2' and 'site 3'. These sites are nearby the proposed locations of customers.

For continuity with the initial business case submitted to the AER in late 2023, we have continued with the option numbering in the RIT-D, adding 'Option 5' through to 'Option 11', which were not included in the initial business case.

Options 1, 2, 3, 8 and 9 remain not credible, in line with the original FPAR assessment.

This revised FPAR concludes that Option 10 is the preferred option under the RIT-D

The analysis in this revised FPAR also takes into account updated information on demand forecasts, VCR values and discount rates. The revised analysis shows that Option 10 is the preferred option that satisfies the RIT-D due to its lower cost.

Table E.2 – Estimated net market benefits by scenario and weighted, $2023/24m

Option / scenario	Central demand	High demand	Low demand	Weighted	Rank
Scenario weighting	1/3	1/3	1/3		
Option 5	747	968	46	587.1	2
Option 7	743	964	42	583.0	4
Option 10	**755**	**976**	**54**	**594.8**	**1**
Option 11	743	964	42	583.1	3

Option 10 includes a new 132kV STSS at site 2, connected to feeders 92G and 92J. The scope of this option includes the acquisition of property at site 2, construction of a new 132kV STSS comprising 19 indoor circuit breakers and the installation of two 132kV feeder connections to tee off from East Ryde Transition Point to the new STSS.

Option 5, which was the preferred option in the original FPAR, is now ranked second in the RIT-D assessment.

Ausgrid intends to proceed with Option 5, with connecting customers to fund the cost difference

While Option 10 is assessed as the option with the greatest market benefit due to its lower cost, this solution would supply customers at 132kV. Adopting this solution would increase costs to the connecting customers and limit the data centre size to accommodate additional electrical infrastructure to convert from 132kV. The new major load customers have a strong preference for Option 5, which involves a new 132/33kV STS, as it provides 33kV supply to customers.

On this basis, Ausgrid will proceed building Option 5, with the difference in capital cost between Option 10 (the lowest cost option) and Option 5 (the second lowest cost option) being borne by the connecting customers, through an up-front capital contribution. Ausgrid notes that the market benefits of Option 10 and Option 5 are identical, with the consequence that if the capital cost difference is borne by the connecting customers, regulated customers will be no worse off than if Ausgrid were to proceed with Option 10.

Option 5 involves a new STS at site 2, connected to feeders 92G and 92J. Specifically, the scope includes:

- Acquisition of property at site 2;
- Construction of the new 132/33kV STS, comprising 3 transformer units and 28 indoor circuit breakers; and
- Installation of two 132kV feeder connections to tee off from East Ryde Transition Point to the new STS.

Construction will commence as soon as practicable and end in late 2028/29, when customers are expected to connect.

‘Re-opening triggers’ for this RIT-D

Under the updated Rules relating to a Material Change in Circumstance (MCC), Ausgrid is required to set out in the DPAR (for consultation) and the FPAR (for confirmation) re-opening triggers for this RIT-D. No submissions were received on the proposed re-opening triggers.

We consider that there is only one RIT-D re-opener trigger associated with less load requesting to connect. In particular:

- If two large customers are connected (instead of four), Ausgrid would build the new substation with a reduced network arrangement initially, noting this would marginally reduce the expected capital costs overall (in the order of 3.5%).

Should this occur, Ausgrid would write to the AER confirming the reduction of the initial scope of work, from three to two switchgroups, noting that remaining connecting customers will bear the cost difference between Option 5 and Option 10. A new RIT-D would not be initiated, as it would jeopardise our ability to timely connect the customers.

We do not consider there are any further RIT-D re-opener triggers related to more or less load requests. In particular:

- If four large customers are connected (instead of five), we would build Wallumatta STS with no scope changes.
- If three large customers are connected (instead of five), we would build Wallumatta STS with no scope changes.
- If only one customer is connected, no shared network asset is required. The customer will pay the entire connection.
- If no customer is connected, the investment would not proceed.
- Any demand over 282MVA will trigger investment outside of this RIT-D and thus a separate RIT-D to be undertaken.

Based on the sensitivity analysis, we do not consider the following will constitute re-opening triggers for this RIT-D either:

- Real cost increases compared to those used in the RIT-D analysis;
- Variations to the AER estimated VCR; or
- Credible changes to the commercial discount rate.

Proceeding with the network investment is not found to be sensitive to changes in these variables.

Next steps

Ausgrid intends to resubmit a contingent project application to the AER for the Wallumatta STS following publication of this revised FPAR.

1 Introduction

This Final Project Assessment Report (FPAR) is a revised version of the analysis published in late 2024 and presents an updated options analysis to address expected capacity constraints in the Macquarie Park network area in the near future. It takes into account feedback provided by the Australian Energy Regulator (AER) on the Contingent Project Application (CPA) that Ausgrid submitted in early 2025 to request an amendment to our revenue determination and enable construction and commissioning of the proposed network augmentation.

Macquarie Park is a suburb in Northern Sydney known for being a sizeable business hub. In particular, the suburb is well connected to telecommunications, electrical and transport infrastructure, making it an attractive location for major loads.

Ausgrid has received a lot of interest from new major load customers to connect in the Macquarie Park area in recent years and has expanded the network to accommodate these loads, by commissioning a new Macquarie subtransmission substation (STS) in July 2021 and adding a third 120 MVA transformer unit, currently under construction.

Once the third transformer is commissioned at the existing Macquarie STS, there will be five major customer loads connected to that STS using all available connection bays at that STS. Physical site restrictions mean that new loads cannot be accommodated at the existing STS. This was noted in a Regulatory Investment Test for Distribution (RIT-D) assessment published in March 2023, which stated that further network investment (covered by a separate RIT-D process) would be required to accommodate any additional major loads in the area.[2]

Since then, we have received a further five connection applications from major customers seeking to connect at Macquarie Park and have therefore undertaken a RIT-D assessment to investigate options for facilitating these connections. Each of these applications has requested connection by 2028/29[3].

If action is not taken, Ausgrid will fail to meet requirements to connect customers under the National Electricity Rules (NER).

As outlined in this revised FPAR, we expect that the construction of a second STS in Macquarie Park is required to accommodate these customers. We have labelled this second STS in Macquarie Park the 'Wallumatta STS', in recognition of the original name given to the area and acknowledging its indigenous history.

1.1 Feedback from the AER as part of the Contingent Project Application

Ausgrid has been aware of the potential need for the Wallumatta STS since these customers submitted formal connection enquires in 2023. Given that these customers indicated that they would require supply during the 2024-29 regulatory period, Ausgrid included a business case for the Wallumatta STS[4] and identified it as a contingent project in its revised 2024-29 regulatory application. After engaging with Ausgrid to seek additional information about its options analysis, the AER approved this as a contingent project as part of its determination on our revised regulatory proposal in April 2024, with an estimated capex of $128 million (real FY24)[5].

Before making a determination on a CPA for a new Wallumatta STS, the AER must be satisfied that the following trigger events have occurred for this contingent project:

1. Ausgrid receives connection applications for loads in Macquarie Park that cannot be supplied from the existing Macquarie Park Zone Substation or the Macquarie STS.
2. Ausgrid has completed a RIT-D to determine the preferred credible option to supply the loads, pursuant to the NER.
3. A commitment from Ausgrid to proceed with the preferred credible option from the RIT-D, subject to the AER amending Ausgrid's 2024-29 regulatory determination pursuant to the NER (and to provide objective verification of this trigger, a letter from the Chief Executive Officer of Ausgrid is to be sent to the AER to confirm such commitment).

Following publication of the original FPAR, Ausgrid submitted a CPA to the AER on 07 February 2025, to enable the construction and commissioning of the proposed Wallumatta STS.

Feedback provided by the AER indicated that it considers that customer connection costs should be excluded when assessing whether an option is credible. The AER expressed concern that Ausgrid's consideration of customers'

[2] Ausgrid, *Addressing increased customer demand in the Macquarie Park area*, FPAR, March 2023, p. 3.

[3] One of these applications was received after publication of the original FPAR.

[4] Ausgrid, *Ausgrid's 2024-29 Revised Proposal Attachment 5.6: New Wallumatta STS Business Case*, 30 November 2023.

[5] AER, *Ausgrid electricity distribution determination 2024 to 2029 (1 July 2024 to 30 June 2029)*, Final decision, Attachment 5, Capital expenditure, April 2024, pp 47.

connection costs had prevented consideration of lower cost 132kV supply options as credible options. Taking this guidance into account, Ausgrid has revised the FPAR to exclude behind-the-meter connection costs and revisit the options analysis.

This revised FPAR is being published to satisfy the AER that the trigger event relating to the completion of a RIT-D pursuant to the NER has occurred. Ausgrid now intends to resubmit its CPA to the AER for the new Wallumatta STS.

As discussed in section **6**, the investment Ausgrid intends to progress is Option 5, which is now the second-ranked option in the RIT-D, but the option strongly preferred by connecting customers as it aligns with their voltage requirements, These customers will make an upfront capital contribution to cover the cost difference between Option 5 and Option 10 (i.e., the preferred option under this revised FPAR). Moreover, as the new major customers are expected to utilise a significant portion of the new STS installed capacity, specific tariff arrangements will be established to recover the majority of the cost of the augmentation from the beneficiaries (i.e., the new major customers), taking into account their share in the capacity of the new STS.

1.2 Role of this final report

Ausgrid has prepared this revised FPAR following feedback received from the AER in relation to the treatment of behind the meter customer connection costs in the analysis. It has been prepared in accordance with NER requirements under clause 5.17.4.

The purpose of the FPAR is to:

- Describe the need Ausgrid is seeking to address, including the assumptions used in identifying this need;
- Provide a description of each credible option assessed (which has been revised since the original FPAR);
- 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 Ausgrid determined that some classes of market benefits or costs do not apply to options considered;
- Present the results of a net present value (NPV) analysis of each credible option and explain these results; and
- Identify the preferred option.

This FPAR has updated the quantitative assessment of the net benefit associated with the investment options, taking into account updated information, as well as adjustments in the scope of some network solutions and the removal of connection cost from the assessment.

1.3 No disputes were received on the initial FPAR

A Draft Project Assessment Report (DPAR) for this RIT-D was published on 16 August 2024. The DPAR presented four credible options for addressing these customer demand requirements, assessed in accordance with the RIT-D framework and concluded that the preferred option was the construction of Wallumatta STS in Macquarie Park at a site located in relative proximity to these major customers.

The DPAR summarised Ausgrid's assessment of the non-network or stand-alone power system (SAPS) solutions to assist in meeting the identified need, reporting that such solutions were not viable for this RIT-D. The DPAR was accompanied by a separate notice that provided further detail on this assessment, in accordance with clause 5.17.4(d) of the NER.

The DPAR called for submissions from parties by 27 September 2024. No submissions were received on either the DPAR or the separate screening notice. As a result, an FPAR was published on 11 October 2024, re-presenting the assessment proposed in the DPAR. No disputes were raised on this FPAR.

Following publication of the original FPAR, Ausgrid submitted a CPA to the AER on 07 February 2025 to enable the construction and commissioning of the proposed Wallumatta STS. Feedback from the AER on the inclusion of connection costs as part of the RIT-D assessment has now led to the revision of the earlier FPAR.

1.4 Contact details for queries in relation to this RIT-D

Any queries in relation to this RIT-D should be addressed to:

Mark Ragusa
Head of Asset Management and Planning
Ausgrid
GPO Box 4009
Sydney 2001

Or

email to: assetinvestment@ausgrid.com.au

2 Description of the identified need

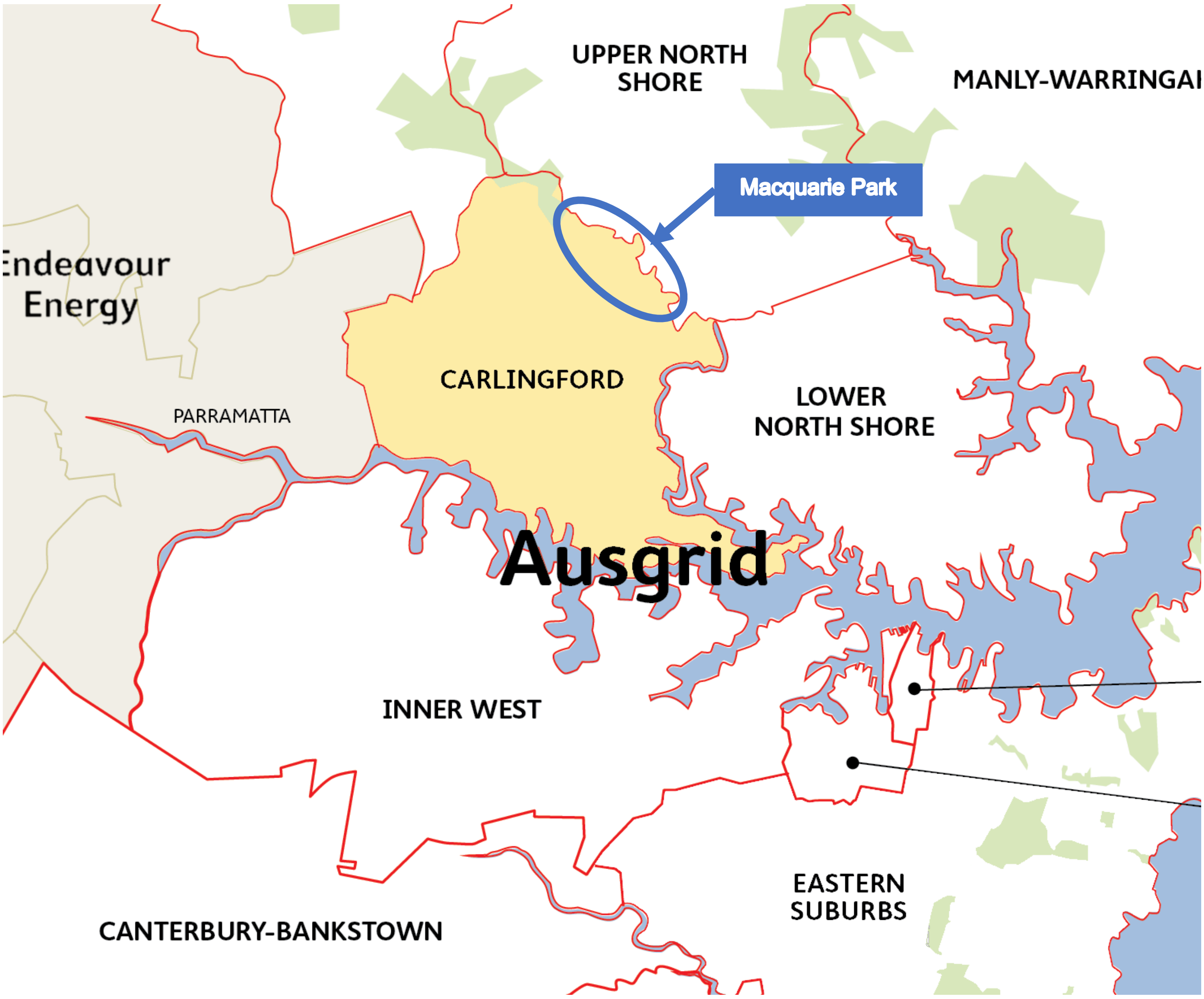
This section provides a description of the network area and the 'identified need' for this RIT-D, before presenting the key assumptions underlying the identified need.

2.1 Overview of the existing supply arrangements for the Macquarie Park area

Macquarie Park is a major commercial and retail district in Sydney's northern suburbs and supplies major loads at the Macquarie shopping centre, Macquarie University, telecommunication and data centre facilities, as well as high-density residential developments.

The Macquarie Park area sits along the northern boundary of the wider Carlingford area of Ausgrid's network, as shown in figure 1 below.

Figure 1 - Overview of the Carlingford network area



The Carlingford area is supplied at 132kV from Transgrid's Sydney North Bulk Supply Point (BSP), Mason Park and Lane Cove Subtransmission Switching Stations (STSS), as well as at 66kV from Endeavour Energy's Carlingford STS.

The proximity to Transgrid's 330kV network and the availability of multiple 132kV supplies offer potential for expansion in the Carlingford network area. Ausgrid's intention is to maintain primary supply at 132kV (from Transgrid) and 66kV (from Endeavour), supply zone substations and large customer loads from a mixed 132kV/66kV subtransmission network and supply commercial and residential loads from the 11kV network.

The Macquarie Park area has become a precinct for data centres and has also been selected by the NSW Department of Planning, Housing and Infrastructure (DPHI) to accommodate new residential dwellings and commercial floorspace, which will increase demand on the 11kV distribution network.

Ausgrid has recently connected three large customers and is in the process of connecting a further two. The network was significantly augmented to accommodate the connection of these five major loads – specifically:

- In 2018, we undertook a RIT-D to address connection of these new loads in the area, which found that a new 132/33kV Macquarie STS was the preferred option in light of the expected demand at that point in time; and
- In 2023, a subsequent RIT-D was completed to accommodate the connection requests of two additional major customer loads in the Macquarie Park area, which concluded that the preferred option was to install a third 120 MVA 132/33kV transformer at the Macquarie 132/33kV STS.

The Macquarie STS was commissioned in July 2021, and the third transformer is on track to be commissioned by December 2025. It is supplied via 132kV feeders teed off from Ausgrid's 132kV feeders 92A and 92B between the Sydney North BSP and the Lane Cove STSS, and it is co-located within the same site as the existing Macquarie 132/11kV Zone Substation (ZS), in Waterloo Rd, Macquarie Park.

The figure below shows the location of Macquarie STS and other major substations in the Carlingford network area.

Figure 2 - Location of Macquarie STS within the Carlingford network area

Once the third transformer is installed at Macquarie STS, the major customer loads will use up all available connection bays at that site. Physical site restrictions mean that additional bays, and thus new major loads, cannot be accommodated at the existing STS and so any new loads would need to be accommodated using other means.

This was recognised in the 2023 RIT-D, which stated that further network investment (covered by a separate RIT-D process) would be required to accommodate any additional major loads in the Macquarie Park area due to the site limitations regarding adding any further transformers at the Macquarie STS.[6]

We have since received a further four connection applications from major customers seeking to connect in the Macquarie Park area. Each of these four applications are seeking connection from 2028/29 at 33kV, since 132kV (or 66kV) supply points would require the developers to allocate space on their property for cables and equipment, and because their current design models are based on 33kV input supply modules.

The names and individual loads of the most recent customers requesting connection have been redacted for confidentiality reasons. However, they have a total expected eventual load of 345MVA with secured "N-1" supply requirements. Further, there is an overlap between some of the customers seeking new connections and the customers that triggered the installation of the Macquarie STS, and so there is evidence and history regarding commitment to connecting shown by these customers.

In 2025, a fifth connection application was received for an existing data centre seeking to expand its business operations located in the Macquarie Park area. The customer is seeking temporary 11kV supply for an initial expansion in 2026/27, and permanent 33kV supply from 2029/30. The supply requirements from this fifth connection application have been incorporated in the load forecasts in this revised FPAR.

There is also additional connection interest from major customers, seeking to expand their footprint in the Macquarie Park area and the vicinity. These customers are targeting supply in the early 2030's.

Considering the scale of the forecast load, Ausgrid considers that establishing a new subtransmission supply at Macquarie Park is the most efficient way to meet customer requirements.

2.2 Summary of the 'identified need'

This RIT-D has been initiated to investigate, and consult on, how to most efficiently facilitate the connection of new major loads in the Macquarie Park area. Importantly, no construction will commence until a property is secured and material components of connection agreement contracts have been executed.

If action is not taken, Ausgrid will fail to meet the requirements to connect customers under section 5.2.3(d) of the NER, which include the requirements that a Network Service Provider must:

> (1) Review and process applications to connect or modify a connection which are submitted to it and must enter into a connection agreement…
> (…)
> (6) Permit and participate in commissioning of facilities and equipment which are to be connected to its network in accordance with rule 5.8;"

We therefore consider the identified need for this investment to be a 'reliability corrective action' under the RIT-D since investment is required to comply with the above NER obligations.

The identified need creates an opportunity to provide a scale-efficient and cost-effective investment in shared network assets to benefit multiple customers.

While any new network augmentation will become part of Ausgrid's Regulatory Asset Base, site-specific network tariff arrangements will be established to recover the majority of the cost of the augmentation from the beneficiaries (i.e. the new customers), taking into account their share of the capacity of the new STS. These charges will include the underlying transmission prices as the proposed project assets are classified as dual function under the NER. The dual function costs apportioned to each customer will be based on the amount of network capacity required from the nearest transmission node supplying the site.

The timing of the identified need, and so the required timing for credible options to address the need, is determined by when the loads are requesting connection (as there is no ability to accommodate new loads at the existing Macquarie STS due to all bays being utilised). This is currently anticipated to be mid to late 2028/29 for the initial four customer loads, and 2029/30 for the fifth customer.

[6] Ausgrid, *Addressing increased customer demand in the Macquarie Park area*, FPAR, March 2023, p. 3.

2.3 Key assumptions underpinning the identified need

The key driver for this RIT-D is the requested connection of load in the Macquarie Park area. If action is not taken, these loads will not be able to connect.

To demonstrate the need, the base case is established as the 'do nothing' case. The 'do nothing' case for connection of major loads in the Macquarie Park area is limited to supply from Macquarie Park STS. As outlined in section 2.1, the 'do nothing' case has identified a number of constraints to utilisation of Macquarie Park STS for connection of major load in the Macquarie Park area:

- Physical site restrictions prohibit further 33kV connection points via brownfield augmentation at Macquarie Park STS.
- Physical site restrictions also prohibit further 132/33kV transformers to be added at Macquarie Park STS to increase substation capacity.

Without the ability to increase capacity at Macquarie Park STS, the connection of major loads in the Macquarie Park area will cause utilisation at Macquarie Park STS to exceed substation firm capacity (N-1) and eventually total capacity (N).

We have investigated how assuming different load forecasts going forward changes the expected net market benefits under the proposed options. In particular, we have investigated three future load forecasts – namely a central forecast that represents the load growth expected from the proposed loads, as well as a lower than-expected load forecast and a higher-than-expected forecast for these customers (reflecting different ramp up rates and ultimate load at full utilisation).

In particular, the three future load forecasts that have been investigated are:

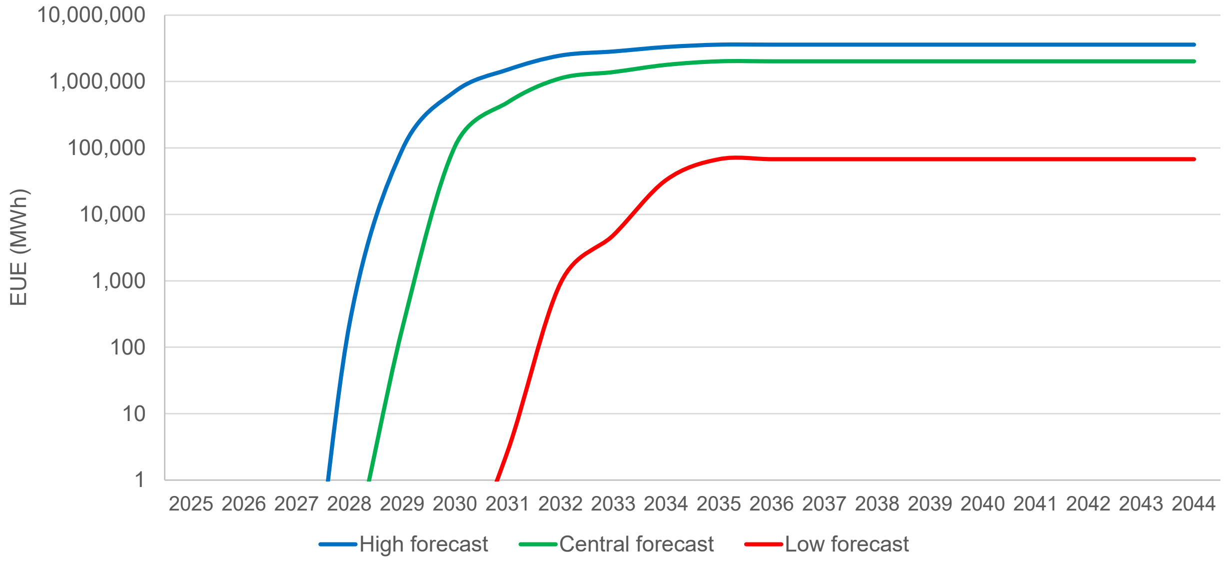
- A central forecast assuming 85% scaled load from the proposed major loads;
- A low demand forecast assuming 60% scaled load from the proposed major loads; and
- A high forecast assuming 100% scaled load from the proposed major loads.

The major loads have been scaled across the forecasts to account for uncertainty over the ramp up rate of customer demand in the future (i.e., the timing for these loads to reach the total load requirements, as well as the size of their ultimate load). These percentages are reflective of ramp up rates experienced in recent years by similar customers in the network. These forecasts also incorporate the fifth connection application Ausgrid has received.

Figure 4 below shows the modelled levels of expected unserved energy (EUE), under each of the three underlying demand forecasts investigated, over the next twenty years. For clarity, this figure illustrates the MWh of EUE assumed under each load forecast if no credible option is commissioned (i.e. under the 'do nothing' base case for that load forecast).

Appendix D provides additional detail on the assumptions underpinning the identified need (i.e. the assumed load duration curve and how the probability of transformer failure has been modelled).

Figure 3 – Forecast EUE under each of the three demand forecasts (uncapped values)

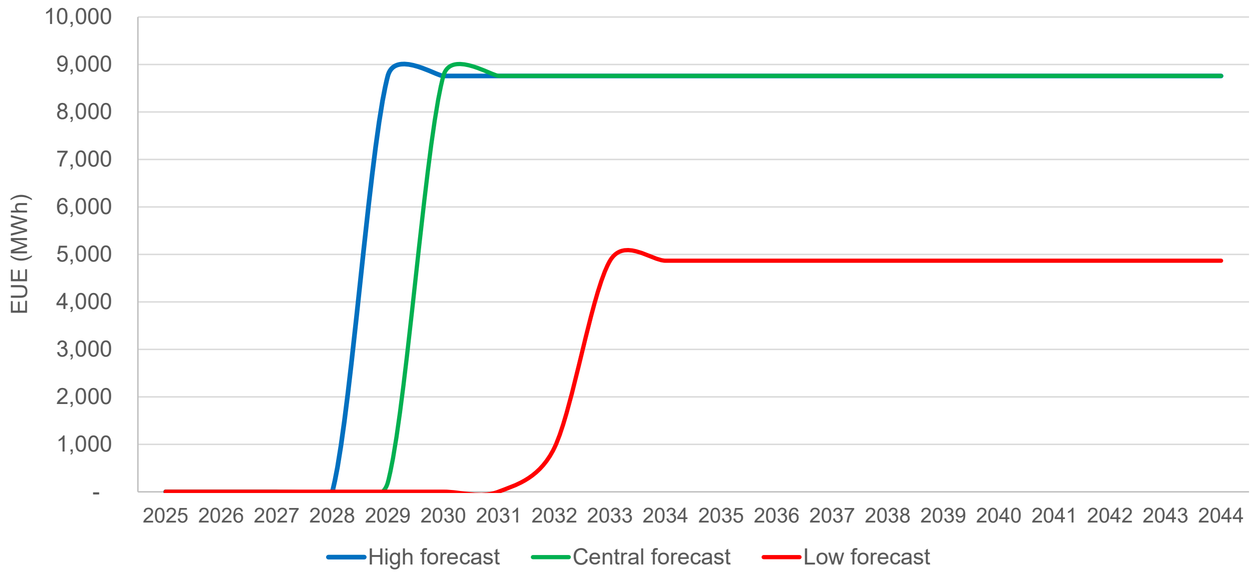


We have capped the level of EUE under all three demand forecasts in the NPV assessment. This cap is not reflected in the figure above (which shows the full EUE forecasts). Since the base case reflects a 'do nothing' approach with rapidly escalating EUE, we consider it appropriate to cap the level of EUE to avoid a situation where a significant increase in EUE skews the results (and we note that this approach does not affect the identification of the preferred option as all options avoid EUE equally)[7]. If uncapped, the EUE will increase exponentially because every MW of load will be unserved if corrective action is not taken.

The EUE under the three load forecasts above is shown to differ in terms of when it first appears (i.e. 2028 under the high forecast, 2029 for the central forecast and 2031 for the low forecast). This reflects the 'proportionate' approach we have taken to estimate EUE. While EUE will occur as soon as customers are requesting to connect in December 2028, we have modelled EUE using a top-down approach to consider the capacity in this area of our network (which factors in the small amount of capacity available at the existing Macquarie STS that cannot be accessed due to there being no free bays). We have not developed more refined EUE estimates (which would remove the assumed ability of the Macquarie STS to assist) given avoided EUE does not change the outcome of this RIT-D, as all options can avoid it equally.

Figure 5 on the next page shows the capped levels of EUE for each of the three scenarios investigated. The cap is activated by the time EUE values reach the equivalent of 1MW of load unserved for a year.

Figure 4 – Forecast EUE under each of the three demand forecasts (capped values)



[7] Ausgrid notes that this approach was commented on and supported by Dr Darryl Biggar in his review of the modelling undertaken for the Powering Sydney's Future RIT-T. See: Biggar, D., *An Assessment of the Modelling Conducted by TransGrid and Ausgrid for the "Powering Sydney's Future" Program*, May 2017, available at: https://www.aer.gov.au/system/files/Biggar%2C%20Darryl%20-%20An%20assessment%20of%20the%20modelling%20conducted%20by%20TransGrid%20and%20Ausgrid%20for%20the%20%20Powering%20Sydney%20s%20Future%20%20program%20-%20May%202017.pdf

3 Four credible options have been assessed

The AER provided feedback after the submission of Ausgrid's CPA to enable the development of the new Wallumatta STS, expressing concerns that the behind the meter connection costs should not be considered, either in determining whether an option is credible, or as part of the NPV assessment. In addition, in updating the FPAR we have also taken into account more recent market information in site costs. Together, these changes have resulted in a different set of credible network options being considered in the NPV assessment in this revised FPAR.

This section provides details of the revised analysis of the credible options to address the identified need.

We have assessed eleven network options following an assessment of the various potential dimensions for supply arrangements to connect the loads, including connection to the upstream network, substation configuration and physical location. In particular, the network options have been defined in the following terms:

- Three substation arrangements to connect customers:
  1. a new 132/33kV STS, or
  2. a new 132kV STSS, or
  3. a new 132/33kV STS with an expanded 132kV busbar to enable both 33kV and 132kV connections.
- Three connection arrangements to the upstream 132kV network:
  1. a loop into 132kV Feeder 92B (Sydney North BSP to Lane Cove STSS), or
  2. a loop into 132V Feeders 92A & 92B (Sydney North BSP to Lane Cove STSS), or
  3. a tee connection to 132kV Feeders 92G & 92J (Mason Park STSS to Lane Cove STSS).
- Three sites to accommodate the new substation: the locations of the sites have been redacted to not affect procurement process and, instead, we only refer to 'site 1', 'site 2' and 'site 3'.

  Sites 1 and 2 are nearby the proposed locations of customers. Whilst site 3 is not suitable to accommodate a large switching station, the adjacent sport grounds could be acquired to accommodate the STSS. This will require compulsory acquisition and national park land clearing.

For continuity with the initial business case submitted in late 2023, as part of our regulatory determination process for the current period, we have continued with the option numbering in the RIT-D, i.e., the options assessed in this FPAR are 'Option 5' through to 'Option 11', which were not included in the initial business case.

The eleven options are listed in the table below.

Table 3 – Network options initially considered

Option	Description
1	New 132/33kV STS at site 1 looped into 132kV Feeder 92B
2	New 132/33kV STS at site 1 looped into 132kV Feeders 92A & 92B
3	New 132kV STSS at site 3 and new 132/33kV STS at site 1 looped into 132kV Feeder 92B
4	New 132/33kV STS at site 1 tee connected at East Ryde Transition Point to 132kV Feeders 92G & 92J
5	New 132/33kV STS at site 2 tee connected at East Ryde Transition Point to 132kV Feeders 92G & 92J
6	New 132/33kV STS with expanded 132kV busbar at site 1 tee connected to 132kV Feeders 92G & 92J
7	New 132/33kV STS with expanded 132kV busbar at site 2 tee connected to 132kV Feeders 92G & 92J
8	New 132kV STSS at site 1 looped into 132kV Feeder 92B
9	New 132kV STSS at site 1 tee connected to 132kV Feeders 92G & 92J
10	New 132kV STSS at site 2 tee connected to 132kV Feeders 92G & 92J
11	New 132kV STSS at site 3 looped into 132kV Feeder 92B

A revised analysis has been undertaken since the RIT-D was completed (with the publication of the original FPAR in October 2024) to address concerns raised by the AER as part of its assessment of Ausgrid's CPA. This has included exclusion of the behind the meter connection costs of the connecting customers, and a revision of the cost of the 132kV STSS substation arrangement (in Options 3, 8, 9, 10 and 11).

This has resulted in an updated list of four credible network options, which are listed in the table below:

Table 4 - Revised credible network options

Option	Description
5	New 132/33kV STS at site 2 tee connected at East Ryde Transition Point to 132kV Feeders 92G & 92J
7	New 132/33kV STS with expanded 132kV busbar at ‘site 2’ tee connected to 132kV Feeders 92G & 92J
10	New 132kV STSS at ‘site 2’ tee connected to Feeders 92G & 92J
11	New 132kV STSS at ‘site 3’ looped into 132kV Feeder 92B

In particular, two of the 132kV options which were previously considered not to be credible options (due to the additional cost of the switching equipment and onsite substations the connecting parties would need to install), are now assessed as credible options (i.e., Options 10 and 11).

Further, updated market reports indicate that site 1 acquisition costs will be higher than the value considered in the original FPAR. As a consequence, Options 4 and 6 (which were included as credible options in the original FPAR, but which utilise site 1) are no longer considered credible options. All other options involving site 1 are also not considered credible.

Fundamentally, the four credible options assessed differ by:

- Substation arrangement – Option 5 involves a new 132/33kV STS, Option 7 also involve a new 132/33kV STS with an expanded 132kV busbar to facilitate future 132kV connections, whilst Options 10 & 11 involve a new 132kV STSS;
- Location of the STS – Options 5, 7 and 10 the same site, whilst Option 11 assumes another site, and
- Connection to the upstream network – Options 5, 7 and 10 consider a tee connection to Feeders 92G & 92J, whilst Option 11 involves looping into Feeder 92B.

A contingency allowance has been estimated and included in the capital costs of the four credible options following a risk assessment. The reasons and basis for this contingency allowance are outlined in section 3.5 below.

As stated in the original October 2024 FPAR, several options initially considered are no longer credible due to a rezoning implemented by the NSW Government, which has resulted in a significant increase in the value of the land required in these options. These options, as well as the other options involving site 1, are discussed below as ‘options considered but not progressed’.

All credible options are expected to be commissioned in 2028/29.

All costs and benefits presented in this FPAR are in $2023/24, unless otherwise stated.

3.1 Option 5 – New 132/33kV STS at ‘site 2’ tee connected at East Ryde Transition Point to 132kV Feeders 92G & 92J

Option 5 involves a new 132/33kV STS at site 2, connected via East Ryde Transition Point to feeders 92G and 92J.

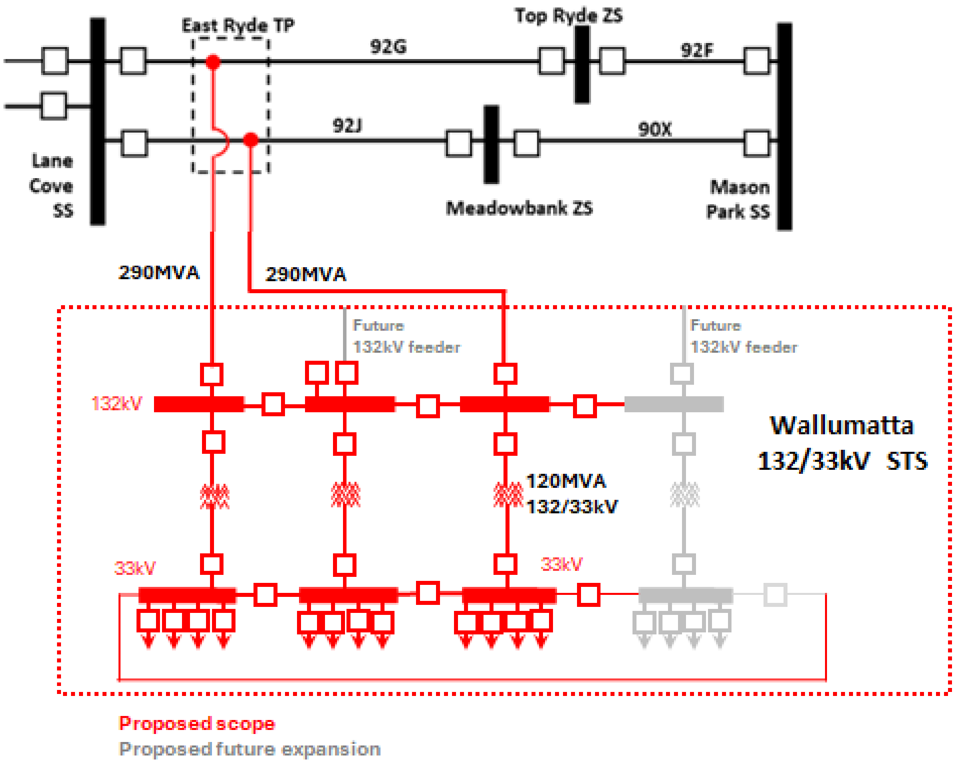
Specifically, the scope of this option includes the:

- Acquisition of property at site 2;
- Construction of the new 132/33kV STS, comprising:
  - 3 transformer units;
  - A new switchroom building; and
  - 28 indoor circuit breakers.
- Installation of two 132kV feeder connections to tee off from East Ryde Transition Point to Wallumatta STS, comprising:
  - Two pole structures to connect to East Ryde Transition Point;
  - The construction of ductline from the transition point to the substation site;
  - Construction of bore under major roads;
  - The installation of cables between East Ryde Transition Point and the substation site;
  - The installation of joint bays; and
  - Termination cable works at substation cable basement.

This option involves installation of long underground 132kV connections to tee off feeders 92G and 92J.

A schematic diagram of this option is presented in the figure below, with the specific network elements shown in red.

Figure 5 - New 132/33kV STS (Option 5) proposed network arrangement



The estimated network augmentation capital cost of this option is approximately $162 million. The table shows the breakdown of the estimated capital costs for this option.

Table 5 – Breakdown of Option 5's expected network augmentation capital cost, $m

Component	Labour	Materials	Contracted Services	Contingency	Total
New 132/33kV STS with 3x120MVA transformers, 10x132kV and 18x33kV circuit breakers on site 2 + 132kV connections to tee off from Feeder 92G & 92J	15.2	44.4	83.8	18.9	162.3

The new 132/33kV STS will be constructed initially with three 120MVA 132/33kV transformer units. The proposed configuration will be able to provide indoor 12x33kV feeder bays to connect large customers.

While we do not currently envisage that any of the options will need to be expanded beyond their initial capacity in the near future, all options offer this ability if required. Specifically, a fourth transformer and associated switchgroup can be accommodated under this option (as shown in grey in the schematic diagram above).

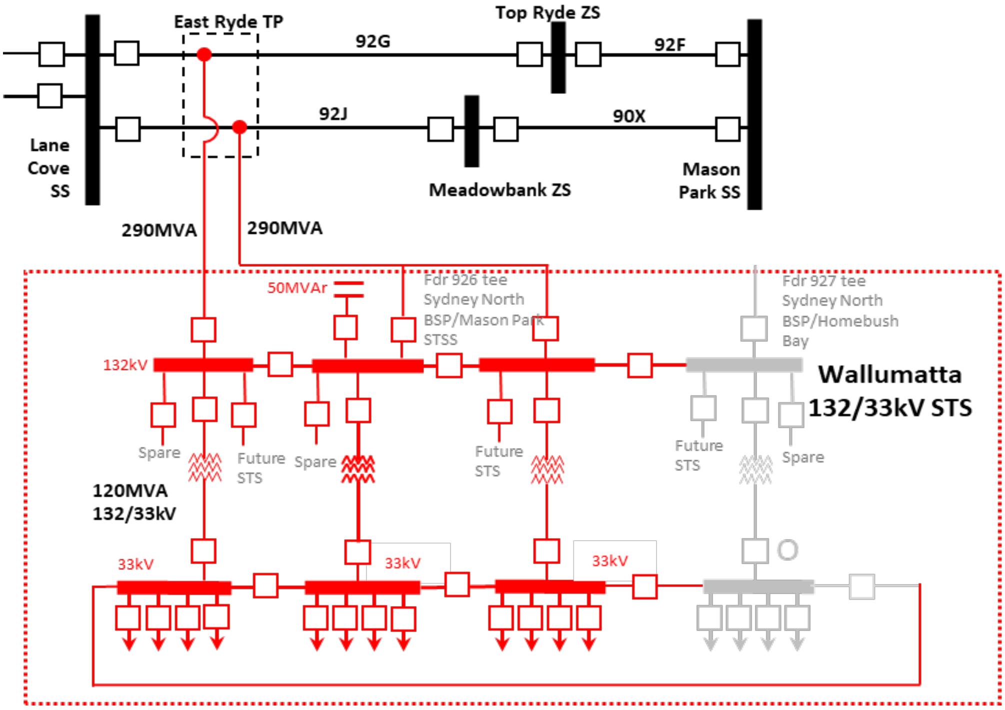
The new STS will require 132kV supply connections by installing underground cables. Two circuits will be installed in a shared trench, connected to transmission feeders 92G & 92J, which link Lane Cove STSS to Mason Park STSS. The connection point will be the East Ryde Transition Point, which is closed to the Lane Cove River and Pittwater Road. From this point, the proposal is to construct approximately 7.1km of dual circuit 132kV ductline to reach the new Wallumatta STS site and install high-capacity cables using cross-linked polyethylene (XLPE) as insulation material.

Additional routine network operating costs under this option are expected to be around $150,000 per year (which is estimated at 0.2% of the new STS capital cost and 0.1% of the new cable capital costs, excluding land and contingency).

3.2 Option 7 – New 132/33kV STS with expanded 132kV busbar at 'site 2' tee connected at East Ryde Transition Point to 132kV Feeders 92G & 92J

Option 7 involves a new 132/33kV STS with an expanded 132kV busbar at site 2, connected via East Ryde Transition Point using tee connections to feeders 92G and 92J. This option is like Option 5, except that 32 circuit breakers are required at the STS (as opposed to 28 under Option 5). The figure below shows the proposed network arrangement for this option, with proposed network augmentation assets shown in red.

Figure 6 - New 132/33kV STS with expanded 132kV busbar (Option 7) proposed network arrangement



This option will provide dual-voltage capability (132kV and 33kV), allowing for voltage-appropriate supply based on the size and profile of the customer loads. The proposed configuration will be able to provide 4x132kV feeder bays and 12x33kV feeder bays to connect large customers or additional substations.

While Option 7 provides the same ability as Option 5 to expand in the future via a fourth transformer (if required), as shown in grey in the schematic diagram above, the cost of doing so under this option is expected to be marginally greater than for Option 5. While the majority of the costs of this expansion are expected to be the same irrespective of the option (due to common design, labour, procurement and installation costs), Option 7 involves additional bay work to expand and thus has slightly greater expected costs for future expansion – approximately $1 million.

The estimated network augmentation capital cost of this option is approximately $170 million. The table below shows the breakdown of the estimated capital costs for this option.

Table 6 – Breakdown of Option 7's expected network augmentation capital cost, $m

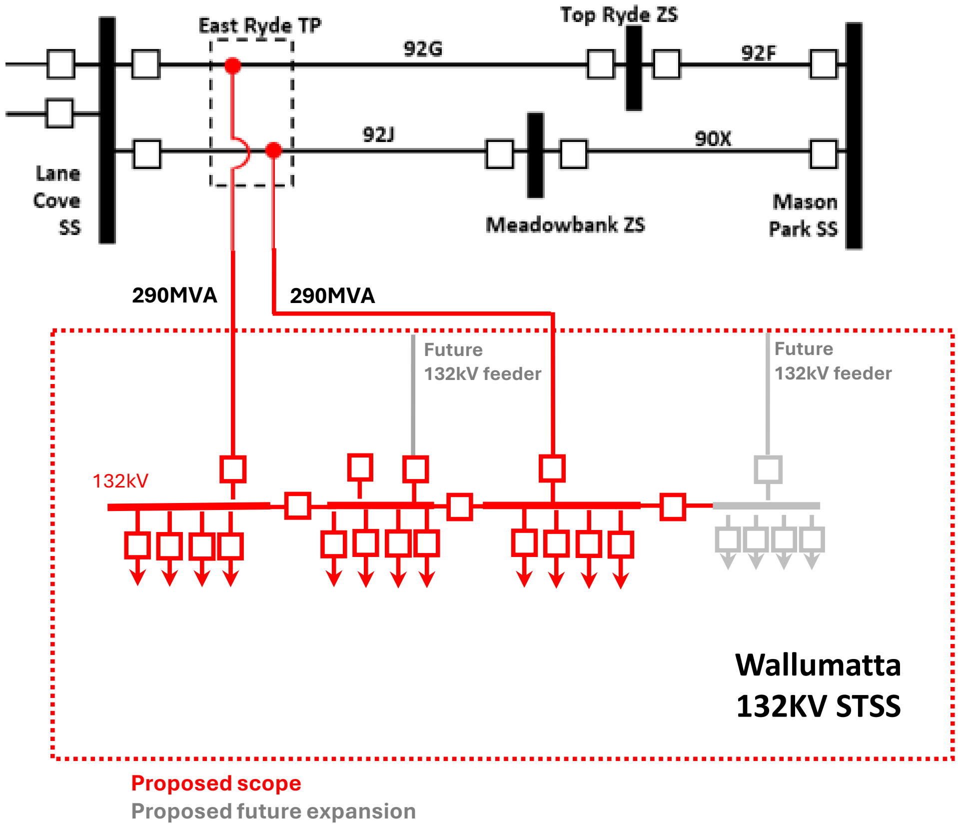
Component	Labour	Materials	Contracted Services	Contingency	Total
New 132/33kV STS with 3x120MVA transformers, 14x132kV and 18x33kV circuit breakers on site 2 + 132kV connections to tee off from Feeder 92G & 92J	**15.8**	**45.3**	**89.8**	**18.9**	**169.8**

Additional routine network operating costs under this option are expected to be around $165,000 per year (which is estimated at 0.2% of the new STS capital cost and 0.1% of the new cable capital costs, excluding land and contingency).

3.3 Option 10 – New 132kV STSS at 'site 2' tee connected at East Ryde Transition Point to 132kV Feeders 92G & 92J

Option 10 involves establishing a new 132kV SSTS with 19 circuit breakers at site 2, connected via East Ryde Transition Point using tee connections to feeders 92G and 92J. The figure below shows a schematic diagram of this option, with network elements shown in red.

Figure 7 - New 132kV STSS (Option 10) proposed network arrangement



The new 132kV STSS will be constructed initially with 12x132kV feeder bays, but capable of accommodating an additional switchgroup with additional 4x132kV feeder bays.

Land requirements would be less for this option compared to Options 5 and 7, given that transformer bays are not required. A transformer bay for a 120MVA 132/33kV unit is 20m x 11m in size. Therefore, at least 880m^2 are required to accommodate up to four transformers. For site 2, the area for a 132kV STSS could be reduced by ~11% (1,320-1,430m^2, equivalent to a section 11m wide x 120-130m long).

The estimated network augmentation capital cost of this option is approximately $147 million. Table 7 below shows the breakdown of the estimated capital costs for this option. The lower land requirements have been taken into consideration in these cost estimates.

Table 7 – Breakdown of Option 10's expected network augmentation capital cost, $m

Component	Labour	Materials	Contracted Services	Contingency	Total
New 1323kV STSS with 19x132kV circuit breakers on site 2 + 132kV connections to tee off from Feeder 92G & 92J	12.4	41.1	75.0	18.9	147.3

Additional routine network operating costs under this option are expected to be around $130,000 per year (which is estimated at 0.2% of the new STSS capital cost and 0.1% of the new cable capital costs, excluding land and contingency).

3.4 Option 11 – New 132kV STSS at 'site 3' looped into 132kV Feeder 92B

Option 11 involves establishing a new 132kV SSTS with 19 circuit breakers at site 2, looped into feeder 92B.

Specifically, the scope of this option includes the:

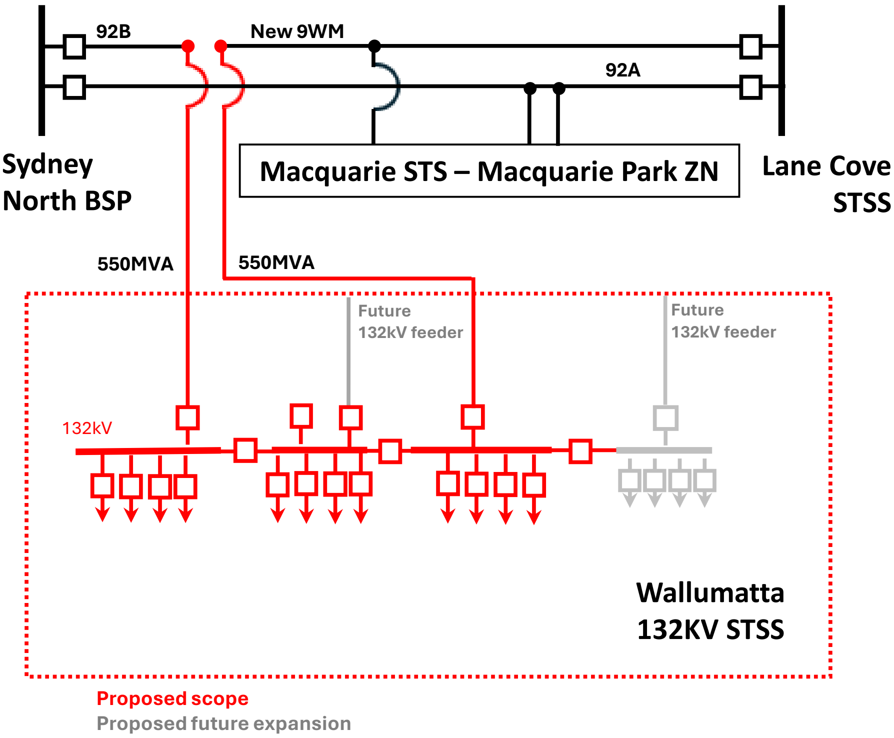
- Acquisition of property at site 3, which is located near the overhead feeder 92B;
- Construction of the new 132kV STSS, comprising a new switchroom building to house 19 indoor circuit breakers.
- Installation of two 132kV feeder connections to loop into feeder 92B, comprising:
    - Between 50 and 100m of two 132kV overhead circuits, adjacent to existing easement;
    - Either two large poles (mid-line terminations) or two 132kV underground to overhead pole structures;
    - Between 50 and 100m of 132kV underground cables to terminate connections at substation basement.
- Installation of new Optical Ground Wire (OPGW) to upgrade communications and meet protection requirements.

It should be noted that site 3 is not large enough to accommodate the proposed STSS. It will require compulsory acquisition of adjacent land and national park land clearing. This is likely to have implications for the local community as it will impact sports grounds. In addition, the installation of overhead connections will also require national park land clearing.

As the new STSS is to be looped into feeder 92B, 132kV connections must meet the 550MVA rating capacity of the feeder. This will require twin 2000mm^2 cables per phase.

The figure below shows a schematic diagram of this option, with network elements shown in red.

Figure 8 – New 132kV STSS (Option 11) proposed network arrangement



The estimated network augmentation capital cost of this option is $184 million. The table below shows the breakdown of the capital costs.

Table 8 – Breakdown of Option 11's expected network augmentation capital cost, $m

Component	Labour	Materials	Contracted Services	Contingency	Total
New 1323kV STSS with 19x132kV circuit breakers on site 3 + 132kV connections to loop into Feeder 92B	13.4	128.6	23.2	18.9	184.1

Additional routine network operating costs under this option are expected to be around $80,000 per year (which is estimated at 0.2% of the new STSS capital cost and 0.1% of the new cable capital costs, excluding land and contingency).

3.5 Inclusion of a Contingency Allowance

A number of risks have been identified, for which a risk cost allowance will be sought. Considering that all credible options require acquisition of land, installation of long-distance underground cables and construction of a new substation, it is assumed that identified risks and potential cost impacts should be similar across these network options.

A cost risk analysis was performed which involved multiplying the probability of an event occurring by the likely cost impact once an event occurs. The probability of an event or risk to occur is determined from the likelihood range established during risk workshops undertaken with subject matter experts. The cost impact may vary from an optimistic case (P10)[8], a likely outcome (P50)[9] to a pessimistic case (P90)[10] for each of the identified risks.

The identified risks, based on consultation with subject matter experts, are summarised and listed below (along with our estimated contingency allowance for each).

Table 9 – Summary of identified risks and corresponding cost allowances

Component	Cost rationale	Cost range (P10 to P90) ($ million)	Likely cost (P50) ($ million)	Probability	Contingency allowance ($ million)
Uncertain property costs due to failing to secure land at budgeted price	Property acquisition costs are highly variable and will most likely be determined on a negotiated basis.	**4.0 - 20.0**	**12.0**	**50%**	**6.0**
Uncertainty of site impact due to tenants with existing leases	Need to compensate tenants by paying out existing leases to enable timely initiation of works on site.	**1.5 - 5.0**	**2.0**	**75%**	**1.5**
Uncertainty in securing resources with suitable capacity and capability	Difficulties to find resources with appropriate skills will be addressed by paying a premium over market rate. Assumes a 20% premium on labour costs budget of $15 million.	**1.5 – 4.6**	**3.1**	**50%**	**1.6**
Changes in design standards that the project must meet	Evolving industry requirements leading to use of non SF_6 132kV switchgear. Based on a cost of $4 million for standard 132kV equipment and assuming the cost will double for non SF_6 equipment.	**4.4 – 8.8**	**4.4**	**35%**	**1.5**
Uncertainty of project site due to demolition requirements not included in base estimates	Costs can vary according to building size. Assuming a unit rate of $200/m2 for a 3-level building, this could lead to demolition costs of up to $3 million	**1.0 – 3.0**	**2.0**	**75%**	**1.5**
Uncertainty in design and construction due to site topography and potential rezoning	Topography could have both time and cost impacts. Bulk earthworks costings of $75/m^3 could apply and retaining walls may be required. Additional rezoning plans could be announced, impacting land value or resulting in additional fire/noise requirements. Additional setback requirements add to the size of land required for substation.	**3.4 -16.0**	**8.5**	**40%**	**3.5**
Escalation of prices not included in base estimates	Pricing for 132kV cable procurement (around $20 million) based on existing supply arrangements, could increase up to 20% subject to exchange rate, commodity price and supply chain cost changes.	**1.4 – 3.9**	**2.9**	**40%**	**1.2**

[8] A positive outcome that 1 in 10 projects would achieve, or a 10% confidence that the project can be delivered to the amount or less.

[9] Expected outcome that 5 in 10 projects would achieve, or a 50% confidence that the project can be delivered to the amount or less.

[10] An adverse outcome that 1 in 10 projects would face, or a 90% confidence that the project can be delivered to the amount or less.

Component	Cost rationale	Cost range (P10 to P90) ($ million)	Likely cost (P50) ($ million)	Probability	Contingency allowance ($ million)
Contractor cost uncertainties	Changes to contracted costs post award. The budget for contracted services is around $84 million, and variations/other claims could range between 2% and 10%	**1.7 – 8.4**	**4.2**	**20%**	**0.8**
Noise complaints arising from construction and/or installation work	Requirement to install noise and/or fire walls. Based on wall length of 10m height x 12m long costing $0.4 million. Up to 5 walls of this type could be required.	**0.4 – 2.0**	**1.2**	**60%**	**0.7**
Uncertainty in design and construction due cable egress issues	Longer cable runs may be required, leading to purchase of easements in neighbouring properties. Assumes 6m wide x 100 long easements at $4,250/$m^2$ rate.	**0.5 – 2.5**	**1.2**	**50%**	**0.6**

The aggregated value of the allowances listed above is $18.9 million and has been included in the assessment for each of the network credible options.

3.6 Options considered but not progressed

Ausgrid also considered several other options that have not been progressed because they were found to be technically or economically infeasible. The table below summarises Ausgrid's consideration and position on each of these options, which are grouped according to when they were considered.

Table 10 – Options considered but not progressed

Description	Reason why option was not progressed
Credible options from the business case ruled out in this RIT-D	
Option 1 – New 132/33kV STS at site 1 looped into 132kV Feeder 92B Option 2 – New 132/33kV STS at site 1 looped into 132kV Feeders 92A & 92B Option 3 – New 132kV STSS at 'site 3' and new 132/33kV STS at site 1 looped into 132kV Feeder 92B Option 4 – New 132/33kV STS at site 1 tee connected to 132kV Feeders 92G & 92J Option 6 - New 132/33kV STS with expanded 132kV busbar at site 1 tee connected to 132kV Feeders 92G & 92J Option 8 – New 132kV STSS at site 1 looped into 132kV Feeder 92B Option 9 - New 132kV STSS at site 1 tee connected to 132kV Feeders 92G & 92J	The NSW Government has rezoned the land in the Macquarie Park area as being suitable for residential high rise. This has significantly increased the estimated value for all options involving site 1, compared to what was assumed at the time of preparing the initial contingent project business case, as well as the original FPAR. Due to the significant increase expected in property acquisition costs of site 1, Options 1 to 4, 6, 8 and 9 are between 20% and 77% more expensive than Option 10 in this FPAR.[11] Given that these options are not expected to provide any additional benefits (or avoided costs), they are therefore not considered economically feasible under the RIT-D. In addition, Options 1 to 3 and 8 have other drawbacks, including: • Rating constraints at Feeder 92A and/or Feeder 92B. • Expected overloading on tee connection 92A(2) to the Macquarie Park ZS under N-1 conditions (for Options 1 and 8). • Materially greater costs due to the need for twin cables to maintain network rating capacity in two different routes given the arrangement of 4 x 132kV feeders to the new STS (for Option 2) • Having to acquire a second property (i.e. site 3), which will require national park land clearing, leading to negative community impact and delays (Option 3).

[11] The total capital expenditure of these options is as follows: $197m (Option 1), $260m (Option 2), $209m (Option 3), $187m (Option 4), $195m (Option 6), $188m (Option 8) and $177m (Option 9).

Description	Reason why option was not progressed
Options ruled out as part of the business case and not considered further	
11kV connection for customers	As outlined in the business case,[12] the magnitude of loads makes 11kV connections not cost effective as extensive rearrangement work would be required in a congested 11kV network. In addition, there are technical limitations associated with installing multiple 11kV feeders to a single large customer, such as multiple switching stations, complex protection schemes and separate metering points. We therefore do not consider that 11kV options are economically or technically feasible under the RIT-D.
Option utilising tee connections on Feeders 92A & 92B	These feeders have reached the maximum number of tee connections and adding a further tee connection is not feasible[13] (unlike for Feeders 92G & 92J under Options 5, 7 and 10). Therefore, these variants are not technically feasible under the RIT-D.
New 132/66kV STS	The substation build costs for a 132/66kV STS is expected to be approximately 10% greater than for a 132/33kV STS without providing any additional benefits (or avoided costs). It is therefore not considered economically feasible under the RIT-D.
Non-network and SAPS options	
Using non-network solutions either in combination with, or in-place of, a network option.	Ausgrid has considered the ability of non-network solutions to meet the identified need. Specifically, we conducted analysis to consider how demand management could defer the timing of the network solution and whether the EUE could be cost effectively reduced. The assessment has shown that non-network alternatives would not be cost effective due to the magnitude of the load reduction required. This is detailed further in the Options Screening Notice released in accordance with clause 5.17.4(d) of the NER.
Transferring and/or connecting customers to SAPS	The reduction in demand that SAPS could provide will not be sufficient to defer the network solution, given the magnitude and characteristics of the loads. This is detailed further in the Options Screening Notice released in accordance with clause 5.17.4(d) of the NER.

[12] Ausgrid, *Ausgrid's 2024-29 Revised Proposal, Attachment 5.6: New Wallumatta STS Business Case*, 30 November 2023, p 8.

[13] Such tee connection would require two multi-ended (four-ended) protection schemes for the 132kV network involving feeders 92A & 92B, Macquarie Park ZS, Macquarie STS and the new Wallumatta STS, between Sydney North BSP and Lane Cove STSS. This is not recommended as it will require three independent and redundant communication paths between all four ends, increasing the complexity of the communications network and switching operations, also noting that distance to fault measurements in relays and fault location information becomes inaccurate.

4 How the options have been assessed

This section outlines the methodology that Ausgrid has applied in assessing market benefits and costs associated with the credible options considered in this RIT-D. Appendix D presents additional detail on the assumptions and methodologies employed to assess the options.

4.1 General 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, Ausgrid will not be able to supply any of the customers' requested load with the existing Macquarie STS given the lack of spare bays. The base case is not a realistic state of the world, because of Ausgrid's obligation to process and facilitate customer connection requirements under Section 5.2.3 in the NER, and has instead only been defined and used to align with the RIT-D framework.

The RIT-D analysis has been undertaken over a 20-year period, from 2024-25 to 2043-44. Ausgrid considers that a 20-year period is appropriate as it takes into account the size, complexity and expected life of the relevant credible options to provide a reasonable indication of the market benefits and costs of the options.

Where the capital components of the credible options have asset lives greater than 20 years, Ausgrid 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. The terminal value has been calculated as the undepreciated value of capital costs at the end of the analysis period.

Ausgrid has adopted a real, pre-tax discount rate of 3.70% as the central assumption for the NPV analysis. This represents Ausgrid's opportunity cost for its capital investments, based on the AER's final decision for Ausgrid's current determination and the guidelines provided in the AER rate of return instrument. As non-network or SAPS options have been found to be not viable, Ausgrid considers that the appropriate discount rate is the regulated cost of capital.

To test the results against variations in the discount rate, an upper value sensitivity of 10.0% has been adopted to align with the parameters prepared and consulted on by AEMO as part of preparing the 2025 Inputs, Assumptions and Scenarios Report (2025 IASR).[14] For a lower value sensitivity for this RIT-D, this would ordinarily be aligned with the latest AER Final Decision for a Distribution Network Service Provider's (DNSP's) regulated weighted average cost of capital (WACC) at the time of preparing this FPAR[15]; however, in this instance we consider that the lower value of 3.0% proposed in AEMO's 2025 IASR seems more appropriate for sensitivity testing purposes, as it is the most recent value available.

4.2 Ausgrid's approach to estimating project costs

Ausgrid has estimated capital costs by considering the scope of works necessary under the credible options together with costing experience from previous projects of a similar nature, including the Macquarie STS project (and the current project adding a third transformer to it). Where possible, Ausgrid has also estimated capital costs using supplier quotes or other pricing information.

Ausgrid does not generally apply the Association for the Advancement of Cost Engineering (AACE) international cost estimate classification system to classify cost estimates. Doing so for this RIT-D would involve significant additional costs, which would not provide a corresponding increase in benefits compared with the use of our standard estimates and so this has not been undertaken.

A specific contingency allowance has been included as part of this FPAR. The basis on which this allowance has been calculated is set out in section 3.5 above. This allowance was included in Ausgrid's CPA and will also be included in the revised CPA.

We have considered sensitivity bounds in the range of -10% to +40% of the capital costs for this FPAR.

All cost estimates are prepared in real, 2023/24 dollars based on the information and pricing history available at the time that they were estimated. The cost estimates do not include or forecast any real cost escalation for materials.

Routine operating and maintenance costs are based on a fleet level assessment of assets and works of similar nature. These costs are included for each year in the planning period from when the options are commissioned.

[14] AEMO, *2025 Inputs, Assumptions and Scenarios Report*, Final report, August 2025, p 158.

[15] AER Final decision on Energex Electricity Distribution Determination 2025 to 2030 (April 2025) indicates a 3.28% real pre-tax WACC.

4.3 Market benefits are expected from avoided unserved energy

Ausgrid considers that the only relevant category of market benefits prescribed under the NER for this RIT-D relate to changes in involuntary load shedding.

The approach Ausgrid has adopted to estimate the financial impact in eliminated unserved energy are outlined in section 4.3.1 below. Further details on the assumptions and methodology considered are presented in Appendix D.

In addition, Appendix C summarises the market benefit categories that Ausgrid considers are not material for this RIT-D.

4.3.1 Avoided unserved energy

EUE is the amount of energy that customers request to utilise but cannot be supplied due to a network capacity limitation. A reduction of the unserved energy expected from the credible option, relative to the base case, results in a positive contribution to market benefits.

EUE under the base case has been estimated using the amount of load requested in the customer connection applications multiplied by the duration of the load not being supplied considering the characteristic of the typical load profile of the customer type.

The 'market benefit' under the RIT-D from avoiding EUE is estimated by multiplying the unserved energy by the Value of Customer Reliability (VCR). The VCR is measured in dollars per kWh and is used as a proxy to evaluate the economic impact of unserved energy on customers under the RIT-D.

Ausgrid has applied a central VCR estimate of $30.93/kWh reflecting the NSW state-wide VCR estimated by the AER in its December 2024 Final Report on VCR values, adjusted by the Consumer Price Index (CPI) to be in 2023/24 dollars.[16] This is the most recent VCR value available, as it has been updated since the original FPAR. We have also tested the VCR as a sensitivity with values that are 30% lower and 30% higher than the central rate, consistent with the AER's specified +/- 30% confidence interval.[17]

While we have also investigated how assuming different load forecasts going forward changes the EUE under the proposed options, as discussed in section 2.3 above, this is not considered material to the assessment as all options avoid the same amount of EUE (and from the same point in time).

4.4 Three different demand scenarios have been modelled 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. Ausgrid has assessed three alternative future load demand scenarios – namely:

- A central forecast assuming 85% scaled load from the proposed major loads;
- A low demand forecast assuming 60% scaled load from the proposed major loads; and
- A high forecast assuming 100% scaled load from the proposed major loads.

The scenarios only differ by the demand forecasts given this is the key parameter that may affect the ranking of the credible options. How the results are affected by changes to other variables (i.e. the discount rate and capital costs) have been investigated in the sensitivity analysis.

A summary of the key variables in each scenario is provided in the table below.

Table 11 – Summary of the three scenarios investigated

Variable	Scenario 1 – central demand scenario	Scenario 2 – low demand scenario	Scenario 3 – high demand scenario
Demand	Central forecast	Low forecast	High forecast
VCR	$30.93/kWh across all scenarios		
Discount Rate	3.70% across all scenarios		

Ausgrid has weighted each of the demand scenarios equally in the NPV assessment. However, Option 10 is preferred (and the NPV outcome is positive) across all scenarios and so the weightings do not influence the RIT-D outcome.

[16] AER, Values of Customer Reliability – Final report on VCR values, December 2024, pp 62.

[17] AER, *Values of Customer Reliability – Final Report on VCR values*, December 2019, p. 84.

5 Assessment of the credible options

This section outlines the NPV assessment of credible options compared against the base case 'do nothing' option.

5.1 Gross market benefits estimated for the credible options

The table below summarises the gross market benefit of the credible options relative to the base case in present value terms. The gross market benefit has been calculated for each of the three scenarios outlined in the section above and is also provided on a weighted basis. For each scenario, the estimated gross market benefits are the same for all options for this RIT-D as they all avoid the same EUE (and this is the only expected source of market benefit).

Table 12 – Present value of gross benefits of credible options relative to the base case, $m

Option / scenario	Central demand	High demand	Low demand	Weighted benefits
Scenario weighting	1/3	1/3	1/3	–
Option 5	831	1,052	130	671
Option 7	831	1,052	130	671
Option 10	831	1,052	130	671
Option 11	831	1,052	130	671

5.2 Estimated costs for the credible options

The table below summarises the cost of the options in present value terms. Option costs comprise capital costs and ongoing operating and maintenance costs. The capital cost of each option does not vary across the three scenarios. Variations in the capital costs have been tested as part of the sensitivity analysis.

Table 13 – Present value of costs of the credible options relative to the base case, PV $m

Option / scenario	Central demand	High demand	Low demand	Weighted costs
Scenario weighting	1/3	1/3	1/3	
Option 5	-84	-84	-84	-84
Option 7	-88	-88	-88	-88
Option 10	-76	-76	-76	-76
Option 11	-88	-88	-88	-88

5.3 Net present value assessment outcomes

The table below summarises the net market benefit in NPV terms for the credible options under each scenario. The net market benefit is the gross benefit (as set out in Table 5-1) minus the cost of the option (as set out in Table 5-2), all in present value terms. Option 10 has the greatest estimated net market benefits of all options across each of the scenarios investigated. The differences in net economic benefits are driven solely by the cost differences across the options.

Table 14 – Present value of net benefits relative to the base case by scenario and weighted, NPV $m

Option / scenario	Central demand	High demand	Low demand	Weighted	Rank
Scenario weighting	1/3	1/3	1/3		
Option 5	747	968	46	587.1	2
Option 7	743	964	42	583.0	4
Option 10	**755**	**976**	**54**	**594.8**	**1**
Option 11	743	964	42	583.1	3

Consideration has been given in the NPV analysis to repurpose part of the land available in Site 2, as it is anticipated that the new Wallumatta STS will use a portion of the site area. This is applicable to Options 5, 7 and 10.

5.4 Sensitivity analysis results

Ausgrid has undertaken a sensitivity testing exercise to understand the robustness of the RIT-D assessment to underlying assumptions about key variables. Specifically, we have investigated the following sensitivities:

- A 40% increase in the assumed network capital costs;
- A 10% decrease in assumed network capital costs;
- A 25% increase/decrease in the assumed planned maintenance costs;
- A 30% lower VCR ($21.65/kWh) and a higher VCR ($40.21/kWh); and
- A lower discount rate (3.0%) and higher discount rate (10.0%) assumption.

We have not investigated sensitivity tests to determine the optimal timing for the new STS since the timing is determined by customers' requirement in their connection applications, and Ausgrid must facilitate the customers' connection.

The results of the sensitivity tests are presented in the table below and show that Option 10 remains the top-ranked option and has positive net market benefits across all the sensitivities modelled.

Table 15 – NPV results from sensitivity tests, weighted across demand scenarios ($2023/24m)

Sensitivity	Option 5	Option 7	Option 10	Option 11
Core weighted results	587.1	583.0	**594.8**	583.1
High capital costs (+40%)	554.1	548.5	**564.9**	548.2
Low capital costs (-10%)	595.4	591.7	**602.3**	591.8
High planned maintenance costs (+25%)	586.8	582.6	**594.5**	582.9
Low planned maintenance costs (-25%)	587.5	583.4	**595.1**	583.3
High VCR ($40.21/kWh)	788.4	784.3	**796.1**	784.4
Low VCR ($21.65/kWh)	385.8	381.7	**393.5**	381.8
High discount rate (10.0%)	342.6	338.3	**351.5**	321.1
Low discount rate (3.0%	625.7	621.8	**633.0**	625.2

We have not investigated boundary values for these variables as they will not change the conclusion that Option 10 is the preferred option under the RIT-D, as it is the lowest cost of all four credible options and all options avoid the same EUE (and do not provide any other market benefits or avoided costs).

While Option 10 is assessed as the option with the greatest market benefits, the customers prefer Option 5 because this better meets their voltage requirements. On this basis, Ausgrid will proceed to build Option 5 with the cost difference between the preferred option and Option 5 being borne by the customers.

No sensitivity against demand forecasts changes was investigated, since this will not affect the preferred option, given that:

- If four customers are connected instead of five, we would build Wallumatta STS with no scope changes
- If three customers are connected instead of four, we would build Wallumatta STS with no scope changes; and
- Any demand over 282MVA[18] will trigger additional investment, thus requiring a separate RIT-D assessment.

If only two customers connected (instead of five), Ausgrid would build Wallumatta STS with a marginally reduced scope. Specifically, the initial number of transformers and 33kV switchgroups to be installed would be reduced from three to two and would result in an approximate 3.5% reduction in overall capital costs[19], which is not considered a material change.

If one customer proceeds to connect, a shared asset is no longer required, and the customer will fund the entire network augmentation. If no customer is connected, the investment would not proceed. No construction will commence until material components of connection agreement contracts have been executed.

[18] The connection applications have combined "N-1" requirements (345MVA) that will exceed the rating capacity of Wallumatta STS (282MVA under N-1). They will require additional network augmentation even if no other customers require additional demand.
[19] The 132kV cable connection scope will remain unchanged, and changes in mobilisation of equipment, project management, design and installation costs of the substation are not material. The impact is limited to the procurement of the equipment not required initially.

6 Proposed investment option

The analysis undertaken in this revised FPAR identifies Option 10 as the preferred option under the RIT-D, due to it being the lower cost option to address the identified need.

Notwithstanding this revised RIT-D outcome, Ausgrid notes that the major load connecting customers have a strong preference for 33kV connection, because it retains space on their premises for their sites to grow.

As a consequence, Ausgrid is proposing to construct Option 5 (i.e., the preferred option in the original FPAR, and the second ranked option in this revised FPAR), with the connecting customers making an upfront capital contribution to cover the difference in capital costs between Option 5 and Option 10 (i.e., the RIT-D preferred option).

Ausgrid notes that there is no difference in market benefits between Option 5 and Option 10, and so regulated customers will be no worse off by the decision to proceed with Option 5, given the capital contribution from connecting customers.

Ausgrid also notes that the assets would be underutilised under Option 10, as customers' requirements are well below the capacity that each 132kV feeder bay can provide.

The scope of Option 5 includes the:

- Acquisition of property at site 2;
- Construction of the new Wallumatta 132/33kV STS, comprising:
  - 3 transformer units;
  - A new switchroom building; and
  - 28 indoor circuit breakers; and
- Installation of two 132kV feeder connections to tee off from East Ryde Transition Point to Wallumatta STS, comprising:
  - Two pole structures to connect to East Ryde Transition Point;
  - The construction of ductline from the transition point to the substation site;
  - Construction of bore under major roads;
  - The installation of cables between East Ryde Transition Point and the substation site;
  - The installation of joint bays; and
  - Termination cable works at substation cable basement.

The estimated network augmentation capital cost of this option is approximately $162 million, comprising:

- $80.0 million for acquisition of land to install and commissioning a new 132/33kV STS with 3x120MVA transformers and 3x33kV switchgroups;
- $63.4 million for the associated 132kV connections to tee off from Feeder 92G & 92J;
- $18.9 million as a contingency allowance; and

Additional routine network operating costs under this option are expected to be around $150,000 per year.

A direct contribution from customers will cover the cost difference between Option 10 (the lowest cost option, and the preferred option under the RIT-D) and Option 5 (the second lowest cost option).

Ausgrid assumes that the necessary construction would commence as soon as practicable and end in 2028/29 ahead of when customers are expected to connect.

Ausgrid considers that this revised FPAR, and the accompanying detailed analysis and confirmation of customer contributions, satisfies the trigger event for the CPA relating to completion of a RIT-D, pursuant to the NER.

'Re-opening triggers' for this RIT-D

Under the updated Rules relating to a Material Change in Circumstance (MCC), Ausgrid is required to set out in the DPAR (for consultation) and the FPAR (for confirmation) re-opening triggers for this RIT-D. No submissions were received on the proposed re-opening triggers.

We consider that there is only one re-opener trigger for this RIT-D associated with less load requesting to connect. In particular:

- If two large customers are connected (instead of five), Ausgrid would build the new substation with a reduced network arrangement initially. We note that this would only marginally reduce the expected capital costs overall (in the order of 3.5%).

To be clear, should this occur, Ausgrid would prepare a letter to the AER confirming the reduction of the original scope of work, from three to two switchgroups,, noting that remaining connecting customers will bear the cost difference between Option 5 and Option 10. A new RIT-D would not be commenced (which would require significant time to complete and jeopardise Ausgrid's ability to facilitate the timely connection of the large customers). Instead, Ausgrid would refer back to this RIT-D to confirm that the action Ausgrid is proposing to take is considered optimal.

We do not consider there are any further re-opener triggers for this RIT-D associated with more or less load requesting to connect. In particular:

- If four large customers are connected (instead of five), we would build Wallumatta STS no scope changes;
- If three large customers are connected (instead of five), we would build Wallumatta STS with no scope changes. Although the arrangement could defer the installation of the third transformer unit, customer demand ramp up rates are such that it would require adding the additional transformer only three years after commissioning the STS. This would reduce the expected capital costs by less than 1%. We consider that the number of initial 33kV switchgroups should remain unchanged, as a similar arrangement was established for Macquarie STS with three customers;
- If only one customer is connected, a shared network asset is no longer required, and the customer will fund the entire connection cost.
- If no customer is connected, Option 5 would not proceed, and no construction will commence until material components of connection agreement contracts have been executed.
- Any demand over 282MVA would trigger additional investment outside of the scope of that contemplated by this RIT-D and would thus require a separate RIT-D to be undertaken.

In addition, based on the sensitivity assessment included in this FPAR Ausgrid does not consider the following will constitute re-opening triggers for this RIT-D either:

- Real cost increases compared to those used in the RIT-D analysis;
-
- Variations to the AER estimated VCR; or
- Credible changes to the commercial discount rate.

Proceeding with the network investment is not found to be sensitive to changes in these variables.

Appendix A – Checklist of compliance clauses

This table below sets out a compliance checklist that demonstrates the compliance of this FPAR with the requirements of clause 5.17.4(r) of the NER version 235.

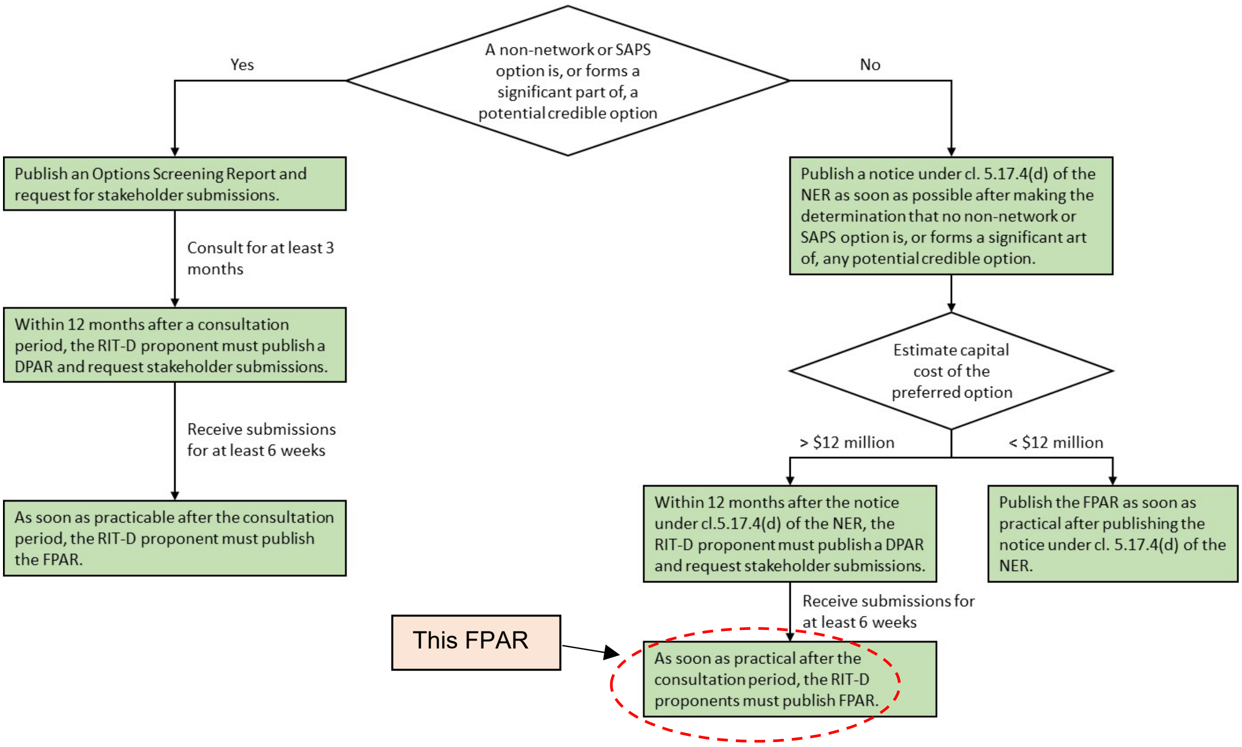
Clause	Summary of requirements	Section in the FPAR
5.17.4(r)	The matters specified as requirements for the DPAR, as outlined below in clause 5.17.4(j).	See below
	A summary of any submissions received on the DPAR and the RIT-D proponent's response to each such submission	NA
5.17.4(j)	(1) a description of the identified need for the investment	2.2
	(2) the assumptions used in identifying the identified need	2.3
	(3) if applicable, a summary of, and commentary on, the submissions on the non-network options report	NA
	(4) a description of each credible option assessed	3
	(5) where a DNSP has quantified market benefits, a quantification of each applicable market benefit for each credible option	5.1
	(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure	5.2
	(7) a detailed description of the methodologies used in quantifying each class of cost and market benefit	4
	(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	Appendix C
	(9) The results of a net present value analysis of each of credible option and accompanying explanatory statements regarding the results	5
	(10) the identification of the proposed preferred option	6
	(11) for the proposed preferred option, the RIT-D proponent must provide: (i) details of technical characteristics; (ii) the estimated construction timetable and commissioning date (where relevant); (iii) the indicative capital and operating cost (where relevant); (iv) a statement and accompanying detailed analysis that the proposed preferred option satisfies the RIT-D; and (v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent	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.	1.4
	(13) if the estimated capital cost of the proposed preferred option is greater than $100 million (as varied in accordance with a cost threshold determination), include the RIT reopening triggers applying to the RIT-D project.	6

In addition, the table below outlines a separate compliance checklist demonstrating compliance with the binding guidance in the latest AER RIT-D guidelines relating to cost estimation (i.e., the new requirements added from the AER's review of the guidelines following the MCC Rule change).

Guidelines section	Summary of requirements	Section in the FPAR
3.5A.1	Where the estimated capital costs of the preferred option exceeds $100 million (as varied in accordance with a cost threshold determination), a RIT–D proponent must, in a RIT-D application: • outline the process it has applied, or intends to apply, to ensure that the estimated costs are accurate to the extent practicable having regard to the purpose of that stage of the RIT-D • for all credible options (including the preferred option), either o apply the cost estimate classification system published by the AACE, or o if it does not apply the AACE cost estimate classification system, identify the alternative cost estimation system or cost estimation arrangements it intends to apply, and provide reasons to explain why applying that alternative system or arrangements is more appropriate or suitable than applying the AACE cost estimate classification system in producing an accurate cost estimate	4.2
3.5A.2	For each credible option, a RIT-D proponent must specify, to the extent practicable and in a manner which is fit for purpose for that stage of the RIT-D: • all key inputs and assumptions adopted in deriving the cost estimate • a breakdown of the main components of the cost estimate • the methodologies and processes applied in deriving the cost estimate (e.g. market testing, unit costs from recent projects, and engineering-based cost estimates) • the reasons in support of the key inputs and assumptions adopted and methodologies and processes applied • the level of any contingency allowance that have been included in the cost estimate, and the reasons for that level of contingency allowance	3 & 4.2
3.8.1	Where the estimated capital cost of the preferred option exceeds $100 million (as varied in accordance with an applicable cost threshold determination), a RIT-D proponent must undertake sensitivity analysis on all credible options, by varying one or more inputs and/or assumptions.	5.4
3.9.4	If a contingency allowance is included in a cost estimate for a credible option, the RIT-D proponent must explain: • the reasons and basis for the contingency allowance, including the particular costs that the contingency allowance may relate to, and • how the level or quantum of the contingency allowance was determined.	3.5

Appendix B – Process for implementing the RIT-D

For the purposes of applying the RIT-D, the NER establishes a three-stage process: (1) the Non-Network Options Report (or notice circumventing this step); (2) the DPAR; and (3) the FPAR. This process is summarised in the figure below.



Appendix C – Market benefit classes considered not material

The market benefits that Ausgrid considers will not materially affect the outcome of this RIT-D assessment include:

- Changes in the timing of unrelated expenditure;
- Changes in voluntary load curtailment;
- Changes in costs to other parties;
- Changes in load transfer capability and capacity of embedded generators to take up load;
- Option value;
- Changes in electrical energy losses; and
- Changes in Australia's greenhouse gas emissions.

The reasons why Ausgrid considers that each of these categories of market benefit is not expected to be material for this RIT-D are outlined in the table below.

Table C. 16 – Market benefit categories under the RIT-D not expected to be material

Market benefits	Reason for excluding from this RIT-D
Timing of unrelated expenditure	While a new Wallumatta STS would be designed to supply large customers in the area, it will free up capacity on the existing zone substations to supply residential and smaller commercial loads. In addition, it is expected that a new STS will release capacity on the 11kV network to supply the load growth expected from the rezoned Macquarie Park area for around ten years (meaning that only minor network augmentations are expected to be required). These impacts have not been quantified in the RIT-D assessment as they are not considered material as each of the four options for the new STS will have the same impact. The options are also not expected to affect the timing or amount of any other expenditure for unrelated needs.
Changes in voluntary load curtailment	The level of voluntary load curtailment currently present in the National Electricity Market is limited. Where the implementation of a credible option affects pool price outcomes, and in particular results in pool prices reaching higher levels on some occasions than in the base case, this may have an impact on the extent of voluntary load curtailment. None of the options in this RIT-D are not expected to affect the pool price and so there is not expected to be any changes in voluntary load curtailment.
Costs to other parties	This category of market benefit typically relates to impacts on generation investment from the options. The options in this RIT-D will not affect the wholesale market and so we have not estimated this category of market benefit.
Changes in load transfer capacity and embedded generators	Load transfer capacity between substations is predominantly limited by the high voltage feeders that connect substations. The options under consideration do not affect high voltage feeders and therefore are unlikely to materially change load transfer capacity. Further, the options are unlikely to enable embedded generators in Ausgrid's network to be able to take up load given the size and profile of the load serviced by network assets considered. Consequently, Ausgrid has not attempted to estimate any benefits from changes in load transfer capacity and embedded generators.
Option value	Option values 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 have sufficiently flexible to respond to that change. The credible options assessed do not involve stages or any other flexibility and so we do not consider that option value is relevant.
Changes in electrical energy losses	Ausgrid does not expect that the credible options considered will lead to significant changes in network losses and so have not estimated this category of market benefits.
Changes in Australia's greenhouse gas emissions	None of the options are expected to result in materially different levels of greenhouse gas emissions (including sulphur hexafluoride (SF6) emissions), as they do not affect either the pattern of generator dispatch in the wholesale market or the level of expected SF6 leakages from network assets.

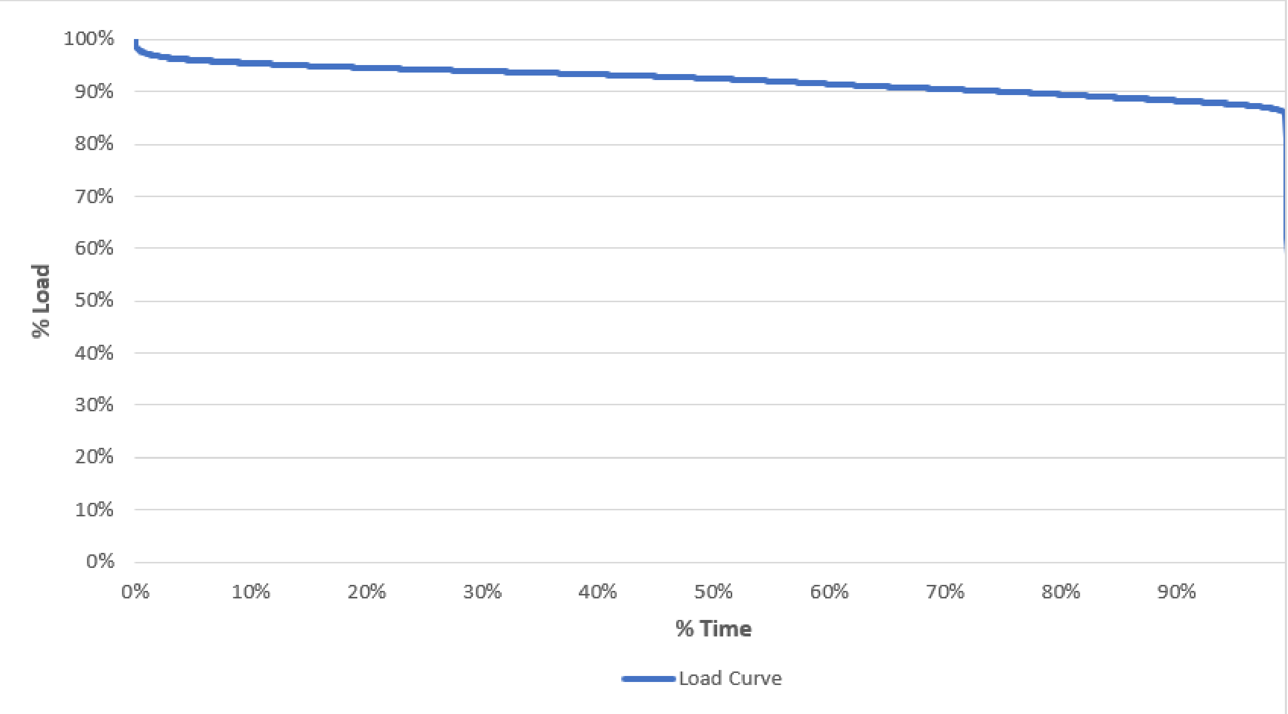
Appendix D – Additional detail on the assessment methodology and assumptions

This appendix provides additional detail on key input assumptions that are used in the evaluation of the base case and the credible options.

D.1 Characteristic load duration curve

The load duration curve used in the analysis is presented in the figure below. It is assumed that the load types supplied will not change substantially into the future and therefore the load duration curve will maintain its characteristic shape.

Figure D.1 – Load duration curve



D.2 Probability of failure

Ausgrid has adopted probability models to estimate expected failure of different network assets. A summary of the models adopted, and the key parameters used are summarised in the table below.

Table D.17 – Summary of failure probability models used to estimate failure probability.

Network asset type	Failure probability model	Key parameters
Subtransmission substation transformer	Weibull distribution function	Transformer failure rate Age of transformer at failure in years Repair time

Transformers

The failure rate of transformers is expressed in terms of the Weibull distribution with sets of parameters for different transformer types.

Table D.18 – Subtransmission Substation transformer parameters

Transformer	Type	Year of commissioning	μ factor	Q factor	MTTR (Weeks)*
Transformer No.1	132kV Bushing Type	2021	160.8	2.33	6
Transformer No.2	132kV Bushing Type	2021	160.8	2.33	6
Transformer No.3 (project in progress)	132kV Bushing Type	2025	160.8	2.33	6

* Mean Time To Repair

The following equation is used to calculate the yearly major failure rates based on the Weibull parameters related to the subtransmission substation transformer.

Equation 1

$$f = \left(\frac{\beta}{\mu}\right) \times \left(\frac{t}{\mu}\right)^{(\beta-1)}$$

Where:

f is the failure rate

t is the age (in years)

β is the shape parameter

μ is the scale parameter

Equation 2 shows how the failure rate is used to calculate unavailability for failures.

Equation 2

$$U = \frac{f \times MTTR_{weeks}}{52 + f \times MTTR_{weeks}}$$

Unavailability of each network element is calculated for pre switching and post switching scenarios, by using Equations 3 and 4.

Equation 3

$$Pre-switching\ unavailability = \frac{8760 \times \lambda \times r_s}{f \times r_r + 8760}$$

Equation 4

$$Post-switching\ unavailability = \frac{8760 \times \lambda \times (r_r - r_s)}{f \times r_r + 8760}$$

Where:

f is the failure rate

r_s is the switching time (in hours)

r_r is the repair time (in hours)

Ausgrid