Preliminary Report – Trip of South East – Tailem Bend 275 kV lines on 12 November 2022

November 2022

A preliminary operating incident report for the National Electricity Market – information as at 23/11/2022

Important notice

Purpose

AEMO has prepared this preliminary report as part of its review of the reviewable operating incident involving the non-credible trip of multiple transmission lines in South Australia, as a first step in reporting under clause 4.8.15(c) of the National Electricity Rules.

The observations in this report will be updated in AEMO's final operating incident report, where new information becomes available.

Disclaimer

AEMO has been provided with preliminary data by Registered Participants as to the performance of some equipment leading up to, during and after the event in accordance with clause 4.8.15 of the National Electricity Rules. In addition, AEMO has collated preliminary information from its own systems. Any analysis and conclusions expressed in this document are also of a preliminary nature.

While AEMO has made reasonable efforts to ensure the quality of the information in this report, its investigations are incomplete, and any findings expressed in it may change as further information becomes available and further analysis is conducted. Any views expressed in this report are those of AEMO unless otherwise stated and may be based on information given to AEMO by other persons.

Accordingly, to the maximum extent permitted by law, AEMO and its officers, employees and consultants involved in the preparation of this document:

- make no representation or warranty, express or implied, as to the currency, accuracy, reliability or completeness of the information in this document; and
- are not liable (whether by reason of negligence or otherwise) for any statements or representations in this document, or any omissions from it, or for any use or reliance on the information in it.]

Copyright

Contact

If you have any questions or comments in relation to this report, please contact AEMO at system.incident@aemo.com.au.

AEMO acknowledges the Traditional Owners of country throughout Australia and recognises their continuing connection to land, waters and culture. We pay respect to Elders past and present.

Abbreviations

Abbreviation	Term
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
APC	Administered Price Cap
APP	Administered Price Period
CPT	Cumulative Price Threshold
DPV	Distributed Photovoltaics
DPVC	Distributed Photovoltaic Contingency
FCAS	Frequency Control Ancillary Services
FFR	Fast Frequency Response
HSM	High Speed Monitoring
MPC	Market Price Cap
NEM	National Electricity Market
NER	National Electricity Rules
NT	Northern Territory
PMU	Phasor Measurement Unit
SA	South Australia
TNSP	Transmission Network Service Provider
VIC	Victoria

Contents

Tables

Figures

1 Overview

This preliminary report relates to a reviewable operating incident[1] that occurred on 12 November 2022 in South Australia (SA). The incident involved a non-credible contingency of multiple transmission lines and caused the synchronous separation of a major part of the SA power system from the rest of the National Electricity Market (NEM). At approximately 1639 hrs, the following equipment tripped:

- Both South East – Tailem Bend 275 kilovolts (kV) lines (No. 1 and No. 2 lines). This was caused by a double circuit transmission tower failure.
- The Keith – Tailem Bend 132 kV line tripped at the Tailem Bend end only. This line tripped due to operation of an automated inter-tripping scheme[2].

This preliminary report provides a summary of the known facts relating to the incident as at 23 November 2022 and does not attempt to provide any analysis or recommendations.

NEM time (Australian Eastern Standard Time [AEST]) is used in this report.

2 Pre-event conditions

2.1 Generation and demand

A summary of SA system conditions at 1639 hrs on 12 November 2022, just prior to the incident, is provided in Table 1.

Table 1 South Australia key system conditions at 1639 hrs, 12 November 2022

Quantity description	Value (MW)
South Australia operational demand	1,043
South Australia generation	1,352
Murraylink interconnector flow (export to Victoria)	122
South East – Tailem Bend 275 kV lines flow (flow from Tailem Bend to South East)	258
Keith – Tailem Bend 132 kV line flow (flow from Tailem Bend to Keith)	19
Heywood interconnector flow (export to Victoria)	208

Table 2 provides a summary of SA generator dispatch at 1639 hrs on 12 November 2022.

[1] See NER clause 4.8.15(a)(1)(i), as the event relates to a non-credible contingency event; and the Australian Energy Market Commission (AEMC) Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

[2] This automated scheme is in place to protect the Keith – Tailem Bend 132 kV line from being thermally overloaded following a contingency on both South East – Tailem Bend 275 kV lines.

Table 2 South Australia generation dispatch at 1639 hrs, 12 November 2022

Station name	Dispatched generation (MW)	Station name	Dispatched generation (MW)
Bluff Wind Farm	19	**Lincoln Gap Wind Farm 1**	62
Bungala Solar Farm 1	3	**Lincoln Gap Wind Farm 2**	43
Bungala Solar Farm 2	2	**Mount Millar Wind Farm**	1
Canunda (Snuggy) Wind Farm	15	**North Brown Hill Wind Farm**	50
Hallet Power Station	32	**PAREP Wind Farm**	179
Hallet Wind Farm	40	**Pelican Point**	335
Hornsdale Power Reserve	12 (Charging)	**Quarantine Power Station 1**	28
Hornsdale Wind Farm 1	64	**Quarantine Power Station 3**	29
Hornsdale Wind Farm 2	93	**Snowtown North Wind Farm**	39
Hornsdale Wind Farm 3	100	**Snowtown South Wind Farm**	78
Lake Bonney 2	2	**Starfish Hill Wind Farm**	18
Lake Bonney 3	1	**Torrens Island Power station B unit 4**	60
Lake Bonney BESS	7 (Charging)	**Waterloo Wind Farm**	39
Lake Bonney Wind Farm 2	2	**Willogoleche Wind Farm**	12
Lake Bonney Wind Farm 3	0.5	**-**	-

2.2 Prior outages

Immediately prior to the event the following outages were in place.

- A planned outage of the Heywood – South East No. 2 275 kV circuit (part of the Heywood interconnector). This outage commenced at 0405 hrs on 12 November 2022 and was due to return to service by 1700 hrs on 14 November 2022. During this outage, the Victoria to SA flow was limited to 50 megawatts (MW) and SA to Victoria flow was limited to 250 MW across the remaining in-service line.
- A planned outage of the Robertstown No. 1 Synchronous Condenser. This outage commenced at 0832 hrs on 23 October 2022.

2.3 Weather conditions in South Australia on 12 November 2022

On 12 November 2022, a low-pressure system was deepening over SA with troughs developing through central and southern Australia ahead of this low. The main trough over SA was moving into a region with significant levels of available atmospheric moisture, instability and upper-level wind dynamics conducive to widespread thunderstorm development. Severe thunderstorms developed over multiple states but especially across SA and parts of the Northern Territory (NT) where some significant damage was observed around the major population centres of Adelaide and Alice Springs during the afternoon.

Specifically, across the SA region some of the highest wind gusts recorded concurrent with these thunderstorms included 115 km/h at Moomba (at 2038 hrs local time) and 106 km/h at Adelaide Airport (1553 hrs local time), while the highest wind gust at Murray Bridge (closest recorded speed to Tailem Bend) was 61 km/h (1643 hrs local time). Associated with the thunderstorms across the Adelaide region were very heavy rainfalls, with several

locations recording their highest November daily rainfalls on record for the 24-hour period to 0900 hrs on 13 November 2022.

The Bureau of Meteorology (BoM) issued several weather warnings for severe thunderstorm activity for the wider Adelaide region on 12 November 2022, including the area of the affected tower. However the forecast wind conditions did not meet the criteria of a destructive wind forecast[3].

3 Event

3.1 Sequence of events

At approximately 1639 hrs on 12 November 2022, both South East – Tailem Bend 275 kV lines tripped. This was caused by a double circuit transmission tower failure located approximately 7 km south of Tailem Bend substation. This tower failure led to the following subsequent events:

- Tripping of Keith – Tailem Bend 132 kV line at the Tailem Bend end only due to operation of an automated inter-tripping scheme[4].
- Synchronous separation of the majority of the SA power system from the rest of the NEM. Only substations between Keith and South East remained connected to Victoria via the Heywood Interconnector. Just prior to the incident, at 1639 hrs, total flow on the South East – Tailem Bend No. 1 and No. 2 275 kV circuits was 258 MW and flow on the Keith – Tailem Bend 132 kV circuit was 19 MW.
- At approximately 1804 hrs on 19 November 2022, the South East – Tailem Bend No.1 275 kV line was returned to service, synchronously connecting SA to Victoria.
- At approximately 1827 hrs on 19 November 2022, the Keith – Tailem Bend 132 kV line was returned to service.
- At approximately 1805 hrs on 23 November 2022, the South East – Tailem Bend No.2 275 kV line was returned to service.

3.2 Power system response

In response to the trip of the South East – Tailem Bend 275 kV lines, the SA system frequency increased to a peak of approximately 50.53 hertz (Hz). Figure 1 shows the frequency of the SA island and Victoria regions during the incident; SA island frequency increased to 50.53 Hz before reducing to below 50.2 Hz less than two minutes. In Victoria, frequency dropped to a minimum of 49.9 Hz. Multiple voltage dips were also observed in response to the event (see Figure 2).

Following the event:

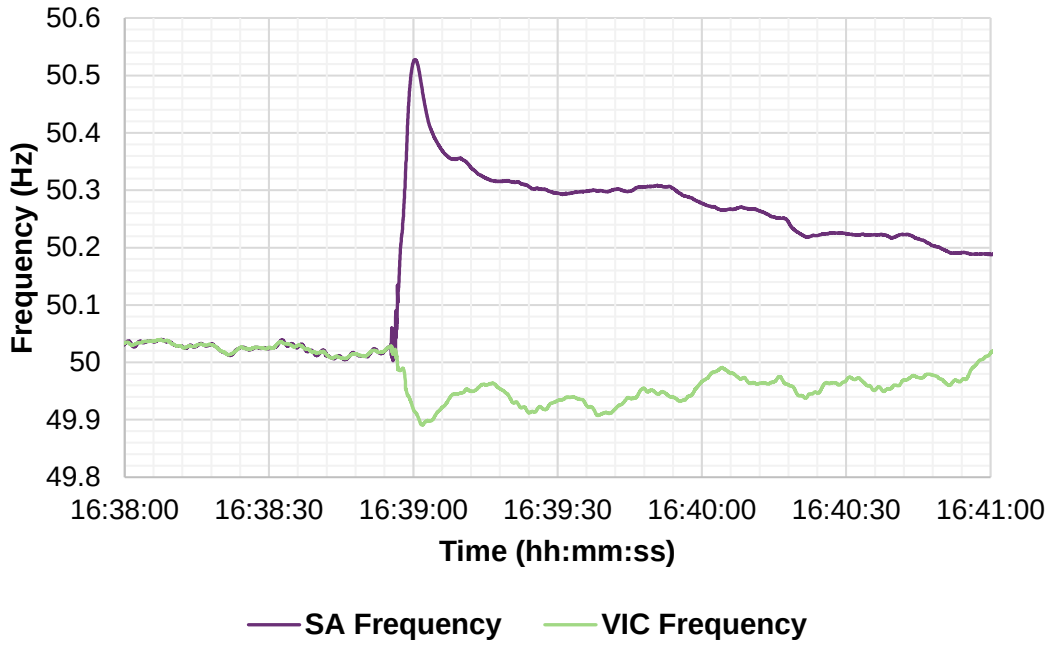
[3] See details of destructive wind conditions in the published AEMO request for Protected Event Declaration, at https://www.aemc.gov.au/sites/default/files/2019-04/AEMO%20Request%20for%20protected%20event%20declaration.pdf.

[4] This automated scheme is in place to protect the Keith – Tailem Bend 132 kV line from being thermally overloaded following a contingency on both South East – Tailem Bend 275 kV lines.

- The SA region remained electrically connected to the rest of the NEM via the Murraylink high voltage direct current (HVDC) interconnector[5].
- Operational demand in SA increased by approximately 75 MW following the separation.
- The South East – Tailem Bend 275 kV No. 1 and the Keith – Tailem Bend 132 kV circuits remained out of service until 19 November 2022. The South East – Tailem Bend 275 kV No. 2 circuit remained out of service until 23 November 2022.

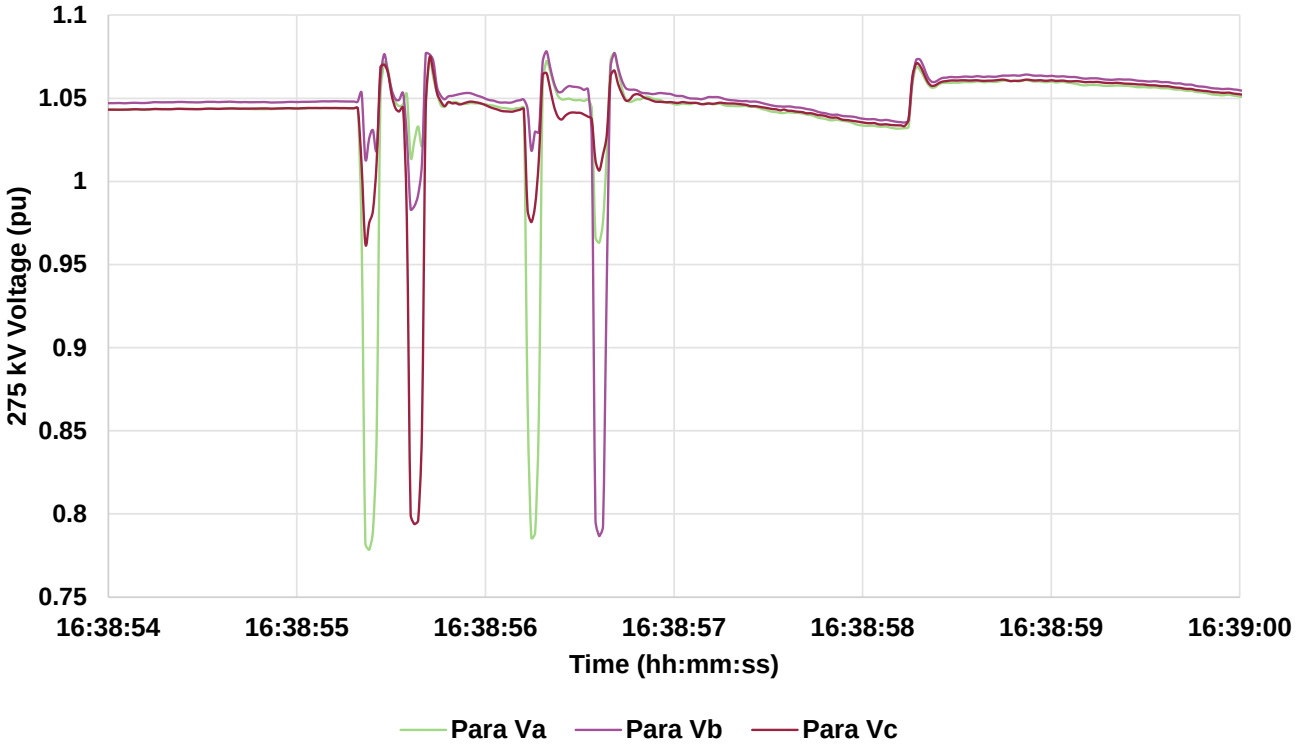
High Speed Monitoring (HSM) and Phasor Measurement Unit (PMU) data is still in the process of being collated and analysed to confirm the exact sequence of events. In the final incident report, ordering of events could change from those presented above.

Figure 1 South Australia and Victoria frequency during the incident



[5] However, frequency control services and system inertia cannot be provided to SA via the Murraylink HVDC interconnector.

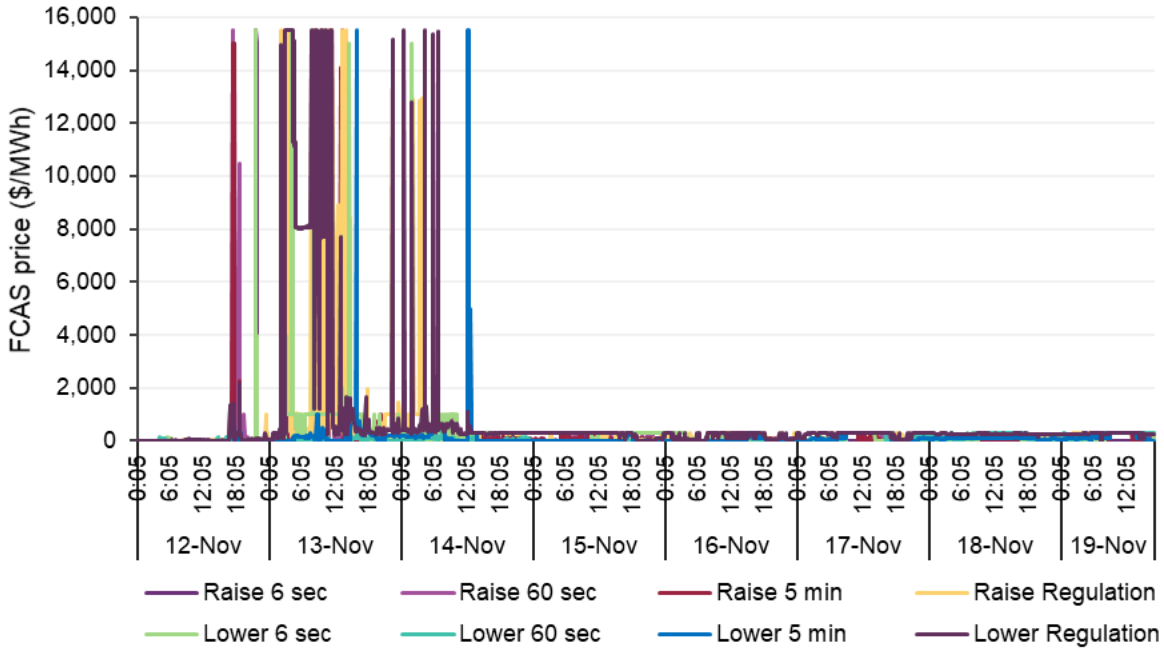
Figure 2 Voltage during incident at Para 275 kV Substation



3.3 Market impact

Following the event, SA frequency control; ancillary services (FCAS) prices experienced significant volatility. All FCAS markets except for the Lower 60 seconds market reached the Market Price Cap (MPC) of $15,500/megawatt hour (MWh) at various trading intervals between 12 November 2022 and 14 November 2022 (see Figure 3).

Figure 3 South Australia FCAS dispatch price by market – 12 to 19 November 2022



Note: Data up to 1700 hrs on 19 November 2022.

Under normal conditions, FCAS services can be supplied on a global basis, where offers from generators or loads in any region can be procured to meet the FCAS requirements determined by AEMO[6]. However, with SA synchronously separated from the rest of the NEM, FCAS requirements could only be procured or supplied by local providers within the South Australian islanded network. This subsequently resulted in an increase in prices across all FCAS markets within SA, substantially above the typical price levels.

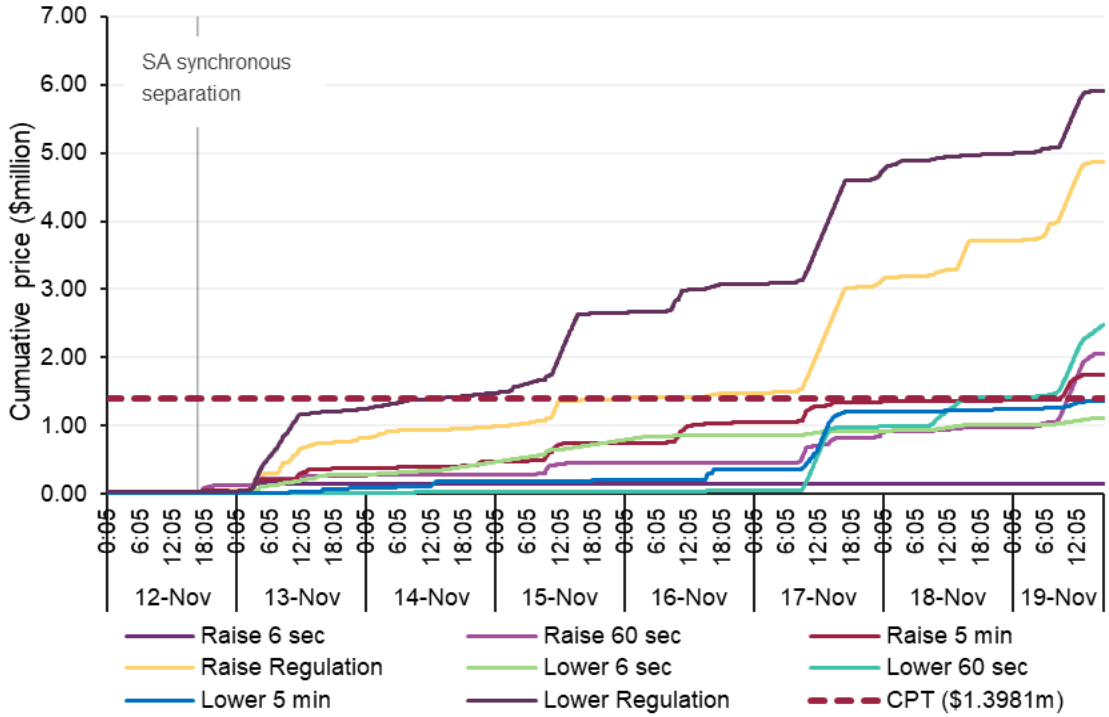
While high prices occurred across all FCAS markets, price volatility was particularly significant in the Lower Regulation market, which resulted in the cumulative price progressively increasing towards the Cumulative Price Threshold (CPT) of $1,398,100[7]. On 14 November 2022 at 1300 hrs, the application of automatic market price caps was triggered in the Lower Regulation market as the rolling sum of the uncapped prices over the previous seven days (or 2016 trading intervals) exceeded the CPT (see Figure 4). Administered price period (APP) commenced, with APC applied across all eight FCAS markets in SA under National Electricity Rules (NER) 3.14.2. APP did not apply to the energy markets. Under NER 3.14.2(d2), within an APP, AEMO is required to set ancillary service price to administered price cap of $300/MWh if an ancillary service price for any market ancillary services for the region exceeds APC. Shortly after the commencement of APP on FCAS markets on 14 November 2022, there were noticeable changes in generator bidding, with several gas units in South Australia rebidding capacity to higher price bands.

Although the APC was applied to all FCAS markets in SA, the cumulative price is calculated as if the cap was not in place. Consequently, other FCAS markets (Raise Regulation, Lower 60 seconds, Raise 5 minutes and Raise 60 seconds) also exceeded the CPT in the following days after APP commenced. APC will continue to apply to all services until the end of the trading day when the cumulative FCAS prices for all services fall below the CPT.

[6] NER 3.8.11(a1)

[7] Applicable for the 2022-23 financial year. For further details, see: https://www.aemc.gov.au/news-centre/media-releases/2022-23-market-price-cap-now-available.

Figure 4 South Australia FCAS cumulative prices by market – 12 to 19 November 2022



Note: Data up to 1700 hrs on 19 November 2022.

In order to maintain power system in a secure operating state, AEMO directed gas units in SA to provide FCAS services during this period. The first direction for FCAS services was issued on 15 November 2022 and remained in place between the trading intervals ending 0705 hrs and 1500 hrs. Further directions for FCAS provision were issued again on 17, 18 and 19 November 2022. Intervention pricing was applied when these directions were in place.

4 Reclassification

Prior to the event, the weather forecast for the area did not meet the reclassification criteria. When the South East – Tailem Bend 275 kV No. 1, the Keith – Tailem Bend 132 kV and the South East – Tailem Bend 275 kV No. 2 275 kV circuits were returned to service, AEMO did not reclassify the simultaneous trip of both circuits as credible because:

- The South East – Tailem Bend 275 kV No. 1 and No. 2 circuit were returned to service only after each circuit had been transferred to a temporary transmission tower. As an effective temporary repair had been made prior to each circuit's return to service, AEMO was satisfied that this event was unlikely to reoccur.
- ElectraNet had confirmed the cause of the Keith – Tailem Bend 132 kV circuit trip as operation of an automated tripping scheme which operated in line with expected performance.

If during its full investigation AEMO becomes aware of a need for reclassification, AEMO will put in place the required reclassification(s), issue any necessary market notices, and report on them in the final incident report.

5 Constraints

The constraints that were invoked on 12 and 13 November 2022 to manage the incident are recorded in Table 3. A full list of constraints invoked to manage the incident (including constraints for SA system strength and FCAS constraints) will be included in the final incident report.

Table 3 Constraints set invoked on 12 November 2022 to manage incident – invoked up to 2355 hrs on 13 November 2022

Set name	Time invoked	Time revoked	Description
F-SA_ESTN_ISLE_REG	12/11/2022 16:50	N/A*	SA / Eastern separation between Heywood and South East (HYTS - SESS) - Regulation FCAS Requirements
SA_ESTN_LG_ISLE	12/11/2022 16:50	N/A*	SA / Eastern separation between Tailem Bend and South East (TBSS - SESS)
S-PA_VC1_BC-2CP	12/11/2022 16:50	N/A*	Out= One Para SVC (Note: with both Black Range series caps O/S)
S-X_BC_CP	12/11/2022 16:50	N/A*	Out = both Black Range series capacitors bypassed
I-HYSE_BC-2CP	12/11/2022 16:55	14/11/2022 14:10	Out =One Heywood-South East 275kV line O/S (Note: with one/both Black Range series caps O/S)
S-SE_VC1_BC-2CP	12/11/2022 16:55	N/A*	Out= One South East SVC (Note: with both Black Range series caps O/S)
S-ACPA_BC-2CP	12/11/2022 17:00	13/11/2022 15:40	Out= Angas Creek-Para 132kV line O/S; (Note: with both Black Range series caps O/S)
SA_ISLE_LB_FFR_ZERO	12/11/2022 21:30	N/A*	SA / Eastern separation with Lake Bonney battery and MOPS NOT CONNECTED to SA island (i.e. Lake Bonney battery remains connected to VIC region) - To provide FFR outside of 4 hours contract
F-S_RREG_0070	12/11/2022 23:20	12/11/2022 23:45	SA Raise Regulation Requirement greater than 70 MW
#TORRB4_DE	13/11/2022 2:00	13/11/2022 3:30	Direction - Energy - No Intervention Pricing
F-S_LBBAT-G_ZERO	13/11/2022 2:40	13/11/2022 11:05	Lake Bonney Battery (Generation Component) FCAS <= 0MW
F-S_LBBAT-L_ZERO	13/11/2022 2:40	13/11/2022 11:05	Lake Bonney Battery (Load Component) FCAS <= 0MW
F-S_LG1_ZERO	13/11/2022 2:45	13/11/2022 11:05	Ladbroke Grove Unit1 FCAS <= 0MW
F-S_LG2_ZERO	13/11/2022 2:45	13/11/2022 11:05	Ladbroke Grove Unit2 FCAS <= 0MW
#TORRB2_DE	13/11/2022 6:00	13/11/2022 11:10	Direction - Energy - No Intervention Pricing
S-LB2_0	13/11/2022 8:35	13/11/2022 9:45	Discretionary upper limit for Lake Bonney 2 generation of 0 MW
S-LB3_0	13/11/2022 8:35	13/11/2022 9:45	Discretionary upper limit for Lake Bonney 3 generation of 0 MW
#TORRB2_DE	13/11/2022 11:10	13/11/2022 12:00	Direction - Energy - No Intervention Pricing
#TORRB2_DE	13/11/2022 12:00	13/11/2022 12:20	Direction - Energy - No Intervention Pricing
#TORRB2_DE	13/11/2022 12:20	13/11/2022 16:00	Direction - Energy - No Intervention Pricing
NC-S_TORRB2	13/11/2022 16:30	13/11/2022 16:35	Non Conformance Constraint for Torrens B2 Power Station
F-S_RREG_0070	13/11/2022 23:20	13/11/2022 23:45	SA Raise Regulation Requirement greater than 70 MW

* Constraint still enabled as at 19 November 2022

6 Market notices

The Market Notices (MN) listed below were issued on 12 November 2022 as a consequence of the event:

- At 1659 hrs on 12 November 2022, AEMO issued MN 103064 to advise of a significant power system event involving tripping of South East – Tailem Bend 275 kV No. 1 and No. 2 lines and the separation of SA from the rest of the NEM.
- At 1739 hrs on 12 November 2022, AEMO issued MN 103066 to advise of a non-credible contingency event following the tripping of two South East – Tailem Bend 275 kV lines.
- At 2107 hrs on 12 November 2022, AEMO issued MN 103067 to provide an update of the significant power system event due to tripping of multiple transmission lines, resulting in synchronous separation of SA from the NEM.
- At 1829 hrs on 23 November 2022, AEMO issued MN 103900 to provide an update on the non-credible contingency event. AEMO confirmed that:
  - At 1803 hrs on 19 November 2022, the South East – Tailem Bend No.1 275 kV circuit was returned to service.
  - At 1805 hrs on 23 November 2022, the South East – Tailem Bend No. 2 275 kV circuit was returned to service.
  - The cause of the non-credible contingency event had been identified and AEMO was satisfied that another occurrence of this event was unlikely under the current circumstances.
- Multiple market notices were issued between 12 November 2022 and 19 November 2022 related to maintaining system security during this incident. A full list of the Market Notices issued in relation to this incident will be provided in the final incident report.

7 Operation of SA following the event

This section describes the key operational measures applied following the event to maintain power system security.

7.1 Distributed photovoltaics (PV) constraints

High levels of distributed PV (DPV)[8] generation (exceeding 1,000 MW) were forecast in SA from 13 to 17 November 2022 and 19 November 2022, with a forecast maximum capacity factor[9] of 71% on 17 November 2022 (1,600 MW).

To ensure secure power system operation, the maximum credible contingency must be maintained within the capability of the available frequency control resources in the SA island. In periods with high levels of DPV generation, the maximum credible contingency is the possible trip of a scheduled generating unit plus the anticipated DPV shake-off that could occur in response to a fault at the associated substation.

[8] DPV are a type of distributed energy resource. DPV is made up of solar generators/panels installed in residential (generator size typically <10 kilowatts [kW]), commercial (typically between 10 kW and 100 kW) and industrial (typically between 100 kW and 30 MW) settings.

[9] Capacity factor is a measure of generator output as a product of installed capacity. As an example, if 10 GW of DPV was installed within a network and 7 GW of that installed DPV capacity was forecast to be generate, the forecast capacity factor would be 70%.

During high DPV generation periods on 13 to 17 November 2022 and on 19 November 2022, AEMO optimised scheduled and semi-scheduled unit dispatch to minimise the credible contingency size and maximised the availability of frequency control resources. Power system studies indicated that the maximum generation contingency size that could be managed in low demand conditions in a typical SA island (i.e. separation at the Heywood interconnector) while maintaining the Frequency Operating Standards was 190-205 MW. AEMO took steps to limit the maximum credible contingency size to 190 MW (to incorporate an operating margin). To allow scheduled units required for system strength to be dispatched to their minimum generation level (some of these units have a minimum generation level of 110 MW), the DPV contingency size was limited to 80 MW. On further review, AEMO revised the DPV contingency limit down to 70 MW, due to the non-standard location of the SA separation and the exclusion of Lake Bonney Battery Energy Storage System (BESS) from the SA island.

On 17 November and 19 November 2022, the DPV curtailment required to maintain the DPV contingency below 70-80 MW was forecast to exceed DPV curtailment capabilities. AEMO completed further power system analysis and identified selected combinations of scheduled units that could operate at lower generation levels and meet system strength and frequency control requirements. The lower dispatch levels on these selected scheduled units presented a smaller generation contingency risk, allowing the DPV contingency limit to be lifted to 110 MW for these days. This alternative approach limited the combinations of units available for system strength and required additional management of reserve and frequency control adequacy, but reduced DPV curtailment requirements to achievable levels.

To reduce the credible contingency size to secure limits, AEMO issued a 4.8.9 instruction to ElectraNet on every day between 13 to 17 November 2022 (inclusive) and on 19 November 2022 to maintain DPV generation to a level that would maintain the DPV contingency risk to secure levels. This translated to operational demand thresholds of between 714 MW and 855 MW, depending on system conditions. To comply with the 4.8.9 instruction, ElectraNet instructed SA Power Networks to maintain operational demand above the necessary threshold. SA Power Networks applied a range of mechanisms[10] to curtail DPV on every day between 13 to 17 and 19 November 2022 for approximately 4-10 hours (up to a maximum of approximately 410 MW of DPV curtailment on Thursday 17 November 2022). This DPV curtailment successfully reduced the largest credible contingency in SA to within secure limits.

AEMO issued multiple DPV Contingency (DPVC) market notices[11] – DPVC1, DPVC2 and DPVC3 – each day to inform market participants when DPV curtailment was anticipated, when it was occurring, and when it was no longer required.

The 4.8.9 instruction and resulting DPV curtailment was the only action available to manage the high DPV contingency condition.

This event is significant because it involved active management of residential, commercial and industrial DPV. This is recognised as a ‘last resort’ measure, to be considered only when other options to maintain power system security are not available or have been exhausted.

[10] Please see Appendix A2 for a summary of the main mechanisms available to SA Power Networks to curtail DPV.

[11] The market notices advise the market of forecast operational challenges and (where the market has not been able to take sufficient action to clear the risk) actions taken by AEMO. For further details on these market notices, see https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/power_system_ops/consumer-fact-sheet.pdf.

7.2 FCAS management

To manage power system security due to insufficient FCAS services in SA, AEMO issued directions under clause 4.8.9(a) to generating units to synchronise to provide FCAS services. A detail assessment on FCAS management in relation to this incident will be provided in the final incident report.

7.3 Reserve management

AEMO added a constraint equation (SA_TBSE1) to the Island constraint set to reflect SA reserve more accurately based on the location of the separation between Victoria and SA.

8 Next steps

AEMO intends to undertake analysis relating to this event and prepare a final incident report in due course with the input and support of ElectraNet and other participants.

The investigation is expected to include, but not be limited to:

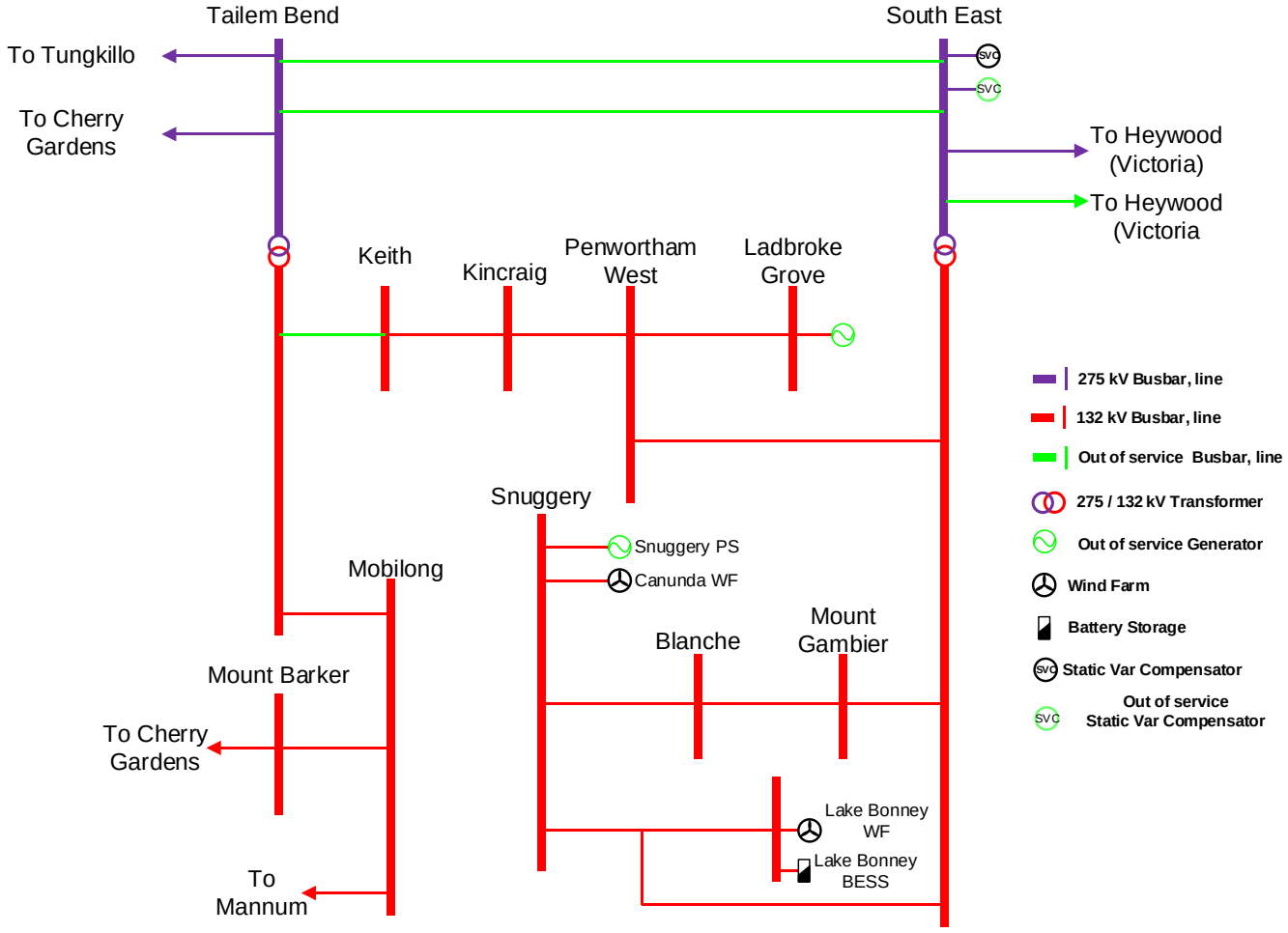
- Confirmation of the exact timing and sequence of events based on available high speed recorder data.
- Confirmation of the cause of the tower failure, including any commonalities with the recent tower failure in Tasmania[12].
- Confirmation of the cause of the multiple voltage dips observed during the event.
- A review of generator performance and fast frequency response (FFR) response during the incident.
- A review of BESS limits and performance within the SA island.
- A review of the DPV constraints following the event.
- Assessment of the post incident operation of the SA network, including an overview of the actions AEMO took to manage available FCAS and system strength within the SA island.
- Review of system operating limits under SA islanded conditions.
- Key findings and recommendations arising from AEMO's investigation.

[12] See https://www.aemo.com.au/-/media/files/electricity/nem/market_notices_and_events/market_event_reports/2022/preliminary-report-trip-of-liapootah-palmerston-lines.pdf?la=en.

A1. System diagram

The network configuration before the event is shown in Figure 5 below.

Figure 5 Post-event single line diagram



A2. Methods of DPV curtailment available to SA Power Networks

Acting on AEMO's instruction, SA Power Networks[13], uses the following agreed methods in the following order to maintain operational demand above a threshold provided by AEMO to maintain system security.

A2.1 SCADA controlled DPV

Larger DPV systems (typically with a capacity above approximately 200 kW) are required by SA Power Networks to be SCADA-controllable. These larger DPV systems can be turned off directly via SA Power Networks' SCADA system when necessary to maintain system security.

A2.2 Smarter Homes regulations[14]

From 28 September 2020, DPV systems in South Australia must comply with the Smarter Homes regulations. These regulations mean customers installing or upgrading solar systems in South Australia are required to appoint a relevant agent who will be responsible for disconnecting and reconnecting the solar system during state electricity security emergencies. This capability was implemented by the South Australian Government to manage scenarios such as the one discussed in this report, where system security is at risk and the only means to mitigate this risk is via a last resort tool to actively manage DPV. When disconnection is required to maintain system security, SA Power Networks will contact the relevant agent(s) with a disconnection requirement. The relevant agents will then meet the requirement.

A2.3 Enhanced voltage management (EVM)

SA Power Networks uses EVM to regulate voltage levels throughout the year and, under normal circumstances, maximise the amount of energy that DPV systems can generate. When using EVM, SA Power Networks increases or decreases the voltage levels at key distribution zone substations (within safe limits). A side-benefit of EVM is that at certain higher voltage levels, a subset of DPV systems trip, disconnecting from the system. This method of disconnecting DPV can be used as a last resort when required to maintain system security.

[13] SA Power Networks is the electricity distributor for South Australia.

[14] For more information on the Smarter Homes regulations, see https://www.energymining.sa.gov.au/industry/modern-energy/solar-batteries-and-smarter-homes/regulatory-changes-for-smarter-homes.