RIT-D Final Project Assessment Report

Providing increased supply capacity for the Riverstone East and Schofields Development Area

5 May 2025

Endeavour Energy

POWER together

1.0 Executive Summary

This final project assessment report (FPAR) was prepared by Endeavour Energy in accordance with the requirements of clause 5.17.4 of the National Electricity Rules (NER).

The purpose of this report is to demonstrate the basis for selection of the preferred option to provide supply to the Riverstone East and Schofields development area. The area is one of the key areas in the NSW Government's plan to increase residential housing with the area forecast to contribute 12% of the additional homes in Sydney over the next 20 years.

The Riverstone East and Schofields development area is located within the north-west of Sydney. It is approximately 25km north-west of Parramatta. The area is currently largely undeveloped and has been recently rezoned for residential housing and a limited area for enterprise business land use.

The Riverstone East and Schofields development area includes the multistage development at Riverstone East, the enterprise area at Riverstone West and residential growth areas at Schofields West and Alex Avenue.

These new residential areas will include their own town centres, schools, community facilities and future small scale commercial zoned spaces. The overall objective of the development area is to provide new residential housing in north-west Sydney and it has been a focus area for NSW government and local government. The area is also well served with public transport including the new Metro rail line and the dedicated bus lanes with stations and access points in close proximity to the development area.

The development area is planned to add approximately 20,000 new residential dwellings and to require 149MVA of electricity supply capacity by 2044. The existing infrastructure supporting these precincts, namely the Schofields ZS and Riverstone ZS and the existing 11kV network are not sufficient to provide the supply necessary to support the future development of the area.

The identified need for this investment is 'reliability corrective action' because the investment is required to comply with our NER obligations to connect customers. The timing of the identified need for this RIT-D is determined by when the expected customer demand will materially exceed the existing network capacity. This is currently expected to be in 2026/27, based on the connection requests Endeavour Energy has received to date and progress in general infrastructure developments in the Riverstone East and Schofields Development Area including public transport, roads and rezoning of land.

This report follows publication of an options screening notice that found that a non-network solution is unlikely to form a potential credible option on a standalone basis or form a significant part of a potential credible option to meet the identified need for the Riverstone East and Schofields Development Area. This is due to the level of forecast demand for the Riverstone East and Schofields Development Area, the expected cost of non-network options and the limited capacity of the existing network to facilitate non-network technologies. It also found that a Stand-alone Power System (SAPS) solution could not contribute to meeting the identified need because the customer demand requirements of what is largely a 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.

Two options were determined to be credible in addressing the identified need and have been assessed in comparison to a business-as-usual base case. The two options are:

- Option 1 – establish Grantham Farm Zone Substation (ZS) for commissioning in 2026/27 and augment the existing Schofields ZS for commissioning in 2031/32; and
- Option 2 – augment the existing Schofields ZS for commissioning in 2026/27 and establish Grantham Farm ZS for commissioning in 2031/32.

Both options involve establishing the same new zone substation at Grantham Farm and installing a third transformer at the existing Schofields ZS.

The order of the staging of works of each option leads to several differences between the two options:

- number of associated distribution feeders to connect customers;
- Endeavour Energy's distribution feeder works due to timing differences in the stages; and
- expected unserved energy from differences in when additional capacity (at Schofields ZS and the new Grantham Farm ZS) becomes available prior to the completion of all works in 2031/32.

These differences consequently result in variances in costs and benefits between the two options considered.

The result of the economic assessment of the credible options considered in this RIT-D is shown in Table 1.

Under the NER, the preferred option is the credible option that maximises the present value of the net economic benefit. With the exception of changes in greenhouse gas emissions, the net economic benefit considered is that accruing to all those who produce, consume or transport electricity in the National Electricity Market (NEM).

Applying this criteria, Option 1 is the preferred option at this final stage because it has the highest net market benefits due to higher gross benefits and lower costs in present value terms.

Table 1 – Economic assessment of credible options (weighted results)

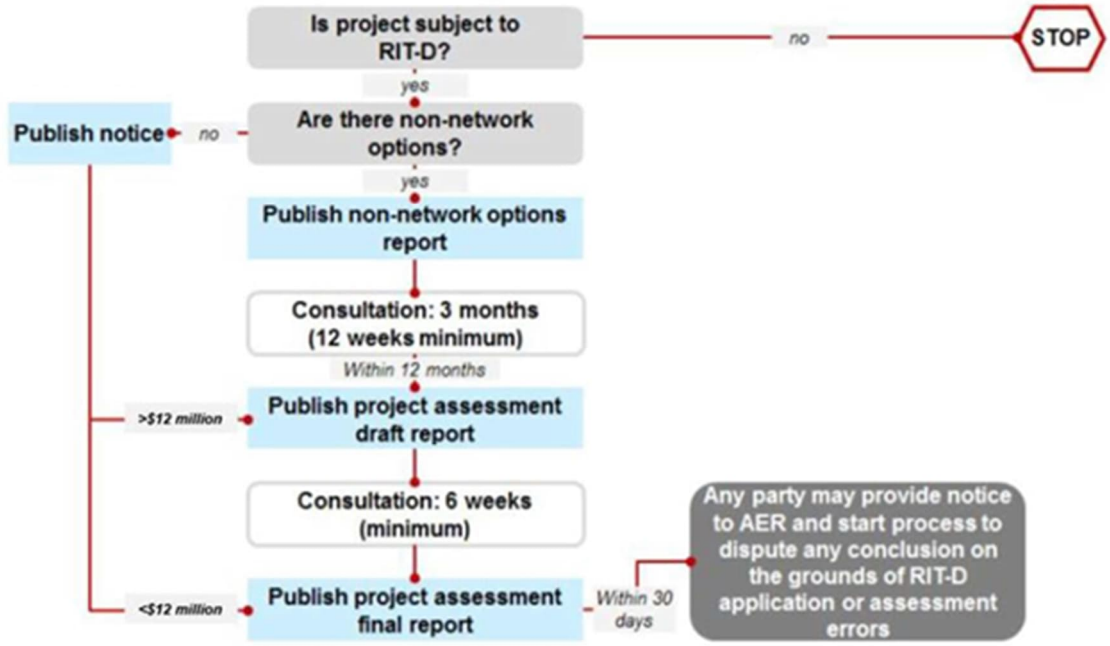
Option	Description	Project capex ($M, real 2023/24)	PV of market benefits[1] ($M, PV)	PV of costs ($M, PV)	NPV ($M, PV)	Rank
1	**Establish Grantham Farm ZS in 2026/27 and augment Schofields ZS in 2031/32**	**53.8**	**81.8**	**30.8**	**51.0**	**1**
2	Augment Schofields ZS in 2026/27 and establish Grantham Farm ZS in 2031/32	54.1	73.6	24.9	48.7	2

[1] Including avoided costs for feeders required to connect customers in the Riverstone East precinct.

2.0 RIT-D Process

This Final Project Assessment Report has been prepared by Endeavour Energy in accordance with the requirements of clause 5.17.4 of the NER and represents the second step in the RIT-D process to determine the most efficient means of providing supply and customer connection capability to the Riverstone East and Schofields Development Area. The RIT-D process is summarised in Figure 1 below.

Figure 1 – Overview of the RIT-D process



2.1 Completion of the RIT-D process

This FPAR represents the final stage of the consultation process in relation to the application of the RIT-D process undertaken by Endeavour Energy regarding providing increased supply capacity for the Riverstone East and Schofields Development Area. It follows publication of the options screening notice and DPAR, both of which were published on 22 November 2024.

Endeavour Energy invited written submissions on the DPAR (over a six-week consultation period which we closed on 10 January 2025) and no submissions were received.

2.2 Contact details

All enquiries should be directed to Endeavour Energy's Enterprise Portfolio Management office at consultation@endeavourenergy.com.au.

3.0 Description of the identified need

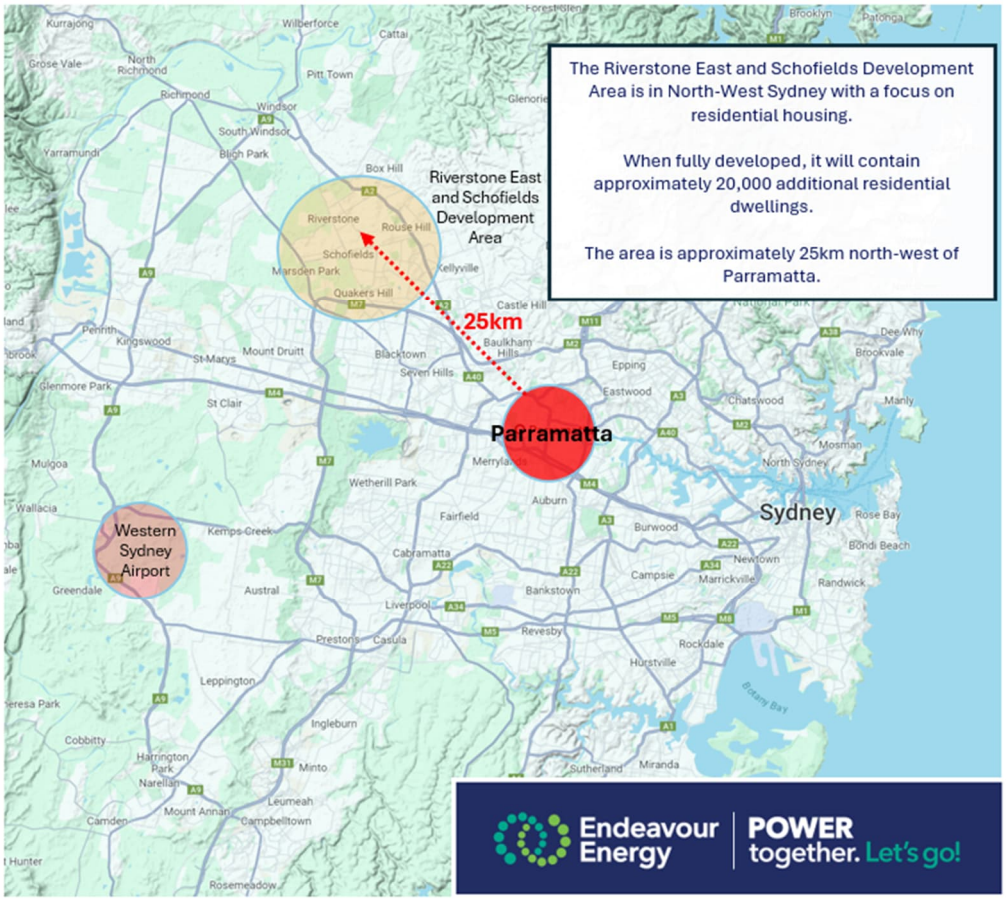
This section provides a description of the identified need and sets out the key assumptions and methodologies that underpin the identified need for this RIT-D.

3.1 Relevant area of our network

The Riverstone East and Schofields development area is located approximately 25km north-west of Parramatta.

Figure 2 below shows the location of the Riverstone East and Schofields development area in relation to Parramatta.

Figure 2 – Location of the Riverstone East and Schofields Development Area in Western Sydney



The development area has been identified by the NSW Department of Planning and Environment (DPE) as an area of substantial growth.

DPE's Land Use and Infrastructure Implementation Plan states that the North West Priority Growth Area is forecast to contribute approximately 12% of the homes needed to meet demand in Sydney over the next 20 years.[2]

[2] NSW DPE, *North West Priority Growth Area Land Use and Infrastructure Implementation Plan*, May 2017, p 8.

Residential development plans in the area have been further underpinned by the introduction of Sydney Metro's Northwest line connecting Tallawong Station (located within the Schofields area) with key employment areas across West Sydney, North Sydney and the Sydney Central Business District (CBD).

Together with existing Sydney Rail connections, Sydney Metro and Sydney Rail transport links have made the area an attractive location for residential development.

Figure 3 below shows the NSW Department of Planning's layout for the North West Sydney area and shows the precincts, LGA boundaries, zoning and rail network. The Riverstone East and Schofields development area is a subset of the NSW Government's North West Sydney area plan and we have further defined this geographic area for this study.

Figure 3 – NSW Department of Planning's layout for the North West Sydney area

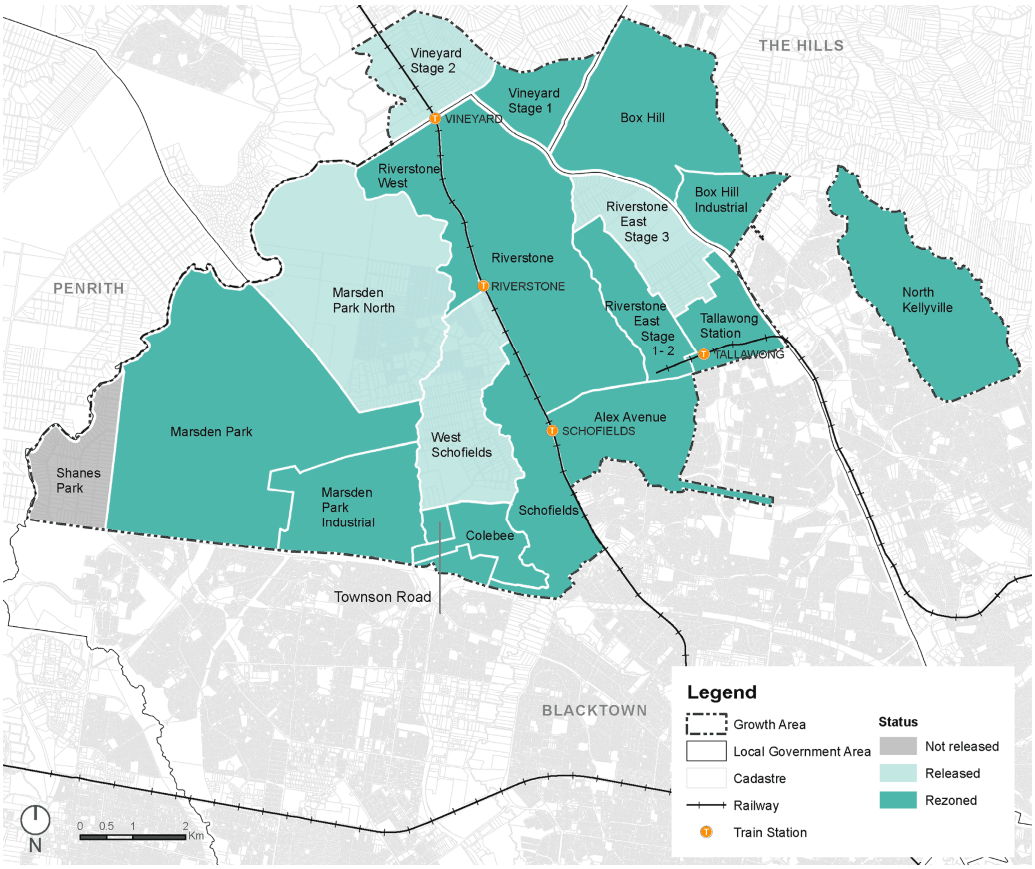


Figure 4 shows the Riverstone East and Schofields development area and the precincts that have been used in making the demand forecast to define the identified need and the electricity supply requirements for the development area. The precinct names are based on information available to Endeavour Energy during the time of our planning process and may not be the final place-names for these areas. The final place-names may be determined by the sales & marketing operations of property developers in conjunction with the local government authority (LGA).

Figure 4 – Riverstone East and Schofields development area and the precincts proposed for new residential housing

3.2 Load characteristics and demand forecast

The Riverstone East and Schofields development area will comprise land zoned primarily for residential use and will also include community facilities such as schools, sporting facilities and town centres with shopping and commercial use. There will also be some land area allocated and zoned for enterprise use.

Based on the proposed precincts, the development area will include approximately 20,000 new residential dwellings by 2044 and will require 149MVA of electricity supply capacity by 2043/44.

Table 2 below shows the proposed Riverstone East and Schofields development area precincts and the corresponding new housing lots estimated to be completed by 2044. The naming of the precincts presented in the table are based on application details from the proponents of the development and may not be the final place-naming. The estimate of housing lots is subject to Local Government approval and are presented here as they are the basis for the demand forecast, noting that assumptions concerning the timing and realisation of the total number of residential housing lots are also included in the demand forecast.

Table 2 – Riverstone East and Schofields Development Area precinct development summary

Proposed Precinct	Estimate of total additional residential housing lots by 2044	Details
Riverstone East	3,600 to 8,700	In addition to the residential housing lots, there are planned community facilities including town centre, schools and sporting facilities. There is a potential increase in housing density which may provide a higher number of residential lots.
Riverstone	2,800	Residential dwellings expected to commence from 2024 onwards. Including community facilities, town centre and shopping centre.
Riverstone West	-	88 hectares of employment land for light industrial enterprise development expected. No residential lots planned.
Schofields	1,250	Residential dwellings expected to commence from 2024 onwards.
Schofields West	2,050	In addition to the residential housing lots, there are planned community facilities.
Alex Avenue	2,400	Residential dwellings expected to commence from 2024 onwards including a town centre and shopping area.

Table 3 shows the assumptions that have been used to develop the demand forecast from the underlying residential growth plans for the area. For the employment lands within the development area, we use the values provided by the proponents of network connection applications as the basis for our aggregated demand forecast including our assumptions of the timing and rate of development of the area.

Table 3 – Riverstone and Schofields Development Area demand forecast assumptions

Assumption	Value and unit of measure
Average Diversified Maximum Demand	5.4kVA per Lot
Town Centre Shopping Village	3.0MVA
School K-12	1.0MVA
School K-6	0.75MVA
Water Supply Services	0.3MVA
Residential Diversity Factor	0.8
Commercial Diversity Factor	0.6

Table 4 below shows the central demand forecast (peak annual demand) for the area based on the development plans and the assumptions set out in Table 3.

Table 4 - Demand forecast for the Riverstone East and Schofields Development Area

Demand Forecast (MVA)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2037	2042
Riverstone ZS	23.7	25.4	28.5	31.1	33.7	34.3	35.0	35.8	36.7	39.1	41.1
Schofields ZS	39.9	50.0	59.5	67.1	73.9	82.9	86.6	90.3	93.9	100.2	105.3
Total Demand	63.6	75.4	88.0	98.2	107.6	117.2	121.6	126.1	130.6	139.3	146.4
Demand Forecast (MVA)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2037	2042
High Forecast	70.0	82.9	96.8	108.0	118.4	128.9	133.8	138.7	143.7	153.3	161.1
Central Forecast	63.6	75.4	88.0	98.2	107.6	117.2	121.6	126.1	130.6	139.3	146.4
Low Forecast	57.2	67.9	79.2	88.4	96.8	105.5	109.4	113.5	117.5	125.4	131.8

Based on the central demand forecast set out above, we have developed additional demand forecasts by applying a 10% increase in MVA to derive a high demand forecast, and a 10% decrease in MVA to derive a low demand forecast. This range is designed to encompass a variety of factors which may change demand, such as variations in the timing of developments or economic conditions. We believe that the +/- 10% variation for the High and Low scenarios is reasonable, although they are relatively small variations, this area has well advanced development plans for other related infrastructure including roads and public transport and sales & marketing activity from property developers. We have a high level of confidence in the demand forecasts used in this study and have been monitoring this area for a number of years in gathering data and information to inform our forecasts.

3.3 Expected pattern of use

Due to the similarities in the expected residential housing development proposed in the Riverstone East and Schofields development area and the adjacent Schofields ZS and Riverstone ZS supply area, we have used the pattern of use from both of the Schofields and Riverstone Zone Substations.

We expect that the demand profile will be similar, including the time of day and day of week demand profiles and the seasonal variation in demand. The penetration of rooftop solar is expected to be similar and we have assumed the solar penetration to be similar to Schofields ZS which has 40% of residential homes with a rooftop solar installation. The average size of rooftop solar system in the adjacent Schofields ZS service area is 6.8kW. We expect similar sizing and penetration in the residential areas of the new development area.

Specifically, the demand profile for the Schofields precincts (which includes the Schofields, West Schofields and Alex Avenue precincts) are based on the Schofields ZS load profile.

The demand profile for the Riverstone precincts (which includes the Riverstone East, Riverstone, and Riverstone West precincts) are based on the existing Riverstone ZS.

The existing supply capacity currently servicing the Riverstone East and Schofields Development Area has been included in our assessment of the identified need.

Figure 5 and Figure 6 below show the load duration curves (LDCs) for the existing Schofields and Riverstone Zone Substations. Both of the zone substations exhibit reverse power flow over the course of the year with Schofields ZS having a reverse power flow for approximately 20% of the year (based on the analysis of all of the half hour periods in the year 2023/24).

Figure 7 and Figure 8 show the peak load profiles for a summer day for both the existing Schofields and Riverstone Zone Substations.

Figure 5 – Schofields ZS Load Duration Curve (based on 2023/24)

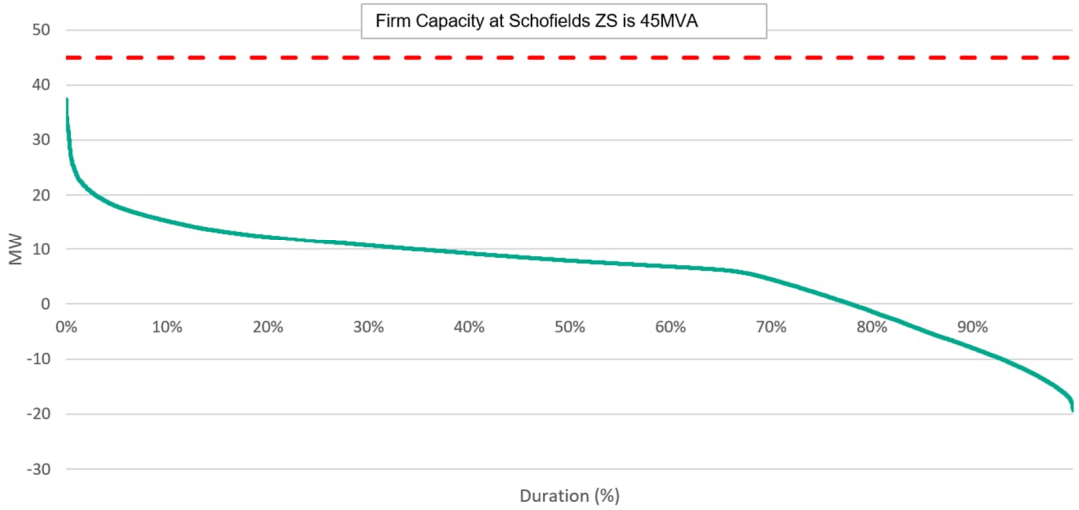
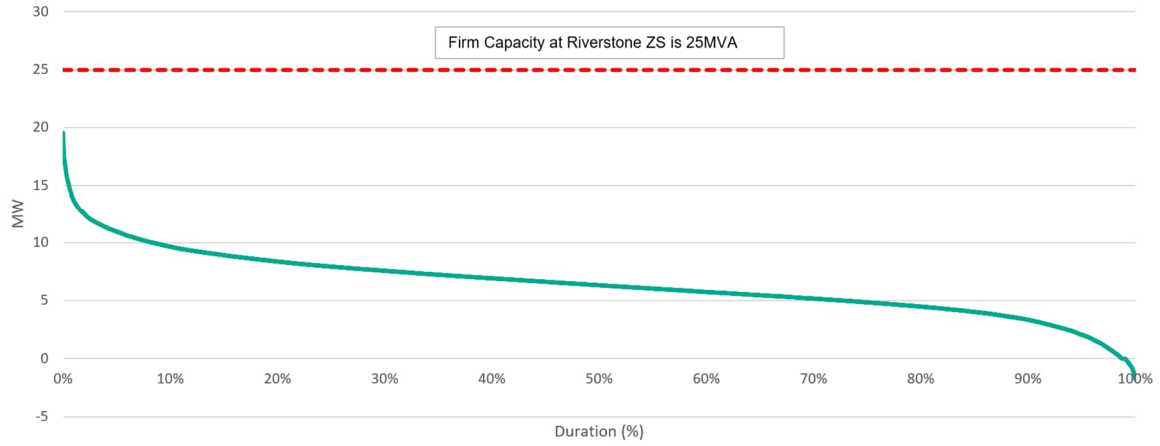


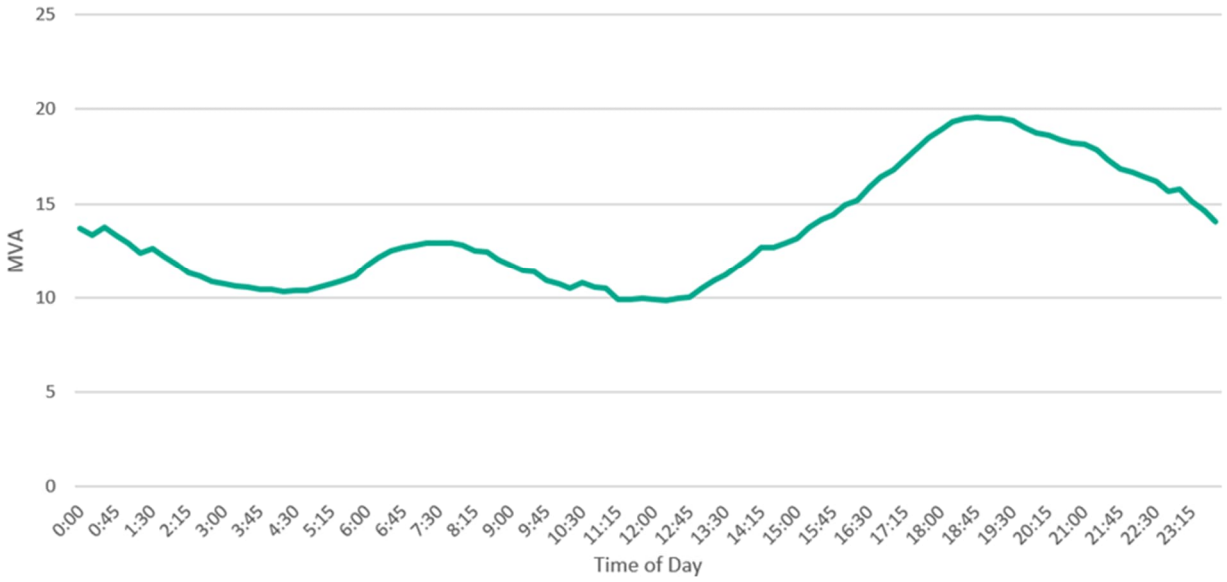
Figure 6 – Riverstone ZS Load Duration Curve (based on 2023/24)



The peak summer day profiles for Schofields ZS and Riverstone ZS show that peak demand is at approximately 6.30pm to 8.00pm due to air conditioning demand in the evening of a hot summer day. By 6pm on a summer evening, the rooftop solar output begins to rapidly decrease as the elevation of the sun falls below the set point angle to the roof that many rooftop solar installations utilise. The majority of rooftop solar installations are set at an angle to maximise energy yield over the course of a year which does not fully capture the summer evening sun particularly after 6pm when the sun will set at 7.30pm to 8.00pm in the summer.

Figure 7 – Peak summer day profile for Schofields ZS

Figure 8 – Peak summer day profile for Riverstone ZS



3.4 Existing network

The Riverstone East and Schofields development area is currently serviced by the 11kV feeders from the existing Riverstone ZS and Schofields ZS. The two existing zone substations are approximately 4km apart and are well positioned and located in geographic terms to supply the area, however they are both capacity constrained and are approaching their firm supply capacity.

Table 5 below provides a summary of the existing zone substations that serve the development area.

Table 5 – Summary of the existing zone substations in the development area

Existing Zone Substation	Summary details
Riverstone ZS	2 x 25MVA 33/11kV transformers. 50MVA Total Capacity. 25MVA Firm Capacity (N-1, assuming the loss of one transformer).
Schofields ZS	2 x 45MVA 132/11kV transformers. 90MVA Total Capacity. 45MVA Firm Capacity (N-1, assuming the loss of one transformer).
Total existing zone substation capacity	140MVA Total installed zone substation transformer capacity. 70MVA Total zone substation firm capacity.

Figure 9 below shows an aerial view of the Riverstone East and Schofields development area including the Riverstone ZS and Schofields ZS. Transgrid's Vineyard Bulk Supply Point is to the north and two of the major 132kV feeders 9JA and 938 (to the east of Riverstone ZS) are shown.

Figure 9 – Aerial view of the existing network in the Riverstone East and Schofields development area

Figure 10 below shows a simplified single line diagram for the existing Schofields ZS. Schofields ZS has three points of 132kV supply, utilising three sections of the 132kV busbar and available space for a third power transformer.

Figure 10 – Schofields ZS - Single Line Diagram

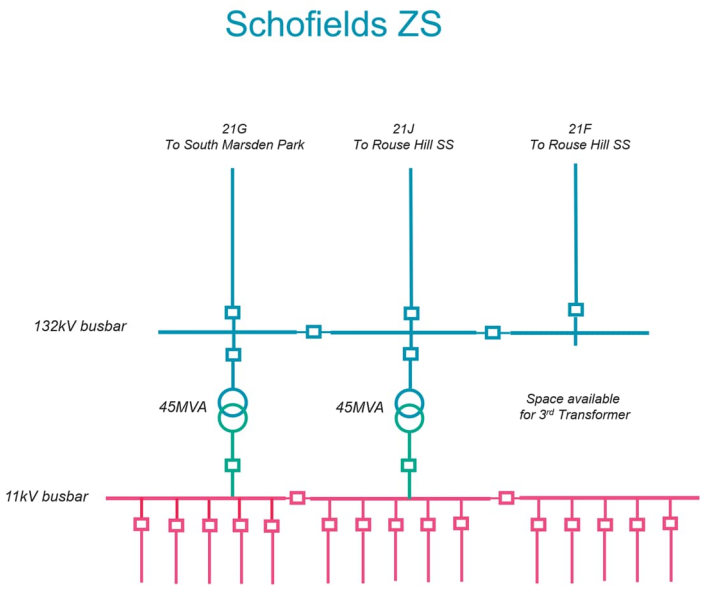
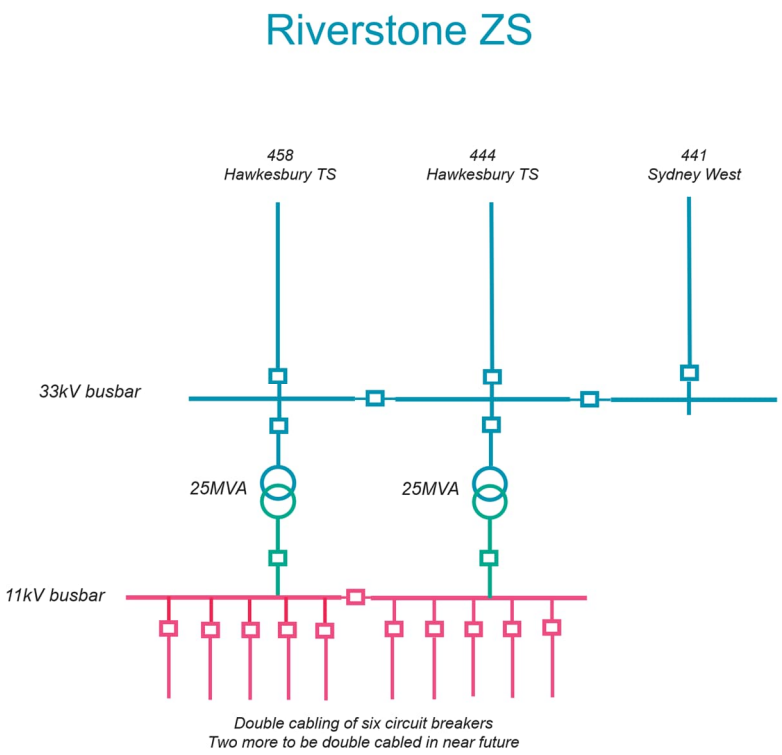


Figure 11 below shows a simplified single line diagram for the existing Riverstone ZS, which has three points of 33kV supply, utilising three sections of the 33kV busbar. The current Riverstone ZS 11kV distribution feeder arrangement is at capacity and will be constrained without further augmentation.

Figure 11 – Riverstone ZS - Single Line Diagram



Both zone substations serve areas with high levels of rooftop solar penetration which results in reverse power flows when solar generation exceeds the demand in the area. In particular, Schofields ZS is now exhibiting reverse power flow for 20% of the year and has the highest level of rooftop solar penetration in the north west area of Sydney. Table 6 shows the existing customer numbers and the solar installations in the Riverstone East and Schofields Development Area that are supplied from the existing zone substations.

Table 6 – Customer Numbers and Solar Installations in the Riverstone East and Schofields Development Area

Zone Substation	Customers	Solar PV installations	Solar Penetration (%)	Installed Customer Solar Capacity (MW)	Average Customer Solar Sizing (kW)
Riverstone ZS	5,822	1,478	25%	9.8	6.6
Schofields ZS	11,075	4,445	40%	30.3	6.8

Despite the high levels of penetration, rooftop solar generation does not materially mitigate peak demand which occurs between 6.30pm to 8.00pm in the summer when air conditioning use during that time period is high. With further development in the Riverstone East and Schofields Development Area, network constraints will become a more significant risk even with a high level of rooftop solar generation. We expect similar uptake of rooftop solar in the development area based on similar housing design and expected customer behaviour. Although Riverstone ZS is more established and has an older housing stock, it has a relatively high level of solar penetration at 25%, however we expect the new residential areas to be at 40% rooftop solar penetration.

Table 7 sets out these network constraints in the Riverstone East and Schofields Development Area.

Table 7 – Network constraints in the Riverstone East and Schofields Development Area

Network Constraint	Description
Lack of firm capacity at Riverstone ZS	The demand forecast for Riverstone ZS for the summer 2024/25 is 25.4MVA which exceeds the firm capacity of 25MVA. If one of the two power transformers at Riverstone ZS were to fail, then the remaining in-service transformer would be unable to supply the maximum demand forecast over summer 2024/25.
Lack of additional distribution feeder availability at Riverstone ZS	Riverstone ZS has 10 x 11kV feeder circuit breakers with six of these double cabled and it is planned that two more circuit breakers will be double cabled in the next two years. There are no freely available feeder circuit breakers to provide for additional distribution feeders at Riverstone ZS.
Lack of firm capacity at Schofields ZS	The demand forecast for Schofields ZS for the summer 2024/25 is 50.0MVA which exceeds the firm capacity of 45.0MVA. If one of the two power transformers at Schofields ZS were to fail, then the remaining in-service transformer would be unable to supply the maximum demand forecast over summer 2024/25.

3.5 Expected unserved energy if action is not taken

If network augmentation is not undertaken, there will be a significant increase in expected unserved energy over the next two decades as demand in the Riverstone East and Schofields development area increases.

The expected unserved energy is determined from the difference between the combined firm capacity at Schofields ZS and Riverstone ZS and the demand forecast for Riverstone East and Schofields development area.

We have used the combined capacity at the two existing zone substations to determine the load at risk and the expected unserved energy.

Based on the demand forecast there will be load at risk from late 2024/25 due to the central demand forecast exceeding the firm capacity of the network.

Table 8 below shows the demand forecasts for the Riverstone East and Schofields development area with the demand in the new precincts allocated to the existing Schofields ZS and Riverstone ZS and then using the combined capacity of the existing network to determine the Load at Risk.

Table 8 – Demand forecasts and existing capacity in the Riverstone East and Schofields Development Area (financial years)

Demand Forecast (MVA)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2037	2042
Riverstone ZS	23.7	25.4	28.5	31.1	33.7	34.3	35.0	35.8	36.7	39.1	41.1
Schofields ZS	39.9	50.0	59.5	67.1	73.9	82.9	86.6	90.3	93.9	100.2	105.3
Total Demand	63.6	75.4	88.0	98.2	107.6	117.2	121.6	126.1	130.6	139.3	146.4
Demand Forecast (MVA)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2037	2042
High Forecast	70.0	82.9	96.8	108.0	118.4	128.9	133.8	138.7	143.7	153.3	161.1
Central Forecast	63.6	75.4	88.0	98.2	107.6	117.2	121.6	126.1	130.6	139.3	146.4
Low Forecast	57.2	67.9	79.2	88.4	96.8	105.5	109.4	113.5	117.5	125.4	131.8
Capacity (MVA)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2037	2042
Total capacity	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0
Firm capacity	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Load at risk	0	5.4	18.0	28.2	37.6	47.2	51.5	56.1	60.6	69.3	76.4

Figure 12 below shows load at risk for the Riverstone East and Schofields development area using the demand forecast scenarios and the capacity of the existing zone substations.

Figure 12 – Load at risk due to insufficient capacity at Riverstone East and Schofields Development Area

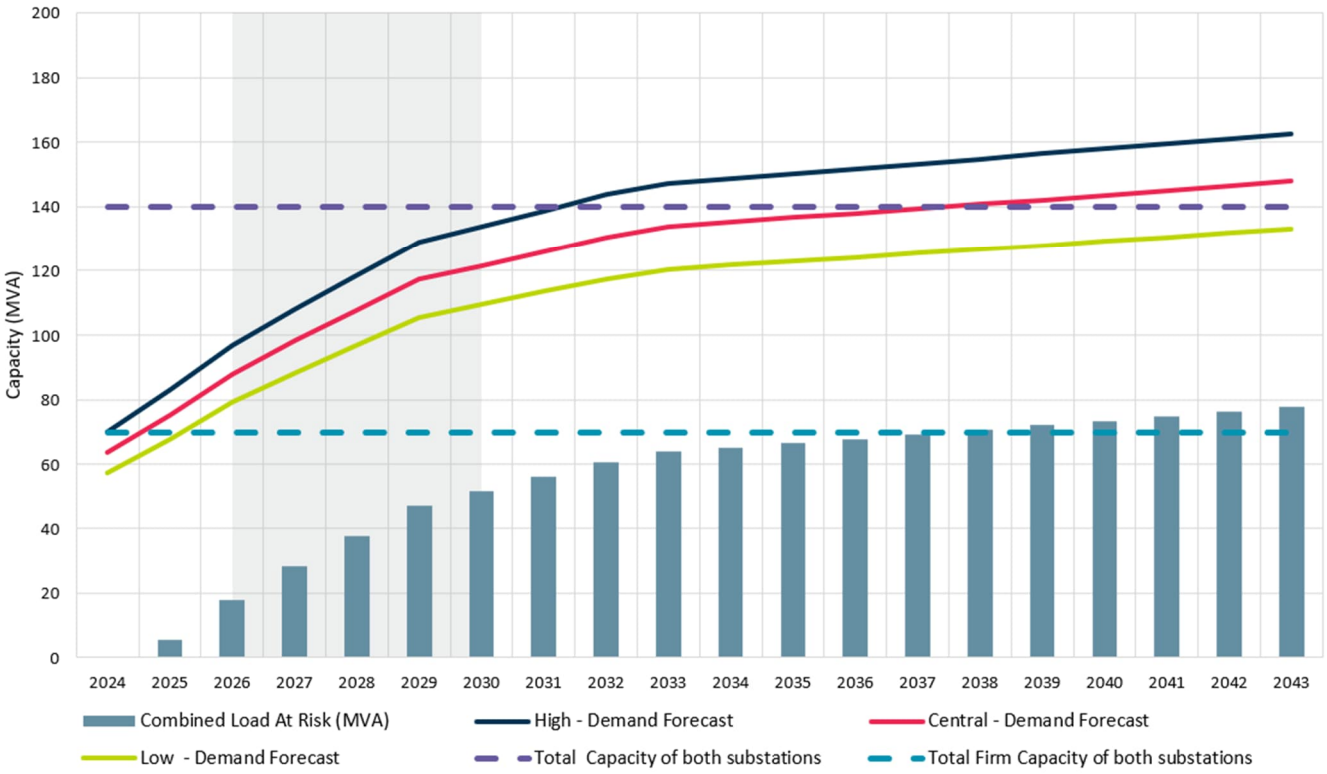
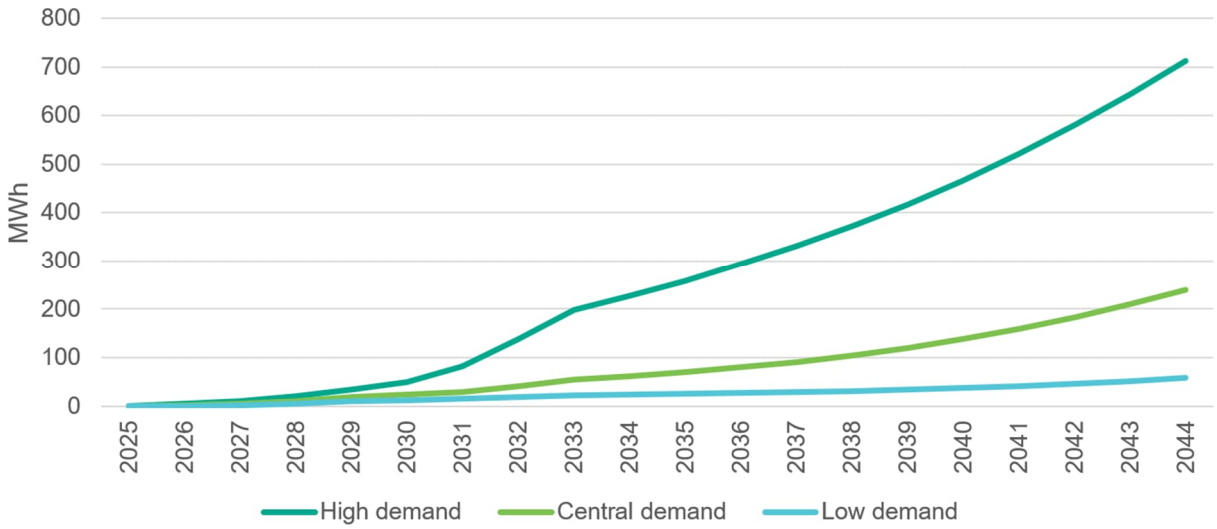


Figure 13 below shows the expected unserved energy for the Riverstone East and Schofields development area based on the three (3) demand forecast scenarios.

Figure 13 – Expected Unserved Energy for the Riverstone East and Schofields Development Area



Although we expect there to be significant market benefits associated with providing supply to the Riverstone East and Schofields Development Area, 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 RIT-D

We have initiated a RIT-D to investigate, and consult on, how to most efficiently provide supply to future load developments in the Riverstone East and Schofields Development Area.

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 likely to occur from late 2024/25, and based on the connection enquiries received to date, load requirements in this area are expected to continue to grow.

4.0 Proposed options to meet the identified need

Two options were determined to be credible in addressing the customer need and have been assessed in comparison to a base case. The options are:

- Option 1 – Establish Grantham Farm ZS in 2026/27 and augment Schofields ZS in 2031/32; and
- Option 2 – Augment Schofields ZS in 2026/27 and establish Grantham Farm ZS in 2031/32.

This section provides detailed information on the scope and cost of these options. It also discusses options that were considered but were not progressed further.

Both credible options involve two stages that reflect common substation works in order to continue servicing existing load and the developments set out in section 3.0. The common substation works under both credible options are:

- augment the existing Schofields ZS to increase total firm capacity by 45 MVA; and
- establish Grantham Farm ZS to increase total firm capacity by 45 MVA.

Figure 14 below shows the location of the Riverstone East and Schofields Development Area in relation to existing zone substations at Riverstone and Schofields. The proposed location of the Grantham Farm ZS is shown. The proposed establishment of the Grantham Farm ZS is a key part of both of the options considered to increase the supply capacity to the development area.

Figure 14 – Riverstone East and Schofields development area in relation to existing and proposed network assets

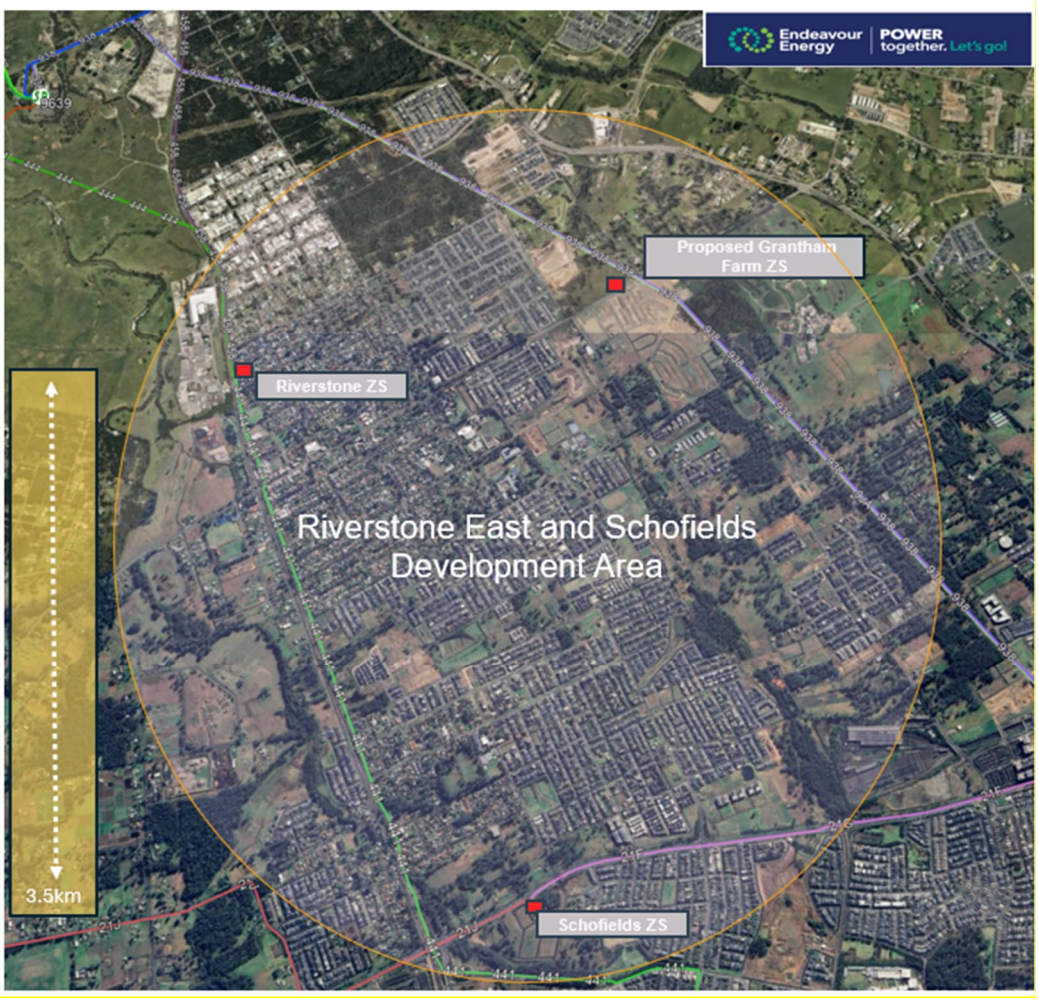
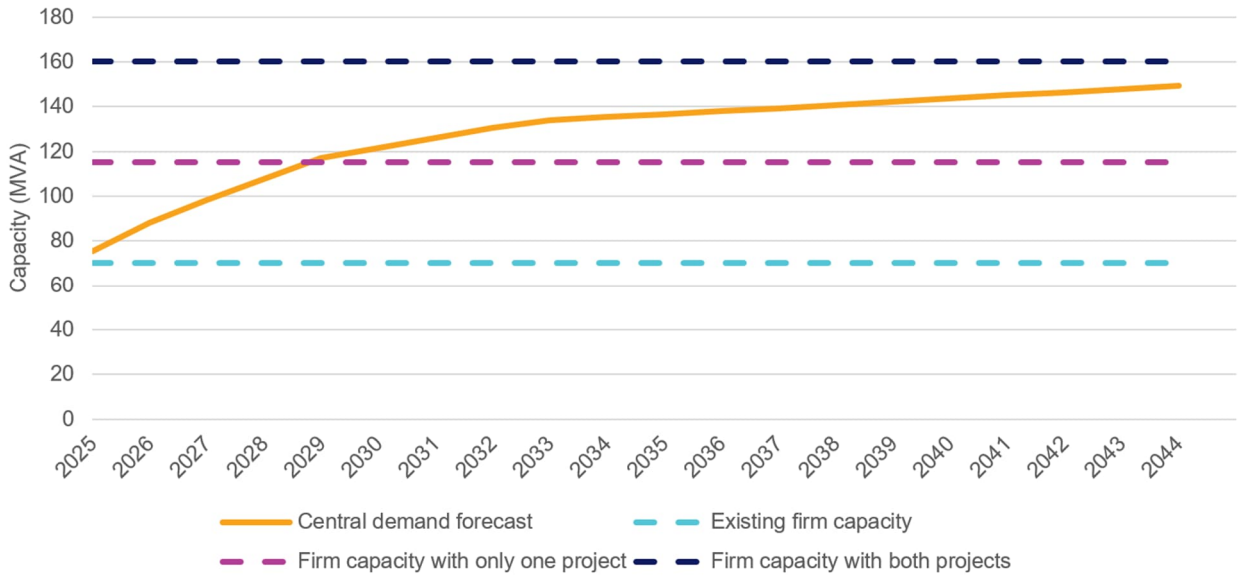


Figure 15 below shows the central demand forecast in relation to the total installed capacity and firm capacity for the development area. For each of the credible options considered, we examine the installed capacity and firm capacity provided by each option. By summer 2024/25, the central demand forecast exceeds the firm capacity for the development area, based on the existing Schofields ZS and Riverstone ZS.

Figure 15 – Forecast demand vs firm capacity



We describe each credible option and their costs below.

4.1 Option 1

Establish Grantham Farm ZS in 2026/27 and augment Schofields ZS in 2031/32

Option 1 provides increased supply capacity to the Riverstone East and Schofields Development Area in two stages:

- Stage 1 – establish a new 132/11kV Grantham Farm ZS with 45MVA firm capacity, commissioned in 2026/27; and
- Stage 2 – establish a third 132/11 kV 45MVA transformer at Schofields ZS, commissioned in 2031/32.

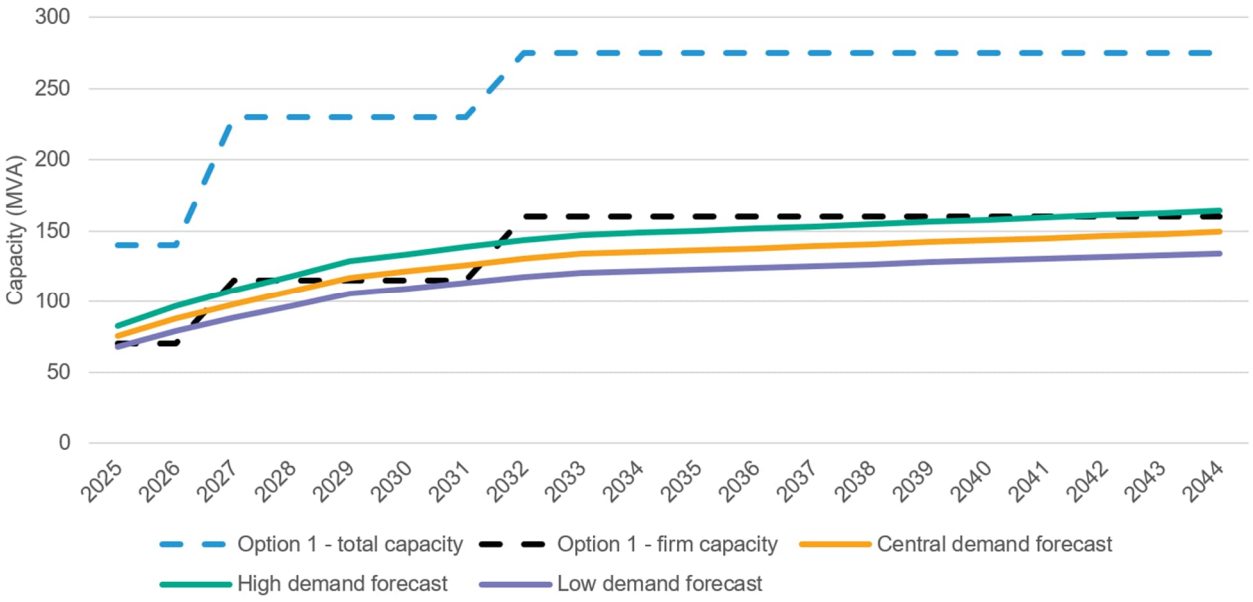
Table 9 below shows the scope of works and the costs for Option 1 including the proposed staging of the works.

Table 9 – Scope of works and costs for Option 1

Stage (commissioning)	Scope	Description	Cost estimate ($M, 2024/25)
Stage 1 (2026/27)	Substation works	Purchase Land for site for Grantham Farm ZS.	6.7
		Establishment of Grantham Farm ZS including: • Two 45MVA 132/11 kV transformers and provision space for three transformers • Two 132kV bus sections and provision of space for a third bus section and a third feeder bay • Two 11kV sections of busbar with 5 x 11kV CBs per section • Outdoor switchgear arrangement	34.4
	Transmission works	• Establish a 132kV supply by connecting to the existing 132kV overhead feeder 9JA.	1.0
	Distribution works	• Establish an auxiliary supply to the new ZS and provide four (4) x 11kV feeders to provide cross zone feeder ties and initial supply to the development area.	4.1
Stage 2 (2031/32)	Substation works	Augmentation of Schofields ZS including: • One 45MVA 132/11kV transformer including bund and blast walls. • Connection of secondary systems for control and data acquisition from the new transformer.	7.6
Total		**Staged establishment of Grantham Farm ZS and the Augmentation of Schofields ZS with a third transformer**	**53.8**

Figure 16 below shows the increase in supply capacity provided by Option 1 in comparison to the customer demand forecast (central, high and low scenarios). The supply capacity shown is the capacity in zone substation power transformers and this is the main constraint to supply in the development area. Option 1 provides an increase in firm capacity that is capable of servicing the area until at least 2044, based on our current demand forecasts.

Figure 16 – Option 1 firm capacity vs demand forecast



Capital expenditure and scope

The total estimated capital cost for Option 1 is $53.8 million in real 2024 dollar terms. The annual operating costs are estimated to be 0.4 per cent of total capital expenditure (excluding land costs).

The purchase of land for the establishment of a proposed Grantham Farm ZS was completed in 2022 and the associated purchase cost has been included at its estimated current market value, in line with AER guidance.[3]

[3] AER, *RIT-D application guidelines*, August 2022, p 32.

Table 10 below shows the expected capital expenditure cashflows over the two stages. We have also shown the regulatory periods because the option cashflow is expected over an 8 year duration.

Table 10 – Option 1 capital expenditure cashflow ($M)

Stage and scope	2025-29 regulatory period					2030-34 regulatory period			Total
	2025	2026	2027	2028	2029	2030	2031	2032	
Stage 1									
Land for Grantham Farm ZS	6.7								**6.7**
Establish Grantham Farm ZS – outdoor substation with a ring-in connection[4]	5.3	15.9	14.2						**35.4**
Endeavour Energy's distribution feeder works			4.1						**4.1**
Stage 2									
Augment Schofields ZS							3.8	3.8	**7.6**
Total	**12.0**	**15.9**	**18.3**				**3.8**	**3.8**	**53.8**

[4] Endeavour Energy compared four different configuration options for the new Grantham Farm ZS and found that an outdoor substation with ring-in connection was preferred to other configurations because it is lowest cost and is consistent with Endeavour Energy's decarbonizing the grid strategy (DTG2035), Other configuration options considered were an indoor substation with a ring-in or tee connection, and to an outdoor substation with tee connection. See section 4.3 .

4.2 Option 2

Augment Schofields ZS in 2026/27 and establish Grantham Farm ZS in 2031/32

Option 2 provides increased supply capacity to the Riverstone East and Schofields development area in two stages:

- Stage 1 – establish a third 132/11kV 45MVA transformer at Schofields ZS, commissioned in FY 2026/27; and
- Stage 2 – establish a 132/11kV Grantham Farm ZS with 45MVA firm capacity, commissioned in FY 2031/32.

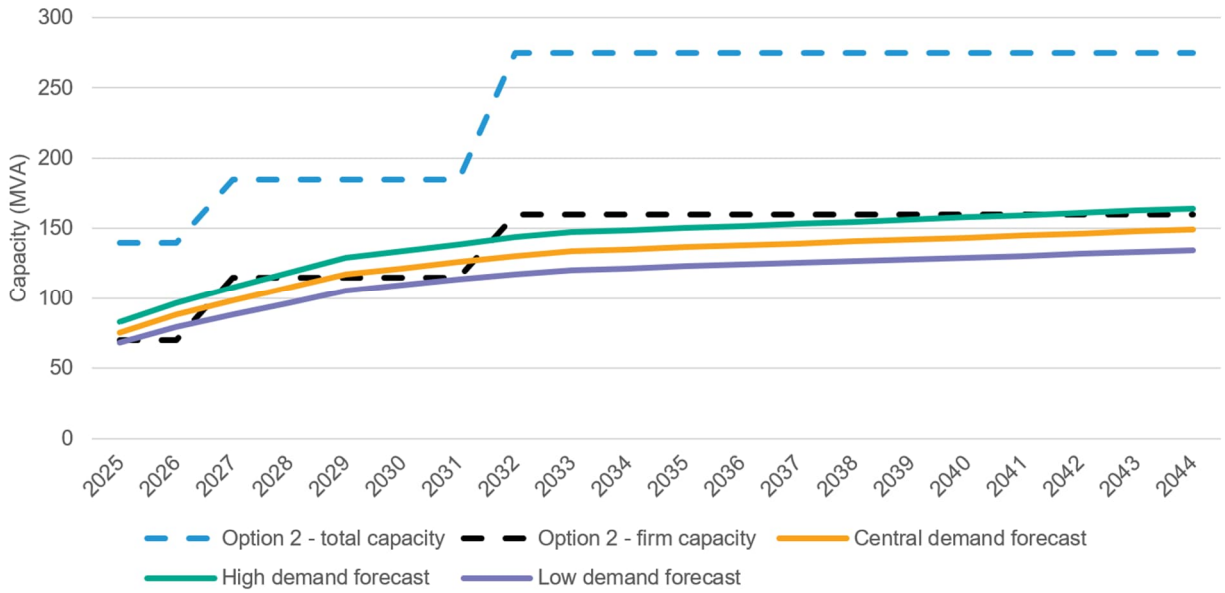
Table 11 below shows the scope of works and the costs for Option 2 including the proposed staging of the works.

Table 11 – Scope of works and costs for Option 2

Stage (commissioning)	Scope	Description	Cost estimate ($M, 2024/25)
Stage 1 (2026/27)	Substation works	Augmentation of Schofields ZS including: • One 45MVA 132/11kV transformer including bund and blast walls. • Connection of secondary systems for control and data acquisition from the new transformer.	7.6
	Distribution works	Establishment of eight (8) additional 11kV feeders from Schofields ZS into the new development precincts.	4.4
Stage 2 (2031/32)	Establish Grantham Farm ZS	Purchase Land for site for Grantham Farm ZS.	6.7
		Establishment of Grantham Farm ZS including: • Two 45MVA 132/11 kV transformers and provision space for three transformers • Two 132kV bus sections and provision of space for a third bus section and a third feeder bay • Two 11kV sections of busbar with 5 x 11kV CBs per section • Outdoor switchgear arrangement	34.4
	Transmission works	• Establish a 132kV supply by connecting to the existing 132kV overhead feeder 9JA.	1.0
Total		**Staged installation of a third transformer at Schofields ZS and establishment of Grantham Farm ZS**	**54.1**

Figure 17 below shows the increase in supply capacity provided by Option 2 in comparison to the customer demand forecast (central, high and low scenarios). The supply capacity shown is the capacity in zone substation power transformers and this is the main constraint to supply in the development area. Similar to Option 1, Option 2 provides an increase in the supply capacity (firm capacity, in particular) to meet the customer demand forecast until at least 2044.

Figure 17 – Option 2 firm capacity vs demand forecast



Capital expenditure and scope

The total estimated capital cost for Option 2 is $54.1 million in real 2024 dollar terms. The annual operating costs are estimated to be 0.4 per cent of total capital expenditure (excluding land costs).

The purchase of land for the establishment of a proposed Grantham Farm ZS was completed in 2022 and the associated purchase cost has been included at its estimated current market value,[5] in line with AER guidance.[6]

[5] Land costs have been included in the RIT-D analysis in real 2023/24 dollars without real price escalations as a non-material simplification, given the uncertainty and difficulty in forecasting real growth in market value. However, we note that inclusion of reasonable real growth rates approximating historical real estate price growth (e.g. 2 to 4 per cent) does not affect the identification of the preferred option of the RIT-D analysis.

[6] AER, *RIT-D application guidelines*, August 2022, p 32.

The cost for distribution feeders required to supply the Riverstone East precincts from Schofields ZS are higher under Option 2 compared to Option 1 for the following reasons:

- new feeders connecting from Schofields ZS to supply the Riverstone precincts are required until 2032 (compared to 2027 under Option 1), because Grantham Farm ZS would not be operational until 2032, under Option 2. In particular, we estimate that eight feeders would need to be built between Schofields ZS and the Riverstone East precincts (over the period to 2032), compared to the four feeders required under Option 1 (to supply the area until 2027).
- the costs of building these distribution feeders will increase for the seventh and eighth feeders because there are a limited number of ducts at the existing Schofields ZS that can be utilised for new feeders heading to the Riverstone East precinct. After these ducts are utilised there will be additional costs for all additional feeders serving the Riverstone East area due to the need to head west along an extended route.

Table 12 below shows the expected capital expenditure cashflows over the two stages. We have also shown the regulatory periods because the option cashflow is expected over an 8 year duration.

In addition to the capital expenditure of Endeavour Energy there would be connection enabling capital expenditure required by property developers and some major customers to provide new feeders to supply the Riverstone East precincts from Schofields ZS[7] . This is a business-as-usual activity and this cost is included in the base case (section 5.1.1).

Table 12 – Option 2 capital expenditure and scope by component ($M)

Stage and scope	2025-29 regulatory period					2030-34 regulatory period			Total
	2025	2026	2027	2028	2029	2030	2031	2032	
Stage 1									
Augment Schofields ZS		3.8	3.8						**7.6**
Endeavour Energy's distribution feeder works			4.4						**4.4**
Stage 2									
Land for Grantham Farm ZS						6.7			**6.7**
Establish Grantham Farm ZS – outdoor substation with a ring-in connection[8]						5.3	15.9	14.2	**35.4**
Total		**3.8**	**8.2**			**12.0**	**15.9**	**14.2**	**54.1**

[7] Feeder costs are treated as costs to other parties in the RIT-D assessment. See section 5.2.2.

[8] Endeavour Energy compared four different configuration options for the new Grantham Farm ZS and found that an outdoor substation with ring-in connection was preferred to other configurations because it is lowest cost and is consistent with Endeavour Energy's decarbonizing the grid strategy (DTG2035), Other configuration options considered were an indoor substation with a ring-in or tee connection, and to an outdoor substation with tee connection. See section 4.3 .

4.3 Options considered but not progressed

Endeavour Energy considered other options that were not progressed further in this RIT-D. These options and our reasoning for not progressing them further are set out below.

4.3.1 Other Option 1 Stage 1 configurations

Four configurations for Stage 1 of Option 1 were considered, including:

- Stage 1a – Outdoor 132kV with tee connection option;
- Stage 1b – Indoor 132kV with tee connection option;
- Stage 1c – Outdoor 132kV with ring in connection option; and
- Stage 1d – Indoor 132kV with ring in connection option.

Each of these configurations would provide the same level of reduction in unserved energy. We have therefore assessed the configurations based on capital and maintenance costs and differences in greenhouse gas emissions.

An outdoor substation (such as stage 1a or stage 1c) uses significantly less SF6 switchgear compared to an indoor substation because of reduced electrical insulation and dielectric requirements in outdoor settings where ambient air can be used as a dielectric. Indoor housed switchgear requires more compact sizing and generally requires SF6 to support the compact size switchgear, although global developments for alternatives are being explored. SF6 has a very high Global Warming Potential (GWP) and has a negative impact on Endeavour Energy's target for net zero emissions by 2035 (under its Decarbonising the Grid 2035 Strategy).

Stage 1c was found to exhibit the lowest cost in present value terms and therefore has been adopted for Option 1. Other configurations have not been progressed given that their higher cost means they are less economically feasible than the Stage 1c configuration, and (in the case of stage 1b and stage 1d) would also have potentially higher greenhouse gas emissions.

Table 13 – Stage 1 configurations for Option 1 and the costs for switchgear and 132kV connection

Stage 1 configuration	PV Costs ($M)	Greenhouse gas emissions
Stage 1a	15.83	Outdoor – less SF6
Stage 1b	20.82	Indoor – more SF6
Stage 1c	**15.15**	**Outdoor – less SF6**
Stage 1d	20.09	Indoor – more SF6

4.3.2 Other option 2 stage 2 configurations

Four configurations for stage 2 of option 2 were considered, including:

- Stage 2a – Outdoor 132kV with tee connection option;
- Stage 2b – Indoor 132kV with tee connection option;
- Stage 2c – Outdoor 132kV with ring in connection option; and
- Stage 2d – Indoor 132kV with ring in connection option.

As with option 1 stage 1, each of these configurations for Option 2 would provide the same reduction in unserved energy. We have therefore assessed the configurations based on capital and maintenance costs, and differences in greenhouse gas emissions.

Stage 2c was the found to exhibit the lowest cost in present value terms and therefore has been adopted for Option 2. Other configurations have not progressed given that their higher cost means they are less economically feasible than the Stage 2c configuration, and (in the case of stage 2b and stage 2d) would also have potentially higher greenhouse gas emissions.

Table 14 – Stage 2 configurations for Option 2 and the costs for switchgear and 132kV connection

Stage 2 configuration	PV Costs ($M)	Greenhouse gas emissions
Stage 2a	22.2	Outdoor – less SF6
Stage 2b	26.9	Indoor – more SF6
Stage 2c	**21.6**	**Outdoor – less SF6**
Stage 2d	26.2	Indoor – more SF6

4.3.3 Establish staged 132/11 kV 45MVA Firm ZS in Riverstone East Area

This option involves a staged establishment of Grantham Farm ZS. The first stage would establish the substation with 1 × 45 MVA transformer with a tee connection to Feeders 938 and 9JA commissioned in FY27. The second transformer would be deferred to the 2029-2034 regulatory period. This option would not have a firm transformer capacity until the second transformer is installed, estimated to be around 2030.

Table 15 below shows that by 2030, the forecast demand is approximately 33 MVA (This is the forecast demand for the new asset, Grantham Farm ZS and allows for load transfers with the existing Riverstone ZS and Schofields ZS, this is different to the area forecast that we have used for the identified need but is the asset level forecast for the new asset). By only having a single transformer, the staged establishment of Grantham Farm ZS would place the entire load at risk, resulting in higher expected unserved energy and a breach of our NER obligations. Given the load at risk, this configuration does not align with Endeavour Energy's practices and our customer service level and expectations. Further, a staged option would only defer a small fraction of the total project cost.

Table 15: Riverstone East Precinct Forecast

Demand Forecast (MVA)	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Riverstone East Precinct	6.7	11.2	19.1	23.5	27.9	30.3	32.8	34.4	36.1	37.8

It follows that this option was not progressed as it is not considered technically feasible in meeting the identified need.

4.3.4 Augmentation of Riverstone ZS

Riverstone ZS is a space-constrained site with little available free space for augmentation. Although there is space for a third transformer, major works would be required to establish an additional 11 kV switchboard to support the additional distribution feeders. Furthermore, the upstream 33 kV network does not have adequate capacity to supply an additional transformer and would require 33kV mains augmentation which would be high cost and we would prefer to not make 33kV mains augmentation but convert the substation to 132kV, however this would require a large cost and require additional time to review options and impacts on the surrounding 33kV network.

Currently, Riverstone ZS will not have sufficient circuit breakers for additional feeders to supply the Riverstone East development area. There are 10 circuit breakers at Riverstone ZS of which six are already double cabled and a further two are earmarked for double cabling. The remaining two circuit breakers can be double cabled to establish additional feeders from Riverstone ZS, however these are being held for expected developments to the North West, because there are no other zone substations to run feeders from in that direction.

For these reasons, options relating to augmenting Riverstone ZS are considered not technically or economically feasible, and have not been progressed further.

4.4 Non-network options

The NER require DNSPs to investigate non-network options by utilising a consultation process as part of planning for major network augmentations. As part of the RIT-D process, Endeavour Energy has issued an Options Screening Notice on 22 November 2024.

Our finding is that non-network options are unlikely to be technically feasible to address the identified need set out in this RIT-D due to the lack of existing infrastructure in the Riverstone East and Schofields development area. Although the Riverstone ZS and Schofields ZS supply areas are well established, the Riverstone East and Schofields development area and the underlying planned precincts are largely undeveloped and we consider this area unsuitable for a non-network option that would avoid or defer our preferred network option.

We have also found that a SAPS solution could not contribute to meeting the identified need because 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.

We note that non-network solutions may be feasible once the proposed network infrastructure has been commissioned to defer future network investment.

In particular, we expect residential roof top solar installations in the development area to be between 30 and 40% of total residential customer connections.

5.0 Assessment framework

This section outlines the methodology that we have applied in assessing the market benefits and costs associated with each of the credible options considered in this RIT-D.

5.1 Overview of the assessment framework

5.1.1 Base case

The costs and benefits of both credible options have been assessed in comparison to a base case that we define below. Under this base case, Endeavour Energy would service the growing demand in the Riverstone East and Schofields Development Area by utilising the existing network.

The base case includes the connection costs, expected to be funded by developers, associated with establishing feeders from the existing Schofields ZS to the Riverstone precincts. In particular, nine feeders from the existing Schofields ZS to the Riverstone precincts would need to be built under the base case during the assessment period to service new developments: two in 2025, two in 2026, and one in each of 2027, 2028, 2029, 2031 and 2035.

The connection costs of these feeders are expected to be incurred by developers if the investments proposed in this RIT-D do not go ahead.

However, in the option cases considered in this RIT-D, the connection costs associated with some of the later feeders projected under the base case are no longer needed, and so are an avoided cost in the RIT-D assessment. The extent to which the expected developer connection costs can be avoided varies between the two options and so including them in the base case allows the analysis to capture this difference between the two options.

Table 16 sets out the expenditure on feeders under the base case.

Table 16 – Feeder program under the base case ($m, real 2024/25)

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
Feeders	2	2	1	1	1	0	1	0	0	0	1	9
Capex	7.60	7.60	3.80	3.80	4.56	0.00	4.56	0.00	0.00	0.00	4.56	36.48

Under this base case, the Riverstone East and Schofields Development Area is expected to be supplied with an ‘N level of redundancy’ until 2037/38. However, there is expected to be significant involuntary load shedding due to a lack of firm capacity, particularly at the zone substation level at Riverstone ZS and Schofields ZS.

5.1.2 Key parameters

This RIT-D analysis has been undertaken over a 20-year period, from 2024/25 to 2043/44. We consider that the length of this assessment period 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.

Development in the Riverstone East and Schofields Development Area is expected to mature over and beyond a 20-year period, but the assessment period incorporates much of the expected demand growth over the development period. Where capital components have asset lives greater than 20 years, we have adopted a residual value approach to incorporating capital costs in the assessment, which ensures that the capital costs of long-lived options are appropriately captured in the 20-year assessment period.

We have adopted a central real, pre-tax discount rate of 3.27 per cent as the central assumption for the NPV analysis presented in this RIT-D. We have also tested the sensitivity of the results to changes in this discount rate assumption with a lower bound real, pre-tax discount rate of 2.23 per cent and an upper bound discount rate of 4.31 per cent (i.e., a symmetrical upwards adjustment).

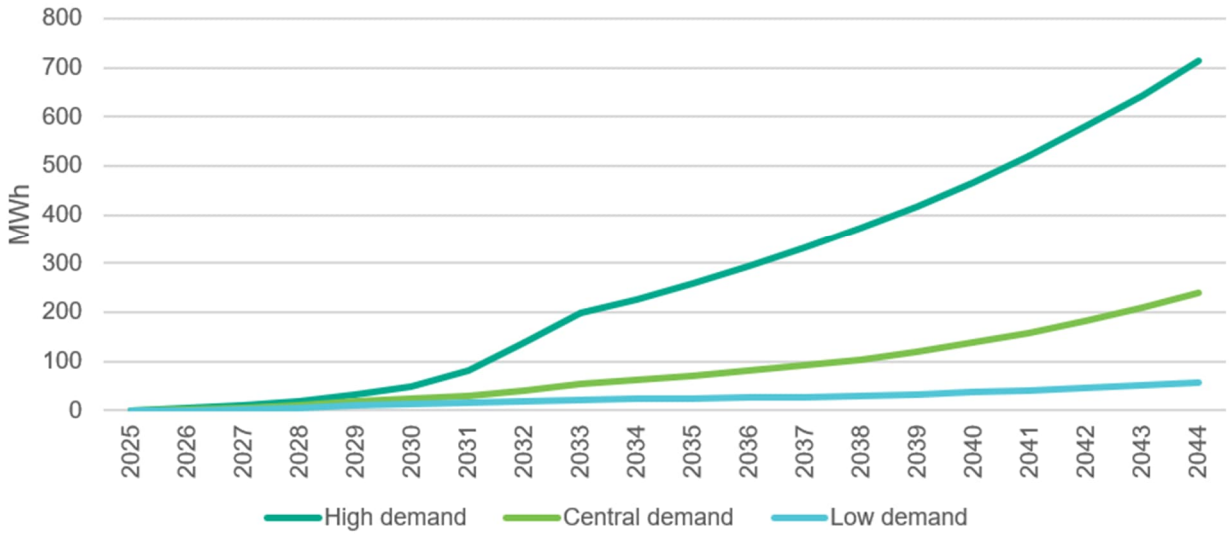
5.2 Market benefits are expected related to USE and changes in costs to other parties

We expect that there are two relevant categories of market benefit examined under the NER for this RIT-D, which are changes in involuntary load shedding (i.e., Unserved Energy, USE) and changes in costs to other parties. Our approach to valuing reduced involuntary load shedding and changes in costs to other parties is outlined below.

5.2.1 Reduced involuntary load shedding

Endeavour Energy has valued reduced and/or involuntary load shedding by reference to our expected unserved energy, which is derived from the annual peak demand forecasts. Figure 18 shows the expected unserved energy profiles in each demand scenario.

Figure 18 – Expected unserved energy profiles in each demand scenario



The value of USE is calculated using the AER's estimate of the value of customer reliability (VCR). The VCR represents an estimate of the value electricity consumers place on reliable electricity supply. The VCR value (in dollars per MWh) is applied to the difference in the MWh of USE calculated between the base case and each credible option.

The VCR is calculated based on the types of customer demand expected to be served in the Riverstone East and Schofields development area. In particular, we expect 63% of the load (customer demand in kVA) to be residential, 28% of the load to be commercial, and 9% of the load to be industrial.

We used a composite VCR value of $47.36 per kWh (or $47,356 per MWhr) in the evaluation, based on the calculation breakdown provided in Table 17 below. This is based on the 2024 VCR values provided by the AER in December 2024. The AER's direction on VCR in December 2024 has resulted in a material increase in the VCR from the DPAR for this RIT-D published in November 2024. This has resulted in an increase in the NPVs of both of the options examined in the RIT-D.

Table 17 – Composite VCR used in evaluation

Parameter	Residential (Climate Zone 6 CBD and Suburban)	Commercial	Industrial
Customer Demand composition of the Riverstone East and Schofields Development Area	63%	28%	9%
VCR used in the DPAR published on 22 November 2024	$25,400/MWh	$53,230/MWh	$76,270/MWh
VCR used in the FPAR (based on the AER's direction on VCRs published in December 2024)	$55,100/MWh	$34,390/MWh	$33,490/MWh
Demand weighted VCR used in the FPAR following the AER's update of VCR values in December 2024	**$47,356.30/MWh**		
VCR used in the DPAR in November 2024	**$37,980/MWh**		

5.2.2 Changes in costs to other parties

New feeders would be required to connect developments in the Riverstone East and Schofields development area precincts under the business-as-usual base case (see section 5.1.1). Costs for these feeders, if they are of a dedicated nature to one particular customer or development, are generally funded by other parties (i.e. developers and customers), and differ under the base case and credible options under consideration.

To quantify changes in costs to other parties, we have included capital expenditure and operating expenditure related to these feeders under the base case, and each option (as set out in Table 18), to calculate the difference in costs relative to the base case in the RIT-D assessment.

Table 18 – Feeders and associated capex ($m, real) under the base case and credible options

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
Base case												
Feeders	2	2	1	1	1	0	1	0	0	0	1	**9**
Capex	7.60	7.60	3.80	3.80	4.56	0.00	4.56	0.00	0.00	0.00	4.56	**36.48**
Option 1												
Feeders	2	2	0	0	0	0	0	0	0	0	0	**4**
Capex	7.60	7.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**14.2**
Option 2												
Feeders	2	2	1	1	1	0	1	0	0	0	0	**8**
Capex	7.60	7.60	3.80	3.80	4.56	0.00	4.56	0.00	0.00	0.00	0.00	**31.9**

5.3 No other categories of market benefit are expected to be material

This section provides a brief overview of the categories of market benefit that Endeavour Energy considers will not materially affect the outcome of this RIT-D assessment. These are:

- changes in voluntary load curtailment;
- option value;
- changes in load transfer capability;
- changes in electrical losses;
- changes in the timing of unrelated expenditure; and
- avoided greenhouse gas emissions.

5.3.1 Changes in voluntary load curtailment

Voluntary load curtailment is when customers agree to reduce their demand (load) to address a network limitation in return for a payment. A credible demand side option to enlist such customers to voluntarily reduce load could lead to a reduction in voluntary load shedding.

Endeavour Energy has not estimated any market benefits associated with changes in voluntary load curtailment. Although customers are now more broadly capable of providing greater levels of voluntary load curtailment, the greenfield nature of this identified need is such that the area does not have the capacity to deliver sufficient voluntary demand reduction.

5.3.2 Option value

Endeavour Energy notes that the AER's view is that option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change and the credible options considered by the RIT-D proponent are sufficiently flexible to respond to that change.

Although we have not explicitly quantified option value for this assessment, it is implicitly captured in the structure of our credible options (each of which have flexibility for future investment).

5.3.3 Changes in load transfer capability

Distribution investments can improve load transfer capacity where a credible option allows customers to gain access to an alternate back-up power supply via the meshed 11kV network. This is a market benefit because the alternate supply can service customers in the event of loss of primary supply. The main objective of this project is to establish a secure connection for new customers in the Riverstone East and Schofields Development Area.

There is currently minimal load transfer capability from adjacent zone substations and feeders. Each credible option would be expected to generate a minor increase in load transfer capability between the Riverstone East and Schofields development area and adjacent areas. However, these changes are much less than the market benefit of avoided USE and therefore not considered material.

5.3.4 Changes in electrical losses

Endeavour Energy recognises that there would be small changes in the loss profiles for customers across the network due to changes in the network.

Since the majority of customers connecting will be general customers (rather than site specific), the impact of the small change in loss profile for these customers is unlikely to have significant impact on the network wide distribution loss factors that will be applicable to these and other customers. These changes are captured as part of the annual review of distribution loss factors when more information about customer usage patterns is available.

5.3.5 Changes in the timing of unrelated expenditure

Differences in the timing of expenditure relates to the potential for a credible option to change the timing (or configuration) of other future investments to be made by or for the RIT-D proponent. Importantly, this relates to distribution investments that address identified needs other than those addressed by the credible option. Given that this investment is concerned with establishing the first stage of supply in the greenfield development area of the North West Priority Growth Area, we do not consider differences in the timing of expenditure to be material for this RIT-D.

5.3.6 Avoided greenhouse gas emissions

Following the change to the National Electricity Objective (NEO) in September 2023 to include changes in Australia's greenhouse gas emissions, and the subsequent change to the NER on 1 February 2024, NSPs now need to include a new benefit category to cater for changes in emissions in RIT assessments (where material).

Endeavour Energy recognises the importance of considering changes in greenhouse case emissions in light of the changes made to the NEO. However, neither of the options considered in this RIT-D 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.

In particular, the similarities between option components in this RIT-D mean that differences in avoided greenhouse gas emissions are unlikely to be material.

Endeavour Energy has considered differences in greenhouse gas emissions in considering the wider set of potential options that could potentially meet the identified need (and in particular whether an outdoor or indoor substation configuration is progressed), as discussed in section 4.3 .

5.4 Endeavour Energy's approach to estimating project costs

Endeavour Energy's design teams have estimated capital costs by considering the scope of works of each of the credible options and utilised unit costs discovered from recent major projects including:

- Aerotropolis Backbone Feeder 132kV from South Erskine Park ZS to Bringelly ZS
- Western Sydney Airport Transmission Substation
- North Bradfield ZS
- Box Hill ZS
- South Erskine Park ZS.

These major projects are in various stages of completion ranging from detailed design to approaching commissioning and we have monitored the increase in cost over the previous four years.

We have observed significant increases in the cost of major equipment including cable and transformers, civil and building works (including bulk earthworks) and the civil works for trenching for cable installation works. The costs of third-party contractors who support the delivery of major projects have increased substantially.

Our cost estimates for the credible options in this RIT-D are based on the best cost estimate information that we have available at the time of publishing.

Endeavour Energy does not generally apply the 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.

We estimate that actual costs will be within ±25 per cent of the central capital cost estimate. While we have not explicitly applied the AACE cost estimate classification system, we note that an accuracy of +/- 25 per cent for cost estimates is consistent with industry best practice and aligns with the accuracy range of a 'Class 4' estimate, as defined in the AACE classification system.

No specific contingency allowance has been included in the cost estimates. All cost estimates are prepared in real, 2024/25 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 network level assessment of assets and works. These costs are included for each year in the planning period from when the options are commissioned.

5.5 Three different demand scenarios have been modelled to address uncertainty

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

We have assessed three alternative future scenarios as part of the RIT-D NPV assessment, namely:

- a central demand scenario – consisting of assumptions that reflect the central demand forecast in MVA terms. This scenario represents the best estimate of demand developed from DPE and council plans, and customer enquiries;
- a high demand scenario – reflecting a 10 per cent increase in total demand, in MVA terms, relative to the central scenario. This scenario has been included in the assessment to test the impact of a higher demand forecast on the ranking of the credible options; and
- a low demand scenario – reflecting 10 per cent lower total demand, in MVA terms, relative to the central scenario. This scenario has been included in the assessment to test the impact of a lower demand forecast on the ranking of the credible options.

Other parameters, including capital expenditure, VCR and discount rate are held constant across the scenarios, with variations considered as part of the sensitivity analysis.

A summary of the key variables/framework used for each scenario is provided in Table 19 below.

Table 19 – Scenarios used in RIT-D NPV assessment

Parameter/ scenario	Central scenario	High demand	Low demand
Demand	Central demand forecast	High demand forecast (+10% MVA)	Low demand forecast (-10% MVA)
Capex	Central estimates	Central estimates	Central estimates
VCR	Load-weighted AER VCR $47,356/MWh	Load-weighted AER VCR $47,356/MWh	Load-weighted AER VCR $47,356/MWh
Discount rate	3.27%	3.27%	3.27%
Scenario weighting	33%	33%	33%

Endeavour Energy considers that all scenarios are equally likely on the basis that there is no information that would indicate each individual scenario being more likely than other scenarios, and as such they have all been given equal weighting of one third for the assessment of credible options.

6.0 Assessment of credible options

This section summarises the results of the NPV analysis, including the sensitivity analysis undertaken. All credible options have been assessed in comparison to the base case that we have defined.

6.1 Gross market benefits estimated for each credible option

Table 20 below summarises the gross market benefit of each credible option relative to the base case in present value terms. The gross market benefit has been calculated for each of the scenarios.

Table 20 - Present value of gross economic benefits of each credible option relative to the base case ($M)

Option	Central scenario	High benefits	Low benefits	Weighted
Scenario weighting	33%	33%	33%	
Option 1	**56.7**	**164.8**	**23.9**	**81.8**
Option 2	48.5	156.5	15.7	73.6

We note that Option 1 is expected to deliver higher avoided unserved energy benefits and avoided costs for other parties compared to Option 2, despite both options delivering the same level of firm capacity. Option 1 would avoid $8.2 million more costs for other parties than Option 2. These differences arise due to:

- the lower number of feeders required under Option 1 (four feeders) compared to Option 2 (eight feeders);
- different failure rates of assets;
- the expected time taken for asset repairs; and
- distances between the zone substation and the development area.

6.2 Estimated costs for each credible option

Table 21 below summarises the costs of each credible option relative to the base case in present value terms. The cost is the sum of the project capital costs and the estimated annual operating and maintenance costs.

The cost of each option has been calculated for each of the three reasonable scenarios described above.

Table 21 - Present value of costs of each credible option under each scenario ($M)

Option	Central scenario	High benefits	Low benefits	Weighted
Scenario weighting	33%	33%	33%	
Option 1	30.8	30.8	30.8	30.8
Option 2	**24.9**	**24.9**	**24.9**	**24.9**

Option 2 exhibits lower costs than Option 1 and is mainly due to capital expenditure to establish Grantham Farm ZS being deferred until 2030-32, which reduces the cost in present value terms. In contrast, Grantham Farm ZS is established under Option 1 between 2025-27.

6.3 Net present value assessment outcomes

Table 22 below summarises the net market benefit in NPV terms for each credible option under each scenario. The net market benefit is the gross market benefit (as set out in Table 20) with the cost of each option (as set out in Table 21) subtracted to obtain a net present value.

Table 22 – Present value of net market benefit of each credible option relative to the base case ($M)

Option	Central scenario	High benefits	Low benefits	Weighted	Rank
Scenario weighting	33%	33%	33%		
Option 1	**25.9**	**134.0**	**(6.9)**	**51.0**	**1**
Option 2	23.6	131.6	(9.2)	48.7	2

Under the NER, the preferred option is the credible option that maximises the present value of the net economic benefit to all those who produce, consume or transport electricity in the National Electricity Market (NEM), as well as that arising from changes in Australia's greenhouse gas emissions. Applying this criteria, Option 1 is the preferred option at this final stage because it has the highest net market benefits. Option 1 has the highest net benefits on a weighted basis and in each scenario. The following section demonstrates that the sensitivity analysis we have undertaken confirms our view that Option 1 is preferred at this final stage.

6.4 Sensitivity analysis results

We have undertaken a thorough sensitivity testing analysis to test the robustness of the RIT-D assessment to underlying assumptions about key variables. Our sensitivity analysis has focused on testing the sensitivity of the total NPV benefit associated with the investment proceeding consistent with the timeframes for customer connection and customer demand. We have assessed the sensitivity of the net benefits of each option to:

- changes in the discount rate;
- changes in the capital costs; and
- changes in the VCR.

The figures below demonstrate that these sensitivities confirm the selection of the preferred option.

Figure 19 – Impact of varying the discount rate on the net market benefits of each credible option

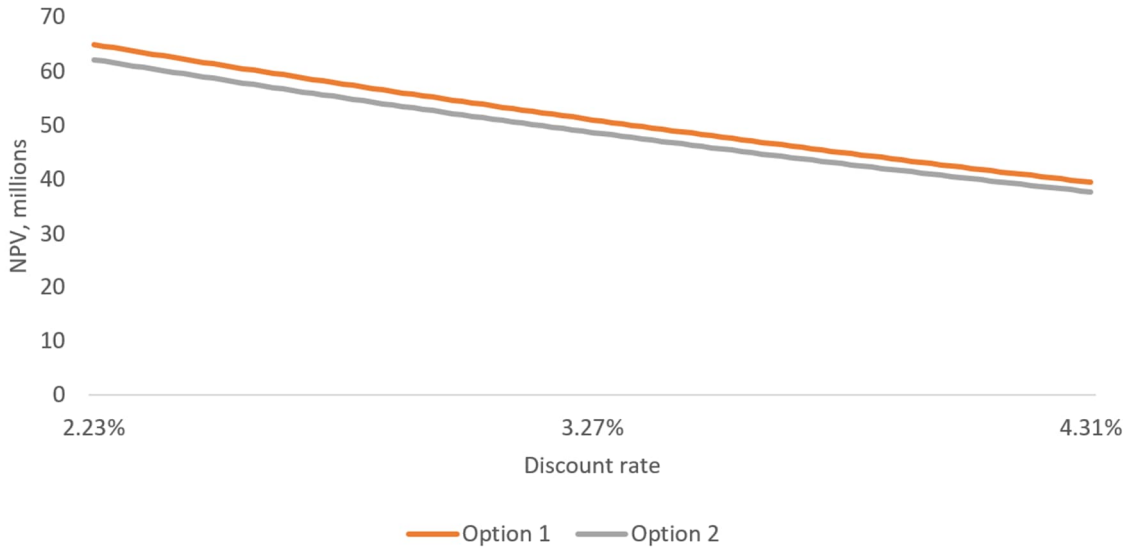
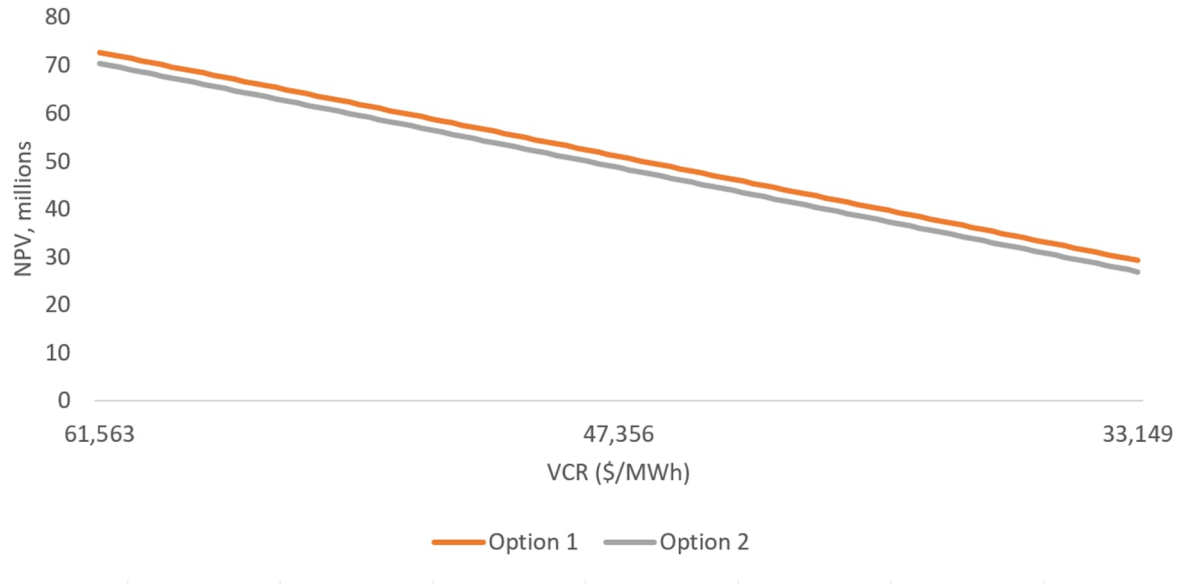


Figure 20 – Impact of varying capital costs on the net market benefits of each credible option

Figure 21 – Impact of varying the VCR on the net market benefits of each credible option



6.4 Boundary analysis results

In addition to sensitivity testing, we have undertaken boundary testing to understand the bounds of discount rates, capital costs, and VCR parameters where the preferred option can continue to exhibit the highest net benefit and maintain a positive net benefit.

Table 23 – Boundary testing

Parameter	For Option 1 not to be ranked first	For Option 1 not to exhibit net benefits
Discount rate	6.91%	9.07%
Capital cost	N/A	185% increase
VCR	N/A	$14,000/MWh

Further, while this RIT-D is considered a reliability corrective action under section 5.10 of the NER we note that there are no reasonable parameter values for capital cost or VCR that would cause Option 1 to no longer exhibit net benefits.

We note that the identification of Option 1 as the preferred option would be affected if the discount rate applied was materially above 6.91%.

7.0 Conclusion

The Riverstone East and Schofields development area is located within the north-west of Sydney. It is approximately 25km north-west of Parramatta. The area is currently largely undeveloped rural land and has been recently rezoned for residential housing and a limited area for enterprise business land use.

The Riverstone East and Schofields development area includes the multistage development at Riverstone East, the enterprise area at Riverstone West and residential growth areas at Schofields West and Alex Avenue.

These new residential areas will include their own town centres, schools, community facilities and future small scale commercial zoned spaces. The overall objective of the development area is to provide new residential housing in north-west Sydney and it has been a focus area for NSW government and local government. The area is also well served with public transport including the new Metro rail line and the dedicated bus lanes with stations and access points in close proximity to the development area.

The development area is planned to add approximately 20,000 new residential dwellings and to require 149MVA of electricity supply capacity by 2044. The existing infrastructure supporting these precincts, namely the Schofields ZS and Riverstone ZS and the existing 11kV network are not sufficient to provide the supply necessary to support the future development of the area.

Consistent with the options screening notice, Endeavour Energy is of the view that no non-network solution or SAPS solution is feasible to form a credible option on a standalone basis, or form a significant part of a potential credible option for the Riverstone East and Schofields Development Area.

This RIT-D process (concluding with this FPAR) identified two credible network-based options that can meet the required customer demand.

The two credible options involve establishing a new zone substation (Grantham Farm ZS) within the Riverstone East precinct, strategically located approximately equal-distant from the existing zone substations of Riverstone and Schofields. This proposed location also takes advantage of the close proximity to a 132kV supply that provides a low-cost connection of the proposed zone substation to the 132kV supply via the overhead feeder 9JA.

The two credible options considered are:

- Option 1 – establishment of Grantham Farm ZS in 2026/27 and augment the existing Schofields ZS with an additional power transformer in 2031/32;
- Option 2 – augment the existing Schofields ZS with an additional power transformer in 2026/27 and establish Grantham Farm ZS in 2031/32.

Each of the options have been assessed in an economic evaluation and Option 1 has been identified as the preferred option on the basis that it provides the highest net benefits.

Option 1 involves establishing a new 132/11kV Grantham Farm ZS with 45MVA firm capacity in stage 1, commissioned in 2026/27, then augmenting Schofields ZS with an additional third 132/11kV 45MVA transformer commissioned in 2031/32 in stage 2.

Construction of the new 132/11kV Grantham Farm ZS would commence in 2024/25, with commissioning in 2026/27. Augmentation of Schofields ZS would commence in 2030/31 with commissioning in 2031/32.

The capital cost for Option 1 is estimated to be $53.8 million in real 2024/25 dollar terms.

Table 24 below shows the staging and cost estimates for Option 1, the preferred option. The commissioning year and the supply capacity increase provided by each stage are also shown. The timing for Stage 2 will be reviewed on an ongoing basis and is dependent upon demand forecasts and customer connection requirements.

Table 24 – Option 1 – Preferred Option – Staging and estimates

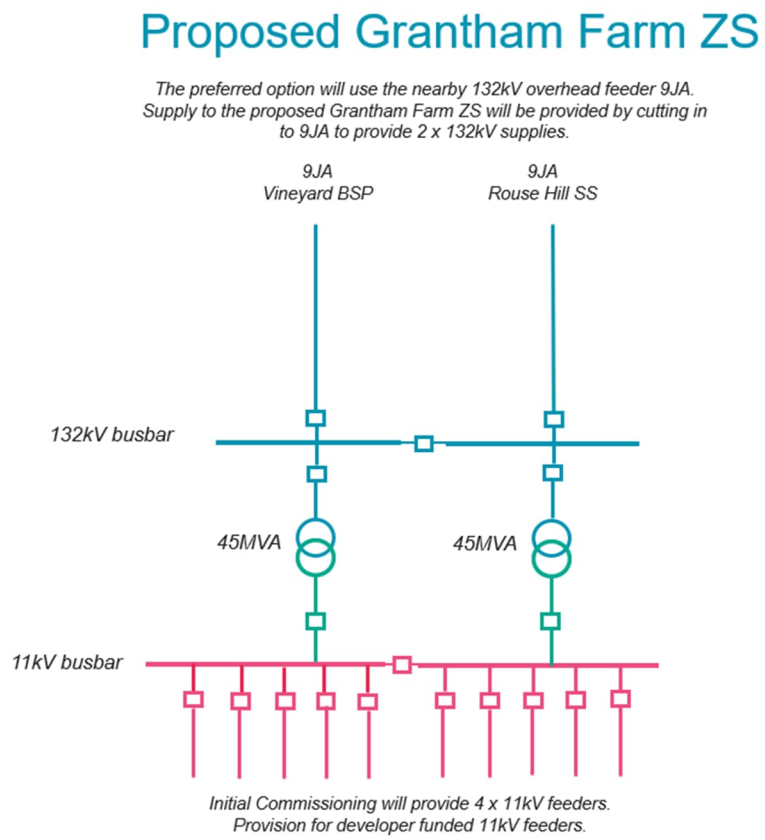
Stage	Deliverable	Commissioning	Added Supply Capacity (MVA)	Cost Estimate ($M)
1	Establishment of Grantham Farm ZS including land acquisition.	2026/27	90	46.2
2	Augmentation of Schofields ZS with addition of 3rd power transformer.	2031/32	45	7.6
			135	**53.8**

Figure 22 below shows the proposed Grantham Farm ZS and its connection to the existing 132kV overhead feeder 9JA providing a high capacity 132kV supply.

Figure 22 – Proposed Grantham Farm ZS and connection to the 132kV feeder 9JA

Figure 23 shows a simplified single line diagram for the proposed Grantham Farm ZS as the first stage of Option 1. We expect that the 132kV feeders maybe renamed and labelled during the detailed design process and we expect that several of the 11kV distribution feeders will be funded by developers as they will be dedicated to the supply of property developments.

Figure 23 – Simplified Single Line Diagram



CONTACT

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