RIT-D Draft Project Assessment Report

North Camellia 132kV Switching Station Establishment

29 April 2022

Endeavour Energy

Contents

1. Executive summary

This Draft Project Assessment Report (DPAR) 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 address the network limitations in the Camellia supply area.

The Camellia-Rosehill precinct is an older industrial area currently seeing many major customer connection applications from across different industries and initial plans for high density housing. Based on the NSW government strategy, the precinct will play an important role as an industry and employment hub within the Greater Parramatta and Olympic Peninsular Economic Corridor. The NSW Department of Planning and Environment (DPE) has released the Camellia-Rosehill Place Strategy which aims to revitalise the precinct through significant growth in dense residential dwellings and commercial loads, in particular the planned Camellia Town Centre towards the North-West of the precinct around the Parramatta Light Rail and Sydney Metro West stations. By 2041, it is forecast that the area will have capacity for up to 10,000 dwellings and 14,500 jobs.

The identified need for this investment is 'reliability corrective action' since 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 load requiring connection will exceed the existing network capacity. This is currently anticipated to be 2023/24, based on the connection enquiries received to date.

This report follows publication of a Screening Report which found that a non-network solution is unlikely to form a potential credible option on a standalone basis, or form a significant part of a potential credible option in the Camellia supply area. This is due to the extent of forecast load in the area, the expected cost of non-network options and the capacity of the existing network to facilitate non-network technologies.

Three options were assessed and only two were determined to be credible in addressing the network need. The options assessed are listed below:

- Do Nothing : Base case;
- Option 1 : Establish a new 132kV switching station, and
- Option 2 : Establish a new 120MVA 132/33kV transmission substation

The 'Do Nothing' option is not considered credible as it will result in significant expected unserved energy in the development area which would prevent the connection of new loads.

Option 1 involves the establishment of a new 132kV switching station which will be commissioned in 2023/24. The scope of works includes the installation of two new 132kV circuit breakers at Camellia transmission substation (TS) and two new 132kV feeders from Camellia TS to the new switching station.

Option 2 involves the establishment of a new 120 MVA 132/22kV transmission substation within the development area. The new substation will be commissioned in 2023/24.

The economic assessment of the credible options is shown in Table 1. Option 1 presents the greatest net present value (NPV) of the market benefits considered in the evaluation. The assessment period for calculating the NPV is 20 years. Market benefits are based predominantly on expected unserved energy which is monetised by using Value of Customer Reliability (VCR).

Table 1: Summary of Credible Options

Option	Description	Project capex nominal ($M)	PV of market benefits ($M)	PV of Costs ($M)	NPV ($M)	Rank
1	Establish a new 132kV switching station	13.3	88,134.5	9.4	88,125.2	1
2	Establish a new 120MVA 132/33kV transmission substation	34.0	88,134.5	23.8	88,110.7	2

Considering the capital cost, value of market benefits and NPV, the preferred option is Option 1.

Sensitivity analysis was undertaken across a range of assumptions including forecasted load growth, discount rate, VCR and Capex. In each scenario considered, Option 1 remained the preferred option, indicating there is a very high degree of confidence in this result.

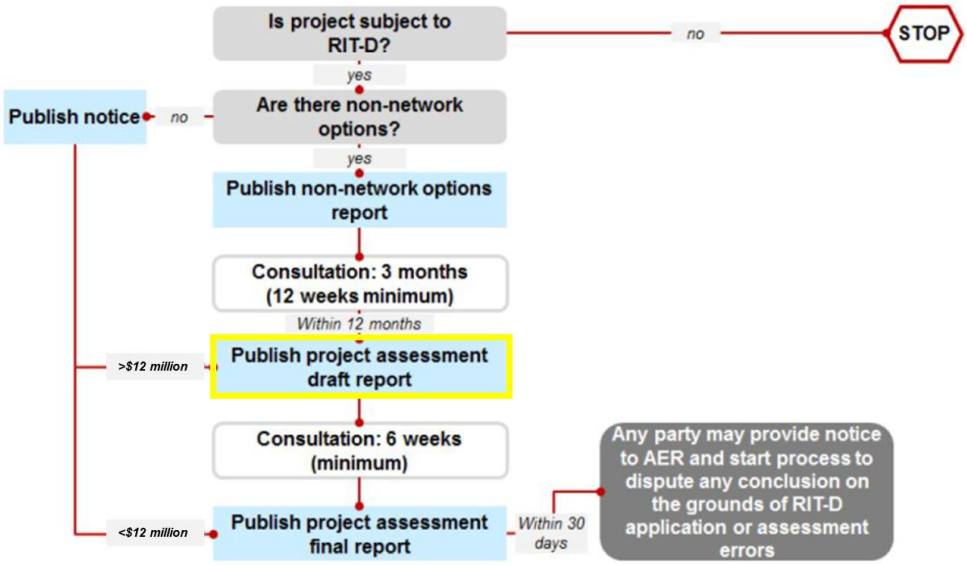
Endeavour Energy seeks written submissions from interested parties in relation to the preferred option outlined in this document. Submissions are due on or before 10 June 2022. All submissions and enquiries should be directed to Endeavour Energy's Head of Portfolio Management Office at consultation@endeavourenergy.com.au.

2. RIT-D Process

This DPAR was prepared by Endeavour Energy in accordance with the requirements of clause 5.17.4 of the National Electricity Rules. This report describes the application of the Regulatory Investment Test – Distribution (RIT-D) for addressing network limitations in the Camellia supply area.

Endeavour Energy adopts a process of exploring feasible methods of supply in assessing the ability to supply development applications. However, for greenfield sites, Endeavour Energy needs to determine the length of time that the existing network will be able to sustain the prevailing precinct development rate. Endeavour Energy needs to balance timely investment with the ramping up of demand as the development progresses. This is required to mitigate the risks of stalling developments due to delayed supply of power to the area which has an adverse impact on the supply of land for housing, as well as commercial and employment needs.

Figure 1 – The RIT-D Process



2.1 Submissions requested to the DPAR

Endeavour Energy seeks written submissions from market participants and interested parties in relation to the preferred option outlined in this document. The consultation period is 6 weeks and submissions are due on or before 10 June 2022. Submissions and any subsequent response by Endeavour Energy may be published.

2.2 Contact details

All submissions and enquiries regarding this DPAR should be directed to Endeavour Energy's Head of Portfolio Management Office at consultation@endeavourenergy.com.au.

3. Context of the Project

The Camellia-Rosehill development precinct is a large industrial area, approximately 320 hectares in size and located along the Parramatta River, 2 kilometres east of the Parramatta CBD. It is bounded by the existing established locations of Rydalmere, Rosehill, Clyde and Silverwater. Based on the NSW government strategy, the precinct will play an important role as an industry and employment hub within the Greater Parramatta and Olympic Peninsular Economic Corridor. By 2041, it is forecast that the area will have capacity for up to 10,000 dwellings and 14,500 jobs.

Currently, Camellia precinct is an older industrial area however it is seeing many major customer connection applications from across different industries and initial plans for high density housing. Nearby customer connections include new major data centres, Sydney Metro West, Ausgrid's Lidcombe and Auburn ZS as well as the future planned high-density Camellia Town Centre.

In 2020, a major customer submitted a connection application to Endeavour Energy for 132kV supply to two separate data centres. The ultimate proposed load stated in the application is 90 MVA. Section 5.2.3 of the NER obliges Endeavour Energy to enable connection of customers to the distribution network. Based on the load requirements that the major customer has provided combined with the exiting load from Camellia TS, there will be a load at risk of 20.7 MVA in 2022/2023 and increasing further to 91.9 MVA by 2031.

The existing network has insufficient capacity to service the major customer and the additional load from future development in the area. Therefore, investment is required as a reliability corrective action to meet expected future load and satisfy our connection obligations under the NER.

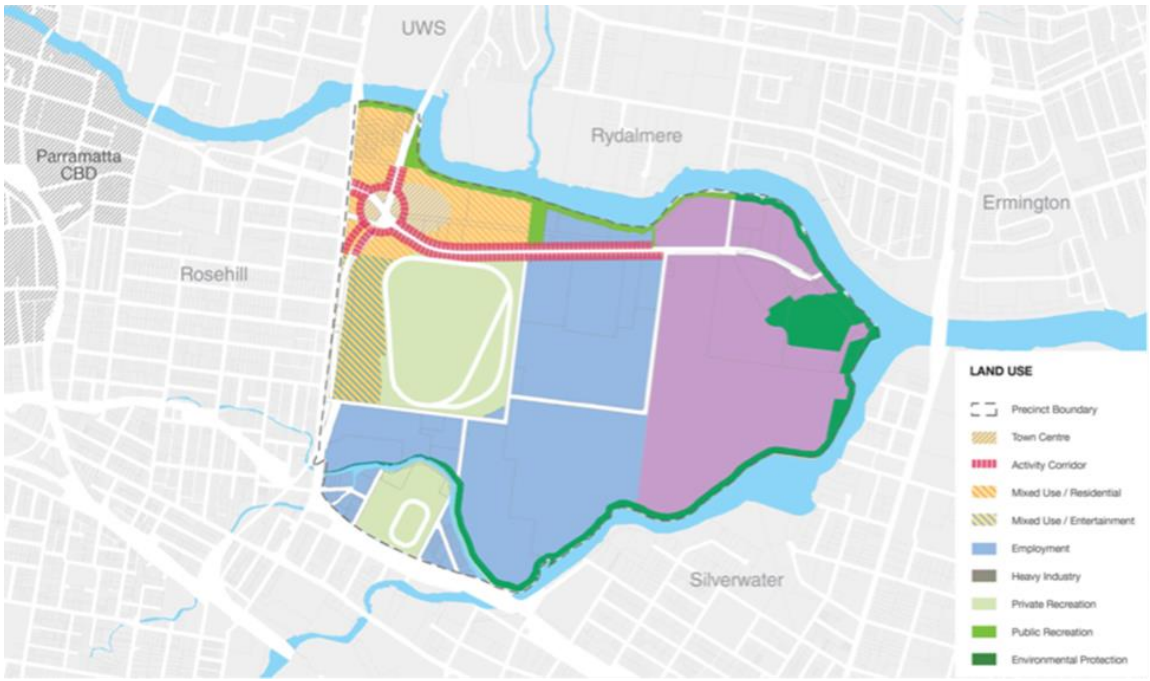
While the total ultimate demand of the area will develop over the next 20 years, there is the requirement for a new 132kV switching station that will supply the two data centre connection applications and enable the support for further growth in the area. We are therefore initiating a RIT-D for this project.

Figure 2 – Artist impression of future potential Camelia-Rosehill Precinct

4. Network Need

Camellia precinct is an older industrial area and is seeing many major customer connection applications from across different industries. Figure 3 shows the Land Use Zoning for the Camellia precinct.

Figure 3 – Overview of future zoning as presented in the Draft Camellia-Rosehill Place Strategy



In 2020, a major customer submitted an application for 132kV supply to two separate data centre customers within its site, with an ultimate proposed load of 90MVA. The major customer is temporarily being supplied by three twin cabled feeders from Rosehill ZS with a firm capacity of 20MVA. The customer has provided their forecast load shown in Table 2 and will have significant load at risk from 2024 if they do not switch to 132kV supply.

Furthermore, Camellia TS will need to supply a number of major customer connections:

- Sydney Metro West: requires 50MVA at 33kV supply to support major transport infrastructure
- Ausgrid's Lidcombe and Auburn ZS: requires 50MVA supply at 33kV
- Silverwater data centre: despite being in Ausgrid's network area, an enquiry was received for direct connection to Endeavour Energy's 33kV network for supply of 30MW. This is not yet confirmed but is a potential future load.
- Camellia Town Centre is a future planned high-density residential development up to 10,000 apartments near the light rail stop.

Currently, Camellia TS has two 120MVA transformers for a firm capacity of 120MVA. The forecast load for Camellia TS is based on the recent Summer Demand Forecast and as shown in Table 3, load at risk will occur from 2025.

Table 4 shows the total expected load at risk considering the combined major customer load and existing load supplied by Camellia TS. The combined load forecast and load at risk is shown graphically in Figure 4.

Further details on the network need and the existing network is provided in the Appendix.

Table 2 – Major Customer Load Forecast

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Equinix Demand (MVA)	14.3	28.7	41.6	41.6	53.1	64.6	76.1	79.2	79.2	79.2
Load At Risk (MVA)	-	8.7	21.6	21.6	33.1	44.6	56.1	59.2	59.2	59.2

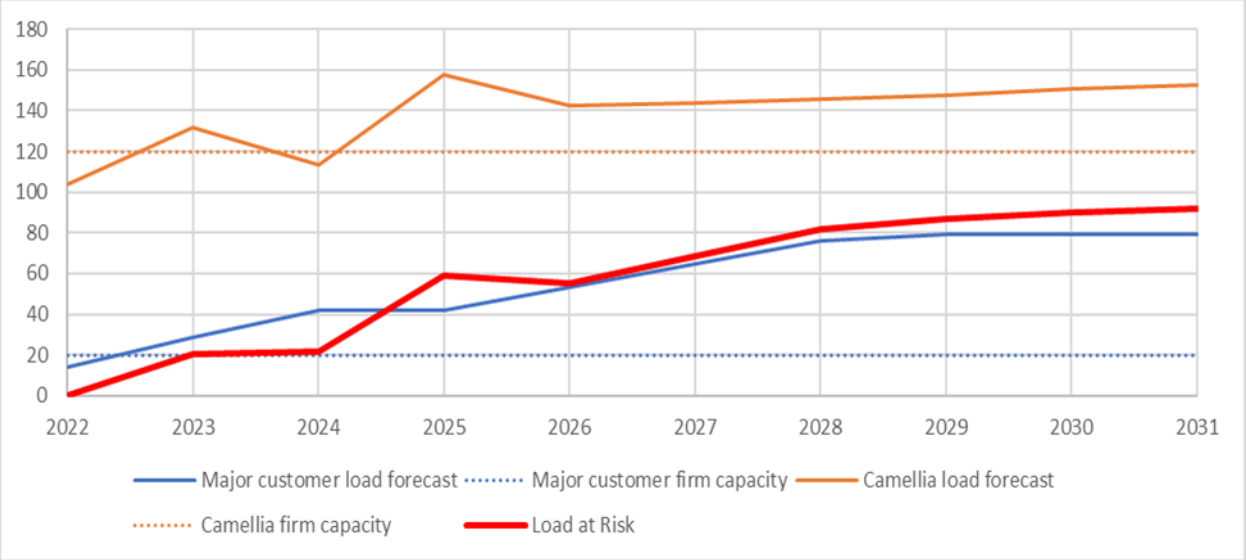
Table 3 – Camellia TS Load Forecast

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Camellia TS Demand 50% POE (MVA)	104.0	132.0	113.5	157.7	142.3	144.0	145.7	147.8	150.6	152.7
Load At Risk (MVA)	-	12.0	-	37.7	22.3	24	25.7	27.8	30.6	32.7

Table 4 – Total Load At Risk

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total Demand (MVA)	118.3	160.7	155.1	199.3	195.4	208.6	221.8	227	229.8	231.9
Load At Risk (MVA)	-	20.7	21.6	59.3	55.4	68.6	81.8	87	89.8	91.9

Figure 4 - Combined Load Forecast and Load at Risk for Camellia TS and major customer



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

We have initiated a Regulatory Investment Test for Distribution (RIT-D) to investigate, and consult on, how to most efficiently facilitate the connection of the new major loads in the Camellia region.

Endeavour Energy is required to connect customers under section 5.2.3(d) of the NER, which state that "A Network Service Provider must:

> (1) Review and process applications to connect or modify a connection which are submitted to it and must enter into a connection agreement…
>
> (6) Permit and participate in commissioning of facilities and equipment which are to be connected to its network in accordance with rule 5.8;"

We therefore consider the identified need for this investment to be a 'reliability corrective action' under

the RIT-D since investment is required to comply with the above NER obligations.

The timing of the identified need for this RIT-D, and so the required timing for credible options to address the need, is determined by when the expected load requiring connection will exceed the existing network capacity. This is currently anticipated to be 2023/24, based on the connection enquiries received to date.

The transmission network augmentation to support the growth in the Camelia-Rosehill precinct has been brought forward due to recent connection applications and was therefore not included as part of our regulatory proposal to the Australian Energy Regulator (AER) for the current regulatory control period. However, this network need is included in our most recent Distribution Annual Planning Report (DAPR).

Endeavour notes that the proposed switching station will be a shared network asset which will become part of Endeavour's Regulatory Asset Base. As initially these prospective customers are expected to utilise a high majority of the asset, specific tariff arrangements will be established to recover the majority of the cost of the augmentation from the beneficiaries (i.e. the new customers). These customers will be charged a cost reflective network price, determined specifically from this network augmentation investment. This will ensure no cross subsidy from existing customers, but can be adjusted such that as a larger number of customers benefit from the asset, the costs can be shared accordingly.

A non-network screening notice has been published in accordance with NER clause 5.17.4(c), and found that there is unlikely to be a non-network option that could form a potential credible option on a standalone basis, or that could form a significant part of a potential credible option. This DPAR represents the next formal stage of the RIT-D process and provides information and outcomes from economic assessment of network-based options for the Camellia-Rosehill precinct.

5. Preferred option

The option that presents the greatest net market benefit and thus considered as the preferred option, is Option 1. This option is the establishment a new 132kV switching station on Grand Avenue. Details on the preferred option is provided in Section 6.2 including the scope of works, costs and timing.

The preferred option has the highest net present value (NPV) of the two credible network options. Despite the two options ultimately having similar value of market benefits, Option 1 has a lower initial cost, thus resulting in a higher net economic benefit.

There are major challenges associated with Option 2 including scarcity of available land suitable for the size of a transmission substation and difficulties associated with connecting a new transmission substation into the existing 132kV oil-filled cable network. Thus, presenting a higher delivery risk.

The total cost of the preferred option is estimated to be $13.3 million including a contingency amount of approximately 10% of the project cost to cover unforeseen costs which may arise during construction. The construction expenditure will occur from 2022/23 to 2023/24, with commissioning in 2023/24.

6. Credible options considered

There were several options considered in the evaluation, of which three network-based options were determined to be credible. Non-network options were considered as part the screening report but were not considered to be credible due to the forecast load requirements. The credible options are listed below, and details are further discussed in this section.

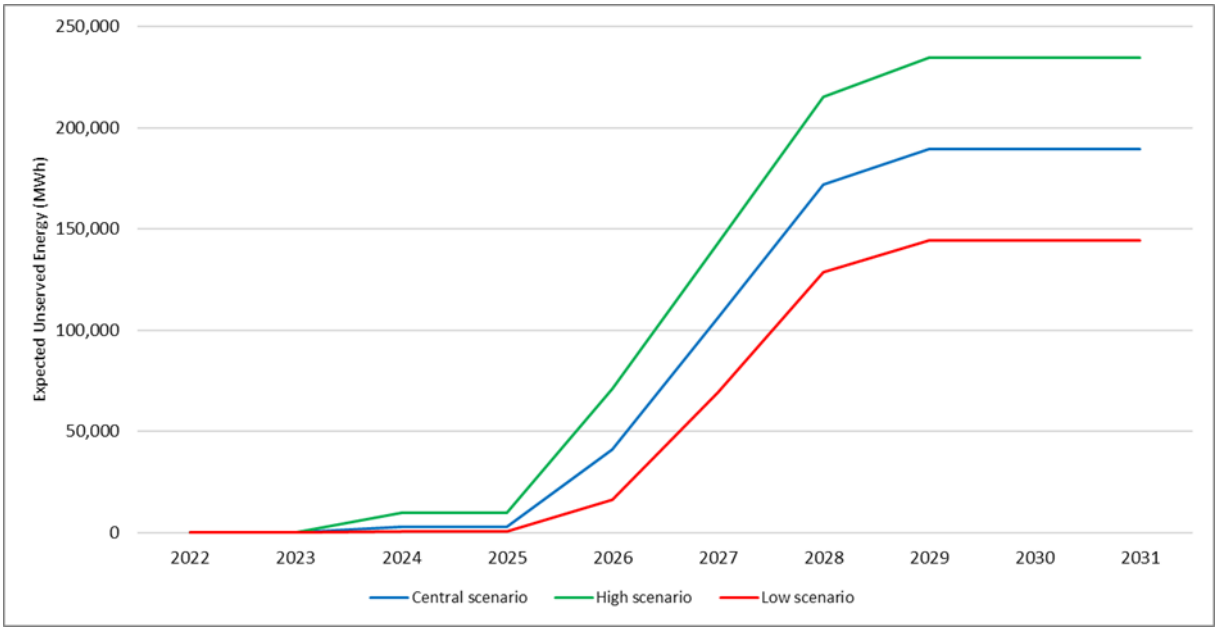
- Do Nothing : Base case;
- Option 1 : Establish a new 132kV switching station, and
- Option 2 : Establish a new 120MVA 132/33kV transmission substation

6.1 Base Case ('Do Nothing' option)

A baseline risk position has been established based on a 'Do Nothing' option. If network augmentation is not undertaken, there will be significant unserved energy in the area from 2023 onwards.

Figure 5 below presents the estimated unserved energy if no action is taken under each of the three demand scenarios. We have only presented the next ten years to enable the differences to be clearly seen in the initial years, but we note that the unserved energy forecasts are expected to increase significantly after 2031.

Figure 5 – Expected unserved energy under the base case scenario (ie, with no investment)



6.2 Option 1 – Establish a new 132kV switching station

This option is to establish a new 132kV switching station on Grand Avenue. The scope of works includes the installation of two new 132kV GIS circuit breakers at Camellia transmission substation and establishment of two new 132kV feeders with 180 MVA rating from Camellia TS to the new switching station on Grand Avenue.

The estimated route is 1 kilometre and is to be underground for its entire route, along Colquhoun St and Grand Avenue. A geographic view of the transmission route is shown in Figure 8.

The switching station will provide a connection point for two data centre customers with each customer utilising one feeder bay. Additionally, provision will be made for two spare feeder bays in the switching station to facilitate a most likely scenario of connecting a new zone substation to service future customers in the precinct, including Camellia Town Centre comprising of approximately 10,000 apartments. Thus, the switching station has been designed with a total of 4x feeder bays. Should the need arise to build a new 132/11kV transmission substation in the future, it will be subject to a separate RIT-D.

It is proposed that the new 132kV switching station be commissioned in 2023/24 with a total project cost (including all associated works) of $13.3M. A contingency amount (approximately 10% of the project cost) has been built into the cost estimates to cover unforeseen costs related to site conditions which may arise during construction. For this option, the construction expenditure will occur from FY23 to FY24.

Figure 6 – Simplified single line diagram for Option 1

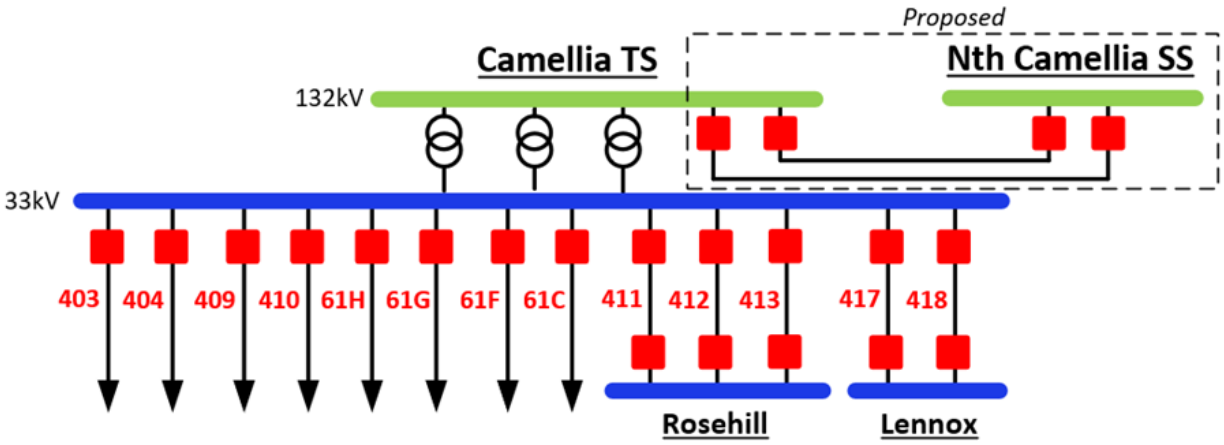


Figure 7 – Simplified transmission single line diagram for Option 1

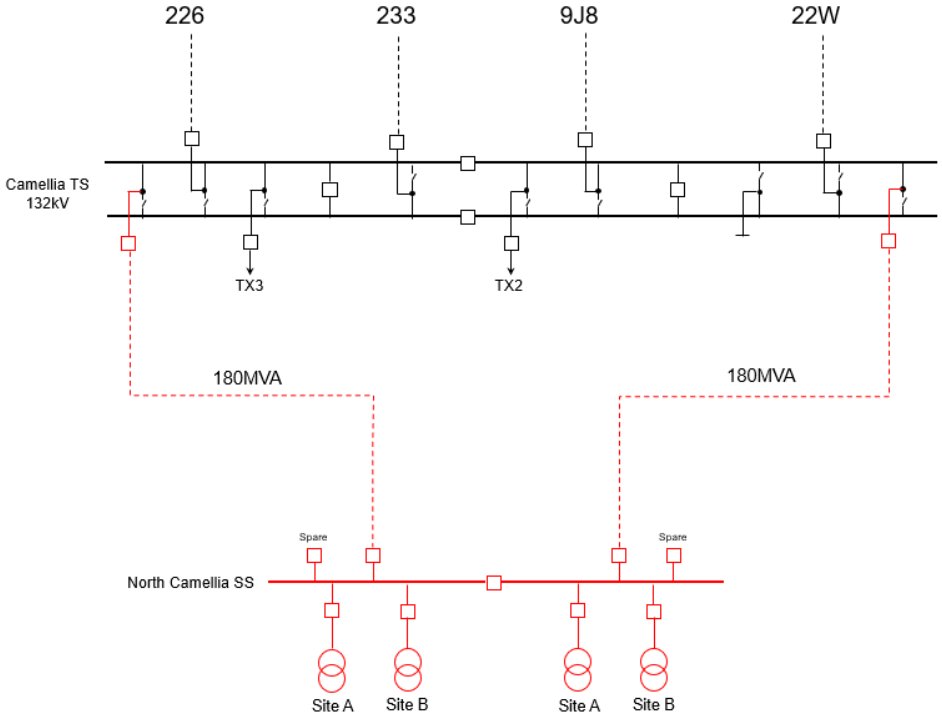
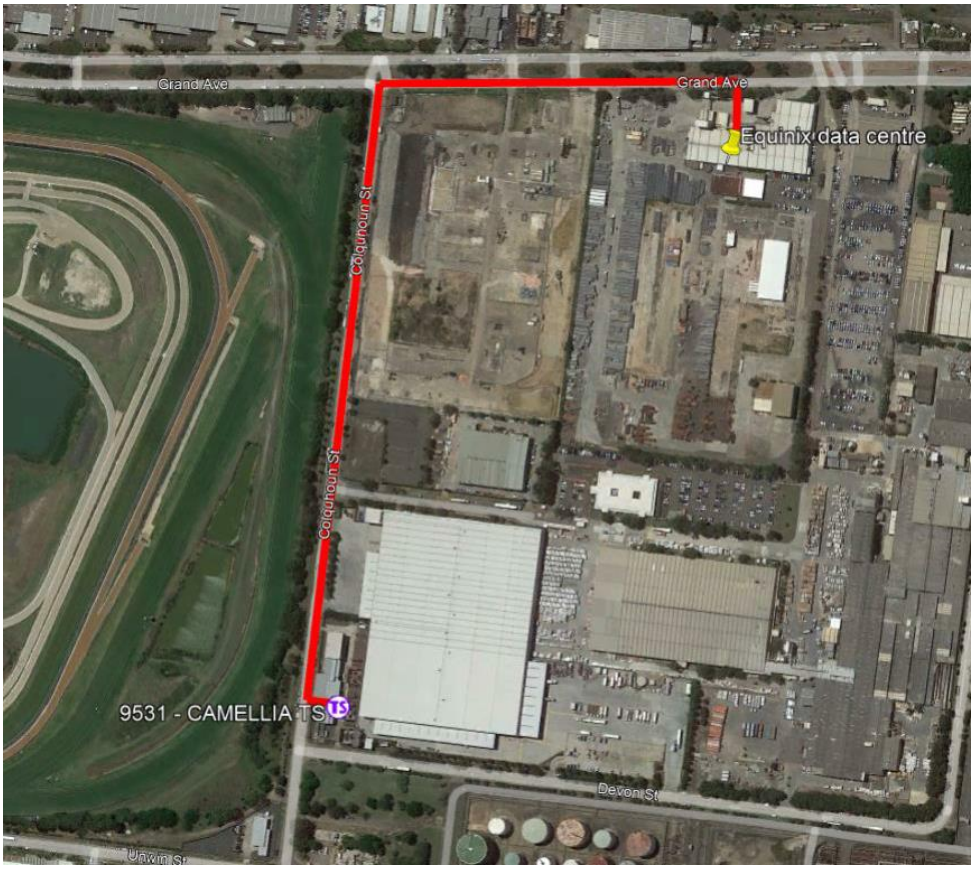


Figure 8 – Proposed feeder route from Camellia TS to the new switching station



6.3 Option 2 – Establish a new 120MVA 132/33kV transmission substation

This option proposes establishment of a new transmission substation with 120MVA (non-firm) capacity within the development area. The scope of works for this option includes land acquisition for the new transmission substation, establishment of the new transmission substation and two 132kV feeders from the new transmission substation to Grand Avenue.

The new transmission substation will be commissioned by FY24. The estimated cost of this option is estimated to be $34M.

There are major challenges associated with this option including scarcity of available land suitable for the size of a transmission substation and difficulties associated with connecting a new transmission substation into the existing 132kV oil-filled cable network.

Figure 9 – Simplified single line diagram for Option 2

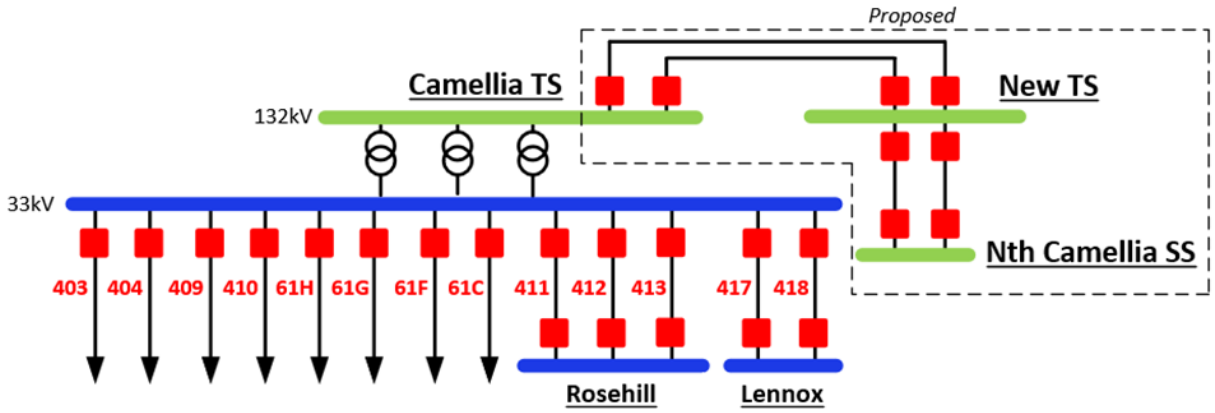
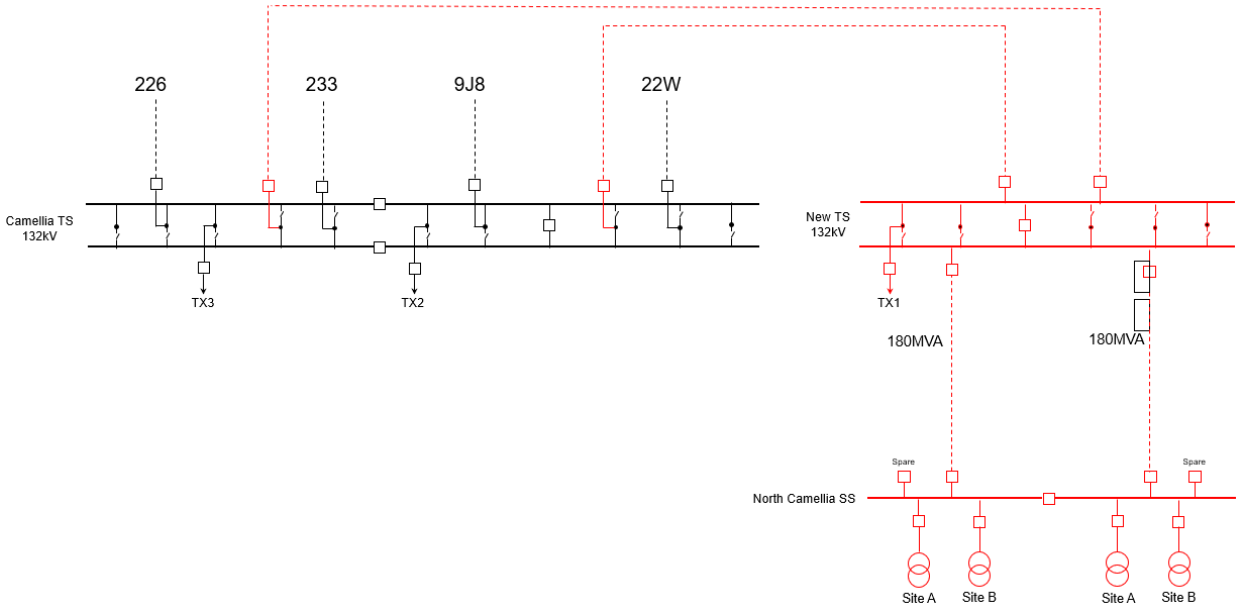


Figure 10 – Simplified transmission single line diagram for Option 2



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

There are no other network options that have been considered but not progressed.

7. Modelling & Assumptions

The RIT-D states that the preferred option is the credible option that maximises the present value of the net economic benefit to all those who produce, consume and transport electricity in the NEM.

The market benefit of a credible option is calculated by comparing the state of the system with the credible option in place with the state of the system in the base case. The emphasis in this situation is differences in the risks of involuntary load shedding.

The market benefits that can be considered under the NER are:

- Changes in voluntary load curtailment (considered a negative benefit);
- Changes in involuntary load shedding and customer interruptions caused by network outages;
- Changes in costs to other parties (timing of new plant, capital costs, operating and maintenance costs);
- Differences in timing of expenditure;
- Changes in load transfer capacity and the capacity of embedded generators to take up load;
- Option value;
- Changes in electrical energy losses; and
- Any other class of market benefit determined to be relevant by the AER.

Endeavour Energy is currently seeking further engagement with the AER on matters to support new technology solutions under the RIT-D framework. Particularly, we are seeking advice to consider new classes of market benefits and guidance on the method to quantify these benefits.

The time period chosen for the NPV analysis was 20 years.

7.1.1 Energy at risk and expected unserved energy

A core justification for this project is based on load at risk and energy not able to be supplied to customers waiting to connect. This is different to a situation where already connected customers risk losing supply. The same VCR value has been applied as a default position to the energy at risk values established from the proposals received. For a greenfield development such as this, where the forecast demand rapidly exceeds the available capacity in the network, the VCR benefits to be captured from implementing a project to address network constraints can quickly rise to extremely large amounts.

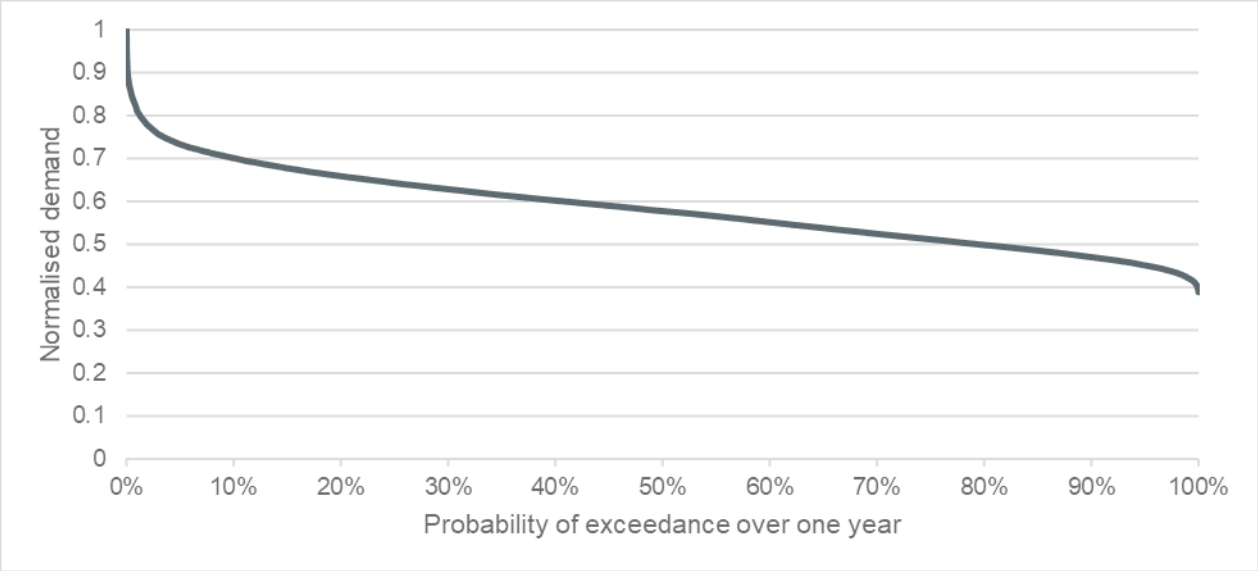
The Energy at Risk (EAR) has been estimated from the annual peak demand forecasts and load duration curves.

7.1.2 Load profile characteristics

Since the forecast loads are yet to connect, we have assessed the identified need using the demand profile of an alternate data centre customer which we believe will be representative of the North Camellia data centres.

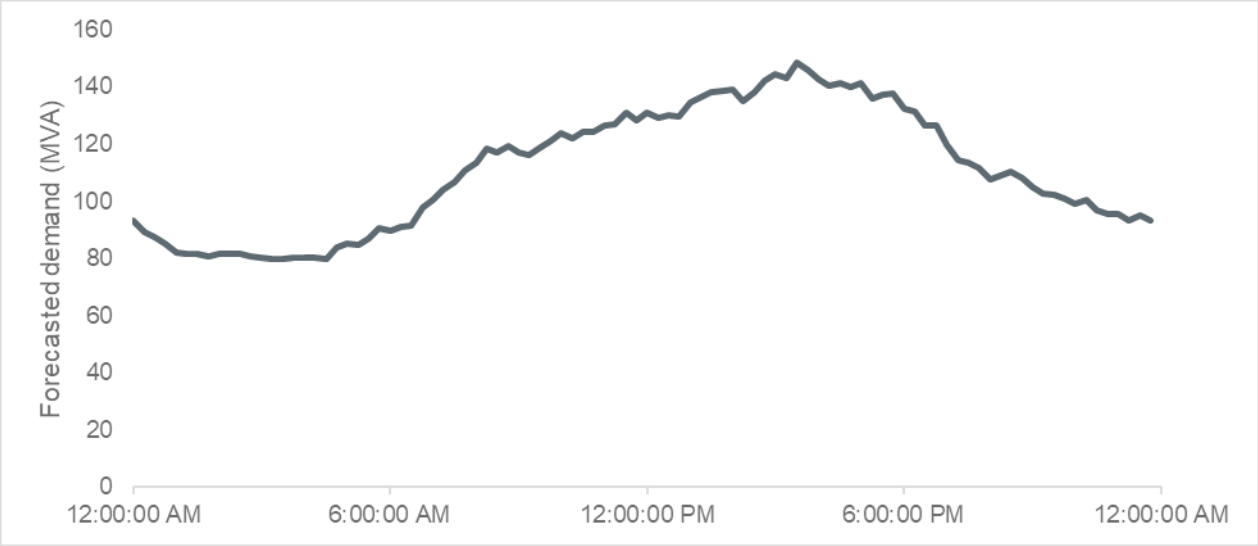
The representative data centre customer receives supply at 132kV similar to the North Camellia data centres. The demand profile over a full year, from 1-Oct-2020 to 30-Sep-2021, has been extracted and Figure 11 presents the normalised Load Duration Curve (LDC).

Figure 11 – Normalised LDC assumed for the major customer



Similarly, Figure 12 presents the peak load profile for summer based on the representative customer demand profile.

Figure 12 – Peak summer day profile for the major customer



7.1.3 Plant failure rates

As this project involves, as the base case, utilisation of existing network capacity to facilitate new customer connections, the most significant risk is the failure of the feeders supplying the area. There is limited backup capacity in the area to service the existing loads, and any further connections will be subject to the risk of extended outages in the event of failure of the feeders supplying the area. However, this is not a dominant issue in expected unserved energy as the underlying problem is the lack of capacity that is required to connect new loads to the network. The distribution feeder failure rate is shown in Table 5.

Table 5 – Distribution feeder failure rates

Major Plant Item: Distribution Feeder	
Distribution feeder failure rate	7 failures per 100 km of line per annum

7.1.4 Plant Ratings

Endeavour Energy's standard ratings have been employed for the purposes of this evaluation.

7.1.5 Value of customer reliability

The value of unserved energy is calculated using the Value of Customer Reliability (VCR). This represents an estimate of the value electricity consumers place on a reliable electricity supply. Endeavour Energy used a VCR of $46.18 per kWh in the evaluation which is based on the 2021 VCR values provided by the AER, weighted in accordance with the composition of the commercial, industrial and residential load within the constituent connections.

7.2 Classes of market benefit considered

The classes of market benefits that are considered material and have been quantified in this RIT-D assessment are:

- Changes in involuntary load shedding and customer interruptions caused by network outages; and
- Differences in the timing of expenditure

7.2.1 Changes in involuntary load shedding

Increasing the supply capability in the Camellia area increases the supply available to meet the growth in demand within the Camellia-Rosehill development area. This will provide greater reliability for this region by reducing potential supply interruptions and consequent risk of involuntary load shedding. The present rules only allow for consideration of changes in involuntary load shedding for connected customers. The establishment of supply in a development precinct where potential customers would otherwise have to go without supply is therefore captured using changes in involuntary load shedding.

7.2.2 Differences in timing of expenditure

The difference in the timing of expenditure for the options considered is shown in Table 6 below. Option 2 has a larger upfront component over the build period, relative to total costs.

Table 6 - Comparison of Option Capital Cost Schedules

Option	Description	2023 ($M)	2024 ($M)
1	Establish a new 132kV switching station	6.2	7.1
2	Establish a new 120MVA 132/33kV transmission substation	30.0	4.0

7.3 Classes of market benefit not considered to be material

The classes of market benefits that are not considered material are listed below:

- Changes in voluntary load curtailment
- Option value
- Changes in load transfer capacity.
- Changes in costs to other parties
- Changes in electrical losses.

7.3.1 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 could lead to a reduction in involuntary load shedding, that is, increase in voluntary load reduction.

Endeavour Energy has not estimated any market benefits associated with changes in voluntary load curtailment as there is insufficient capacity in the existing customer base (predominantly residential) to deliver sufficient voluntary demand reduction.

7.3.2 Option Value

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

Due to the committed connections there is little uncertainty about the need and use of the assets and each option is considered equivalent in that respect. Option Value has therefore not been considered in the economic analysis.

7.3.3 Changes in costs to other parties

In this instance, Endeavour Energy has not identified any changes in costs to other parties from developing the credible options identified in this document.

7.3.4 Changes in electrical losses

Endeavour Energy recognises that there would be small changes in the loss profile for customers serviced out via the options considered but given they are all 132kV feeders that these are negligibly small in each case. Changes in electrical losses have not been modelled.

7.4 Scenarios and sensitivities

The capital and operating cost assumptions for each credible option are summarised in Table 7.

Table 7 – Base Case Capital and Operating Cost Assumptions

Variables	Values
Maximum demand forecasts	Base (expected) growth scenario presented in Section 4
Capital costs	Estimates provided in Section 1
O&M costs	0.4% of capital spend unless otherwise stated.
Value of customer reliability	Base estimates provided in Section 7.1.5

7.4.1 Demand forecasts

The maximum demand forecasts have been derived from a projection of the connection and growth of new loads. Notionally, this is on an approximate 50% probability of exceedance basis. For sensitivity analysis, the base forecast has been varied by ± 10% and included variable customer growth rate assumptions, as shown in the earlier table.

7.4.2 Capital costs

Capital cost estimates have been based on standard planning cost estimates of the detailed scope of work including a high-level scope of work. For sensitivity analysis, these estimates have been varied by ± 25%.

7.4.3 Value of customer reliability

This analysis adopts the value of customer reliability values published by AER to calculate the expected unserved energy. The ratio of load types has been estimated and used to calculate the weighted aggregate VCR value and then applied to the energy at risk. Based on the estimated load composition of the subject area, a volume weighted VCR value of $46.18 per kWh has been derived and used in the RIT-D analysis. A variation of ±30% has been used for sensitivity testing in accordance with AER guidelines.

7.4.4 Discount Rate

The discount rate used in the financial analysis will impact the estimated present value of net market benefits and may affect the ranking of credible options. Endeavour Energy has employed a real, pre-tax discount rate based on the latest AER determination as the low case. For sensitivity analysis, a symmetrical application was used to determine the high case.

7.4.5 Summary of sensitivities

Table 8 below describes the variations in input parameters used for the purpose of defining various scenarios.

Table 8 – Variables for Sensitivity Testing

Parameter/ scenario	Central scenario	High benefits	Low benefits
Capex	Central estimates	-25%	+25%
Demand	Central demand forecast	High demand forecast	Low demand forecast
VCR	Load-weighted AER VCR	+30%	-30%
Discount rate	3.26%	2.22%	4.30%

8. Results of analysis

This section describes the results of the NPV modelling for each of the credible options considered in this RIT-D assessment.

8.1 Central case results

The economic analysis of the options under the Central case scenario is shown in Table 9. This shows Option 1 has the highest NPV of all the credible options, thus considered the preferred option.

Table 9 – Central case results

Option	Description	Project capex nominal ($M)	PV of market benefits ($M)	PV of Costs ($M)	NPV ($M)	Rank
1	Establish a new 132kV switching station	13.3	88,134.5	9.4	88,125.2	1
2	Establish a new 120MVA 132/33kV transmission substation	34.0	88,134.5	23.8	88,110.7	2

8.2 Sensitivity and scenario assessment

Endeavour Energy has carried out sensitivity analysis in the RIT-D assessment based on variations of key parameters. Specifically, Endeavour Energy has investigated changes in relation to:

- Forecast demand, and hence quantity of involuntary load shedding
- Investment costs
- Discount Rate

Detailed in Figure 13 are the scenarios used in sensitivity testing and their relative weightings.

Figure 13 – Summary of Scenarios used in sensitivity testing

Scenarios	
Scenario selection	
Scenario	Scenario 1

Scenario weighting			
	Scenario 1	Scenario 2	Scenario 3
Weighting	0.50	0.25	0.25

General inputs							
General	Unit	Value	Selection	Scenario 1	Scenario 2	Scenario 3	User defined
Commercial discount rate	Percent	3.26%	Central	Central	High	Low	Central

Cost inputs							
Cost	Unit	Value	Selection	Scenario 1	Scenario 2	Scenario 3	User defined
Capital cost	Percent	100%	Central	Central	High	Low	Central
Planned routine maintenance and refurbishment	Percent	100%	Central	Central	Low	High	Central
Unplanned corrective maintenance	Percent	100%	Central	Central	Low	High	Central
Decommissioning costs	Percent	100%	Central	Central	Central	Central	Central
Non-network option provider costs	Percent	100%	Central	Central	High	Low	Central

Benefit inputs							
Market benefits	Unit	Value	Selection	Scenario 1	Scenario 2	Scenario 3	User defined
Involuntary load shedding - VCR	$/MWh	46,180	Central	Central	Low	High	Central
Involuntary load shedding - MWh	Scenario	NA	Central	Central	Low	High	Central
Difference in timing of unrelated expenditure	Scenario	NA	Central	Central	Low	High	Central
Difference in timing of unrelated expenditure	Percent	100%	Central	Central	Low	High	Central
Voluntary load curtailment - VCR	$/MWh	46,180	Central	Central	Low	High	Central
Voluntary load curtailment - MWh	Scenario	NA	Central	Central	Low	High	Central
Costs for non RIT-D proponent parties	Percent	100%	Central	Central	Central	Central	Central
Electricity energy losses	$/MWh	100	Central	Central	Central	Central	Central
Change in load transfer capacity and the capacity for embedded gene	Percent	100%	Central	Central	Central	Central	Central
Other classes of market benefits	Percent	100%	Central	Central	Central	Central	Central

Detailed in

Table 10 are the results of the sensitivity analysis.

Table 10 Sensitivity and Scenario Assessment

Option	Description	Scenario 1 Rank	Scenario 2 Rank	Scenario 3 Rank	Weighted Scenario Rank
1	Establish a new 132kV switching station	1	1	1	1
2	Establish a new 120MVA 132/33kV transmission substation	2	2	2	2

The results show that Option 1 maximises the net market benefit in the base case as well as the weighted scenarios considered for sensitivity analysis.

8.3 Economic timing

The economic timing of the proposed preferred option may be taken to be the point where network capacity is insufficient to connect new customers.

The Camellia precinct requires connection capacity to be made available as soon as the existing available capacity in the network is exhausted. Based on current demand forecast, this is expected to occur in 2023/24. Consequently, this date is seen as the economic timing for this project.

9. Conclusion

The Camellia-Rosehill precinct is an older industrial area currently seeing many major customer connection applications from across different industries and initial plans for high density housing. Based on the NSW government strategy, the precinct will play an important role as an industry and employment hub within the Greater Parramatta and Olympic Peninsular Economic Corridor. The NSW Department of Planning and Environment (DPE) has released the Camellia-Rosehill Place Strategy which aims to revitalise the precinct through significant growth in dense residential dwellings and commercial loads, in particular the planned Camellia Town Centre towards the North-West of the precinct around the Parramatta Light Rail and Sydney Metro West stations. By 2041, it is forecast that the area will have capacity for up to 10,000 dwellings and 14,500 jobs.

High-level estimates based on this Strategy have shown that both Camellia TS and Rosehill ZS will have insufficient capacity to maintain security of supply to the Camellia-Rosehill precinct from 2023. Furthermore, a major customer submitted a connection application to Endeavour Energy for 132kV supply to two separate data centres. The ultimate proposed load stated in the application is 90 MVA. Based on the load requirements that the major customer has provided combined with the exiting load served by Camellia TS, there will be a load at risk of 20.7 MVA in 2022/2023 and increasing further to 91.9 MVA by 2031.

As outlined in the Screening Report, it is not considered feasible that a non-network solution will form a potential credible option on a standalone basis, or form a significant part of a potential credible option for the Camellia supply area.

This DPAR has identified two credible network-based options that can technically meet the required network demand. Option 1 involves establishing a new 132kV switching station and Option 2 involves the establishment of a new 120 MVA 132/33kV transmission substation. An economic evaluation was conducted on the two credible options and the option that presented the greatest net market benefit and

thus considered as the preferred option is Option 1. This option proposes to establish a new 132kV switching station on Grand Avenue. The scope of works includes the installation of two new 132kV circuit breakers at Camellia TS and establishment of two new 132kV feeders from Camellia TS to the new switching station.

The proposed switching station will provide a connection point for two data centre customers. Additionally, provision will be made for two spare feeder bays in the switching station to facilitate a most likely scenario of connecting a new zone substation to service the future customers in the precinct. Should the need arise to build a new 132/11kV transmission substation in the future, it will be subject to a separate RIT-D.

The total cost of the preferred option is estimated to be $13.3 million including a contingency amount of approximately 10% of the project cost to cover unforeseen costs which may arise during construction. The construction expenditure will occur from 2022/23 to 2023/24, with commissioning in 2023/24.

Endeavour notes that the new switching station will be a shared network asset which will become part of Endeavour's Regulatory Asset Base. As initially the connecting customers are expected to utilise a high majority of the asset, specific tariff arrangements will be established to recover the majority of the cost of the augmentation from the beneficiaries (i.e. the new customers). These customers will be charged a cost reflective network price, determined specifically from this network augmentation investment. This will ensure no cross subsidy from existing customers, but can be adjusted such that as a larger number of customers benefit from the asset, the costs can be shared accordingly.

10. Appendix – Further Details on Network need

10.1 Existing Network Overview

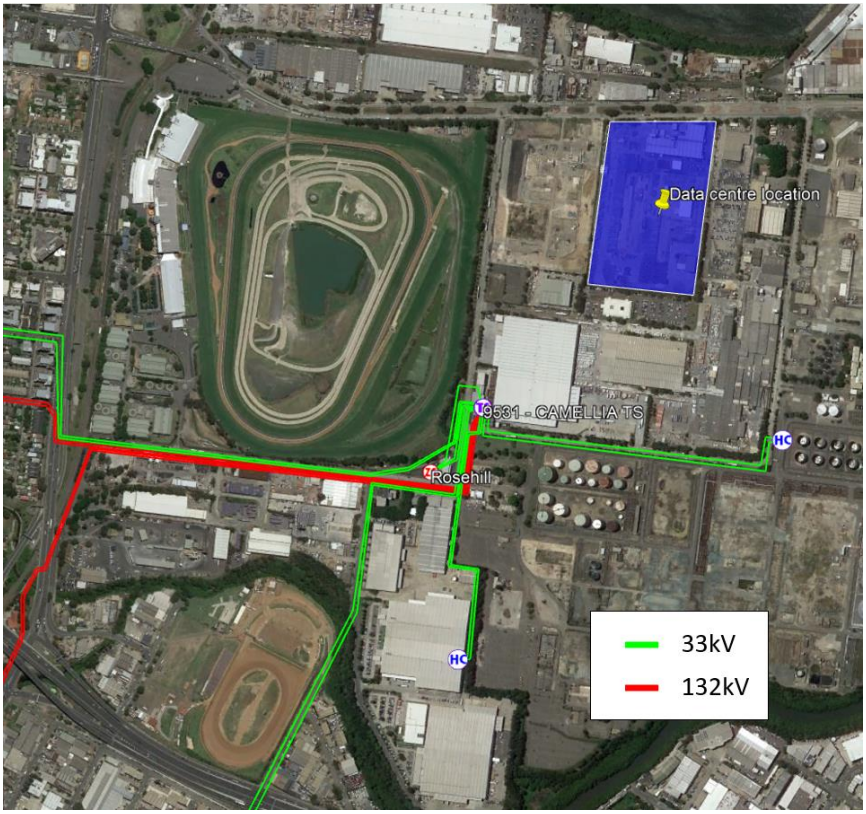
Within the Camellia-Rosehill precinct is Camellia 132kV/33kV TS, Rosehill 33kV/11kV ZS, an underground sub-transmission network at voltages of 132kV and 33kV, and an 11kV distribution network. The location of the sub-transmission assets is shown in Figure 14. It can be seen that the sub-transmission network is primarily towards the south of the precinct and there are no existing sub-transmission assets towards the north, where the North Camellia data centres and future development are located. It is also noted that all four of the 132kV cables are oil-filled cables that will eventually require replacement based on end-of-life or capacity constraints.

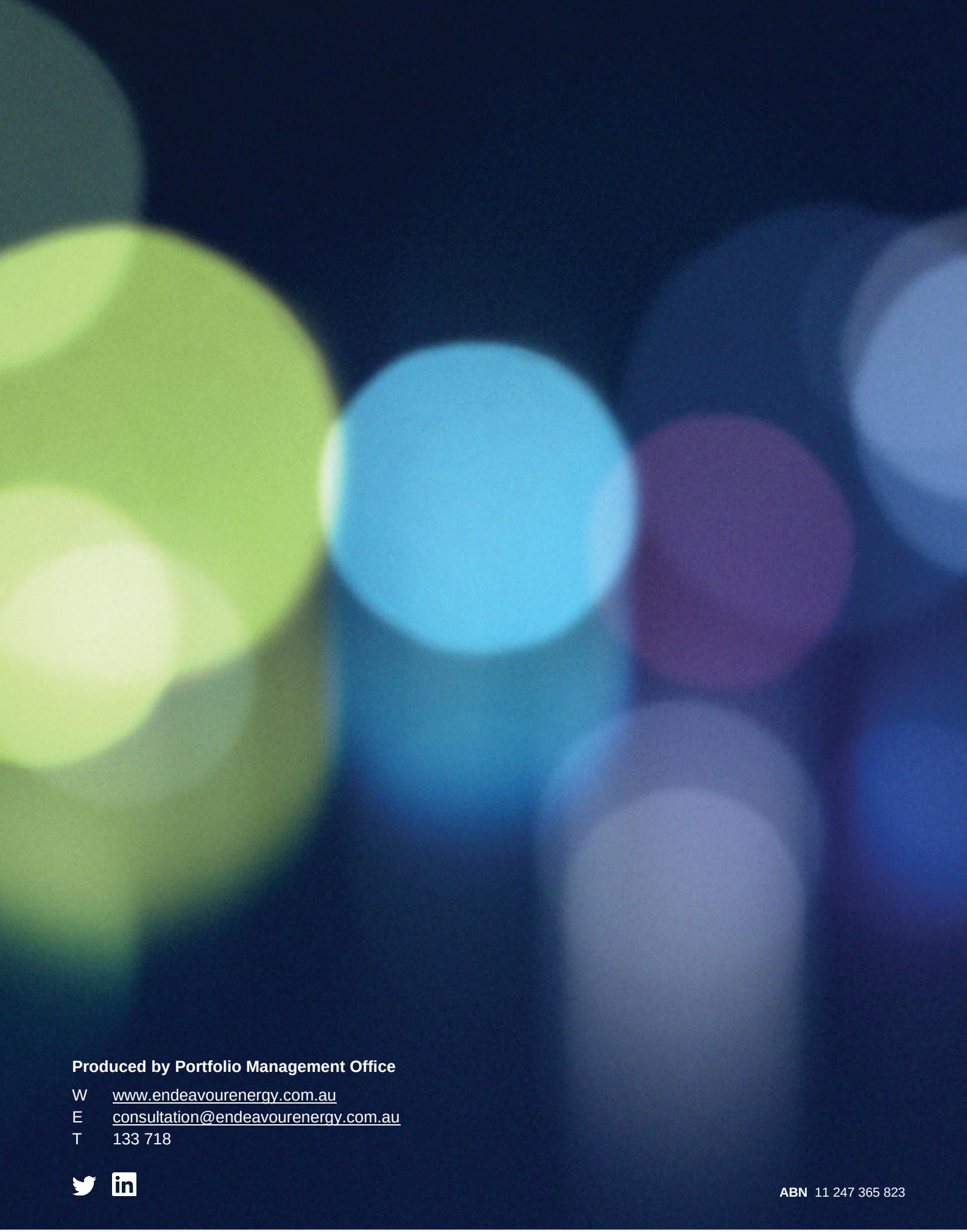
The existing area is largely non-residential and primarily supplied by the 11kV network and only two high voltage customers with 33kV supply. Additionally, Sydney Metro West will have its stabling yard within the Camellia-Rosehill precinct to be supplied at 33kV.

The NSW Department of Planning and Environment has released the Camellia-Rosehill Place Strategy which aims to revitalise the precinct through significant growth in dense residential dwellings and commercial loads, in particular the planned Camellia Town Centre towards the North-West of the precinct around the Parramatta Light Rail and Sydney Metro West stations. High-level estimates based on this growth strategy have shown that both Camellia TS and Rosehill ZS will have insufficient capacity to maintain security of supply to the Camellia-Rosehill precinct from 2023.

Camellia TS, which supplies Rosehill ZS, is able to be augmented to address capacity constraints at 33kV. However, Rosehill ZS has insufficient space for augmentation and additional loads above its firm rating will need to be addressed via 11kV feeders from adjacent zone substations or from a new zone substation within the precinct.

Figure 14 – Geographic location of the existing network





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