RIT-D Final Project Assessment Report

Providing supply to the South Creek West Residential Growth Area

6 June 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 South Creek West residential growth area.

The South Creek West residential growth area is located within the South West of Sydney. It is approximately 40km south-west of Parramatta and 8km south of the new Western Sydney Airport. The area is currently largely undeveloped and has been recently rezoned for residential housing.

The South Creek West residential growth area includes the planned Oran Park Town Centre to the north of the existing Oran Park residential area and the planned new residential development areas at Lowes Creek Marylands, Pondicherry, Greenways and Cobbitty South Creek West.

These new residential areas will include their own town centres, schools, community facilities and future small scale commercial and limited industrial zoned spaces. The overall objective of the development area is to provide new residential housing in south-west Sydney and it has been a focus area for NSW government and local government. In total, the South Creek West residential growth area is estimated to include 20,500 new residential dwellings and to require 172MVA of electricity supply capacity by 2050.

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 requiring connection will exceed the existing network capacity. This is currently expected to be in 2026/27, based on the advanced plans of property developers and the customer connection arrangements in place.

This report follows publication of an options screening notice that found non-network solutions are unlikely to form a potential credible option on a standalone basis or form a significant part of a potential credible option for the South Creek West residential growth area. This is due to the level of the forecast demand for the area, the expected cost of non-network options and the 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 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.

Four options were determined to be credible in addressing the identified need and have been assessed in comparison to a 'do nothing' (no proactive intervention) base case. These are:

- Option 1 – installation of a third transformer at Oran Park zone substation (ZS) in 2026/27 and establishment of Lowes Creek ZS (using an outdoor switchgear arrangement) with a single transformer in 2032;
- Option 2 - establishment of Lowes Creek ZS using an outdoor switchgear arrangement with two transformers in 2026/27;
- Option 3 – establishment of Lowes Creek ZS using an indoor switchgear arrangement with two transformers in 2026/27; and
- Option 4 – establishment of Lowes Creek ZS (using an outdoor switchgear arrangement) in stages with one transformer in 2026/27 and a second transformer added in 2031/32.

Each of the credible options involves the establishment of Lowes Creek ZS. The four options provide variations to this establishment by considering different technical configurations for the zone substation (including whether it is indoors or outdoors), staging of the zone substation transformers and the augmentation of the adjacent Oran Park ZS.

Option 1 utilises the existing Oran Park ZS and involves installing a third transformer followed by the establishment of Lowes Creek ZS at a later time. This option defers a large amount of capital to a later time.

Option 2 and Option 3 provide the same level of supply capacity to the development area. However they vary in that Option 2 is an outdoor option for the major switchgear at the new Lowes Creek ZS, while Option 3 houses the switchgear indoors. Option 3 better aligns with the architectural and aesthetic considerations for the area. Although this option has a higher capital cost. Endeavour Energy notes that a developer has committed to making an external contribution to Option 3, which has the effect of lowering its effective cost in the RIT-D assessment. The economic evaluation of these two options also takes into account the higher level of fugitive greenhouse gas (SF6) emissions for the indoor option (Option 3).

Option 4 involves the staging of the establishment of Lowes Creek ZS by installing supply capacity over a longer period of time. However, this option provides a lower supply capacity in the early period of the development of the South Creek West residential growth area.

The results of the economic assessment of the credible options are shown below in Table E 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).

The RIT-D assessment has identified Option 2 and Option 3 as being effectively equally ranked in NPV terms, with the net market benefits of Option 3 being within 1 per cent of Option 2's net market benefits (on a weighted basis). As noted above, Option 3 enhances the visual amenity of the Lowes Creek ZS, as compared to Option 2. Although this factor is not quantified in the RIT-D NPV analysis, Endeavour Energy has taken this qualitative consideration into account in selecting between these two options, given their equal weighting, and has therefore identified Option 3 as the preferred option.

The economic assessment, including the treatment of the external contribution applying to only Option 3, aligns to the requirements of the NER and the Australian Energy Regulator (AER)'s RIT-D guidelines.

The value of the external contribution is commercially sensitive and therefore is treated as **confidential**. To meet reporting requirements under section 4.3 of the RIT-D guidelines we have disclosed the full cost of Option 3, before subtracting the external contribution, while net economic benefits for Option 3 are presented inclusive of the external contribution. To maintain confidentiality, we have redacted the PV of market benefits and costs, noting that we will provide these values to the AER upon request.

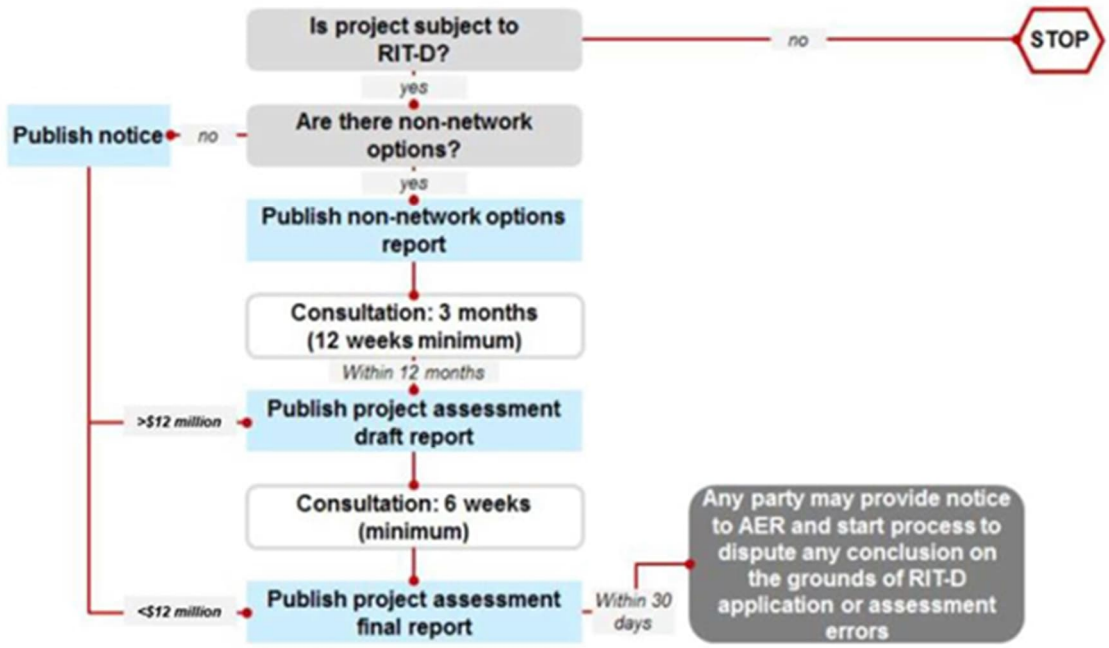
Table E 1 – Economic assessment of credible options weighted results

Option	Description	Project capex ($M, real 2024/25)	PV of market benefits ($M, PV)	PV of costs ($M, PV)	NPV ($M, PV)	Rank
1	Establish 3rd transformer at Oran Park ZS and establish Lowes Creek ZS with a single transformer	53.0	79.1	27.5	51.6	3rd
2	Establish Lowes Creek ZS with two transformers	40.3	78.0	25.1	52.9	Equal 1st
3	Establish Lowes Creek ZS indoors with two transformers	45.0	Confidential		52.7	Equal 1st
4	Establish Lowes Creek ZS with a staged implementation	48.5	53.0	26.9	26.1	4th

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 South Creek West Residential Growth 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 supply to the South Creek West residential growth area. It follows publication of the options screening notice and DPAR, both of which were published on 7 November 2024.

Endeavour Energy invited written submissions on the materials contained in the DPAR (over a six-week consultation period which we closed on 19 December 2024) 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.

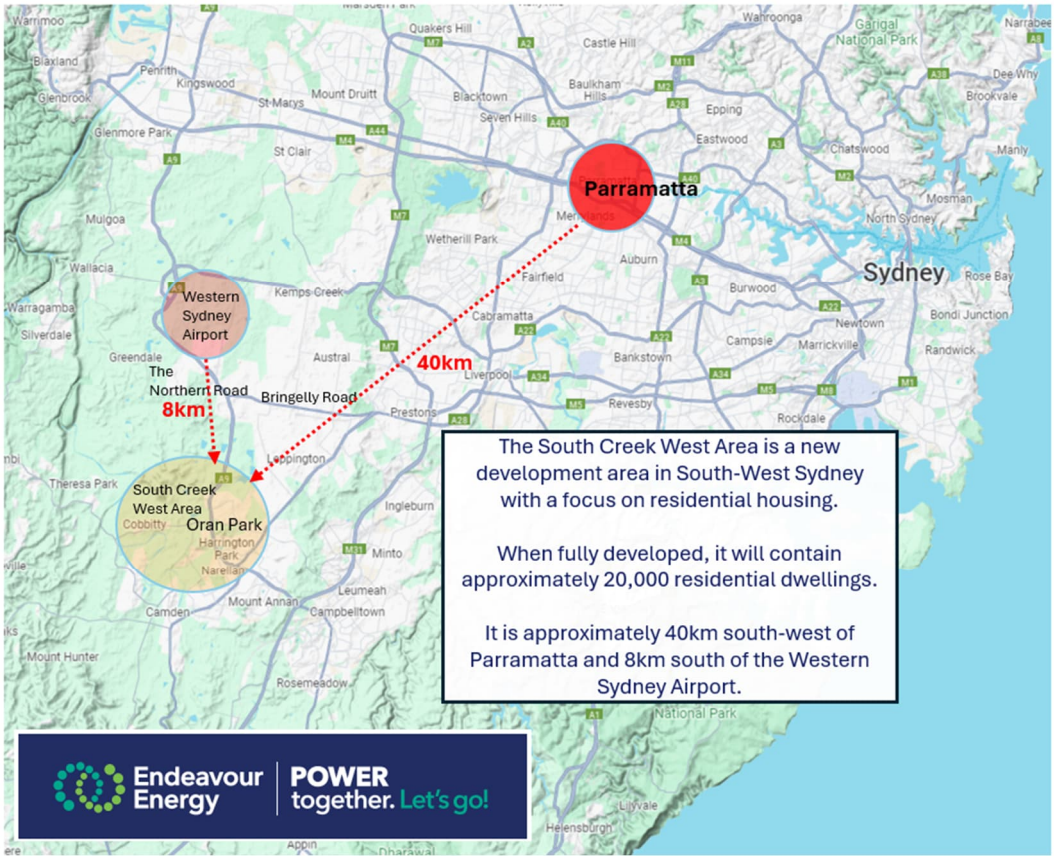
3.1 Relevant area of our network

The South Creek West residential growth area is located approximately 40km south-west of Parramatta and approximately 8km south of the new Western Sydney Airport.

The area has been identified by the NSW Department of Planning, Housing and Infrastructure (DPHI) for future urban development,[1] and is expected to be fully developed with residential dwellings by 2050. This will include complementary developments including town centres, schools, community facilities and future commercial and limited industrial spaces.

Figure 2 below shows the geographic location of the South Creek West residential growth area in relation to Parramatta and the new Western Sydney Airport.

Figure 2 – Location of the South Creek West residential growth area in relation to Parramatta



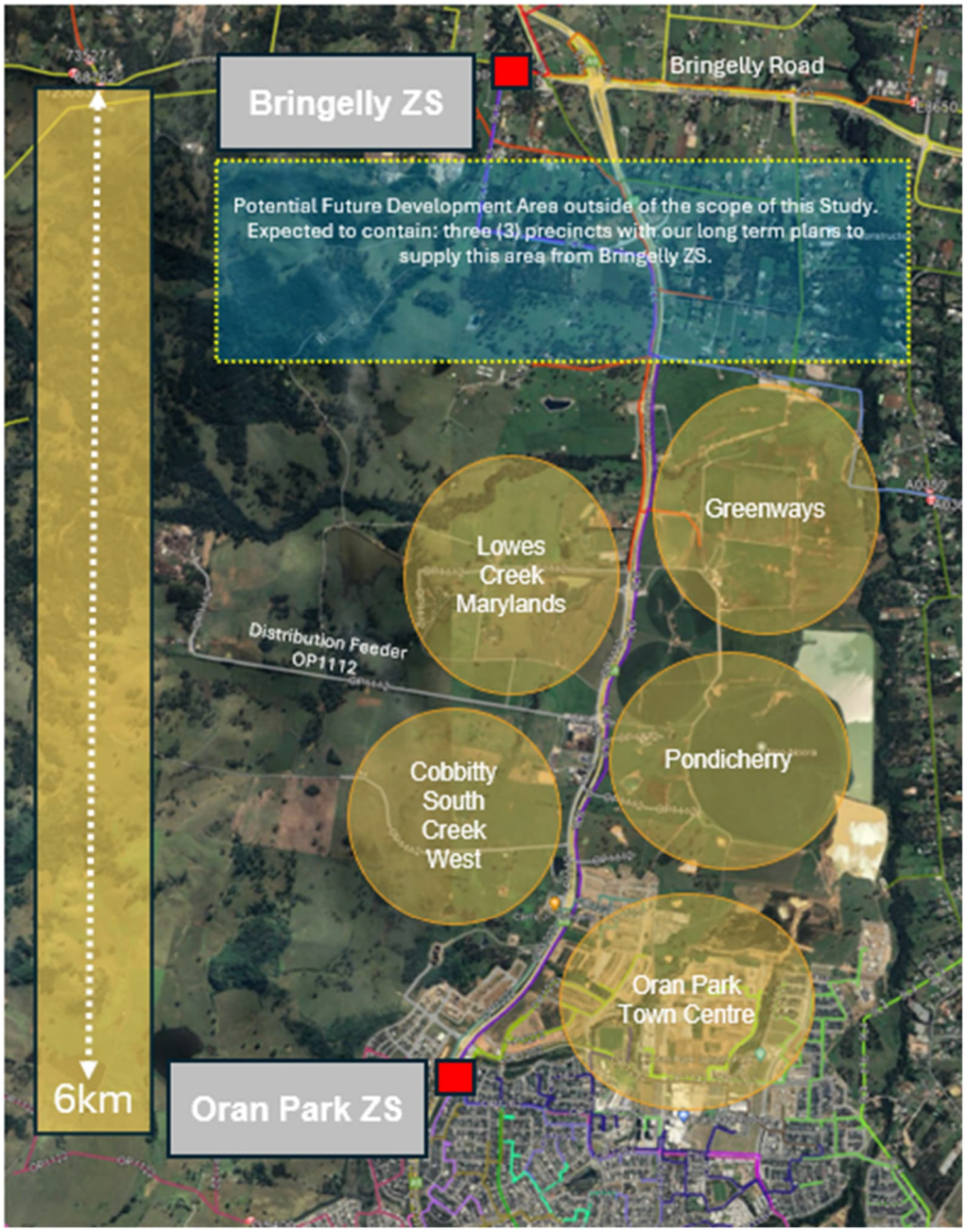
[1] NSW Department of Planning, Housing and Infrastructure, see: https://www.planning.nsw.gov.au/plans-for-your-area/priority-growth-areas-and-precincts/south-west-growth-area/south-west-growth-area-plan, accessed 30 July 2024.

The South Creek West residential growth area is wholly within the Camden Local Government Area.

Figure 3 below shows the location of several proposed residential development precincts within the South Creek West residential growth area. The existing land use, as can be seen from Figure 3, is currently largely undeveloped rural land. The area is located between the existing Bringelly and Oran Park Zone Substations. These Zone Substations are approximately 6km apart.

The details of the proposed development precincts, including the number of residential lots and associated demand forecasts, are presented and analysed further below.

Figure 3 – Location of residential development precincts within the South Creek West residential growth area



3.2 Load characteristics and demand forecast

The South Creek West residential growth 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. The land will be subdivided into residential lots, subject to receiving approval from Local Government.

Based on the proposed precincts, the South Creek West residential growth area will include 20,500 residential dwellings by 2050 and will require 172MVA of electricity supply capacity.

Table 1 below shows the proposed South Creek West residential growth area precincts and the corresponding housing lots estimated to be completed by 2050. 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. Further details on the estimate of residential housing lots are provided by the Urban Development Plan for the South West Growth Area.[2]

Table 1 – South Creek West residential growth area precinct development summary

Proposed Precinct	Estimate of total residential housing by 2050	Details
Lowes Creek Marylands	7,000	In addition to the residential dwellings , there are planned school and community facilities.
Oran Park Town Centre	2,000	Predominantly high density apartments with schools, community facilities and outdoor recreational spaces.
Pondicherry	2,800	Predominantly residential housing lots, town centre, community facilities and schools.
Greenways	4,900	Development to also include schools and some limited commercial and enterprise developments.
Cobbitty South Creek West	3,800	Development to also include community and sporting facilities.

Table 2 shows the assumptions that have been used to develop the demand forecast from the underlying residential growth plans for the area.

[2] See NSW Department of Planning and Environment, *A Guide to the South West Growth Area and updated Structure Plan*, December 2022.

Table 2 – South Creek West residential growth area demand forecast assumptions

Assumption	Value and unit of measure
Average Diversified Maximum Demand – Standalone lots	5.4kVA per Lot
Average Diversified Maximum Demand – Terraces	4.35kVA per Lot
Average Diversified Maximum Demand – Apartments	3.3kVA 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 3 below shows the central demand forecast for the South Creek West residential growth area based on the development plans and the assumptions set out in Table 2.

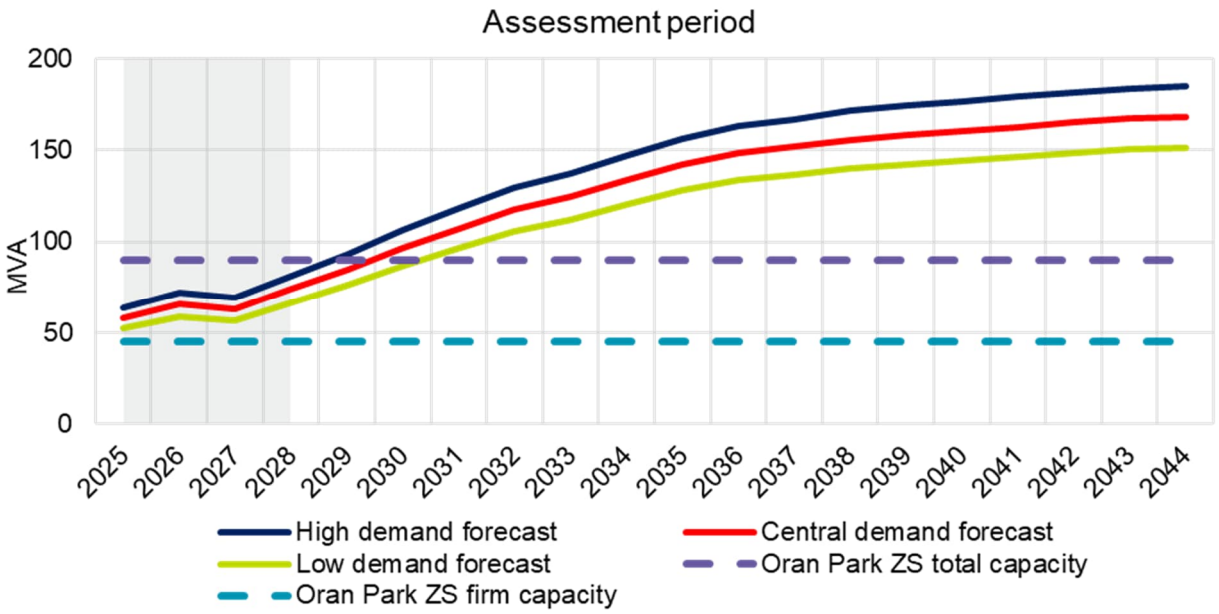
Table 3 – South Creek West residential growth area central demand forecast (MVA)

Central demand forecast	2024	2025	2026	2027	2028	2029	2030	2031	2032		2037	2042
Existing Oran Park	48.4	53.7	56.3	58.5	60.6	62.8	65.2	67.3	70.3		71.1	71.1
Oran Park Town Centre	0.3	2.4	4.7	7.9	10.6	13.2	15.0	16.0	17.2		21.4	21.4
Pondicherry	0.4	1.9	3.2	5.1	6.8	8.3	9.7	10.7	11.8		13.0	13.0
Greenways	0.0	0.0	0.0	0.2	1.3	2.9	4.8	7.2	9.5		16.5	22.2
Cobbitty South Creek West	0.0	0.0	0.0	1.3	2.7	4.1	5.5	6.7	7.9		15.2	16.7
Lowes Creek Marylands	0.0	0.0	1.3	3.0	4.8	6.6	9.4	12.2	13.8		20.4	26.4
Total demand	**49.1**	**58.0**	**65.5**	**63.0**	**73.8**	**84.9**	**96.6**	**107.2**	**117.5**		**151.8**	**165.1**

Based on the central demand forecast set out in Table 3, 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. Endeavour Energy applies a +/-10% range for residential load, to reflect the typical degree to which actual residential load has historically varied from forecast residential load in Endeavour Energy's network.

Figure 4 below shows the firm and total capacity at the existing Oran Park ZS that currently serves the South Creek West residential growth area (discussed further below) and the low, central and high forecasts of the growth in demand for this area. These demand forecasts have been used to inform the scenarios adopted in assessing the credible options.

Figure 4 – Capacity and forecast peak demand at Oran Park ZS



3.3 Expected pattern of use

Due to the similarities in the expected residential housing development proposed in the South Creek West residential growth area and the adjacent Oran Park ZS supply area, we have used the pattern of use from the Oran Park ZS to analyse the South Creek West residential growth area. This includes applying the same load duration curve and peak summer day profile as at Oran Park.

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 Oran Park ZS which has 34% of residential homes with a rooftop solar installation.

Many of the community facilities, sports and recreation complexes and shopping centres are expected to have similar patterns of use as Oran Park. We are confident in our use of Oran Park ZS to represent the South Creek West residential growth area pattern of use.

Figure 5 shows the Load Duration Curve (LDC) for Oran Park ZS that we have applied to the South Creek West residential growth area. The LDC uses MW real power rather than MVA apparent power to show the impact of the reverse power flow caused by the high solar PV penetration. Oran Park ZS has reverse power flow during high solar PV production periods of the day, based on the 34% of solar penetration in the area.

Oran Park ZS experiences reverse power flow for approximately 18% of the year, on a half hourly basis, this would typically be during the peak solar production period of 2pm to 4pm on a sunny day. When fully developed, we expect the South Creek West area to have a similar load duration curve and reverse power flow.

Figure 5 – Oran Park ZS Load Duration Curve

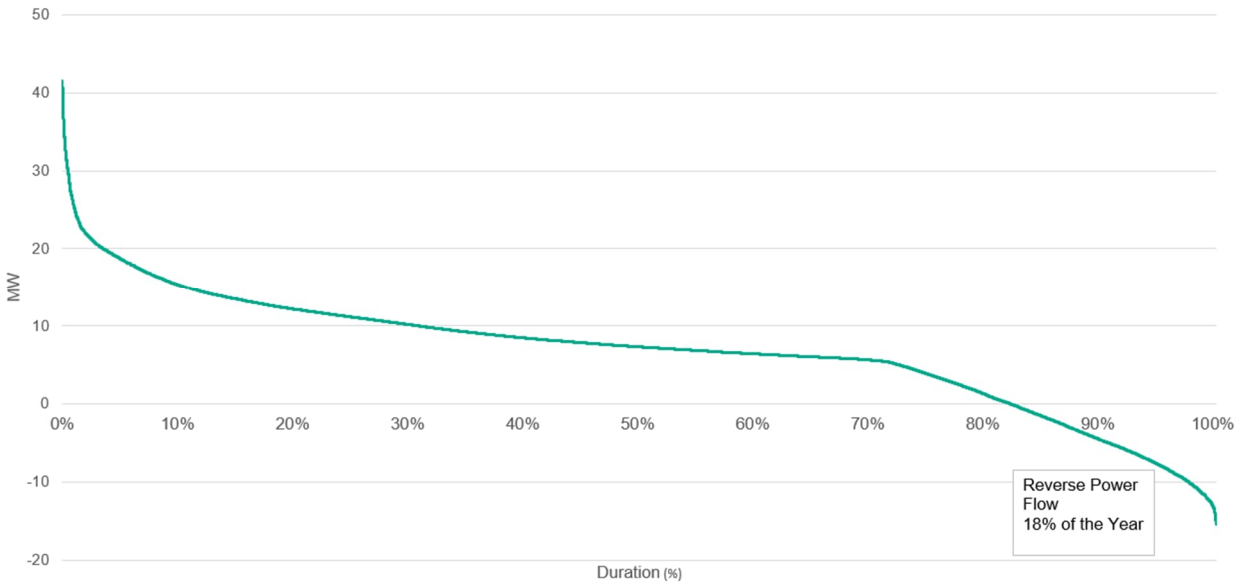
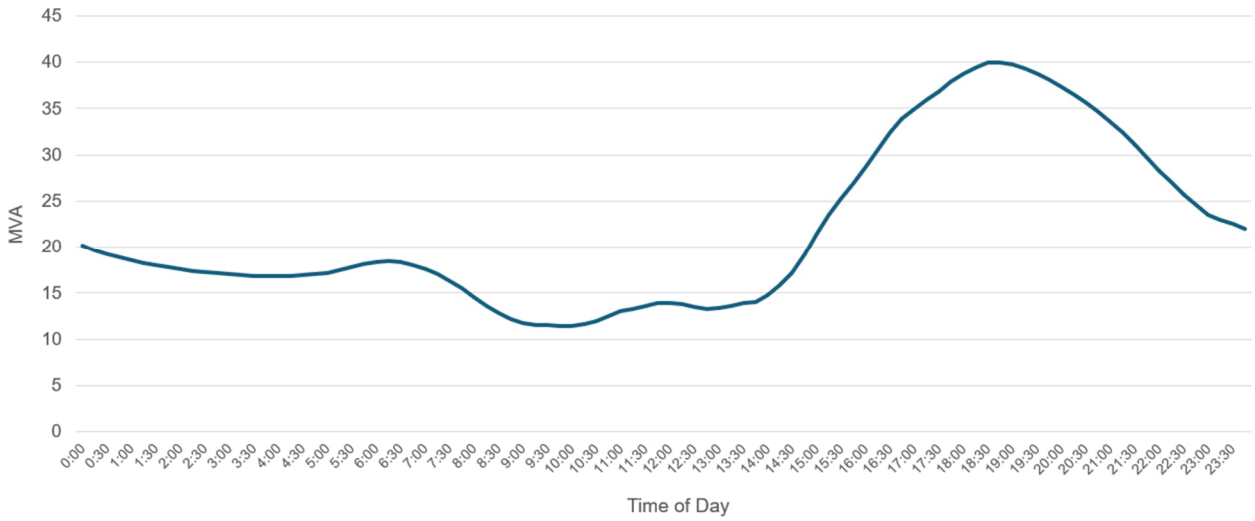


Figure 6 shows the peak summer day profile for Oran Park ZS. We expect the South Creek West growth area to have a very similar load profile shape, based on similar underlying customer behaviour and similar planned residential housing stock and built environment. It shows that the peak period of the day is expected to be 6.30pm, resulting from air conditioning demand in the evening of a hot summer day. This demand profile is from a day with a maximum temperature of >35 degrees. The impact of the solar generation within the area is shown by this time of day profile, with the peak being later in the day after the peak generation expected from rooftop solar.

Figure 6 – Peak summer day profile for Oran Park ZS



3.4 Existing network

The South Creek West residential growth area is currently serviced by the Oran Park ZS by a single 11kV distribution feeder (OP1112). This feeder is capable of servicing the initial development area until 2026/27, based on the demand forecast for the area.

The Bringelly ZS is approximately 3km to the north of the centre of the South Creek West residential growth area and although it has an 11kV feeder that extends into the area, Bringelly ZS has no available capacity at the power transformer level to supply this demand, and no longer has anymore connection points available. Bringelly ZS is also presently dedicated to temporarily service the development area to the north which includes the Aerotropolis Core Precinct.

Oran Park ZS has two 45MVA 132/11kV transformers and is supplied via two 132 kV feeders (9L3 and 9L6). Total installed capacity of Oran Park ZS is 90MVA with a firm (N-1) capacity of 45MVA.

Figure 7 shows the existing network in the South Creek West residential growth area, including the location of the existing Oran Park Zone Substation and Bringelly Zone Substation, and shows the 11kV feeder OP1112.

Figure 7 – Existing network in the South Creek West residential growth area

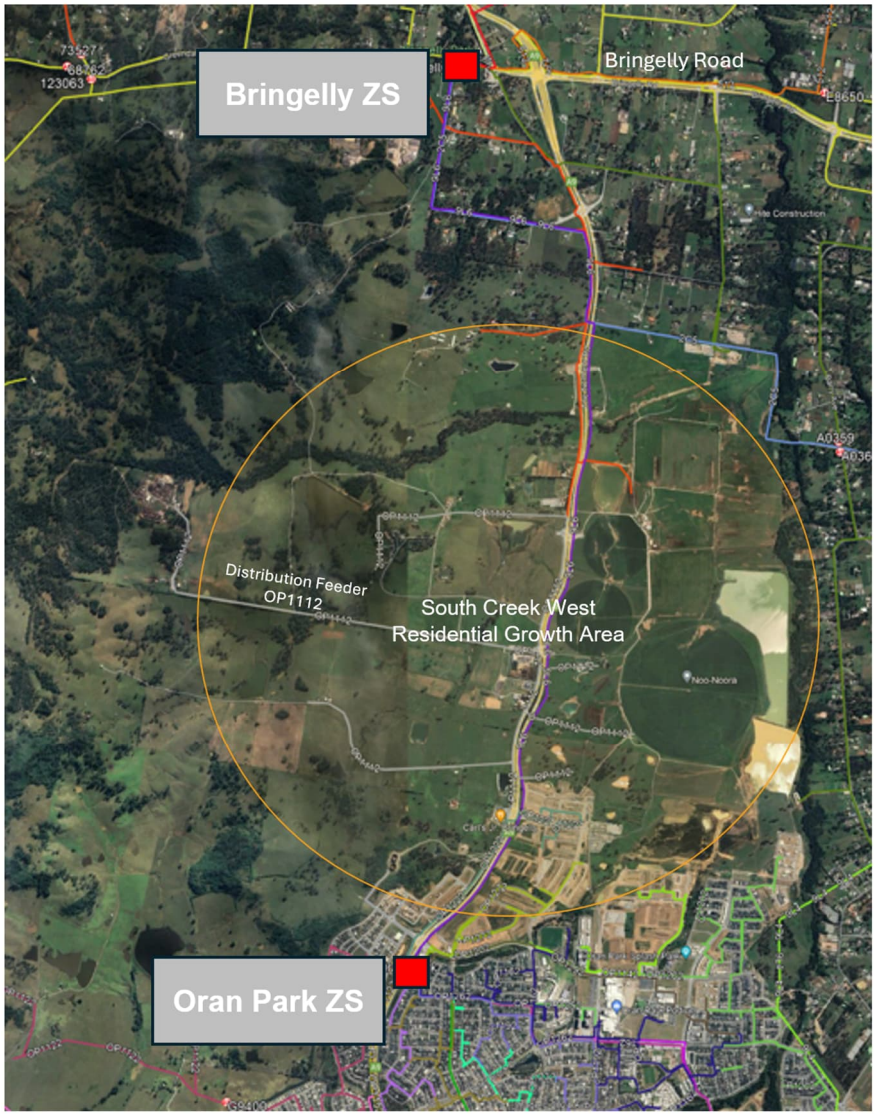
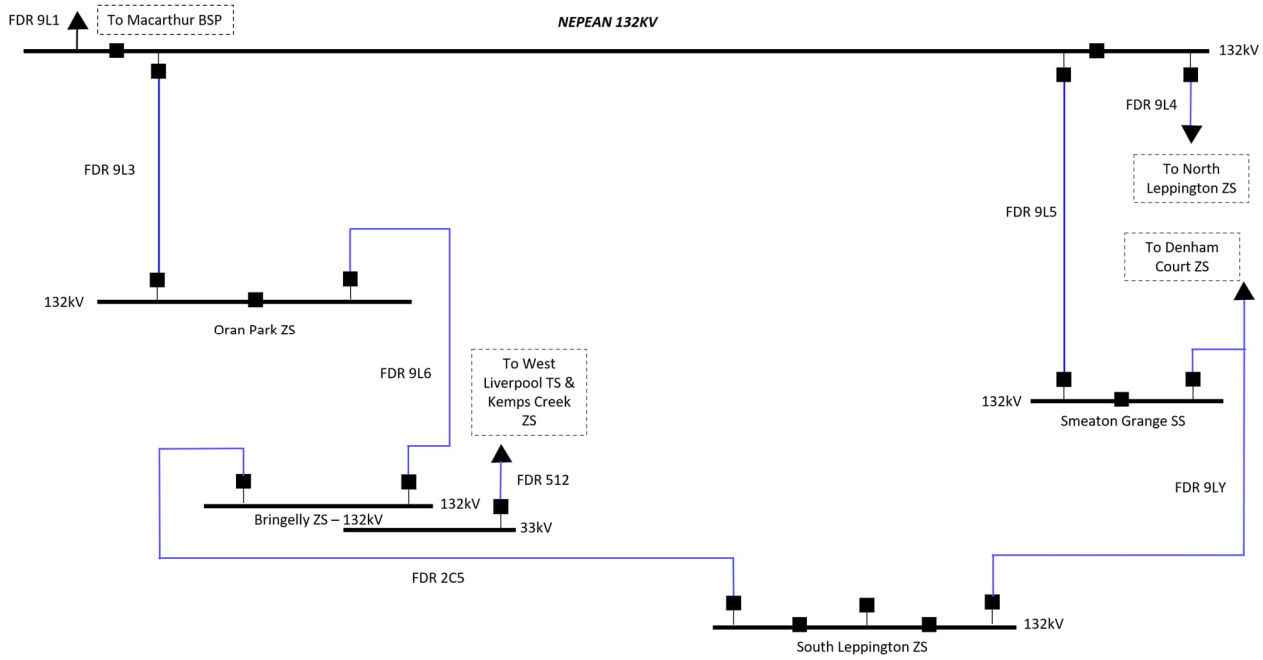


Figure 8 shows the 132kV supply to Oran Park ZS. 132kV feeders 9L6 and 9L3 provide supply to Oran Park ZS. Feeder 9L6 provides a 132kV connection between Oran Park ZS and Bringelly ZS. 9L6 follows The Northern Road and is approximately 6.0km route length.

Figure 8 – Single Line Diagram of the existing 132kV supply to Oran Park ZS



The existing network in the area is not capable of servicing the forecast growth in electricity demand. In particular, there are a number of network constraints that inhibit the ability to supply the forecast demand and customer connection requirements in the area. Table 4 shows the network constraints in the South Creek West residential growth area.

Table 4 – Network constraints in the South Creek West residential growth area

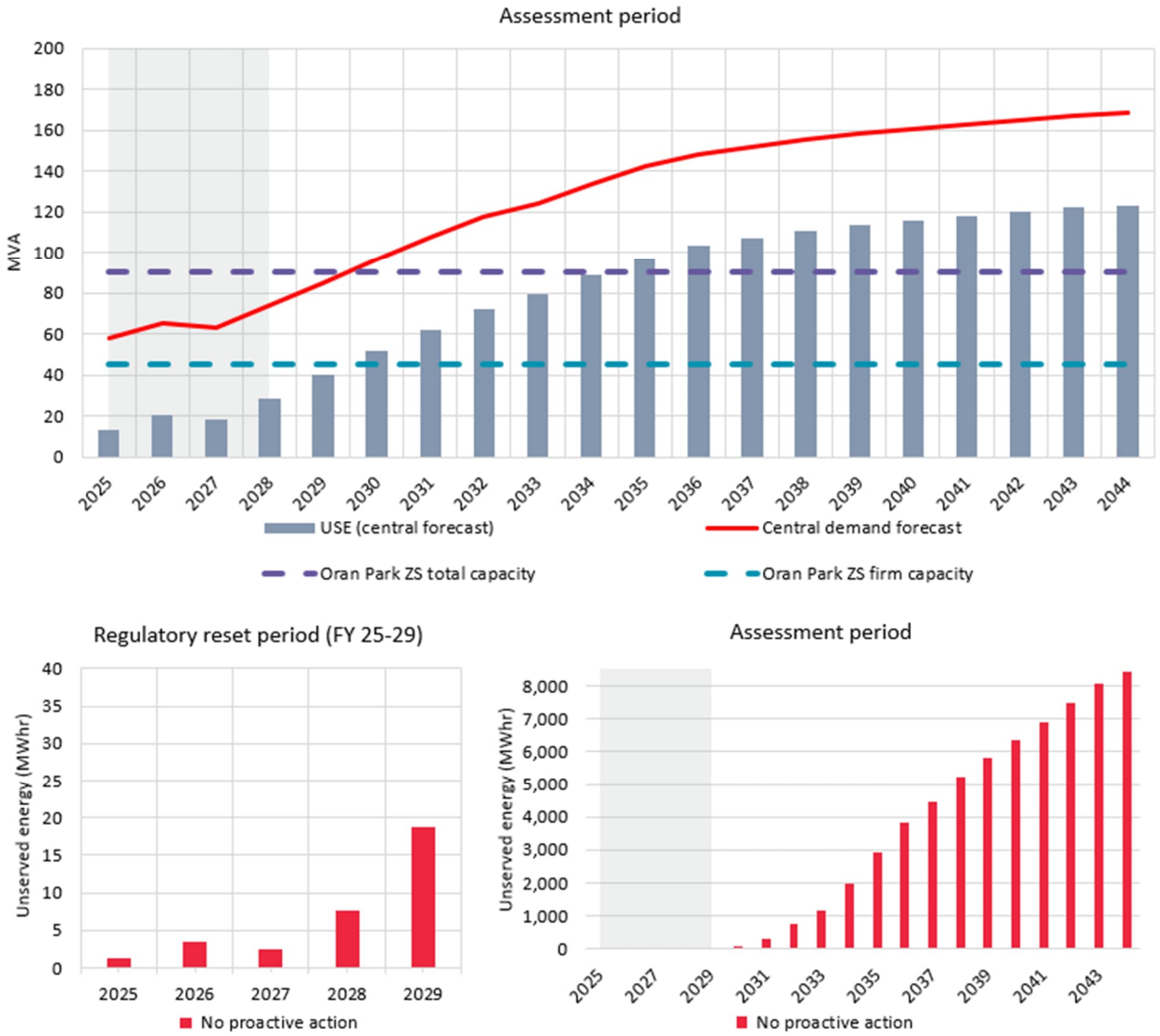
Network constraint	Description
Lack of firm capacity at Oran Park ZS	The Oran Park ZS has already exceeded its firm capacity in 2023/24. The maximum demand forecast for Oran Park ZS for the summer 2024/25 is approximately 53MVA which exceeds the firm capacity at 45MVA.
Lack of distribution network capacity from Oran Park ZS to the South Creek West residential growth area	There is currently only one 11kV feeder from Oran Park ZS that services the South Creek West residential growth area (OP1112). There are currently no available 11kV feeder circuit breakers at Oran Park ZS to support the establishment of new 11kV feeders to supply the South Creek West residential growth area.
No available capacity to supply from Bringelly ZS	There are no freely available 11kV feeder circuit breakers to provide additional feeders to supply the residential growth area. Bringelly ZS will require augmentation in the future to support the growth surrounding it, as well as in the Aerotropolis area including the planned new Bulk Supply Point in the Aerotropolis area and the potential augmentation to provide a 22kV supply to align to the Aerotropolis area. Although technically feasible, we also consider Bringelly ZS to be too far north of the initial centre of development of the South Creek West residential growth area to support a full service plan from Bringelly ZS (3km north of the centre of the South Creek West residential growth area).

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 South Creek West residential growth area increases. The expected unserved energy is calculated as the difference between the firm capacity at Oran Park ZS and the demand forecast for Oran Park ZS. The demand forecast of the South Creek West residential growth area is allocated to Oran Park ZS, such that Oran Park ZS is the constrained asset for the purpose of determining the expected unserved energy.

Figure 9 shows the expected unserved energy under the central demand forecast if 'no proactive intervention' is taken. Estimates are provided in both MVA and MWh. Notably, the available firm capacity in this area of our network has been exceeded since 2023/24 and is expected to continue to be exceeded into the future as more development occurs.

Figure 9 – Unserved energy at the Oran Park ZS based on the central demand forecast scenario



Although we expect there to be significant market benefits associated with providing supply to the South Creek West residential growth 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 this RIT-D to investigate, consult and determine the most efficient provision of supply to the South Creek West residential growth 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 commenced in 2023/24, and based on the connection enquiries received to date, customer servicing requirements in this area are expected to continue to grow.

4.0 Proposed options to meet the identified need

Four options were determined to be credible in addressing the network need and have been assessed in comparison to a “do nothing” (or no proactive intervention) base case. These were:

- Option 1 – installation of a third transformer at Oran Park ZS in 2027 and establishment of Lowes Creek ZS (using an outdoor switchgear arrangement) with a single transformer in 2032;
- Option 2 - establishment of Lowes Creek ZS using an outdoor switchgear arrangement with two transformers in 2027;
- Option 3 – establishment of Lowes Creek ZS using an indoor switchgear arrangement with two transformers in 2027; and
- Option 4 – establishment of Lowes Creek ZS (using an outdoor switchgear arrangement) in stages with one transformer in 2027 and a second transformer added in 2032.

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.

All four of the credible options involve establishing a new zone substation within the Lowes Creek Maryland precinct, which is strategically and beneficially located between Oran Park ZS and Bringelly ZS. The proposed location also takes advantage of the proximity to a 132kV supply that provides a low-cost connection of the proposed zone substation to the 132kV supply via feeder 9L6.

The credible options take different approaches that test the staging, use of adjacent zone substation and different technical configuration (including both outdoor and indoor) of the proposed new zone substation.

4.1 Option 1

Install a third transformer at Oran Park ZS in 2027 and establish Lowes Creek ZS using an outdoor switchgear arrangement with a single transformer in 2032

Option 1 involves two stages where:

- in Stage 1, a third 132/11kV 45MVA transformer is installed at the existing Oran Park ZS in 2026/27; and
- in Stage 2, a new 132/11kV Lowes Creek ZS using an outdoor switchgear arrangement with one 45MVA transformer is established in 2031/32.

Stage 1 results in the Oran Park zone substation having a firm capacity of 90MVA and a total installed capacity of 135MVA. It meets all requirements for medium term network capacity needs arising from the South Creek West residential growth area.

Supply to the Lowes Creek ZS established in Stage 2 would be established from a single tee-off connection from the existing 132kV feeder that runs between Oran Park ZS and Bringelly ZS.

The total capital expenditure for this option is estimated to be $53.0 million in real 2024/25 dollars.[3] The installation of the third transformer at Oran Park ZS would commence in 2024/25 with commissioning in 2026/27. The new Lowes Creek ZS would be commissioned in 2031/32.

Table 5 provides an overview of the scope of works and capital cost of works for Option 1 with operating costs estimated to be 0.4 per cent of total capital expenditure.

[3] Capital expenditure for Option 1 is higher than for Options 2 and 3 due to the staged nature of the option, that involves additional mobilisation and demobilisation costs at each stage of the build-out. These additional mobilisation and demobilisation costs are also incurred under Option 4.

Table 5 – Scope of works and costs for Option 1

Stage (commissioning)	Scope	Description	Cost estimate ($M, 2024/25)
Stage 1 (2026/27)	Substation works	Augmentation of Oran Park ZS including: • One 45MVA 132/11kV transformer and associated bund and firewall • One 132kV bus section circuit breaker • Three 132kV disconnection/earth switches • One 132kV transformer circuit breaker • One 11kV transformer circuit breaker • Two 11kV bus sections (five feeders on each section) • Ten feeder circuit breakers • One new bus truck or relocation of existing bus truck and protection and control panels • Relocation of security fence	9.0
	Distribution works	Distribution works include: • Establishment of ten 11kV feeders with a route heading north towards the development area	12.4
Stage 2 (2031/32)	Establish Lowes Creek ZS	Purchase Land for Lowes Creek ZS	3.6
		Establishment of Lowes Creek ZS includes: • One 45MVA 132/11kV transformer and provision space for three transformers • One 132kV bus section and provision space for a third bus section and a third feeder bay • Two 11kV sections of busbar with five 11kV circuit breakers per section • Outdoor switchgear arrangement	24.0
	Transmission works	Transmission works include: • Establish one underground 132kV feeder teeing off 132kV feeder 9L6 via a new 132kV HV Underground to Overhead Connection (UGOH)	2.0
	Distribution works	Distribution works include: • Establish auxiliary supply and enable connection of existing feeders from Oran Park ZS and Bringelly ZS to establish cross zone feeder ties and to allow for load transfer.	2.0
Total		**Staged installation of a third transformer at Oran Park ZS and establishment of Lowes Creek outdoor ZS with a single transformer**	**53.0**

Figure 10 shows the expected unserved energy of Option 1 under the central demand scenario compared to the base case (i.e., “no proactive intervention”).

Figure 10 – Expected unserved energy under Option 1 compared to the base case – central demand forecast

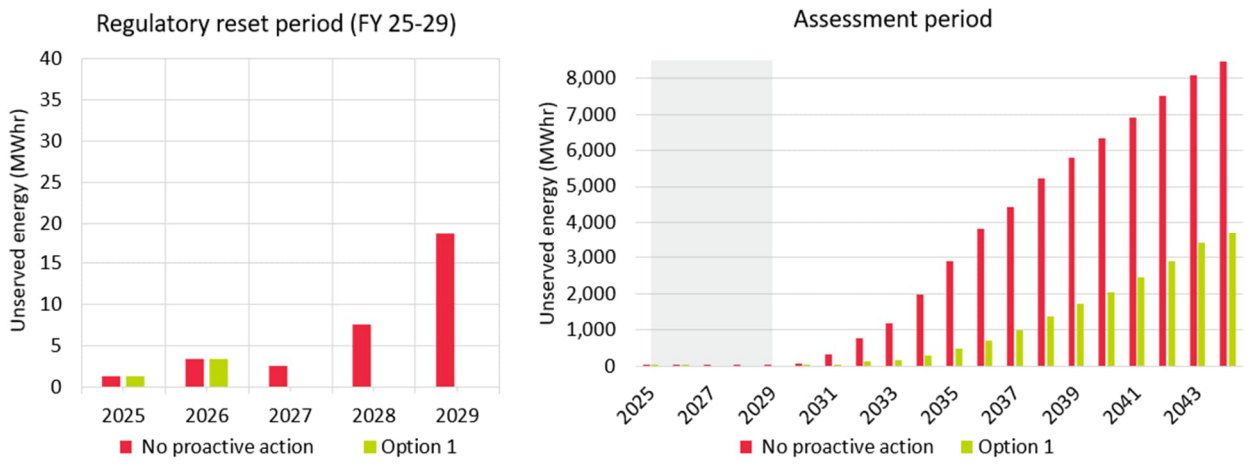
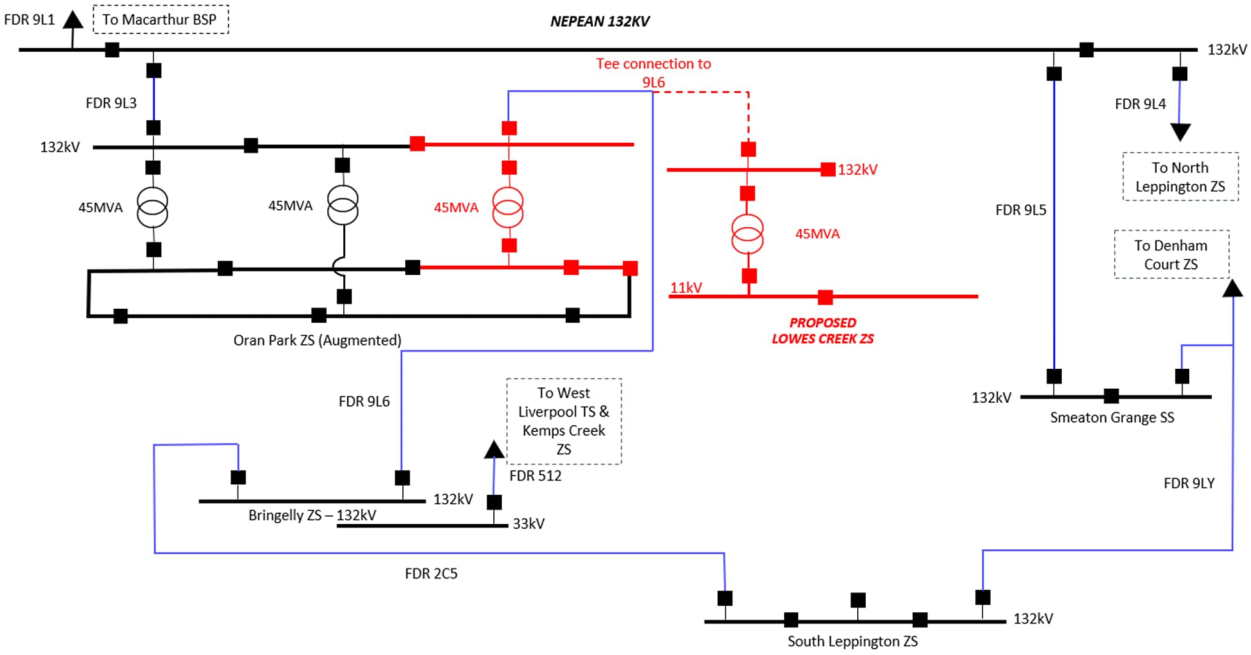


Figure 11 shows a simplified single line diagram for Option 1, showing the augmented network in red.

Figure 11 – Option 1 Simplified Single Line Diagram



4.2 Option 2

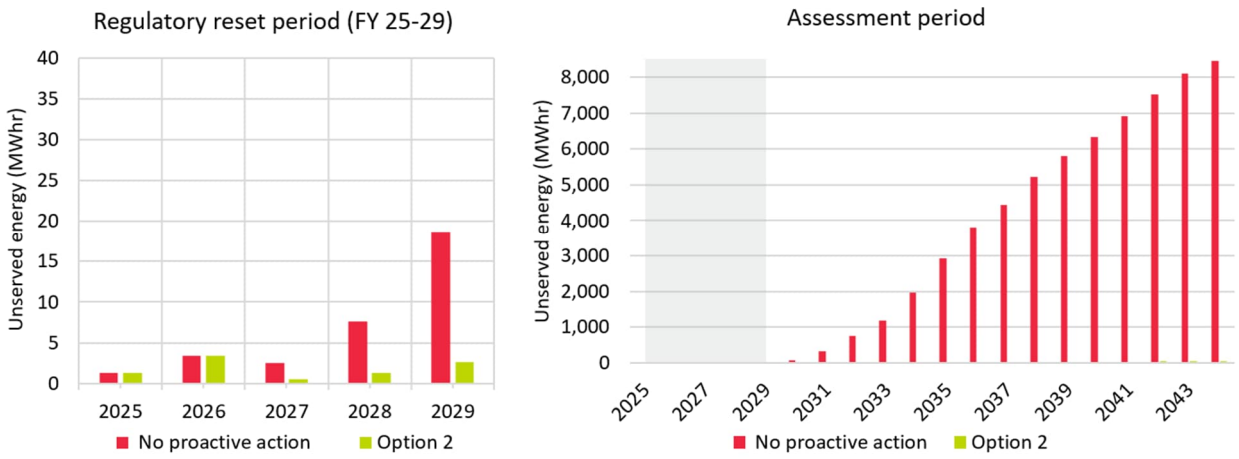
Establish Lowes Creek ZS using an outdoor switchgear arrangement with two transformers in 2027

Option 2 involves the establishment of Lowes Creek ZS 132/11kV using an outdoor switchgear arrangement with two 45MVA transformers commissioned in 2027.

132kV supply to the Lowes Creek ZS would be established from a connection to the nearby 132kV feeder 9L6 that has a route from Oran Park ZS to Bringelly ZS.

Figure 12 shows the expected unserved energy of Option 2 under the central demand scenario compared to the base case (i.e., “no proactive intervention”).

Figure 12 – Expected unserved energy under Option 2 compared to the base case – central demand forecast



The total capital expenditure for this option is estimated to be $40.3 million in real 2024/25 dollars. The construction of the Lowes Creek ZS would commence in 2024/25 and commissioning would occur in 2026/27.

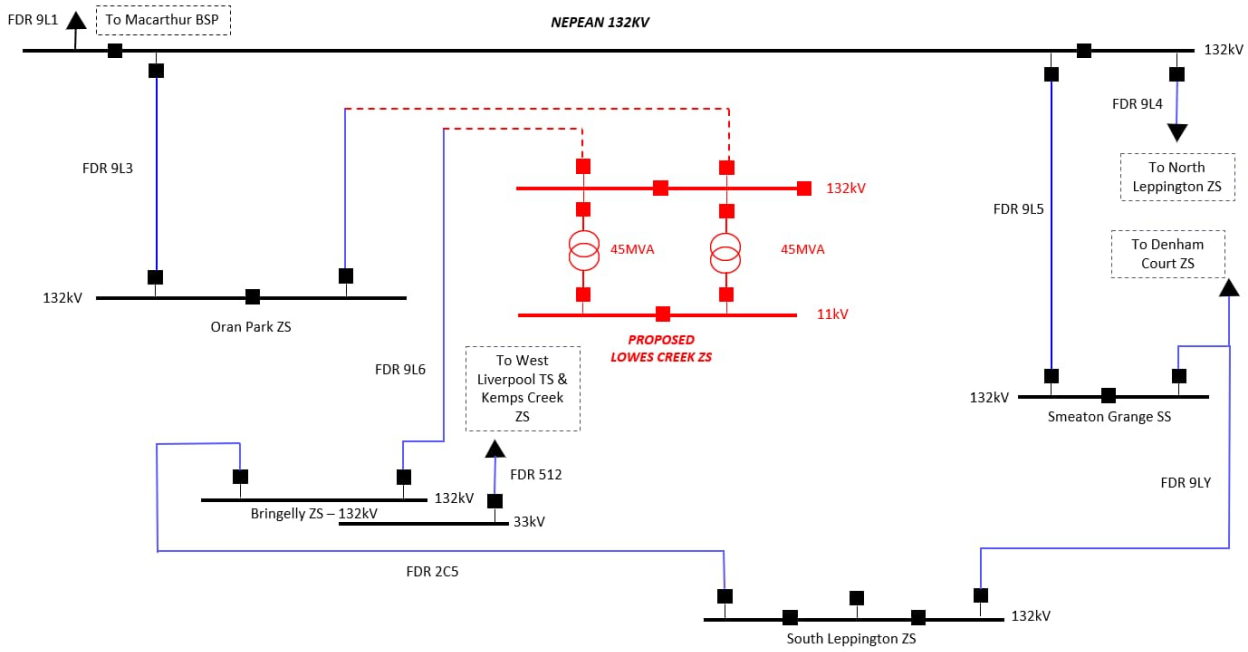
Table 6 provides an overview of the scope of works and capital cost of works for Option 2 with operating costs assumed to be 0.4 per cent of total capital expenditure.

Table 6 – Scope of works and costs for Option 2

Scope	Description	Cost estimate ($M, 2024/25)
Substation works	Purchase land	3.6
	Establishment of Lowes Creek ZS includes: • Two 45MVA 132/11kV transformers and provision of space for a future third transformer • 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	29.7
Transmission works	Transmission works include: • Establish two underground 132kV feeder supplies by cutting into the adjacent 132kV feeder 9L6 via two new 132kV HV UGOHs.	3.0
Distribution works	Distribution works include: • Establish auxiliary supply for the new zone substation and establish cross zone feeder ties to the adjacent Oran Park ZS and Bringelly ZS to provide load transfer capability between the three zone substations.	4.0
Total	**Establishment of Lowes Creek outdoor ZS with two transformers**	**40.3**

Figure 13 shows a simplified single line diagram for Option 2 showing the augmented network in red.

Figure 13 - Option 2 Simplified Single Line Diagram



4.3 Option 3

Establish Lowes Creek ZS indoors with two transformers in 2027

Option 3 involves a new 132/11kV Lowes Creek ZS using an indoor switchgear arrangement with two 45MVA transformers to be established in 2027. It provides the same supply capacity as Option 2, however the 132kV and 11kV switchgear would be housed in an indoor arrangement instead of the outdoor arrangement of Option 2.

Establishing the zone substation with an indoor arrangement will incur a higher level of capital costs due to the increased size of the building and civil works and also the higher cost for compact type switchgear. It would also incur greater operating costs than Option 2, consistent with operating costs assumed to be 0.4 per cent of total capital expenditure.

Option 3 will reduce the level of expected unserved energy in an identical manner to Option 2. It will also provide an identical level of additional supply capacity and connection capability as Option 3. From a network augmentation and capability perspective, these options are identical in their supply aspects. There maybe small differences in the number of 11kV distribution feeders readily available from Option 2 and 3, however, in terms of benefits to customers, this is negligible. Both options provide ample 11kV feeder connection capability based on the current demand forecast covering the next 20 years.

However, due to the use of compact type switchgear required for Option 3, this option will emit more SF6 fugitive emissions than Option 2. More detail is provided on the Assessment Framework section of this report.

Endeavour Energy is considering this option based on property developer feedback that an indoor arrangement would provide better visual amenity for the surrounding area. The developer is aware that the indoor arrangement imposes additional cost on the project and Endeavour Energy's customers. Accordingly, the developer has agreed to make an external contribution towards this option.[4] This reduces the effective cost of the option in the RIT-D assessment, in line with the AER RIT-D guidelines.[5]

The total capital expenditure for this option (before the external contribution) is estimated to be $45.0 million in real 2024/25 dollars. The construction of the Lowes Creek ZS would commence in 2024/25 with commissioning in 2026/27.

Table 7 provides an overview of the scope of works and capital cost of works for Option 3 with operating costs assumed to be 0.4 per cent of total capital expenditure.

[4] The value of the external contribution is considered commercially sensitive and therefore is treated as confidential. To meet reporting requirements under section 4.3 of the RIT-D guidelines we have disclosed the full cost of Option 3, before subtracting the external contribution, while net economic benefits for Option 3 are presented inclusive of the external contribution. To maintain confidentiality, we have redacted the PV of market benefits and costs, noting that we will provide these values to the AER upon request.

[5] AER, *RIT-D application guidelines*, October 2023, p 58-60.

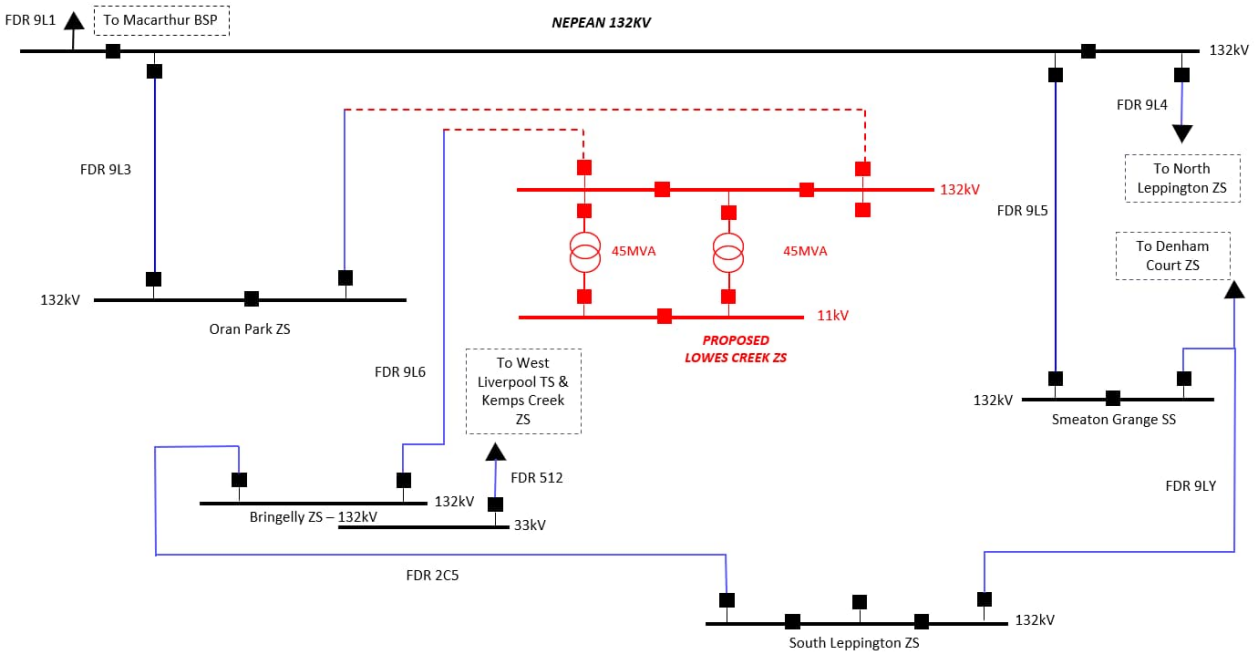
Table 7 – Scope of works and costs for Option 3

Scope	Description	Cost estimate ($M, 2024/25)
Substation works	Purchase land	3.6
	Establishment of Lowes Creek ZS includes: • Two 45MVA 132/11 kV transformers and provision of space for three transformers • Two 132kV bus sections and provision of space for a third bus section and a third feeder bay • Four 11kV sections of busbar with four (4) 11kV feeder CBs per section • Indoor switchgear arrangement including the use of SF6 within the compact type switchgear (132kV and 11kV circuit breakers).	34.4
Transmission works	Transmission works include: • Establishment of two underground 132kV feeder supplies by cutting into the adjacent 132kV feeder 9L6 via two new 132kV HV UGOHs.	3.0
Distribution works	Distribution works include: • Establish auxiliary supply for the new zone substation and establish foundation cross zone feeder ties to the adjacent Oran Park ZS and Bringelly ZS. • We expect to provide 16 distribution feeder circuit breakers to provide connection capability for future feeder developments to the residential growth precincts in the area.	4.0
Total	**Establishment of Lowes Creek indoor ZS with two transformers**	**45.0**

The total capital expenditure estimate for Option 3 is $45.0M. This cost has not been reduced by the external contribution.

Figure 14 shows a simplified single line diagram for Option 3, showing the augmented network in red.

Figure 14 - Option 3 Simplified Single Line Diagram



4.4 Option 4

Establish a staged Lowes Creek ZS using an outdoor switchgear arrangement with one transformer in 2027 and a second transformer in 2032

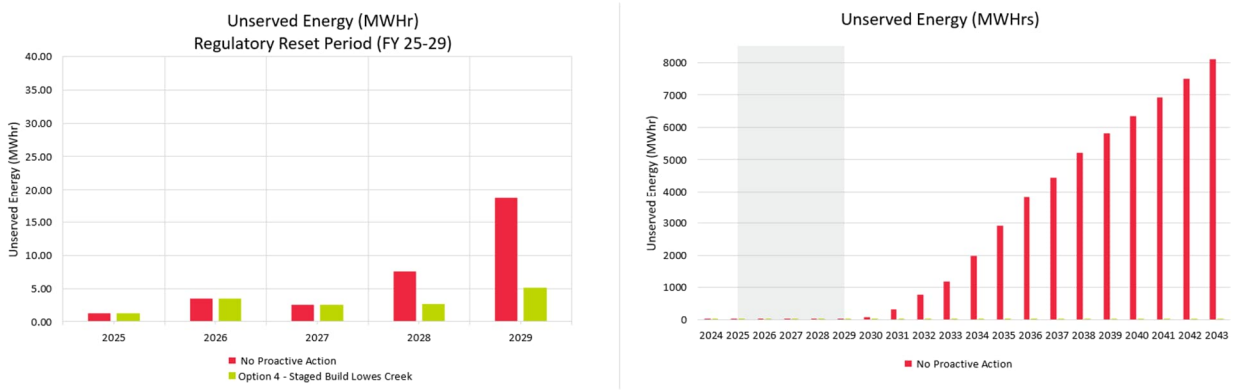
Option 4 involves the Lowes Creek ZS using an outdoor switchgear arrangement being established over two stages, where:

- in Stage 1, Lowes Creek ZS with one 45MVA transformer is established with a connection from the existing 132kV feeder 9L6 in 2026/27; and
- in Stage 2, an additional 45MVA transformer, 132kV bus bar, 132kV transmission feeder bay and 11kV busbar is installed in 2031/32 to provide the substation with firm 45MVA capacity.

Stage 1 results in the zone substation having an installed capacity of 45MVA and following the commissioning of Stage 2, the installed capacity would be 90MVA.

Figure 15 shows the expected unserved energy of Option 4 under the central demand scenario compared to the base case (i.e. “no proactive intervention”).

Figure 15 – Expected unserved energy under Option 4 compared to the base case – central demand forecast



The total capital expenditure for this option is estimated to be $48.5 million in real 2024/25 dollar terms. This option is the highest cost option out of the four credible options being considered. The higher costs reflect higher mobilisation and demobilisation costs required to stage the Lowes Creek ZS built out. The construction of the Lowes Creek ZS would commence in 2024/25, with commissioning in 2026/27, and augmentation to the Lowes Creek ZS with a second transformer would commence in 2030/31, with commissioning in 2032/33.

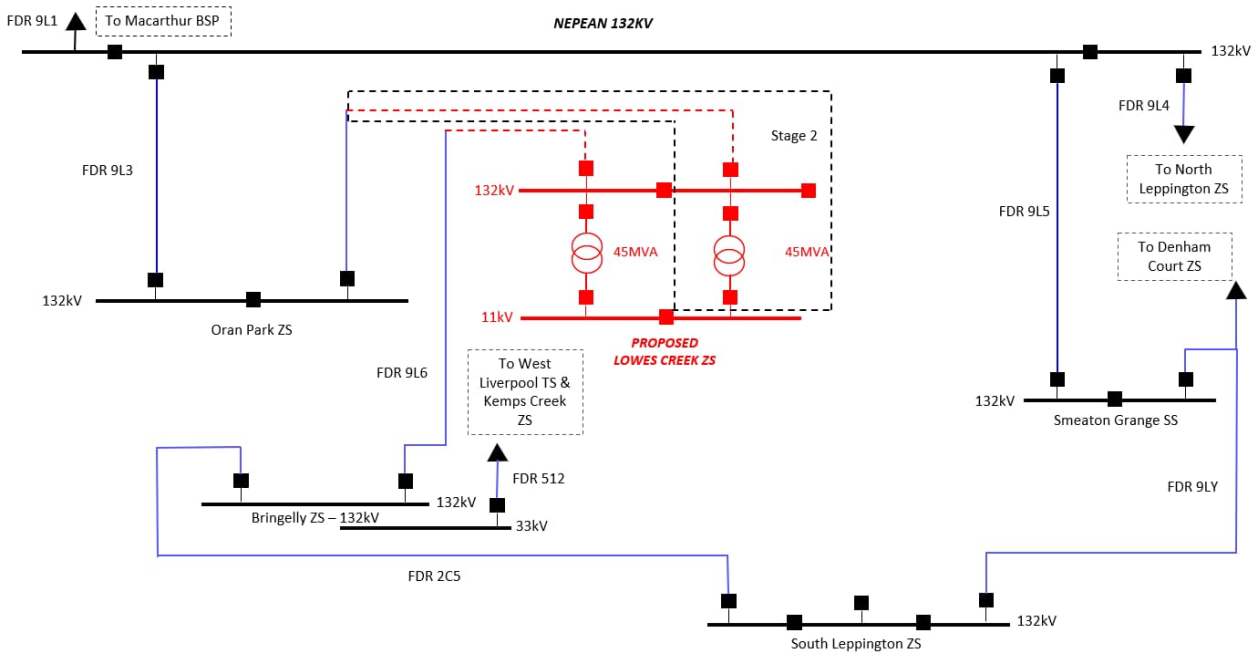
Table 8 provides an overview of the scope of works and capital cost of works for Option 4, with operating costs assumed to be 0.4 per cent of total capital expenditure.

Table 8 – Scope of works and costs for Option 4

Stage (commissioning)	Scope	Description	Cost estimate ($M, 2024/25)
Stage 1 (2026/27)	Substation works	Purchase Land	3.6
		Establishment of Lowes Creek ZS including: • One 45MVA 132/11 kV transformer and provision space for three transformers • One 132kV bus section 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	22.9
	Transmission works	Transmission works include: • Establish one underground 132kV feeder linkage teeing off 132kV feeder 9L6 loop via a new 132kV HV UGOH	2.0
	Distribution works	Distribution works include: • establishing auxiliary supply and any initial feeder works not covered by the property developers	4.0
Stage 2 (2031/32)	Establish Lowes Creek ZS	Augmentation of Lowes Creek ZS including: • One 45MVA 132/11kV transformer • One 132kV bus section	12.0
	Transmission works	Distribution works include: • Establish one underground 132kV feeder linkage off 132kV feeder 9L6 loop via a new 132kV HV UGOH, establishing ring connection of Lowes Creek ZS onto 9L6	2.0
	Distribution works	Distribution works include: • Feeder re-configuration to provide additional cross zone feeder ties to Oran Park ZS	2.0
Total		**Staged establishment of Lowes Creek outdoor ZS with two transformers**	**48.5**

Figure 16 shows a simplified single line diagram for Option 4, showing the augmented network in red.

Figure 16 - Option 4 Simplified Single Line Diagram



4.5 Options considered but not progressed

Endeavour Energy has considered two options that we have not progressed in this FPAR. These options, and our reasoning for not progressing them further, are summarised in Table 9.

Table 9 – Options considered but not progressed

Option	Reason not progressed
Augmentation of existing Bringelly Creek Zone Substation	One network option considered was to supply the South Creek West residential growth area by augmenting the existing Bringelly ZS and connecting it to the South Creek West residential area via 11kV feeders Bringelly ZS is approximately 3km north of the centre of the South Creek West residential growth area and it would be technically possible to provide 11kV supply, albeit difficult. Under this option, Bringelly ZS would provide back-up support for the 11kV network from Oran Park ZS which is 6km to the south. We believe that this is too far to guarantee that we will meet our regulatory requirements to maintaining voltage for customers. Bringelly ZS is also required to support the early development of the Aerotropolis Core Precinct to the north and has no spare available transformer capacity to provide additional supply to the South Creek West residential growth area. Bringelly ZS is also likely to require a significant augmentation at significant cost to enable the commissioning of Transgrid's planned Aerotropolis Bulk Supply Point, which will provide an additional 132kV supply and also provide a 22kV distribution supply to the Aerotropolis area. Finally, Bringelly ZS is located on a relatively small land parcel and we prefer not use it for supply to the South Creek West residential growth area but to reserve it for the identified needs to the north of its location. For these reasons, we consider this option to be not technically or economically feasible and therefore it has not been progressed.
Utilise a 22kV distribution network to align with our Aerotropolis Servicing Strategy	The option of supplying the South Creek West residential growth area using a 22kV distribution supply was considered because it would align with our Aerotropolis Serving Strategy, whereby we are utilising 22kV supply. However, the cross-zone feeder ties to the adjacent Oran Park ZS, which use 11kV, would require approximately 10 auto-transformers to enable supply integration of the South Creek West residential growth area to Oran Park ZS. This would impose an additional cost and limit the extent of future load transfers from Oran Park ZS to the South Creek West residential growth area because of the typical rating of auto-transformers at 3MVA. Finally, the South Creek West residential growth area is relatively small compared to the Aerotropolis area, which encompasses the airport and enterprise areas. Additionally, the South Creek West residential growth area is wholly residential and the benefits of using 22kV are smaller in the South Creek West residential growth area compared to the Aerotropolis where feeder route lengths are expected to approach 10km, far longer than the routes required for South Creek West. For these reasons, we do not consider this option to be economically feasible and therefore it has not been progressed.

4.6 Non-network solutions unlikely to be technically feasible

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 issued an Options Screening Notice on 7 November 2024.

Our finding is that non-network options are unlikely to be technically feasible to address the identified need set out in this FPAR due to the lack of existing infrastructure in the South Creek West residential growth area.

We have also found that a stand-alone power supply (SAPS) solution could not contribute to meeting the identified need because the load requirements of the largely 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 the area.

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 four (4) credible options considered in this RIT-D.

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

5.1 Overview of the assessment framework

5.1.1 Base case

All costs and benefits for each credible option have been assessed in comparison to a 'do nothing', business-as-usual base case. Under this base case, Endeavour Energy would utilise the existing network to service the growing demand in the South Creek West residential growth area. If no investment is undertaken, there will be significant USE due to the existing supply network being constrained and incapable of supplying the forecast demand from new development in the area.

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 South Creek West residential growth 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 FPAR. 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 2.65 per cent and an upper bound discount rate of 3.89 per cent (i.e., a symmetrical upwards adjustment).

5.2 Market benefits are expected related to USE and changes in greenhouse gas emissions

The relevant categories of market benefit prescribed under the NER for this RIT-D are changes in involuntary load shedding (i.e., USE : Unserved Energy) and avoided greenhouse gas emissions. Our approach to valuing the market benefits in both of these areas is outlined below.

5.2.1 Reduced involuntary load shedding

Endeavour Energy has valued reduced and/or involuntary load shedding by reference to our estimate of energy at risk, which is derived from the annual peak demand forecasts.

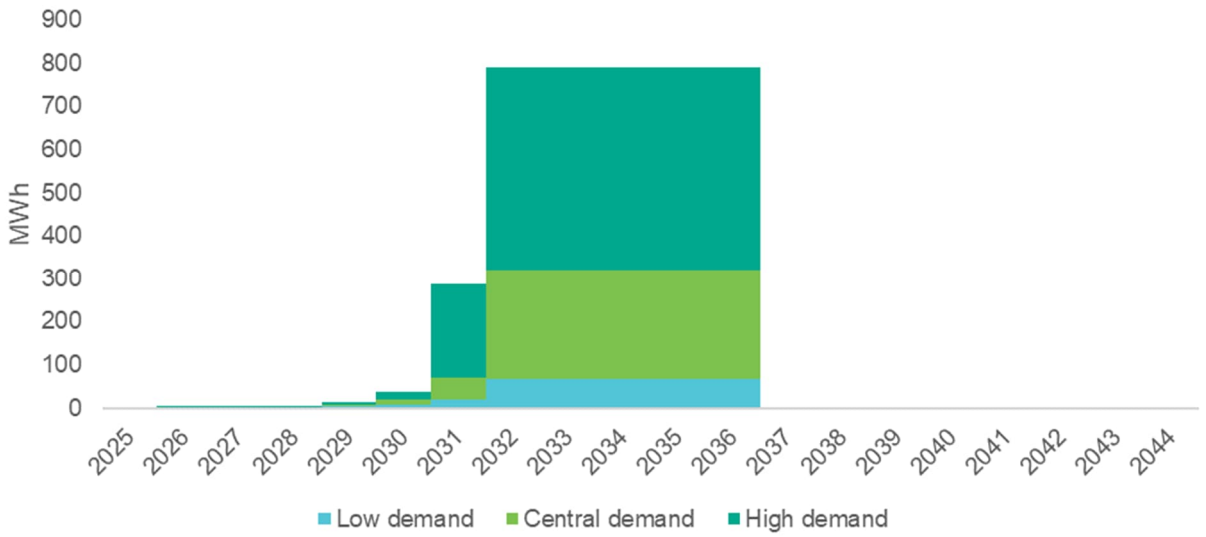
We have capped the expected future USE under the base case in all three load scenarios (discussed further in section 5.5) at the 2031/32 values for this FPAR NPV assessment. The cap has been adopted because the uncapped value of USE would otherwise become extremely high (since, in reality, we would undertake

investment to avoid widespread customer outages and inability of customers to connect to the network). Using the very large, uncapped USE values can distract from the comparison of net market benefits between the credible options. In addition, we have also zeroed out (set to a zero value) USE from 2036/37 onwards, for the same reason.

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. However, we provide the NPV results on the basis of uncapped USE in Appendix A.

Figure 17 illustrates the USE scenario profiles in each demand scenario with USE values capped at the 2031/32 levels, and then with the USE benefits zeroed out after 2035/36.

Figure 17 – Unserved energy profiles used in economic analysis



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 by Lowes Creek ZS. In particular, we expect 81 per cent of load to be residential and 19 per cent to be commercial.

The commercial component is expected to consist of town centres, shopping centres, restaurant, smaller medical facilities, service stations and miscellaneous convenience and personal service businesses.

We have used a composite VCR value of $51.17 per kWh in the evaluation, based on the calculation breakdown provided in table 10 below. This is based on the 2023 VCR values provided by the Australian Energy Regulator (AER), inflated by CPI to June 2024.[6]

[6] AER, *2021 VCR annual adjustment,* December 2021. VCR values have been inflated to 2024/25 dollars using ABS CPI index data and RBA Monetary Policy Statement forecast of CPI for the 30 June 2024 quarter.

Table 10 – Composite VCR used in evaluation

Parameter	Residential (Climate Zone 6 CBD and Suburban)	Commercial
Demand composition of the South Creek West residential growth area	81%	19%
VCR used in the DPAR published in November 2024	$25.40/kWh	$53.23/kWh
VCR used in the FPAR (based on the AER's direction on VCRs published in December 2024)	$55.10/kWh	$34.39/kWh
Demand weighted VCR used in the FPAR following the AER's update of VCR values in December 2024	$51.17/kWh	
Demand weighted VCR used in the DPAR that we published in November 2024	$30.69/kWh	

5.2.2 Avoided greenhouse gas emissions

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

The options considered in this RIT-D are not expected to affect the pattern of generator dispatch in the wholesale market, and so they will not have an impact of the level of greenhouse gas emissions associated with NEM dispatch.

However, there is a potential difference in greenhouse gas emissions between the options considered in this RIT-D, arising from the difference in the configuration of the new substation at Lowes Creek and the resulting implications for SF6 emissions.

Specifically, establishing the indoor switchgear (under Option 3) would require a greater volume of sulphur hexafluoride i.e., SF6 (a greenhouse gas) compared to outdoor switchgear (Options 1, 2 and 4). SF6 is contained in sealed units and recaptured when assets are decommissioned. However, there is a small risk of leakage or accidents, and thus Option 3 has a greater potential to emit SF6 as a result of the increased volume of SF6 in this option.

To determine the value of the different in emissions, we have applied the values of emissions reduction (VER) that were determined by the Energy Ministers and set out in the AER guidance and explanatory

statement published in May 2024.[7] Specifically, we have multiplied the CO_2 equivalent of the SF6 emissions that are expected to be released in each year by the VER value for that year.[8]

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

This section provides a brief overview of why Endeavour Energy considers the categories of market benefit (other than reduced involuntary load shedding and avoided greenhouse gas emissions) are not material for this RIT-D. These are:

- differences in timing of expenditure;
- changes in voluntary load curtailment;
- option value;
- changes in load transfer capability;
- changes in costs to other parties; and
- changes in electrical losses.

5.3.1 Differences in timing of 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 South Creek West residential growth area, we do not consider differences in the timing of expenditure to be material for this RIT-D.

5.3.2 Changes in voluntary load curtailment

Voluntary load curtailment is when customers agree to reduce their 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 involuntary 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 investment is such that the area does not have the capacity to deliver sufficient voluntary demand reduction.

5.3.3 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).

[7] AER, *Valuing emissions reduction – AER guidance and explanatory statement*, May 2024, p 5-6.

[8] SF_6 is 23,500 times more effective at trapping infrared radiation than an equivalent amount of CO_2 over a 100 year period. See https://www.epa.gov/eps-partnership/sulfur-hexafluoride-sf6-basics

5.3.4 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 South Creek West residential growth area.

There is currently minimal load transfer capability from adjacent zone substations and feeders. All credible options increase load transfer capability through the development of additional 11kV feeders which will extend into the 11kV network and allow for more interconnectivity to adjacent zone substations. These changes are much less than the market benefit of avoided USE.

5.3.5 Changes in costs to other parties

Option 1 among the four (4) options considered in the economic evaluation has a higher cost for the 11kV distribution component (cost estimate of $10.8M). This is due to the distance from the existing Oran Park ZS and the proposed location of the Lowes Creek ZS being approximately 3km closer to the expected geographic load-centre of the new development area. 11kV distribution feeders from Oran Park ZS would have a higher cost due to the longer route length and also civil ground works required for those feeders due to the well established roads around the existing Oran Park ZS site location.

We would expect a large proportion of these costs may be funded by property developers to enable their connection to the Oran Park ZS in the Option 1 scenario. The level of costs to these parties would depend on the extent to which the 11kV distribution feeders would be dedicated to a particular parties connection request and to what extent the distribution feeders would provide shared benefits to the existing customer base in the area.

Options 2,3 and 4 providing the early establishment of the proposed Lowes Creek ZS all provide lower 11kV distribution connection costs and feeder development costs for other parties due to it being in closer proximity to the centre of the development of the area.

We believe that our preferred option provides the most economically efficient customer connection costs compared to the other options considered in the economic evaluation. The preferred option avoids the higher distribution costs to other parties that are included in the Option 1 economic assessment.

5.3.6 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.

Changes in electrical losses have therefore not been modelled for this RIT-D.

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
- Berrima Junction ZS Augmentation

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 FPAR are based on the best cost estimate information that we have available at the time of publishing. We have also included inflation in our cost estimates to cover the future delivery of staged works as far into the future as 2032.

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 '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 local council plans, and customer enquiries;
- a high demand scenario – reflecting assumptions reflecting higher demand forecasts above the central demand scenario in MVA terms. 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 factors that would lead to lower demand forecasts above the central demand scenario in MVA terms. 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 parameters used for each scenario is provided in Table 11 below.

Table 11 – Scenarios used in RIT-D NPV assessment

Parameter	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 of $51.17/kWh	Load-weighted AER VCR of $51.17/kWh	Load-weighted AER VCR of $51.17/kWh
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 business-as-usual (no proactive intervention) base case.

6.1 Gross market benefits estimated for each credible option

Table 12 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 outlined in the previous section.

Table 12 – 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	63.4	159.7	14.3	79.1
Option 2	62.4	158.0	13.7	78.0
Option 3	Confidential.			
Option 4	37.4	128.4	-6.9	53.0

6.2 Estimated costs for each credible option

Table 13 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 operating and maintenance costs for each option.

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

Table 13 – 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	27.5	27.5	27.5	27.5
Option 2	25.1	25.1	25.1	25.1
Option 3	Confidential. Available to AER on request.			
Option 4	26.9	26.9	26.9	26.9

6.3 Net present value assessment outcomes

Table 14 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 12) with the cost of each option (as set out in Table 13) subtracted to obtain a net present value.

Table 14 – 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	35.9	132.2	-13.3	51.6	3rd
Option 2	37.3	132.9	-11.5	52.9	Equal 1st
Option 3	37.1	132.7	-11.6	52.7	Equal 1st
Option 4	10.5	101.4	-33.8	26.0	4th

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).

Applying this criteria, we have determined that Option 2 and Option 3 are effectively equal in the ranking as preferred option(s) at this final stage because they have the highest net market benefits. The difference in their net present values in the economic assessment is $0.2M. This is based on the net market benefits. The difference in the net market benefits is less than 1% of the net market benefits of each of the highest ranked options. We consider this difference to be negligible in the context of the accuracy of the underlying estimates of benefits and costs. Our conclusion presented in this FPAR uses important qualitative aspects to determine the singular preferred option.

We have used the central scenario to determine the preferred option(s) and we have used the high and low scenarios to test the robustness of the preferred option(s).

The weighting applied to the scenarios has also been selected to test the robustness of the preferred option(s).

We have reviewed the recent RIT-D and RIT-T regulatory developments with regards to the use of scenarios. We have used them to test the robustness of the preferred option that has been identified by applying the central values of key variables in the economic evaluation. We believe that the Central scenario is the most likely scenario and intend to use this as the basis for selecting preferred options for our RIT-D assessments in the future.

6.4 Sensitivity analysis results

We have undertaken a thorough sensitivity testing exercise to understand 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.

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

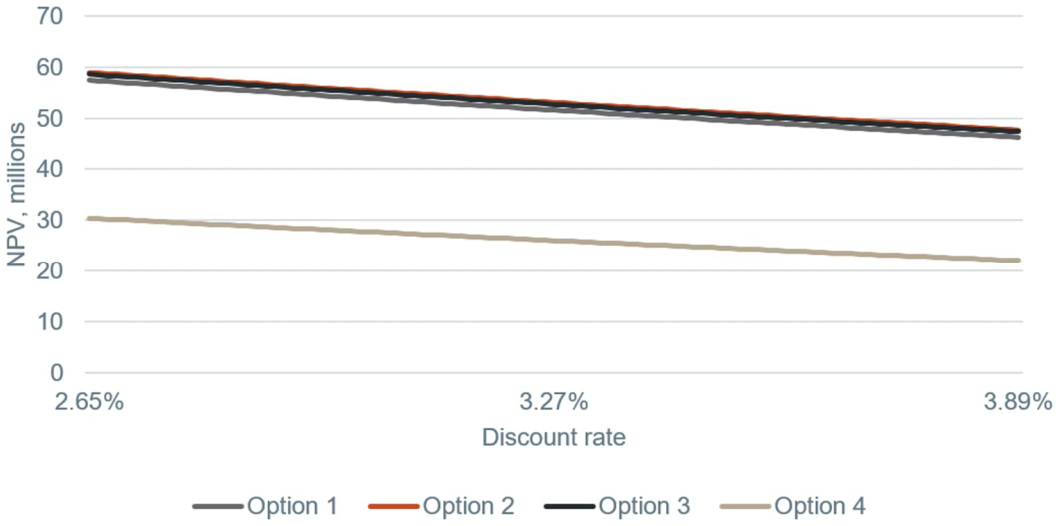


Figure 19 – Impact of varying capital costs on the net market benefits of each credible option

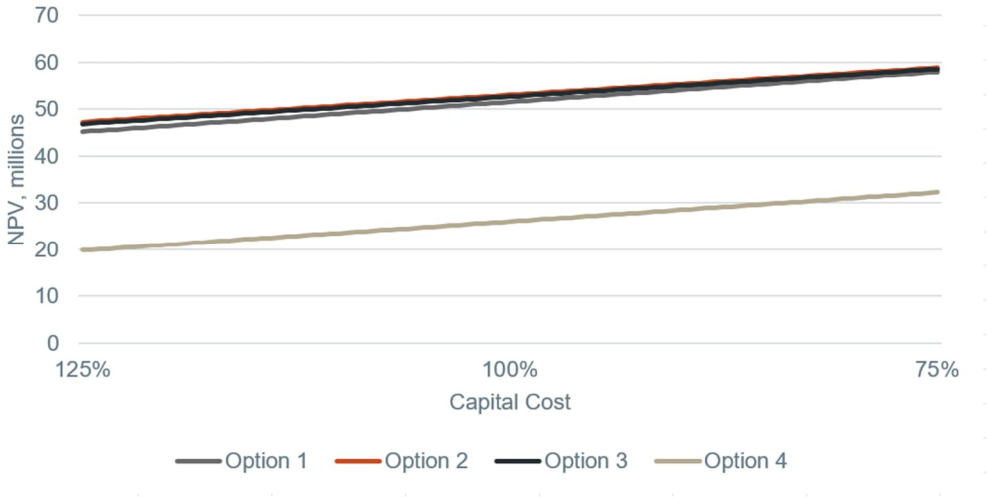
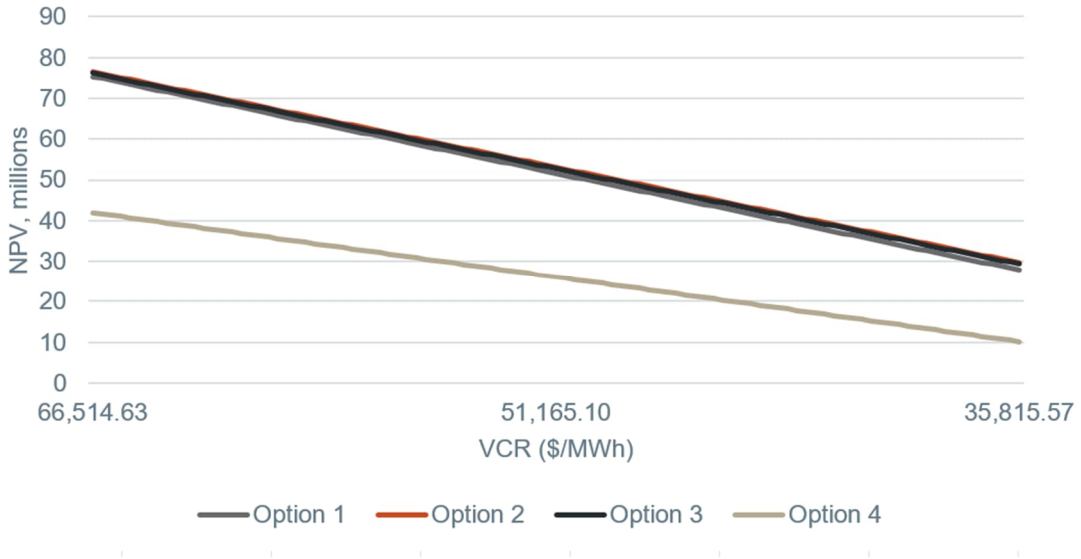


Figure 20 – Impact of varying the VCR on the net market benefits of each credible option



7.0 Conclusion

The South Creek West residential growth area is located within the south-west of Sydney. It is approximately 40km south-west of Parramatta and 8km south of the new Western Sydney Airport. The area is currently largely undeveloped rural land and has been recently rezoned for residential housing.

The South Creek West residential growth area includes the planned Oran Park Town Centre to the north of the existing Oran Park residential area and the planned new residential development areas at Lowes Creek Marylands, Pondicherry, Greenways and Cobbitty South Creek West.

These new residential areas will include their own town centres, schools, community facilities and future small scale commercial and limited industrial zoned spaces. The overall objective of the development area is to provide new residential housing in south-west Sydney and it has been a focus area for NSW government and local government.

The South Creek West residential growth area is estimated to include 20,500 new residential dwellings and to require 172MVA of electricity supply capacity by 2050.

As outlined in the options screening notice, it is not considered feasible that a non-network solution, or SAPS solution, will form a potential credible option on a standalone basis, or form a significant part of a potential credible option for the South Creek West residential growth area.

This RIT-D identified four credible network-based options that can meet the required customer demand.

All four of the credible options involve establishing a new zone substation (Lowes Creek ZS) within the Lowes Creek Maryland precinct, strategically located between Oran Park ZS and Bringelly ZS. This proposed location also takes advantage of the proximity to a 132kV supply that provides a low-cost connection of the proposed zone substation to the 132kV supply via feeder 9L6.

The four credible options considered are:

- Option 1 – installation of a third transformer at Oran Park ZS (using an outdoor switchgear arrangement) in 2027 and establishment of Lowes Creek ZS with a single transformer in 2032;
- Option 2 - establishment of Lowes Creek ZS using an outdoor switchgear arrangement with two transformers in 2027;
- Option 3 – establishment of Lowes Creek ZS using an indoor switchgear arrangement with two transformers in 2027; and
- Option 4 – establishment of Lowes Creek ZS (using an outdoor switchgear arrangement) in stages with one transformer in 2027 and a second transformer added in 2032.

Each of these options have been considered in an economic evaluation and when the external contribution towards Option 3 has been taken into account, Option 2 and Option 3 were found that to be ranked effectively equally first. The difference in the net market benefits between Option 2 and Option 3 is less than 1% of their net market benefits and we consider this difference to be negligible in the context of the underlying accuracy of the costs and benefits of both options. Given that Option 3 provides greater visual amenity than Option 2 and aligns with the aesthetics and architectural design of the proposed built environment in the Lowes Creek area, we have identified Option 3 as the preferred option, taking into account these additional qualitative factors.

Construction of the Lowes Creek ZS would commence in 2024/25, with commissioning in 2026/27. The capital cost for Option 3 is **$45.0 million** in real 2024/25 dollar terms, although the cost to consumers will be **reduced** by the amount of the external contribution. This is a central cost estimate based on similar recent works.

Table 15 below shows the cost estimate for the preferred option and the difference from the DPAR to the FPAR. During the period from November 2024 to May 2025, the project management team further refined the cost estimate for the preferred option including an alignment to market prices for key inputs (including major equipment and civil works) and a thorough review and assessment of site conditions at the proposed site of the Lowes Creek ZS.

Table 15 – Cost Estimate for the Preferred Option to provide supply to the South Creek West residential growth area ($M)

Cost Estimate (Option 3 – Preferred Option)	Value ($M)
DPAR – Published in November 2024.	**39.5**
FPAR – Final Cost Estimate for the RIT-D process.	**45.0**

Appendix A – NPV results with uncapped avoided unserved energy benefits

We discuss our approach to capping avoided unserved energy benefits and the rationale for this approach in section 5.2.1. The NPV results presented in the DPAR and FPAR are based on the capped avoided unserved energy benefits.

In this appendix, for completeness, we present information on the uncapped avoided unserved energy and the associated present value of net market benefits.

Figure 21 below presents the uncapped avoided unserved energy benefits under the base case based on demand forecasts through to 2043/44.

Figure 21 – Uncapped avoided unserved energy benefits ($M, PV)

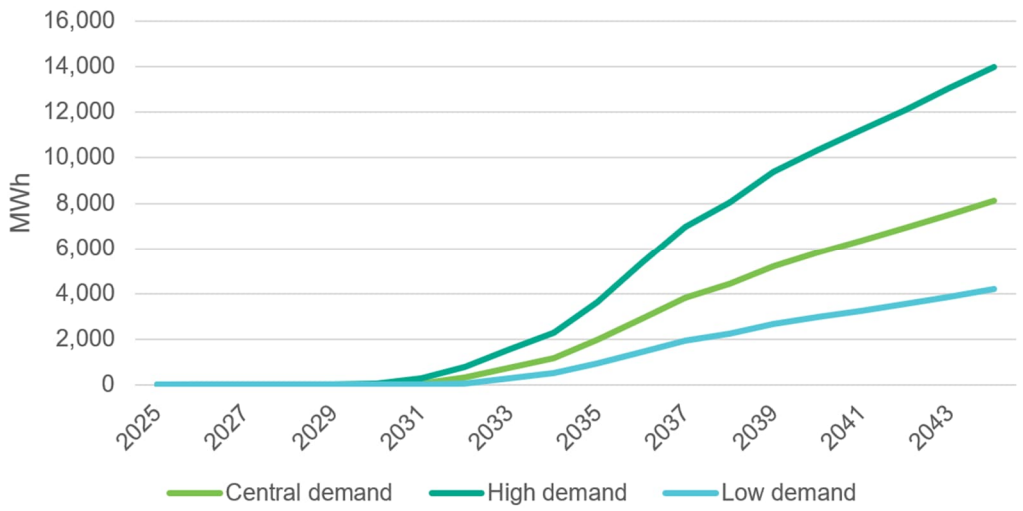


Table 16 below presents the NPV results if the full avoided unserved energy amounts based on the demand forecasts through to 2043/44 are included. Using the full avoided unserved energy amounts results in all options having significant net market benefits, with Option 2 and Option 3 continuing to be ranked effectively equally first. We have included the ranking of the options based on the capped unserved energy as a reference, emphasising that we are using the capped view of unserved energy as the basis for the economic assessment in the investment test. The rankings differ for 3rd and 4th place in the economic assessment.

Table 16 – Present value of net market benefit of each credible option relative to the base case with uncapped avoided unserved energy benefits ($M, PV)

Option	Central scenario	High demand scenario	Low demand scenario	Weighted	Rank Uncapped	Rank Capped
Scenario weighting	33%	33%	33%			
Option 1	688.3	1,277.9	317.0	761.1	4th	3rd
Option 2	982.6	1,782.5	480.5	1,081.8	Equal 1st	Equal 1st
Option 3	982.2	1,782.1	480.1	1,081.5	Equal 1st	Equal 1st
Option 4	975.0	1,773.7	473.9	1,074.2	3rd	4th

Appendix B – Technical details of our preferred option

Based on our current detailed design for the proposed Lowes Creek ZS, we can provide further technical details.

Figure 22 below shows the preferred option to provide supply to the South Creek West Residential Growth Area. The site location will allow for a spatial provision for a future Battery Energy Storage System (BESS).

Figure 22 – Simplified Single Line Diagram of the preferred option – Lowes Creek ZS

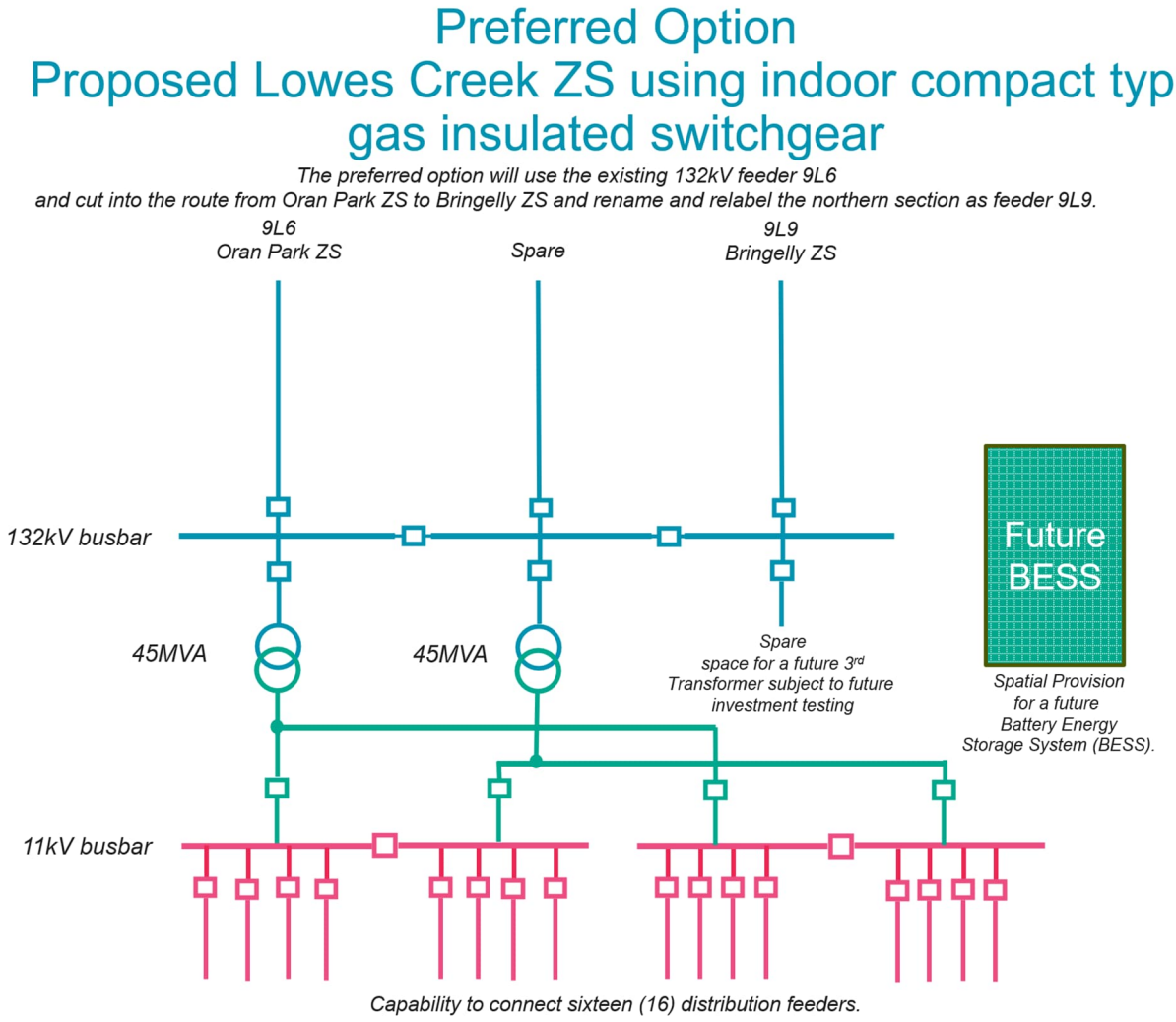


Figure 23 shows the location of the proposed Lowes Creek ZS. It will be located within the Lowes Creek Maryland precinct and approximately mid-way between the existing Oran Park ZS and Bringelly ZS. The location is approximately at the centre of the proposed development of the South Creek West residential growth area.

Figure 23 – Location of the proposed Lowes Creek Zone Substation

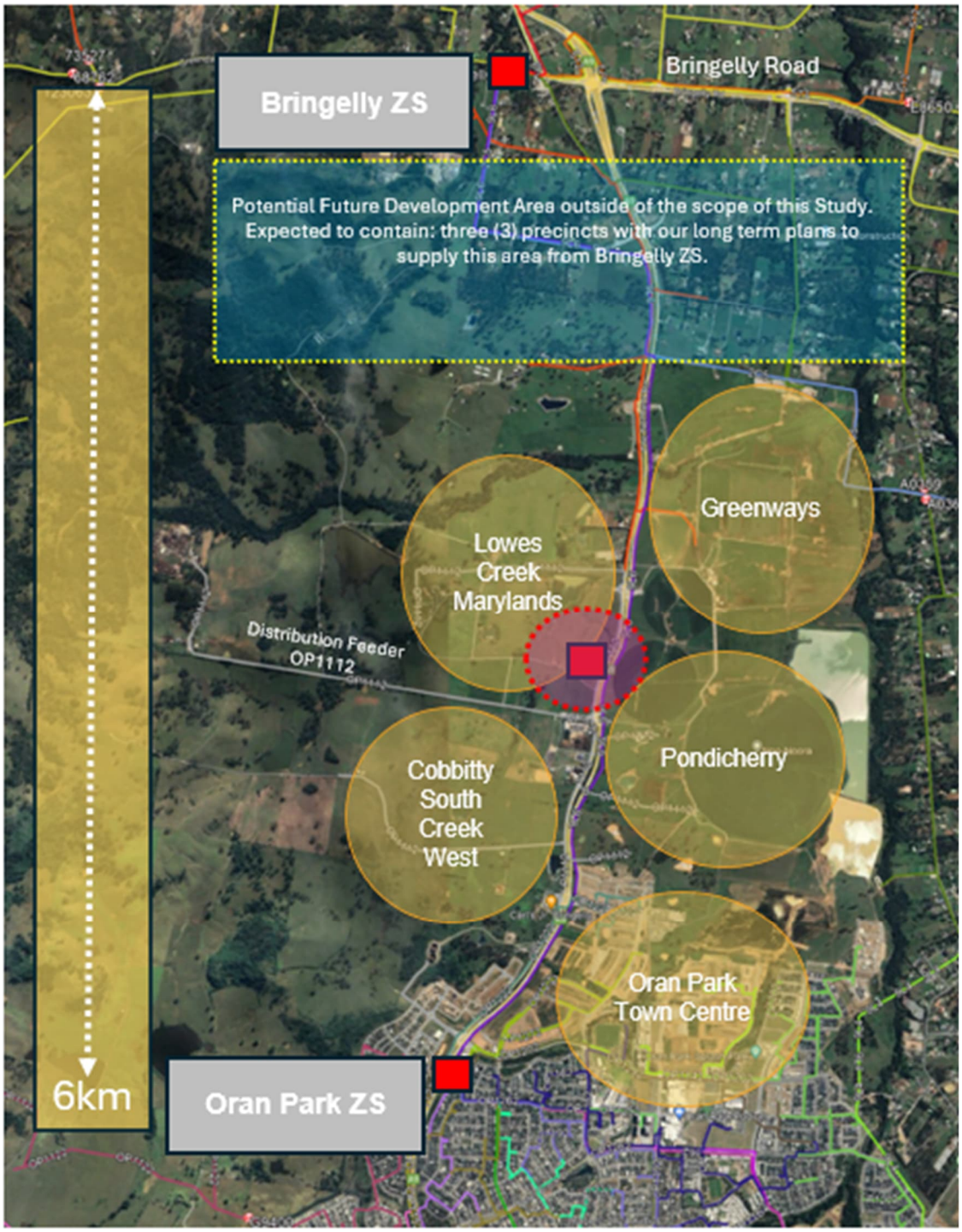


Figure 24 shows the proposed 132kV supply to the proposed Lowes Creek ZS that includes a connection to the existing 132kV feeder 9L6, which is economically efficient because of its proximity to the zone substation location.

Figure 24 – Proposed 132kV supply to the Lowes Creek Zone Substation

CONTACT

If you have any comments or enquiries regarding this report, please send them to the **Enterprise Portfolio Management Office** at: consultation@endeavourenergy.com.au

endeavourenergy.com.au

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