Providing Supply to the Aerotropolis Core Precinct

Options screening notice
7 October 2022

Endeavour Energy

CONTACT

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1. Introduction

The Western Sydney 'Aerotropolis' area is a greenfield development of a new city covering 11,000 hectares of land, which will spearhead Western Sydney's future urbanisation. The proposed development features a precinct-based land use and zoning approach that will require significant development of electricity infrastructure to meet the needs of the area over the long term. This includes the Aerotropolis Core Precinct, which is planned for dense urban development centred around a new central business district including the proposed Aerotropolis Metro Station. The precinct forms one of the priorities of the Aerotropolis Precinct Plan focusing on commercial, enterprise and light industry and including mixed density residential, retail and education. Developments in this area are expected to require approximately 140MVA of electricity supply capacity by 2041.

We have already applied the Regulatory Investment Test for Distribution (RIT-D) to determine the most efficient means of providing the foundation supply to the Aerotropolis area – a 132kV backbone feeder.[1] We are now commencing this RIT-D to determine the most efficient means of providing supply to the Aerotropolis Core Precinct. Although we expect there to be significant market benefits associated with providing supply to the Aerotropolis Core Precinct, we consider the need for this investment a 'reliability corrective action' due to our regulatory obligations to connect new customers. These regulatory obligations are set out in the box below.

'Identified need' for this Regulatory Investment Test for Distribution (RIT-D)

We have initiated a Regulatory Investment Test for Distribution (RIT-D) to investigate, and consult on, how to most efficiently provide supply to major new loads (customers) in the Aerotropolis Core Precinct.

Endeavour Energy is required to connect customers under section 5.2.3(d) of the National Electricity Rules (NER), which state 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 timing of the identified need for this RIT-D, and so the required timing for credible options to address the need, is determined by when the expected load requiring connection will exceed the existing network capacity. This is currently anticipated to be 2024/25, based on the customer connection enquiries received to date.

This options screening notice sets out the reasons why we consider that there will not be a non-network option, or Stand Alone Power Supply (SAPS) option, that could form a potential credible option on a standalone basis, or that could form a significant part of a potential credible option for the Aerotropolis Core Precinct RIT-D, i.e., in accordance with NER clause 5.17.4(c). It represents the first formal stage of the RIT-D assessing how to most efficiently provide supply to major new customers in the Aerotropolis Core Precinct.

The second formal stage of this RIT-D is a Draft Project Assessment Report (DPAR), which includes a full net present value (NPV) options assessment.

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[1] See: https://www.endeavourenergy.com.au/modern-grid/creating-the-modern-grid/network-planning/rit-d-projects.

2. Key assumptions underpinning the 'identified need' for this RIT-D

This section sets out the key assumptions and methodologies that underpin the identified need for this RIT-D. These assumptions have been used in making our determination that there will not be a potential credible non-network option, or SAPS option, on a standalone basis, or that forms a significant part of a potential credible option, i.e., in accordance with NER clause 5.17.4(c).

2.1 Relevant area of our network

The Aerotropolis Core Precinct sits within the Western Sydney Airport development area which is also referred to as the Western Sydney Aerotropolis. It is planned for dense urban development centred around a new central business district including the proposed Aerotropolis Metro Station. The precinct forms one of the priorities of the Aerotropolis focusing on commercial, enterprise and light industry and including mixed density residential, retail and education. It neighbours the Agribusiness Precinct to the west, and the Badgerys Creek Precinct to the north –Figure 1. The Aerotropolis Core Precinct sits to the south of the Airport.

Figure 1 – Overview of the Aerotropolis and the Aerotropolis Core Precinct in relation to the Western Sydney Airport

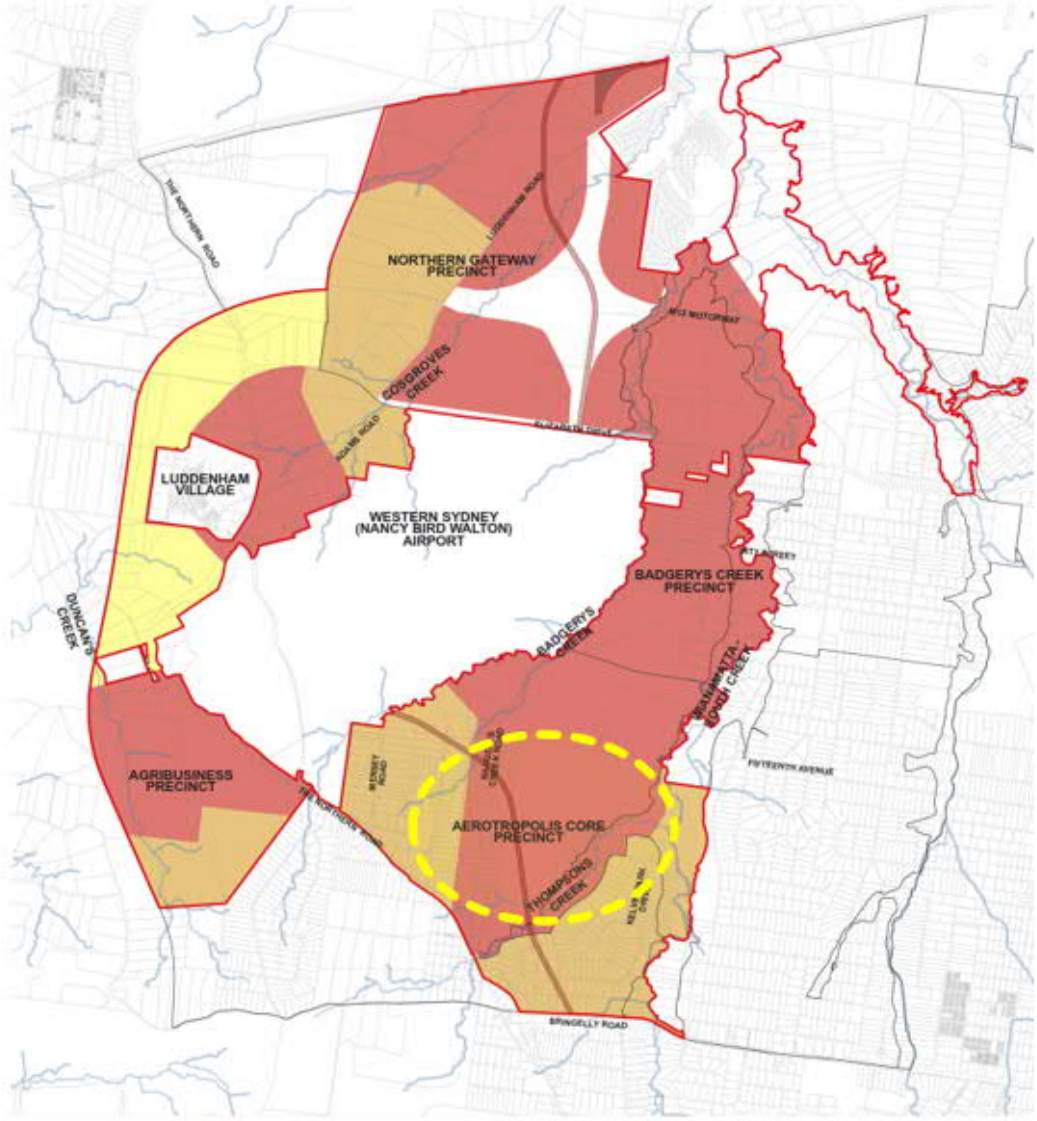
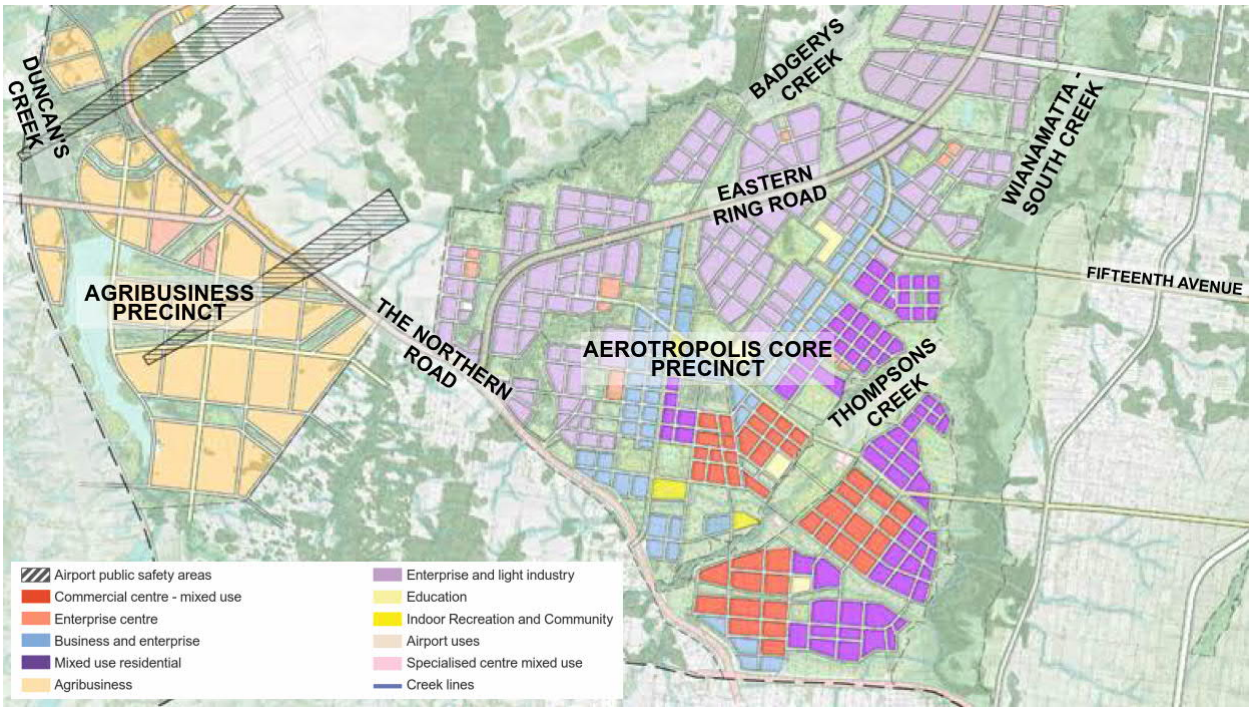


Figure 2 below shows a detailed colour coded map view of the Aerotropolis Core Precinct and the proposed land use and zoning for the area. The area will include mixed use covering commercial, enterprise and light industry and residential land use. The area will feature medium to high density buildings including building heights of upto 70m.

Figure 2 – Aerotropolis Core Precinct Proposed Land Use and Zoning



2.2 Load characteristics and demand forecast

The Aerotropolis Core Precinct proposed land use and zoning will provide a metropolitan centre with a focus on advanced manufacturing, research and development, professional services, creative industries and science, technology, engineering and mathematics-focused educational facilities. Residential developments will be centred around access to the planned Aerotropolis Metro Station.

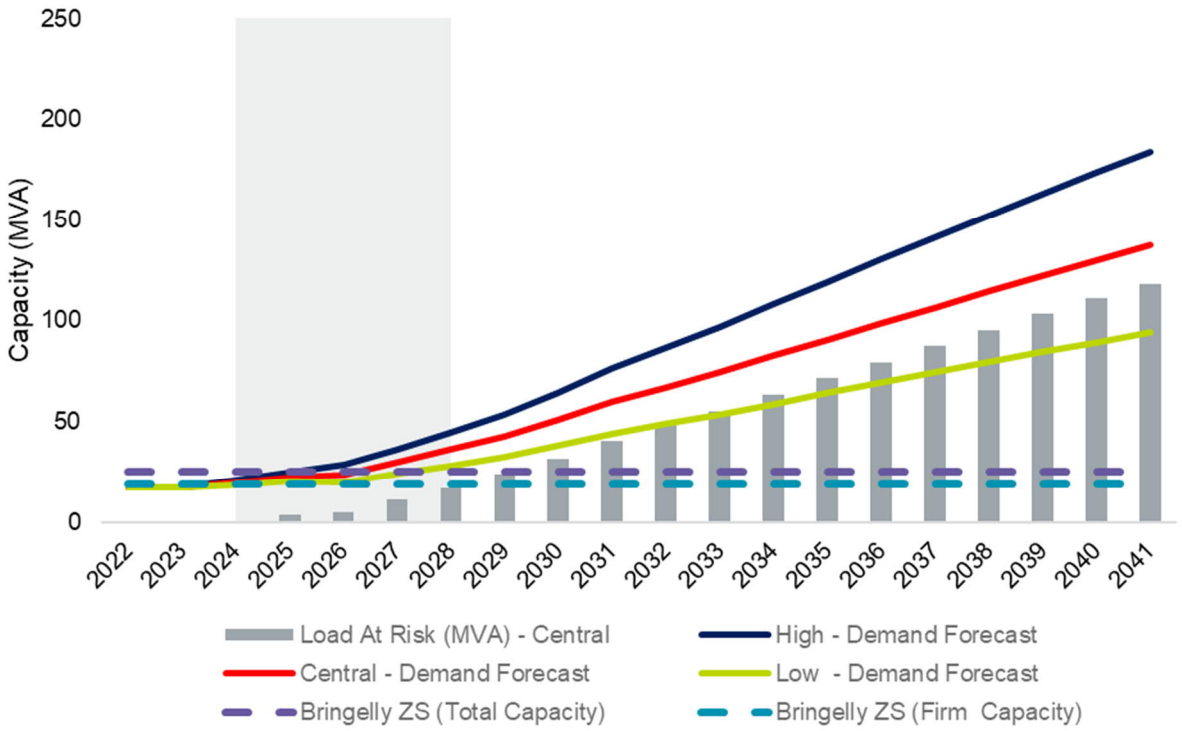
Key developments in the area include:

- the new Central Business District area within the Aerotropolis Core Precinct, which is expected to grow to a maximum demand of 67MVA over a 30-year period from 2026;
- the residual Aerotropolis Core Precinct to the north of the proposed CBD that will comprise enterprise and industrial developments, which is expected to grow to 97MVA maximum load over a 30-year period from 2024; and
- the southern portion of the Agribusiness Precinct, which is forecast to require 73MVA maximum load from 2027 onwards.

In total, the developments in this area are expected to require approximately 140MVA of capacity by 2041 to meet the forecast customer demand.

Figure 3 below shows our forecast maximum demand under a central, low and high demand scenario for the Aerotropolis Core Precinct. It also shows the available capacity (both total and firm) at the existing Bringelly Zone Substation, and the load at risk as connecting load exceeds existing capacity (the existing network is described in greater detail in section 0).

Figure 3 – Aerotropolis Core Precinct maximum demand forecasts from 2022 to 2041



The central scenario is primarily based on the proposed customer connections for the Aerotropolis Core Precinct. Endeavour Energy has close contact with developers and major customers (and their advisors) planning to connect to the network in this area. The demand forecast is based on an ultimate load estimate for the precinct, a time frame to reach that ultimate load and a load ramp up assumption, which in this case is linear. The estimated time for this precinct to reach maturity is 30 years. Probabilistic 'load realisation' factors have been applied to developer derived forecasts and that in turn is calibrated by the actual connection applications that we receive as time progresses.

A low growth scenario has been developed using a lower load realisation factor than the central scenario and a longer time frame to reach maturity.

A high growth scenario has developed on the assumption of a 100 percent load realisation factor suggesting that the full developer derived forecast will be realised within the expected time frame, and given that the subject area is a high density CBD, a higher power density (MVA/ha) value has been applied to the high growth scenario to account for full realisation of the land use and zoning plans for the area.

2.3 Expected pattern of use

Due to the fact that the area will not be fully developed for some time and the customers and their forecast loads are yet to connect, we have assessed the identified need using a representative demand profile, which assumes a representative load profile from an existing substation that we expect (at least initially),

will have similar demand characteristics as the forecast load (i.e., capturing time and seasonal demand variations).

Specifically, the demand profile is based on the Moorebank zone substation load profile (an existing commercial/industrial and light enterprise site). The existing supply capacity to the area has been included in our assessment of the identified need.

Figure 4 below presents the normalised load duration curve (LDC) assumed based on the representative demand profile, while figure 5 presents the peak load profile for a summer day assumed for the load from the customer connections associated with the Aerotropolis Core Precinct based on the representative demand profile.

Figure 4 – Normalised LDC assumed for the customers expected in the Aerotropolis Core Precinct

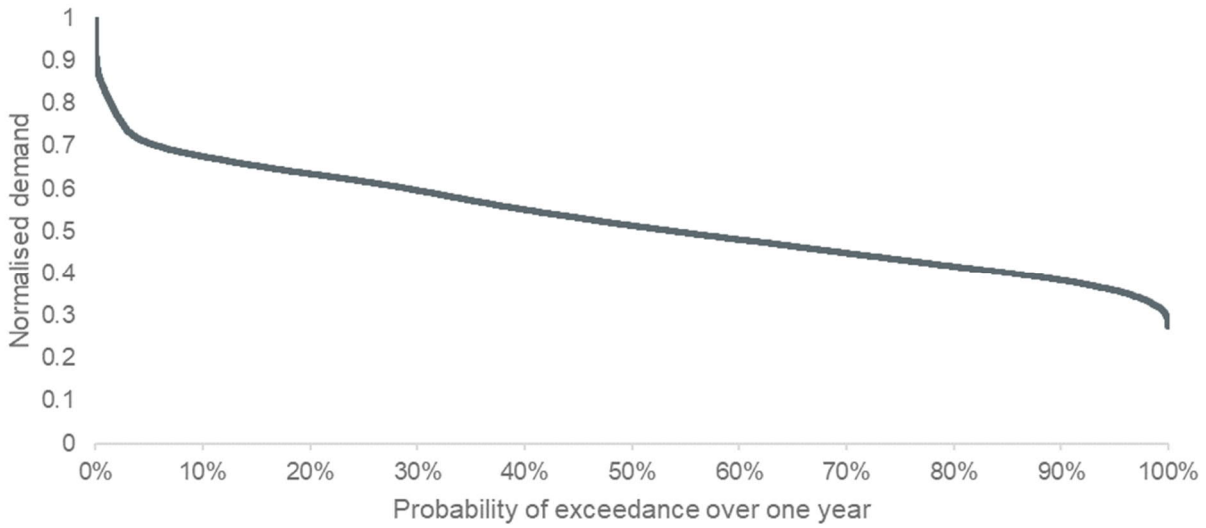
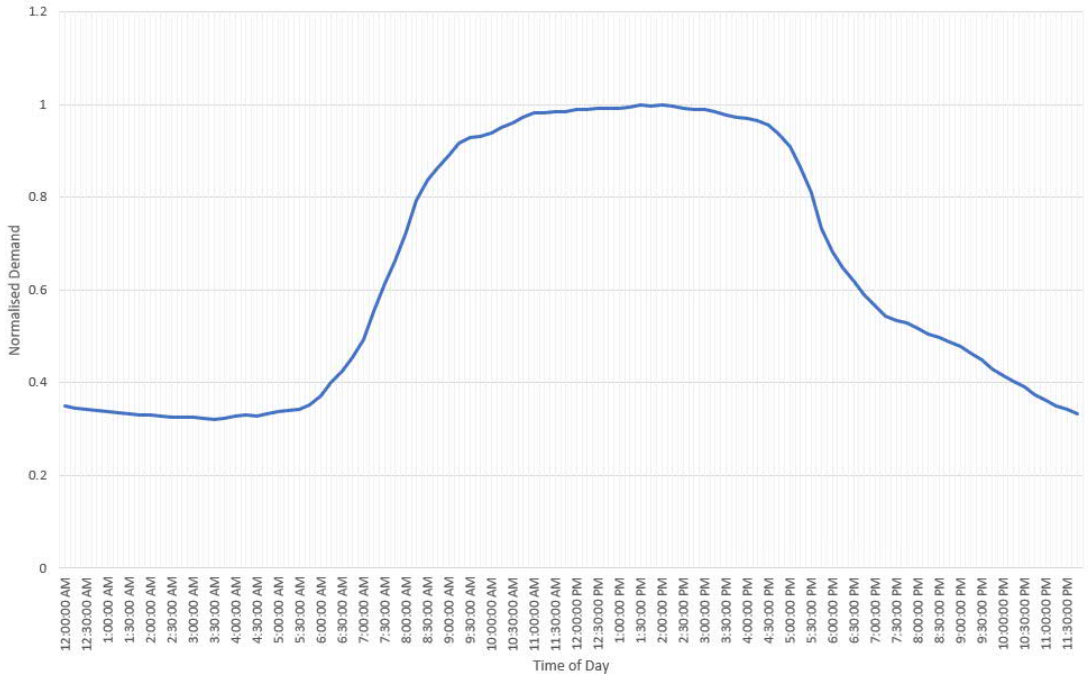


Figure 5 – Peak summer day profile for the customers expected in the Aerotropolis Core Precinct



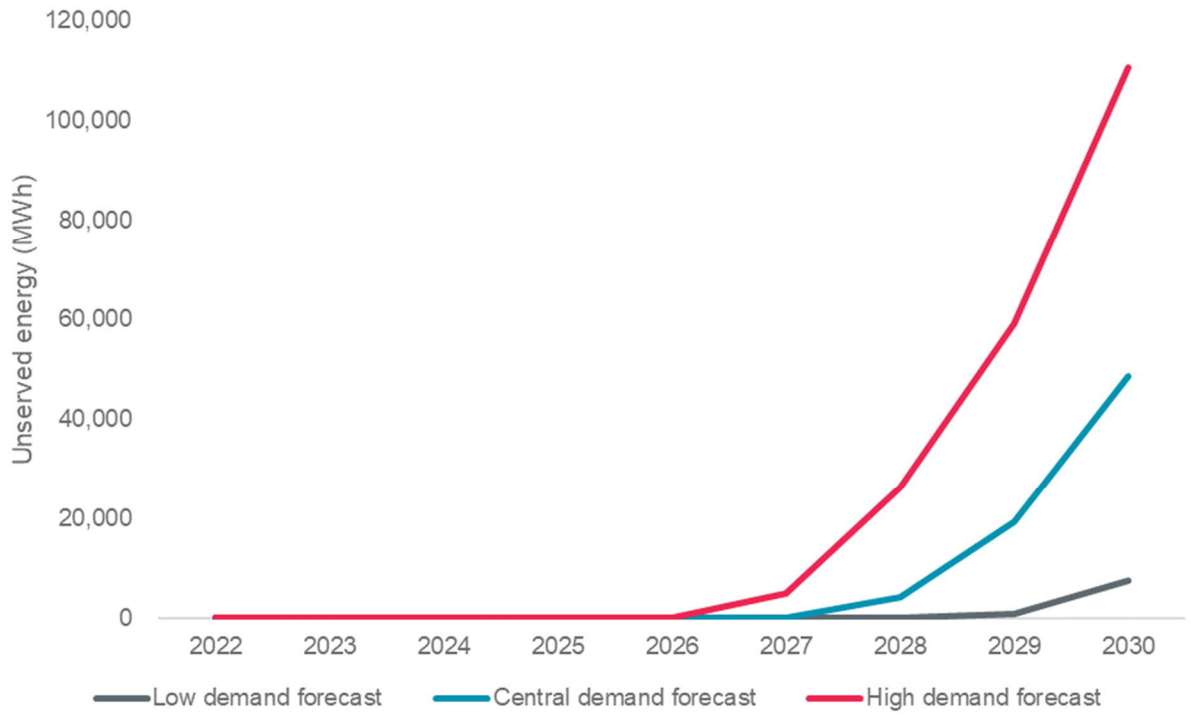
2.4 Existing network

The area around the Aerotropolis Core Precinct is currently serviced by the low capacity 11kV network from the Bringelly, Kemps Creek and Luddenham zone substations. This principally overhead network was established initially to service the rural residential load base in the area. It features relatively long route length 11kV feeders and low voltage reticulation. Figure 3 above illustrates that the existing distribution network in the Aerotropolis Core Precinct development area is insufficient to meet the supply needs of the Aerotropolis Core Precinct from 2023/24. In particular, the Bringelly zone substation has a limited firm capacity of 19MVA that is set to be exceeded by 2024/25 based on current demand forecasts and customer connection applications. The transformer capacity at Bringelly ZS is the main network constraint in relation to supply of the Aerotropolis Core Precinct and this constraint has been used to determine the load at risk used in the demand forecast.

2.5 Expected unserved energy if action is not taken

If network augmentation is not undertaken then there will be significant expected unserved energy (USE) in our network over the next decade with available capacity being exceeded from 2024/25. Figure 6 presents the expected USE if no action is taken.

Figure 6 – Forecast unserved energy for the Aerotropolis Core Precinct under low, central and high scenarios



We propose to cap the expected future USE, in MWh, as part of the DPAR NPV assessment, because the uncapped value of USE will otherwise become unrealistically high (because, in reality, we would undertake investment to avoid widespread customer outages or declining to connect new customers). Using the very large uncapped USE values has the potential to distort the comparison of net market benefits between credible options. The approach of capping USE in the base case is in-line with other RIT-Ds (and RIT-Ts) and does not affect the ranking of the overall options.[2,3]

2.6 Proposed scenarios for the forthcoming RIT-D NPV assessment

We propose to assess three alternative future scenarios as part of the DPAR NPV assessment, namely:

- a central scenario – consisting of assumptions that reflect a central set of variable estimates, which, in our opinion, provides the most likely scenario;
- a high benefit scenario – reflecting an optimistic set of assumptions which have been selected to investigate an upper bound on reasonably expected market benefits; and
- a low benefit scenario – reflecting a number of assumptions that give rise to a lower bound NPV estimate for each credible option, in order to represent a conservative future state of the world.

[2] We note that this is also consistent with the approach proposed by Dr Biggar in his review of 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, p. 27). While Dr Biggar suggests capping the 'congestion cost' (calculated as the unserved energy valued at the VCR) in such assessments, we consider it more intuitive to cap the underlying unserved energy, in MWh, and continue to value it at the appropriate VCR. This is the approach that has been adopted by other DNSPs and is effectively equivalent to the approach proposed by Dr Biggar.

[3] See for example: Ausgrid, *Ensuring reliable supply for the Sydney Airport network area*, Final Project Assessment Report, 6 March 2020, p. 15.

A summary of the key variables/framework expected to be used for each scenario is provide in table 1 below.

Table 1 – Proposed scenarios for the forthcoming RIT-D NPV assessment

Parameter/ scenario	Central scenario	High benefits	Low benefits
Capex	Central estimates	-25%	+25%
Demand	Central demand forecast (see section 2.2)	High demand forecast (see section 2.2)	Low demand forecast (see section 2.2)
VCR	Load-weighted AER VCR	+30%	-30%
Discount rate	3.26%	2.22%	4.30%
Maintenance costs	Central estimates	-25%	+25%

The above scenarios have been developed to comprehensively test the range of net benefits that can be expected from the credible options. We consider that this approach allows for a more robust test of the preferred option compared with adopting individual sensitivity tests because multiple inputs are changed together in a consolidated scenario.

3. Proposed network options to meet the identified need

We have identified three credible network options to meet the identified need. This section provides more information on the scope and cost of these options. It also outlines options considered but that we do not propose to progress further.

Each of the credible options involve establishing the North Bradfield zone substation (connecting to the 132kV Aerotropolis backbone feeder) and augmenting the existing Bringelly zone substation to service the connection of the expected customer base in the Aerotropolis Core Precinct.

However, the sequencing of the network investments (i.e., establishing North Bradfield zone substation and augmentation of Bringelly zone substation) differs between the credible options, as well as the timing of the investments (e.g., full or staged establishment of North Bradfield zone substation).

Figure 7 provides an overview of how North Bradfield and Bringelly zone substations fit into the proposed and existing network infrastructure for the broader Aerotropolis precinct, with figure 8 providing an aerial view of the development area and proposed network infrastructure.

Figure 7 – Overview of Aerotropolis precinct with proposed and existing network infrastructure

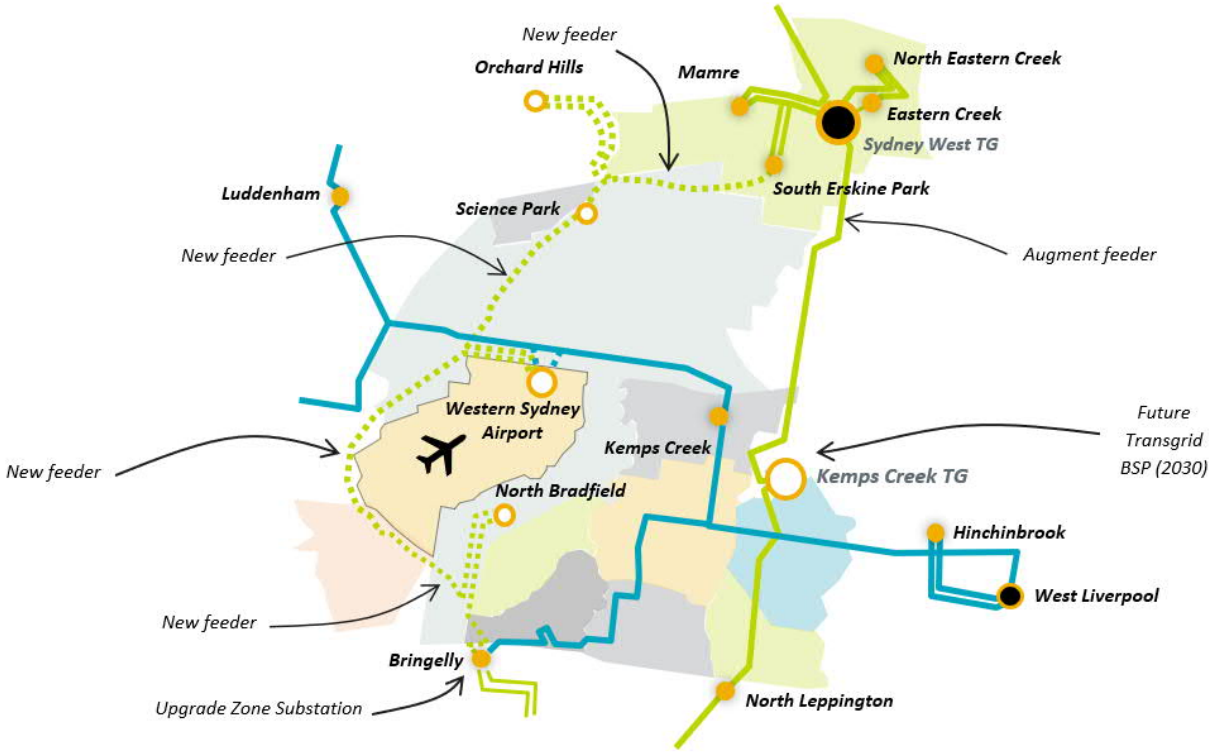
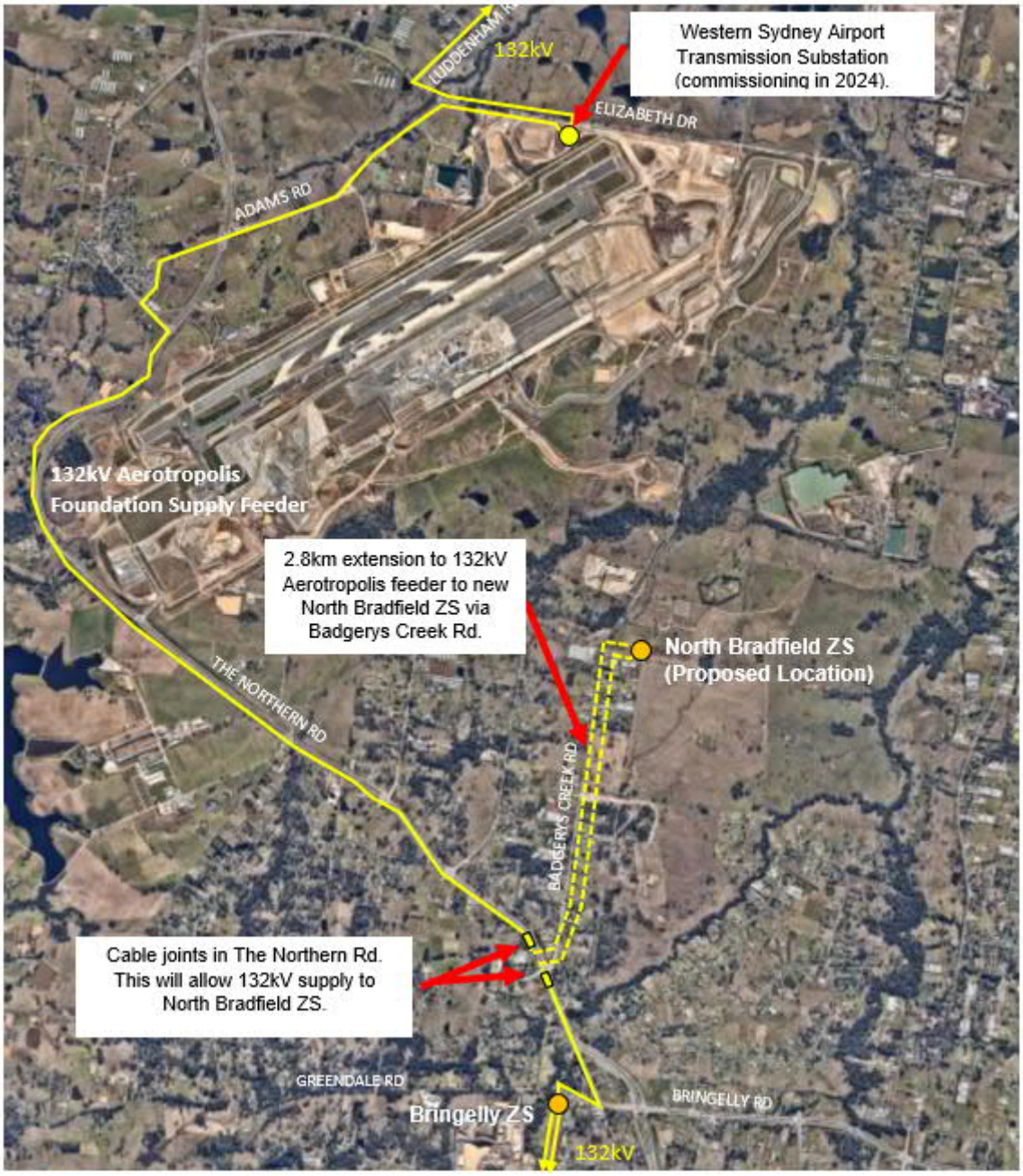


Figure 8 – Proposed North Bradfield ZS in relation to the existing and proposed 132kV supply.



The options set out below represent complete network solutions to supply the forecast demand of the Aerotropolis Core Precinct discussed in section 2.2. In particular, each involves an initial investment to service near-term load requirements to 2030, with subsequent stages of investment to cater for further load increases post-2030. However, we are cognisant that once the initial investment is made, there may be a material change in circumstances (such as a substantive presence of customers in the Precinct capable of offering network support) that warrants assessing whether non-network options could defer or displace the need for the subsequent stages of network investment. Endeavour Energy will monitor these changes and assess whether an update to the evaluation in this RIT-D is needed should non-network options be a credible alternative to the subsequent stages of network investment.

3.1 Option 1 – Establish North Bradfield ZS and augment Bringelly ZS

Option 1 involves establishing a 45MVA firm 132/22kV North Bradfield zone substation toward the north of the Aerotropolis Core Precinct to be commissioned by 2025/26. Supply to the zone substation would be established via two 132kV 2.8km feeder extensions along Badgerys Creek Road from the planned Aerotropolis feeder along the Northern Road. The new substation would be connected to the Aerotropolis backbone feeder, with one feeder terminating at the Bringelly zone substation and the other feeder terminating at the Western Sydney Airport transmission substation. These feeders would be built underground and avoid the use of poles for the alternative overhead lines.

Establishing the North Bradfield zone substation would provide sufficient capacity to connect new customers in the precinct up until the early 2030s. However, the demand forecasts indicate that by 2031/32 the forecast demand will exceed the installed capacity leading to additional load at risk. Option 1 therefore also includes augmentation of the existing Bringelly zone substation to alleviate this load at risk. In particular, an additional 45 MVA transformer would be installed at the substation in both 2029/30 and 2033/34. The augmentation works at Bringelly zone substation would be subject to independent investment testing prior to those works going ahead and using demand forecasts and cost estimates that would be prevailing at that time in the future.

The total cost of this option is estimated to be $56.8 million and construction of the North Bradfield zone substation would commence in 2022/23 with commissioning in 2025/26. The first phase of the Bringelly zone substation augmentation would commence in 2028/29 with commissioning in 2029/30, while the second phase would commence in 2033/34 and be commissioned in the same year.

Table 2 provides an overview of the scope of works and capital cost of works for Option 1, with operating costs assumed to be 0.4 per cent of total capital expenditure.

Table 2 – Scope of works and costs for Option 1

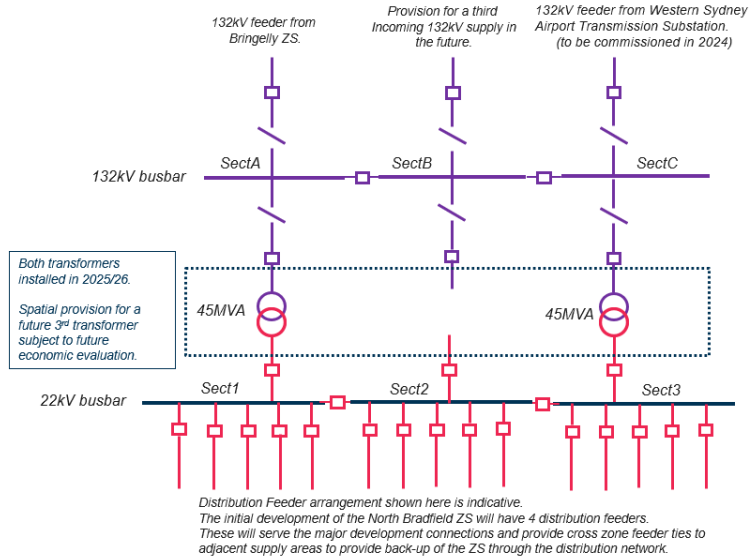
Scope	Description	Capital cost estimate ($M)

Zone Substation	Establishment of North Bradfield zone substation including:
	• Two 45MVA 132kV/22kV power transformers and associated bunds and fire walls.
	• 132kV switchgear
	• 22kV switchgear
	• Buildings for housing switchgear, protection & control equipment and amenities.
	• Spatial provision for future:
	  o Third 45MVA transformer
	  o Third incoming 132kV feeder
	  o Grid BESS
		$21.0

Transmission Mains	Connection of North Bradfield zone substation to the 132kV transmission network: • Connection to the 132kV Aerotropolis backbone feeder from Western Sydney Airport transmission substation to Bringelly zone substation with cables matching the size and type of the 132kV Aerotropolis backbone feeder. o 2 x 2.8km 132kV feeder extensions.	$12.8
Distribution	Distribution works include: • 22kV conversion of the Aerotropolis Core Precinct (from the existing 11kV) • Four 22kV distribution feeders • Four 11/22kV auto transformers • Installation of time clocks or smart meters at customer premises to ensure off peak hot water heating service to existing customers in the area and adjacent areas.	$5.0
Bringelly ZS Phase 1 FY2030	Phase 1 of Bringelly zone substation augmentation: • One 45MVA 132kV/22kV transformer and associated bunds and fire walls • Extension of the existing switchyard • Outdoor 132kV equipment works : busbar, feeder and transformer bays	$14.7
Bringelly ZS Phase 2 FY2034	Phase 2 of Bringelly zone substation augmentation: • One 45MVA 132kV/22kV transformer and associated bunds and fire walls • Installation of transformer bay and bus section circuit breaker	$3.3
Total	Establishment of North Bradfield zone substation and augmentation of Bringelly zone substation	**$56.8**

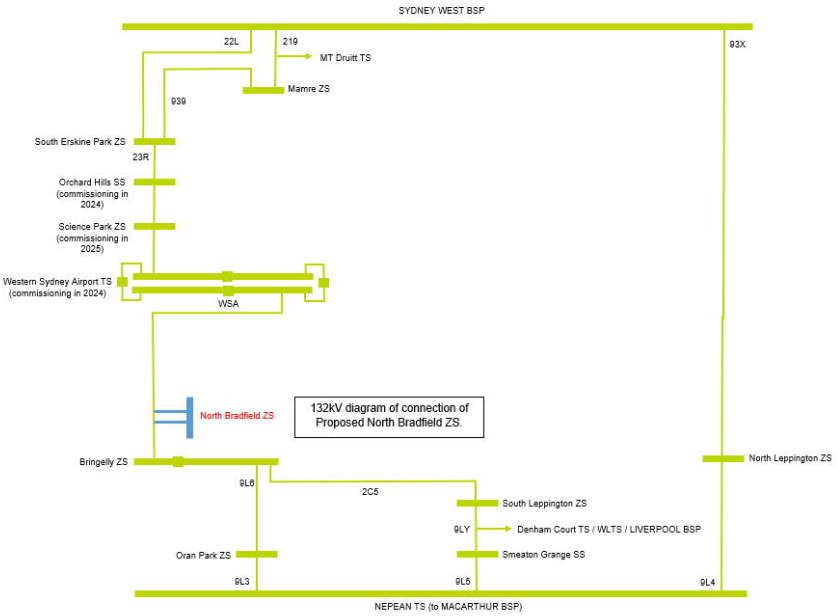
A simplified single line diagram is provided for this option below in figure 9.

Figure 9 – Simplified line diagram of Option 1



The proposed connection of Option 1 to the 132kV network in shown in Figure 10 below.

Figure 10 – 132kV connection of Option 1



3.2 Option 2 – Augment Bringelly ZS and stage North Bradfield ZS

Option 2 would involve the augmentation of the Bringelly zone substation by 2024/25 to service the growing customer demand in the Aerotropolis Core Precinct. In particular, two 45MVA 132/22kV transformers would be installed – providing the zone substation with 45MVA of additional firm capacity.

Although augmentation of Bringelly zone substation would provide sufficient capacity to service the new demand initially, the demand forecasts indicate that the forecast demand will exceed firm capacity by 2031/32 leading to additional load at risk.

Option 2 therefore also includes the staged establishment of North Bradfield zone substation to be commissioned in 2029/30 and 2033/34. It would have the same characteristics as under Option 1, i.e., supply would be established via two 132kV, 2.8km feeder extensions along Badgerys Creek Road from the planned Aerotropolis feeder along the Northern Road. The new substation would be connected to the Aerotropolis feeder, with one feeder terminating at the Bringelly zone substation and the other feeder terminating at the Western Sydney Airport transmission substation. These feeders would be built underground and avoid the use of poles for the alternative overhead lines.

The total cost of this option is estimated to be $62.7 million, with the additional cost relative to Option 1 reflecting additional cost for long route length distribution feeders being required as part of the proposed supply from Bringelly ZS in the network option. Augmentation of the Bringelly zone substation would commence in 2022/23 with commissioning in 2024/25. The first phase of construction for the North Bradfield zone substation would commence in 2028/29 with commissioning in 2029/30, while a second transformer would be installed in 2033/34.

Table 3 provides an overview of the scope of works, and the cost of those works, for Option 2. Operating costs are assumed to be 0.4 per cent of total capital expenditure.

Table 3 – Scope of works and costs for Option 2

Scope	Description	Cost Estimate ($M)
Bringelly ZS Augmentation	Bringelly zone substation augmentation: • Installation of two 45MVA 132kV/22kV transformers. • Extension of existing 132kV busbar to allow connection of new transformers. • Installation of 22kV switchgear. • Extension of the existing switchyard to accommodate the new transformers, extended 132kV busbar and the 22kV switchgear. • Five 22kV distribution feeders to supply the Aerotropolis Core precinct.	$23.9
North Bradfield Stage 1	First stage of North Bradfield zone substation: • One 45MVA 132kV/22kV power transformer. • 132kV switchgear. • 22kV switchgear. • Buildings for housing switchgear, protection & control equipment and amenities. • Spatial provision for future: o Second and Third 45MVA transformer o Third incoming 132kV feeder o Grid BESS	$16.0
North Bradfield Stage 2	Second stage of North Bradfield zone substation: • One 45MVA 132kV/22kV power transformer. • Extend 22kV switchgear by installing additional building.	$5.0
Transmission Mains	Connection of North Bradfield zone substation to the 132kV transmission network: • Connection to the 132kV Aerotropolis backbone feeder from Western Sydney Airport transmission substation to Bringelly zone substation with cables matching the size and type of the 132kV Aerotropolis backbone feeder. o 2 x 2.8km 132kV feeder extensions.	$12.8
Distribution	Distribution works include: • 22kV conversion of the Aerotropolis Core Precinct (from the existing 11kV) • Four 22kV distribution feeders and autotransformers. • Installation of time clocks or smart meters at customer premises to ensure off peak hot water heating service to existing customers in the area and adjacent areas.	$5.0
Total	Augmentation of Bringelly zone substation and establishment of North Bradfield zone substation with connection to the Aerotropolis backbone feeder.	**$62.7**

3.3 Option 3 – Stage North Bradfield ZS and stage Bringelly ZS augmentation

Option 3 would involve establishing the North Bradfield zone substation toward the north of the Aerotropolis Core Precinct to be commissioned in stages. In particular, a single 45MVA transformer would be installed in 2024/25, with the installation of the second transformer deferred until 2029/30. Under this approach the North Bradfield zone substation would not have a firm capacity until the second transformer is installed in 2029/30 and until then, it would rely on 6MVA of firm capacity from autotransformers and use the adjacent zone substation distribution network.

This option also includes augmentation of the Bringelly zone substation to service future load growth. Additional 45 MVA transformers would be installed in both 2029/30 and 2033/34 to increase the firm capacity of the Bringelly zone substation to supply part of the Aerotropolis Core precinct and provide backup supply in the event of an outage of the North Bradfield zone substation.

The total cost of this option is estimated to be $56.8 million and construction of the first stage of the North Bradfield zone substation would commence in 2022/23 with commissioning of the first transformer in 2024/25. The second transformer would then be installed in 2029/30. The first stage of the augmentation of the Bringelly zone substation would commence in 2028/29 with commissioning in 2029/30, with the second stage being commenced and commissioned in 2033/34.

Table 4 provides an overview of the scope of works and cost of works for Option 3. Operating costs are assumed to be 0.4 per cent of total capital expenditure. Endeavour Energy notes that additional preliminary design and project management costs resulting from the various stages in this option have not been included in this cost estimate. These costs are not considered to be material to the outcome of this RIT-D because they are small in the context of total project costs.

Table 4 – Scope of works and costs for Option 3

Scope	Description	Cost Estimate ($M)
North Bradfield Stage 1	First stage of North Bradfield zone substation: • One 45MVA 132kV/22kV transformer. • 132kV and 22kV switchgear. • Buildings for housing switchgear, protection & control equipment and amenities. • Spatial provision for future transformers, incoming 132kV feeder and BESS.	$16.0
North Bradfield Stage 2	Second stage of North Bradfield zone substation: • One 45MVA 132kV/22kV transformer. • Extend 22kV switchgear by installing additional building.	$5.0
Transmission Mains	Connection of North Bradfield zone substation to the 132kV transmission network: • Connection to the 132kV Aerotropolis backbone feeder from Western Sydney Airport transmission substation to Bringelly zone substation with cables matching the size and type of the 132kV Aerotropolis backbone feeder. o 2 x 2.8km 132kV feeder extensions.	$12.8
Distribution	Distribution works include: • 22kV conversion of the Aerotropolis Core Precinct (from the existing 11kV) • Four 22kV distribution feeders and autotransformers. • Installation of time clocks or smart meters at customer premises to ensure off peak hot water heating service to existing customers in the area and adjacent areas.	$5.0
Bringelly ZS Phase 1 FY2030	Phase 1 of Bringelly zone substation augmentation: • One 45MVA 132kV/22kV transformer and associated bunds and fire walls • Extension of the existing switchyard • Outdoor 132kV equipment works : busbar, feeder and transformer bays	$14.7
Bringelly ZS Phase 2 FY2034	Phase 2 of Bringelly zone substation augmentation: • One 45MVA 132kV/22kV transformer and associated bunds and fire walls. • Installation of transformer bay and bus section circuit breaker.	$3.3
Total	Establishment of North Bradfield zone substation with connection to the Aerotropolis backbone feeder and augmentation of Bringelly zone substation.	**$56.8**

3.4 Options considered but not proposed to be progressed in the DPAR

Endeavour Energy considered a possible 33kV network option when first assessing the electricity supply needs of the broader Aerotropolis precinct. The local area near the Aerotropolis Core precinct has a 33kV supply from the West Liverpool TS, however this would require a new long route 33kV supply from that substation. West Liverpool TS is approximately 20km north east of the development area for the Aerotropolis Core precinct.

We had previously determined that a 22kV reticulation strategy would optimise the build out of the network for the Aerotropolis area. This is based on the longer feeder routes and higher capacity supply available from 22kV in comparison to 11kV distribution. As a result of the 22kV distribution network adoption, the 33kV network options for transmission and zone substations is not feasible based on standard industry practice and equipment available.

Accordingly, 33kV network options will not be progressed to the DPAR.

4. Assessment of non-network solutions and SAPS

Following a review of the expected future customer demand in the Aerotropolis Core Precinct and the nature of the existing demand and network capability, Endeavour Energy has determined that there is unlikely to be a non-network option, or SAPS option, that could form a potential credible option on a standalone basis, or that could form a significant part of a potential credible option for this RIT-D.

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

We note that our assessment is principally focused on the initial network investment required to meet demand growth in the Aerotropolis Core Precinct. Once this initial investment is made, Endeavour Energy will continue to monitor the presence of customers capable of providing network support and assess whether an update to the evaluation in this RIT-D is needed should non-network options be a credible alternative to the subsequent stages of network investment.

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

We have considered the requirement that a non-network option would need:

- to be able to form a credible stand-alone option; or
- to defer the network investment.

A feasible non-network option that maintains supply to all customers must be capable of reducing the estimated shortfall on the network from the firm capacity at Bringelly zone substation. Under the central scenario, by the end of 2024/25 a shortfall is estimated to exist for 36 days in the year and is at a maximum of about 21 MWh per day in the summer period. By 2027/28, a shortfall is estimated to exist for 281 days in the year and at a maximum of about 150 MWh per day in the summer period under the central scenario. The requirement for support from non-network options is therefore substantive in both the number of days expected to be required and the magnitude of the support needed.

In addition, we note that for any non-network solution to be effective it would need to locate near, and essentially be connect to the new customer connection points. We consider that any such co-location would be extremely difficult at the required capacity given the substantial land requirements for many non-network options, the planning approvals required, issues with community acceptance and these being in addition to and in competition with the underlying developments expected in these areas. Further, the lack of existing large scale customer demand in the area negates the potential for demand reduction approaches towards existing customers in the area.

Table 5 below summarises the expected network support requirements to 2027/28 for any non-network solutions to form standalone options under the central scenario. We note that the requirements would increase further beyond 2027/28 as more customers connect in the development area.

Table 5 – Network support required for a standalone option under the central scenario

Year	Peak load reduction required (MW)	Days required	Hours required	Total MWh required
FY25	3.6	36	192	204
FY26	4.8	51	307	465
FY27	11.0	188	1,333	4,075
FY28	17.2	281	2,722	13,348

Table 6 below sets out the requirements for non-network options to defer network expenditure in a cost effective manner, i.e., for them to be coupled with a network option in order to form a combined credible option.

Given that the comprehensive NPV assessment of the network options is yet to be undertaken (and will be part of the DPAR), the deferral assessment has been undertaken in this screening report using the preliminarily preferred network option, Option 1.

Table 6 – Network support required to defer a network option under the central scenario

Deferral period	Deferral year	Peak load reduction required (MW)	Days required	Hours required	Total MWh required	Deferral value[4]
1 year	FY25	3.6	36	192	204	$1.1M
2 years	FY25	3.6	36	192	204	$2.2M
	FY26	4.8	51	307	465	

The required characteristics for non-network solutions set out above demonstrates that the amount of demand reduction and/or local storage or generation that would be required to represent a credible option for this RIT-D is at a level that does not appear realistic or credible given the existing customer load base in the area. We therefore do not consider it technically feasible that non-network technologies can form standalone credible options that meet the entire identified need.

Similarly, the amount of demand reduction that would be required in order to enable a deferral of network augmentation by one year is also unrealistically high, particularly when considering the deferral value. We therefore also do not consider it commercially feasible that non-network technologies can be coupled with a network option to form a credible option.

[4] The deferral value is calculated as the net present value of deferring the preliminary preferred network option by one year using the central scenario's discount rate.

4.2 Assessment of specific non-network technologies

In addition to our general assessment of whether non-network options are likely to be able to form a potential credible option on a standalone basis, or form a significant part of a potential credible option for the Aerotropolis Core Precinct RIT-D, we have considered individual non-network technologies. Our assessment is summarised in table 7.

Table 7 – Assessment of non-network technologies

Non-network technology	Assessment
Grid-scale storage	Not feasible because it would not defer network investment due to the energy storage system itself requiring connection to the network to provide charging supply.
VPP	Not feasible because the Aerotropolis Core Precinct is a new development. Uptake initially requires customers to connect to the network, which is not feasible with the existing network infrastructure and small existing customer base in the area.
Residential BESS	Not feasible because it does not defer network investment. It also requires customers to connect to the network, which is not feasible with the existing network infrastructure. The early stages of this development area will likely feature enterprise customers with a residential customer base in medium to high density housing coming a few years later.
Commercial direct load control	Not feasible because the Aerotropolis Core Precinct is a new development. Uptake initially requires customers to connect to the network, which is not feasible with the existing network infrastructure. In the longer term there will be a strong commercial and enterprise customer base in the area that could participate in future demand management programs.
Behaviour demand response	Not feasible because the Aerotropolis Core Precinct is a new development. Uptake initially requires customers to connect to the network, which is not feasible with the existing network infrastructure. In the long term it is likely that the residential customer base in the area would be able to participate in demand response programs when the planned residential developments are built out.

Endeavour Energy acknowledges that non-network solutions may be able to assist in future as customer demand continues to grow following the establishment of the initial network infrastructure for the Aerotropolis Core Precinct. Indeed, the proposed design of the North Bradfield zone substation includes consideration of space for a grid battery in the future. We will be interested in working with customers who move into this new area and have their own embedded generation (behind their meter) and intend on exporting energy to the NEM via the network.

4.3 Consideration of SAPS options

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

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

We consider that there is not a SAPS option that could form a potential credible option on a standalone basis, or that could form a significant part of the credible option, in this RIT-D. In particular, the load requirements of the greenfield development area are significant and therefore could not be supported by a network that is not part of the interconnected national electricity system with the ability to draw on grid-connected generation sources. In forming this conclusion we have considered both the potential to convert part of our distribution network to a regulated SAPS as well as the potential to build a new SAPS, given the greenfield nature of the network development in this area.

We note that this conclusion does not preclude the development of embedded generation and storage by specific customers or groups of customers to meet part of their energy needs or as back-up to their network connections. However, we also note that the proposed network options for the Aerotropolis area are for highly reliable and resilient distribution networks that will also support two way power flows.

[5] See definition of 'SAPS option' in the NER.

[6] Section 6B(6) of the NEL.

5. Conclusion

The development of the Aerotropolis Core Precinct is associated with the Western Sydney Airport and the significant development and investment throughout Sydney's Western Parklands City. Significant electricity demand growth and customer connection requirements in the Aerotropolis Core Precinct requires the establishment of new network infrastructure.

Although the existing network capacity may be able to service the initial customer connections, as demand continues to grow it will exceed the existing supply capacity meaning there will be a large amount of load at risk and unserved energy in the area. In particular, the Aerotropolis Core Precinct is expected to have demand of 140MVA by 2041, while the existing available firm supply capacity is 19MVA.

Based on the magnitude of forecast demand for the area, the expected cost of network options and the capacity of the existing network to facilitate non-network technologies, it is not considered feasible that a non-network solution will form a potential credible option on a standalone basis, or form a significant part of a potential credible option for this RIT-D. Further, SAPS options are unlikely to contribute to meeting the identified need because the size of the greenfield development cannot be supported by a network that is not part of the interconnected national electricity system. Consequently, a Non Network Options Report is not intended to be prepared for this RIT-D in accordance with clause 5.17.4(c) of the NER.

We consider that non-network solutions may be more likely to be feasible for future developments in the area as the cost of large scale battery storage continues to decrease, the widespread inclusion of solar PV in new commercial and industrial developments continue to increase, and the uptake of electric vehicles, including electric buses offer opportunities for network support.

The load duration curve and peak load profile used in our analysis are based on our best estimate of the expected pattern of use in the area, however given the uptake of EVs, battery storage behind the meter and continued higher penetration of solar PV the load duration curve and the pattern of usage will change.

For example, we expect that the impact of EV charging cycles in both homes and workplaces will change the pattern of usage over time and will then impact the sizing of network infrastructure and potentially the capital investment required. Future changes to energy prices from retailers and network use of system charges are also likely to change the pattern of usage in the area over the long term.

These developments will be closely monitored as the Aerotropolis Core Precinct develops over the next decade and non network options will be considered as part of future network augmentations. In particular, Endeavour Energy will monitor these changes and assess whether an update to the evaluation in this RIT-D is needed should non-network options be a credible alternative to the subsequent stages of network investment.

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