

NETWORK SUPPORT AND CONTROL ANCILLARY SERVICE (NSCAS) DESCRIPTION AND QUANTITY PROCEDURE REVIEW

FINAL REPORT AND DETERMINATION

Published: **December 2021**







EXECUTIVE SUMMARY

The publication of this Final Report and Determination (Final Report) concludes the consultation process conducted by AEMO on the Network Support and Control Ancillary Service (NSCAS) description and NSCAS quantity procedure under the National Electricity Rules (NER).

AEMO forecasts increasing occurrences of NEM mainland operational demand falling below the expected minimum threshold for operation¹ over the coming five-year period. In order to adjust power system planning assessments to respond to this unprecedented situation, AEMO proposed amending the NSCAS description and quantity procedure to facilitate the broader use of a planning assumption for no pre-contingent line switching for voltage control, through a Notice of First Stage of Consultation released on 4 October 2021 and a Notice of Second Stage of Consultation on 18 November 2021.

AEMO received two submissions in response to the Notice of First Stage of Consultation. The submissions were generally supportive of the proposed amendment, with recommendations that AEMO supported, in relation to improved transparency and suggested alternative wording.

AEMO received five submissions in response to the Second Stage of Consultation. The submissions were generally supportive of the proposed amendment with recommendations that AEMO supports, although one submission noted concerns about treatment of risk and costs.

Table 1 overleaf summarises AEMO's response to the key issues raised in the submissions in response to the Second Stage of Consultation.

After considering the submissions received, AEMO's final determination is to amend the NSCAS description and the NSCAS quantity procedure in the form published with this Final Report and Determination.

¹ AEMO. 2021 Electricity Statement of Opportunities. August 2021. Accessible via https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2021/2021-nem-esoo.pdf.



Table 1 AEMO response to key issues raised in submissions on the Notice of Second Stage of Consultation

Pre-Contingent Line Switching for Voltage Management	
Issue and AEMO proposal	AEMO considers that pre-contingent line switching should no longer be assumed for voltage management in NSCAS planning studies, due to unprecedented minimum demand conditions, asset management risks and operational considerations. AEMO proposes amending the NSCAS description and quantity procedure to assume no pre-contingent line switching in NSCAS planning studies unless there is a regionally-specific justification.
Submissions	<p>Five submissions were received. Four submissions were from transmission network service providers (TNSPs) which supported AEMO’s proposed changes to the pre-contingent line switching assumption. One of those submissions proposed alternative wording to include <i>protected events</i> to clarify AEMO’s intent.</p> <p>One submission was from the AER which suggested a cost benefit assessment of options to support the proposed change. The AER also expressed concerns that the proposed change would rule out line switching as potential option for managing high-voltage conditions</p>
Assessment and outcome	<p>AEMO agrees with stakeholder feedback that the proposed amendment should explicitly include <i>protected events</i> in the wording. The updated wording is included in the final NSCAS description and quantity procedure provided with this report.</p> <p>AEMO considers that assuming that pre-contingent line switching will be applicable in all cases for voltage management is no longer a satisfactory de-facto basis when assessing future needs. AEMOs considers is that line switching should only be assumed in planning studies where there is evidence that such a recourse is operable and supported by advice from TNSPs.</p> <p>This does not mean that pre-contingent line switching should not be considered as a means to support voltage control when considering options to address an identified need. AEMO considers that line switching should be assessed along with a range of technology neutral options by the TNSP when developing solutions to meet the identified need. AEMO anticipates that this assessment by TNSPs would include prudent assessments of operating risks, and as applicable, costs and benefits.</p> <p>This approach is intended to ensure that system security and reliability gaps are appropriately surfaced and allow transparent consideration of the full suite of options to address the gap (including pre-contingent line switching if suitable and operable).</p>



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1. STAKEHOLDER CONSULTATION PROCESS

As required by clause 5.20.2 of the NER, AEMO is consulting on the NSCAS description and NSCAS quantity procedure in accordance with the Rules consultation process in rule 8.9.

AEMO’s timeline for this consultation is outlined below.

Deliverable	Indicative date
Notice of first stage consultation published	4 October 2021
First stage submissions closed	8 November 2021
Draft Report & Notice of second stage consultation published	18 November 2021
Submissions due on Draft Report	2 December 2021
Final Report published	17 December 2021

The publication of this Final Report marks the conclusion of this consultation. Note that there is a glossary of terms used in this Final Report at Appendix A.

2. BACKGROUND

2.1. NER requirements

AEMO is responsible for managing power system security and reliability of supply in the NEM. The NSCAS framework is one of the last-resort tools in place for AEMO to manage power system security and reliability of supply, and is part of the broader joint system planning process between AEMO and TNSPs who are Jurisdictional Planning Bodies.

NSCAS are non-market ancillary services acquired to control active and reactive power flow into or out of an electricity transmission network to address an NSCAS need². An NSCAS need is NSCAS required to:

- Maintain power system security and reliability of supply of the transmission network in accordance with the power system security standards and the reliability standard³; and
- Maintain or increase power transfer capability of the transmission network to maximise the present value of net economic benefit to all those who produce, consume or transport electricity in the market⁴.

AEMO is required to develop and publish an NSCAS description providing a detailed description of each type of NSCAS, and an NSCAS quantity procedure explaining the determination of the location and quantity of each type of NSCAS required⁵. AEMO may amend the NSCAS description and quantity procedure. When amending the NSCAS description and/or the NSCAS quantity procedure AEMO must comply with the NER consultation procedures⁶.

Annually, AEMO must also publish an assessment of any NSCAS gaps in the coming five-year period, and a summary of any NSCAS it has procured in the previous year⁷. An NSCAS gap is defined as any NSCAS need that AEMO forecasts will arise at any time within a planning horizon of at least five years.

² The NSCAS definition is in the Chapter 10 Glossary of the NER Version 144.

³ NSCAS need definition, Chapter 10 glossary, NER Version 144. The NSCAS need definition specifically excludes an *inertia network service* to address an *inertia shortfall* and a *system strength service* to address a *fault level shortfall*

⁴ NSCAS need definition, Chapter 10 glossary, NER Version 144. The NSCAS need definition specifically excludes an *inertia network service* to address an *inertia shortfall* and a *system strength service* to address a *fault level shortfall*

⁵ AEMO. Network Support and Control Ancillary Service (NSCAS) Description and Quantity Procedure. September 2020. Accessible via https://aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2020/ncas/2020-ncas-description-and-quantity-procedure.pdf

⁶ Except for minor and administrative amendments (NER clause 5.20.2(d)).

⁷ NER 5.20.3.



When AEMO declares an NSCAS gap, it may ask the relevant TNSP when it will have arrangements in place to address the gap, via connection agreements or network support agreements. In cases where AEMO does not consider that an NSCAS gap will be met, where the gap relates to preventing an adverse impact on power system security and reliability of supply of the transmission network, AEMO may use reasonable endeavours to acquire the necessary NSCAS itself via an ancillary services agreement.

2.2. Context for this consultation

Australia is experiencing what is acknowledged to be the world's fastest energy transition⁸. AEMO has forecast that the occurrence of operational demand falling below 6 gigawatts (GW) in the mainland NEM (excluding Tasmania) is increasing over the coming 5-year period, most notably in the middle of the day due to distributed PV generation uptake. AEMO's 2021 Electricity Statement of Opportunities notes that minimum operational demand of 4 to 6 GW may be required in the mainland NEM to ensure delivery of essential system security services with the present operational toolkit⁹. AEMO considers that power system planning and operational practices must be urgently reviewed and adjusted to respond to this unprecedented situation.

In September 2020, AEMO published its updated NSCAS description and NSCAS quantity procedure in order to allow NSCAS reviews to appropriately respond to challenges introduced by the energy transition. After applying the updated description and quantity procedure for delivery of the 2020 NSCAS review¹⁰, AEMO found that some traditional network planning assumptions may no longer be fit for purpose.

AEMO has previously assumed in planning assessments that one transmission line per region can be switched out of service before a credible contingency event ('pre-contingent') to manage voltage levels at times of minimum demand. This assumption is aligned with historical operational practices and historical power system design. Switching a transmission line (or lines) out of service can reduce voltages during low demand periods. However, switching transmission lines out of service creates other risks because:

- Maintaining system security under unprecedented minimum demand conditions is now differing from many historically planned-for system security challenges.
- Asset management risks must be considered when assuming more frequent switching practices.
- Increased forecast occurrence of minimum demand as well as the shift to daytime minima ahead of evening ramping events introduces an increased likelihood that power system operators would need to switch lines in the middle of the day and return to service in time for evening peak demand events. AEMO considers that it may not be practically feasible for power system operators to implement this safely for multiple lines across multiple regions on a recurring basis.

Consequently, AEMO believes there is a need to consult on the existing line switching assumption for NSCAS studies. AEMO proposes that pre-contingent line switching should no longer be assumed in system normal planning studies for the management of high voltages unless there is a regionally-specific justification.

⁸ AEMO. 2020 Integrated System Plan. July 2020. Accessible via <https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf>.

⁹ AEMO. 2021 Electricity Statement of Opportunities, Chapter 5 'Factors and implications of an accelerated transition'. August 2021. Accessible via https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2021/2021-nem-esoo.pdf.

¹⁰ AEMO. 2020 Network Support and Control Ancillary Services Report. December 2020. Accessible via <https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/planning-for-operability>



2.3. First stage consultation

AEMO issued a Notice of First Stage Consultation on 4 October 2021. This information is available on AEMO's website¹¹. The topic of this consultation is the proposed amendment to the NSCAS description and quantity procedure to assume no pre-contingent line switching for voltage management unless there is a regionally-specific justification.

In the first stage consultation, AEMO sought views on its proposal to amend the NSCAS description and the NSCAS quantity procedure. The current arrangements and proposed amendments are summarised in Table 2.

Table 2 Proposed changes to NSCAS description and quantity procedure from the Notice of First Stage Consultation

	Summary of existing and proposed line-switching assumptions
Current	"AEMO will conduct the NSCAS review by applying the planning assumption that one transmission line per region may be switched out of service in order to meet system security and reliability obligations such as addressing high voltage levels. Exceptions to this approach will include plausible network conditions which permit the assumption that more than one line may be switched in a region (or sub-region), or conversely plausible network conditions for which assuming pre-contingent switching of any transmission lines is not feasible. These exceptions would be subject to an appropriate assessment by AEMO of the risk associated with such an assumption, informed by the experience of the relevant AEMO and TNSP system operators."
Proposed	"AEMO will conduct the NSCAS review by applying the planning assumption that no transmission line per region may be switched out of service in order to meet system security and reliability obligations such as addressing high voltage levels. Exceptions to this approach may include plausible network conditions which permit the assumption that one or more lines may be switched in a region (or sub-region), informed by the experience of the relevant AEMO and TNSP system operators."

AEMO received two written submissions in the first stage of consultation. Copies of all written submissions have been published on AEMO's website at: <https://aemo.com.au/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-consultation>.

2.4. Second stage consultation

AEMO issued a Notice of Second Stage Consultation on 18 November 2021. This information is available on AEMO's website. The topic of this consultation is the proposed amendment to the NSCAS description and quantity procedure to assume no pre-contingent line switching for voltage management unless there is a regionally-specific justification.

In the second stage consultation, AEMO sought views on its proposal to amend the NSCAS description and the NSCAS quantity procedure.

AEMO received five written submissions in the second stage of consultation, including some late submissions which have been accepted. Copies of all written submissions have been published on AEMO's website at: <https://aemo.com.au/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-consultation>.

¹¹ See AEMO's current consultation on Network Support and Control Ancillary Services description and quantity procedure Consultation, October 2021, accessible via <https://aemo.com.au/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-consultation>



3. SUMMARY OF MATERIAL ISSUES

The key material issues arising from the proposal and raised by Consulted Persons are summarised in the following table:

No.	Issue	Raised by
1.	Need for clarity and detailed assessment of options	Australian Energy Regulator (AER)
2.	Cost benefit assessment - Ruling out line switching to manage high voltage levels	AER
3.	No network service providers made submissions supporting the reasons for change	AER
4.	Need to include <i>protected event</i> for clarity	TasNetworks

AEMO received five written submissions from stakeholders. The written submissions were from:

- AER
- TasNetworks
- Powerlink
- ElectraNet
- Transgrid

AEMO would like to thank all stakeholders who provided feedback throughout this process. A detailed summary of issues raised by Consulted Persons in submissions, together with AEMO’s responses, is contained in **Appendix B**. In addition, a summary of issues raised in the previous stages of this consultation and AEMO’s response to each issue are recorded in Appendix E.

4. DISCUSSION OF MATERIAL ISSUES

This section discusses the material issues raised, along with AEMO’s considerations and conclusions. Appendix B summarises all issues raised.

4.1. Need for clarity and detailed assessment of options

4.1.1. Issue summary and submissions

In their submission, the AER consider that the risks associated with pre-contingent line switching in the Draft Report are unclear. The AER also consider that other options may not have been explored.

“We consider that these [risks raised in the Draft Report] are broad statements which do not describe the nature, materiality, consequence or probability of these risks occurring.”

“We consider that this re-evaluation would benefit from a clear articulation of the risks, options and choices available ... it is also not clear from the consultation papers whether other options and alternatives have been explored ... and what the impacts of this may be”



4.1.2. AEMO's assessment

AEMO agrees that transparency is important when assessing system security and reliability risks in the NEM, and when considering options to address those risks. AEMO has consulted with the TNSPs and the risks noted in the Draft Report have emerged as the reduction in minimum demands and the frequency of low demand periods continue to accelerate.

AEMO considers that assuming that pre-contingent line switching will be applicable in all cases for voltage management is no longer a satisfactory starting point when assessing future needs. AEMO considers that line switching should only be assumed in planning studies where there is evidence that such a recourse is operable and supported by advice from TNSPs.

This does not mean that pre-contingent line switching should not be considered as a means to support voltage control when considering options to address an identified need. AEMO considers that line switching should be assessed along with a range of technology neutral options by the TNSP when developing solutions to meet the identified need. AEMO anticipates that this assessment by TNSPs would include prudent assessments of operating risks, and as applicable, costs and benefits.

This approach is intended to ensure that system security and reliability gaps are appropriately surfaced and allow transparent consideration of the full suite of options to address the gap (including pre-contingent line switching if suitable and operable).

AEMO considers that there is little downside risk with this approach, and invites the TNSPs to assess the costs and benefits of a range of options, potentially including pre-contingent line switching, where an NSCAS gap is declared.

4.1.3. AEMO's conclusion

AEMO agrees with the need for clarity when assessing system security risks and the need for a detailed risk assessment and cost benefit evaluation of options when making service procurements and/or network investments.

AEMO anticipates these investigations will be conducted by the relevant TNSP after an NSCAS gap has been declared, when seeking approval for service procurement and/or network investment through the existing regulatory approval pathways.

4.2. Ruling out line switching to manage high voltage levels

4.2.1. Issue summary and submissions

The AER consider that the proposed change to the planning assumptions would rule out pre-contingent line switching as a low-cost option for managing high voltage conditions and that this could lead to higher network costs.

“ruling out a potentially low-cost option such as line switching [to manage pre-contingent high voltage levels], this may in turn require the implementation of higher cost solutions”

4.2.2. AEMO's assessment

AEMO considers that the proposed change to the NSCAS description and quantity procedure does not rule out pre-contingent line switching as an option for TNSPs to consider when planning to manage high voltage levels or address potential NSCAS gaps.

The proposed change only removes the assumption of pre-contingent line switching when performing studies to identify potential NSCAS gaps. This does not prohibit network service providers from considering pre-contingent line switching as an option to address potential NSCAS gaps.

The NSCAS inputs and assumptions are developed in consultation with asset owners and operators to reflect anticipated real-world operating conditions and practices. The identification of an NSCAS gap based



on these assumptions is an opportunity for TNSPs to assess their practices as well as other solutions to meet the need.

AEMO considers it appropriate that TNSPs perform detailed option and risk assessments as part of a cost benefit analysis to support proposed service procurement and/or network investment through the existing regulatory approval pathways.

4.2.3. AEMO's conclusion

AEMO considers that the proposed change to the NSCAS description and quantity procedure does not rule out line switching as an option to manage high voltage levels.

AEMO anticipates proposed network investment to address any potential NSCAS gaps to go through the existing regulatory framework which may include a RIT-T, options study or cost benefit assessment, depending on which rules framework applies for the particular gap. When seeking to address an NSCAS gap, TNSPs or AEMO (as procurer of last resort) will consider the benefits and costs for a range of options, potentially including pre-contingent line switching if appropriate. This may occur through a RIT-T for non-urgent issues above the cost threshold or during tender assessment for procuring reasonable short-term solutions.

4.3. No network service providers made submissions to support the reasons for change

4.3.1. Issue summary and submissions

The AER consider AEMO's reasons for making the proposed change to mitigate against the risks associated with frequent line switching are not supported by network service providers:

"We also note that no network service providers made submissions that supported or clarified these concerns or which provided any further information to describe the nature, consequence or probability of the risks."

4.3.2. AEMO's assessment

Although no TNSPs submitted to the First Stage of Consultation, AEMO received submissions from Powerlink, TasNetworks, ElectraNet and Transgrid in the Second Stage of Consultation. The TNSPs' submissions support the proposed changes and reiterate some of the risks associated with planning for pre-contingent line switching.

In their submission, Powerlink consider:

"it is no longer appropriate to plan for pre-contingent line switching to manage what are now routine voltage conditions across the network".

Powerlink also describe the nature and consequence of the risk:

"the wear and tear on equipment from repeatedly being brought into and taken out of service and the increased potential for equipment failure during operation to leave critical lines unavailable to meet periods of subsequent maximum demand".

In their submission, TasNetworks identify the following risks with deliberate switching of a single circuit:

- exposure to increased frequency control ancillary service (FCAS) requirements due to multiple generating units being radially connected;
- potential increased loss of system strength and inertia support following any subsequent contingency event; and
- increased probability of islanding events following any subsequent contingency".



In their submission, ElectraNet note the system strength risks of pre-contingent line switching to manage high system voltages at times of low demand:

“switching a line out-of-service reduces system security and also further reduces system strength at times when system strength is already low, potentially impacting market participants’ access to supply customers”

ElectraNet note the impact to asset condition of frequent switching, possibly multiple times in a day. This could incur additional maintenance costs or increase the potential for equipment failure.

“switching of a cable or a line would introduce unnecessary stress on assets and therefore have an impact on their lifecycle and condition ”

ElectraNet also raise the concern that:

“switching a line out-of-service to manage voltages reduces the reliability of the grid...This situation could lead to a breach of the South Australia Electricity Transmission Code (ETC) N-2 obligation for supply to the Adelaide CBD.”

In their submission, Transgrid note that the rapidly changing power network may cause an issue with procuring solutions to potential NSCAS gap with sufficient lead times if line switching is planned for but not suitable:

“Transgrid considers that this [AEMO’s proposed amendment] is necessary given the rapidly evolving network and the lead times for network investment.”

AEMO considers it reasonable to assume based on the risks raised in the Draft Report and in the TNSPs’ submissions that a planning assumption for pre-contingent line switching for voltage management is no longer appropriate as it may conceal a range of NSCAS gaps.

4.3.3. AEMO’s conclusion

AEMO considers the risks associated with pre-contingent line switching are supported by the network service providers and warrant the removal of this planning assumption when identifying NSCAS gaps.

AEMO considers that more detailed studies into the nature, consequence and probabilities of those risks are outside the scope of the annual NSCAS assessment. As noted above, AEMO expect these detailed investigations would be conducted by the relevant TNSP after an NSCAS gap has been declared when seeking approval for service procurement and/or network investment.

4.4. Need to include *protected events* for clarity

4.4.1. Issue summary and submissions

TasNetworks suggested that protected events be included in addition to a credible contingency event in the description of conditions stated in the proposed planning assumption. Minor wording adjustment was also suggested.

4.4.2. AEMO’s assessment

AEMO agrees that a *protected event* is a post-contingent event and should be explicitly included in the assumption in addition to *credible contingency event* for clarity, consistent with NER clause 4.2.4 treatment of protected events with relation to a secure operating state of the power system.

4.4.3. AEMO’s conclusion

AEMO’s final determination is to include the *protected event* change proposed by TasNetwork, but not the minor re-wordings.



5. FINAL DETERMINATION

Having considered the matters raised in submissions, AEMO's Final determination is to **amend** the **NSCAS description and quantity procedure** shown in the form of Attachment 1, in accordance with clause 5.20.2 of the NER.



APPENDIX A. GLOSSARY

Term or acronym	Meaning
AEMO	Australian Energy Market Operator
NEM	National Electricity Market
NEMOC	National Energy Market Operations Committee
NSCAS	Network Support and Control Ancillary Service
TNSP	Transmission Network Service Provider



APPENDIX B. SUMMARY OF SUBMISSIONS AND AEMO RESPONSES

No.	Consulted person	Point raised in submission	AEMO response
1.	AER	In their submission, the AER consider that the risk associated with pre-contingent line switching in the Draft Report are unclear. The AER also consider that other options have not been explored.	<p>AEMO agrees with need for clarity when assessing system security risks and the need for a detailed risk assessment and cost benefit evaluation of options when making service procurements and/or network investments.</p> <p>AEMO anticipates these detailed investigations will be conducted by the relevant TNSP after an NSCAS gap has been declared when seeking approval for service procurement and/or network investment through the existing regulatory approval pathways.</p>
2.	AER	The AER consider that the proposed change to the planning assumptions would rule out pre-contingent line switching as a low-cost option for managing high voltage conditions and that this could lead to higher network costs.	<p>AEMO considers that the proposed change to the NSCAS description and quantity procedure does not rule out line switching as an option to manage high voltage levels.</p> <p>AEMO anticipates proposed network investment will address any potential NSCAS gaps to go through the existing regulatory framework which may include a RIT-T, options study or cost benefit assessment.</p>
3.	AER	<p>The AER consider AEMO’s reasons for making the proposed change to mitigate against the risks associated with frequent line switching are not supported by network service providers. The AER note:</p> <p>“no network service providers made submissions that supported or clarified these concerns or which provided any further information to describe the nature, consequence or probability of the risks.”</p>	<p>AEMO considers the risks associated with pre-contingent line switching are confirmed in the submissions received from network service providers for this Second Stage of Consultation, and that the risks warrant the removal of this planning assumption when identifying NSCAS gaps.</p> <p>AEMO anticipates that more detailed studies into the nature, consequence and probabilities of those risks would be conducted by the relevant TNSP after an NSCAS gap has been declared when seeking approval for service procurement and/or network investment.</p>
4.	Powerlink	<p>Powerlink supports AEMO’s proposed amendment to the Procedure’s planning assumption that there should be no pre-contingent line switching for voltage management unless there is a region-specific justification.</p> <p>Powerlink considers it is no longer appropriate to plan for pre-contingent line switching to manage what are now routine voltage conditions across the network.</p>	AEMO notes Powerlink’s support for this change.



No.	Consulted person	Point raised in submission	AEMO response
5.	Powerlink	Powerlink acknowledges that transmission networks will require additional reactive power capability to manage network voltages in the absence of pre-contingent line switching.	<p>AEMO acknowledges that pre-contingent line switching is one option to manage high voltages and that there are other options.</p> <p>AEMO considers that a detailed investigations and evaluation of options will be conducted by the relevant TNSP after an NSCAS gap has been declared when seeking approval for network investment through the existing regulatory approval pathways.</p>
6.	TasNetworks	<p>TasNetworks are supportive of AEMO’s updated planning assumption, considering the minor amendments made as part of the first stage consultation process.</p> <p>TasNetworks also raise several risks associated with planning for pre-contingent line switching. Some of these risks are increased loss of system strength and inertia support and increased probability of islanding events following any subsequent contingency.</p>	AEMO notes TasNetwork’s support for this change and notes the risks regarding pre-contingent line switching.
7.	TasNetworks	TasNetworks consider that there are other practical and cost-effective alternatives to manage high network voltages than pre-contingent line switching including procuring access to additional reactive absorption capability.	AEMO notes TasNetwork’s alternatives to managing high network voltages.
8.	TasNetworks	<p>AEMO may wish to consider the following alternate wording to its key assumption which may help with its ongoing implementation:</p> <p>AEMO will conduct the NSCAS review by applying the planning assumption that no transmission lines per region may be switched out of service in any region before the impact of a credible contingency event or protected event is considered, in order to meet system security and reliability obligations such as addressing high voltage levels. Exceptions to this approach may include plausible network conditions which permit the assumption that one or more lines may be switched in a region (or sub-region), as informed by the experience of the relevant AEMO and TNSP system operators.</p>	<p>AEMO agrees with TasNetworks that the amendment should explicitly include <i>protected events</i>.</p> <p>AEMO’s final determination is to include the ‘<i>protected event</i>’ changes proposed by TasNetwork, but not the minor re-wordings.</p>



No.	Consulted person	Point raised in submission	AEMO response
9.	ElectraNet	<p>ElectraNet supports AEMO's proposal that switching lines out-of-service should not be assumed as a long-term planning option for voltage management.</p> <p>ElectraNet raise several risks associated with planning for pre-contingent line switching. Some of these risks include:</p> <ul style="list-style-type: none">• reduced system strength at times when system strength is already low, potentially impacting market participants' access to supply customers.• unnecessary stress on assets and therefore have an impact on their lifecycle and condition.• a breach of the SA Electricity Transmission Code (ETC) N-2 obligation for supply to the Adelaide CBD	AEMO notes ElectraNet's support for this change and the risks raised regarding pre-contingent line switching.
10.	Transgrid	Transgrid is in agreement with AEMO on the planning assumption that no transmission line may be switched out of service before a credible contingency event in order to meet system security and reliability obligations, such as addressing high voltage levels when conducting the NSCAS review.	AEMO notes Transgrid's support for this change.

APPENDIX C. ATTACHMENT 1 – NSCAS DESCRIPTION AND QUANTITY PROCEDURE

Please see Attachment 1 'NSCAS description and quantity procedure v2.2' provided on AEMO's website: <https://aemo.com.au/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-consultation>,

This attachment provides the final amended NSCAS description and quantity procedure (version 2.1), in effect from 17 December 2021.

APPENDIX D. ATTACHMENT 2 – TRACKED CHANGES BETWEEN DRAFT AND FINAL NSCAS DESCRIPTION AND QUANTITY PROCEDURE

Please see Attachment 2 'NOT FOR OFFICIAL USE – NSCAS procedure v2.2 changes between draft and final' provided on AEMO's website: <https://aemo.com.au/consultations/current-and-closed-consultations/network-support-and-control-ancillary-services-description-and-quantity-procedure-consultation>.

This attachment provides the changes between the draft and final NSCAS description and quantity procedures, for stakeholder information. This attachment is for information only and cannot be used for official purposes.

APPENDIX E. SUMMARY OF SUBMISSIONS AND AEMO RESPONSES IN PREVIOUS STAGES OF THIS CONSULTATION

The tables below summarise issues and their treatment from first stage of this consultation are replicated from the NSCAS Draft Report and Determination. All references to section numbers in the tables refer to that report.

AEMO response to key issues raised in submissions on the Notice of First Stage of Consultation

Pre-Contingent Line Switching for Voltage Management	
Issue and AEMO proposal	AEMO considers that pre-contingent line switching should no longer be assumed for voltage management in NSCAS planning studies, due to unprecedented minimum demand conditions, asset management risks and operational considerations. AEMO proposes amending the NSCAS description and quantity procedure to assume no pre-contingent line switching in NSCAS planning studies unless there is a regionally-specific justification.
Submissions	Two submissions were received. Both submissions supported AEMO’s proposed changes to the pre-contingent line switching assumption, with one proposing alternative wording to clarify AEMO’s intent. Both submissions raised an expectation of transparency when regionally-specific exceptions applies, as well as a number of additional matters.
Assessment and outcome	Amending the pre-contingent line switching assumption will allow AEMO to align its planning assumptions with the context of declining minimum demand and ensure that the system is designed to more efficiently maintain reliability and security with manageable operational risks. AEMO agrees with stakeholder feedback that the proposed amendment should be reworded to better reflect AEMO’s intent. The updated proposed wording is included in the draft NSCAS description and quantity procedure provided with this report. AEMO acknowledges the importance of transparency and will publish any rationale regarding the use of pre-contingent line switching in NSCAS studies. AEMO has also responded to each of the additional matters raised.

No.	Consulted person	Point raised in submission	AEMO response
1.	CS Energy	"CS Energy is strongly supportive of AEMO's proposal to change the existing assumption regarding line switching for voltage management in the current NSCAS description and quantity procedure and considers it a step in the right direction."	AEMO notes CS Energy's support for this change.
2.	CS Energy	"CS Energy has continued to express concern about the observed routine and patterned line switching for voltage management in the operational domain. This has been raised to AEMO both in written correspondence and at a variety of forums hosted by AEMO that included discussions on system security challenges"	AEMO notes CS Energy's concern around line switching for voltage management.
3.	CS Energy	"Since 2018, CS Energy with interest from the AEMC has encouraged AEMO to form a NEM voltage control working group that could reside under existing operational working groups or as a standalone group."	AEMO notes CS Energy's interest in the establishment of a voltage control working group. However, at this stage, AEMO intends to continue with its existing industry consultation practices for matters such as these, for example through membership of the National Electricity Market Operations Committee ¹² .
4.	CS Energy	<p>CS Energy note their support for AEMO's proposal through the proposed amendment, however raised its expectations on transparency and the consideration of non-network solutions.</p> <p>"[...] CS Energy would expect any agreement between the local Transmission Network Provider (TNSP) and AEMO to be transparent and available to Participants. The information would provide transparency and potential opportunities for viable non-network solutions, that could include VRE synchronous condensers required for connection to the network to be utilised in the management of voltages in the NEM."</p>	<p>AEMO agrees with CS Energy that network and non-network options should be considered when addressing NSCAS gaps, consistent with the existing regulatory framework.</p> <p>AEMO notes CS Energy's preference for transparency about situations where line switching will be assumed in planning studies. AEMO will publish any rationale (including advice from the relevant TNSP, if any) in the relevant documents, for example in the annual Network Support and Control Ancillary Services reports.</p>
5.	Shell Energy	<p>"Shell Energy supports AEMO's intent to amend the NSCAS description and quantity procedure [... and agrees] that switching out lines during the middle of the day will increasingly expose the system to additional risk"</p> <p>"Taking lines out of service for any reason reduces system security and increases system losses, which is reflected in indirect costs to all stakeholders."</p>	AEMO notes Shell Energy's support for this change.

¹² See AEMO's website for further details on NEMOC, accessible via <https://aemo.com.au/en/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/national-electricity-market-operations-committee-nemoc>

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6.	Shell Energy	<p>Shell Energy proposes the following change to the proposed amendment, to clarify AEMO's intent that post-contingent line switching is allowable to manage the next contingency event from a planning perspective:</p> <p>"AEMO will conduct the NSCAS review by applying the planning assumption that no transmission line per region may be switched out of service before a credible contingency event in order to meet system security and reliability obligations post contingency such as addressing high voltage levels. Exceptions to this approach may include plausible network conditions which permit the assumption that one or more lines may be switched in a region (or sub-region), informed by the experience of the relevant AEMO and TNSP system operators."</p>	<p>AEMO notes Shell Energy has proposed alternative wording. AEMO agrees that the amendment should be explicit in stating that the assumption is that line switching should not be considered before a contingency event from a planning perspective. As such, AEMO now proposes the following alternative wording:</p> <p>"AEMO will conduct the NSCAS review by applying the planning assumption that no transmission line per region may be switched out of service before a credible contingency event in order to meet system security and reliability obligations such as addressing high voltage levels. Exceptions to this approach may include plausible network conditions which permit the assumption that one or more lines may be switched in a region (or sub-region), informed by the experience of the relevant AEMO and TNSP system operators."</p>
7.	Shell Energy	<p>Shell Energy recommend that the process for exceptions to the default "no line switching" assumption is formal and transparent.</p> <p>"In our view, it is insufficient for there to be a non-publicised agreement between the local TNSP and AEMO. We recommend that, if there is an exception, AEMO should publish the rationale. This could be either as a short standalone report, or as part of an existing process (e.g., the General Power System Risk Review)."</p>	<p>AEMO notes Shell Energy's preference for transparency about situations where line switching will be assumed in planning studies. AEMO will publish any rationale (including advice from the relevant TNSP, if any) in the relevant documents, for example in the annual Network Support and Control Ancillary Services reports. AEMO does not currently consider this assumption to be strongly relevant for the General Power System Risk Review.</p>
8.	Shell Energy	<p>Shell Energy note the need for additional reactive power support to manage voltage levels without pre-contingent line switching, and raise the likely involvement of inverter-connected technologies in achieving the most efficient outcome.</p>	<p>AEMO agrees that a range of solutions are possible to meet reactive power requirements in the power system. AEMO agrees with Shell Energy that network and non-network options should be considered when addressing NSCAS gaps, consistent with the existing regulatory framework</p>
9.	Shell Energy	<p>"[Shell Energy] ask AEMO to consider if a NSCAS contract(s) could be used to reduce or remove the need for ongoing directions in South Australia"</p>	<p>AEMO notes Shell Energy's suggestion about ongoing directions in South Australia. AEMO will continue to publish information about system security in South Australia, and will continue to consider system security issues through the NSCAS process and other AEMO processes.</p>