Case For Investment (CFI) NPR-000013 (PR620) West Dapto Zone Substation Establishment

August 2022

Endeavour Energy

Version Control and Approvals

Table 1 below is updated detailing key changes made between versions. The table is populated in descending order.

Table 1 – Version Control

Version	Date	Comments
1	18 August 2022	Final version.
0	November 2021	Initial issue.

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Date: 19/08/2022

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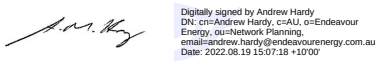

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Contents

Investment Title	**Capacity Increase for West Lake Illawarra Residential Area**
NPR-000013 (PR620)	West Dapto Zone Substation Establishment
Portfolio	Augex
CFI Date	August 2022
Pre RIT-D	☐
Final CFI	☐
Other	☒ Early phase options analysis.

1. Executive Summary

This Executive Summary sets out an overview of the proposed investment, including the underlying need, our recommended solution, a discussion of the key drivers, and the options considered to address the identified need. These aspects are covered in detail in the body of the Case for Investment (CFI).

1.1 Need / Background

The West Dapto development area is a part of the West Lake Illawarra Growth Area and consists of north, central & south precincts within the Wollongong Local Government Area (LGA). The West Dapto development area is expected to ultimately deliver 19,126[1] new dwellings by 2051. As indicated in the West Lake Illawarra Area Plan, commercial and industrial loads are also planned in the area. However, the load of employment land is not considered in this CFI as Endeavour Energy has not yet received any firm applications.

The developments of new dwellings are expected to require approximately 72MVA of capacity by 2051 and 15MVA by 2031. This growth in new demand forms the basis for this CFI. This project was included within the submission to the current regulatory control period. The last published Endeavour Energy 2021 Distribution Annual Planning Report (DAPR) provided that the project has been rescheduled to the 2025-2029 regulatory period due to slow growth. This CFI has been revised to capture all changes since the last submission.

This CFI only includes options for investments for initial stages of the West Dapto development area, for which Endeavour Energy have strong and credible forecast. The future stages, likely to be required after 2031 will be covered in a separate CFI when the need or trigger arises.

The area is currently supplied from five 11kV distribution feeders - two 11kV feeders from Kembla Grange Zone Substation (ZS) and three 11kV feeders from Dapto ZS. Initial capacity for the new growth in the West Dapto north & central precincts was assessed as up to 9.6MVA and is planned to be supplied by existing five 11kV distribution feeders. However, the capacity of existing 11kV distribution feeders is expected to be gradually exceeded by 2028. From then, there will be a large amount of load at risk and ultimately sustained involuntary load shedding resulting in considerable unserved energy and loss of supply. Investment into additional electrical capacity in this area is required to reduce this risk.

Figure 1 below depicts the decision rule from Endeavour Energy's growth servicing strategy to determine the required approach to address the trigger and need. Based on the decision rule:

- This investment is classified as **brownfield.** This classification is based on characteristics (connections driven) and type of growth (densification in the area due to growth in residential load), including the ability to utilise the adjacent network.
- The identified need is a **market benefit**[2] because the consequence of doing nothing is that the loss of supply risk becomes unacceptable.

[1] Based on NSW Department of Planning and Environment (DPE) data from July 2022: Source

[2] Refer to Growth Servicing Strategy for definitions of greenfield and brownfield sites.

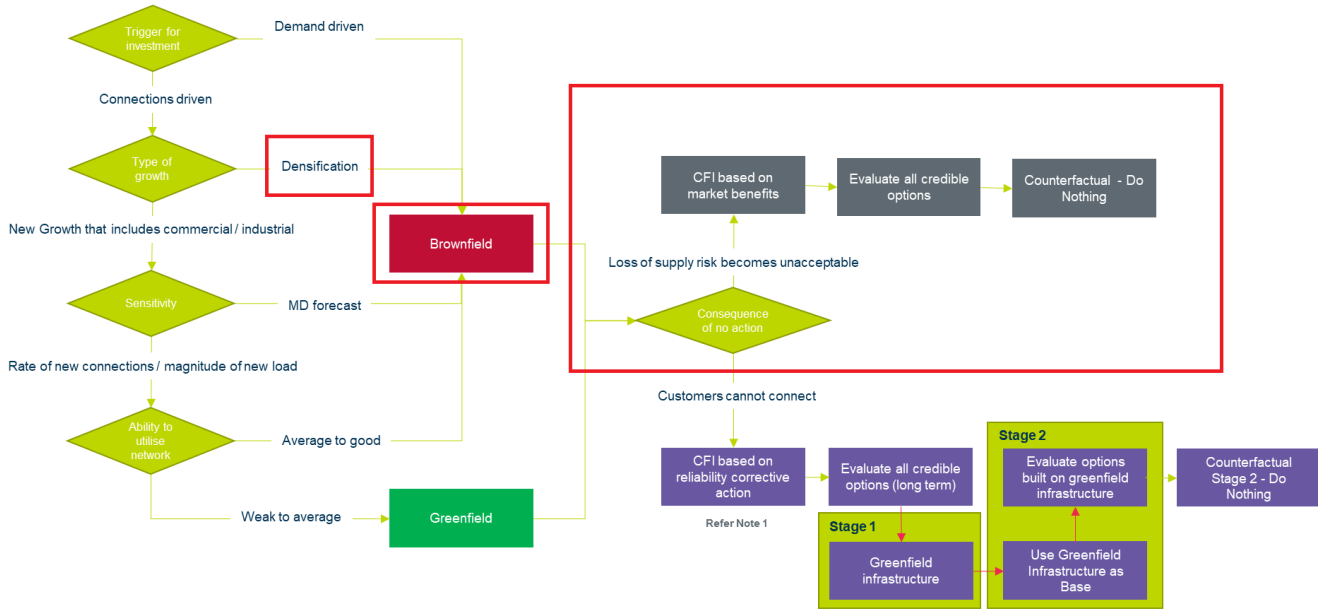

Figure 1 - Decision Rule from Endeavour Energy's Growth Servicing Strategy

1.2 Considered Options

Long term network options, Non-Network and New-Technology solutions have been considered.

1.2.1 Long Term Network Options

Based on gathered credible growth information and conditions of the existing infrastructure, there is a definite need for increased capacity in the abovementioned precincts to connect future customers from the proposed developments without increasing the risk of considerable unserved energy and loss of supply. Increasing the electrical capacity requires investment in infrastructure, which

- finds the right balance between short-term and long-term needs, and
- provides the choices (network or non-network) for future growth of electricity infrastructure investment that is not constrained.

As a result, feasible network topologies based on the ultimate demand were tested and the costs and benefits of these ultimate configurations were compared over a sensible time horizon (i.e., what is likely demand within 10-15 years). Table 2 below summarises the network options that were considered to address the identified need of supplying the new connections in the precincts. The table shows that both options have a similar Net Present Value (NPV) over the study period (30 years) and they both provide significant benefit by reducing the amount involuntary load shedding (i.e., expected unserved energy). Considering this small difference, both credible options are assessed as equally ranked given the accuracy in the estimates used in the analysis.

Table 2 - List of Long-Term Network Options

Option	Description	Solution Type	NPV[1] $M	Rank	Assessment Description
1	Establish (Firm) 132/11kV 2 x 45MVA ZS with 2 x sub transmission connections	Network solution	$77.38M	1	Technically and commercially feasible
2	Establish (Staged) 132/11kV 1 x 45MVA ZS with 2 x sub transmission connections	Network solution	$78.05M	1	Technically and commercially feasible

Notes:
1: The NPV is based on the central scenario.

1.2.2 Comparative Assessment of the Long-Term Network Options

As presented in the Table 2, Option 2 has a similar NPV ($78.05M) as Option 1 ($77.38M) over the study period (30 years). To further assess these options, Endeavour Energy compared Option 1 against Option 2, which defers the 2nd transformer by ten years. To compare the options, a comparative NPV analysis was developed, which baselines Option 2 against Option 1 as outlined in Table 3.

Table 3 shows that Option 2 is NPV positive when baselined against Option 1, in which the benefits of deferring the 2nd transformer outweigh the quantified cost of unserved energy. Additionally, a staged implementation may facilitate new technology or non-network solutions, while leaving the choice for simple expansion of network capacity of the existing infrastructure if a non-network option does not exist in the future. **For these reasons, Option 2 is the preferred network option.**

Table 3 - Comparative NPV Analysis of Option 2 against Option 1

Option	Description	Solution Type	Relative PV Cost[1] $M	Relative PV Benefits[2]	Relative NPV[3] $M	Comments
2	Establish (Staged) 132/11kV 1 x 45MVA ZS with 2 x sub transmission connections 10-year deferral of 2nd transformer	Network solution	-0.25	+0.54	+0.29	Technically feasible, relative benefits compared to Option 1

Notes:
1: The PV cost relative to Option 1.
2: The PV benefits relative to Option 1.
3: The breakdown of PV is based on the central demand forecast scenario.

1.2.3 Non-Network Options

The New Technology Master Plan (NTMP) tool was used to evaluate credible non-network options against the constraints in the existing distribution network. The NTMP tool and the subsequent qualitative analysis found following credible non-network solutions which could potentially defer network investment:

- Grid Scale Storage – a possible non-network solution that can potentially defer network investment by 2 years into the next regulatory cycle (2030-34)
- Behavioural Demand Response – a possible non-network solution that could potentially defer network investment by 3 years into the next regulatory cycle (2030-34).

1.3 Recommendation and Next Steps

Based on this early phase analysis and the Endeavour Energy's RIT-D process (Figure 2), it is recommended that at the appropriate time and following revision:

- A Non-Network Options Report be issued seeking submissions for non-network options, given that there are credible non-network options available.
- If a feasible and cost-effective non network option is not received, proceed with the recommended network solution which is the establishment of a new **132/11kV 45MVA zone substation** (**Option 2**) in a **staged manner** to supply the West Dapto precincts (prior to 2029). Currently, this option represents a high value (economic benefit) being NPV positive **$78.05 Million** and represents the best option to reduce the risk of unserved energy. This option is estimated to cost **$23.6 Million** and is expected to be spread in 2 stages over five years (stage 1 from 2027 to 2029 and stage 2 from 2037 to 2038).
- It is recommended that the project value of **$20.1 Million** which is **Stage 1 of Option 2 to** be approved for consideration in the FY25-FY29 regulatory period.

- The CFI will be finalised at the completion of the RIT-D process and a final approval will then be submitted to the confirm if the scope will include a non-network option and if the recommended timing of investment of the preferred network option will change.

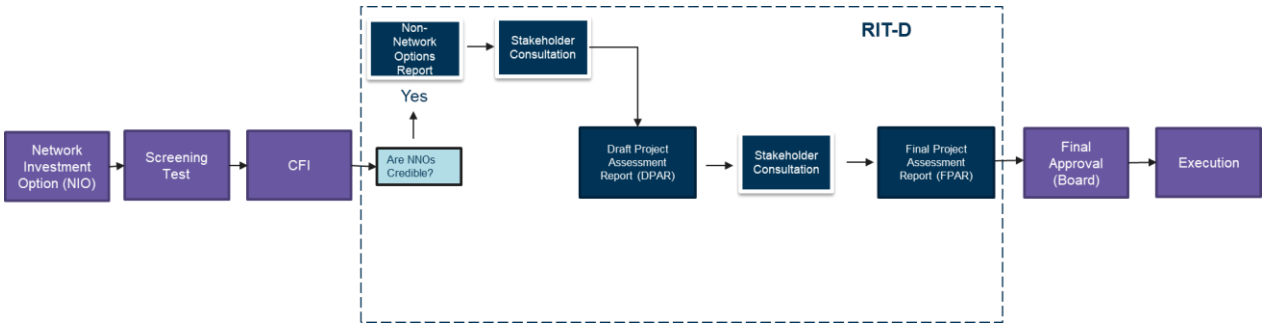

Figure 2 - Endeavour Energy's RIT-D Process

2. Project Proposal

2.1 Identified Need or Opportunity

The CFI within the West Lake Illawarra Area Plan has arisen due to the need to service the planned development precincts of West Dapto (North, Central & South) as illustrated in Figure 3.

Identified by the NSW Department of Planning and Environment (DPE) for future urban development, these three precincts will ultimately account for approximately 19,126[3] new residential dwellings by 2051, as well as ancillary loads consisting of town centres, schools, community facilities and future commercial spaces. Figure 3 also shows the planned development staging from north to south. The rezoning of large tracts of rural land in the central and northern precincts has already occurred along with the development of over 1400 lots with a further 1000 lots currently under development. Endeavour Energy have already received firm applications for over 2,400 new dwellings.

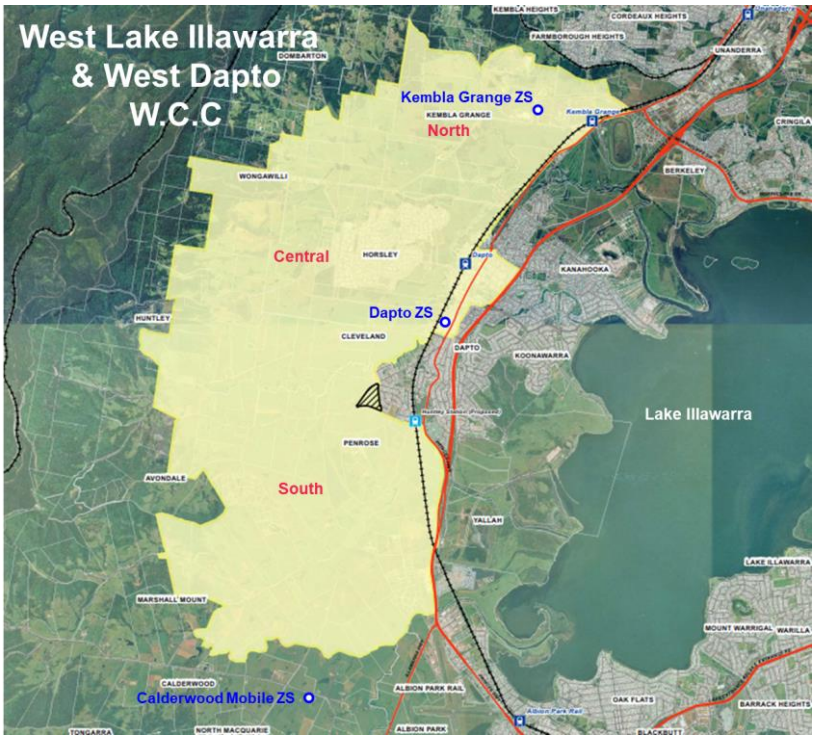

Figure 3 – West Dapto Precincts (North, Central & South)

These developments are expected to require approximately 72MVA of capacity by 2051 and 15MVA by 2031. This growth in new demand forms the basis for this case of investment. Demand due to employment lands has not been considered in this CFI as Endeavour Energy has not yet received any firm applications.

The developments are well progressed according to Table 4 below which shows the status of the three important criteria to determine the timing of the investment. The table shows the growth is likely in the medium term which will require investment.

[3] Based on NSW Department of Planning and Environment (DPE) data from July 2022: Source

Table 4 - Criteria for Investment Timing

Criteria	Low or later growth time frame	Moderate growth in medium term expected	High growth likely in shorter term
Zoning status	Not part of any official release area and not rezoned	Part of official release area but not rezoned yet	Yes rezoned
Development status	No current activity	First stages already planned /committed to	Construction commenced for initial stages
Supporting infrastructure (water/sewer, roads, transport)	Lack of other infrastructure commitment	Planned/committed initial stages of other infrastructure	Significant progress on roads and transport and water/sewer infrastructure already

The timing of the investment to meet the identified need is critical to facilitate growth. Due to the relatively slower residential development of West Dapto precincts, Endeavor Energy have taken a “just in time” approach and considered NNO/NTS solutions. More details on the “just in time” approach can be found in Endeavour Energy's Growth Servicing Strategy.

2.2 Existing Infrastructure

Figure 4 shows that this region is supplied from 33kV feeders 7341 (Kembla Grange ZS to Dapto ZS), 7120 (Unanderra ZS to Dapto ZS), 7041 (Mt Terry TS to Dapto ZS) and 7017 (Springhill TS t Kembla Grange ZS). The main source of the supply to meet the capacity of West Dapto precinct is Kembla Grange ZS and Dapto ZS.

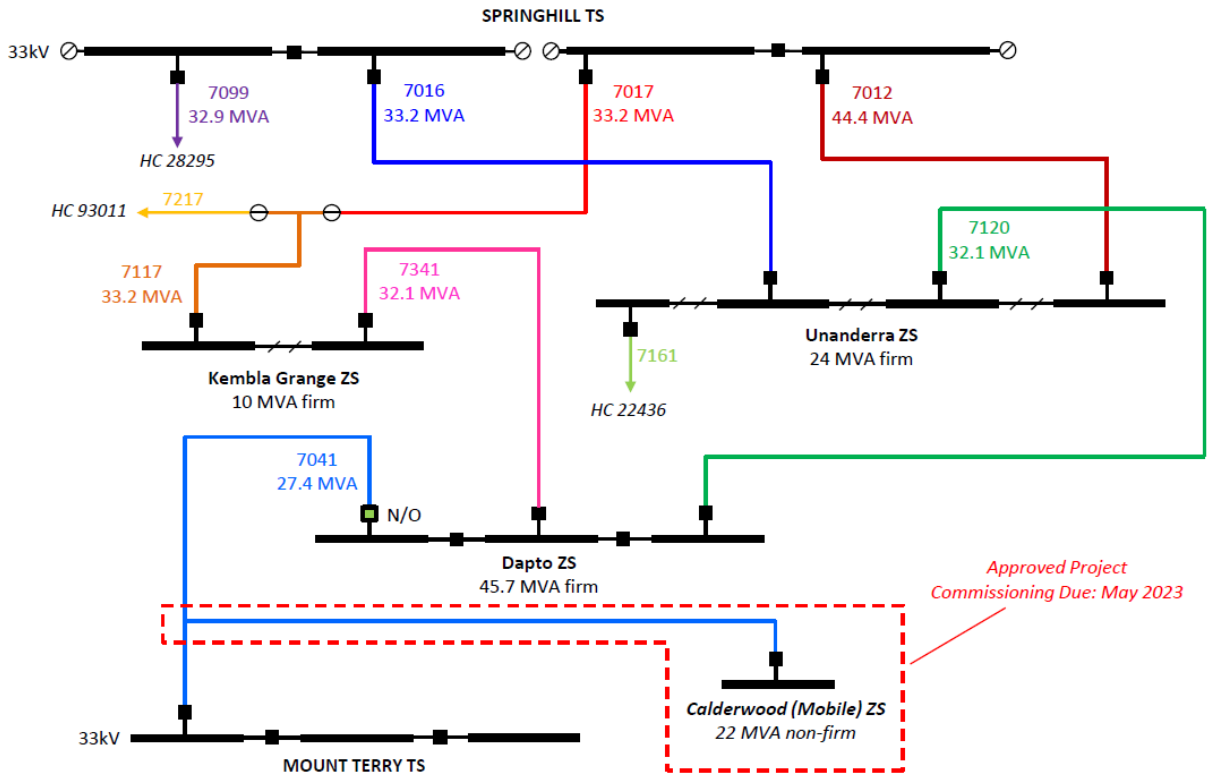

Figure 4 - Single Line Diagram of 33kV sub transmission network

Initial capacity for the new growth in the West Dapto precinct was assessed as up to 9.6MVA from five existing 11kV distribution feeders. This comprises of two feeders (25449 & 35590) from Kembla Grange ZS (one existing and one planned - commissioned in 2019) plus three existing feeders from Dapto ZS (DP1243, DP1284, DP1236/B). There is a gradual increase in the new capacity due to densification of the area which will service the initial developments. As a result, there is no load at risk (LAR) on the distribution feeders as it can be seen in the Table 5.

A 11kV trial 1.5MWh BESS was commissioned on feeder 35590 in April 2020. The battery charges during low load times and discharges during high load times, such as afternoons and evenings. The project's main intent was to augment the grid in times of peak load anticipated during the summer months resulting in major capital expenditure (CAPEX) deferral which otherwise would be required to increase the capacity of the local substation. The BESS of this size positively affected the deferral of network augmentation.

Table 5 - West Dapto Distribution Feeder Loads

Zone Substation	Feeder	Design Rating (MVA)	Actual Load @S2022	LAR @S2022
Kembla Grange	25449	4.6	2.2	0
	35590	4.6	1.7	0
Dapto	DP1243	4.6	3.8	0
	DP1284	4.6	3.6	0
	DP1236/B	4.6	2.2	0

2.2.1 Demand Forecast

The West Dapto development area consists of north, central & south precincts within the Wollongong Local Government Area (LGA). These developments are expected to require approximately 72MVA of capacity by 2051 and 15MVA by 2031. Assumptions related to the estimation of maximum demand are as follows:

- Straight line growth for residential load (same as DPE)
- Growth rate is 2.5%
- 3.76kVA/lot for all residential blocks based on the provisions from National Institute of Economic Industry Research (NIEIR) report

The expected dwelling forecast based on the NSW DPE and EE's estimates shown in Table 6. NSW DPE dwelling forecast is overstated compared to actual dwellings connected and forecast by EE. EE forecasts 2,417 new dwellings to be connected by 2025 compared to 4,302 new dwellings estimated by NSW DPE. The forecast is informed by firm applications received by Endeavour Energy and is included in the area plan and Summer Demand forecast (SDF).

Table 6 - West Dapto Dwellings' Forecast

Dwellings' Forecast	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2036	2041
Number of new dwellings per year based on DPE's estimates	1,083	986	1,084	1,149	-	-	-	-	-	-	-	-
Number of new dwellings per year based on EE's estimates	200	200	225	225	225	250	250	275	275	275	275	275
Total Cumulative Number of Dwellings EE connected	1,767	1,967	2,192	2,417	2,642	2,892	3,142	3,392	3,667	3,942	5,317	6,692
Dwellings' Load in MVA	6.6	7.4	8.2	9.1	9.9	10.9	11.8	12.8	13.8	14.8	21.0	25.2

West Dapto precinct demand forecast is further developed in Table 7, and covers central, high, and low forecast cases. The high forecast case represents 110% of central forecast case, while low forecast case represents 90% of central forecast case.

Endeavour Energy believes this forecast is a conservative forecast to strengthen the case for this CFI. This load forecast is used for business as usual (BAU) base case ("No proactive Intervention") and network options that involve the augmentation of the existing distribution and sub transmission network.

As illustrated in Figure 5 and presented in Table 7, the capacity of the existing 11kV infrastructure will be entirely utilised by 2028 which will result in load at risk from 2028. From then, there will be a large amount of load at risk and ultimately sustained involuntary load shedding, resulting in considerable unserved energy and loss of supply. Investment into additional electrical capacity in this area is required to reduce this risk. Consequently, this investment in increased capacity will deliver the market benefit by reducing the amount of involuntary load shedding in line with Section 5.17.1 of the NER.

Table 7 - West Dapto Demand Forecast & Load At Risk

West Dapto 11kV Demand Forecast	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2036	2041
Cumulative Number of Connected Dwellings in West Dapto Precinct	1,767	1,967	2,192	2,417	2,642	2,892	3,142	3,392	3,667	3,942	5,317	6,692
West Dapto Precinct Load in MVA (3.76kVA per dwelling)	6.6	7.4	8.2	9.1	9.9	10.9	11.8	12.8	13.8	14.8	20.0	25.2
West Dapto 11kV Demand Forecast	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2036**	**2041**
Total Demand Forecast - Central	6.6	7.4	8.2	9.1	9.9	10.9	11.8	12.8	13.8	14.8	20.0	25.2
Total Demand Forecast - Low	6.0	6.7	7.4	8.2	8.9	9.8	10.6	11.5	12.4	13.3	18.0	22.6
Total Demand Forecast - High	7.3	8.1	9.1	10.0	10.9	12.0	13.0	14.0	15.2	16.3	22.0	27.7
11kV Network Capacity (MVA)	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2036**	**2041**
Total Capacity of West Dapto's 11kV network	9.5	9.5	9.4	9.4	9.3	9.3	9.2	9.2	9.1	9.1	8.9	8.6
Firm Capacity of West Dapto's 11kV network[4]	11.4	11.3	11.3	11.2	11.2	11.1	11.1	11.0	11.0	10.9	10.6	10.4
Load At Risk (MVA) - Central	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.8**	**1.7**	**2.8**	**3.9**	**9.4**	**14.8**

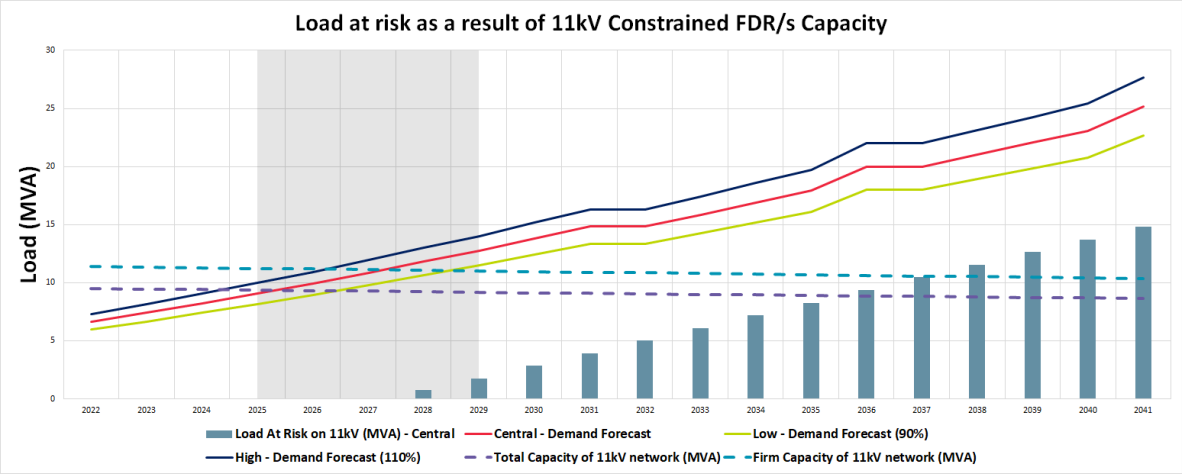

Figure 5 - Load at Risk because of 11kV constrained feeders' capacity

[4] Due to a meshed distribution network, the firm capacity exceeds the total capacity under N-1 contingency events.

2.2.2 Limitations of existing infrastructure

Two limitations of the existing infrastructure have been identified that will result in unserved energy:

- **Constrained 11kV feeders' capacity and equipment:** From 2028, there will not be sufficient capacity from the 11kV distribution feeders at Dapto ZS and Kembla Grange ZS to supply the mature load in the West Dapto development precincts (Refer to Figure 5). This will result in involuntary load shedding (Unserved Energy). Beyond FY29, both Dapto and Kembla Grange ZS's cannot accommodate additional distribution feeders due to switchboard ratings, double cabling constraints and insufficient physical space. Also, additional distribution feeders would be difficult to develop over relatively long distances to the new load centre. For these reasons, it is uneconomical to augment the 11kV switchboards at Dapto and Kembla Grange ZS's and develop additional distribution feeders.
- **Constrained 33kV sub transmission network:** The single line diagram (SLD) of the 33kV sub transmission network is presented in Figure 4. The 33kV sub transmission feeders are only constrained with load at risk under N-1 contingencies supplying Unanderra, Kembla Grange and Dapto ZS's as shown in Figure 6 and Table 8. Currently, there is insufficient capacity at Springhill TS 33kV network to supply Kembla Grange ZS and Dapto ZS under single contingency events without manual intervention by System Operations[5]. Without manual switching there would otherwise be load at risk today on some feeders. This risk is forecasted to double by 2031.

The Expected Unserved Energy (EUE) described in Section 3.1 demonstrates that the 11kV feeders' network is the primary constraint that needs to be resolved. The secondary constraint is the limited capacity available within existing 33kV distribution feeders under N-1 contingency events.

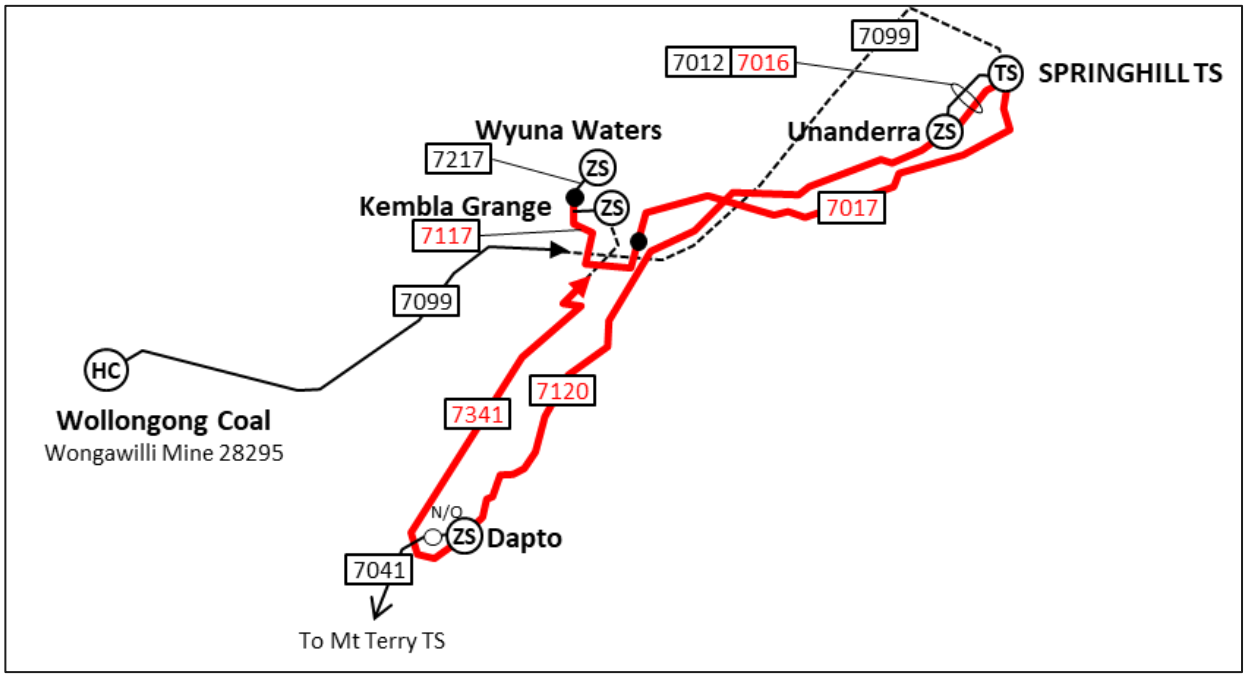

Figure 6 - Geographic 33kV Network and Constraints (red lines)

[5] System Operations pre-emptively or reactively switch peak loads away from Springhill TS by transferring Dapto ZS number three transformer to Mt Terry TS.

Table 8 – Transmission Network N-1 Load & Load At Risk

33kV Demand Forecast (MVA)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2036	2041
Scenario 1: 7016 overload, 7012 outage;	32.2	32.7	32.9	33.3	33.8	34.3	34.8	35.3	35.9	36.4	38.3	40.2
7016 Firm Capacity	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
Scenario 1: LAR (MVA)	**0.0**	**0.0**	**0.0**	**0.1**	**0.6**	**1.1**	**1.6**	**2.1**	**2.7**	**3.2**	**5.1**	**7.0**
Scenario 2: 7017 overload, 7120 outage;	45.3	47.1	48.3	49.4	50.7	51.9	53.3	54.7	56.2	57.8	60.8	63.9
7017 Firm Capacity	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
Scenario 2: LAR (MVA)	**12.1**	**13.9**	**15.1**	**16.2**	**17.5**	**18.7**	**20.1**	**21.5**	**23.0**	**24.6**	**27.6**	**30.7**
Scenario 3: 7120 overload, 7017 outage;	42.1	44.1	45.3	46.7	47.8	48.9	50.4	51.7	53.2	54.7	57.5	60.5
7120 Firm Capacity	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
Scenario 3: LAR (MVA)	**8.9**	**10.9**	**12.1**	**13.5**	**14.6**	**15.7**	**17.2**	**18.5**	**20.0**	**21.5**	**24.3**	**27.3**
Scenario 4: 7341 overload, 7120 outage;	32.8	33.0	33.7	34.5	35.4	36.1	37.1	38.0	39.0	40.1	42.2	44.3
7341 Firm Capacity	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
Scenario 4: LAR (MVA)	**0.0**	**0.0**	**0.5**	**1.3**	**2.2**	**2.9**	**3.9**	**4.8**	**5.8**	**6.9**	**9.0**	**11.1**
33kV Network Capacity (MVA)	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2036**	**2041**
All 33kV FDRs Total Capacity	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
All 33kV FDRs Firm Capacity	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2
LAR on 33kV (MVA) - Maximum constraint	**12.1**	**13.9**	**15.1**	**16.2**	**17.5**	**18.7**	**20.1**	**21.5**	**23.0**	**24.6**	**27.6**	**30.7**

2.2.3 Related Projects

There are no interrelated projects which would impact the timing, scope, or timing of this proposed investment case.

3. Options Considered

Based on the decision rule from Endeavour Energy's Growth Servicing Strategy outlined in the Executive summary, the characteristics of the area are as follows:

- Investment is classified as **brownfield.**
- Identified need based on consequence of no action for the greenfield development is **market benefit**[6].

Figure 7 below (subset of the decision rule included in the Growth Servicing Strategy) has been utilised to outline the process of defining and evaluating options for addressing the identified need.

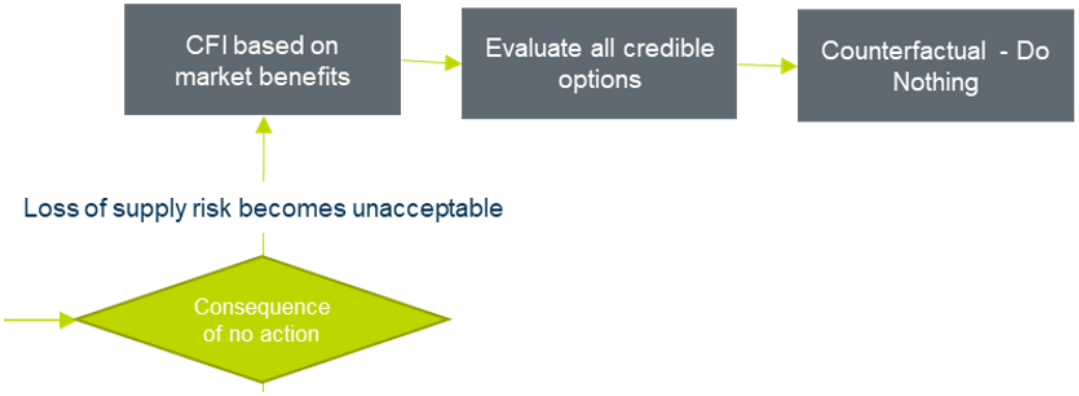

Figure 7 - Decision Rule from Endeavour Energy's Growth Servicing Strategy

3.1 BAU Base Case - 'No proactive intervention'

This chapter examines the risks and benefits of undertaking non-proactive intervention. Figure 4 above shows the current network configuration with Kembla Grange and Dapto ZS's as the main supply source to meet the capacity of West Dapto precinct.

The consequence of not proceeding with any investment in the West Dapto precinct will result in significant unserved energy due to the existing supply network being constrained and incapable of supplying the forecast demand for the area as illustrated in Figure 5. Most of the Expected Unserved Energy (EUE) is result of the constrained 11kV distribution network and shown in Table 10. Table 10.also shows that there is negligible EUE due to the constrained 33kV network. While the LAR is higher for 33kV network as shown in than for 11kV (Refer to Table 7 & Table 8), the probability of failure of 33kV feeders is much lower than the probability of failure of 11kV distribution transformers.

Table 9 and Figure 8 show the amount and value of EUE. The "No Proactive Intervention" approach will result in significant expected unserved energy in West Dapto precinct from 2028 onwards. Without proactive intervention, a risk of unserved energy will remain, and Endeavour Energy may be unable to provide supply security for future developments in the growth area. There are also substantial reputational risks and stakeholder dissatisfaction if Endeavour Energy cannot meet supply requirements for this area.

In terms of Risk Cost assessment, the "No Proactive Intervention" option provides a base case where the risks are valued by applying a Value of Customer Reliability (VCR) to the forecast expected unserved

[6] Refer to the Growth Servicing Strategy for definitions of greenfield and brownfield sites.

energy. The VCR values used by Endeavour Energy in its modelling are the same as those published by AER. This approach was endorsed by the AER during the determination process.

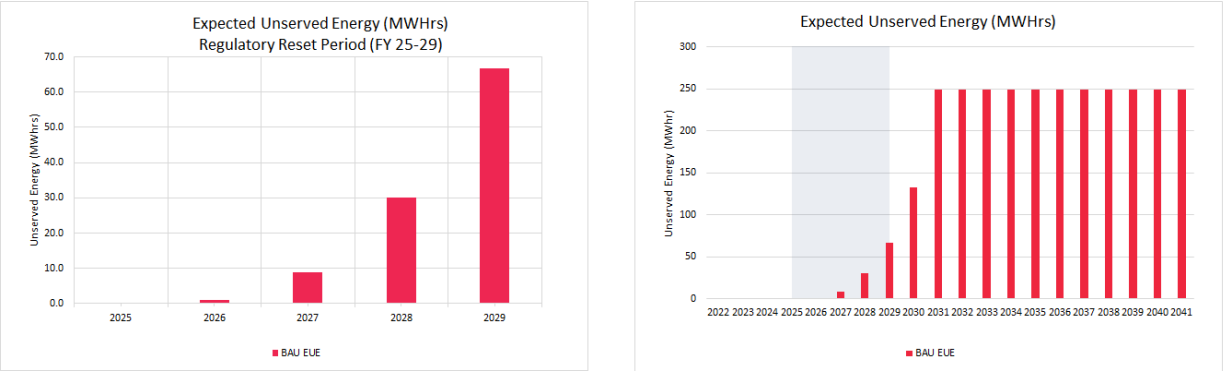

Figure 8 - Expected Unserved Energy as a result of "no proactive intervention"

Table 9 - Value of Expected Unserved Energy[7] as a result of "no proactive intervention"

	2024	2025	2026	2027	2028	2029	2030	2031	2036	2041
Expected Unserved Energy (MWh)	0.00	0.00	0.92	8.87	30.17	66.61	132.62	249.12	249.12	249.12
Value of Unserved Energy ($M)	0.00	0.00	0.03	0.27	0.92	2.02	4.03	7.57	7.57	7.57

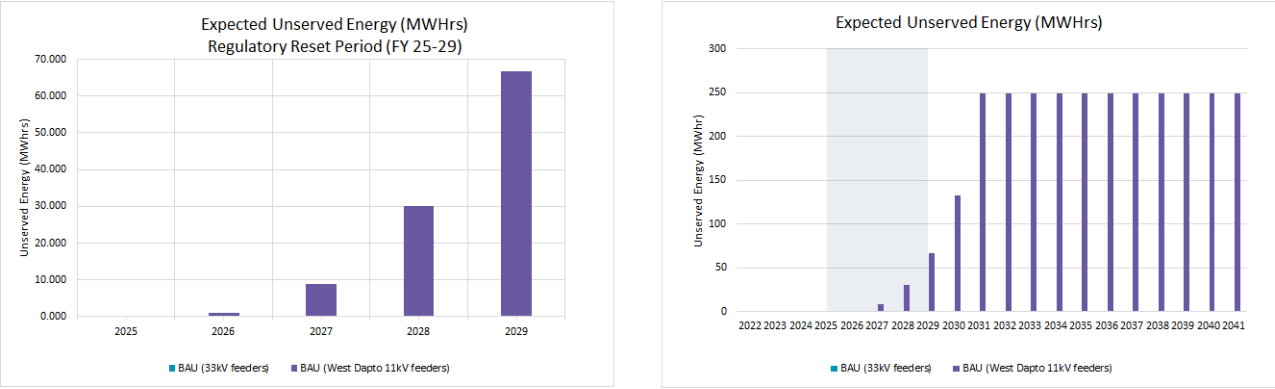

Figure 9 - Breakdown of EUE for 33kV & 11kV network based on the central case demand forecast – graphical representation

Table 10 - Tabular overview of BAU EUE breakdown for 33kV & 11kV

Expected Unserved Energy (MWh)	2024	2025	2026	2027	2028	2029	2030	2031	2036	2041
33kV Network	0.003	0.004	0.005	0.006	0.008	0.010	0.013	0.016	0.023	0.034

[7] The value of EUE for the base case has been capped to the level three years after commissioning the proposed options (2029) in Section 3.2.

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11kV network	0.000	0.000	0.921	8.867	30.175	66.612	132.618	249.122		249.122	249.122

3.2 Credible Network Options

The National Electricity Objectives (NEO) as stated in the National Electricity Law (NEL) require Endeavour Energy to operate the networks in the long-term interests of consumers. The options in this section sets out the ***credible options*** that were considered, together with a counterfactual option: "*no proactive intervention"* to assist the overall comparison. These include all substantially differing commercially and technically credible options, including non-network solutions. Credible options (or a group of options) are those that meet the following criteria:

- addresses the identified need
- is (or are) commercially and technically feasible
- can be implemented in sufficient time to meet the identified need

Each credible network option is further elaborated in the subsequent chapter.

3.2.1 Option 1 - Firm 132/11kV 45MVA Zone Substation

3.2.1.1 Scope

Option 1 proposes to establish a new 132/11kV zone substation with two 45MVA transformers and two very short overhead transmission feeder connections to loop into the adjacent 132kV sub-transmission line (Feeder 980) on land owned by EE on West Dapto Rd, Lot 99 DP1269057. Figure 10 shows the location of the proposed zone substation in the vicinity of the new development and the 132kV infrastructure, while Figure 11 illustrates the proposed layout. This option will satisfy the initial and medium-long term capacity by providing N-1 security.

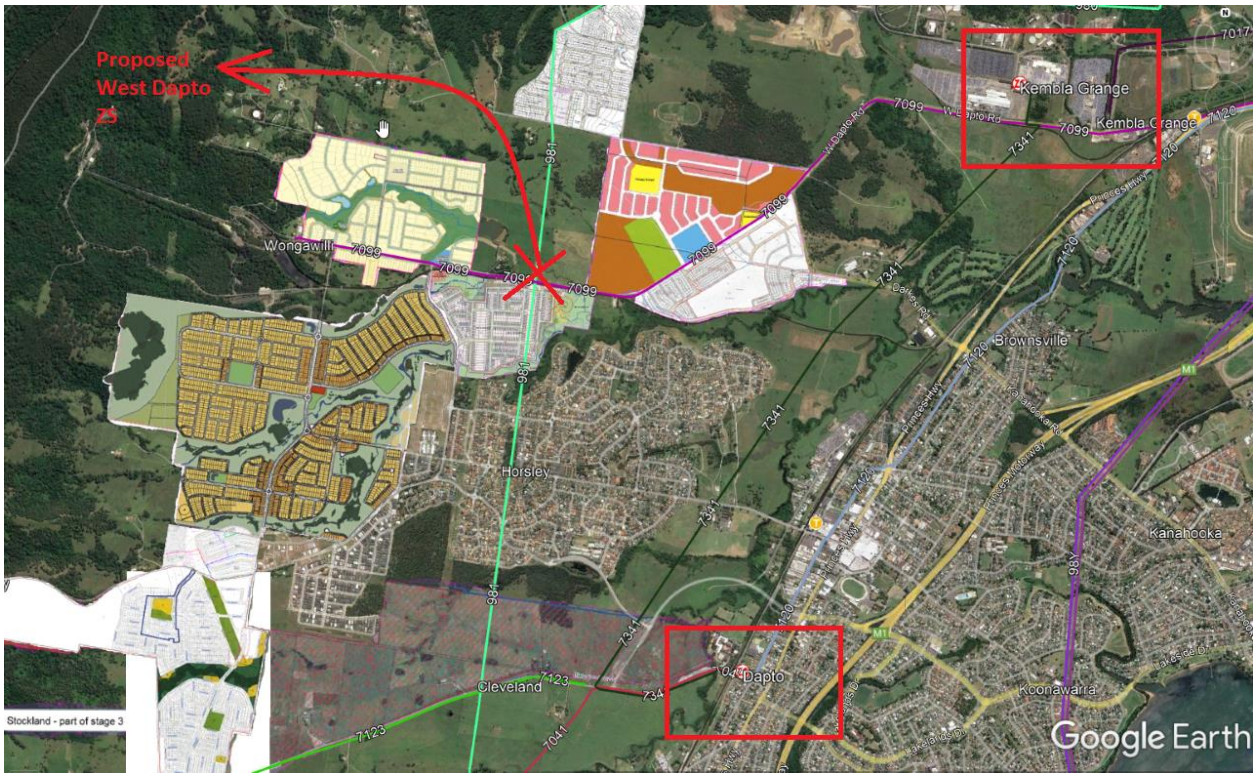

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Figure 10 – Proposed West Dapto ZS site – Aerial view of the area – 132kV feeders represented by green line

Figure 11 - Proposed West Dapto ZS layout

This Option's scopes of works are as follows:

Zone Substation:

- Establish a new control building to accommodate the 11kV switchboard and other equipment
- Install two132/11kV 45MVA transformers
- Establish outdoor 132kV switchyard with two 132kV feeder bays and two transformer bays
- Install two sections of 11kV busbar; refer to SDI 501

Transmission Lines:

- Establish two overhead 132kV feeder linkages to loop into adjacent existing feeder 980
- Install OPGW on feeder 980 between Dapto BSP and West Dapto ZS

Distribution:

- Establish 8 x 11kV feeders into the existing 11kV network

The ultimate configuration is shown below in the single line diagram in Figure 12.

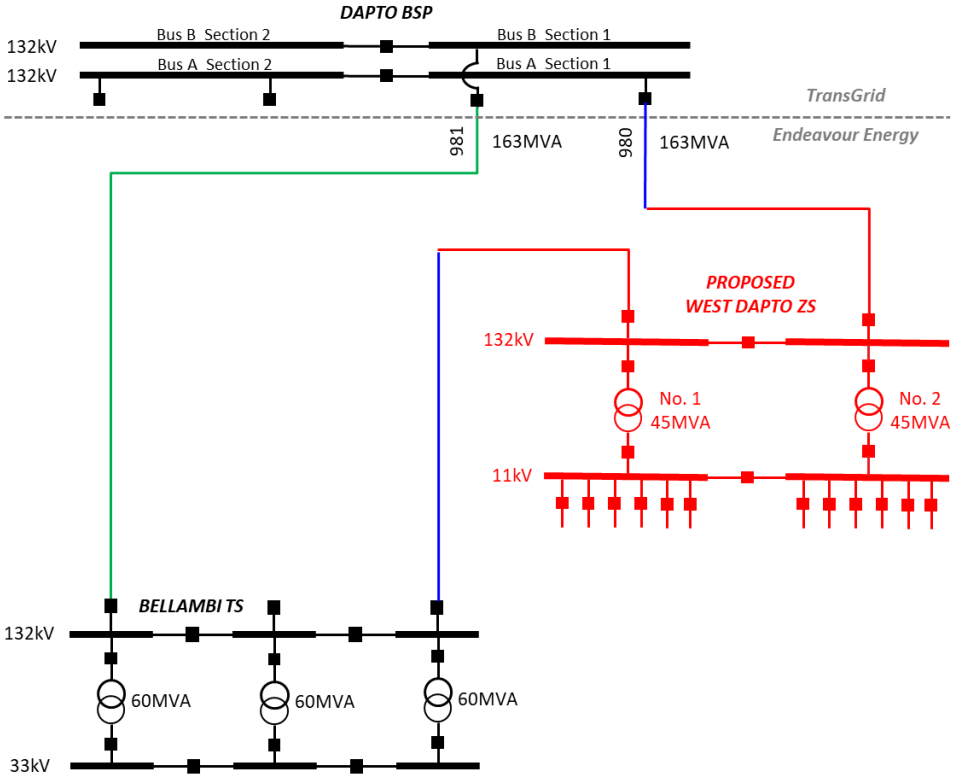

Figure 12 – 132/11kV 45MVA Zone Substation at West Dapto SLD

Figure 13 presents how this option will significantly reduce the unserved energy when compared to the base case (“no proactive intervention”). This option results in a firm capacity of 45 MVA by 2029. This option can meet the forecasted central demand of the development with N-1 capacity until 2041 resulting in minimal expected unserved energy for this period. Additionally, this option provides wider network benefits by transferring the initial load from Dapto ZS and Kembla ZS to the new West Dapto ZS. This will unload the substation to a certain extent and help defer future network investment.

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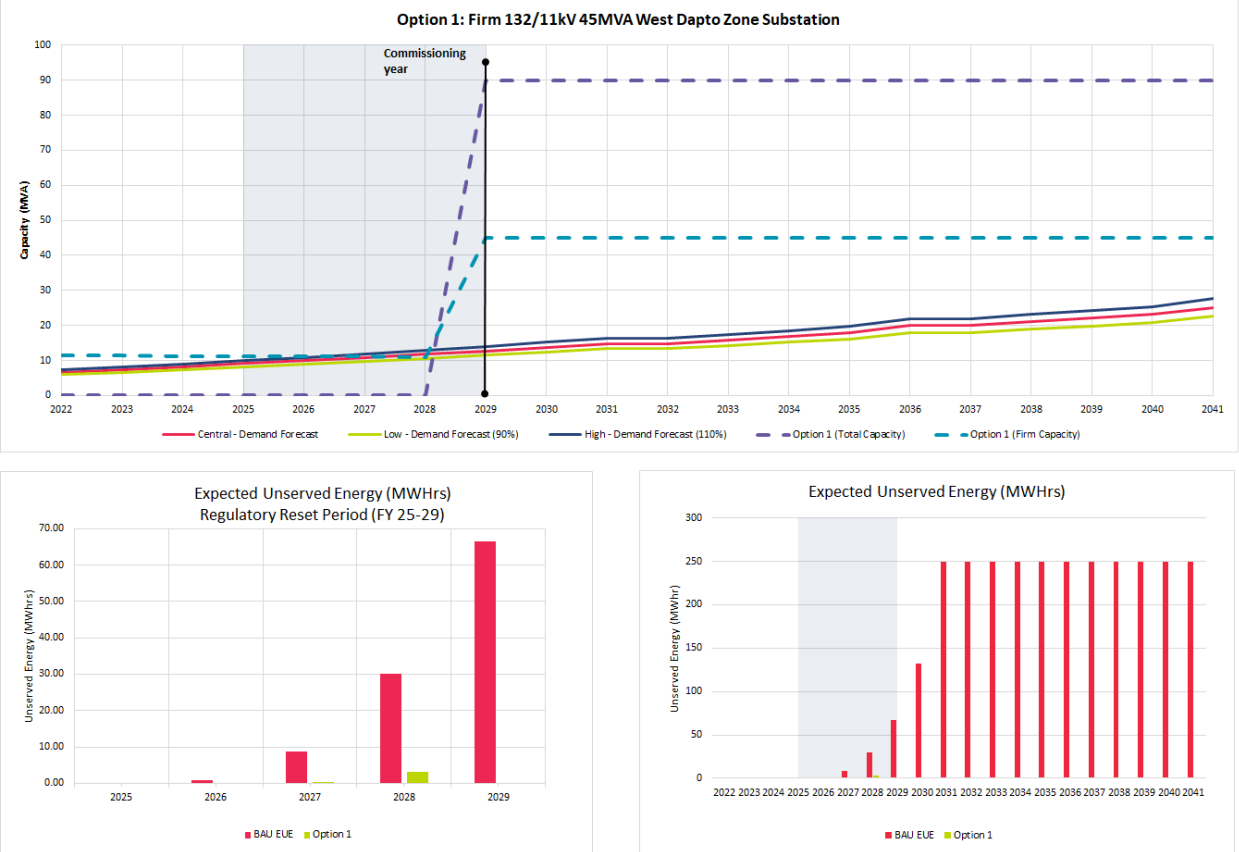

Figure 13 - Summary of Option 1 - Expected Unserved Energy based on central case demand forecast

3.2.1.2 Cost

The total estimated capital cost of Option 1 is $23.1 M. The cost is spread over three years to align with construction timelines and is based on estimates provided by Endeavour Energy's estimating team. Commissioning of new equipment from Option 1 is planned for FY29. A summary of the capital cost can be found in Table 11.

The total present value of costs for Option 1 is $16.29M.

Table 11 - Option 1 - Capital cost summary

Option	2026	2027	2028
1	$3.47M	$10.4M	$9.24M

3.2.1.3 Benefits & NPV

The NER states that quantifiable economic market benefits (needs) include changes in involuntary load shedding. The costs and benefits analysis described in the following section included this benefit in determining the best option. Endeavour Energy's Unserved Energy Template was used to estimate the involuntary load shedding that can be prevented because of proactive action. The involuntary load shedding was utilised by the Houston Kempt (HK) model along with a Value of Customer Reliability to calculate a market benefit. No other identified risks were included in the costs and benefits analysis.

The assumptions used in the HK model are:

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- A study period of 30-years.
- The commercial discount rate was set to 3.26% based on the pre-tax real weighted average cost of capital (WACC) for the 2025-29 determination period and 1.04% for low and high sensitivities.
- A VCR of $30,370 was used based on current 100% residential load type which is a conservative estimate of the load profile in this area.
- The benefits of options are based on the avoided unserved energy.
- NPV based on the central scenario.
- The benefits of avoided EUE have been capped to the level three years (2032) after commissioning the proposed option (2029) in Section 3.2.

There were no other identified risks that were included in the costs and benefits analysis.

A Summary of HK model's output is given in Table 12 below.

Table 12 – Summary of benefits & NPV of Option 1

Option	PV "Market Benefits" ($M)	PV Costs ($M)	NPV ($M)
1	$ 93.67M	$16.29M	$77.38M

3.2.2 Option 2 – Staged 132/11kV 45MVA Zone Substation

3.2.2.1 Scope

This option proposes establishing a new 132/11kV zone substation with two 45MVA transformers staged with two very short overhead transmission feeder looping into the adjacent 132kV sub-transmission line (Feeder 980) on land owned by EE on West Dapto Rd, Lot 99 DP1269057. Figure 10 below shows the location of the proposed zone substation in the vicinity of the new development and the 132kV infrastructure. Figure 11 below illustrates the proposed West Dapto ZS's layout.

This option will satisfy short-medium term capacity needs without providing N-1 security until Stage 2 works are implemented. Endeavour Energy accepts risk associated with "N" supply security due to a single transformer. The cross-zone distribution support from the 11kV network will mitigate this risk until Stage 2. Based on the forecast in Table 7, Stage 2 works would be required by 2039, allowing for a ten-year deferral of the second power transformer.

This option's scopes of works are as follows, and the ultimate configuration is shown below in the single-line diagram in Figure 14.

<u>Stage 1</u>
Zone Substation:
- Establish a new control building to accommodate the 11kV switchboard and other equipment
- Install the 1st 132/11kV 45MVA transformer
- Establish outdoor 132kV switchyard with two 132kV feeder bays and two transformer bays
- Install two sections of 11kV busbar; refer to SDI 501

Transmission Lines:
- Establish two overhead 132kV feeder linkages to loop into adjacent existing feeder 980
- Install OPGW on feeder 980 between Dapto BSP and West Dapto ZS

Distribution:
- Establish 8 x 11kV feeders into the existing 11kV network

<u>Stage 2</u>
Zone Substation:

- Install 2nd 132/11kV 45 MVA transformer and associated works including bund

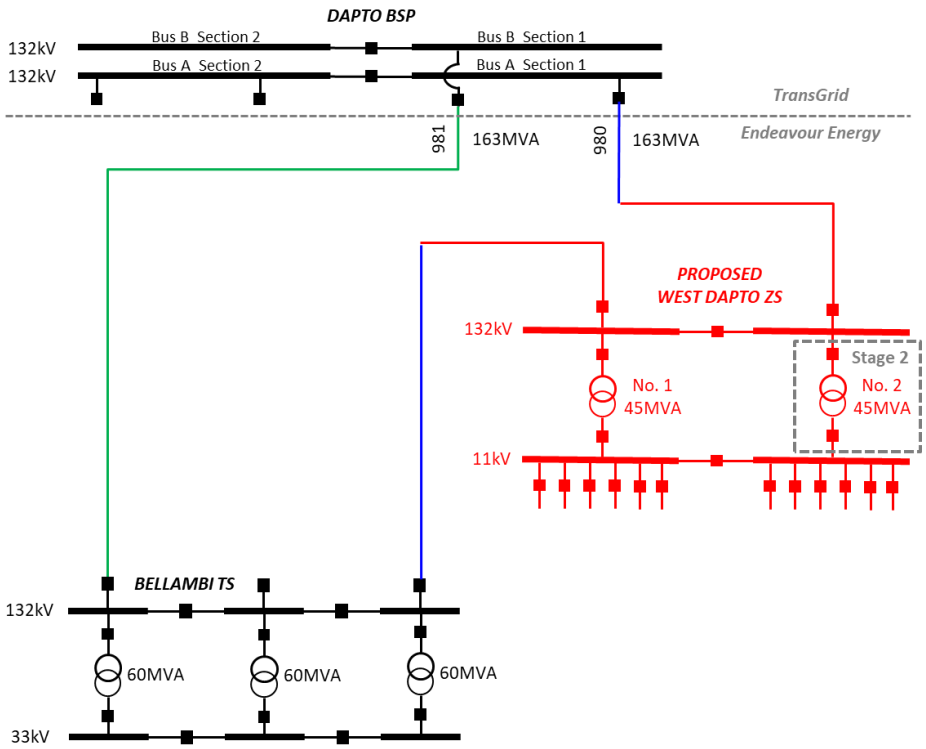

Figure 14 – 132/11kV 45MVA Zone Substation at Lowes Creek Marylands SLD

It can be seen in that even with Stage 1 commissioned, this option will significantly reduce the expected unserved energy when compared to the BAU base case ("no proactive intervention").

Figure 15 presents how this option will reduce the unserved energy when compared to the base case ("no proactive intervention"), while Table 13 compares the EUE between Option 1 and Option 2 during the years where the 2nd transformer is deferred (2029-39). Option 2 significantly reduces the expected unserved energy compared to the BAU base case ("no proactive intervention") and has a marginally higher EUE compared to Option 1. Similar to Option 1, this option provides wider network benefits by transferring the initial load from Dapto ZS and Kembla ZS to the new West Dapto ZS, which could defer future network investment for the existing substations.

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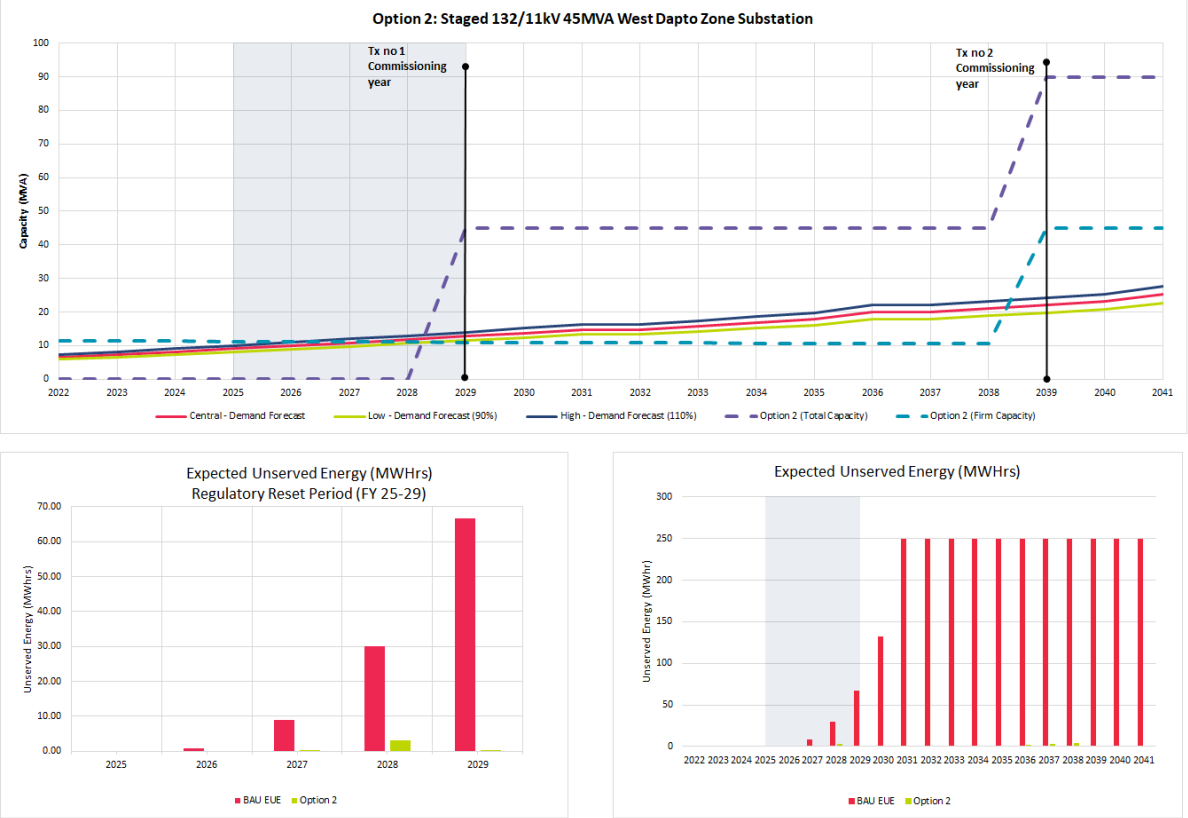

Figure 15 - Summary of Option 2 - Expected Unserved Energy based on central case demand forecast

Table 13 –Overview of Unserved Energy Comparison between Option 1 & Option 2 during the time period where the 2nd Transformer is deferred.

Expected Unserved Energy (MWh)	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Option 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Option 2	0.019	0.065	0.143	0.266	0.461	0.780	1.26	1.93	2.82	3.96	0.00

3.2.2.2 Cost

Total estimated capital cost of Option 2 including both stages is $23.6 M. The cost is spread over five years to align with construction timelines in both stages, and it is based on estimates provided by Endeavour Energy's estimating team. Commissioning of Stage 1 is planned for FY29 while commission of Stage 2 is planned for FY39. The first stage is estimated to cost $20.1 M, while the second stage is estimated to cost $3.5 M. A summary of the capital cost can be found in Table 14.

The total present value of costs for Option 2 is $15.4M.

Table 14 - Option 2 - Capital cost summary

Option	Stage	2026	2027	2028	2037	2038
2	1	$3.01M	$9.04M	$8.04M	-	-
2	2	-	-	-	$1.93M	$1.58M

3.2.2.3 Benefits & Net Present Value (NPV)

The NER states that quantifiable economic market benefits (needs) include changes in involuntary load shedding. The costs and benefits analysis described in the following section included this benefit in determining the best option. Endeavour Energy's Unserved Energy Template was used to estimate the involuntary load shedding that can be prevented because of proactive action. The involuntary load shedding was utilised by the HK model along with a VCR to calculate a market benefit.

The assumptions used in the HK model are the same as in the case of Option 1 and a summary of the HK model's output is given in Table 15 below.

Table 15 – Summary of benefits & NPV for Option 2

Option	PV "Market Benefits" ($M)	PV Costs ($M)	NPV ($M)
2	$93.45M	$15.4M	$78.05M

3.2.3 Other Options Considered but not Progressed

3.2.3.1 Option A – Establish additional 11kV feeders from Dapto and Kembla Grange ZS

As detailed in Section 2.2.2, Endeavour Energy did not consider additional 11kV feeders from the existing Dapto ZS and Kembla Grange ZS for the following reasons:

- After 2029, both substations cannot accommodate additional distribution feeders due to switchboard ratings, double cabling constraints and insufficient physical space.
- Additional distribution feeders would be difficult to develop over relatively long distances to the new West Dapto precinct.

For these reasons, it is uneconomical to augment the 11kV switchboards at Dapto and Kembla Grange ZS's and develop additional distribution feeders.

3.2.3.2 Option B - Establish additional 33/11kV Zone Substations

As detailed in Section 2.2.2 and the West Lake Illawarra Area Plan [2], Endeavour Energy did not progress with new 33/11kV Zone Substation(s) for the following reasons:

- There are existing N-1 constraints on 5 x 33kV feeders having a route length of 22.1km and the estimate augmentation cost is $14.0m.
- To establish West Dapto ZS as 33/11kV a new underground feeder from Springhill TS would be needed, route length of 9.0km at estimated cost of $17.1m.
- The West Lake Illawarra Area Plan recommends using existing spare capacity from source 132kV feeder 980 for West Dapto ZS. Connection route length is 105m at an estimated cost of $0.66m.

For these reasons, it is uneconomical to augment and establish additional 33kV feeders to the proposed West Dapto ZS as a 33/11kV substation.

3.3 Recommended Network Option

Option 2, which defers part of the network investment, has a similar NPV ($78.05M) as Option 1 ($77.38M) over the study period (30 years), even with the sensitivity & scenarios considered in Section 3.4. This is because Option 2 is a subset of Option 1, with the only change being between 2029-39, where the second transformer is deferred in Option 2. Considering this small difference, both credible options are assessed as equally ranked given the accuracy in the estimates used in the analysis.

Option	Description	Solution Type	PV residual risk[1] $M	PV Cost[2] $M	PV Benefits[3]	NPV [45] $M	Rank	Assessment Description
BAU	No proactive intervention	Base case / counterfactual	91.8	-	-	-	3	Non-preferred as will lead to unacceptable risk or higher cost for customers if opportunity not captured
1	Establish firm 132/11kV zone substation with two 45MVA transformer and two very short overhead transmission feeder connections	Network solution	-	16.29	93.67	77.38	1	Technically feasible
2	Establish staged 132/11kV zone substation with two 45MVA transformer and two very short overhead transmission feeder connections	Network solution	-	15.4	93.45	78.05	1	Technically feasible

Notes:
1: PV residual risk cost (or savings for opportunities) post the investment.
2: PV of total costs, both Capex and Opex. See Section 3 for further details.
3: PV of total quantified benefits, both risks mitigated, and any forecast decrease in Capex or Opex arising because of undertaking the investment (opportunities).
4: PV Benefits less PV Investment Costs
5: The breakdown of PV is based on the central demand forecast scenario

3.3.1 Comparative Assessment of the Long-Term Network Options

Due to the similar long term NPV, a comparative NPV analysis was completed to compare these options, which baselines Option 2 against Option 1. The comparative NPV analysis was based on the following inputs and assumptions and is summarised in Table 16.

- A study period of 13 years (2026-2039).
  - Before 2026 and after 2039, both Option 1 & Option 2 are the same.
- The commercial discount rate was set to 3.26% and a VCR of $30,370/MWh was used.
  - Same inputs defined in Section 3.2.2.3.
- Comparative PV Costs
  - The relative cost for deferring the 2nd transformer in Option 2 is the increase in expected unserved energy from only having one transformer relative to Option 1.
- Comparative PV Benefits
  - The relative benefits of deferring the 2nd transformer for Option 2 are:
    - Deferred capital expenditure of the 2nd transformer.

- Reduced maintenance cost by only having one transformer compared to two transformers in Option 1.

Table 16 shows that Option 2 is NPV positive when baselined against Option 1, in which the benefits of deferring the 2nd transformer outweigh the quantified cost of unserved energy. Additionally, a staged implementation may facilitate new technology or non-network solutions, while leaving the choice for simple expansion of network capacity of the existing infrastructure if a non-network option does not exist in the future. **For these reasons, Option 2 is the preferred network option.**

Table 16 - Comparative NPV Analysis of Option 2 against Option 1

Option	Description	Solution Type	Relative PV Cost[1] $M	Relative PV Benefits[2]	Relative NPV[3] $M	Comments
2	Establish (Staged) 132/11kV 1 x 45MVA ZS with 2 x sub transmission connections 10-year deferral of 2nd transformer	Network solution	-0.25	+0.54	+0.29	Technically feasible, relative benefits compared to Option 1

Notes:
1: The PV cost relative to Option 1.
2: The PV benefits relative to Option 1.
3: The breakdown of PV is based on the central demand forecast scenario.

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3.4 Sensitivity and Scenario Analysis

3.4.1 Sensitivity Analysis

Sensitivity tests have been applied to the economic evaluation of the network options and the results are shown below. The results show that Option 2 remains the most favourable option in all sensitivity tests as there was no tipping point found between the options. Details of the sensitivity analysis for various parameters are presented in the Figure 16 and Figure 17.

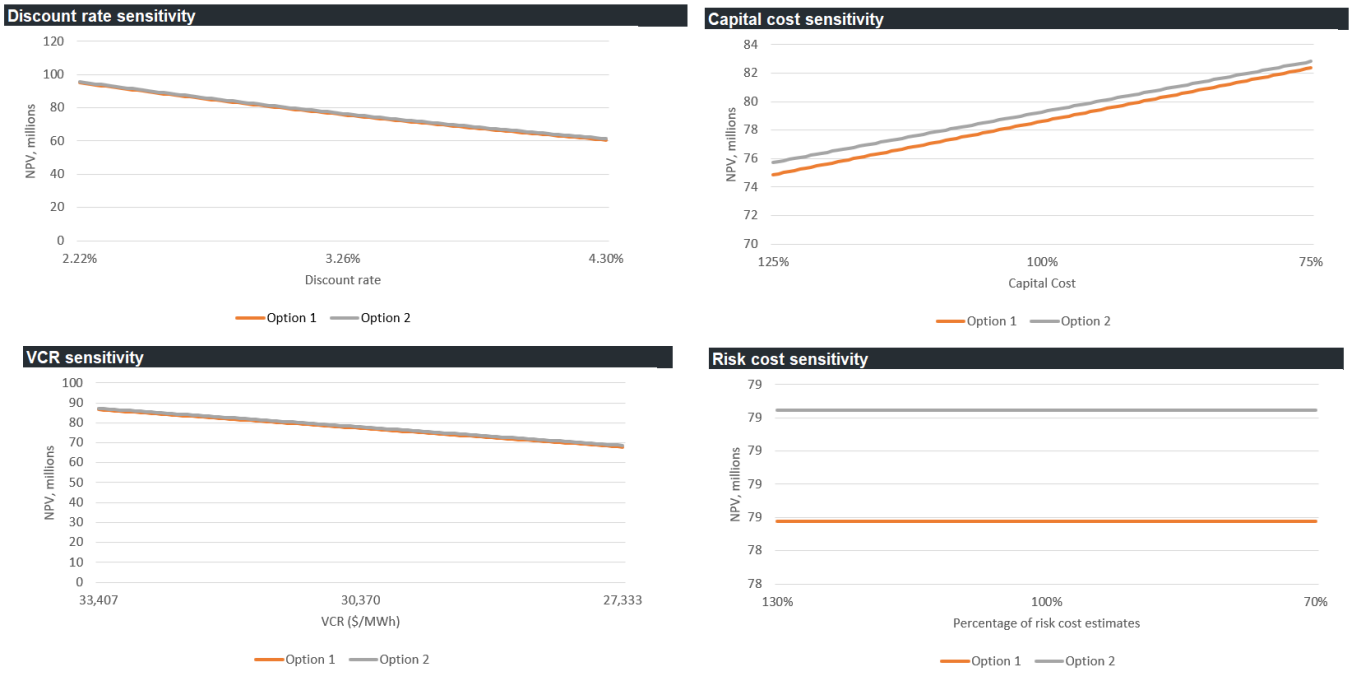

Figure 16 - Sensitivity analysis

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Thresholds and tipping points

Rank	Option	Weighted NPV
1	Option 2	81,062,534
2	Option 1	80,396,498

Goal seek values

Parameters	Units	Value	Notes
Discount rate	Percent	3.26%	Users should provide the seed values for goal seek values,
Capital cost	Factor	1.0000	which can be the same value from the central scenario.
VCR	$/MWh	30,370	Using extreme seed values may cause issues with the
Risk costs	Factor	1.0000	model.

Rank 1 Option 2 for zero NPV

Parameters	Units	Value	Notes
Discount rate	Percent	20.34%	
Capital cost	Factor	6.5890	
VCR	$/MWh	4,993	
Risk costs	Factor	-335,543.3200	No reasonable risk costs can achieve zero NPV

Rank 2 Option 1 for zero NPV

Parameters	Units	Value	Notes
Discount rate	Percent	18.87%	
Capital cost	Factor	6.2455	
VCR	$/MWh	5,272	
Risk costs	Factor	##############	No reasonable risk costs can achieve zero NPV

Tipping points for Rank 1 to Rank 2

Parameters	Units	Value	Notes
Discount rate	Percent	#N/A	No tipping points were identified
Capital cost	Factor	#N/A	No tipping points were identified
VCR	$/MWh	#N/A	No tipping points were identified
Risk costs	Factor	#N/A	No tipping points were identified

Figure 17 - Summary of Sensitivity Analysis

3.4.2 Scenario Analysis

Scenario analysis has been carried out by the model. The parameters of the scenario analysis are presented below (Figure 18).

Scenario settings

Parameters		S1	S2	S3	S4	
General parameters	Unit	Central	High	Low	[Extra]	Notes
Commercial discount rate	Percent	3.26%	2.22%	4.30%	3.26%	
VCR for involuntary load shedding	$/MWh	30,370	33,407	27,333	30,370	
VCR for voluntary load curtailment	$/MWh	30,370	33,407	27,333	30,370	
Cost parameters	**Unit**	**Central**	**High**	**Low**	**[Extra]**	**Notes**
Capital cost	Factor	1.00	0.75	1.25	1.00	
Planned routine maintenance and refurbishment	Factor	1.00	0.75	1.25	1.00	
Unplanned corrective maintenance	Factor	1.00	1.25	0.75	1.00	
Decommissioning costs	Factor	1.00	1.25	0.75	1.00	
NNO proponent charges	Factor	1.00	0.75	1.25	1.00	
Cost X	Factor	1.00	1.00	1.00	1.00	
Risk cost parameters	**Unit**	**Central**	**High**	**Low**	**[Extra]**	**Notes**
Reliability and security risk costs	Factor	1.00	1.30	0.70	1.00	
Safety and health risk costs	Factor	1.00	1.30	0.70	1.00	
Environmental risk costs	Factor	1.00	1.30	0.70	1.00	
Legal/regulatory compliance risk costs	Factor	1.00	1.30	0.70	1.00	
Financial risk costs	Factor	1.00	1.30	0.70	1.00	
Benefit parameters	**Unit**	**Central**	**High**	**Low**	**[Extra]**	**Notes**
Avoided involuntary load shedding	Factor	1.00	1.00	1.00	1.00	
Avoided voluntary load curtailment	Factor	1.00	1.00	1.00	1.00	
Avoided costs for non-RIT-D proponent parties	Factor	1.00	1.00	1.00	1.00	
Differences in the timing of unrelated network expenditure	Factor	1.00	1.00	1.00	1.00	
Changes in load transfer capacity	Factor	1.00	1.00	1.00	1.00	
Additional option value	Factor	1.00	1.00	1.00	1.00	
Changes in electrical energy losses	Factor	1.00	1.00	1.00	1.00	
Scenario weightings	**Unit**	**Central**	**High**	**Low**	**[Extra]**	**Notes**
Weightings	%	0.50	0.25	0.25	0.00	

Figure 18 - Houston Kemp model scenario parameters

Table 10 – Summary of scenarios investigated

Variable	Scenario 1 - baseline	Scenario 2 – high benefits	Scenario 3 – low benefits
Capital cost	Estimated network capital costs	25% decrease in the estimated network capital costs	25% increase in the estimated network capital costs
Value of customer reliability (VCR)	$30,370/MWh (from AER VCR report)	$33,407/MWh 10% higher than baseline	$27,333/MWh 10% lower than baseline
Discount rate	3.26% (WACC)	4.3% (WACC + 2%)	2.22% (WACC - 2%)
Maintenance costs	Estimated network maintenance costs	25% increase in the estimated network maintenance costs	25% decrease in the estimated network maintenance costs
Scenario weighting	50%	25%	25%

The scenarios have been weighted as 50% for Scenario 1 (Central) being the most likely with Scenarios 2 (High) and 3 (Low) being given a weighting of 25%. This is a reasonable approach to incorporate the uncertainty in the timing of development across the three scenarios that form the basis of the demand forecasts. The table below shows that Option 2 still has the highest NPV and is still the preferred option.

Table 11 – Weighted net present value of options

Option	Scenario 1 NPV ($M)	Scenario 2 NPV ($M)	Scenario 3 NPV ($M)	Weighted NPV ($M)	Option ranking
Option 1	77.38	123.13	43.69	80.39	2
Option 2	78.05	123.42	44.74	81.06	1

3.5 Proposed Investment Timing

The optimal timing where the value of unserved energy from the 'No Proactive Intervention' scenario exceeds investment costs for Option 2 is 2029 as per Figure 19. This timing aligns with the proposed commissioning date of Option 2 Stage 1.

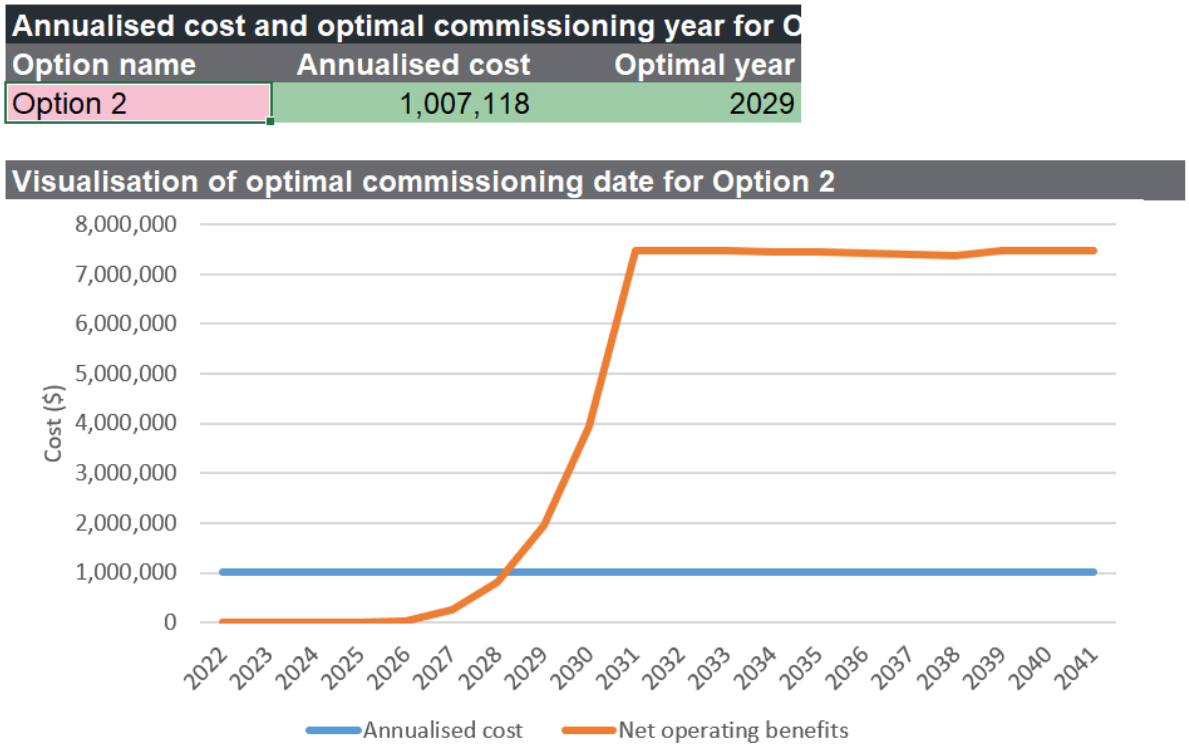

Figure 19 - Houston Kemp optimal timing output for Option 2

3.6 Non-Network Solutions to defer network investment

3.6.1 Scope

Electricity Distributors in NSW operate under the licence requirement (under the *NSW Electricity Supply Act 1995*) to investigate non-network alternatives to network augmentation for specific capital expenditure projects. The National Electricity Rules (NER) require Distribution Network Service Providers (DNSP) to investigate non-network options by utilising a consultation process as part of planning for major network augmentations.

The New Technology Master Plan (NTMP) tool was used to evaluate credible non-network options with the primary constraint of the existing Oran Park ZS. Figure 20 shows the comparison of non-network solutions and network solutions against the base case ("no proactive intervention"), while Figure 21 compares non-network solutions against the network solution.

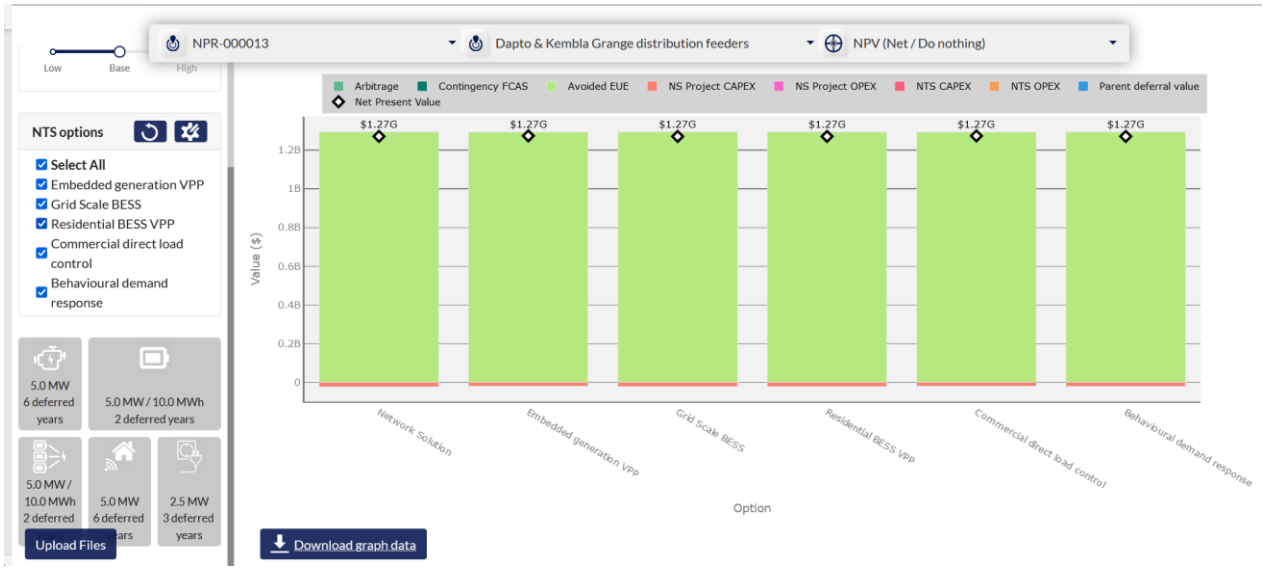

Figure 20 - NTMP Output for Non-Network Options when compared to the Base Case ("no proactive intervention")

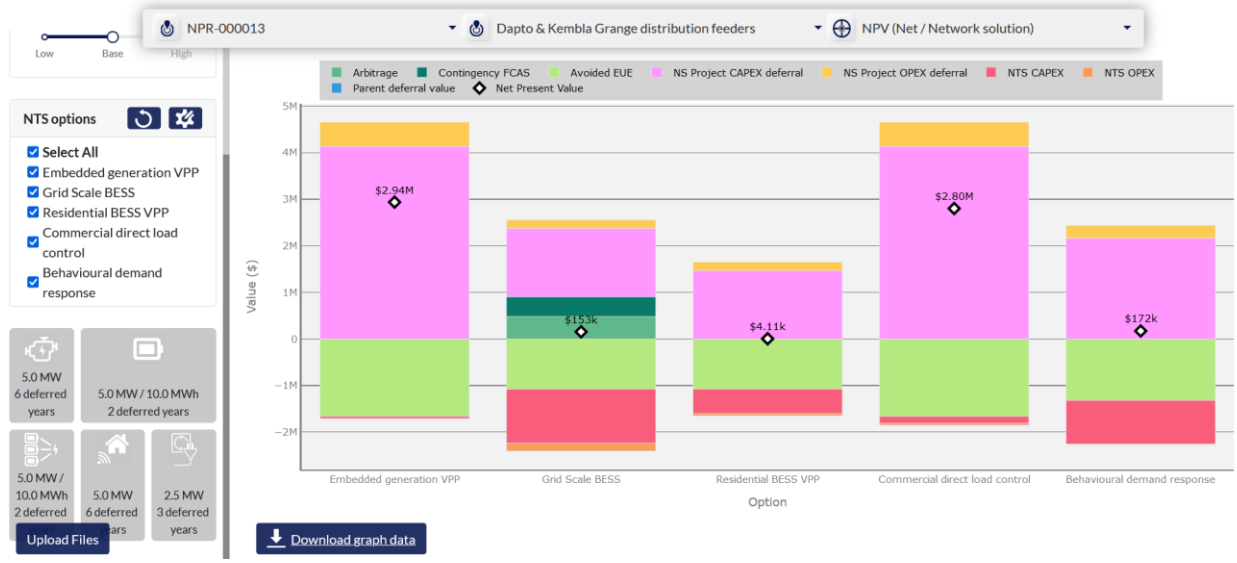

Figure 21 - NTMP Output for Non-Network Options when compared to the Network Solution

Table 17 provides an overview of the outputs from the NTMP tool and overlays with qualitative assessment.

Table 17 - Non-Network / New Technology Options

Non-Network Options	Outcomes	Qualitative Assessment	Comments
Grid-Scale Storage (5 MW /10 MWh)	Potentially defer the network investment by 2 year	✔	Grid Scale storage can potentially be explored and connected to existing feeder infrastructure and could defer the network investment into the next regulatory cycle.
VPP (5 MW)	Potentially defer the network investment by 6 years	✖	Not a feasible as the proposed capacity is large for a new technology and this uptake is approximately 50% of the total load by 2029
Residential BESS VPP (5 MW /10 MWh)	Potentially defer the network investment by 1 year	✖	Not a feasible option as this is a new development and the proposed capacity would require significant uptake by 2029.
Commercial Direct Load Control (5.0 MW)	Potentially defer the network investment by 6 years	✖	Not feasible as, it would require a large uptake from commercial/industrial load in this region, which is mainly residential prior to 2029.
Behavioural Demand Response (2.5 MW)	Potentially defer the network investment by 3 years	✔	Behavioural Demand Response is a feasible option and should be investigated further and could defer the network investment into the next regulatory cycle. However, the proposed capacity would require approximately 23% uptake of the central load forecast by 2028.

3.6.2 Summary

The NTMP tool and the subsequent qualitative analysis found at least two credible non-network options (BESS & Behavioural Demand Response). These options need to be further evaluated using the screening test in the RIT-D process. As part of the RIT-D process, Endeavour Energy will issue a non-network options report before progressing with the Draft Project Assessment Report (DPAR).

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4. Detailed description and costs of preferred option

High level cost estimate is provided in the Table 18 below.

Table 18 - Option 2 – Staged 132/11kV 90MVA Zone Substation at West Dapto

Description – Stage 1	Standard Land Size (km^2)	Cost ($)	Contingency ($)	Total Cost ($)
Outdoor 132/11kV 1x 45MVA, 2x TR feeder bays	11.4	14,000,000	1,400,000	15,400,000
132kV O/H line IN (35m)	0.035	21,875	2,187.5	24,063
132kV O/H line OUT (70m)	0.07	43,750	4,375	48,125
OPGW – Dapto BSP to West Dapto ZS (6.4km)	6.4	406,080	40,608	446,688
Distribution (Fdr 1) – 1.3km UG	1.3	1,100,000	110,000	1,210,000
Distribution (Fdr 2) – 1.1km UG	1.1	885,000	88,500	973,500
Distribution (Fdr 3) – 0.8km UG	0.8	680,000	68,000	748,000
Distribution (Fdr 4) – 1.25km UG	1.25	975,000	97,500	1,072,500
Distribution (Fdr 5) – 1.3km UG	1.3	1,100,000	110,000	1,210,000
Distribution (Fdr 6) – 0.1km UG	0.1	90,000	9,000	99,000
Distribution (Fdr 7) – 1.4km UG	0.9	700,000	70,000	770,000
Distribution (Fdr 8) – 1.4km UG	0.1	90,000	9,000	99,000
Stage 1 - SUB TOTAL		**20,091,705**	**2,009,170.5**	**22,100,875.5**
Description – Stage 2	**Standard Land Size (km^2)**	**Cost ($)**	**Contingency ($)**	**Total Cost ($)**
Add another, outdoor 132/11kV 45MVA TX		3,500,000	350,000	3,850,000
Stage 2 - SUB TOTAL		**3,500,000**	**350,000**	**3,850,000**
TOTAL		**23,591,705**	**2,359,170.50**	**25,950,875.5**

Note: Substation Primary Design and Transmission Mains groups to confirm the above and further scope during full proper budget estimate.

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5. Recommendations and Next Steps

Based on the Endeavour Energy's RIT-D process (Figure 22), it is recommended that:

- A Non-Network Options Report be issued seeking submissions for non-network options, given that there are credible non-network options available.
- If a feasible and cost-effective non network option is not received, proceed with the recommended network solution which is the establishment of a new **132/11kV 45MVA zone substation** (**Option 2**) in a **staged manner** to supply the West Dapto precincts (prior to 2029). Currently, this option represents a high value (economic benefit) being NPV positive **$78.05 Million** and represents the best option to reduce the risk of unserved energy. This option is estimated to cost **$23.6 Million** and is expected to be spread in two stages over five years (stage 1 from 2027 to 2029 and stage 2 from 2037 to 2038).
- It is recommended that the project value of **$20.1 Million** which is **Stage 1 of Option 2 to** be approved for consideration in the FY25-FY29 regulatory period.
- The CFI will be finalised at the completion of the RIT-D process and a final approval will then be submitted to the confirm if the scope will include a non-network option and if the recommended timing of investment of the preferred network option will change.

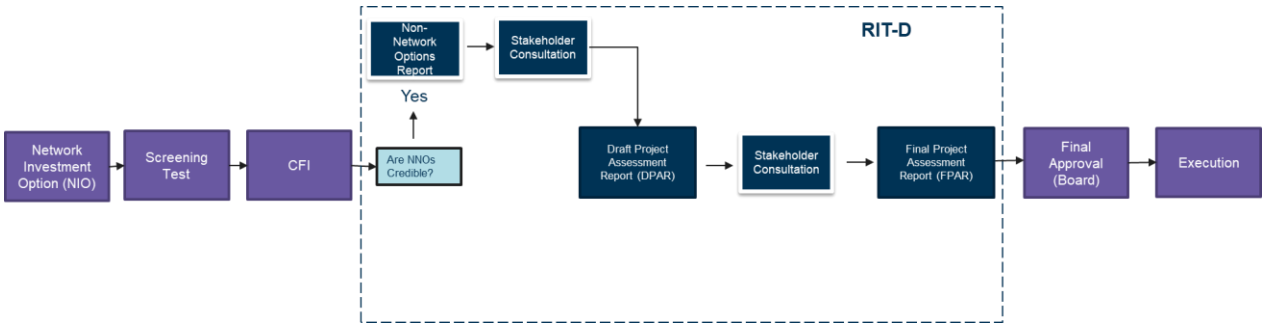

Figure 22 - Endeavour Energy's RIT-D Process

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Appendices

A. Summer Demand Forecasts

The respective expected demand forecasts over the next 10 years and LAR due to the zone substation capacity within and near West Dapto is shown in the below tables. Forecast summer demands 2022-2031 are per published SDF[1] and scenario two SDF[2] being with all future load growth and planned load transfers transferred back to Dapto ZS and Kembla Grange ZS. With scenario two there is no load on the proposed West Dapto ZS forecast and reflects present network configuration.

Table 19 - Unanderra ZS

Unanderra ZS	*2021*	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Published SDF[1] (MVA)	*12.5*	12.4	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.2
Scenario SDF[2] (MVA)	*12.5*	12.4	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.2
Load At Risk (MVA)	-	-	-	-	-	-	-	-	-	-	-

Unanderra ZS has an N-1 capacity of 24MVA. 2021 is actual load.

Table 20 - Dapto ZS

Dapto ZS	*2021*	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Published SDF[1] (MVA)	*33.0*	30.3	31.1	17.9	17.9	17.9	18.0	18.0	18.1	18.1	18.1
Scenario SDF[2] (MVA)	*33.0*	30.9	31.1	31.1	32.0	32.1	32.1	33.1	34.1	35.1	36.1
Load At Risk (MVA)	-	-	-	-	-	-	-	-	-	-	-

Dapto ZS has an N-1 capacity of 45.7MVA due to Tx CB rating. 2021 is actual load.

Table 21 - Kembla Grange ZS

Kembla Grange ZS	*2021*	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Published SDF[1] (MVA)	*5.7*	6.8	8.3	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Scenario SDF[2] (MVA)	*5.7*	7.3	8.8	9.2	10.1	10.9	10.9	10.9	10.9	10.9	10.9
Load At Risk (MVA)	-	-									

Kembla Grange ZS has an N-1 capacity of 10MVA. 2021 is actual load

Table 22 - West Dapto ZS

West Dapto ZS - *Proposed*	*2021*	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Published SDF[1] (MVA)	-	-	-	17.6	18.6	19.4	20.2	21.2	21.2	23.1	24.1
Scenario SDF[2] (MVA)	-	-	-	-	-	-	-	-	-	-	-
Load At Risk (MVA)	-	-	-	-	-	-	-	-	-	-	-

West Dapto ZS proposed ultimate N-1 capacity is 45MVA.

B. Referenced documents and appendices

[1] **Establish West Dapto ZS Capacity Constraint**
Need and/or Opportunity Statement - October 2021
H:\SPB\Filing\Zonesub\West Dapto\CFI_PR620_NPR-000013\NOS\West Dapto ZS Establishment NOS PR620_signed.pdf

[2] **West Lake Illawarra Plan**
Area Plan - August 2022
H:\SPB\Filing\Areastudy\Area Plans\West Lake Illawarra\West Lake Illawarra Plan (Final).pdf

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