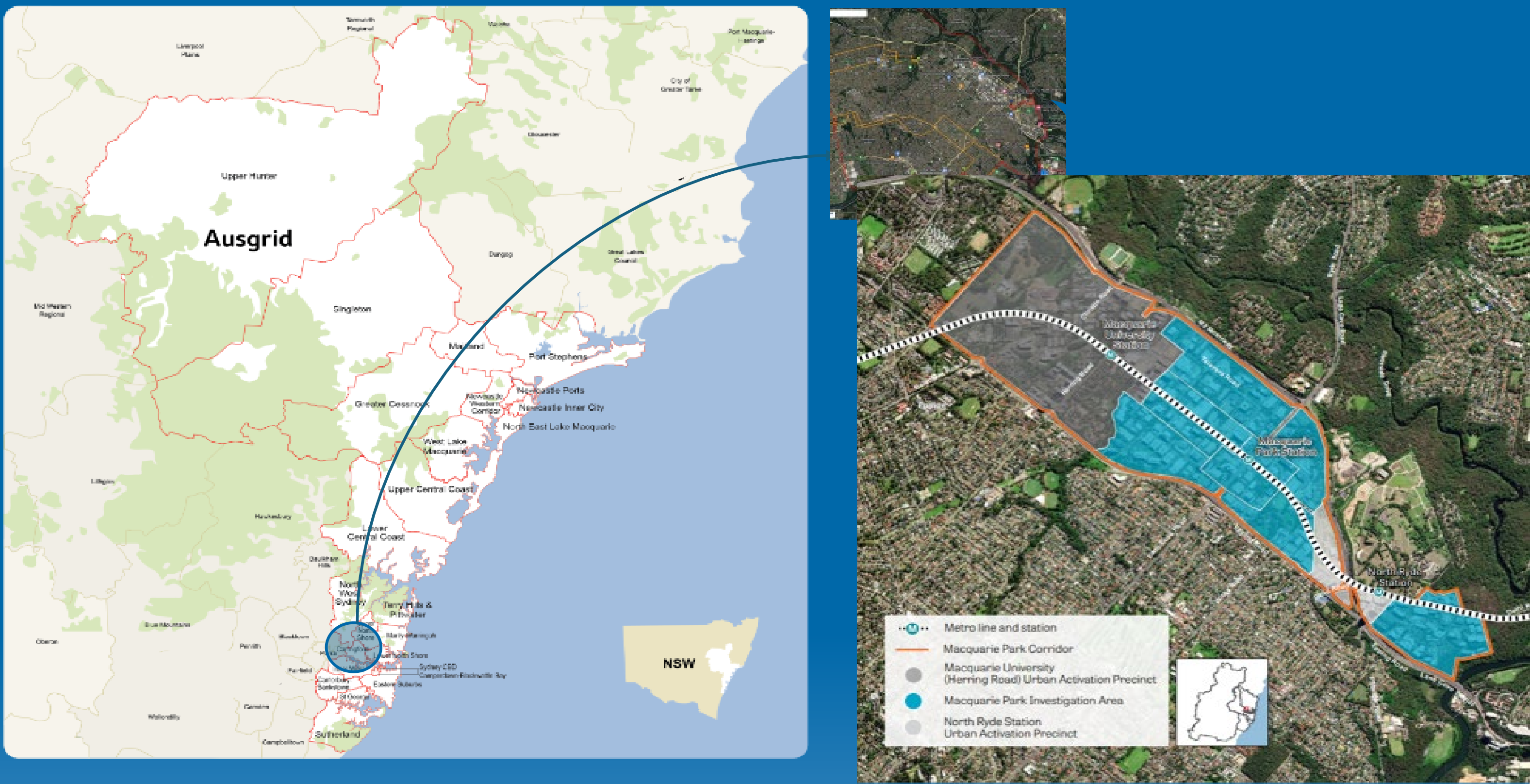
Addressing increased customer demand requirements in the Macquarie Park area

NOTICE ON SCREENING FOR SAPS AND NON-NETWORK OPTIONS



15 August 2024

Ausgrid

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Addressing increased customer demand in the Macquarie Park area

Notice on screening for SAPS and non-network options – August 2024

Title of Contents

1 Introduction

This Options Screening Notice has been prepared in accordance with the application of the Regulatory Investment Test for Distribution (RIT-D) process under clause 5.17.4(d) of the NER, and in line with the Draft Project Assessment Report (DPAR) publication to options for addressing the expected capacity constraints in the Macquarie Park supply area of Ausgrid's network in the near future.

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 increasingly popular location for major load customers.

Ausgrid has received a lot of interest from new major load customers in the Macquarie Park area in recent years and has subsequently expanded the capacity of the distribution network to accommodate these loads. Specifically:

- During the second half of 2018, we undertook a RIT-D to address the connection of several new major loads in the area, which found that a new 132/33kV Macquarie subtransmission substation (STS) was the preferred option in light of the expected demand at that point in time – the Macquarie STS was subsequently built and commissioned in July 2021, and the major customers were connected between June 2022 and April 2023.
- In early 2023, we completed a subsequent RIT-D 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 Park 132/33kV STS – the third transformer is on track to be commissioned by December 2025, with the two major customers expected to be connected around the same time.

Once the third transformer is installed at the existing Macquarie STS, there will be five major customer loads connected to that STS and these loads will be using up all available connection bays at that STS. Physical site restrictions mean that no additional bays, and thus new loads, can be accommodated at the existing STS and so any new loads need to be accommodated using other means. This was noted 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 further transformers at the Macquarie STS[1].

We have since received a further four connection applications from major customers seeking to connect in the Macquarie Park area and have commenced this RIT-D to investigate the options for facilitating these connections. Each of these four applications requests connection from December 2028 and that the connection is provided at 33kV.

As outlined in the DPAR, 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 acknowledge its indigenous history.

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[2] 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).[3]

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

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

[3] 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, and 49-51.

The AER being satisfied that Ausgrid has satisfactorily completed a RIT-D to determine the preferred option for connecting additional major customer loads in the Macquarie Park area is a key trigger event for the contingent project.[4] The other trigger events are:[5]

- Ausgrid receiving a connection application for a major load that requests supply at 33kV or higher voltage from the existing Macquarie STS – we consider that this has now been met as we have received a formal connection application from each of the four major customers; and
- Ausgrid making a commitment 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 National Electricity Rules (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) – this trigger event is expected to occur following completion of this RIT-D.

Once all trigger events are met, Ausgrid will submit a formal contingent project application to the AER.

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 of the capacity of the new STS.

No exemptions listed in the NER clause 5.17.3(a) apply and therefore Ausgrid is required to apply the RIT-D to this project. This notice has been prepared under cl. 5.17.4(d) of the NER and summarises Ausgrid's determination that no SAPS and non-network option forms all or a significant part of any potential credible option for this RIT-D. It sets out the reasons for Ausgrid's determination, including the methodologies and assumptions used. A full discussion of asset conditions and the identified need can be found in the Draft Project Assessment Report (DPAR) for addressing increased customer demand in the Macquarie Park area.

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[4] AER, *Ausgrid electricity distribution determination 2024 to 2029 (1 July 2024 to 30 June 2029)*, Final decision, Attachment 5, Capital expenditure, April 2024, pp 49-51.

[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 49-51.

2 Description of the identified need

2.1 Overview of the existing supply arrangements

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.

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.

Figure 1 below shows a diagram of the Ausgrid's subtransmission network infrastructure in the Carlingford network area, using red lines to represent 132kV connections, blue lines to represent 66kV connections, and circles to represent both subtransmission and zone substations.

Figure 1: Overview of the subtransmission network supplying the Carlingford area

The Macquarie Park area has developed into a significant hub in Sydney for large customers with major loads due to the proximity of telecommunications (i.e. major optical fibre trunk connections), electricity and transportation infrastructure.

In the last two years, Ausgrid has connected three large customers and is in the process of connecting a further two (both of which are due to be connected by December 2025). The network was significantly augmented to accommodate the connection of these five major loads – specifically:

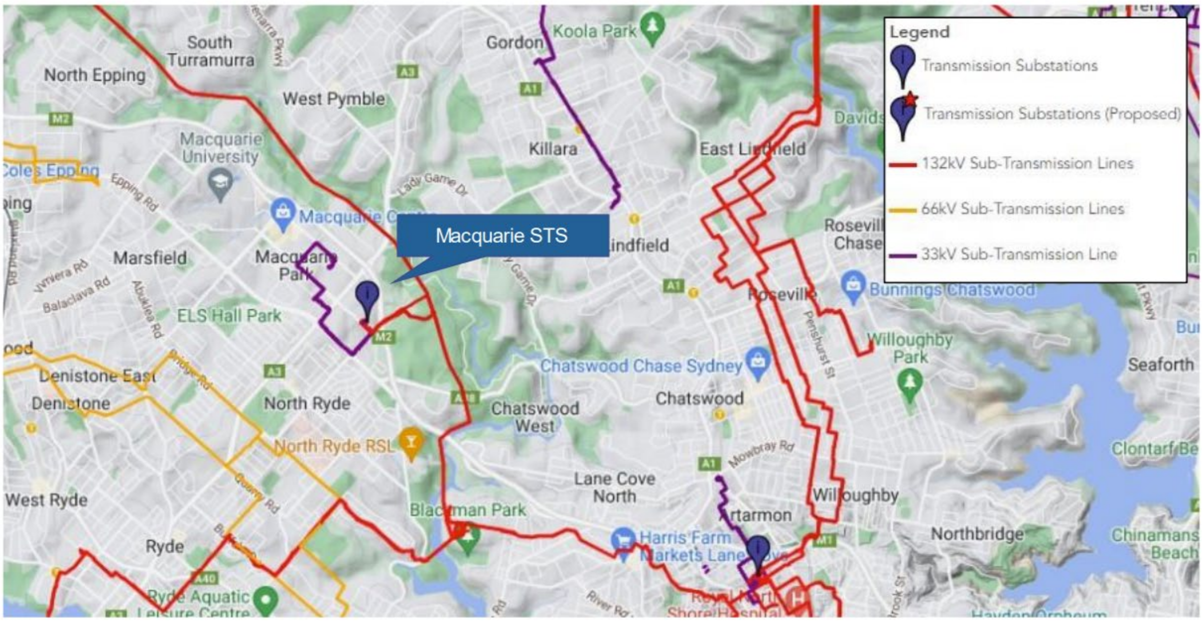
- During the second half of 2018, we undertook a RIT-D to address connection of these new loads in the area, which found that a new 132/33kV Macquarie STS was the preferred option in light of the expected demand at that point in time; and
- In early 2023, we completed a subsequent RIT-D to accommodate 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 subsequently built and commissioned in July 2021, and the three initial major customers were connected between June 2022 and April 2023. The third transformer is on track to be commissioned by December 2025, with the two additional major customers expected to be connected around the same time.

The existing Macquarie STS 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. It is co-located within the same site as the existing Macquarie 132/11kV Zone Substation (ZS), in Waterloo Rd, Macquarie Park.

Figure 2 illustrates where the existing Macquarie 132/33kV STS sits in the wider Carlingford network area.

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



Once the third transformer is installed at the existing Macquarie STS, there will be five major customer loads connected to that STS and these 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 December 2028 at 33kV,

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

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.

There is also additional connection interest from major customers other than those who have already made formal connection applications. These companies have plans to expand their footprint in the Macquarie Park vicinity and the broader Sydney region. So far Ausgrid has received one formal connection enquiry and expects to receive more in the near term.

Considering the scale of the forecast load, Ausgrid considers that establishing a new 33kV 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 December 2028 for all four loads.

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.

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:

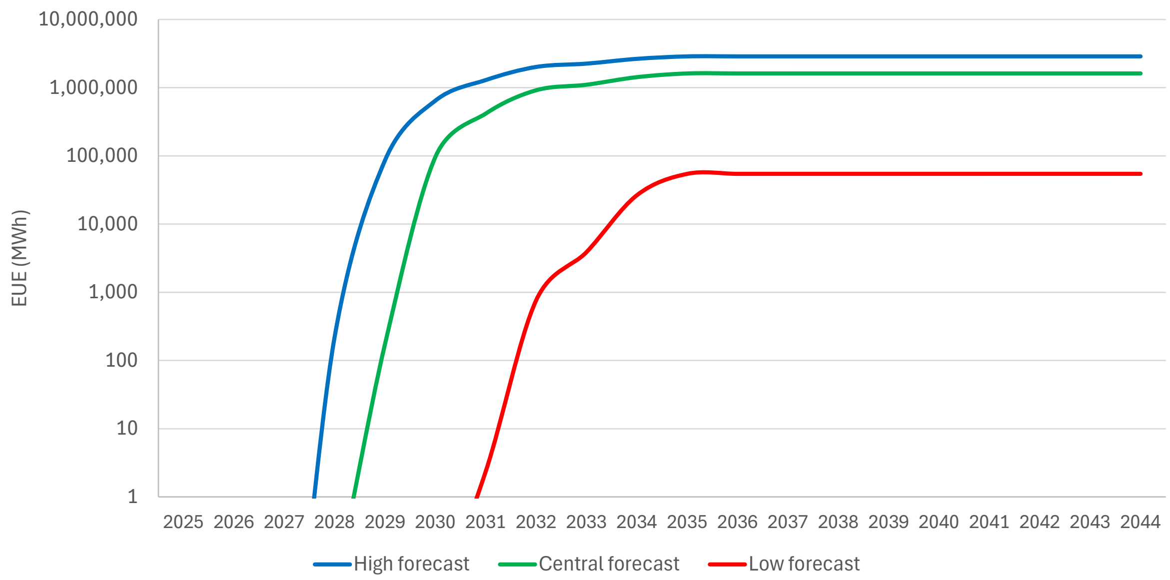
- A central forecast assuming 85% scaled load from the proposed major loads;
- A low demand forecast assuming 60% scaled load from the proposed major loads; and
- A high forecast assuming 100% scaled load from the proposed major loads.

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 major 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.

2.3.1 EUE Forecast

Figure 3 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).

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



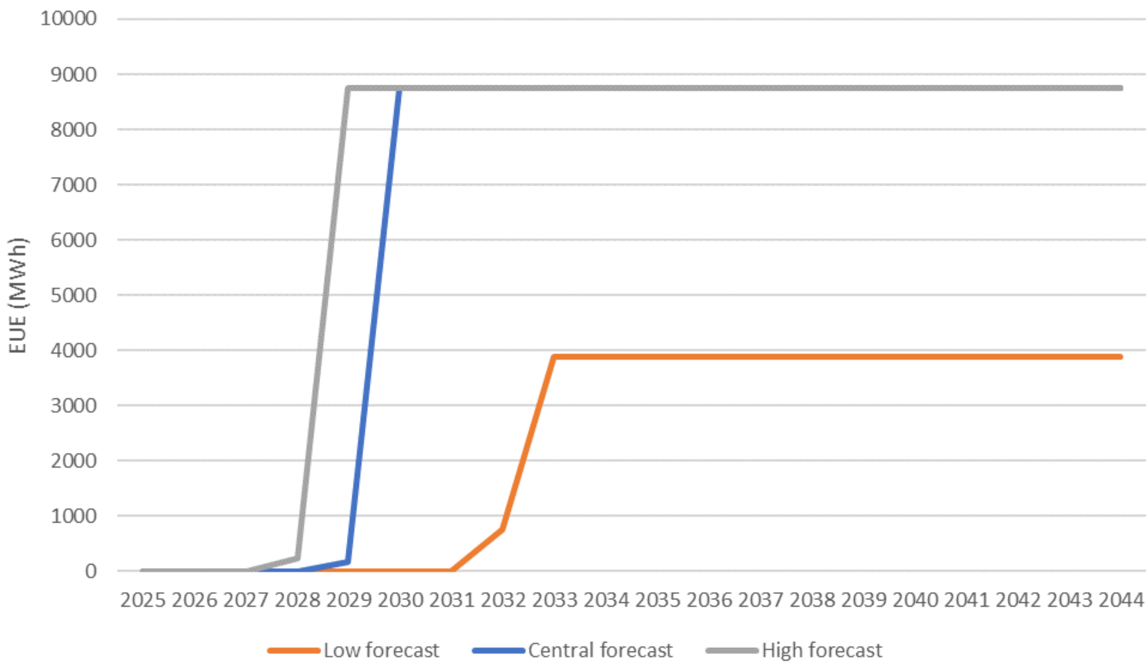
We have capped the level of EUE under all three demand forecasts in the NPV assessment. This cap is not reflected in the figure above (which shows the full EUE forecasts). Since the base case reflects a 'do nothing' approach with rapidly escalating EUE, we consider it appropriate to cap the level of 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.

[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*

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 4 below 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)

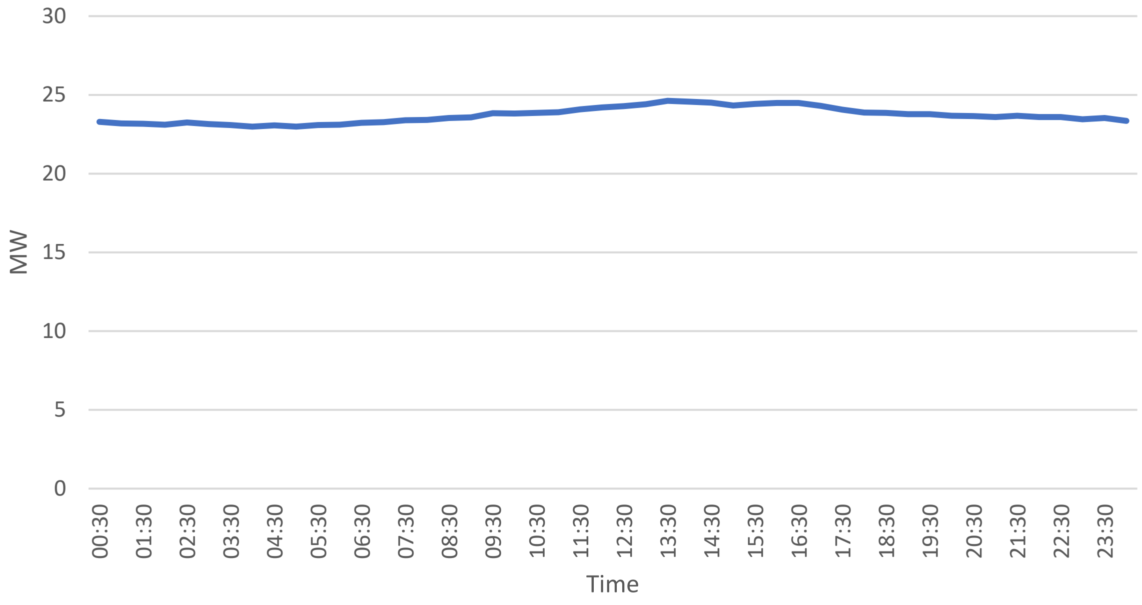


2.3.2 Pattern of use

As described in Section 2.1, Macquarie STS was built and commissioned in July 2021. Existing major customers consisting of mainly data centres were connected to the existing Macquarie STS between June 2022 and April 2023. Figure 5 below shows a typical data centre demand profile at Macquarie STS.

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%20Po wering%20Sydney%20s%20Future%20%20program%20-%20May%202017.pdf

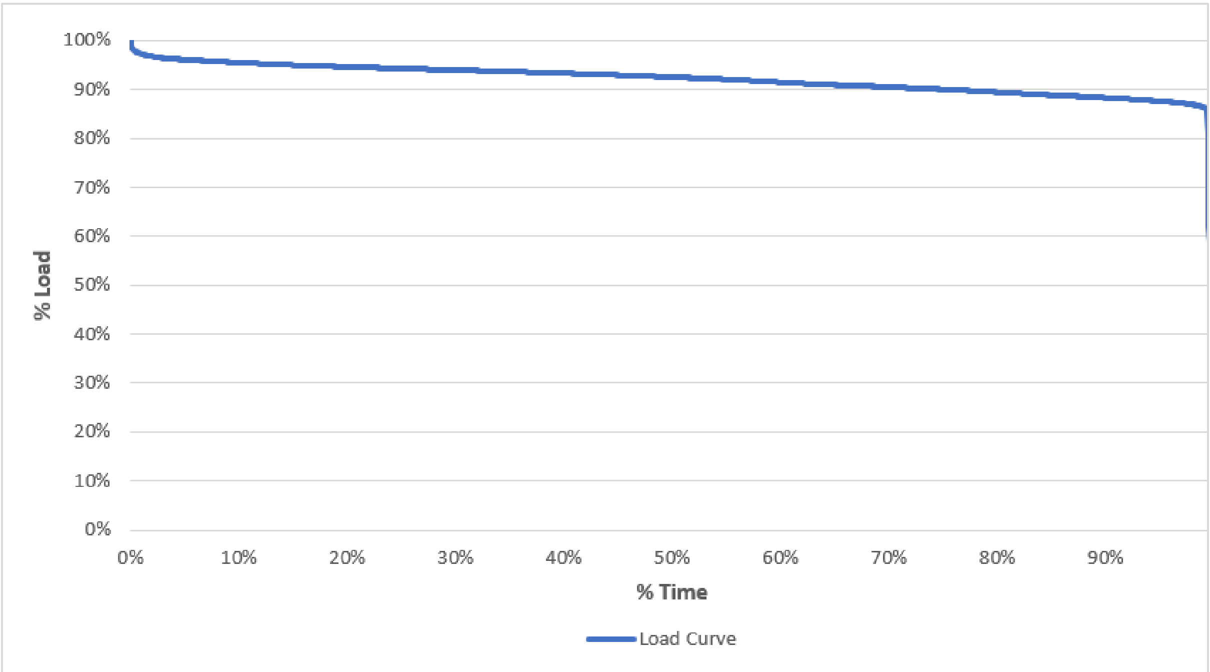
Figure 5: Data centre demand profile



2.3.3 Load Duration Curve

The load duration curve used in the analysis is presented in the Figure 6 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 6: Load duration curve



3 Proposed preferred network option

This section provides details of the four credible options that Ausgrid has identified as part of its network planning activities. Each credible option has been developed following a comprehensive assessment of the various potential dimensions for supply arrangements to connect the requested load, including connection to the upstream network, substation configuration and physical location.

For continuity with the AER business case, we have continued with the option numbering in the DPAR, i.e., the four credible options assessed in this DPAR are 'Option 4' (which was included in the business case) through to 'Option 7' (noting that Options 5-7 were not included in the business case and have been developed as part of the DPAR).

Fundamentally, the four credible options assessed differ by:

- Substation arrangement – Option 4 and Option 5 involve a new 132/33kV STS, while Option 6 and Option 7 also involve a new 132/33kV STS but include an expanded 132kV busbar to facilitate possible future 132kV connections; and
- Location of the new STS site – Option 4 and Option 6 assume the same site, while Option 5 and Option 7 assume another site.

The specific locations of the sites have been redacted to not affect the subsequent procurement process and, instead, we only refer to 'site 1' (for Option 4 and Option 6) and 'site 2' (for Option 5 and Option 7). Both sites are in close proximity to where the customers are proposing to locate.

Three of the four options presented in the contingent project business case submitted as part of our current regulatory determination process are no longer considered credible, primarily in light of a fundamental change in the value of the land required since the business case was submitted due to recent rezoning by the NSW Government. These options are discussed below as 'options considered but not progressed', along with all other options Ausgrid has considered to-date.

All options have an approximate 4.5 years of construction time and Ausgrid assumes that the necessary construction would commence as soon as practicable after this RIT-D (and the subsequent contingent project application being approved by the AER). All credible options are expected to be commissioned in 2028/29.

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

Table 1: Summary of the credible options considered

Overview	Key components	Estimated network augmentation capital cost

Option 4 involves a new 132/33kV STS at site 1, connected via East Ryde Transition Point to feeders 92G and 92J. Option 4 was included in the contingent project business case as part of our current regulatory determination process.	The scope of this option includes the:
	• Acquisition of property at site 1;
	• Construction of the new Wallumatta 132/33kV STS, comprising:
	  o 3 transformer units;
	  o A new switchroom building; and
	  o 28 indoor circuit breakers; and
	• Installation of two 132kV feeder connections to tee off from East Ryde Transition Point to the new Wallumatta STS, comprising:
	  o Two pole structures to connect to East Ryde Transition Point;
	  o The construction of ductline from the transition point to the substation site;
	  o Construction of bore under major roads;
	  o The installation of cables between East Ryde Transition Point and the substation site;
	  o The installation of joint bays; and
	  o Termination cable works at substation cable basement.
	This option involves installation of long underground 132kV connections to tee off feeders 92G and 92J.
		$168 million

Option 5 involves a new 132/33kV STS at site 2, connected via East Ryde Transition Point to feeders 92G and 92J.	The scope of this option involves the same components as Option 4 except that the assumed property acquired is at site 2 (as opposed to site 1). The proposed Wallumatta STS and network connection arrangement is therefore the same as that shown above for Option 4.	$137 million
Option 6 involves a new STS with an expanded 132kV busbar at site 1, connected via East Ryde Transition Point using tee connections to feeders 92G and 92J.	The scope of this option involves the same components as Option 4 except that 32 circuit breakers are required at the new Wallumatta STS (as opposed to 28 under Option 4).	$176 million
Option 7 involves a new STS with an expanded 132kV busbar at site 2, connected via East Ryde Transition Point using tee connections to feeders 92G and 92J.	The scope of this option involves the same components as Option 6 except that the assumed property acquired is at site 2.	$145 million

Options 4 and 6 involve an additional $28 million each in contestable customer connection costs, while Options 5 and 7 are estimated to have additional $12 million each in contestable customer connection costs.

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 2: Network options considered but not progressed

Option	Reason why option was not progressed
Option 1 – New 132/33kV STS at site 1 looped into 132kV Feeder 92B Sydney North BSP - Lane Cove STSS Option 2 – New 132/33kV STS at site 1 looped into 132kV Feeders 92A & 92B Sydney North BSP - Lane Cove STSS Option 3 – New 132kV STSS at 'site 3' and new 132/33kV STS at site 1 looped into 132kV Feeder 92B Sydney North BSP – Lane Cove STSS.	In 2023, the NSW Department of Planning, Housing and Infrastructure proposed to rezone land in the Macquarie Park area as being suitable for residential high rise. The expectation that this will occur has significantly increased the estimated value for all options involving site 1, compared to what was assumed at the time of preparing the contingent project business case. Due to the significant increase expected in property acquisition costs of site 1, Options 1-3 are between 38% and 80% more expensive than Option 5 (the preferred option in the DPAR)[8]. Given that Options 1-3 are not expected to provide any additional benefits (or avoided costs) they are therefore not considered economically feasible under the RIT-D. In addition, relative to Options 4-7, Options 1-3 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 Option 1). • 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).

[8] The total capital expenditure, including both network augmentation and customer connection costs, of options 1, 2 and 3 are $207m, $270m and $219m respectively, while the total capital expenditure of Option 5 cost is $150m.

Option	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,[9] the scale of requested loads means that 11kV connections would not be cost effective or efficient as extensive rearrangement work would be required to facilitate load transfers and the existing 11kV network is congested and near full capacity. In addition, there are technical limitations associated with installing multiple 11kV feeders to a single large load customer (such as multiple switching stations), complex protection schemes to manage the operation and separate metering points at 11kV. We therefore do not consider that 11kV connection is economically or technically feasible under the RIT-D.
Option variants 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[10] (unlike for Feeders 92G & 92J under Options 4-7). 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. In addition, and as stated in section 2.1 above, each of the customers have requested 33kV connection. If 66kV connections were the only option, this would result in additional costs to the customers. Therefore, a 132/66kV STS is not considered economically feasible under the RIT-D.
	Direct supply at 132kV options considered further following the business case
Option 8 – New 132kV STSS (expandable) at site 1 looped into 132kV Feeder 92B Option 9 - New 132kV STSS (expandable) at site 1 tee connected to 132kV Feeders 92G & 92J Option 10 - New 132kV STSS (expandable) at site 2 tee connected to 132kV Feeders 92G & 92J Option 11 - New 132kV STSS (expandable) at 'site 3' looped into 132kV Feeder 92B	Each customer would have to install switching equipment and substations onsite to reduce voltage to required internal levels for these options, which would occupy areas on their properties that otherwise could be used for their core business activities. While these options involve similar network augmentation capital expenditure to Options 4-7,[11] the additional connection costs required mean that they are considered overall materially higher cost options (in the order of 56-132% higher total cost than Option 5).[12] Given that Options 8-11 are not expected to provide any additional benefits (or avoided costs) compared to Options 4-7, they are therefore not considered economically feasible under the RIT-D. In addition, relative to Options 4-7, Options 8-11 have a range of other drawbacks, including: • That customers have requested 33kV input supply. • Assets will be underutilised, as customers requirements are well below the capacity that each 132kV feeder bay can provide (i.e., at least 286MVA). • Customer will have less space available at their sites to grow (i.e., add load). • Rating constraints at Feeder 92B (Option 8). • Under N-1 conditions, an overload will occur on tee connection 92A(2) to Macquarie Park Zone Substation (Option 8). • There are 132kV cable egress issues (Option 8, 9 and 10). • Site 3 is not suitable to accommodate a large switching station. Expansion of the site will require compulsory acquisition and national park land clearing, leading to a high risk of project delays (Option 11). • Customer connection costs would include long cable connections and excavation work under the motorway M2 (Option 11).

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

[10] 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.

[11] Specifically, the network augmentation capital expenditure for these options is estimated at $169 million for Option 8, $159 million for Option 9, $128 million for Option 10 and $166 million for Option 11.

[12] The total capital expenditure, including network augmentation and customer connection costs, of options 8, 9, 10 and 11 are $295m, $284m, $233m and $347m respectively, while the total capital expenditure of Option 5 cost is $150m.

Refer to the Draft Project Assessment Report for further details about the options assessment methodology and scenario analysis.

3.1 Preferred option at this stage

Ausgrid considers that Option 5 is the preferred option that satisfies the RIT-D. It involves a new 132/33kV STS at site 2, connected via East Ryde Transition Point to feeders 92G and 92J.

The scope of this option 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 circuit breakers; and
- Installation of two 132kV feeder connections to tee off from East Ryde Transition Point to the new 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 Lane Cove/Epping Rd (the motorway);
  - 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 $137 million, comprising:

- $89.0 million for commissioning a new 132/33kV STS with 3x120MVA transformers and 3x33kV switchgroups; and
- $63.4 million for the associated 132kV connections to tee off from Feeder 92G & 92J.

Additional routine network operating costs under this option are expected to be around $143,000 per year.

In addition, Option 5 is estimated to involve an additional $12 million in contestable customer connection costs.

Overall, Option 5 is the lowest cost of all four credible options assessed in the DPAR.

Ausgrid assumes that the necessary construction would commence as soon as practicable after this RIT-D, and the subsequent contingent project application being approved by the AER, and end in 2028/29 ahead of when customers are expected to connect (in December 2028).

Refer to the Draft Project Assessment Report for this project for further details about the options assessment.

4 Assessment of SAPS and non-network solutions

4.1 Required demand management characteristics

To be considered a feasible option, any demand management solution must be technically feasible, commercially feasible, and able to be implemented in sufficient time by 2028/29 for deferral of the network investment.

4.2 Available demand management funds

The driver for the proposed investment and timing of the proposed Wallumatta STS is the need to provide connections, capacity and the relevant reliability to meet the requirements of several large customers. The connection requests from these customers are for 33kV supplies with N-1 reliability requirements.

It is not appropriate to attempt to defer the connection date for new customer connections. Whilst it is considered that any demand management activities will have minimal impact on the connection date, and will not defer or avoid the proposed investment, an attempt to identify the available funds for a possible demand management solution has been carried out via Net Present Value (NPV) analysis, where the net NPV for the network option is compared against the net NPV of deferral scenarios.

In line with the Draft Project Assessment Report, and as described in 2.3.1, we have capped the relevant level of EUE under all three demand forecasts in the NPV assessment. Since the base case reflects a 'do nothing' approach with rapidly escalating EUE, which is unrealistic, we consider it appropriate to cap the level of EUE to avoid a situation where an exponential increase in EUE skews the results (this approach does not affect the identification of the preferred option as network options avoid EUE equally). If uncapped, the EUE will increase significantly because every MW of load will be unserved if corrective action is not taken. Refer to the Draft Project Assessment Report for further details about the key assumptions that underpin the identified need.

Table 3 below shows the available funds for a deferral of the network investment for 1, 2 and 3 years. The required peak demand reduction is significantly large due to the proposed large customer connections.

Table 3: Required demand reduction and available funds

Demand Scenario	Required demand reduction (MVA)*		
	1st Year deferral	2nd Year deferral	3rd Year deferral
Low	258.6	306	342
Central	366.4	433.5	484.5
High	431	510	570
Available demand management Funds	**$5.7m**	**$11.3m**	**$16.7m**

*The proposed investment is driven by new large customers. Given the large magnitude of the loads, loading characteristics and 24/7 operational requirements, the Non-network and Demand Management solutions must materially offset the 24/7 operational demand of the large customers. Available funds have been calculated accordingly.

- For a 1-year deferral, at least 258.6MVA (low demand scenario) of demand reduction is required in 2028/29 with total available demand management funds of $5.7m, which is equivalent to $22.1/kVA/year,
- For a 2-year deferral, at least 258.6MVA (low demand scenario) of demand reduction is required in 2028/29 and 306MVA in 2029/30 with total available demand management funds of $11.3m, which is equivalent to $20.0/kVA/year, and

- For a 3-year deferral, at least 258.6MVA (low demand scenario) of demand reduction is required in 2028/29, 306MVA in 2029/30 and 342MVA in 2030/31 with total available demand management funds of $16.7m, equivalent to $18.5/kVA/year.

These are the parameters considered for determining the feasibility of demand management solutions as outlined in section 4.3 below. The available demand management funds for the central and high demand scenarios will be lower than the figures specified above.

4.3 Options considered

Ausgrid has considered Stand Alone Power Systems (SAPS) and other demand management solutions to determine their commercial and technical feasibility to assist with the identified need for Wallumatta STS. Each of the solutions considered is summarised below.

4.3.1 Stand Alone Power Systems (SAPS)

SAPS self-generate, store and supply electricity to connected customers that are physically disconnected to the wider electricity grid. Typical SAPS are made up of solar panels, a battery storage system and a back-up diesel generator.

Ausgrid is currently trialing SAPS with selected customers living in fringe-of-grid areas of Ausgrid's network[13]. The program aims to explore how SAPS can provide an alternative electricity supply solution that improves reliability and safety of our service to remote and rural customers, as well as being sustainable and cost-effective.

Ausgrid's experience with proposals from SAPS providers during the trial has provided insights on the cost of SAPS. On average it would cost $50k-100k or more to supply a typical residential customer (based on their annual energy usage) using a SAPS. Assuming a mid-point SAPS cost of $75k each, the amount of load that that Ausgrid would be able to supply via SAPS using all the available funds would be equivalent to only 76 to 223 residential customers. This is not sufficient to reduce, defer or postpone the proposed preferred network solution.

4.3.2 Other demand management options

As described earlier in Section 1, the major data centre customers are expected to utilise the majority 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 of the capacity added to the network.

The magnitude of the load reduction required is such that available funds to implement demand management initiatives will be very small, equivalent to $19-22/kVA/year. There is no demand management solution mix that could meet the required demand reductions with the funds that are available.

5 Conclusion

Based on the demand management options considered in Section 4, it is not considered possible that sufficient demand management measures could be feasibly implemented to achieve the required demand reduction to make project deferral technically and economically viable. Consequently, an Options Screening Report has not been prepared in accordance with rule 5.17.4(c) of the National Electricity Rules.

[13] https://www.ausgrid.com.au/In-your-community/Stand-Alone-Power-Systems