Expression of Interest

Non - Network Solutions 2023

18/4/2023 – Version 1.0

SA Power Networks

Empowering South Australia

1 Document Control

Version	Date	Notes
0.0		Publication version
1.0	11/04/2023	Initial Release Approved by Network Investment Planning Manager Approved by Head of Network Planning

2 Contents

3 Shortened Forms

Abbreviation	Definition or Description
ABN	Australian Business Number
ACN	Australian Company Number
AEMO	Australian Energy Market Operator
ARENA	Australian Renewable Energy Agency
BESS	Battery Energy Storage System
CPI	Consumer Price Index
DAPR	Distribution Annual Planning Report
EDC	Electricity Distribution Code as published by ESCOSA
EG	Embedded Generation
EOI	Expression of Interest
ESCOSA	The Essential Services Commission of South Australia. The jurisdictional service standards regulator of electricity distribution in South Australia
N constraint	The capacity of a sub-transmission line, primary distribution feeder or zone substation with all plant and equipment in service. The design life of the sub-transmission line, zone substation and distribution feeder assets (typically 30 years) will be reduced if the peak cyclic load exceeds this value
N-1 constraint	The term used to describe the state of the distribution network when any one major item of plant (N-1) is out of service, with the rest of the network remaining intact
NEM	National Electricity Market
NER	National Electricity Rules
OTR	Office of the Technical Regulator
POE	Probability of Exceedance
RIT-D	Regulatory Investment Test – Distribution
SAPN	SA Power Networks
SAPS	Stand-Alone Power System

4 General Information

4.1 Background

SA Power Networks is mandated through the RIT-D process to consider all credible network and non-network options where more than $6 million of investment is required. SA Power Networks is looking to expand the scope of this process to include investments less than $6 million. This approach forms part of our pursuit for optimal network operation by engaging the most efficient long-term solutions. To achieve this, SA Power Networks seeks to assess the viability of contracting non-network solutions as an alternative to network augmentation.

Our aim is to explain to customers and providers how non-network solutions, or where applicable SAPS solutions, are considered when resolving identified needs and our expectations of them throughout this process.

4.2 Purpose

This document seeks expressions of interest from suitably qualified interested parties, particularly from proponents of non-network solutions, to provide solutions that address network constraints to limit or defer augmentation of SA Power Networks' existing electricity distribution network. SA Power Networks is interested in exploring all potential non-network solutions with proponents.

To do so, this document has been prepared to acquaint non-network service providers and interested parties with relevant information regarding SA Power Networks' requirements to address network constraints within three regions. These constraints are not an exhaustive list of issues experienced or forecast on the network.

4.3 Conditions

In the interest of selecting the most cost-effective solutions, all proposals will be considered in a technology-agnostic way. Respondents should make no assumptions that rules, regulations, or network standards will be changed to facilitate the non-network solution.

It should not be assumed that SA Power Networks will identify or recruit customers to participate in non-network solutions as this should form part of the scope of the solution provider.

SA Power Networks is not obliged to make an offer to contract with a respondent, issue a procurement specification or to invite a non-network service provider to submit a tender. Furthermore, SA Power Networks does not warrant that any offer or invitation to tender that may be issued will necessarily reflect SA Power Networks' requirements as outlined in this document or any information received as part of this process.

All costs incurred by respondents in relation to contributing to this expression of interest (EOI) must be borne by them. Regardless of the outcome, respondents are not entitled to claim for reimbursement of time, materials or expenses occurred in connection with this feasibility.

SA Power Networks acknowledges that the ARENA community battery funding is available, and proponents may seek this as a funding opportunity. SA Power Networks will not make any special accommodations for projects seeking this funding (or contingent funding by any other means). Proponents bare all responsibility to secure funding for their proposed non-network solution. Inability to demonstrate appropriate levels of funding, by an agreed date, may deem the proposal unviable.

Proponents may require information in addition to that provided in this report. Proponents seeking additional information are encouraged to contact SA Power Networks as early as possible to ensure that adequate time is available to fully assess feasible network and no-network potential solutions. Further engagement will also be possible following the submission due date. It is crucial that any solutions presented by proponents is done so in a manner that provides sufficient time for their evaluation and any necessary clarifications.

Proponent-initiated requests for information beyond that published within this document will be considered by SA Power Networks, provided any or all of the following criteria are met:

(1) The proponent signs a confidentiality or non-disclosure agreement;
(2) The disclosure of the information does not breach the Privacy or Data Protection Act or any existing confidentiality or non-disclosure agreements;
(3) SA Power Networks deems the requested information relevant to the proposal; and
(4) The scale of requested information is reasonably proportional to the potential benefits offered by the proposal.

Any additional information provided on request to one or more proponents may at SA Power Networks' discretion be made publicly available to all potential proponents.

4.4 Invitation for submissions

Submissions to this EOI are due on or before the 26 May 2023.

Assessment of responses are proposed to be completed by SA Power Networks by the end of June 2023.

Depending on responses, SA Power Networks may seek to engage with one or more respondents to progress to a trial in 2024/25.

There are several essential elements that need to be included within any proposal to ensure it can be adequately evaluated. This is so SA Power Networks can ascertain and compare different proposals' technical and financial viability as well as the feasibility of their delivery within the required timeframe.

If at any time SA Power Networks requires further information during its assessment, the relevant parties will be contacted in a timely manner and given the opportunity to provide the necessary material.

Any prospective submission should also recognise SA Power Networks' license conditions and the NER ring-fencing rules which restrict the type of assets we are permitted to operate within the NEM and therefore adopt as part of any solution. For example, any proposal suggesting the construction of an embedded generating system for adoption and operation by SA Power Networks will be rejected on the basis of technical unviability unless ownership is under a class waiver permitting DNSP ownership (which is the case for the ARENA funded Community Battery program).

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

5 Requirements

5.1 General

Proponents may provide solutions to any number of the constraints identified below. South East Region Constraints (Appendix A), Tailem Bend Region Constraints (Appendix B) and Bordertown Substation Constraints (Appendix C) can be found on pages 16, 34 and 41 respectively.

A viable non-network solution or where applicable SAPS solution should be able to demonstrate:

(1) Resolution of all identified network constraints or needs;
(2) Deliverability within the required timeframe;
(3) Technical viability through the use of proven technology (eg achieves load reduction to sufficiently remove or delay identified need);
(4) Economic viability (ie combination of costs and resultant net market benefits exceed all alternative solutions);
(5) Adequate risk management (eg technical, environmental, legal, financial, social); and
(6) Conformity to/with all implementation requirements (eg planning and development approvals)

5.2 Specific

For each solution, the following information must be included:

a) The type of constraint being addressed;
b) The proposed physical location of the solution;
c) The deployment timeframe and recruitment strategies (if applicable);
d) How the solution will technically solve the constraint;
e) Concept design;
f) The operation regime of the solution;
g) How reliability and accuracy of the solution will be addressed;
h) The life of the solution;
i) The cost of the solution - this should be provided in a modular way, for example $/kW, so the solution may be scaled or applied to similar constraints; and
j) Any specific inclusions and exclusions.

5.3 Constraint Summaries

5.3.1 Constraint 1 – South East Region Constraints (Appendix A)

SA Power Networks has identified emerging system limitations located within the South East region with components along the Beachport Tee to Robe 33kV line being overloaded and the 33kV Snuggery-Hatherleigh-Robe line having insufficient voltage regulation during peak demand conditions. The Robe 7.6kV feeder also has an emerging thermal constraint.

5.3.2 Constraint 2 – Tailem Bend Region Constraints (Appendix B)

SA Power Networks has identified emerging system limitations at the Tailem Bend Connection Point and within the 33kV sub-transmission system between the Tailem Bend Connection Point and the end of line substation Pinnaroo. ElectraNet are responsible for remediating the emerging thermal constraints at the (category 4) Tailem Bend Connection Point however, deferring the need for investment may be in the best interest of all South Australians. Furthermore, there is insufficient voltage management capability on the

33kV sub-transmission system beyond Geranium substation to provide sufficient voltage regulation during peak load conditions.

5.3.3 Constraint 3 – Bordertown Substation Constraints (Appendix C)

Bordertown Substation has an existing system limitation with power transformer overload at Bordertown substation following an outage of the other power transformer (i.e., under N-1 conditions) during peak demand conditions. The Keith-Wirrega-Bordertown 33kV line also has an N thermal constraint due to the 10 POE forecasted load exceeding the summer normal rating of the line. System limitations within this region have historically been managed via an NSSA (Network Support Service Agreement) contracting generate when load is at risk.

6 Response Schedule

Please provide responses as per the schedule below.

Schedule 1 Registrant's Details & Declaration

Trading Name	<insert name>
Registered Name	<insert name>
ACN	<insert number>
ABN	<insert number>
Address of registered office	<insert address>
Place of business in South Australia (if relevant)	<insert address>
Type of entity (e.g. company, trust, partnership, sole trader, other)	<insert entity>
Key Personnel (e.g. directors, chief executive officer, principal of business etc.)	<insert names and positions>
Telephone	<insert phone number>
Website	<insert URL>

CONTACT DETAILS

Contact Person	<insert name>
Position	<insert position>
Address	<insert address>
Postal address (if different to above)	<insert address>
E-mail	<insert email address>
Telephone	<insert phone number>

Schedule 2 Past Experience on Projects of a similar nature and scale

List details of two (2) project references demonstrating prior project experience of a similar nature and scale. Please include details of project value, project commencement and completion dates and partnership organisational structures employed in the project delivery.

Schedule 3 Referees

Details of at least two references for past experience on projects of a similar nature and scale as outlined in Schedule 2:

Reuse this page if more than three references are provided.

Referee 1:	
Company Name	< insert name of organisation>
Company Address	< insert address >
Contact Person	< insert name >
Contact Person Title	< insert title >
Contact Person E-mail	< insert email address >
Contact Person Telephone	< insert phone number >
Project Description & Value	< insert project details >
Referee 2:	
Company Name	< insert name of organisation>
Company Address	< insert address >
Contact Person	< insert name >
Contact Person Title	< insert title >
Contact Person E-mail	< insert email address >
Contact Person Telephone	< insert phone number >
Project Description & Value	< insert project details >

Schedule 4 Project Delivery

Please detail how each non-network solution would be delivered to those projects you are proposing a solution to. <u>Please note, it is not mandatory to provide a solution to all constraints, but rather those you have nominated based on your skills and capabilities</u>.

Overview of solution	Brief overview of proposed solution including any diagram(s) that assist with description of the solution. Describe how the solution will technically solve the constraint.
Delivery Mechanism	Will the solution be delivered as a service, capital expenditure or other mechanism?
Type of technology/solution proposed	Eg. BESS, rotational generation, Load reduction, Inverter Energy System
Level of load reduction	MW/MVA
Duration of load reduction achievable	Hours
Dispatching arrangement (pre-contingent)	
Notice periods required to invoke the non-network support	
Availability and reliability performance details	
Technical details of the technology/solution	
Project components	List component type, make & model of major project components.
Warranty Details	Detail warranty of associated major project components
Operating regime	How will the solution operate to address the constraint?
Solution timing	Detail when the solution could be delivered listing relevant milestones, including: • Completion of initial design • Regulatory approvals (if required – e.g. Development, SA Power Networks, AEMO, OTR) • Procurement of components • Construction of solution • Commissioning/testing Commencement of operations
Solution duration	Detail the lifespan of the solution
Willingness to enter into a NSSA	A statement indicating the proponent's willingness and to enter any other agreement required to enable the solution to be implemented
Reliability and Accuracy	Non-network solutions or SAPS solutions must be capable of reliably delivering electricity under a range of conditions and must meet all relevant EDC

	and NER requirements related to quality of supply. Generation proposals should consider any operating and maintenance costs, connection costs required under the NER such as AEMO registration or ESCOSA licensing. In particular, a non-network solution must provide some level of redundancy or over-subscription (eg if involving aggregated load curtailment) to ensure the level of network support required can be provided in order to be considered a credible alternative to a network solution. SAPS solutions must be capable of complying with the SAPS performance and supply standard as published in SA Power Networks' website.
Certainty	Submitted proposals must use proven technology and have funding and project management to be delivered within the required timeframe. Corrective action is critical to the reliability of the electricity supply system; it is not considered appropriate to rely on high-risk developments that may not proceed.
Longevity	Non-network solutions must be capable of resolving the forecast system limitation or deferring network expenditure for a period of at least three years. SA Power Networks considers that the overhead involved in undertaking a third-party solution makes a period shorter than this uneconomic. The longevity of SAPS solutions will be assessed depending on the identified need to be addressed.
Scalability of the solution	How could the solution be scaled up or down?
Inclusions/exclusions	Details all relevant inclusions and exclusions to the solution
Market prices	Proponents of embedded generation proposals should note that NER clause 5.3A.12 (b) (1) prohibits a generator that is providing network support from setting the market price.

Note: We do not expect the proponent at this stage to have a confirmed site or to have carried out detailed engineering, environmental or town planning studies other than those activities required to demonstrate that the proposal is technically viable.

6.2 Pricing

Please detail the costs to be incurred by SA Power Networks under the proposal including:

Initial Capital Expenditure	Detail initial charges such as capital expenditure and/or setup fees.
Ongoing Charges	List ongoing charges such as weekly, monthly fees and/or event-based charges.
Other Charges	
Annual escalation	Annual adjustment of ongoing fees (e.g. CPI)

The proponent's cost proposal should be all inclusive, including consideration of the proponent's operating and maintenance costs and all other costs expected to be incurred in providing the service within its cost offering.

Declaration:

Re: **EOI Non-Network Solutions** ("the Expression of Interest")

I , ……………………….of ………………………………………………………….

[insert name and address of declarant]

do hereby declare as follows:

1. I hold the position of ……………within ………………………. ("the Registrant") and that I am authorised to provide this declaration on its behalf.

2. I confirm that the Response submitted by the Registrant is independent and that there has not been any unlawful collusion with any other Supplier or party in connection with this Expression of Interest Process. This clause does not apply to any formal joint venture contractual arrangement entered into between the Supplier and any other person(s), the details of which have been provided to SA Power Networks as part of the Response submitted by the Supplier.

3. I understand that if any part of this declaration is found to be false, SA Power Networks reserves the right (regardless of any subsequent dealings) to:
   - terminate negotiations with the Registrant;
   - terminate consideration of the Registrant's Response; and
   - terminate any contract between the Registrant and SA Power Networks in relation to the Procurement without any obligation on SA Power Networks to make or receive any payment to or from the Registrant.

………………………………………………………../……../ 2023

Signature Date

Note: If your Response is submitted jointly with another party or parties then each joint respondent must provide a signed declaration in the form set out in this Appendix.

7 Next Steps

Following your response to this EOI SA Power Networks expect to proceed following the steps below:

- Formal review of the proposed solutions including clarifications as required – Indicatively 4 weeks.
- Decision and notification – Prior to end of 2023.

Depending on responses SA Power Networks may seek to engage with one or more respondents to progress to a trial.

Appendix A – South East Region constraint

Background

SA Power Networks' South East region includes the region from Tintinara in the north to Port MacDonnell in the south and extends westwards to the coast and eastwards to the Victorian border. There are six main transmission connection points in the South East, being Keith, Kincraig, Snuggery, Mount Gambier, Blanche and Penola West.

Electricity is supplied to the various towns and localities throughout the South East region directly from the 33kV sub-transmission network or via zone substations. These zone substations are operated at 33kV stepped down to 11kV (7.6kV at Robe).

The 33kV sub-transmission system extending from Snuggery Transmission Connection Point to the end of line substation Robe has emerging system limitations including both thermal and voltage constraints during peak demand conditions.

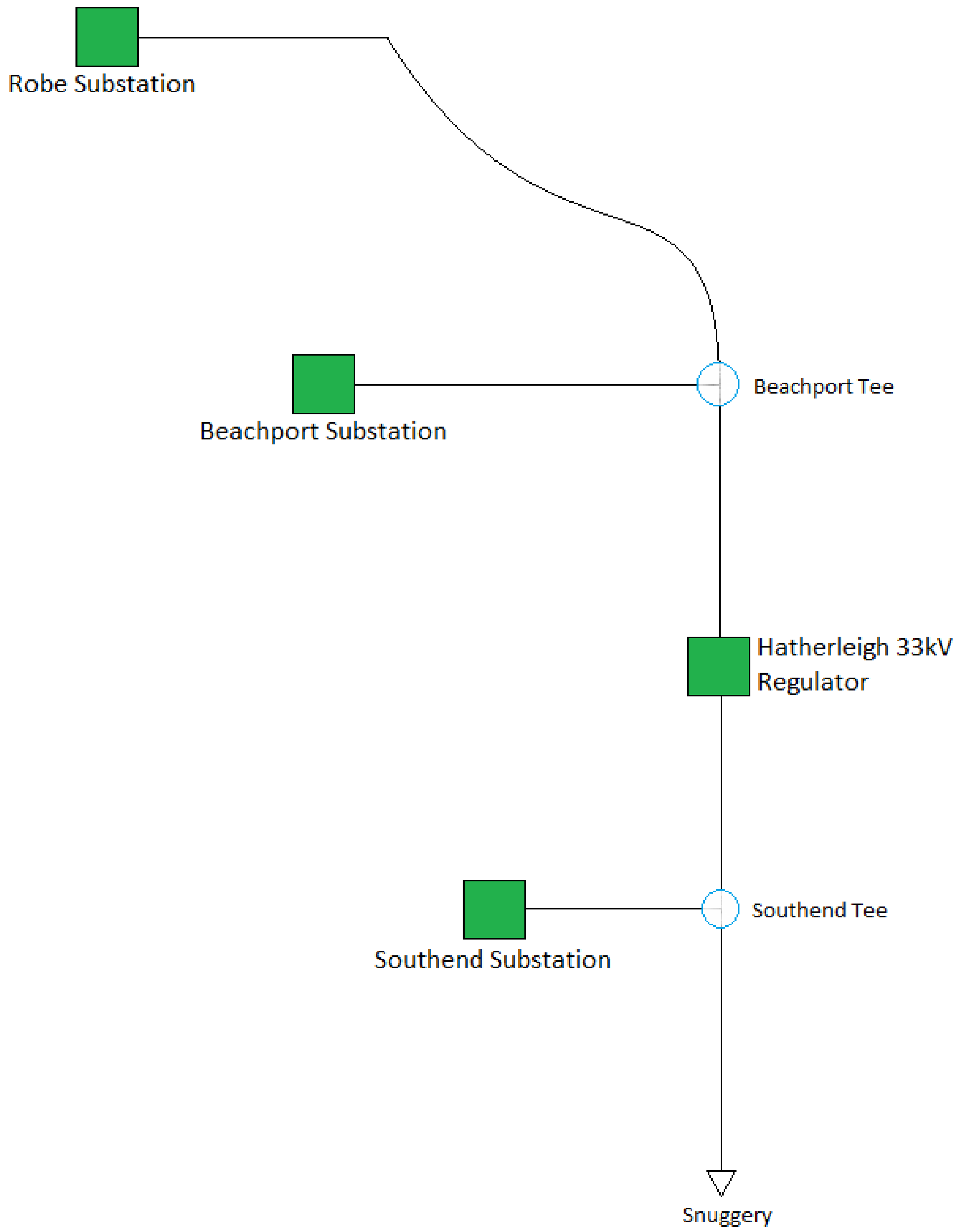

Figure A.1 – Simplified Snuggery to Robe Line Diagram

Specifically, the Beachport Tee to Robe 33kV line has an emerging thermal constraint and the 33kV South End Tee -Hatherleigh-Robe line has an emerging voltage constraint. The Beachport Tee to Robe 33kV line supplies approximately 2,500 customers and the 33kV South End-Hatherleigh-Robe line supplies approximately 7,000 customers. The Robe 7.6kV feeder, supplying 1,245 customers, also has an emerging thermal constraint. The constrained regions comprise of mainly residential load connections. Figure A.1 outlines the entirety of the South East region discussed in this constraint.

Although the new loads expected to connect in Robe during 2023/24 are relatively small, the load as seen at Beachport Tee and South End Tee, are considerably greater due to the contribution from the 33kV line losses. Given all the above mentioned constraints are triggered by the load being predominately located in Robe, it is possible to solve all constraints with a solution located within the Robe township and surrounding areas.

The specific lengths of the lines are given below in kilometres:

- South End Tee to South End – 3.50km
- South End Tee to Hatherleigh – 11.72km
- Hatherleigh to Beachport Tee – 0.94km
- Beachport Tee to Robe – 65.40km
- Beachport Tee to Beachport – 17.36km

Network Visualisation / DAPR Portal

SA Power Networks has engaged Rosetta Analytics to develop and host a portal with a visualisation of our distribution network. The portal includes - Network overlays of zone substations, sub-transmission lines and distribution feeders on google maps, demand forecast of zone substations and distribution feeders, indication of import and export hosting capacity on 11kV distribution feeders, and system strength levels on distribution zone substations.

To register and access SA Power Network's Rosetta DAPR Portal, follow the link below:
https://dapr.sapowernetworks.com.au/

An overview of the South East region along with a regional map can also be found on page 157 of the SA Power Networks Distribution Annual Planning Report.

Robe 7.6kV Constraint

In Figure A.2, the 10 POE and 50 POE demand forecast for the Robe 7.6kV feeder has been shown from 2023/24 to 2030/31. An N thermal constraint presents from 2023 as the forecast demand exceeds the Summer Normal rating of 2.32MVA.

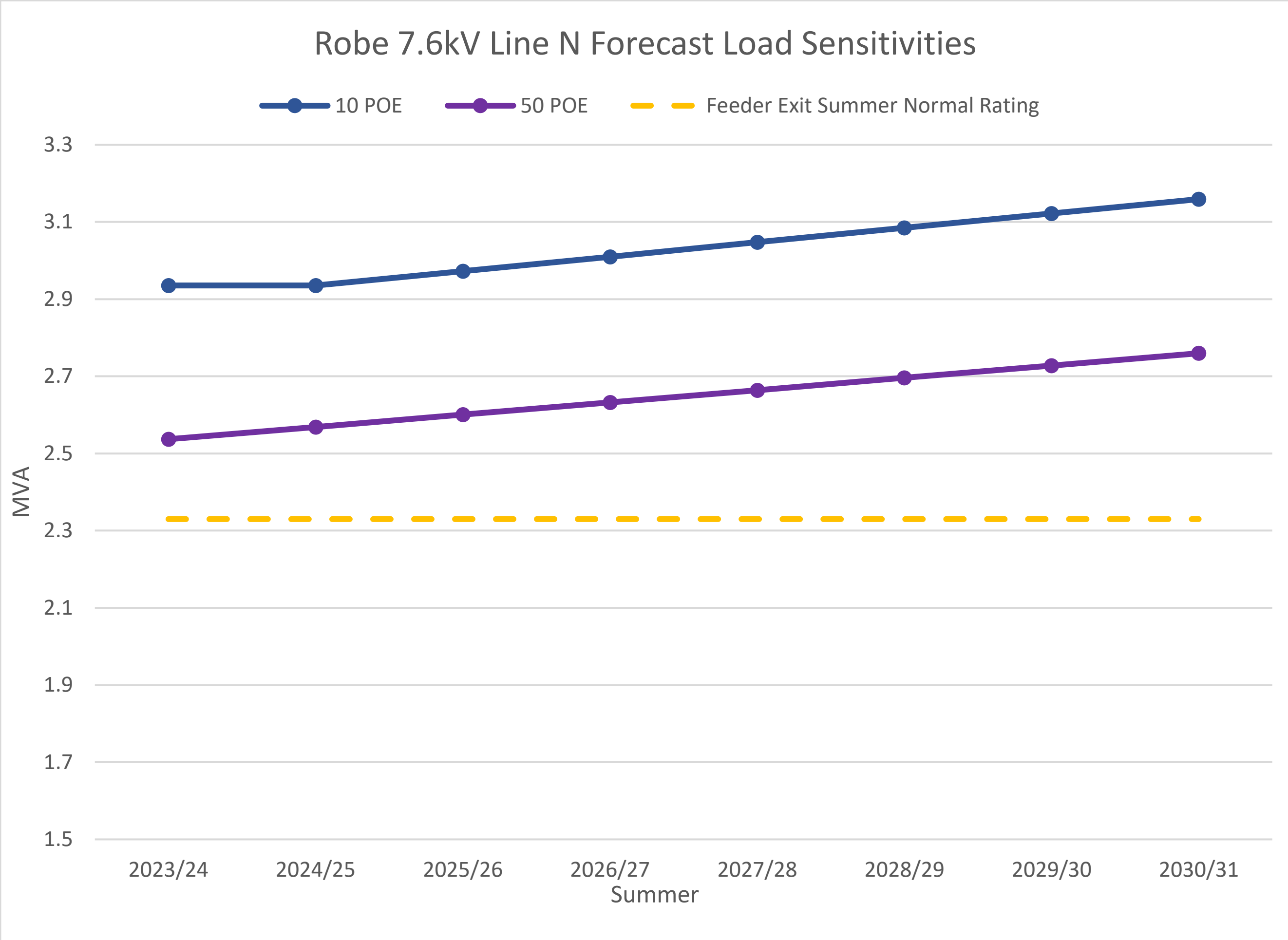

Figure A.2 - Robe 7.6kV Line N Forecast Load Sensitivities

Figure A.3 shows the load duration curve for Robe 7.6kV feeder. The peak load value used to calculate the load duration curve is 2.45MVA, which is equivalent to the 10 POE forecast load for 2023/24 less the additional new load connections.

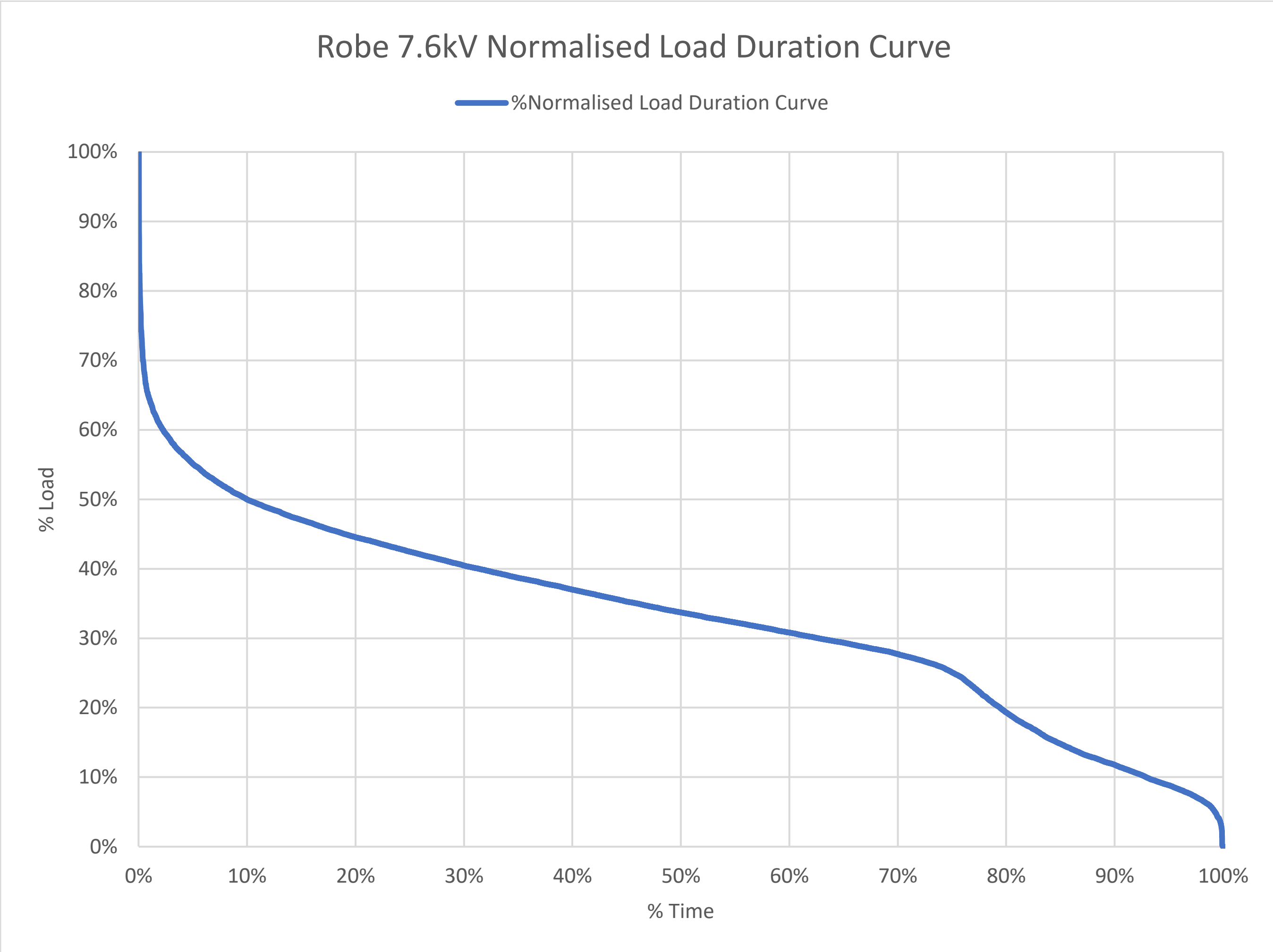

Figure A.3 - Load Duration Curve for Robe 7.6kV feeder

Figure A.4 represents Robe 7.6kV feeder load profile on a peak summer load day in 2022. The peak load is above the feeder exit summer normal rating of 2.32MVA. The measured load at the feeder exceeds the current 2023/24 forecast load of 2.45MVA (which excludes any new connections in 2023).

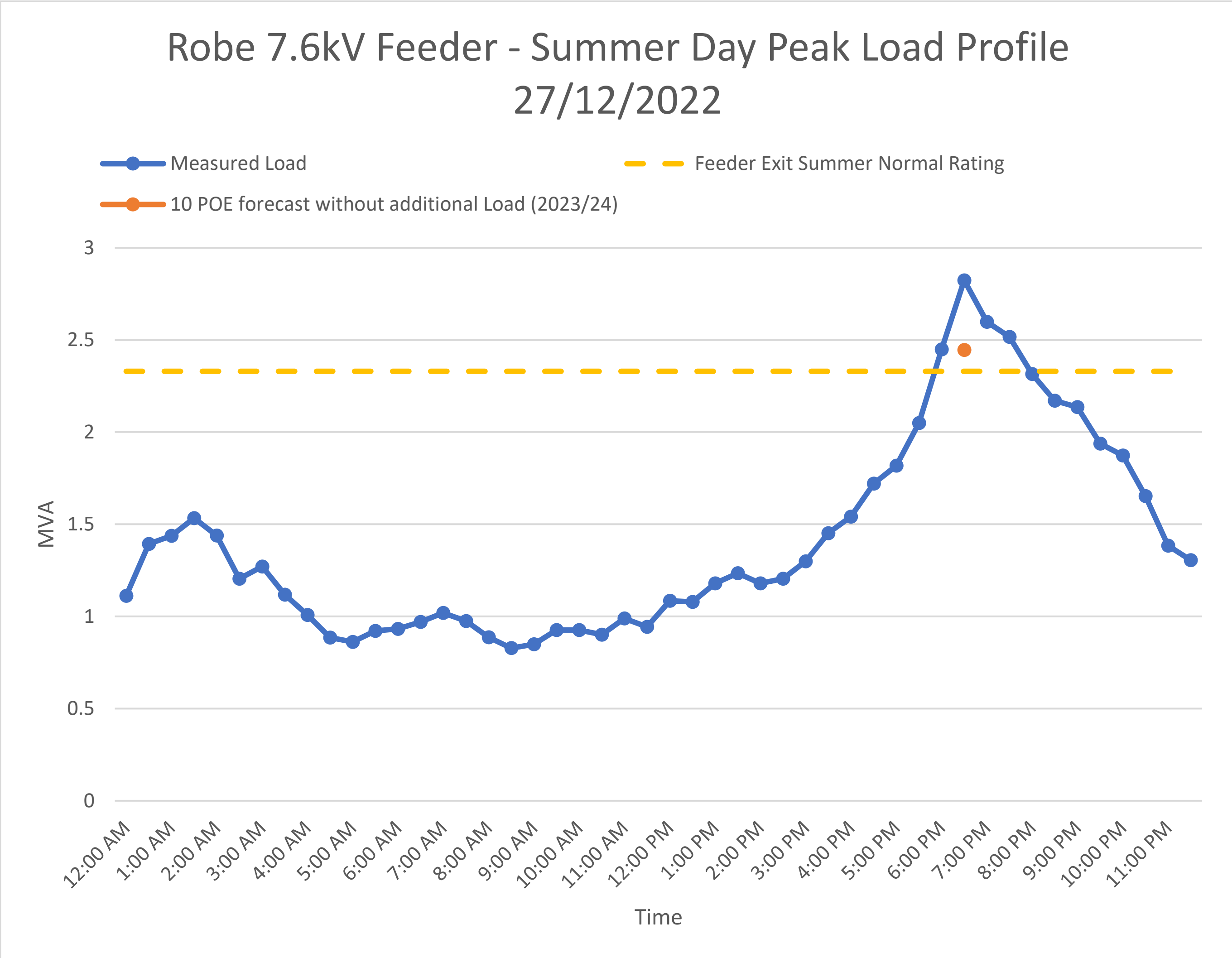

Figure A.4. – Robe 7.6kV feeder Peak Summer Day load profile as measured on 27/12/2022

Figure A.5 illustrates the load measured in MVA on the Robe 7.6kV feeder from 1 April 2022 to 31 March 2023. No additional load adjustments have been made to this graph to represent new loads connecting in 2023. The graph shows the feeder exit summer normal rating of 2.32MVA was exceeded on one occasion.

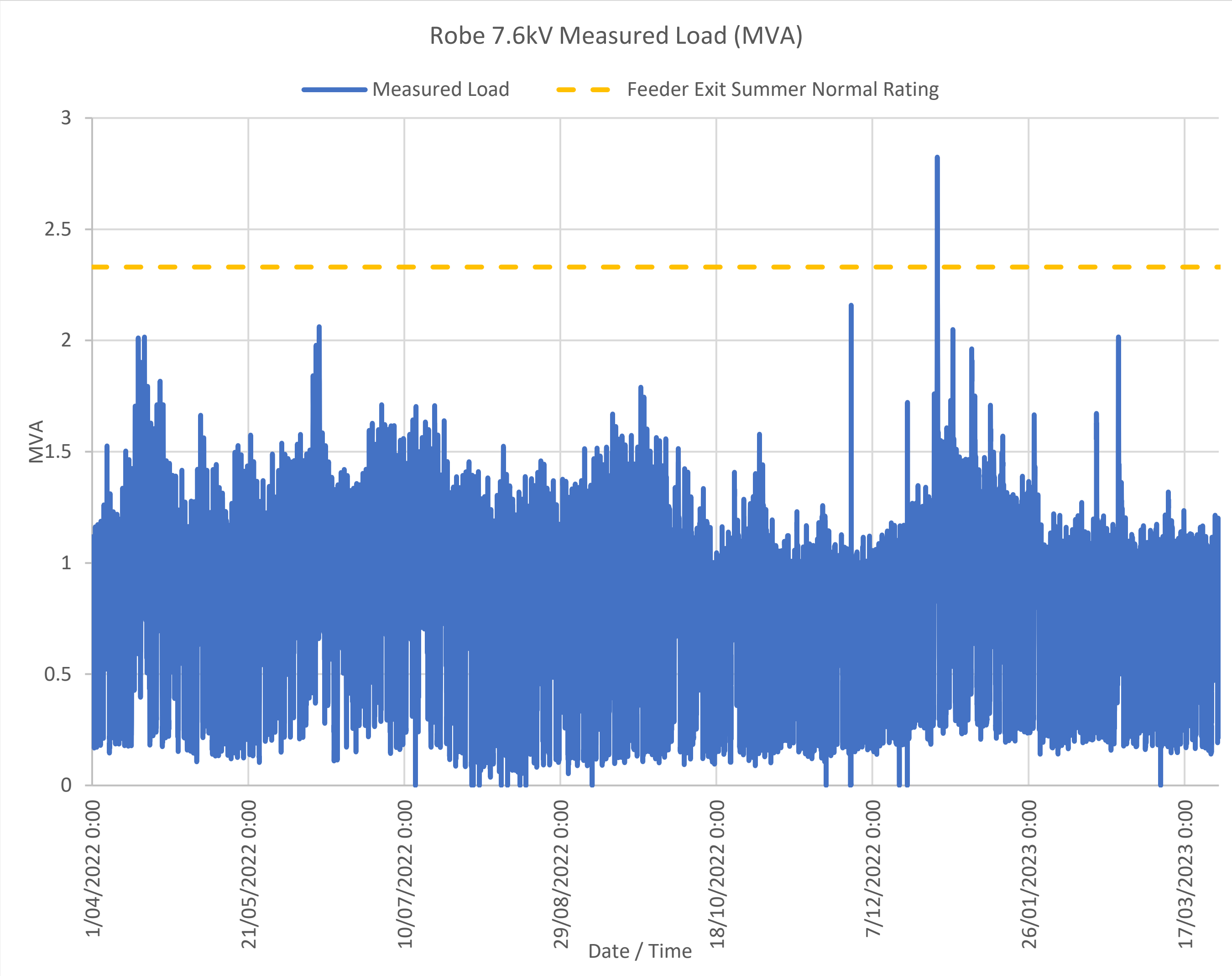

Figure A.5 - Robe 7.6kV Measured Load (MVA) – April 2022 to March 2023

Beachport Tee to Robe 33kV line constraint

SA Power Networks' planning criteria for N country sub-transmission line constraints utilises the 10 POE demand forecast as part of the analysis. In Figure A.6, the 10 POE demand forecast for the Beachport Tee to Robe 33kV line has been shown from 2023/24 to 2030/31. New loads expected to connection in 2023 have been included in this forecast, thus resulting in the 10 POE forecast exceeding the summer normal rating of 5.1 MVA.

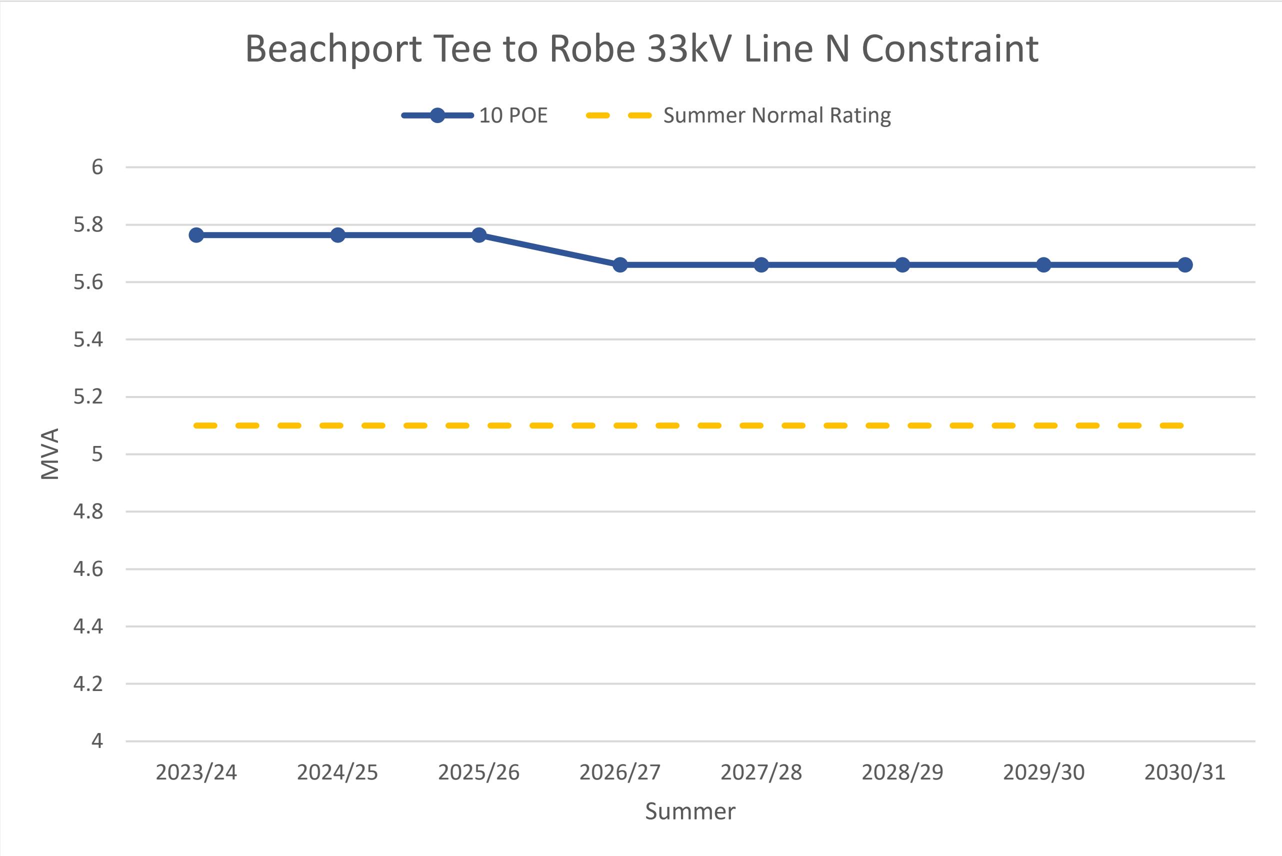

Figure A.6 - Beachport Tee to Robe 33kV Line N Constraint

Figure A.7 shows the load duration curve for the Beachport Tee to Robe 33kV line. The peak load value used to calculate the load duration curve is 5.06 MVA, which is equivalent to the 10 POE forecast load for 2023/24. This peak load value also does not include any of the additional new load connections.

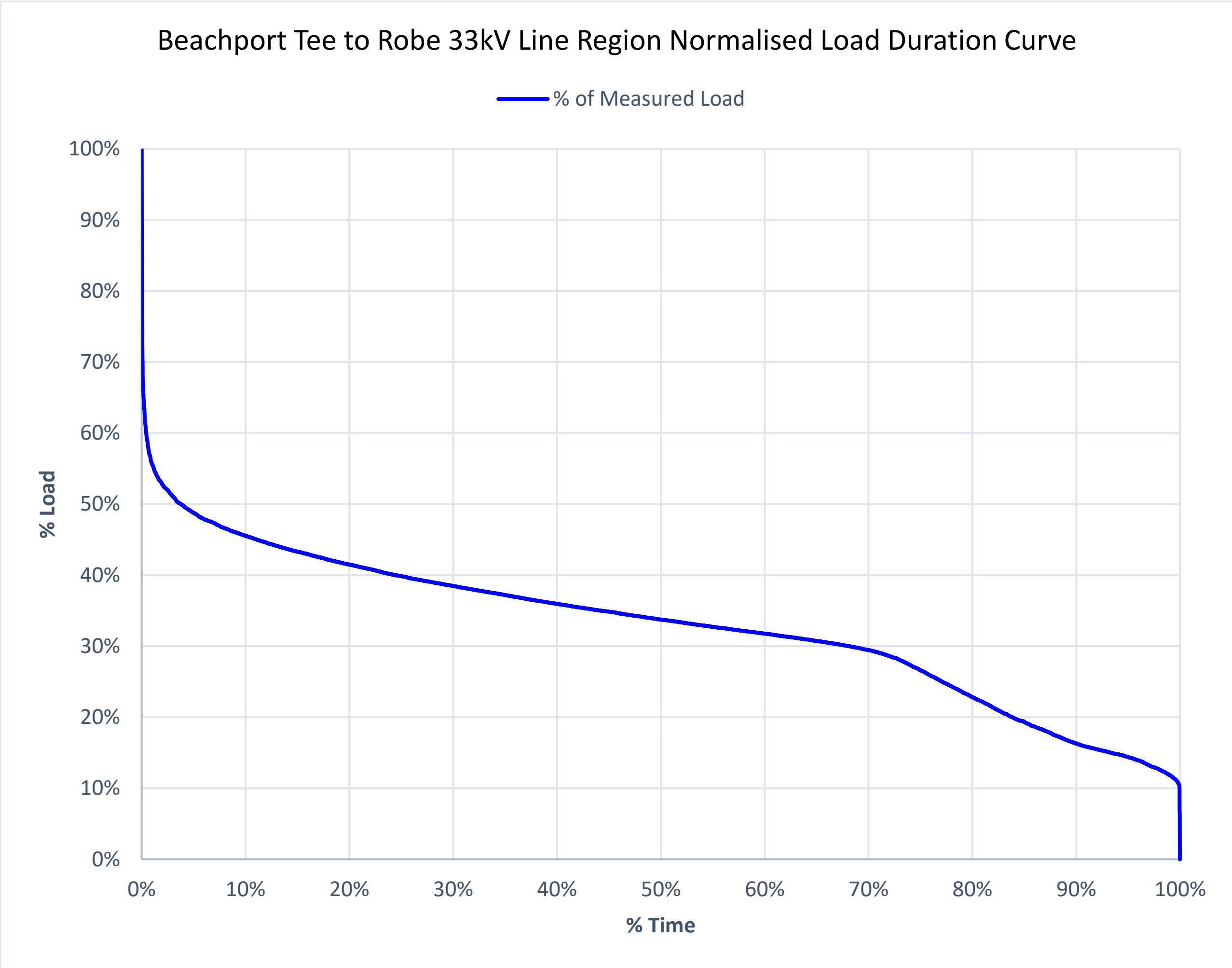

Figure A.7 – Normalised Load Duration Curve for Beachport Tee to Robe 33kV Line

Figure A.8 illustrates a peak summer day load profile. This curve was taken on a summer day in 2022. Additionally, the 10 POE forecast load is represented at 5.06 MVA. With the additional new load expected to connect in 2023/24, the forecast load exceeds the summer normal rating of 5.1MVA.

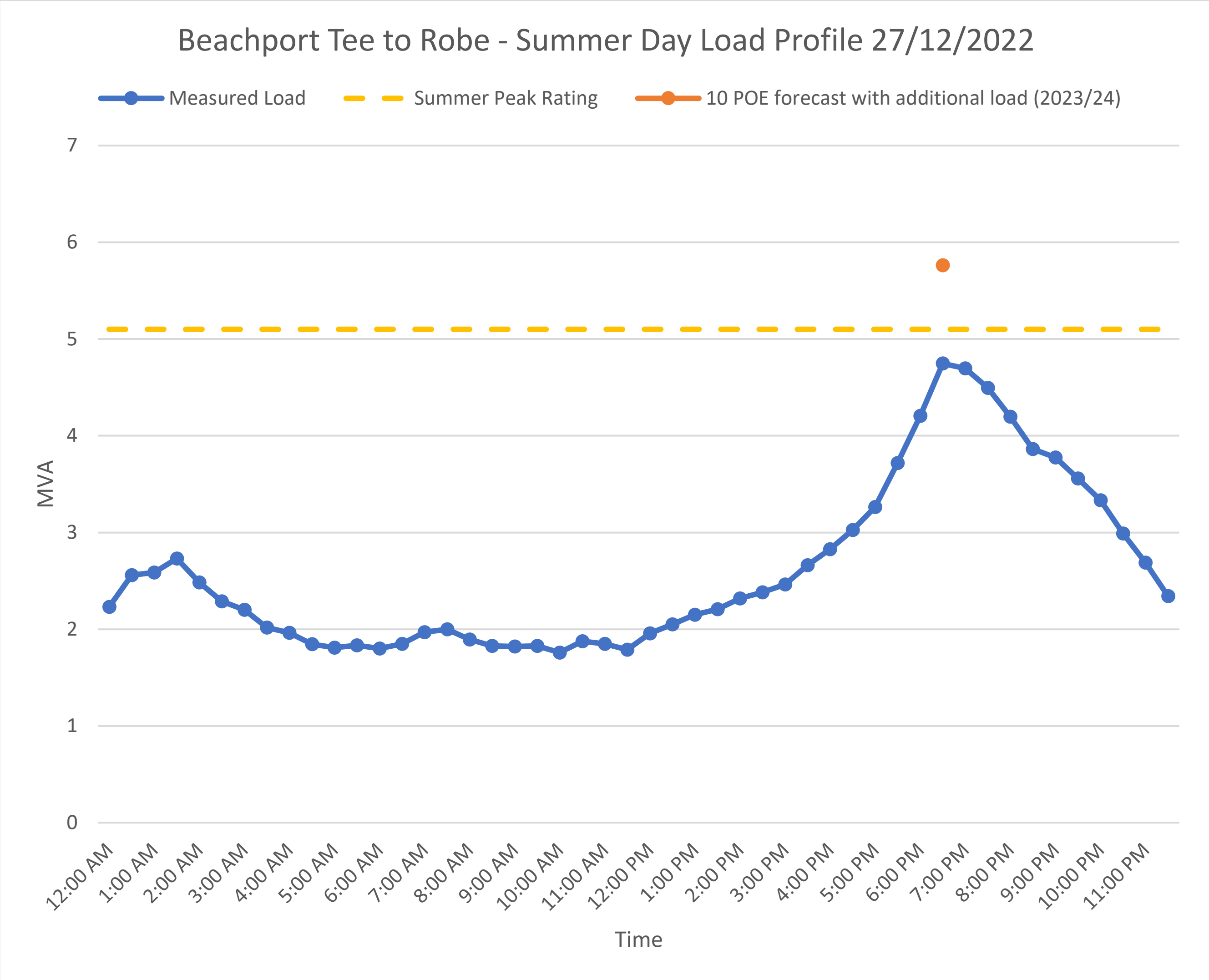

Figure A.8 - Summer Day Load Profile for Beachport Tee to Robe 33kV Line on 27/12/2022

Figure A.9 illustrates the load measured in MVA at the Beachport Tee on the 33kV line towards Robe from 1 April 2022 to 31 March 2023. No additional load adjustments have been added to this graph to represent new loads connecting in 2023. The feeder exit summer normal rating of 5.1MVA has not been exceeded during this period.

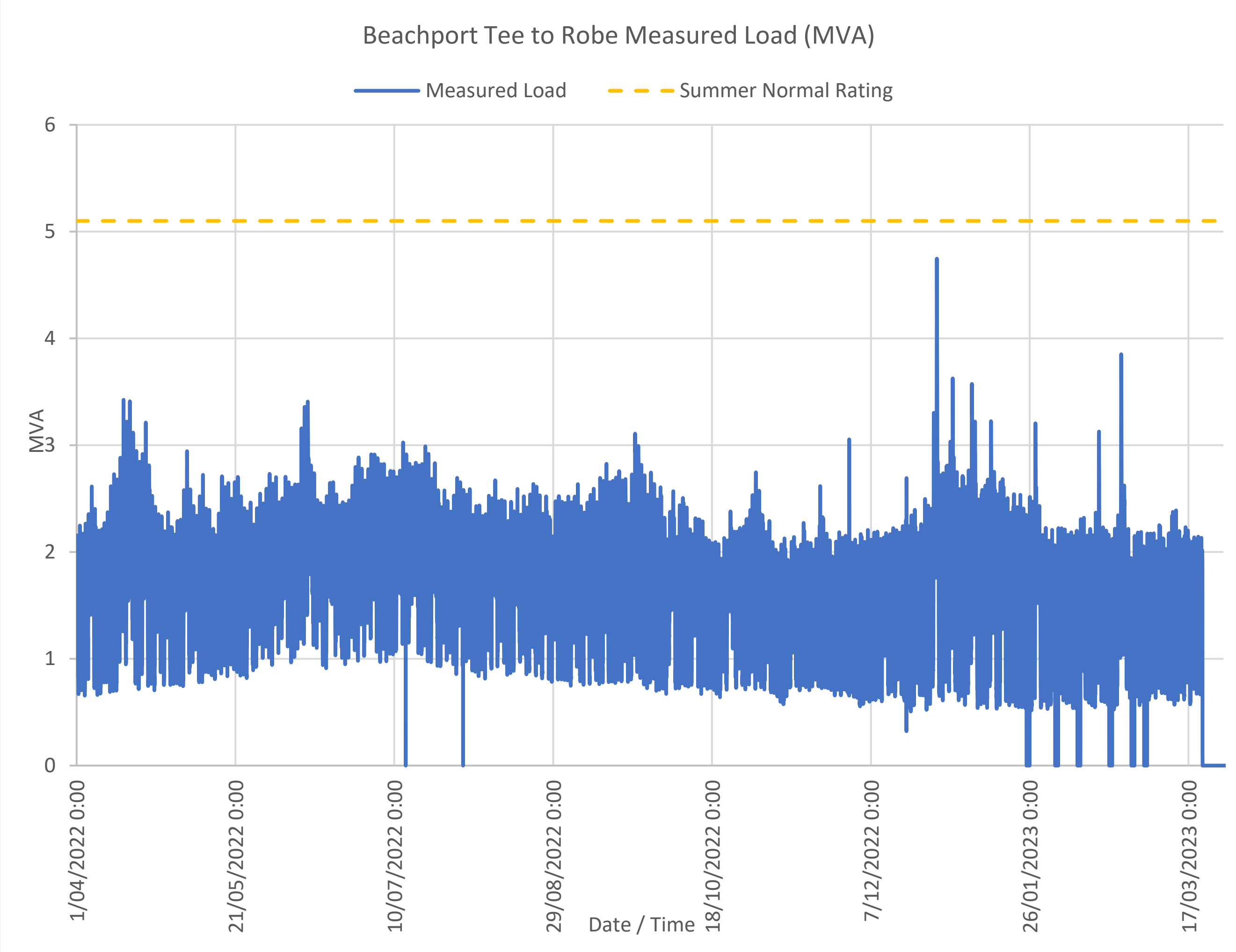

Figure A.9 – Beachport Tee to Robe 33kV Measured Load (MVA) – April 2022 to March 2023

South End Tee to Hatherleigh 33kV Constraint

In Figure A.10, the 10 POE demand forecast for the South End Tee to Hatherleigh 33kV line has been shown from 2023/24 to 2030/31. The voltage constraint emerges when the demand observed on the South End Tee exceeds 7.7MVA. The 10 POE forecast, including the additional new load connections expected in 2023/24, exceeds the system limit of 7.7MVA.

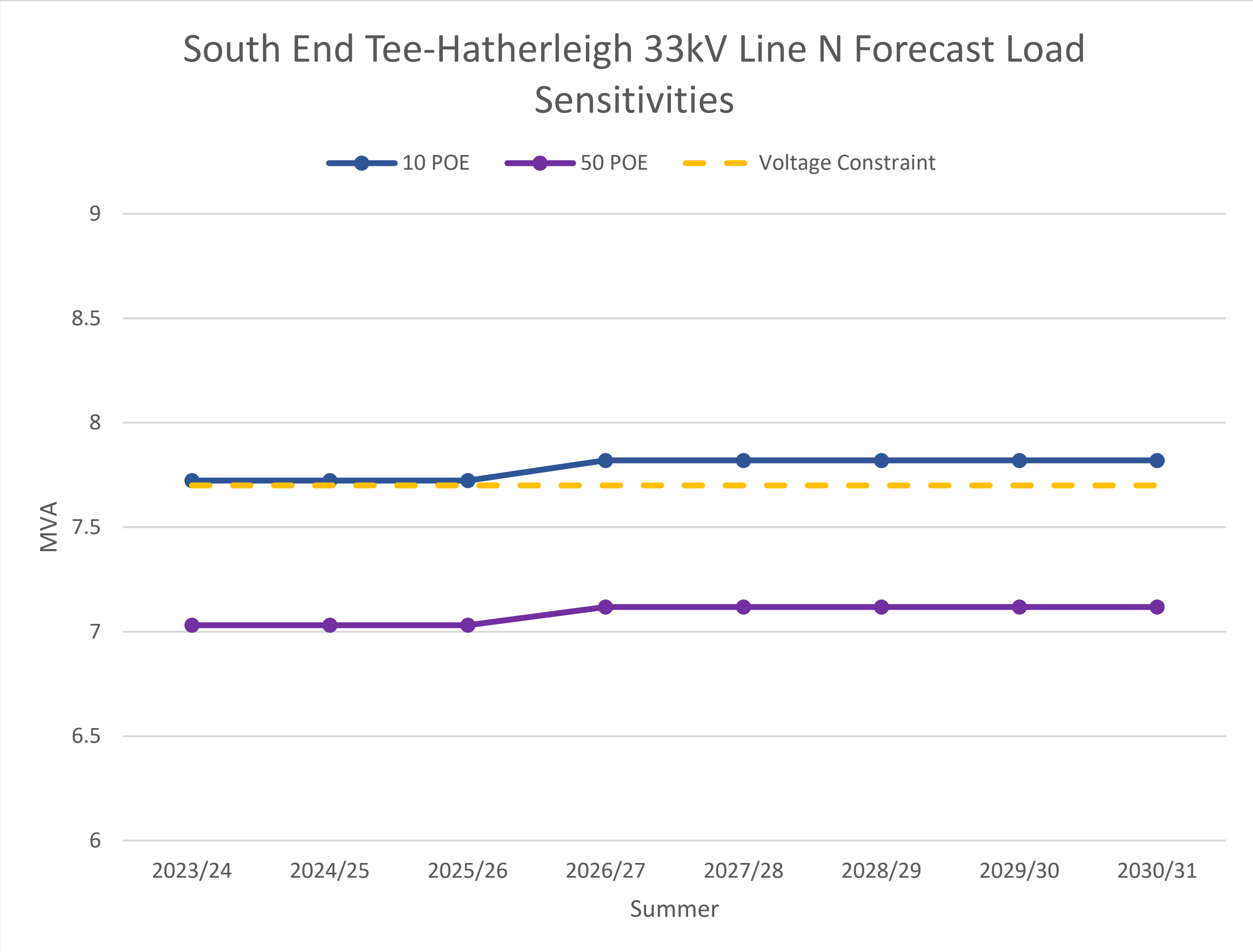

Figure A.10 – South End Tee-Hatherleigh 33kV Line N Forecast Load Sensitivities

Figure A.11 is the load duration curve from the South End Tee to Hatherleigh 33kV line. The peak load value used to calculate the load duration curve does not include any new load connections. It has been set at 6.92MVA which is equivalent to the 10 POE forecast load for 2023/24.

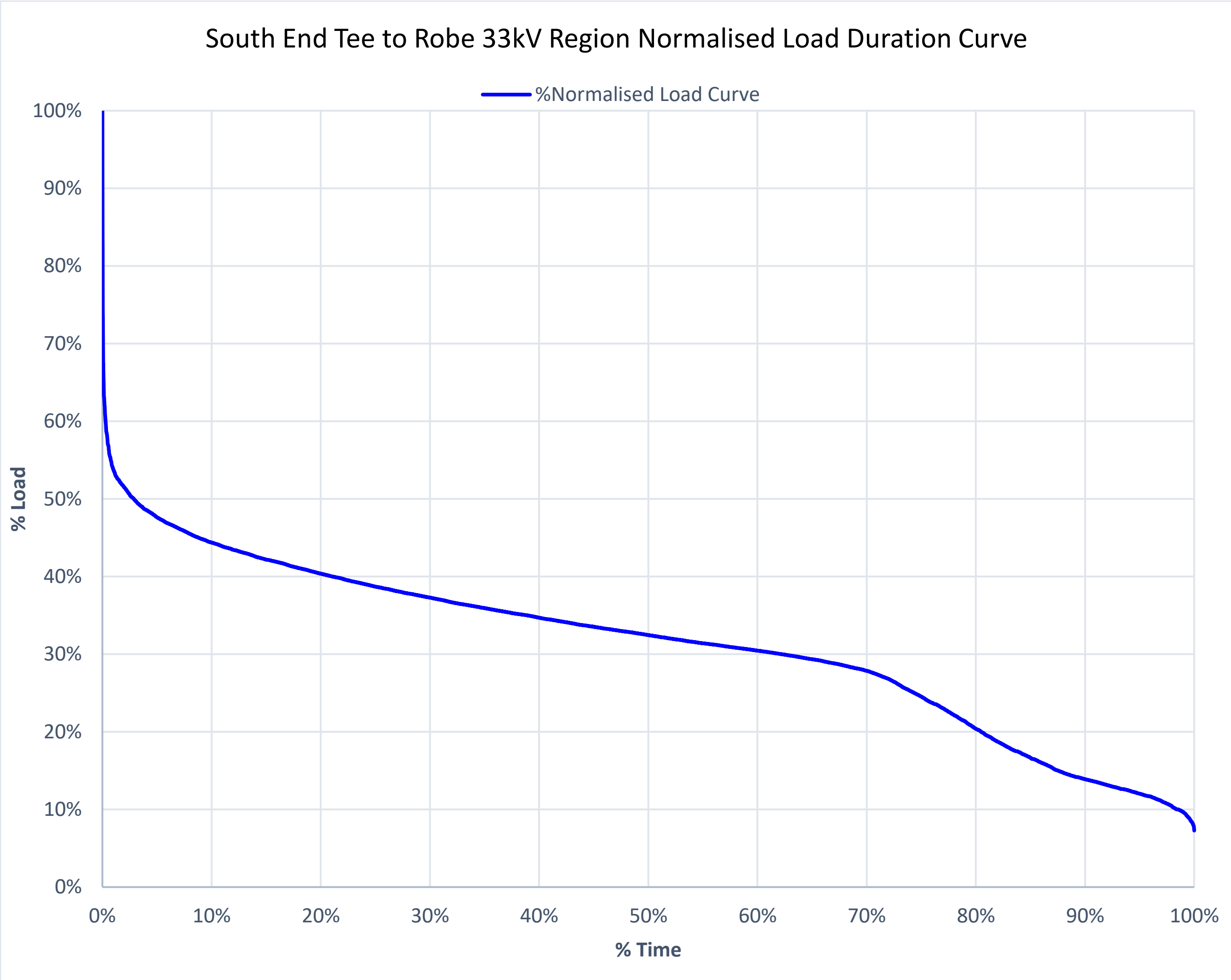

Figure A.11 – Normalised Load Duration Curve for South End Tee to Hatherleigh

Figure A.12 represents a summer peak load profile using measured load from 27 December 2022. The current voltage threshold for this constraint is shown at 7.7MVA. With the additional new load expected to connect in 2023/24, the forecast load of 7.72MVA exceeds the voltage constraint system limit.

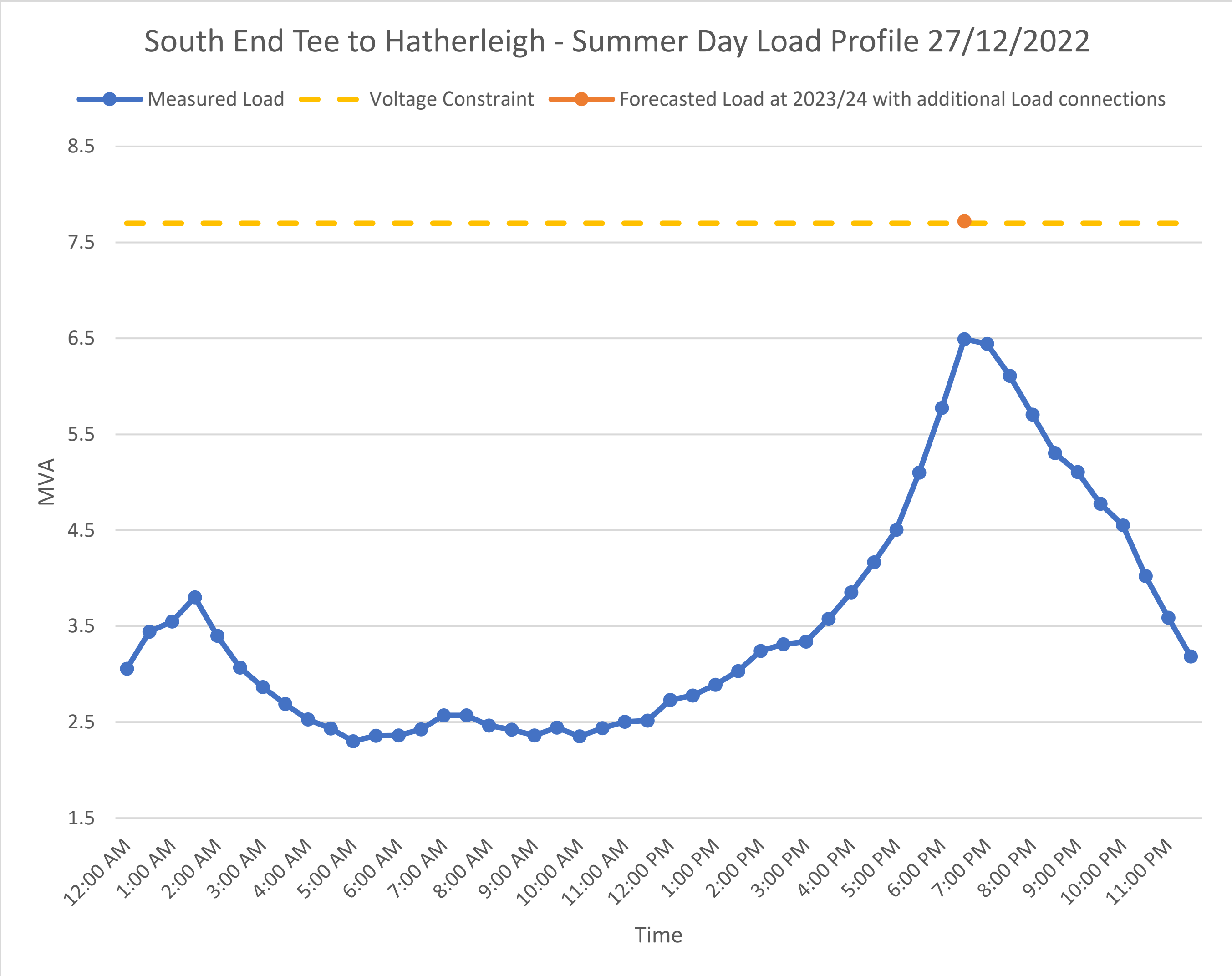

Figure A.12 - Summer Day Load Profile for South End Tee to Hatherleigh 33kV Line on 27/12/2022

Figure A.13 illustrates the measured load in MVA at the South End Tee on the 33kV line towards Hatherleigh from 1 April 2022 to 31 March 2023. No additional load adjustments have been added to this graph to represent the new load connections in 2023. The system limit of 7.7MVA represents the voltage constraint has not been exceeded during this period.

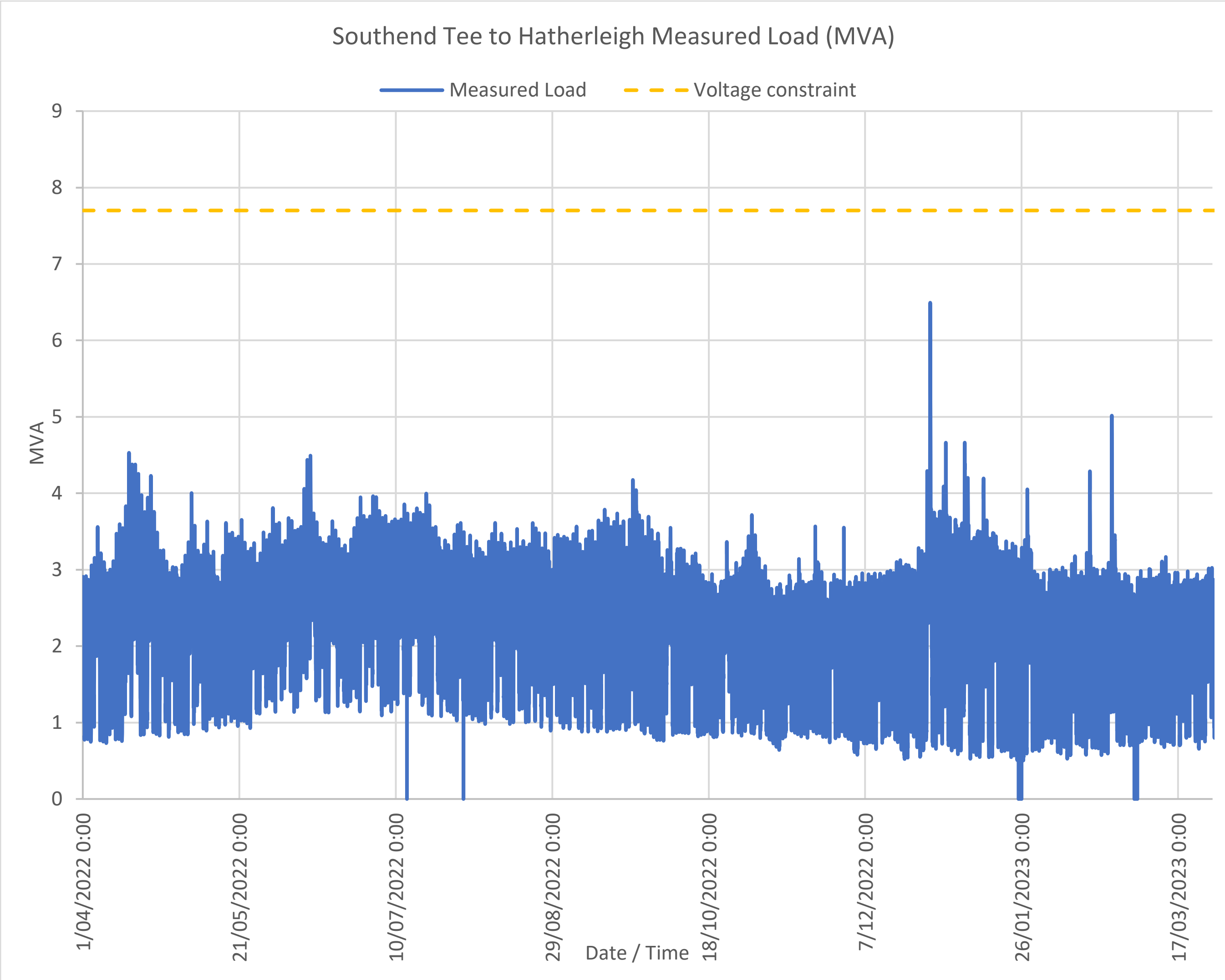

Figure A.13 – South End Tee to Hatherleigh 33kV Load Profile (MVA) – April 2022 to March 2023

Size of load reduction or additional supply

The estimated load at risk represents the size of load reduction and/or additional supply that would be required from a non-network solution in each year under 10 POE conditions to avoid one of the network options being commissioned (since each network option is designed to eliminate all load at risk).

Figure A.14 represents the estimated load at risk reduction for the Robe 7.6kV feeder being 0.61MVA in 2023/24 and 2024/25, then increases incrementally to 0.83MVA in 2030/31.

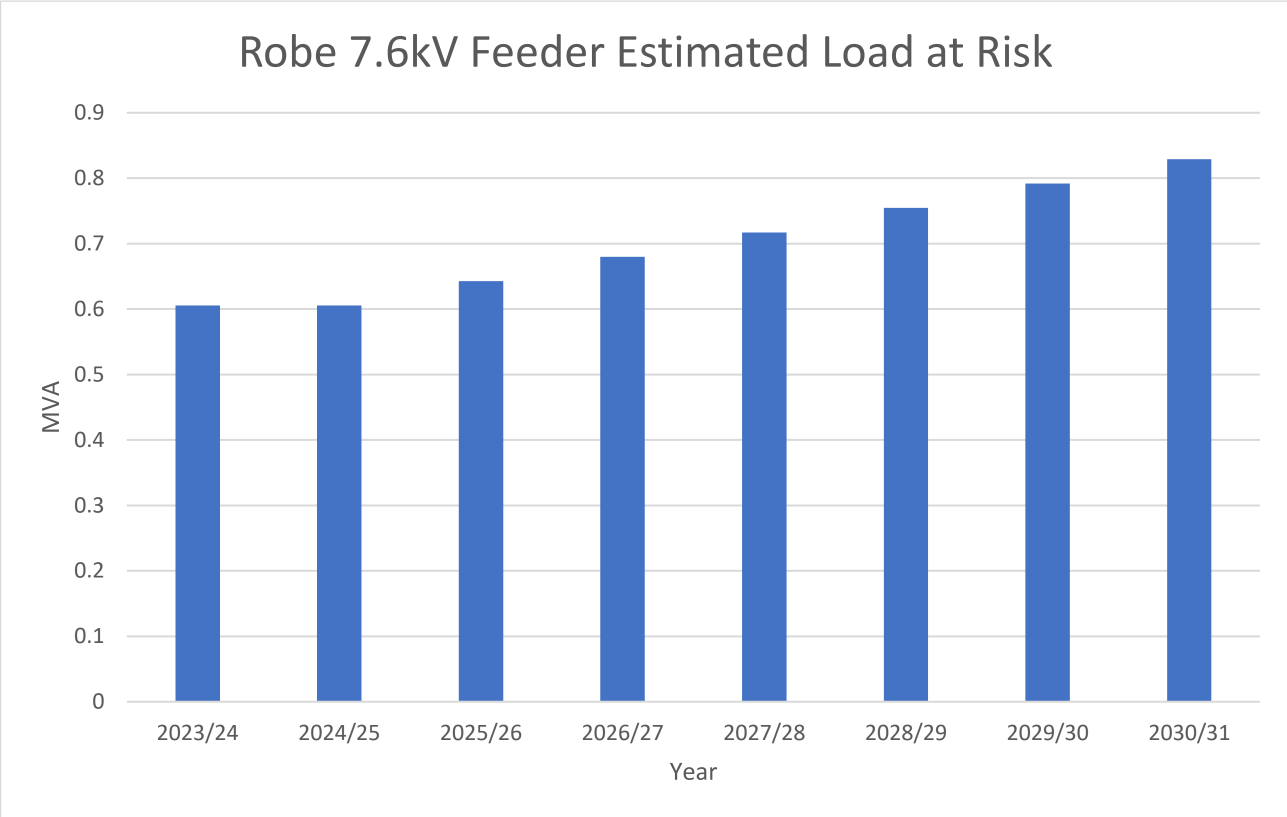

Figure A.14 – Robe 7.6kV feeder load at risk under 10 POE conditions

In Figure A.15 the estimated load at risk reduction for the Beachport Tee to Robe 33kV line, begins at 0.66MVA in 2023/24 and stays constant for 3 years (inclusive). It then decreases by 0.10MVA in 2026/27 and remains constant until 2031/32.

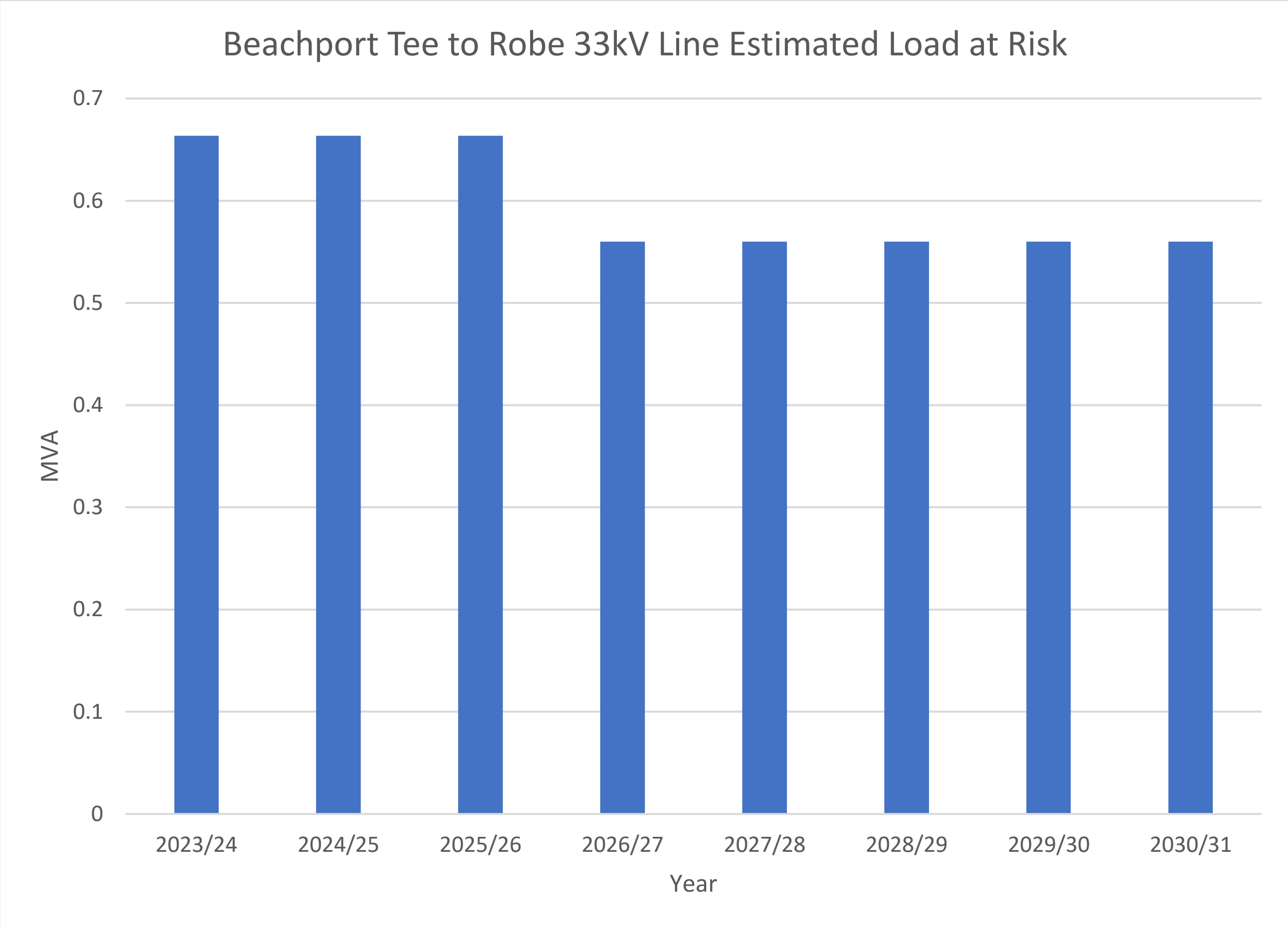

Figure A.15 - Beachport Tee to Robe 33kV Line load at risk under 10 POE conditions

In Figure A.16 the estimated load at risk reduction for the South End Tee to Hatherleigh 33kV line, begins at 0.02MVA in 2023/24 and stays constant for 3 years (inclusive). It then increases by 0.10MVA in 2026/27 and remains constant until 2031/32.

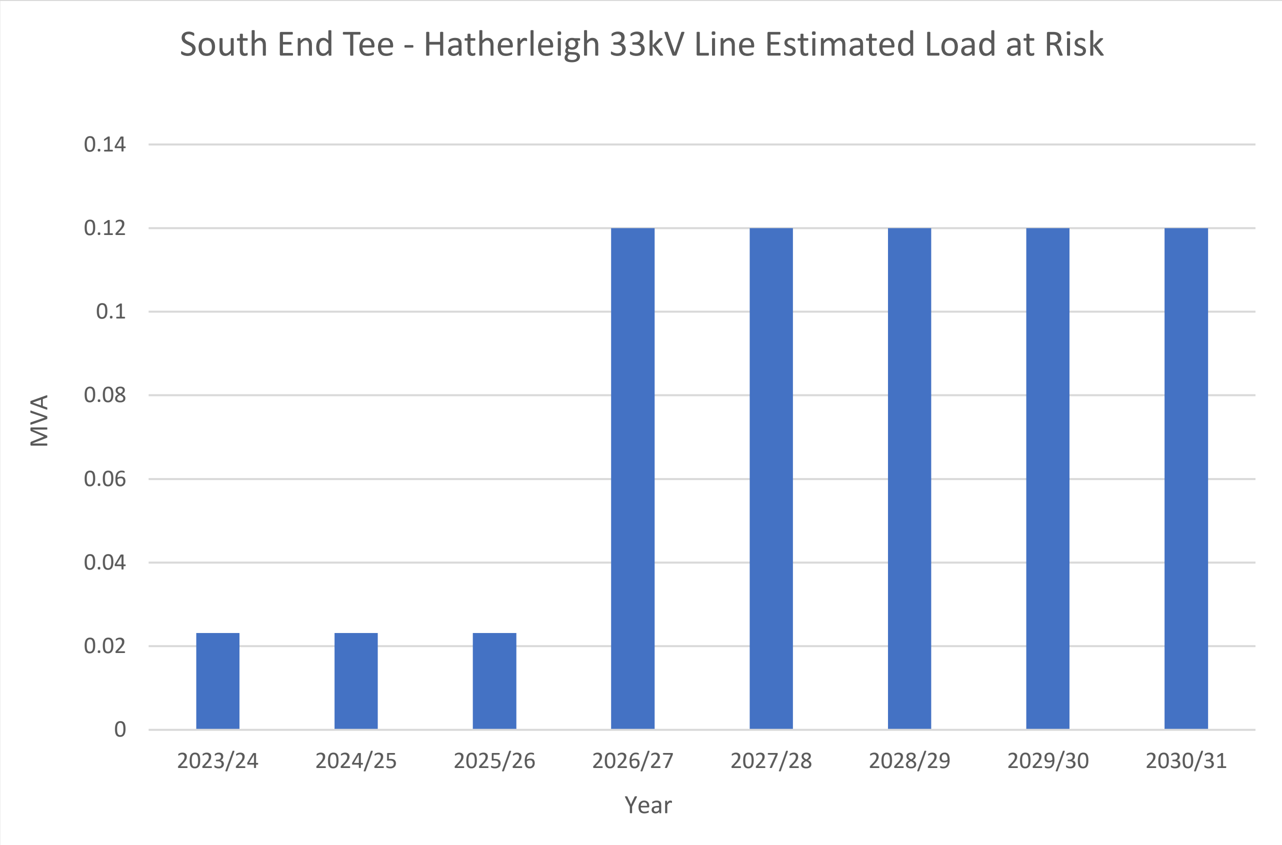

Figure A.16 - South End Tee to Hatherleigh 33kV Line load at risk under 10 POE conditions

Location

Each sub-constraint of the South East region has ideal locations where the non-network solutions can be placed. All the solutions can potentially be solved by the same peak lopping solutions. The specific ideal and potential locations for each of the individual sub-constraints can be found below.

The Robe 7.6kV feeder constraint has an ideal solution location in the Robe township – at the Robe substation or along the Robe 7.6kV feeder.

The Beachport Tee to Robe 33kV line constraint has an ideal solution location in the Robe township. Other potential locations include between Beachport and Robe, at Robe substation or along the Robe 7.6kV feeder.

The South End Tee to Hatherleigh 33kV line constraint also has an ideal location in the Robe township. Other potential locations include downstream of the Hatherleigh Regulator along the 33kV line, at the Robe substation or along the Robe 7.6kV feeder.

Timing

Current forecasts indicate a solution is needed prior to the start of Summer 2023/24. SA Power Networks will consider managing this constraint operationally to allow for a solution to be delivered in 2024.

Peak load in the area typically occurs in summer months coinciding with the school and public holiday times between mid-November and mid-March when local temperatures exceed 38^{o} C – in groups of two to three consecutive days.

Maximum customer load in this area typically occurs between 16:00 and 22:00.

Contract Duration

At discretion of the respondent. A fixed period contract followed by provision for annual extensions would appear to be appropriate, however variations will be considered.

Contract Services

At the discretion of the respondent. It is not a requirement that one respondent’s solution fully resolves the constraint. It would be most favourable for solutions to be scalable and pricing to be modular to address the issue as it is exposed.

Appendix B – Tailem Bend System Constraint

Background

The Tailem Bend connection point (Category 4 CP Substation) is forecast to be overloaded in 2030. SA Power Networks is working closely with ElectraNet to understand the impact and timing of any connection point upgrade works, driven by the load growth in the region.

The sub-transmission line from Tailem Bend to Geranium and Geranium to Lameroo is designed for operation up to a temperature of 60°C (T60) and the line from Lameroo to Pinnaroo is designed for operation up to a temperature of 50°C (T50).

The approximate 120km of 33kV sub-transmission line between the Tailem Bend Connection Point and the end of line zone substation Pinnaroo, has six zone substations and three 33kV voltage regulators. The 33kV line from Geranium to Pinnaroo supplies approximately 1,900 customers with the connections predominately being residential and industrial loads. The existing voltage management capability on the 33kV system is unable to support the present peak load.

During peak load conditions, Geranium voltage regulator reaches top tap. Insufficient voltage regulation could lead to voltage collapse. A committed load increase downstream of Geranium is forecast for 2023 which will exacerbate the existing voltage constraint.

There is significant risk of voltage collapse should Geranium Regulation Substation exceed ~6-6.5MVA. Additionally, the thermal rating within parts of the 33kV backbone feeder is forecast to be overloaded and requires up-rating to avoid breaching thermal ratings during peak demand conditions. Future upgrades may be required if demand continues to grow in the region.

Figure B.1 is the simplified Geranium to Pinnaroo line diagram. The line lengths between the Geranium Substation to Lameroo Substation, and Lameroo Substation to Pinnaroo Substation are shown to be 32.25km and 41.14km, respectively. The source substation is Tailem Bend.

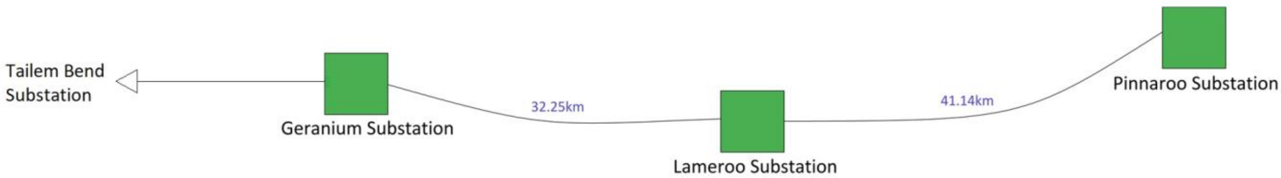

Figure B.1 - Simplified Geranium to Pinnaroo Line Diagram

Network Visualisation / DAPR Portal

SA Power Networks has engaged Rosetta Analytics to develop and host a portal with a visualisation of our distribution network. The portal includes - Network overlays of zone substations, sub-transmission lines and distribution feeders on google maps, demand forecast of zone substations and distribution feeders, indication of import and export hosting capacity on 11kV distribution feeders, and system strength levels on distribution zone substations.

To register and access SA Power Network's Rosetta DAPR Portal, follow the link below:
https://dapr.sapowernetworks.com.au/

An overview of the Murraylands region along with a regional map can also be found on page 152 of the SA Power Networks Distribution Annual Planning Report.

Demand forecasts

The Geranium to Pinnaroo voltage constraint has been translated into a capacity limit of 6.1MVA. Figure B.2 shows the forecasted 10 POE and 50 POE demand exceeding the system limit.

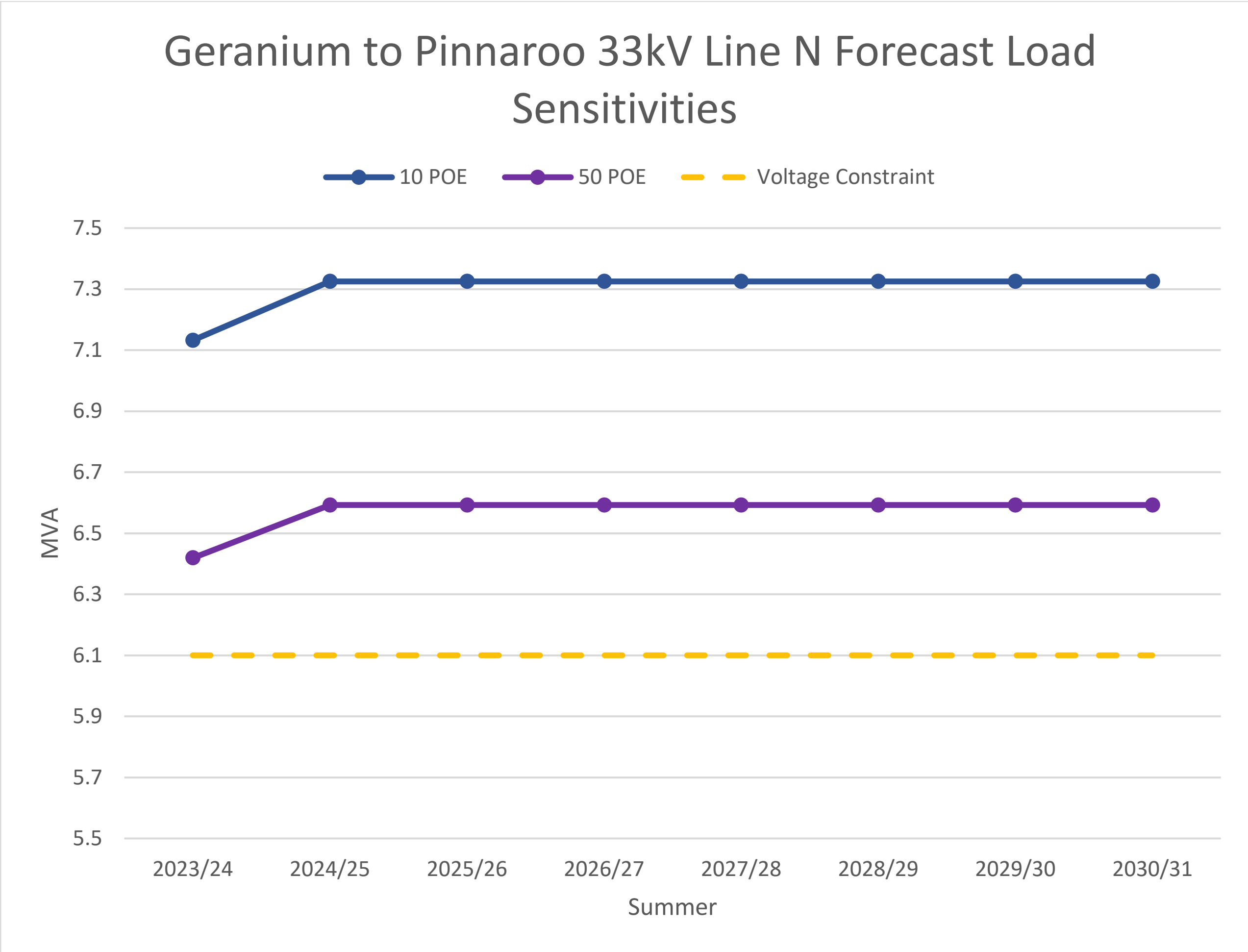

Figure B.2 - Geranium to Pinnaroo 33kV Line N Forecast Load Sensitivities

Figure B.3 is the load duration curve from the Geranium to Pinnaroo 33kV line. The peak load value used to calculate the load duration curve does not include any additional new load connections. It is set at 7.77MVA, which is equivalent to the 10 POE forecasted load for 2023/24.

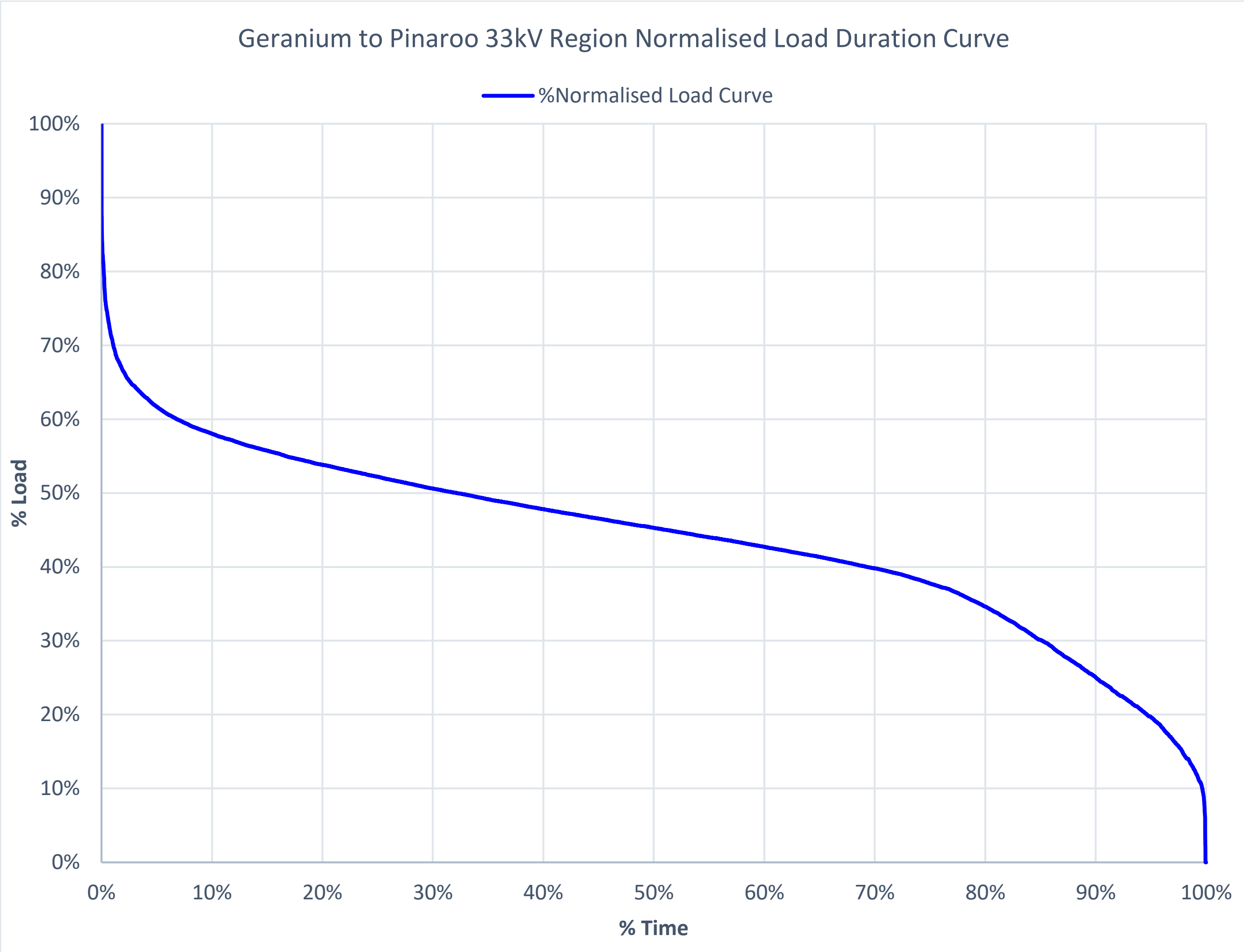

Figure B.3 - Normalised Load Duration Curve for Geranium to Pinnaroo 33kV Line

Figure B.4 represents a summer peak load profile using the measured load from 27 January 2023. The 10 POE demand forecast (2023/24) of 5.76MVA is below the system limit of 6.2MVA during this period. The forecast value is expected to increase with a new load connecting in 2023.

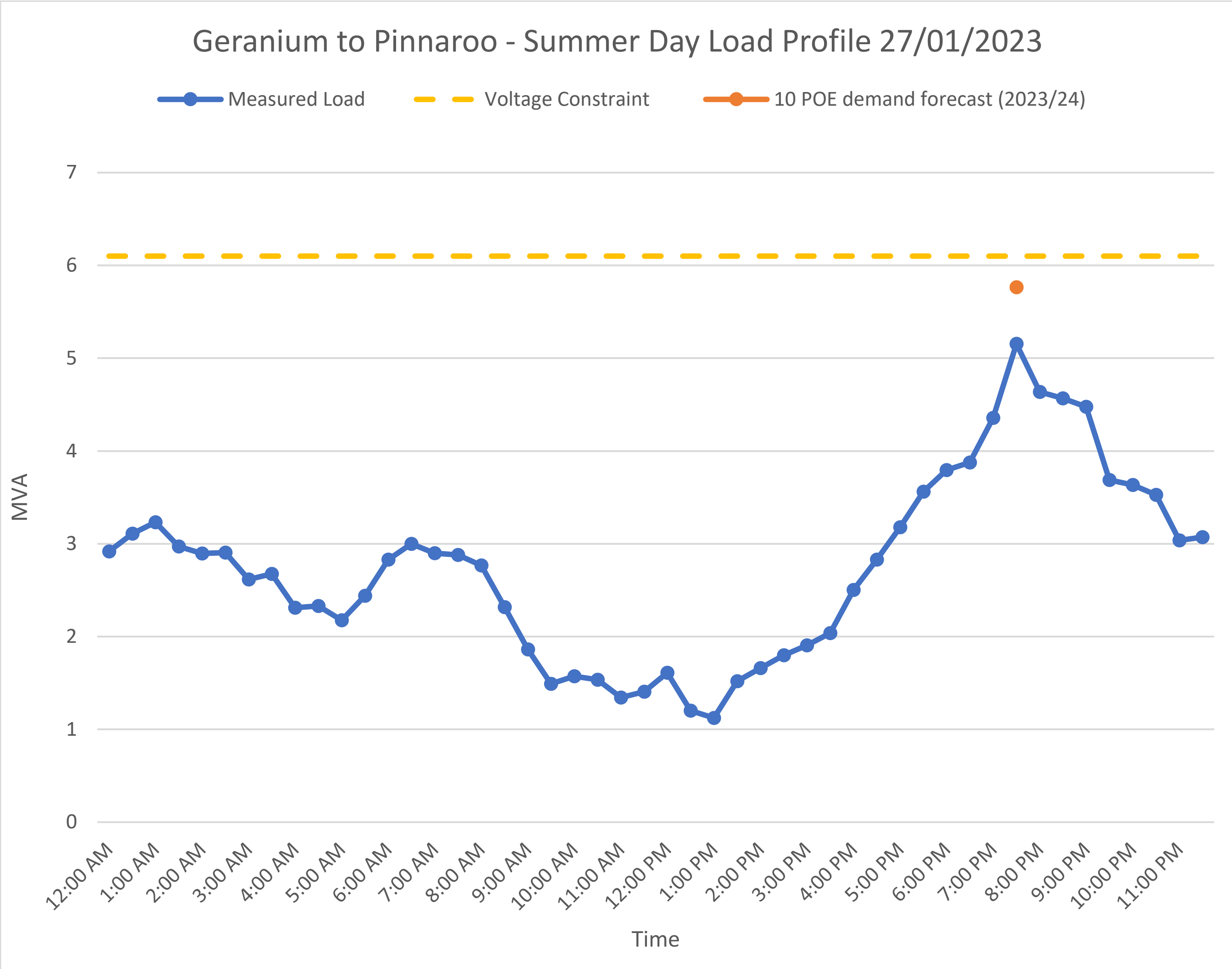

Figure B.4 – Summer Day Load Profile for Geranium to Pinnaroo 33kV Line on 27/01/2023

Figure B.5 illustrates the load measured in MVA at Geranium on the Pinnaroo 33kV line exit from 1 April 2022 to 31 March 2023. No additional load adjustments have been added to this graph to represent the new load connecting in 2023. The load does not reach the system limit during this period.

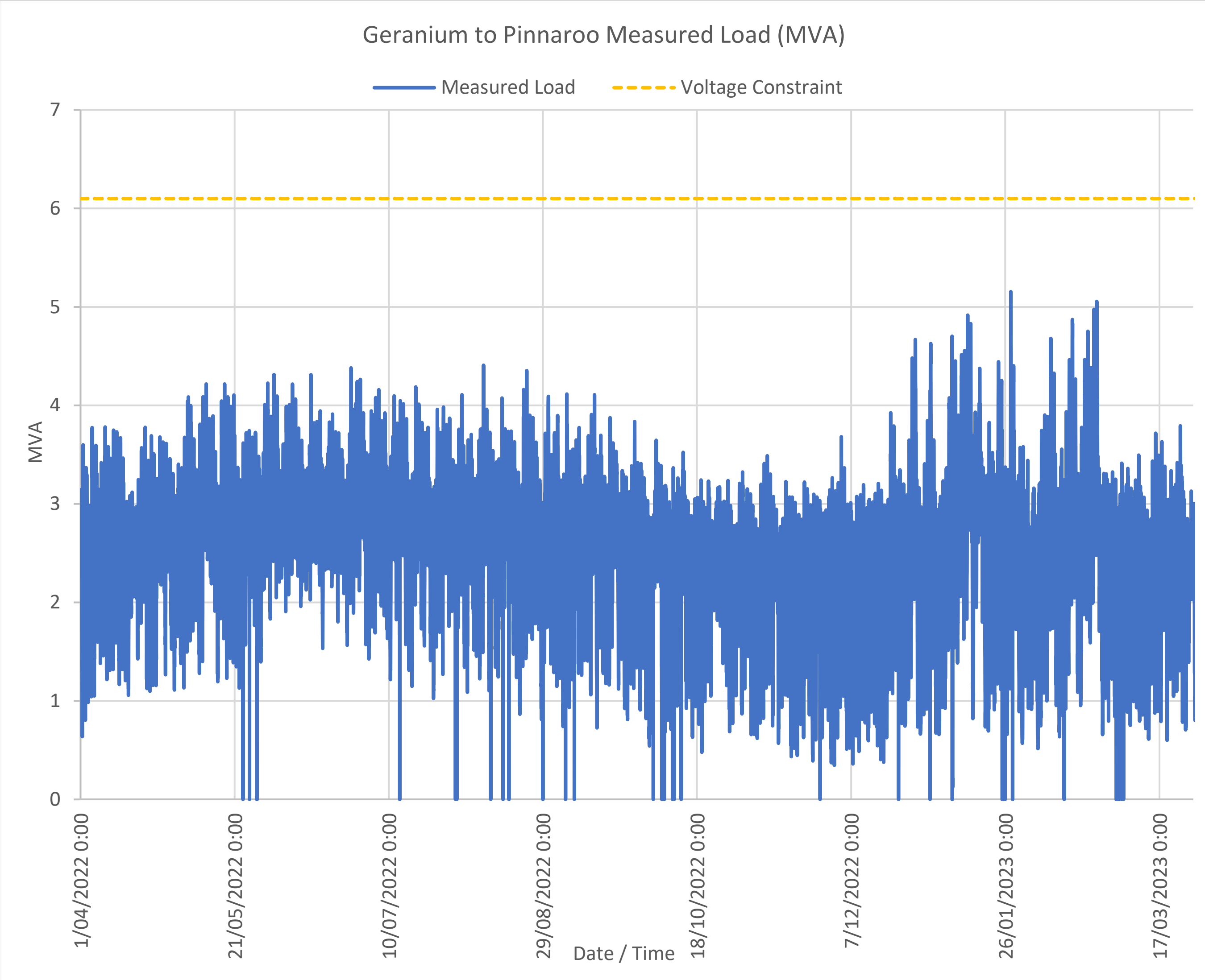

Figure B.5 – Geranium to Pinnaroo 33kV Measured Load (MVA) – April 2022 to March 2023

Size of load reduction or additional supply

The estimated load at risk represents the size of load reduction and/or additional supply that would be required from a non-network solution in each year under 10 POE conditions to avoid one of the network options being commissioned (since each network option is designed to eliminate all load at risk).

As shown in Figure B.6, the estimated load at risk reduction for the Geranium to Pinnaroo 33kV line is initially 1.03MVA in 2023/24, increasing to 1.22MVA in 2024/25 and then remaining constant until 2030/31.

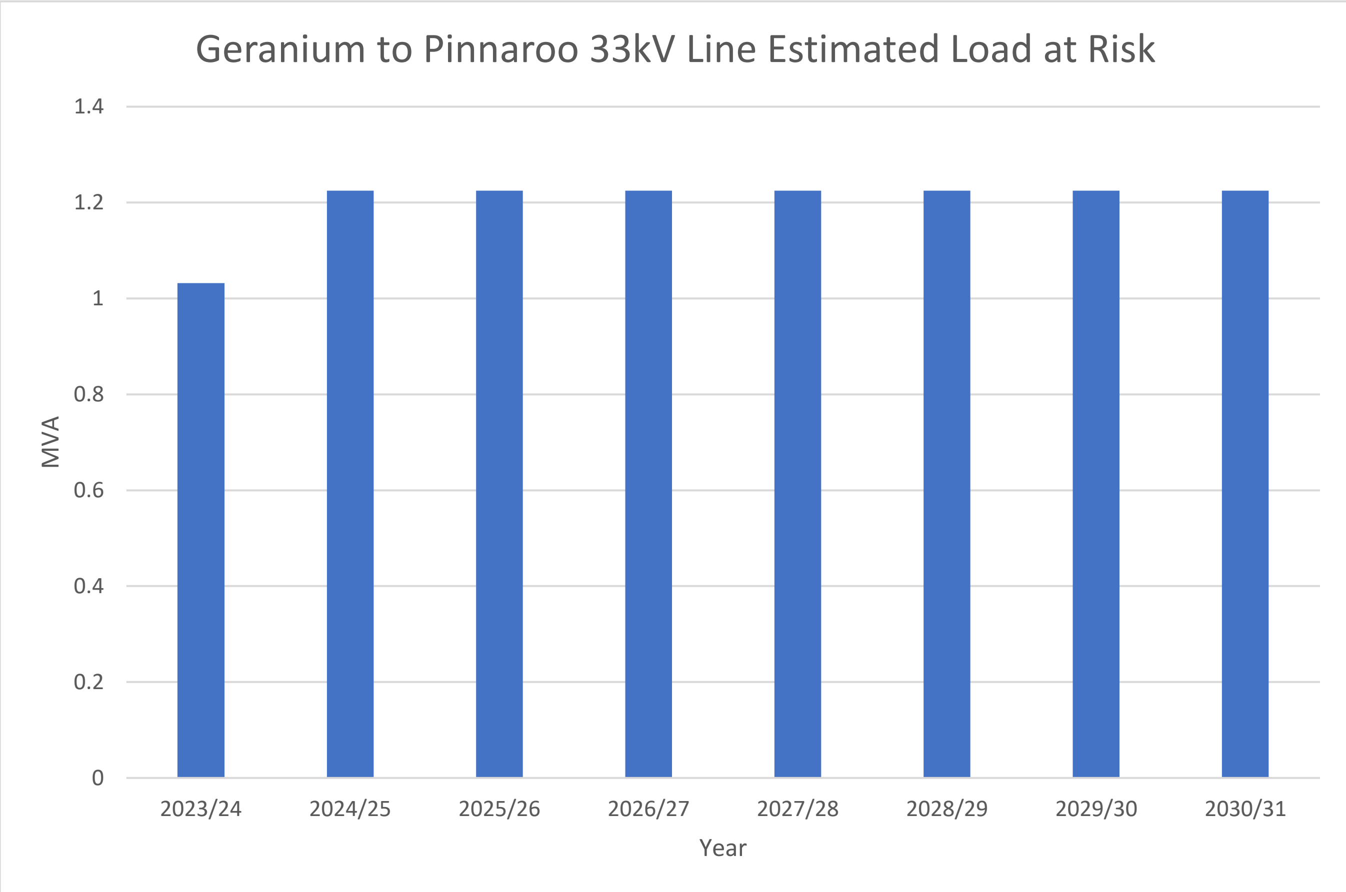

Figure B.6 – Geranium to Pionaroo 33kV Line load at risk under 10 POE conditions

Location

Potential locations for the solutions include Karoonda substation, Lameroo substation or Pinnaroo Substation and surrounding areas.

Timing

Current forecasts indicate a solution is needed prior to the start of Summer 2023/24. SA Power Networks will consider managing this constraint operationally to allow for a solution to be delivered in 2024.

Periods of high demand typically occur between mid-November and mid-March when local temperatures exceed 40^{o} C. These conditions typically occur approximately 10 days a year, often in groups of two or three days.

Maximum demand typically occurs between 17:00 and 20:00.

Contract Duration

At discretion of the respondent. A fixed period contract followed by provision for annual extensions would appear to be appropriate, however variations will be considered.

Contract Services

At the discretion of the respondent. It is not a requirement that one respondent's solution fully resolves the constraint. It would be most favourable for solutions to be scalable and pricing to be modular to address the issue as it is exposed.

Appendix C – Bordertown Constraint

Background

Bordertown Substation is supplied via a 47.2km radial 33kV line from Keith Connection Point. The Keith-Wirrega-Bordertown 33kV line supplies approximately 3,000 customers in the township of Bordertown and surrounding rural regions. The majority of connected loads are residential and agricultural.

Bordertown Substation has an existing system limitation with power transformer overload at Bordertown substation following an outage of the other power transformer (i.e., under N-1 conditions) during peak demand conditions. System limitations within this region have historically been managed via an NSSA (Network Support Service Agreement) contracting generate when load is at risk.

Bordertown Substation contains two 5MVA 33/11kV transformer with a substation normal cyclic rating of 12.5MVA. Bordertown Substation is forecasted to be overloaded, following a N-1 event, under 50 POE conditions. This forecast overload increasing from 3MVA in 2023 to 3.38MVA by 2031, leaving customers at risk of being interrupted for a substation failure.

The Keith-Wirrega-Bordertown 33kV line has an N thermal constraint, leaving customers at risk of being interrupted for a 33kV line failure, due to overload during peak load times.

In Figure C.1, a simplified line diagram of the Keith-Wirrega-Bordertown line is shown. Keith is the source substation and the distance between Keith and Wirrega is 30.48km and from Wirrega Regulator to Bordertown Substation is 16.75km.

Figure C.1 – Simplified Keith to Bordertown Line Diagram

Network Visualisation / DAPR Portal

SA Power Networks has engaged Rosetta Analytics to develop and host a portal with a visualisation of our distribution network. The portal includes - Network overlays of zone substations, sub-transmission lines and distribution feeders on google maps, demand forecast of zone substations and distribution feeders, indication of import and export hosting capacity on 11kV distribution feeders, and system strength levels on distribution zone substations.

To register and access SA Power Network's Rosetta DAPR Portal, follow the link below:
https://dapr.sapowernetworks.com.au/

An overview of the South East region along with a regional map can also be found on page 157 of the SA Power Networks Distribution Annual Planning Report.

Bordertown Substation demand forecast

SA Power Networks' planning criteria for N-1 substation constraints utilises the 50 POE demand forecast as part of the analysis. As shown in Figure C.2, the 50 POE forecasted load exceeds the emergency N-1 capacity of 7.5MVA.

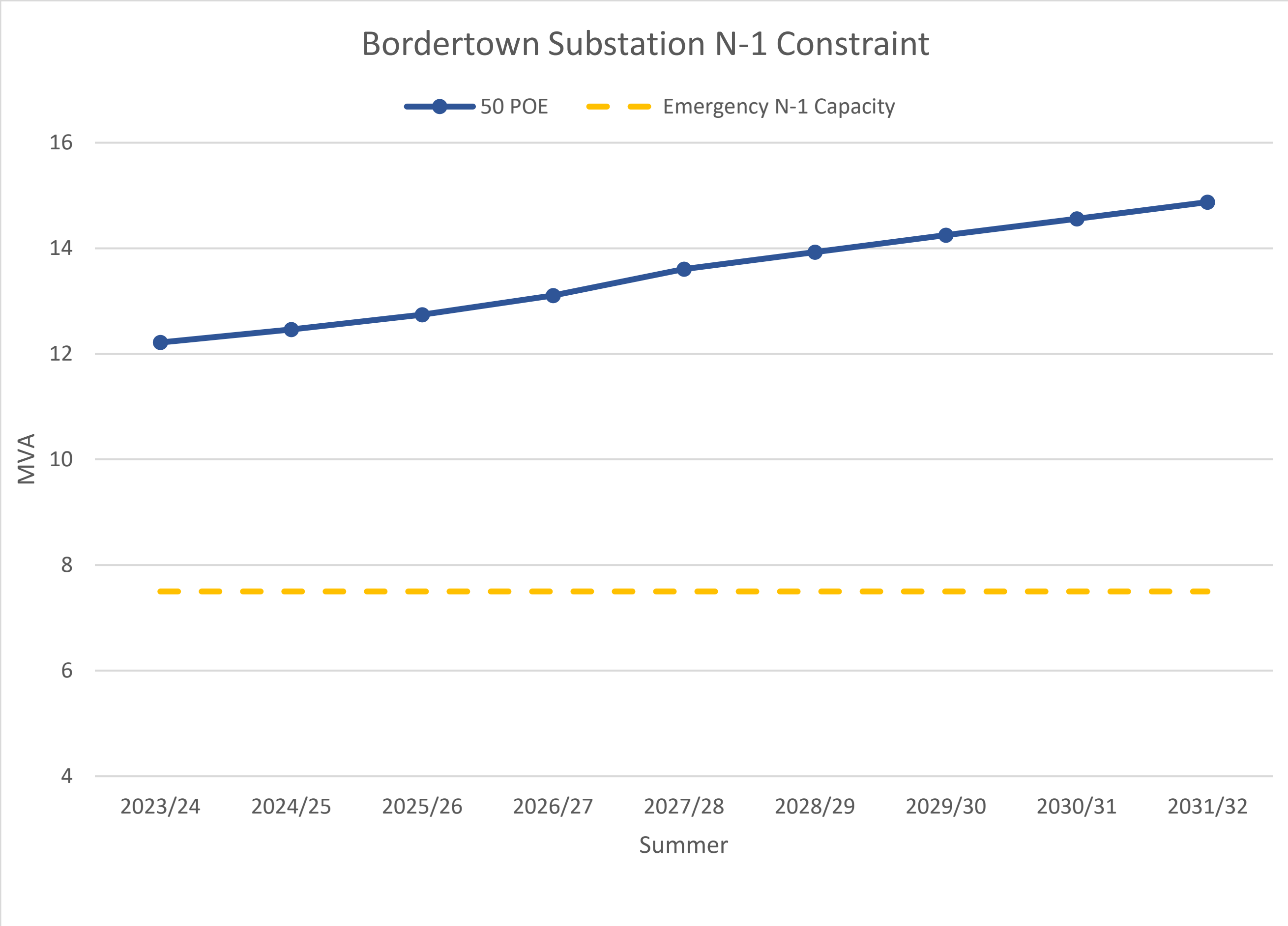

Figure C.2 – Bordertown Substation N-1 Constraint

In Figure C.3 the load duration curve at Bordertown Substation has been illustrated. The peak load value used to calculate this normalized curve is 12.22MVA, which is equivalent to the 10 POE forecast load for 2023/24.

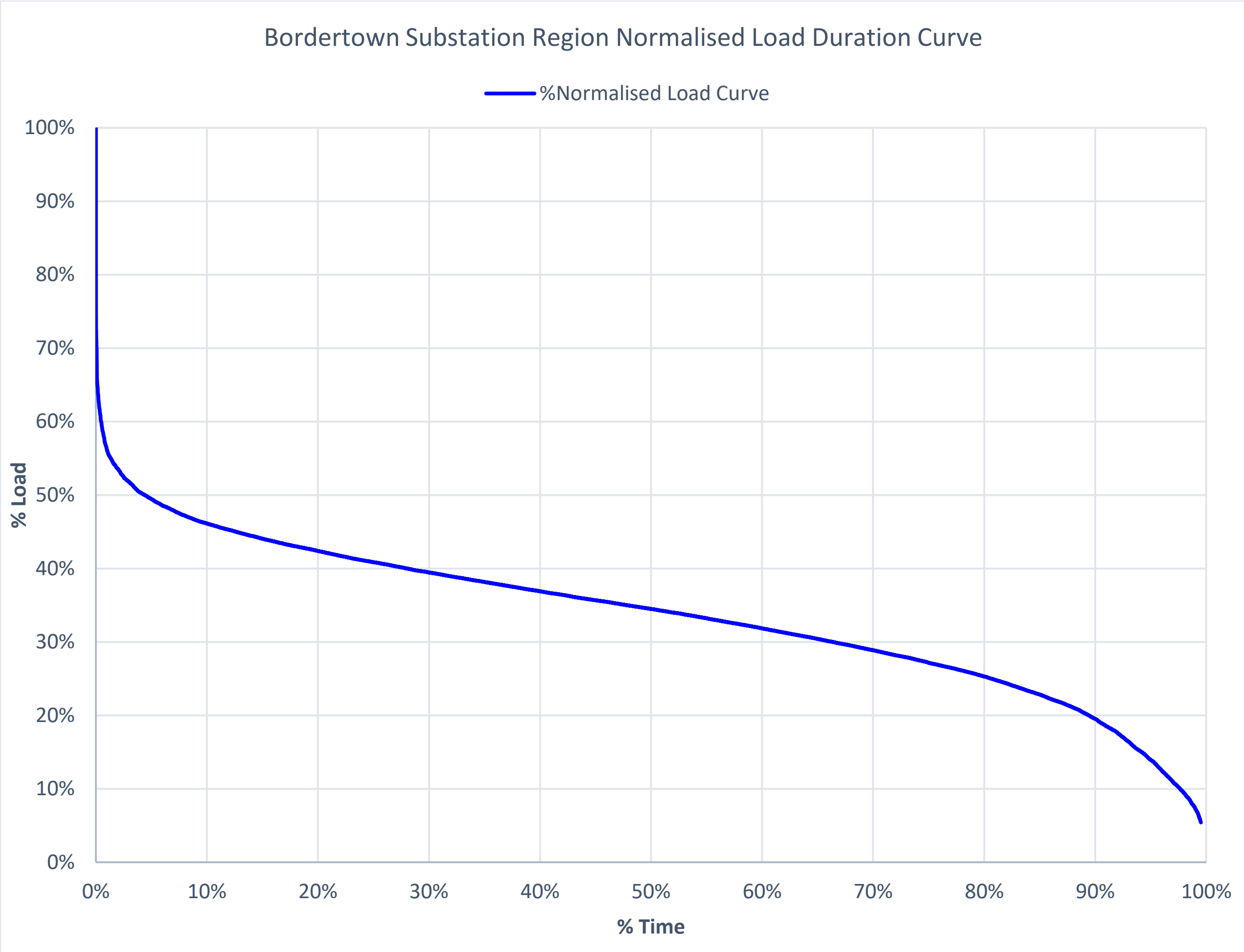

Figure C.3 – Normalised Load Duration Curve for Bordertown Substation

Figure C.4 represents a peak summer day load profile for Bordertown Substation using data from 13 January 2023. The peak demand is above the emergency N-1 rating of 7.5MVA. The 50 POE forecast for 2023/24 considers local embedded generation exporting at times of peak demand. If the local embedded generation was unavailable or chose not to operate during peak demand conditions, then the 50POE forecast would be closer to 8.93MVA.

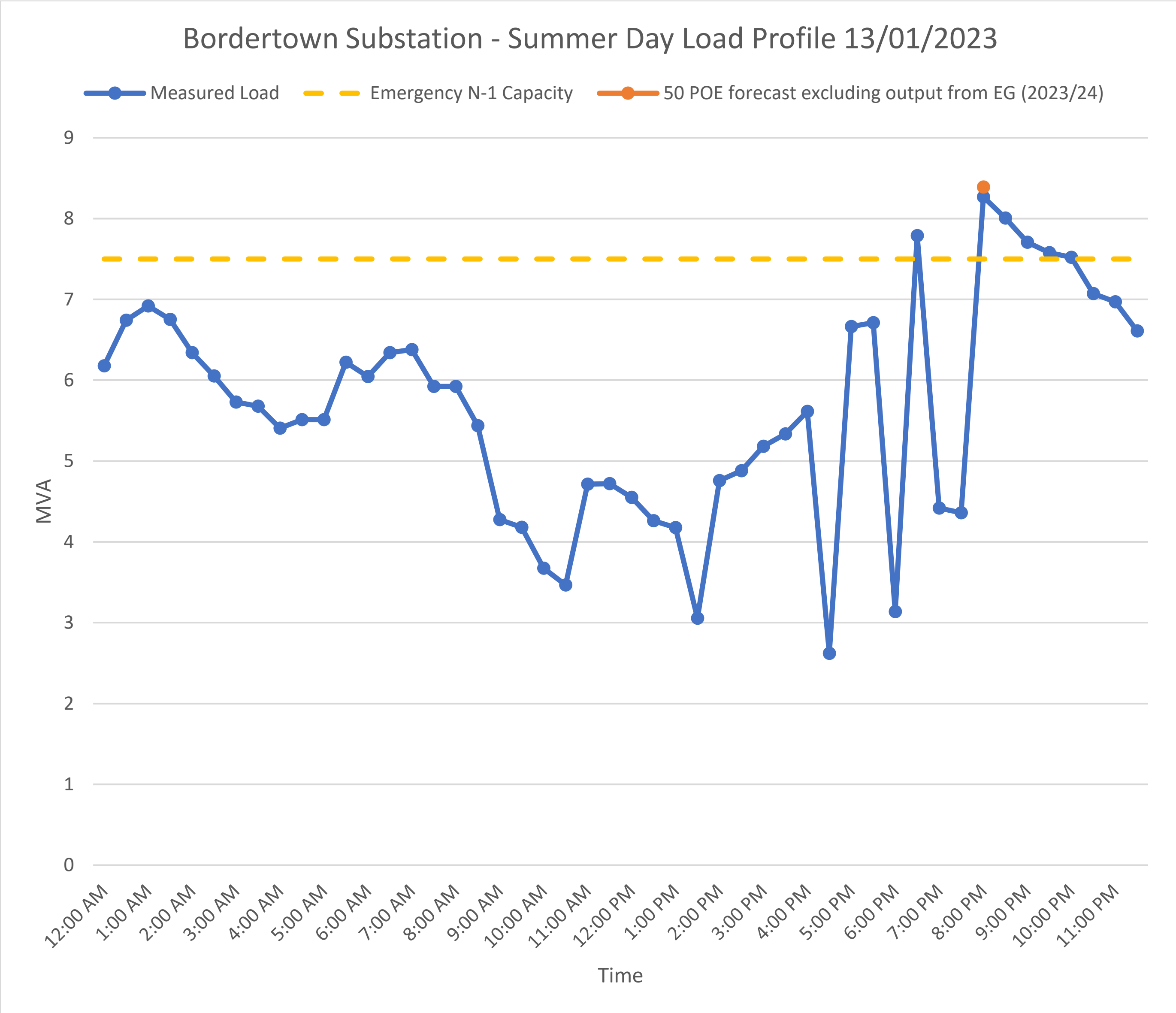

Figure C.4 – Summer Day Load Profile for Bordertown Substation on 13/01/2023

Figure C.5 illustrates the load measured in MVA at Bordertown Substation from 1 April 2022 to the 31 March 2023. No additional load adjustments have been added to this graph. The substation N-1 emergency rating of 7.5MVA has been exceeded for 5 days.

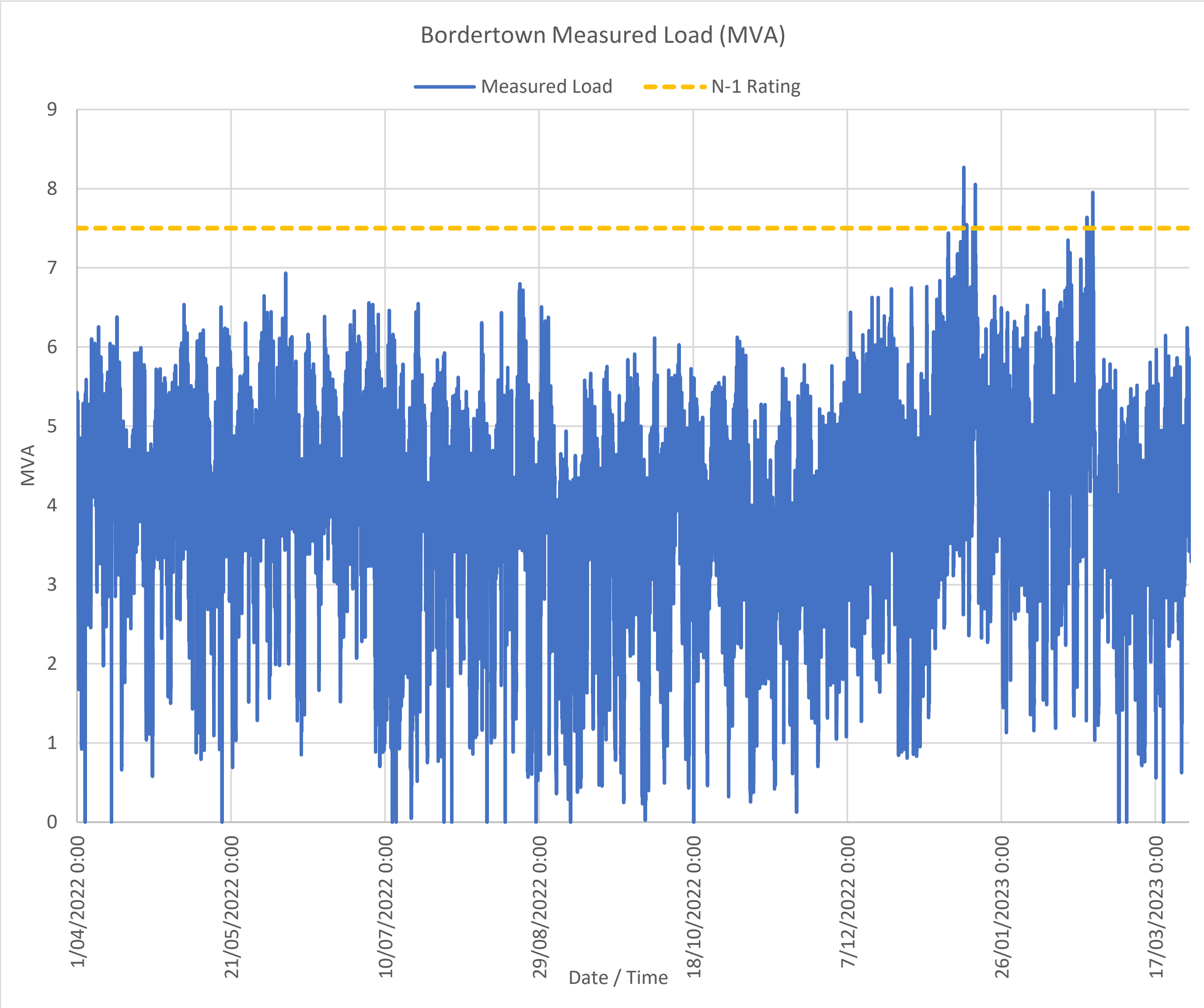

Figure C.5 Bordertown Substation Measured Load (MVA) – April 2022 to March 2023

Keith-Wirrega-Bordertown Demand forecast

The Keith-Wirrega-Bordertown 33kV line has an N thermal constraint due to the 10 POE forecasted load exceeding the 13MVA summer normal rating as shown in Figure C.6. The 2023/24 10 POE forecast is 16.01MVA which is forecast to steadily increases to 22.06MVA in 2030/31.

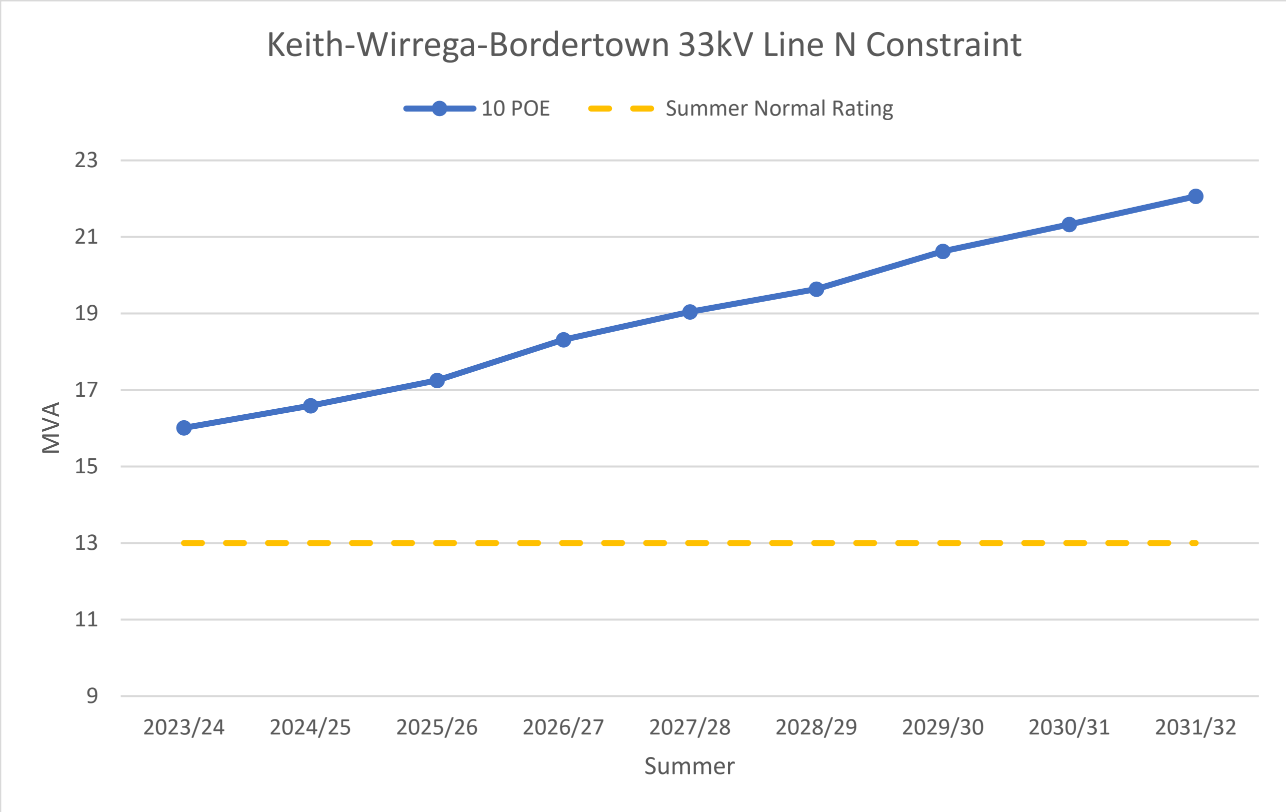

Figure C.6- Keith to Wirrega to Bordertown 33kV Line N Forecast Constraint

In Figure C.7 represents the load duration curve for the Keith to Wirrega 33kV line. The peak load value used to calculate this normalized curve is 16.01MVA, which is equivalent to the 10 POE forecasted load for 2023/24.

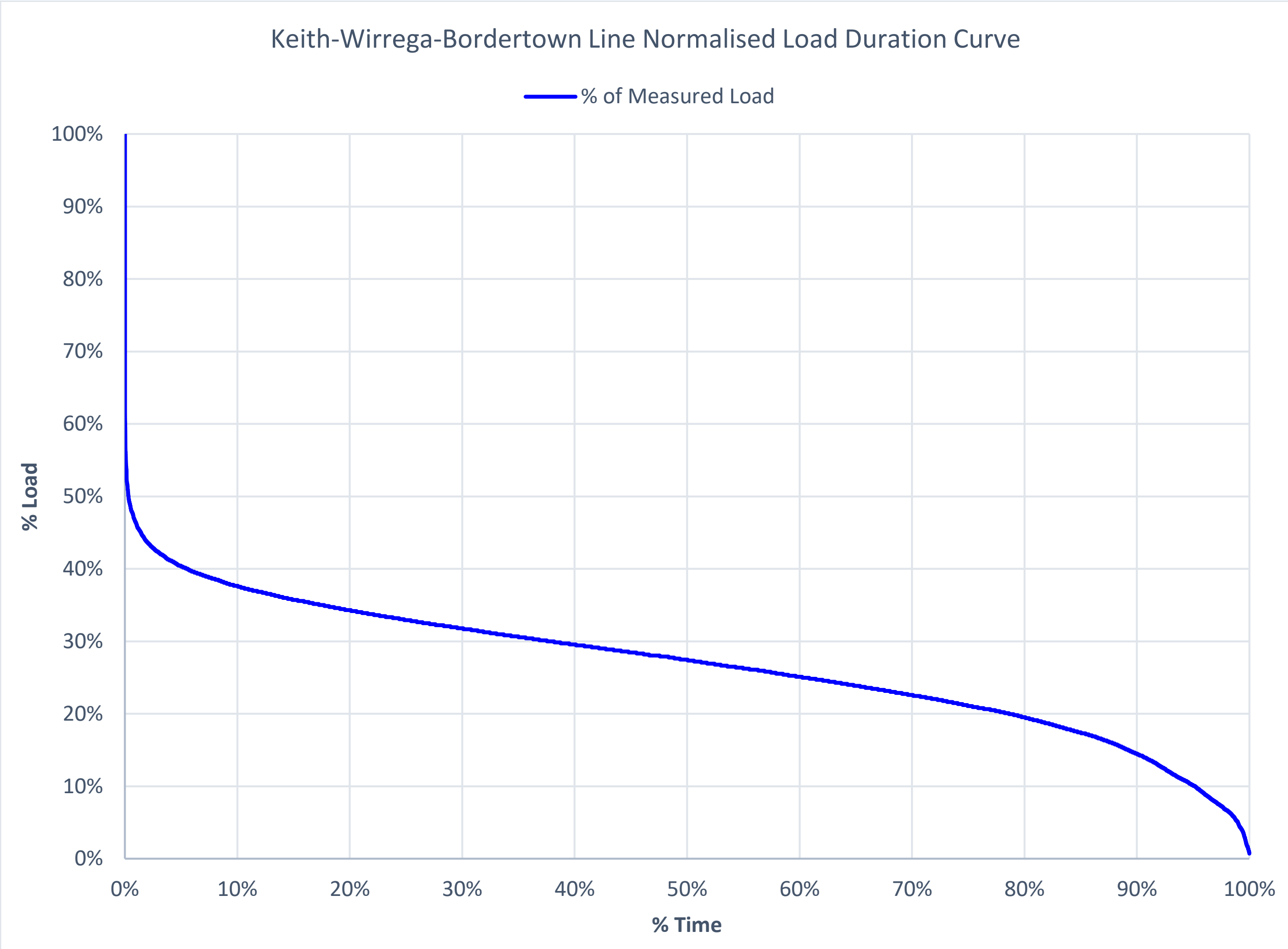

Figure C.7 - Normalised Load Duration Curve for Keith-Wirrega

Figure C.4 represents a peak summer day load profile for the Keith-Wirrega-Bordertown 33kV line using data from 13 January 2023. The Keith-Wirrega-Bordertown 33kV line Summer normal rating of 13MVA is exceeded by the 2023/24 10 POE forecast of 16.01MVA.

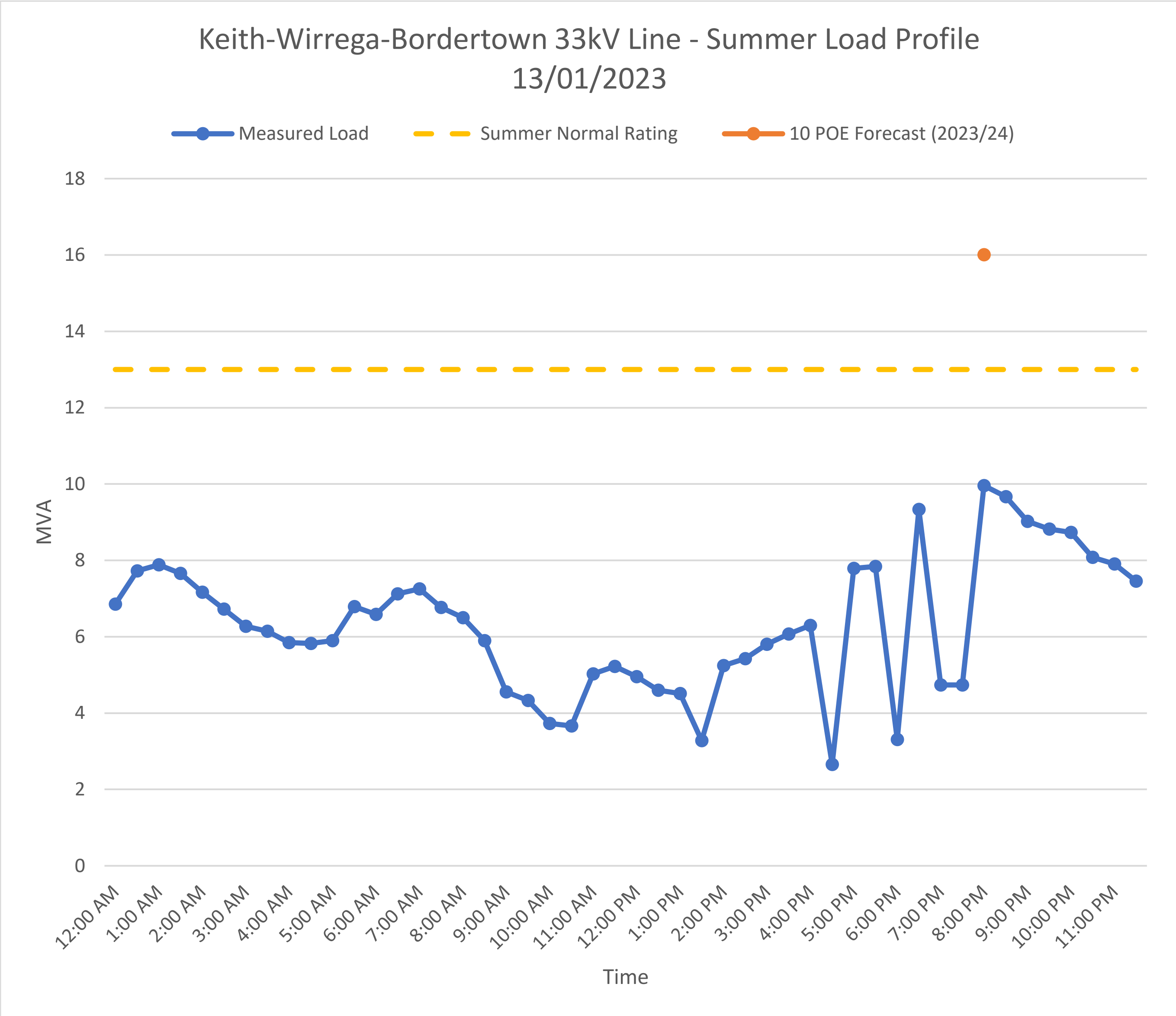

Figure C.8 - Summer Day Load Profile for Keith-Wirrega 33kV Line on 13/01/2023

Figure C.9 illustrates the load measured in MVA at the Keith-Wirrega-Bordertown 33kV line exit, at Keith Connection Point from 1 April 2022 to the 31 March 2023. No additional load adjustments have been added to this graph. The line summer normal rating of 13MVA has not been exceeded during this period.

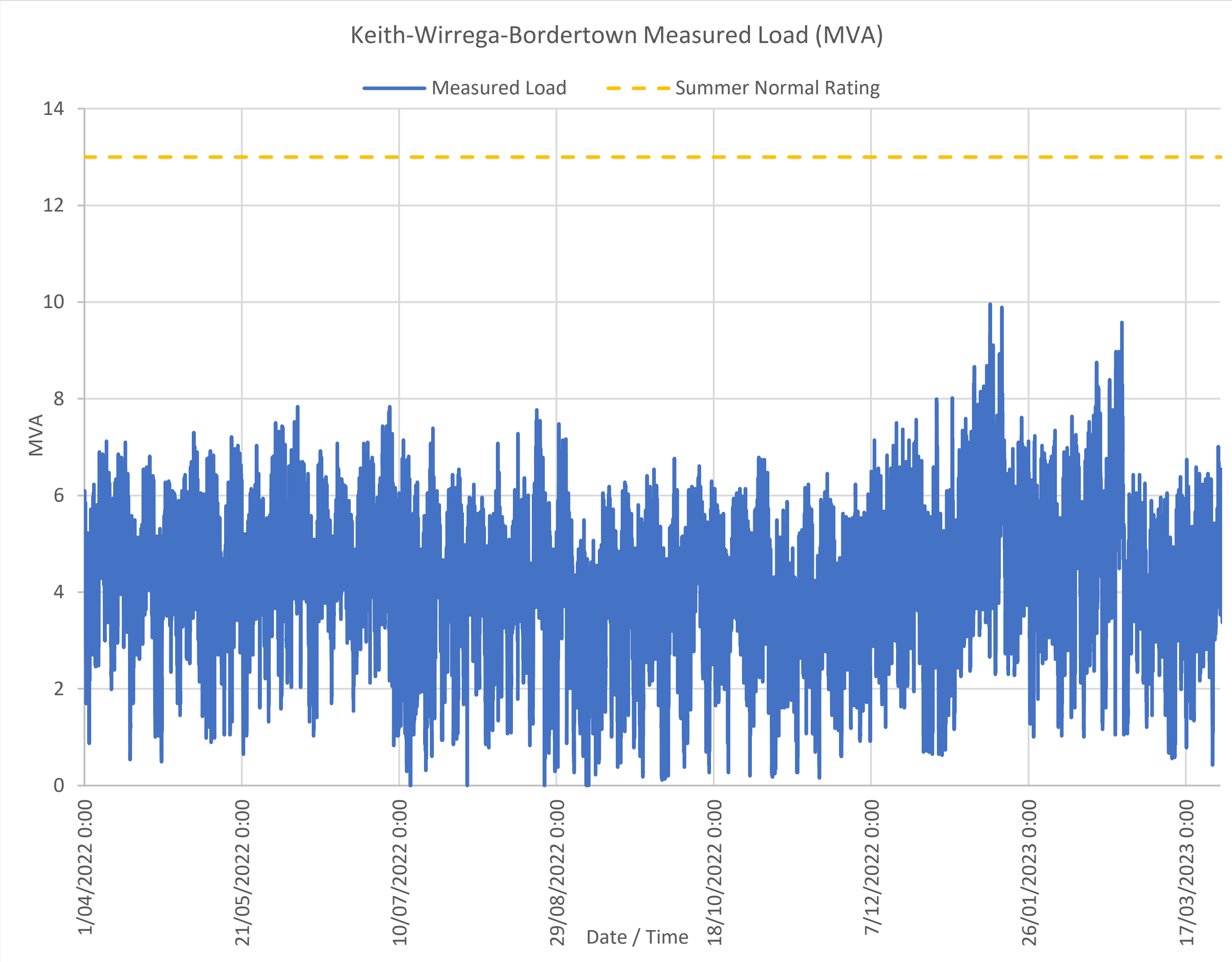

Figure C.9 - Keith-Wirrega-Bordertown 33kV line Measured Load (MVA) – April 2022 to March 2023

Size of load reduction or additional supply

The estimated load at risk represents the load reduction and/or additional supply as seen at Keith Substation, that would be required from a non-network solution in each year under 10 POE conditions, to avoid network augmentation. The load reduction, if located within the Bordertown area, would be closer to 3-4MVA, as load at risk associated with 33kV line losses can be excluded when the generation is located within close proximity to the load. The maximum power station size is in the order of 4MW.

As shown in Figure C.10, the estimated load at risk reduction for Bordertown Substation is 4.71MVA in 2023/24 and increases to 7.37MVA in 2030/31. This value is inclusive of the 33kV line losses associated with the impedance/length of the Keith-Wirrega-Bordertown 33kV line.

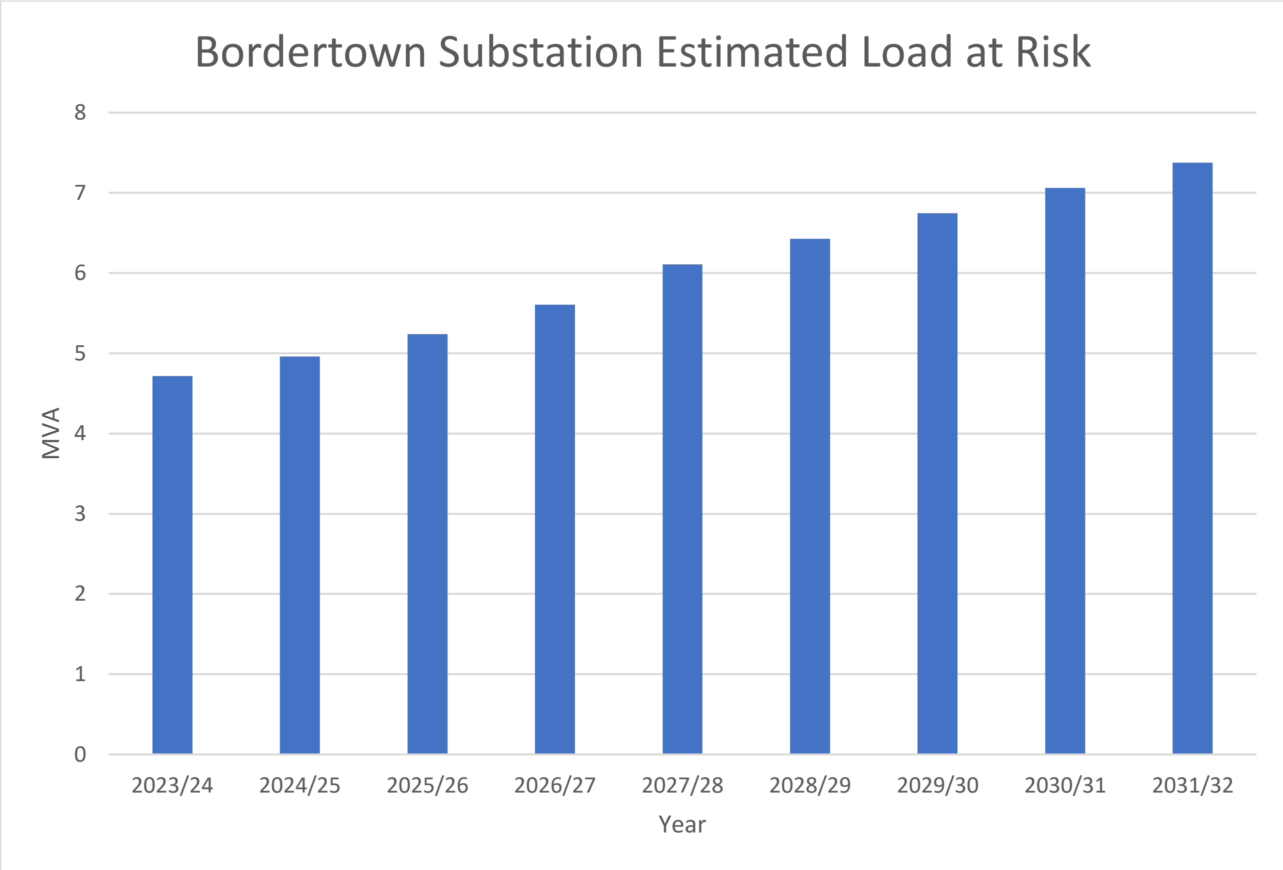

Figure C.10 – Bordertown Substation load at risk (inclusive of line losses) during 10 POE conditions

Figure C.11, represents the estimated load at risk reduction for the Keith-Wirrega-Bordertown 33kV Line with 3.01MVA at risk in 2023/24 increasing to 9.06MVA in 2030/31. The 33kV line losses are a contributing factor, in addition to the increase in demand at Bordertown, for the rapid rise in the load reduction requirement.

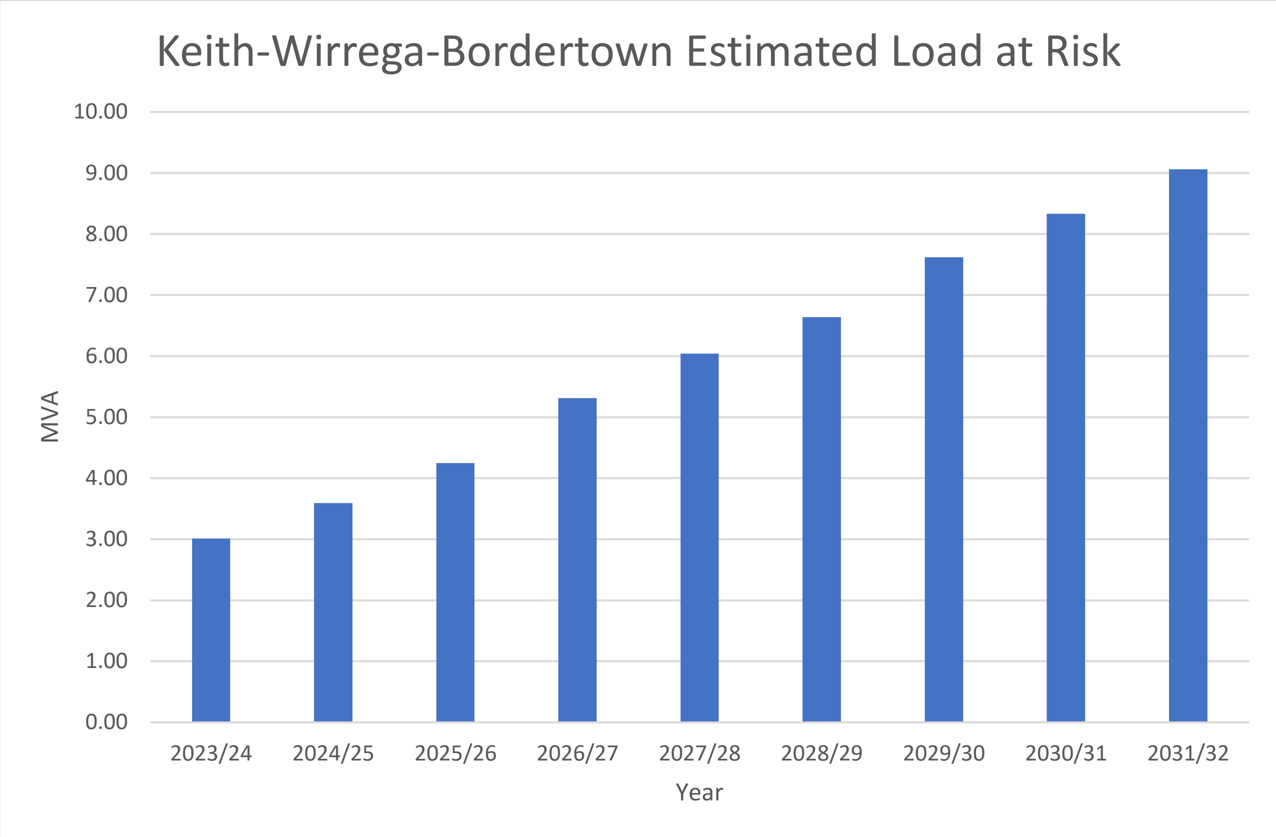

Figure C.11 – Keith-Wirrega-Bordertown Substation load at risk (inclusive of line losses) during 10 POE conditions

Location

Located ideally within Bordertown and surrounding region, as close as practical to the Bordertown Substation – preferably connected at 11kV. A solution connected at Bordertown will reduce network losses leading to a reduction in the load reduction MVA requirement.

Timing

Current forecasts indicate a solution is needed prior to the start of Summer 2023/24. SA Power Networks will consider managing this constraint operationally to allow for a solution to be delivered in 2024.

Peak load in the area typically occurs between mid-November and mid-March when local temperatures exceed 40^{o} C. These conditions typically occur approximately 10 days a year, often in groups of two or three days.

Maximum customer load in this area typically occurs between 16:00 and 22:00.

Contract Duration

At discretion of the respondent. Short term contracts would appear to be appropriate due to the sporadic nature of the constraints.

Contract Services

It is not a requirement that one respondent's solution fully resolves the constraint. It would be most favourable for solutions to be scalable, quickly deployed, and pricing be modular to address the issue as it is exposed.

Appendix D – Templates

Please find attached a pdf of the proposal form on the SA Power Networks website.

Schedule 1 Registrant's Details & Declaration

Trading Name	
Registered Name	
ACN	
ABN	
Address of registered office	
Place of business in South Australia (if relevant)	
Type of entity (e.g. company, trust, partnership, sole trader, other)	
Key Personnel (e.g. directors, chief executive officer, principal of business etc.)	
Telephone	
Website	

CONTACT DETAILS

Contact Person	
Position	
Address	
Postal address (if different to above)	
E-mail	
Telephone	

Schedule 2 Past Experience on Projects of a similar nature and scale

Schedule 3 Referees

Referee 1:	
Company Name	
Company Address	
Contact Person	
Contact Person Title	
Contact Person E-mail	
Contact Person Telephone	
Project Description & Value	
Referee 2:	
Company Name	
Company Address	
Contact Person	
Contact Person Title	
Contact Person E-mail	
Contact Person Telephone	
Project Description & Value	

Schedule 4 Project Delivery

Overview of solution	
Delivery Mechanism	
Type of technology/solution proposed	

Level of load reduction	
Duration of load reduction achievable	
Dispatching arrangement (pre-contingent)	

Notice periods required to invoke the non-network support	
Availability and reliability performance details	
Technical details of the technology/solution	

Project components	
Warranty Details	
Operating regime	

Solution timing	
Solution duration	
Willingness to enter into a NSSA	

Reliability and Accuracy	
Certainty	
Longevity	

Scalability of the solution	
Inclusions/exclusions	
Market prices	