Addressing Network Constraints on the Southern Outer Metro 66kV Loop

Draft Project Assessment Report (DPAR)

10 July 2023

SA Power Networks
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Disclaimer

This Draft Project Assessment Report (DPAR) has been prepared in accordance with and is limited to the requirements of Clause 5.17.4 of the National Electricity Rules for the purpose of publicly announcing the provisional outcome of SA Power Networks evaluation of options in response to a specific set of identified needs. The DPAR is a summary or general description only of the matters considered by SA Power Networks when evaluating the various options. It is not intended to be used for other purposes, such as making decisions to invest in generation, transmission or distribution capacity. This document has been prepared using information provided by, and reports prepared by, a number of third parties. It contains assumptions regarding, among other things, economic growth and load forecasts that, by their nature, may or may not prove to be correct. SA Power Networks recommends and advises that anyone proposing to use this information should verify its reliability, accuracy and completeness before committing to any course of action or expenditure. SA Power Networks accepts no responsibility or liability of any nature whatsoever for any loss or damage that may be incurred by any person acting in reliance on the information or assumptions contained in this document. Any use of or reliance upon the information or assumptions contained in this report is at the sole risk of the user. SA Power Networks makes no warranties or representations whatsoever as to the reliability, accuracy and completeness of any information contained in this document. SA Power Networks specifically disclaims any liability or responsibility for any errors or omissions in any of the information contained in this document.

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1 Introduction

The Southern Outer Metro (SOM) 66-kilovolt (kV) loop is an integral part of SA Power Networks' southern suburbs network, providing supply to approximately 51,500 customers comprising a mixture of residential and commercial load, plus some industrial load. It is the sole 66kV line source for the McLaren Flat, Willunga, Aldinga and Seaford substations within the Metro South region while also providing supply to the Fleurieu radial 66kV network including the regions of Goolwa, Victor Harbor, Yankalilla and Kangaroo Island.

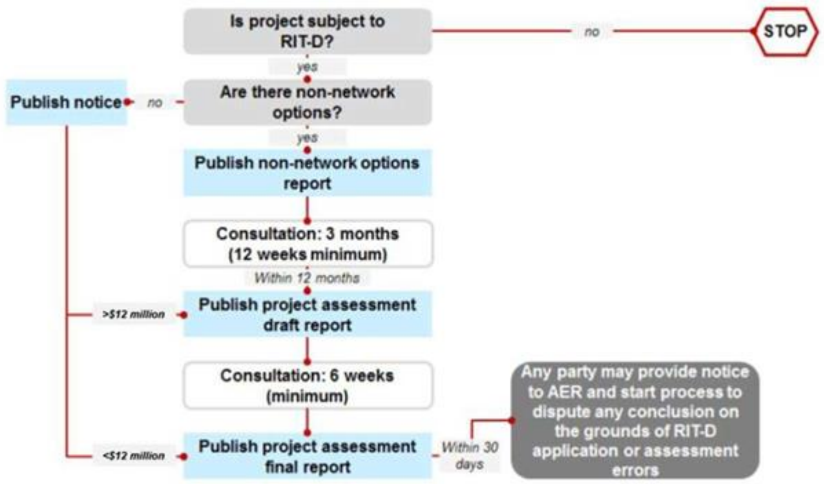
The Outer South and Fleurieu regions are forecast for additional load growth over the next 10 years. Load growth can be attributed to the forecast of additional dwellings and ongoing infrastructure expansion (eg, shopping precincts) to support the increase in local population. Details of expected dwelling increases can be found in the Land Supply Report for Greater Adelaide, published June 2021, by the Government of South Australia. [1]

SA Power Networks has identified that components of the SOM loop – for example the Morphett Vale East to McLaren Flat to Willunga and Port Noarlunga to Seaford to Aldinga 66kV lines – as being overloaded following an outage of the other (ie, under N-1 conditions) during probability of exceedance (POE) 10 conditions. That is, the Morphett Value East to McLaren Flat to Willunga line is overloaded in the absence of the Port Noarlunga to Seaford to Aldinga line and vice versa. Failure to address this constraint risks customers losing supply from unplanned outages.

SA Power Networks has prepared this Draft Project Assessment Report (DPAR) in accordance with the requirements of clause 5.17.4 of the National Electricity Rules (NER). It is the second stage of the formal consultation process set out in the NER in relation to applying the RIT-D – figure 1.1 below.

This DPAR follows the publication by SA Power Networks of the Options Screening Report (OSR).

Figure 1.1: Overview of the RIT-D process



The purpose of this DPAR is to:

- describe the identified need SA Power Networks is seeking to address, together with the assumptions used in identifying it;
- provide a description of each credible option assessed;
- quantify relevant costs and market benefits for each credible option;

[1] https://plan.sa.gov.au/__data/assets/pdf_file/0003/830982/Land_Supply_Report_for_Greater_Adelaide_-_Background_and_Context.pdf

- describe the methodologies used in quantifying each class of cost and market benefit;
- explain why SA Power Networks has determined that classes of market benefits or costs do not apply to the credible options;
- present the results of a net present value analysis of each credible option, including an explanation of the results; and
- identify the proposed preferred option.

Since the release of the OSR, SA Power Networks has since updated all metropolitan 66kV line forecasts, including those in the SOM 66kV loop. SA Power Networks acknowledge 66kV line forecasts and other salient data presented within this DPAR will slightly differ from the published OSR.

The next step of this RIT-D involves publication of a Final Project Assessment Report (FPAR). The FPAR will update the assessment considering any submissions received on this DPAR. SA Power Networks intends to publish the FPAR as soon as practicable after submissions are received on this DPAR.

1.1 SA Power Networks Contact

If you have any comments or enquiries regarding this DPAR, please send to the following email: requestforproposals@sapowernetworks.com.au.

2 Description of the Identified Need

This section describes the identified need for this RIT-D and sets out the key assumptions and methodologies that underpin this need.

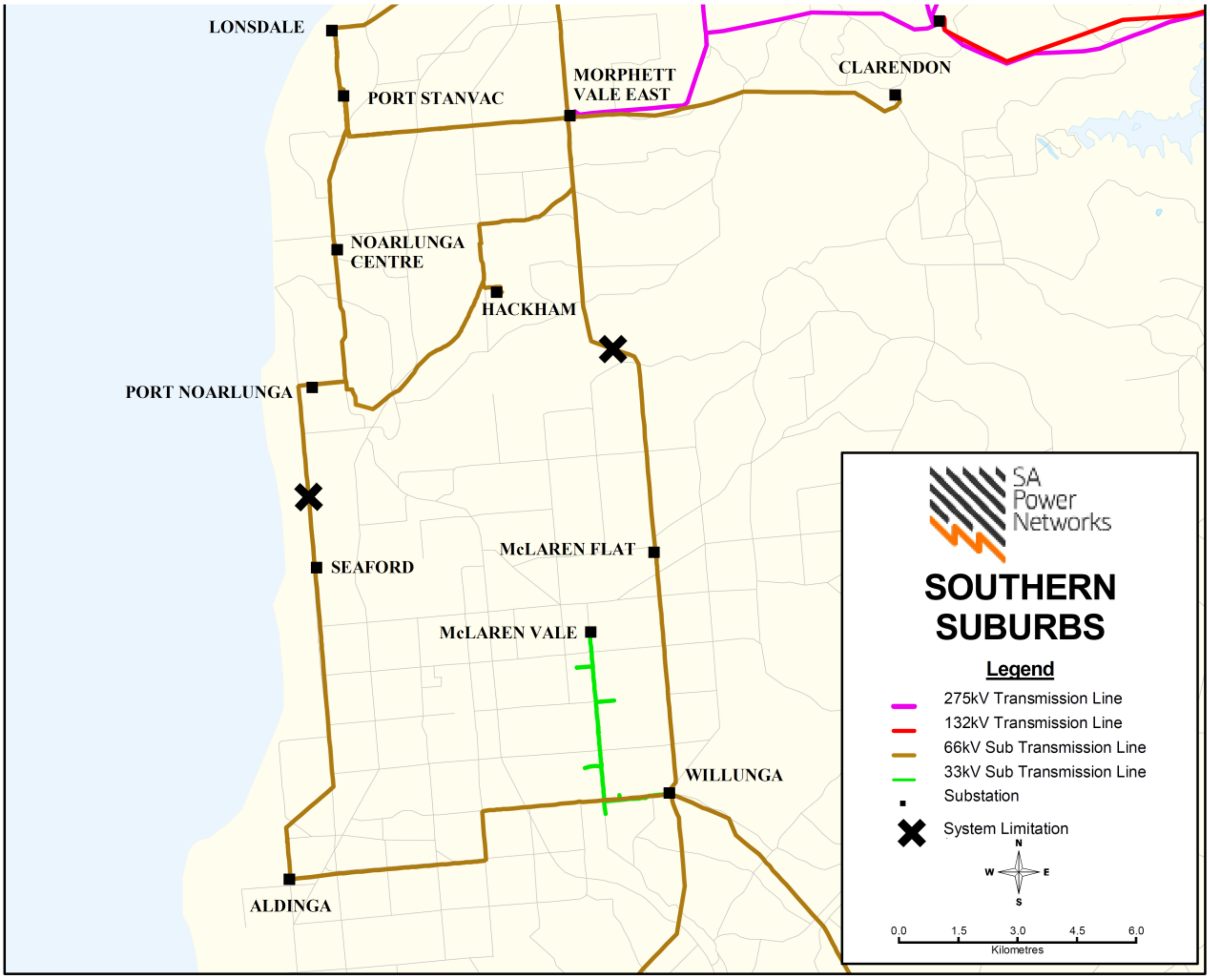
2.1 Relevant area of the SA Power Networks distribution network

The SOM loop represents an integral part of SA Power Networks' southern suburbs network, providing supply to approximately 51,500 customers comprising a mixture of mostly residential and commercial load, plus some industrial load. It is the sole 66kV line source for the McLaren Flat, Willunga, Aldinga and Seaford substations within the Metro South region while also providing supply to the Fleurieu radial 66kV network including the regions of Goolwa, Victor Harbor, Yankalilla and Kangaroo Island.

An overview of the SOM loop is provided in Figure 2.1 and comprises four 66kV lines:

- Morphett Vale East to McLaren Flat to Willunga line;
- Morphett Vale East to Hackham to Port Noarlunga line;
- Port Noarlunga to Seaford to Aldinga line; and
- Aldinga to Willunga line.

Figure 2.1: Overview of the SOM loop



2.2 Network Constraints within the SOM Loop

SA Power Networks has identified numerous 66kV lines that are overloaded in the SOM Loop following an outage of another (ie, under N-1 conditions) during POE10 conditions over the 2022/23 summer. A summary of all overloaded 66kV line sections and their corresponding 66kV line outage (N-1) within the SOM loop are summarized in Table 2.1.

Table 2.1: SOM Loop summary of all N-1 overloads for the 2022/23 summer

Overloaded 66kV Line Section	66kV Line Contingent Event (loss of)
Port Noarlunga to Seaford	Morphett Vale East to McLaren Flat to Willunga
Seaford to Aldinga	Morphett Vale East to McLaren Flat to Willunga
Morphett Vale East to McLaren Flat	Port Noarlunga to Seaford to Aldinga
Willunga to McLaren Flat	Port Noarlunga to Seaford to Aldinga

If investment is not undertaken, there will be significant unserved energy (USE) in SA Power Networks' distribution network. The potential USE risks breaching SA Power Networks' network reliability performance standards under the Electricity Distribution Code. SA Power Networks therefore considers the identified need for this RIT-D to be reliability corrective action. This reflects that the constraint was identified as a result of SA Power Networks' planning criteria, which incorporates the objectives of maintaining compliance with all applicable regulatory and legal requirements.

SA Power Network has therefore considered and focussed on the scenarios contained in Table 2.1 above. Focusing on these contingent conditions enables SA Power Networks to clearly convey the maximum load at risk and the correlating USE.

2.3 Demand forecast scenarios

SA Power Networks' planning criteria for N-1 66kV line constraints utilises the POE10 central (medium) summer forecast. For the purpose of this assessment, demand scenarios have been based on the POE10 central forecast including a plus 20 per cent (high) and minus 20 per cent (low) margins.

Figure 2.2, Figure 2.3, Figure 2.4 and Figure 2.5 below show the POE10 coincident forecasts from 2022/23 to 2042/43 on the Port Noarlunga to Seaford, Seaford to Aldinga, Morphett Vale East to McLaren Flat and McLaren Flat to Willunga 66kV lines (respectively) under N-1 conditions for these demand scenarios. It shows that each of the lines would be overloaded relative to their emergency rating during the outage (loss of) as per Table 1.

As a result, there will be significant USE during the summer period under contingent conditions if action is not taken. USE is discussed in greater detail within Section 2.4.

Figure 2.2: POE10 N-1 coincident summer demand forecast for the SOM loop from 2022/23 to 2042/43 under low, central and high scenarios (Port Noarlunga to Seaford 66kV line)

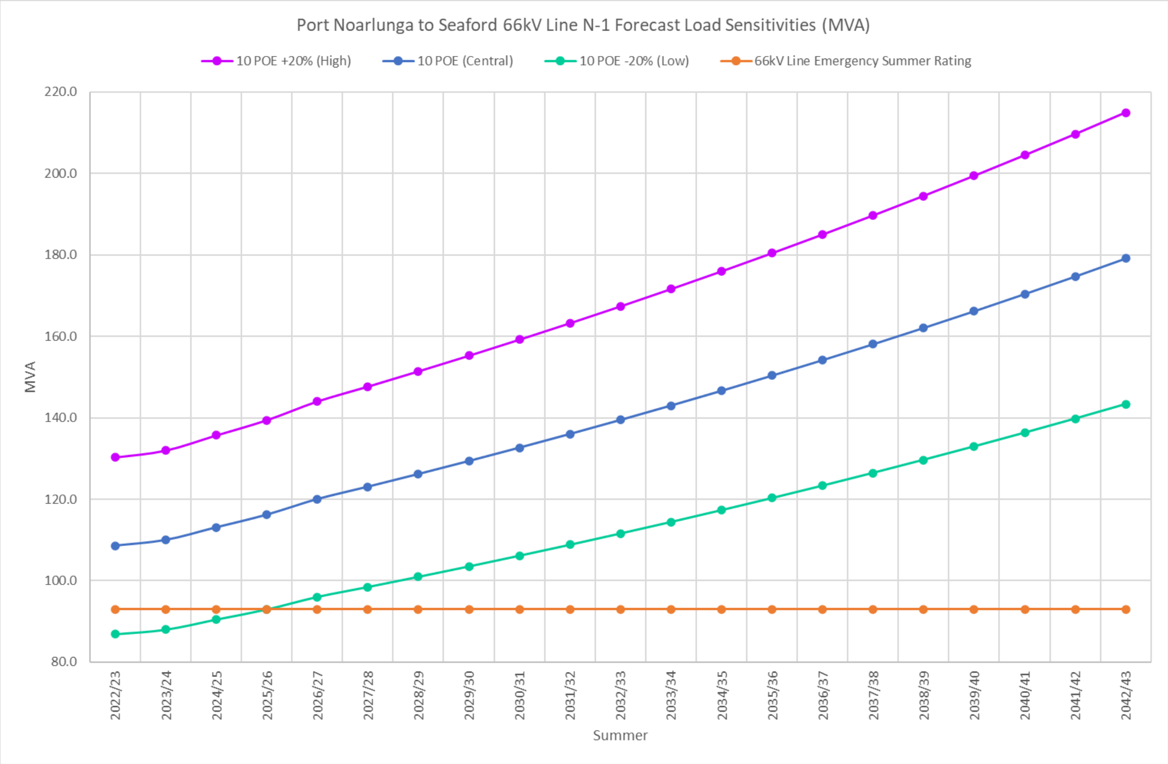


Figure 2.3: POE10 N-1 coincident summer demand forecast for the SOM loop from 2022/23 to 2042/43 under low, central and high scenarios (Seaford to Aldinga 66kV line)

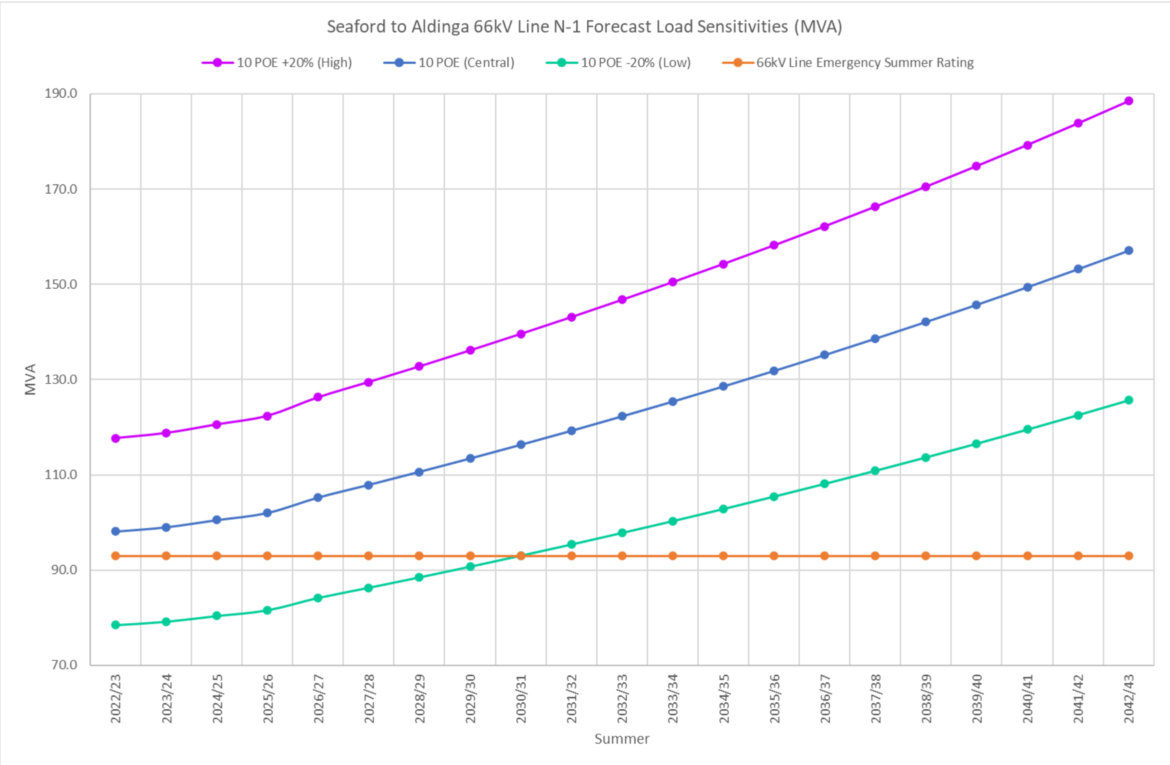


Figure 2.4: POE10 N-1 coincident summer demand forecast for the SOM loop from 2022/23 to 2042/43 under low, central and high scenarios (Morphett Value East to McLaren Flat 66kV line)

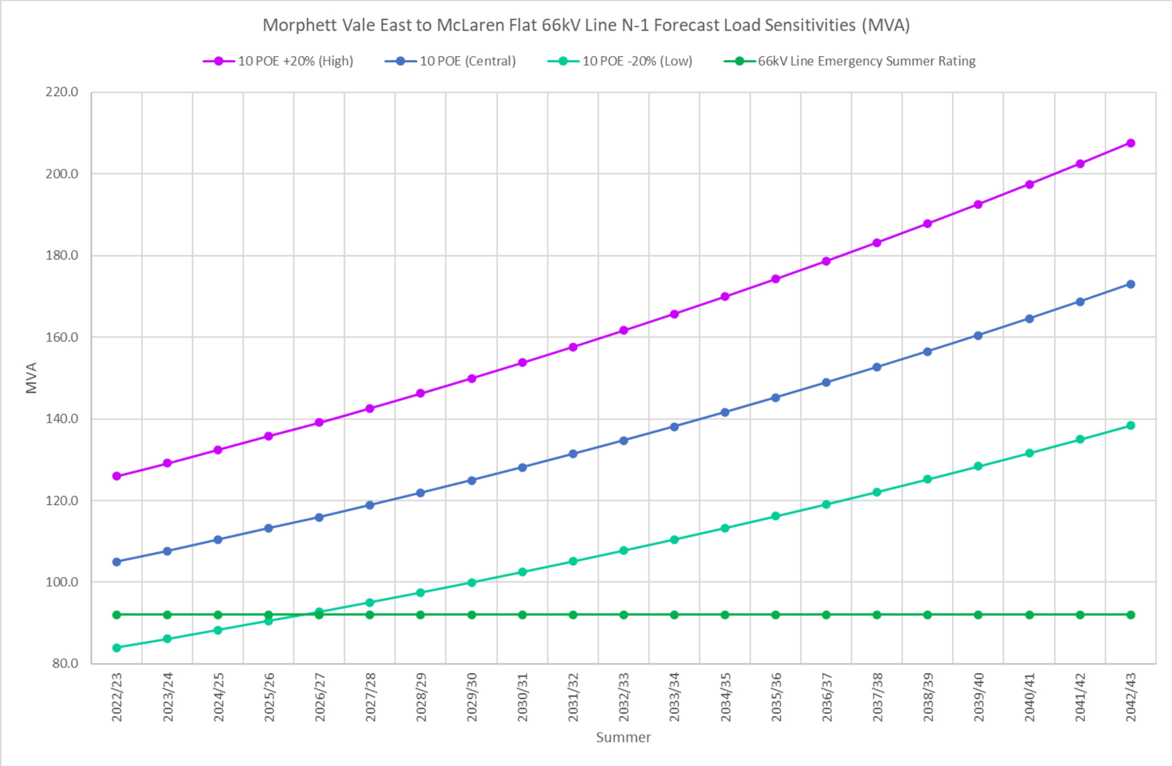


Figure 2.5: POE10 N-1 coincident summer demand forecast for the SOM loop from 2022/23 to 2042/43 under low, central and high scenarios (Morphett Value East to McLaren Flat 66kV line)

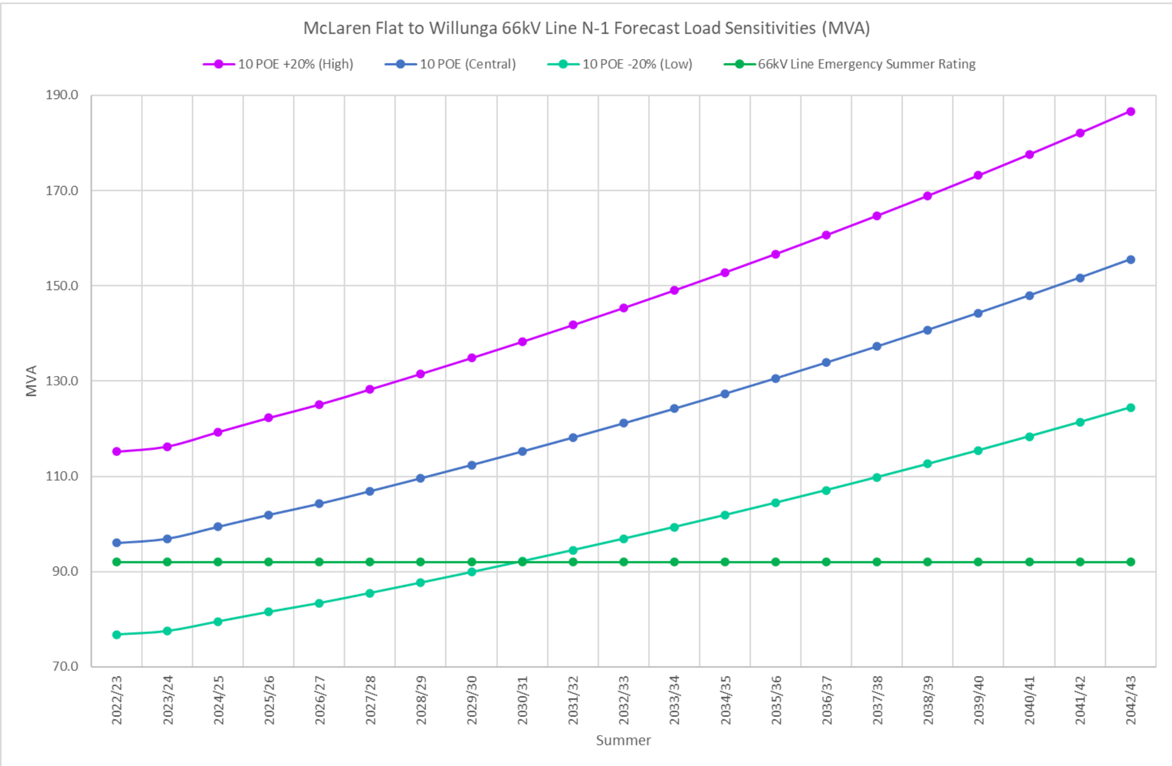


Figure 2.6 the normalized load duration curves for measured actual load and estimated native load for the SOM loop. The intention is to use estimated native load for all upcoming analysis.

Figure 2.6: Normalised load duration curve for the SOM loop

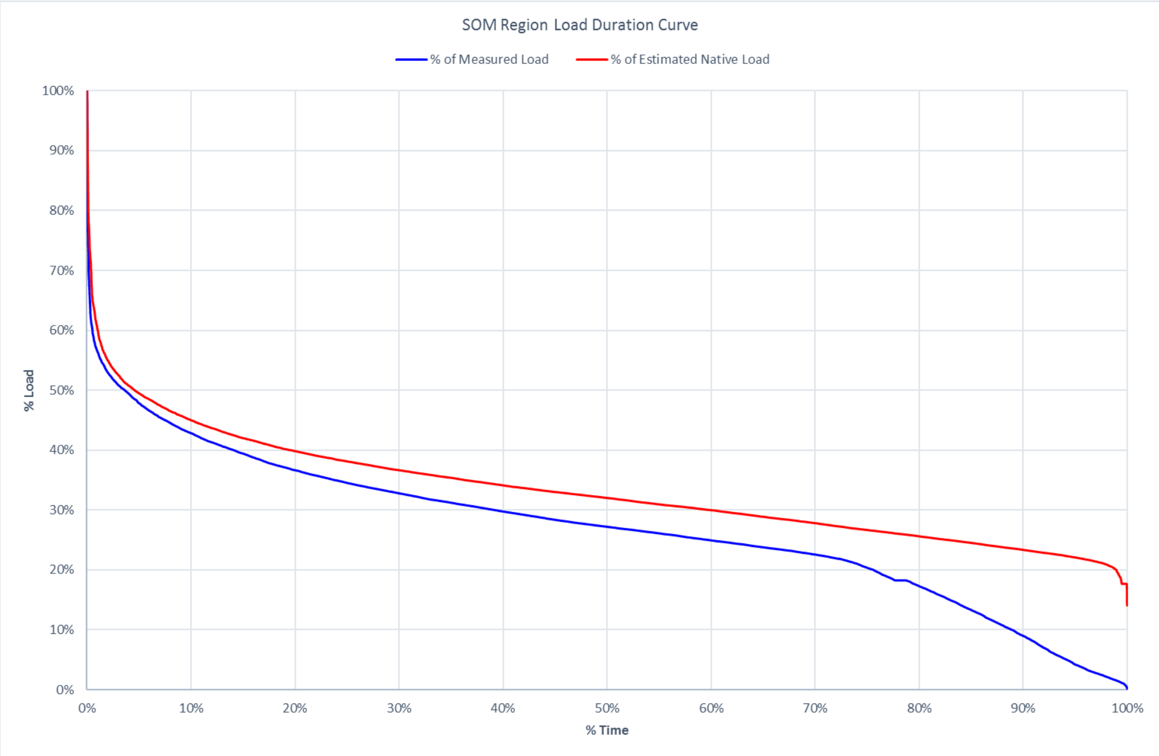


Figure 2.7 shows the peak summer day profile and estimated native for the SOM loop.

Figure 2.7: Peak summer day profile for the SOM loop

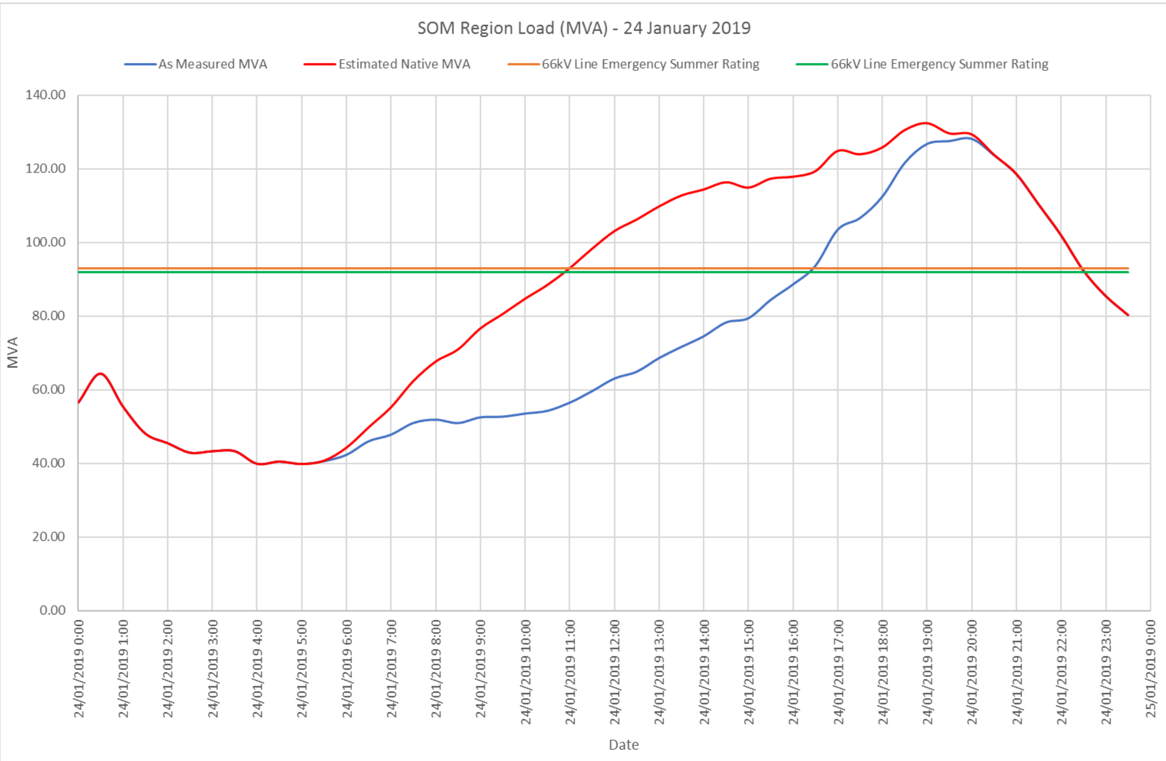


Figure 2.8, Figure 2.9, Figure 2.10 and Figure 2.11 present the assumed 2022-23 summer day native load profiles representing POE levels for the Port Noarlunga to Seaford to Aldinga and Morphett Vale East to McLaren Flat to Willunga 66kV line sections under worse N-1 condition.

Figure 2.8: Assumed native 2022/23 summer day POE profiles for Port Noarlunga to Seaford 66kV line (N-1)

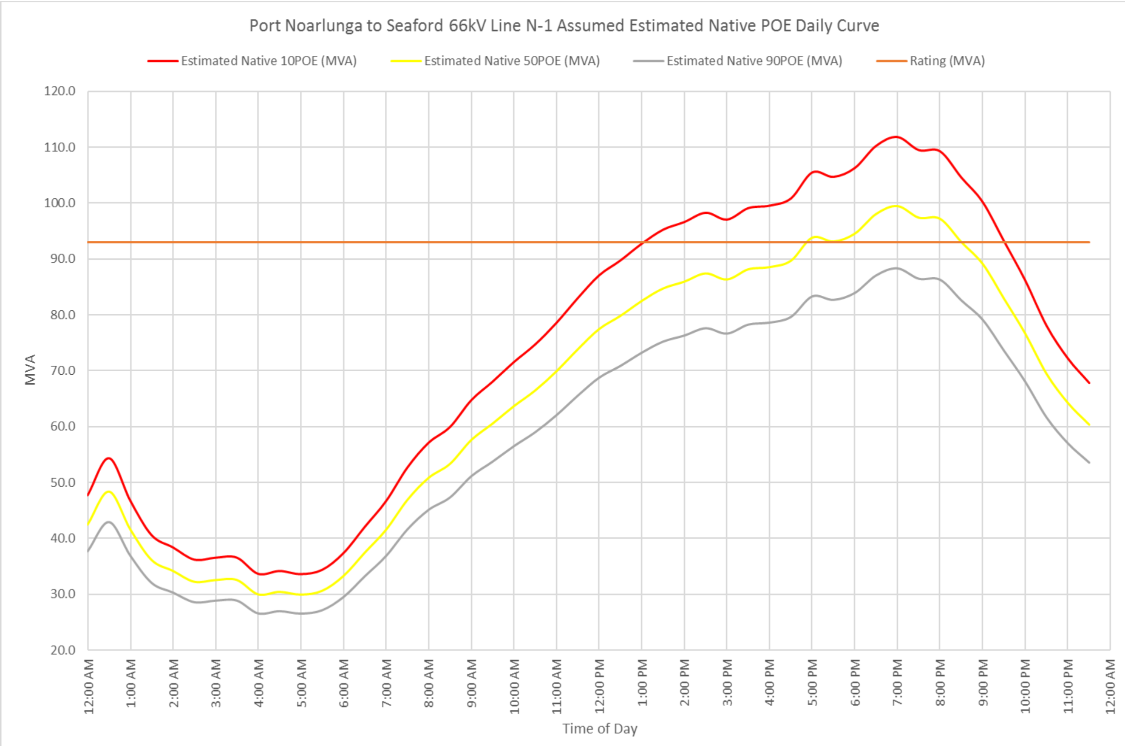


Figure 2.9: Assumed native 2022/23 summer day POE profiles for Seaford to Aldinga 66kV line (N-1)

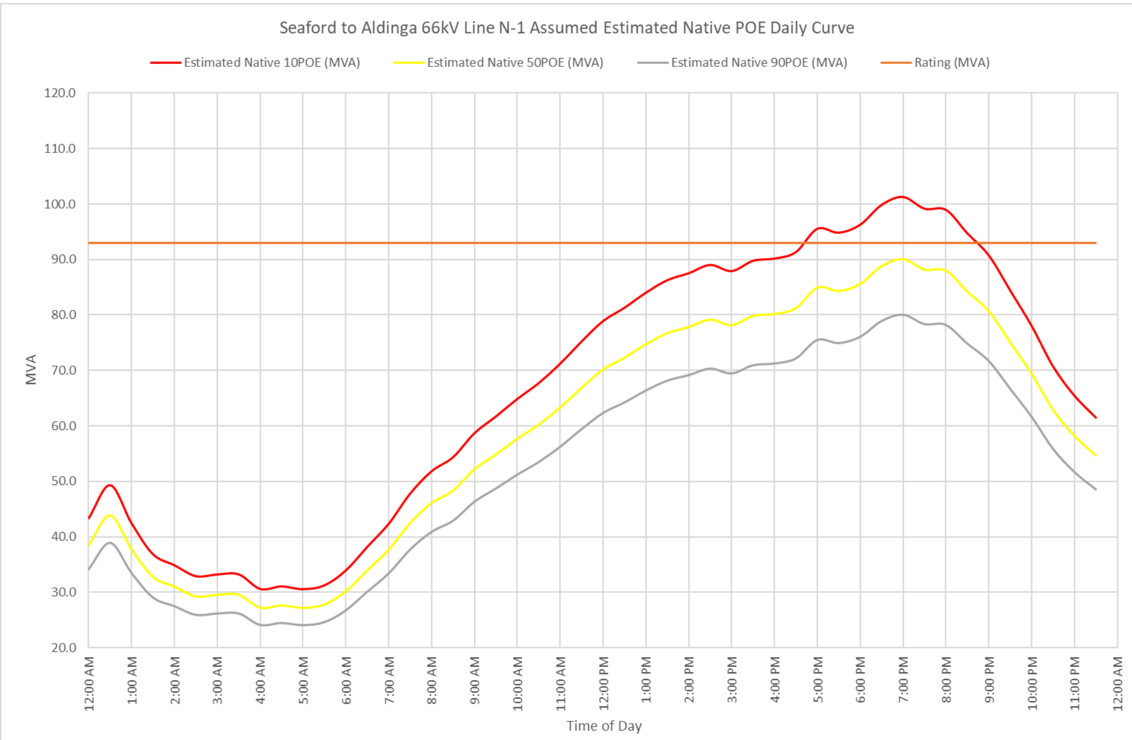


Figure 2.10: Assumed native 2022/23 summer day POE profiles for Morphett Value East to McLaren Flat 66kV line (N-1)

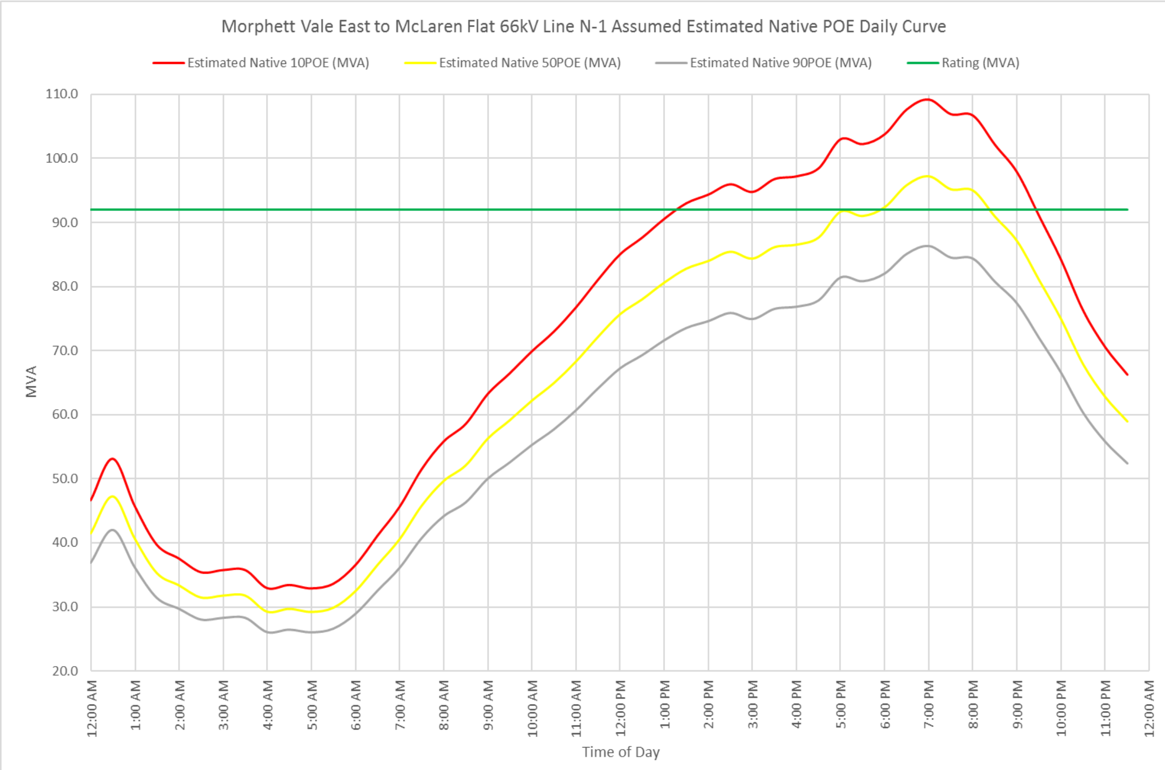
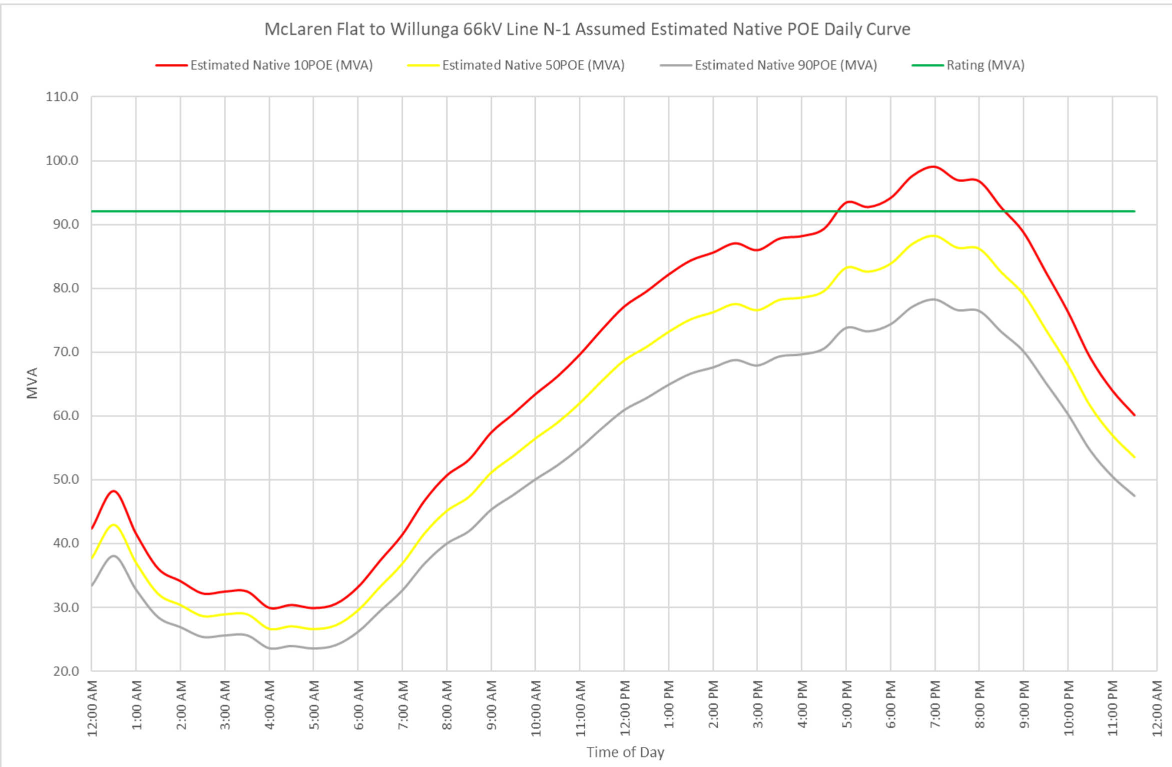


Figure 2.11: Assumed native 2022/23 summer day POE profiles for Morphett Value East to McLaren Flat 66kV line (N-1)



2.4 Expected unserved energy if action is not taken

Morphett Vale East to McLaren Flat to Willunga and Port Noarlunga to Seaford to Aldinga 66kV lines are overloaded following an outage of the other (ie, under N-1 conditions) during POE10 conditions. That is, Morphett Value East to McLaren Flat to Willunga line is overloaded in the absence of the Port Noarlunga to Seaford to Aldinga line and vice versa.

Under the option of "do nothing", modelling indicates when the SOM region load level exceeds 100MW then controlled load shedding would be required to prevent 66kV line overloads under the worst-case N-1 contingency. Failure to address this constraint risks customers losing supply from unplanned outages (ie, load shedding). It follows that, absent network augmentation or a non-network solution, there will be significant USE in the next few years.

For the purpose of this assessment, the demand scenarios have been based on the POE10 central (medium) forecast including a plus 20 per cent (high) and minus 20 per cent (low) margins.

Figure 2.12 presents the 'estimated raw' USE if no action is taken under each of the central, high and low scenarios.

Figure 2.12: Estimated raw unserved energy for the Port Noarlunga to Seaford 66kV line under worst-case N-1 contingency

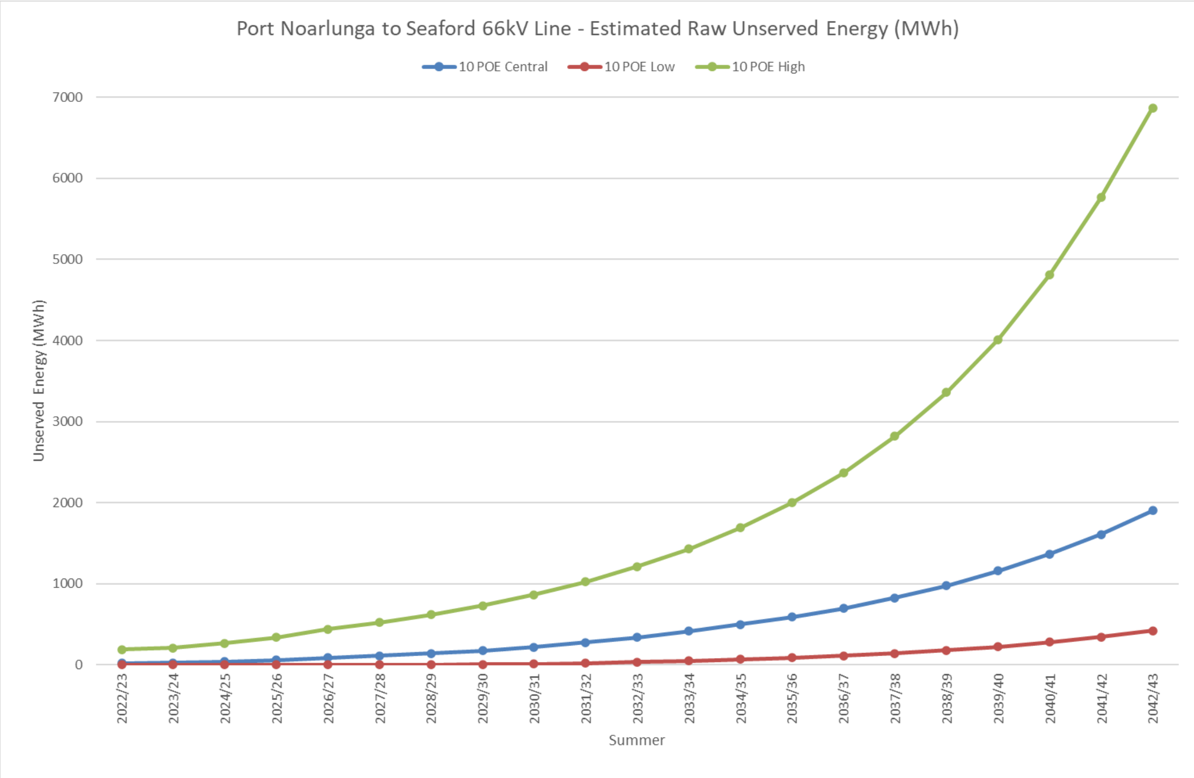
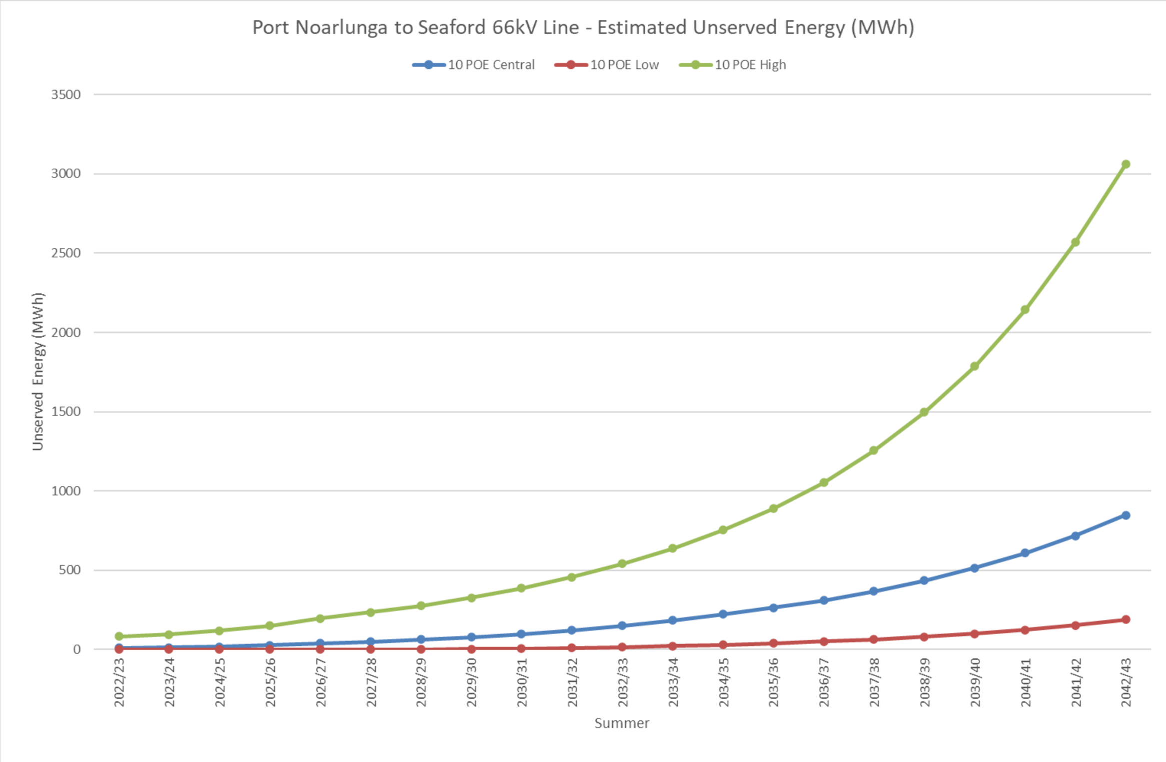


Figure 2.13 presents the 'estimated' USE if no action is taken under each of the central, high and low scenarios. This accounts for the probability of the N-1 66kV line contingency occurring. The estimated USE will be used in the NPV analysis.

Figure 2.13: Estimated unserved energy for the Port Noarlunga to Seaford 66kV line under worst-case N-1 contingency



SA Power Networks proposes to cap the expected future USE if greater than 5,000 MWh as part of the DPAR NPV assessment, because the uncapped value of USE will otherwise become unrealistically high (since, in reality, we would undertake investment to avoid widespread customer outages). Using the very large uncapped USE values has the potential to distort the comparison of net market benefits between credible options. The approach of capping USE in the base case is in-line with other RIT-Ds (and RIT-Ts) and does not affect the ranking of the overall options.[2,3]

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[2] We note that this is also consistent with the approach proposed by Dr Biggar in his review of the Powering Sydney's Future RIT-T (see: Biggar, D., *An Assessment of the Modelling Conducted by TransGrid and Ausgrid for the "Powering Sydney's Future" Program*, May 2017, p. 27). While Dr Biggar suggests capping the 'congestion cost' (calculated as the unserved energy valued at the VCR) in such assessments, we consider it more intuitive to cap the underlying unserved energy, in MWh, and continue to value it at the appropriate VCR. This is the approach that has been adopted by other DNSPs and is effectively equivalent to the approach proposed by Dr Biggar.

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

3 Proposed network options to meet the identified need

SA Power networks has identified four credible network options to address the identified need. This section provides more information on the scope and cost of these options. It also outlines options considered but that SA Power Networks does not propose to progress further.

3.1 Option 1 – replace all SOM loop underrated 66kV conductor sections with a higher capacity AAAC conductor

Option 1 involves replacing all SOM loop underrated 66kV conductor sections with a higher capacity All Alloy Aluminum Conductor (AAAC). This replacement would occur on all relevant line sections between the Port Noarlunga, Seaford, Aldinga, Willunga, McLaren Flat and Morphett Vale East substations.

Practically, restringing the conductors in this way will require the replacement of existing poles with new 66kV poles as required.

The total cost of this option is expected to be $13.5 million and construction would likely commence in 2024 with completion before July 2025.

3.2 Option 2 – replace all SOM loop underrated 66kV conductor sections with a higher capacity HTLS conductor

Option 2 involves replacing all SOM loop underrated 66kV conductor sections with a higher capacity High Tempertaure Low Sag (HTLS) conductor. This replacement would occur on all relevant line sections between Port Noarlunga, Seaford, Aldinga, Willunga, McLaren Flat and Morphett Value East substations.

Practically, restringing the conductors in this way will require the replacement of existing poles with new 66kV poles as required.

The total cost of this option is expected to be $12.5 million and construction would likely commence in 2024 with completion before July 2025.

3.3 Option 3 – rebuild the Port Noarlunga to Seaford to Aldinga 66kV line as a hybrid double circuit using AAAC conductor

Option 3 involves the restringing of existing lines and the construction of a new double circuit. In particular, it would involve:

- replacing all Port Noarlunga to Seaford to Aldinga underrated 66kV conductor sections with a higher capacity AAAC conductor; and
- installing a second 66kV circuit between Port Noarlunga and Aldinga using the same AAAC conductor.

As under Options 1 and 2, replacement of existing poles with new 66kV poles will be undertaken as required. Furthermore, the construction of the new 66kV line would require reconfiguring and augmenting of Port Noarlunga and Aldinga substations so that the new 66kV line could be accommodated.

The total cost of this option is expected to be $15.6 million and construction would commence in 2024 with completion and all substation commissioning before July 2025.

3.4 Option 4 – rebuild the Port Noarlunga to Seaford to Aldinga 66kV line as a hybrid double circuit using HTLS conductor

Option 4 involves the restringing of existing lines and the construction of a new double circuit line. In particular, it would involve:

- replacing all Port Noarlunga to Seaford to Aldinga underrated 66kV conductor sections with a higher capacity HTLS conductor; and
- installing a second 66kV circuit between Port Noarlunga to Aldinga using the same HTLS conductor.

As under Options 1 and 2, replacement of existing poles with new 66kV poles will be undertaken as required. Furthermore, similarly to Option 3, the construction of the new 66kV line would require reconfiguring and augmenting of Port Noarlunga and Aldinga substations so that the new 66kV line could be accommodated.

The total cost of this option is expected to be $15.5 million and construction would commence in 2024 with commissioning before July 2025.

3.5 Options considered but not proposed to be progressed to the DPAR

SA Power Networks considered two options to meet the identified need that are not currently proposed to be progressed to the DPAR. These are:

- establishing a widespread Virtual Power Plant (VPP) and other potential load control measures at individual NMI levels, which was determined as not being credible because of the magnitude of load control required; and
- thermal uprating of the lines comprising the SOM loop, which was determined as not being credible because all sections within the SOM loop are currently designed and constructed at their ultimate design temperature.

4 Assessment of non-network solutions and SAPS

Upon release of the Options Screening Report (OSR) in late September 2022, SA Power Networks received one formal submission for a BESS non-network solution. This submission was subsequently withdrawn prior to the assesement stage.

As a result, credible non-network or stand-alone power system (SAPS) options were not included in the options analysis assessement.

5 How the options have been assessed

This section outlines the methodology that SA Power Networks has applied in assessing market benefits and costs associated with the credible options considered in this RIT-D.

5.1 Overview of the assessment framework

All costs and benefits for each credible option have been measured against a ‘do nothing’ base case.

The RIT-D analysis has been undertaken over a 20-year period, from Q3 2023 to Q2 2043. SA Power Networks considers that a 20-year period considers the size, complexity and expected life of the relevant credible option to provide a reasonable indication of the market benefits and costs of the option. While the capital components of the credible option have asset lives greater than 20 years, SA Power Networks has taken a terminal value approach to incorporate capital costs in the assessment, which ensures that the capital cost of long-lived options is appropriately captured in the 20-year assessment period.

The commercial rate determined by the Australian Energy Market Operator (AEMO) from its Integrated System Plan has been used as the central discount rate, which is currently 5.5%. This is a rate that reflects an energy business operating in the NEM. The high benefit discount rate has been set at 2.34%, reflecting the latest Australian Energy Regulator (AER) WACC determinations for DNSPs. The high discount rate determined by AEMO from its ISP has been used as the low benefit discount rate, which is currently 7.5%.

5.2 Approach to estimating project costs

SA Power Networks has estimated capital costs through formal estimations conducted by estimation experts within the business.

Planned routine maintenance and unplanned corrective maintenance costs have been excluded in this RIT-D as they are deemed immaterial in comparison to the identified capital costs. While 66kV poles and wires are subject to routine inspections, identified defects are generally relatively low cost to remediate (eg: insulator replacement, conductor sleeve repair, etc).

5.3 Benefits expected from avoided involuntary load shedding

SA Power Networks considers the relevant categories of market benefits prescribed under the NER for this RIT-D relate to changes in involuntary load shedding. Other market benefits are considered immaterial to this RIT-D in comparison to involuntary load shedding.

The approach SA Power Networks has made to estimating reductions in involuntary load shedding are outlined in Section 2.4.

5.3.1 Avoided involuntary load shedding

Involuntary load shedding occurs when a customer’s load is interrupted from the network without warning or their agreement. This can occur due to unavailability of network elements and the resulting reduction in network capacity to supply the load.

The USE is the probability weighted average amount of load that customers request to utilise but would need to be involuntarily curtailed due to loss of network connectivity or a network capacity limitation. SA Power Networks has forecast load over the assessment period and has quantified the USE by comparing forecast load to network capabilities under 66kV line outage N-1 conditions. A reduction in involuntary load shedding expected from an option, relative to the base case, results in a positive contribution to market benefits of the credible option being assessed.

The market benefit that results from reducing the involuntary load shedding with a network solution is estimated by multiplying the quantity of USE in MWh by the Value of Customer Reliability (VCR). The VCR is measured in dollars per MWh and is used as proxy to evaluate the economic impact of USE on customers under the RIT-D.

SA Power Networks has applied a central VCR estimate of $33,720/MWh, which is the value calculated for Residential customer VCRs by state/territory in $/kWh for South Australia by the AER in its 2022 VCR Annual Adjustment[4]. The AER also recommends using values of ± 30% of the base case VCR for the purposes of testing how sensitive investment decisions are to the VCR input[5]. A lower VCR of $23,604/MWh and a higher VCR of $43,836/MWh have been chosen for the low and high benefit scenarios, as a result.

5.3.2 Likelihood of a 66kV line failure and involuntary load shedding

SA Power Networks applied a simplified 66kV overhead line faults per km per annum factor to estimate the expected likelihood of an unplanned 66kV line outage upon a critical section of the SOM Loop. A summary is provided in Table 5.1.

Table 5.1: SOM Loop 66kV Line Section Lengths

66kV Line Section	Faults per km per annum	Length (km)	Faults per annum
Port Noarlunga to Seaford	0.015	4.5	0.0675
Seaford to Aldinga		8.2	0.1230
Morphett Vale East to McLaren Flat		11.2	0.1680
Willunga to McLaren Flat		5.8	0.0870
		Total faults per annum	**0.4455**

The estimated USE for the low, central and high scenario were then multiplied by the total faults per annum respectively as depicted in Figure 2.13.

5.3.3 Capping of unserved energy

As per Figure 2.13, the expected future USE does not exceed 5,000 MWh over the 20 year assessment period for either the low, central or high scenario. The capping of expected future USE to 5,000 MWh is not applicable for this NPV assessment.

5.4 Scenarios to address uncertainty

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

SA Power Networks has elected to assess three alternative future scenarios – namely:

- Central Benefits Scenario – the central scenario consists of assumptions that reflect SA Power Networks’ central set of variable estimates which, in SA Power Networks’ opinion, provides the most likely scenario;
- Low Benefits Scenario – SA Power Networks has adopted a number of assumptions that give rise to a lower bound estimate for each credible option, in order to represent a conservative future state of the world with respect to potential market benefits that could be realised under the credible option; and

[4] AER, VCR Update Annual Adjustment, 2022 available at Update - Annual adjustment | Australian Energy Regulator (aer.gov.au)

[5] AER, Values of Customer Reliability Review – Final Report on VCR values – December 2019, available at https://www.aer.gov.au/system/files/AER%20-%20Values%20of%20Customer%20Reliability%20Review%20-%20Final%20Report%20-%20December%202019.pdf

- High Benefits Scenario – this scenario reflects an optimistic set of assumptions, which have been selected to investigate an upper bound on reasonably expected market benefits.

A summary of the key variables in each scenario is provided in Table 5.2.

Table 5.2: Summary of three scenarios investigated; Central, Low and High Benefits

Variable	Central Scenario	Low Scenario	High Scenario
Discount Rate	5.5%	7.5%	2.34%
VCR	$33,720/MWh	$23,604/MWh	$43,836/MWh
Capital Costs	100% of capital cost estimate	125% of capital cost estimate	75% of capital cost estimate
Avoided Involuntary Load Shedding	100% of PoE 10 Demand	80% of PoE 10 Demand	120% of PoE 10 Demand

SA Power Networks considers that the Central Scenario is the most likely, since it is based on a set of central assumptions. SA Power Networks has therefore assigned this scenario a weighting of 50 per cent, with the other two scenarios being weighted equally with 25 per cent each.

6 Assessment of the credible options

This section provides a description of the credible network options SA Power Networks has identified as part of its network planning activities to date. The option is compared against a base case option.

6.1 Gross market benefits estimated for the credible options

Table 6.1 below summarises the gross benefit of the credible options relative to the base case in present value terms. The gross market benefit for each option has been calculated for each of the three scenarios outlined in Section 5.

Table 6.1: Present value of Benefits of credible options relative to the base case, $m 2023

Variable	Central Scenario	Low Scenario	High Scenario
Scenario Weighting	50%	25%	25%
Option 1	80.2	6.7	573.0
Option 2	80.2	6.7	573.0
Option 3	80.2	6.7	573.0
Option 4	80.2	6.7	573.0

6.1.1 Unquantified benefits

SA Power Networks has also identified the following unquantified benefits which have not been included within the present value summary of benefits in Table 5.2 – namely:

- Option 1 and Option 2 (conductor replacements) have the lowest upfront expenditure in the 2020-25 reset period.
- Based on existing Central load forecasts, Option 1 and Option 2 (conductor replacements) results in nil additional upgrades or augmentation works until the 2035-40 reset period. Unlike Option 3 and Option 4 which require additional upgrades and expenditure in the 2025-30 reset period.

6.2 Estimated costs for the credible options

Table 6.2 below summarises the costs of the credible options relative to the base case in present value terms. The cost is the project capital costs associated with reinforcing the SOM loop with network solutions. The cost of each option has been calculated for each of the four scenarios, in accordance with the approach outlined in Section 5.

It is important to note that the difference in estimated costs will determine the preferred option, as the benefits of all options are the same as per Table 6.1.

Table 6.2: Present value of Costs of credible options relative to the base case, $m 2023

Variable	Central Scenario	Low Scenario	High Scenario
Scenario Weighting	50%	25%	25%
Option 1	-16.4	-20.3	-11.9
Option 2	-15.7	-19.3	-11.4
Option 3	-17.1	-22.0	-11.2
Option 4	-16.7	-21.5	-11.0

6.3 Net present value assessment outcomes

Table 6.3 below summarises the net market benefit in Net Present Value (NPV) terms for the credible options under each scenario. Overall, Option 2 exhibits the highest estimated net market benefit.

Table 6.3 Present value of weighted net benefits relative to the base case, $m 2023

Option	Weighted PV of costs	Weighted PV of gross benefits	Weighted NPV	Ranking
Option 1	-16.2	185.0	168.8	2
Option 2	-15.5	185.0	169.5	1
Option 3	-16.9	185.0	168.2	4
Option 4	-16.5	185.0	168.6	3

7 Proposed preferred option

SA Power Networks considers that detailed analysis within this DPAR identifies Option 2 as the preferred option and that this satisfies the RIT-D. SA Power Networks is the proponent for Option 2. Construction would commence in Q2 2024 with final completion in H1 of 2025.

Upon completion of detailed final design and field checks, it may be beneficial to combine Option 1 and Option 2 when developing the final construction solution. Furthermore, each Option has a very similar weighted NPV assessment outcome. The following factors are to be assessed and considered so that the project can be delivered in an overall efficient manner:

- Time of year site access - avoid wet weather months for steep terrain areas between Morphett Vale East and Willunga, avoid properties with grapevines within the 66kV line easement during vintage season.
- Limitations with Option 2 HTLS conductor - conductors left in stringing blocks for long period of time can result in damage, sharp angles within the existing 66kV line route and high pulling tensions can result in damage.
- Materials procurement - possible unusual very long lead times and shortages.

8 Compliance Statement

This Project Assessment Report complies with the requirements of Section 5.17.4. (j) as demonstrated below.

Table 8.1: Regulation compliance cross reference

Requirement	Report Section
(1) a description of the identified need;	2.2
(2) the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, why the RIT-D proponent considers reliability corrective action is necessary);	2.2, 2.3
(3) if applicable, a summary of, and commentary on, the submissions on the non-network options report	4
(4) a description of each credible option assessed;	3.1, 3.2, 3.3, 3.4
(5) where a *Distribution Network Service Provider* has quantified market benefits in accordance with clause 5.17.1(d), a quantification of each applicable market benefit for each credible option;	5.2
(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure;	3.1, 3.2, 3.3, 3.4
(7) a detailed description of the methodologies used in quantifying each class of cost and market benefit;	5.1, 5.2, 5.3
(8) where relevant, the reasons why the RIT-D proponent has determined that a class or classes of market benefits or costs do not apply to a credible option;	N/A
(9) the results of a net present value analysis of each credible option and accompanying explanatory statements regarding the results;	6.3
(10) the identification of the proposed preferred option;	7
(11) for the proposed preferred option, the RIT-D proponent must provide:	
(i) details of the technical characteristics;	3.1, 3.2
(ii) the estimated construction timetable and commissioning date (where relevant);	3.1, 3.2
(iii) the indicative capital and operating cost (where relevant);	3.1, 3.2
(iv) a statement and accompanying detailed analysis that the proposed preferred option satisfies the *regulatory investment test for distribution*;	7
(v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent	7

Requirement	Report Section
(12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the draft report may be directed.	1.1

9 Definitions and Contractions

Words and phrases within this document should be read with the meaning given to them within the National Electricity Rules.

Term	Meaning
AAAC	All Alloy Aluminium Conductor
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
Base Case	The case considered most likely used as the reference case when considering alternative plausible market scenarios
DAPR	Distribution Annual Planning Report
DPAR	Draft Project Assessement Report
DM	Demand Management
DNSP	Distribution Network Service Provider
FPAR	Final Project Assessement Report
HTLS	High Tempertaure Low Sag
Identified Need	The objective or purpose of a proposed network investment
NEM	National Electricity Market
NER	National Electricity Rules
NPV	Net Present Value
O&M	Operating and Maintenance
OSR	Options Screening Report
PoE	Probability of Exceedance. The probability that, in any one year, peak demand will exceed the forecast value. For instance demand is expected to exceed a 10% PoE forecast, 1 year in 10.
QOS	Quality of Supply
RCA	Reliability Corrective Action
RIT-D	Regulatory Investment Test – Distribution
Rules	National Electricity Rules (NER)
SAPN	SA Power Networks
SAPS	Stand Alone Power System
TNSP	Transmission Network Service Provider

Term	Meaning
USE	Unserved Energy
VCR	Value of Customer Reliability.
WACC	Weighted Average Cost of Capital