2024 System Strength Report

February 2025

A report for the National Electricity Market

We acknowledge the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and continuing connection to Country; and hope that our work can benefit both people and Country.

'Journey of unity: AEMO's Reconciliation Path' by Lani Balzan

AEMO Group is proud to have launched its first Reconciliation Action Plan in May 2024. 'Journey of unity: AEMO's Reconciliation Path' was created by Wiradjuri artist Lani Balzan to visually narrate our ongoing journey towards reconciliation - a collaborative endeavour that honours First Nations cultures, fosters mutual understanding, and paves the way for a brighter, more inclusive future.

Important notice

Purpose

The purpose of this publication is to report on the system strength nodes and system strength standards (minimum and efficient levels) for the coming decade for the National Electricity Market. AEMO publishes this 2024 System Strength Report in accordance with clauses 5.20.7 and 11.143.14(f) of the National Electricity Rules (NER). This publication is generally based on information available to AEMO as at November 2024 unless otherwise indicated.

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Version control

Version	Release date	Changes
1.0	2/12/2024	Initial release
1.1	28/02/2025	Correcting inconsistent shortfall sizes and timing for Queensland in text and in Figure 11. Correcting Buronga node voltage level in Table 8 and Table 9. Correcting Darlington Point node voltage level in Table 3 and Table 49. Updating Figure 30 to show the shortfall at Thomastown. Minor typographical changes.

Executive summary

This report updates AEMO's 10-year specification of system strength requirements for the National Electricity Market (NEM). All regions except South Australia are expected to experience system strength shortfalls over the next three years unless adequate investment or services are provided by the relevant System Strength Service Provider (SSSP) in each region.

In undertaking this 2024 assessment, AEMO has considered whether any material system changes have occurred that would warrant reassessing the location of system strength nodes or recalculating their associated minimum fault level requirements. No new nodes have subsequently been declared, and only one isolated change was identified to the existing minimum fault level requirements in Tasmania.

The 10-year inverter-based resources (IBR) forecasts have also been updated for all nodes, and consider the 2024 *Integrated System Plan* (ISP) results alongside the latest announced timings for network projects, generator commissioning and plant retirements.

Minimum system strength requirements remain mostly unchanged, while IBR projections have been adjusted to reflect recent generation and transmission project updates.

Table 1 summarises the current system strength requirements for each region. These form the basis of investment obligations for delivery by the SSSPs from 2 December 2025 onwards.

Table 1 Summary of projected system strength requirements

Region	Minimum requirements and IBR projections
New South Wales	**New South Wales minimum fault level requirements remain unchanged across the 10-year outlook. In the near term, IBR projections increased at Darlington Point node and reduced at Red Cliffs, primarily due to dispatch changes following the Eraring extension.** The latest IBR projections now indicate an increased capacity (from existing) of 3,356 MW of wind, 4,782 MW of solar and 5,158 MW of battery energy storage systems (BESS) across New South Wales by 2027-28.
Queensland	**Queensland minimum fault level requirements remain unchanged across the 10-year outlook. In the near term, IBR projections have decreased at Lilyvale, Gin Gin and Ross nodes**, linked with dispatch changes following the Eraring extension. The latest IBR projections now indicate an increased capacity (from existing) of 5,126 MW of wind,1,998 MW of solar and 2,550 MW of BESS across Queensland by 2027-28.
Tasmania	**Burnie 110 kilovolts (kV) pre-contingent minimum fault level requirement has been reduced from 850 megavolt amperes (MVA) to 750 MVA, all other minimum requirements remain unchanged.** TasNetworks in nearing commissioning completion of two STATCOMS installed at Port Latta addressing wind farm fault ride-through issues dictating requirements at this node. The latest IBR projections now indicate an increased capacity (from existing) of 717 MW of wind across Tasmania by 2027-28, however no solar or BESS, largely consistent with the 2023 *System Strength Report*.
Victoria	**Victoria minimum fault level requirements remain unchanged across the 10-year outlook. IBR projections are mostly aligned with 2024 ISP projections.** The latest IBR projections now indicate an increased capacity (from existing) of 2,963 MW of wind, 1,312 MW of solar and 3,835 MW of BESS across Victoria by 2027-28.
South Australia	**South Australia minimum fault level requirements remain unchanged across the 10-year outlook. IBR projections are mostly aligned with 2024 ISP projections.** The latest IBR projections now indicate an increased capacity (from existing) of 699 MW of wind, 492 MW of solar and 681 MW of BESS across South Australia by 2027-28.

Without investment, near-term shortfalls are expected across four regions

AEMO has modelled the projected availability of three phase fault levels over a three-year period from December 2024 to December 2027, assuming no SSSP or operational intervention is forthcoming. AEMO used these projections to identify system strength shortfalls as part of the 2024 Network Support and Control Ancillary Services (NSCAS) report[1], and a summary of these findings is presented in Table 2.

Table 2 Summary of projected system strength shortfalls

Region	Projected system strength shortfalls
 **New South Wales**	**The previous shortfalls at Newcastle and Sydney West have been deferred until 2027-28.** Sydney West and Newcastle shortfalls are linked with delayed retirement of Eraring Power station. Transgrid is progressing remediation against a full set of New South Wales requirements as part of its broader System Strength Regulatory Investment Test for Transmission (RIT-T) process, and AEMO will continue to work with Transgrid to track the progress of its remediation activities.
 **Queensland**	**AEMO has identified new system strength shortfalls of between 105 MVA and 173 MVA across three nodes in Queensland in 2026-27 and Lilyvale alone in 2027-28.** These shortfalls are primarily linked with decreased energy exports to New South Wales, with more energy available in that region following the delayed retirement of Eraring Power Station. That change has resulted in fewer thermal units expected to be online economically in Queensland, and lower fault levels than previously projected. Powerlink has remediation arrangements in place to address the previous shortfall at Gin Gin node and is progressing a RIT-T to meet system strength requirements across all Queensland nodes.
 **Tasmania**	**AEMO has confirmed ongoing shortfalls at all four nodes in Tasmania**, noting sufficient network support agreements in place until 2 December 2025. TasNetworks is progressing a Regulatory Investment Test for Transmission (RIT-T) to ensure sufficient ongoing support arrangements.
 **South Australia**	**AEMO has not identified any system strength shortfalls in South Australia.**
 **Victoria**	**AEMO has identified a need for system strength services of 368 MVA at Red Cliffs from 2025-26,** primarily linked with the expected end of existing system strength remediation contracts. AEMO Victorian Planning (AVP) is exploring options to extend this arrangement. **Shortfalls are also forecast to emerge against requirements at Moorabool, Hazelwood, and Thomastown from 2027-28,** and AVP is progressing a regional system strength RIT-T.

SSSPs are testing available options to meet their planning obligations

SSSPs are responsible for providing sufficient levels of system strength to meet the minimum requirements projected by AEMO from 2 December 2025. Some SSSPs have now published Project Assessment Draft Reports (PADRs) outlining available options to meet system strength obligations and their respective net market benefits. These options include both network and non-network options ranging from (but not limited to) development of synchronous condensers, retrofitting of clutches to existing/future gas turbines, and grid-forming IBR-based solutions. AEMO will continue to engage with SSSPs on the operability and impact of these preferred options.

AEMO is seeking feedback on key inputs for the 2025 system strength assessments

AEMO takes a consultative approach to setting the system strength standards each year and intends to use feedback on each annual report to inform future reports. Stakeholders are welcome to provide feedback to planning@aemo.com.au on the matters considered in this report. This may include feedback on:

[1] AEMO, https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

- Current, proposed, or new system strength nodes.
- Factors affecting minimum fault level requirements over time.
- Critical planned outages, and the criteria used to select them.
- The clarity, structure, and content of the report and its datasets.

Delivering adequate system strength services will be one of the highest priority matters facing the NEM over the coming decade, and AEMO looks forward to working with the SSSPs and other industry stakeholders to ensure long-term power system security.

To allow adequate consideration ahead of scoping the 2025 report, AEMO seeks feedback by 28 February 2025.

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1 Introduction

System strength describes the ability of the power system to maintain and control the voltage waveform at a given location, both during steady state operation and following a disturbance. System strength is often approximated by the amount of electrical current available during a network fault (fault level), however the concept also encompasses a collection of broader electrical characteristics and power system interactions.

Each year, AEMO assesses and publishes the regional requirements for system strength to allow subsequent delivery and maintenance by the SSSPs in each region. AEMO can also take action through its last resort planning functions in the Network Support and Control Ancillary Services (NSCAS) framework to ensure that the minimum secure levels published in this report can be met in the near term.

1.1 Regulatory changes impacting the 2024 System Strength report

System strength services can now be considered under the NSCAS framework

The Australian Energy Market Commission (AEMC) published the National Electricity Amendment (Improving security frameworks for the energy transition) Rule 2024 (ISF Rule) in March 2024[2]. The ISF Rule expands the system security procurement frameworks and provides AEMO with new tools to manage power system security in the NEM through the current energy transition.

With effect from 1 December 2024, the ISF Rule permits minimum fault level requirements for system strength to be considered under the NSCAS framework (removing the previous exclusion of those services).[3] While SSSPs retain the primary obligation to procure these services, AEMO is now also able to declare and procure these services to fill near-term expected shortfalls via its NSCAS last resort functions.

As a result of this change, the system strength shortfalls that would previously have been discussed in this report are now declared in the 2024 NSCAS Report. For completeness, this report still highlights those outcomes – however, this report now has a stronger focus on the calculation and presentation of the requirements themselves.

1.2 Scope of analysis

This report provides AEMO's 2024 assessment of system strength requirements over the 10-year period from December 2024 to December 2034 inclusive. The underlying analysis has been conducted in accordance with the latest System Strength Requirements Methodology (SSRM)[4], and for each region, includes review of the system strength nodes, minimum fault level requirements, and efficient levels of system strength.

[2] At https://www.aemc.gov.au/rule-changes/improving-security-frameworks-energy-transition.

[3] This is through the amended definition of "NSCAS need" in Chapter 10 of the NER.

[4] AEMO. System Strength Requirements Methodology 1 December 2022, at https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system-strength-requirements/system-strength-requirements-methodology.pdf?la=en.

Review of system strength nodes

A system strength node is a physical location on the transmission network, at which AEMO must determine system strength requirements and apply those requirements for power system security. AEMO applies engineering, market, and policy judgement to select and review the nodes for each region to ensure their number and location support efficient investment outcomes.

AEMO has not declared any new nodes in this report, however recent renewable energy zone (REZ) policy announcements, generator connections, and network projects may justify including additional locations to maximise the effectiveness of system strength investments. AEMO has identified these potential nodes in each regional summary and welcomes any stakeholder feedback on the utility of these (or other) network locations.

Review of minimum fault level requirements

The minimum fault level requirements are intended to represent a minimum secure operability requirement for three phase fault level that, if met, ensures correct operation of network protection systems, appropriate operation of voltage control devices, and overall system stability following credible contingencies and protected events.

These requirements are specified as a fault level value and must be met by solutions capable of delivering protection-quality fault current. Technology options may include synchronous condensers, contracts with market participants to provide fault level services, or the conversion of existing thermal units into synchronous condensers.

This year AEMO has chosen to assess projections against pre-contingent fault level requirements, see appendix A1.4 for more information on this.

Review of efficient levels of system strength

In addition to the minimum fault level requirements, AEMO specifies an efficient level of system strength. This level is intended to deliver additional investment in system strength, at optimised network locations, sufficient to accommodate and encourage future IBR connections near those locations. This requirement is specified as a capacity of inverter-based resources (IBR) that must be able to connect without voltage stability and synchronisation issues, assuming all other generator performance standards are met.

As such, the efficient level can be met by any existing or new technology capable of improving the resilience of the local voltage waveform. This could include synchronous machines, as well as dynamic reactive devices, network reconfigurations, or grid-forming technology customised to the needs of specific network locations.

Efficient levels are typically based on the most likely scenario published in AEMO's most recent *Integrated System Plan* (ISP). Requirements in this report are based on the 2024 ISP *Step Change* scenario, with adjustments in some regions to accommodate material changes in the timing of generation and transmission projects. Requirements are specified by node, technology, and year.

Jurisdictional SSSPs are then required to take proactive measures to ensure sufficient levels of system strength to accommodate IBR projections. SSSPs may adjust near-term forecasts as more information becomes available regarding plant connection status, technology type etc., with proponent advised election for self-remediation as an example.

1.3 Structure of this report

The 2024 *System Strength* Report contains the following information:

- For each region, AEMO's assessment of minimum system strength requirements and shortfalls:
  - New South Wales (Section 2.1).
  - Queensland (Section 2.2).
  - South Australia (Section 2.3).
  - Tasmania (Section 2.4).
  - Victoria (Section 2.5).
- An overview of next steps related to the findings in this report (Section 3).
- An overview of power system and market modelling assumptions used in preparing this report (Appendix A1).
- A summary of minimum fault level requirements applied operationally (Appendix A2).

1.4 Relationship with other AEMO documents

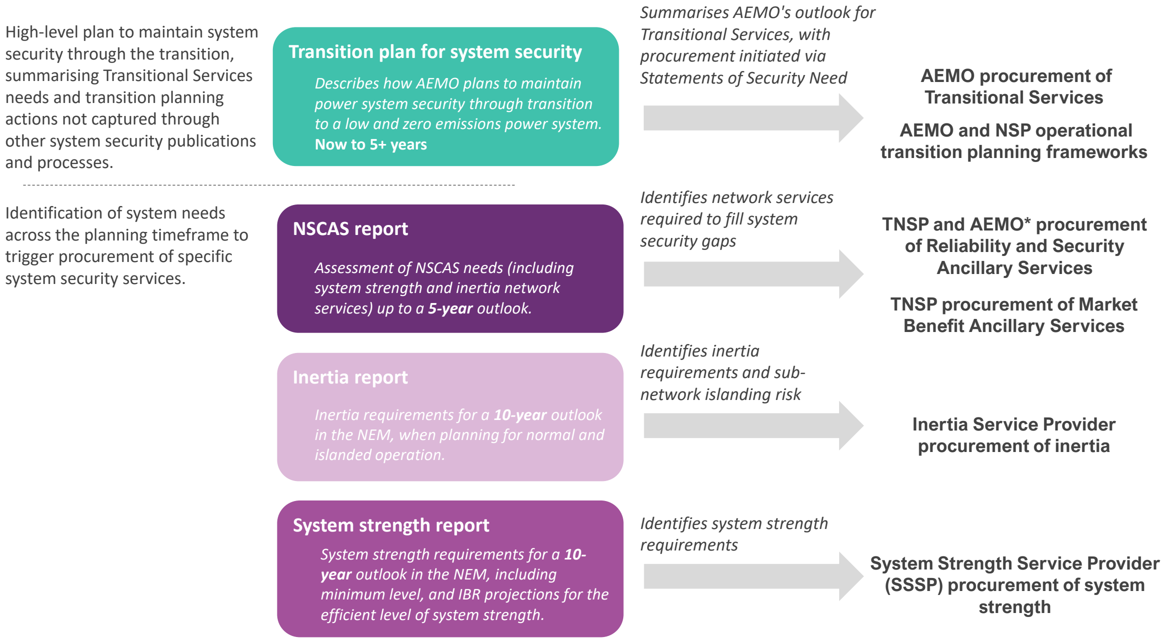
Effective system security management requires a range of tools and frameworks working in tandem, across multiple timescales, participant types, and geographic areas. Figure 1 summarises AEMO's multilayered approach with respect to this report; and its relationship to other AEMO documents.

While procurement of security services is the role of the TNSP in each region, AEMO has specific roles to:

- **Set minimum security requirements** for inertia and system strength over a 10-year horizon, which must then be planned for and delivered by the relevant network business in each region. This is done through the respective annual *Inertia* and *System Strength Reports*.
- **Act as a last resort planner** where security needs emerge faster than normal TNSP planning processes can accommodate. This is done annually with a 3-to-5-year outlook horizon through the NSCAS report, and AEMO is able to procure last-resort services through this framework.
- **Map and respond to future engineering challenges and transition points** associated with operating a 100% renewable power system. This is done through AEMO's Engineering Roadmap, which prioritises the critical engineering actions required; and through AEMO's new *Transition Plan for System Security* which provides a holistic outlook of transition planning activities and transitional services required to support a low- or zero-emissions power system.

- Coupling with these security focused functions, AEMO also publishes the *Integrated System Plan* (ISP)[5] and the *Electricity Statement of Opportunities* (ESOO)[6] which present a long-term view of the power system under a range of possible future scenarios.

Figure 1 Relationship between AEMO system security reports and transition plan for system security



*Note: Under the NSCAS framework, AEMO can only procure Reliability and Security Ancillary Services under last resort planning powers.

[5] At https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp.

[6] At https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo.

2 System strength assessment

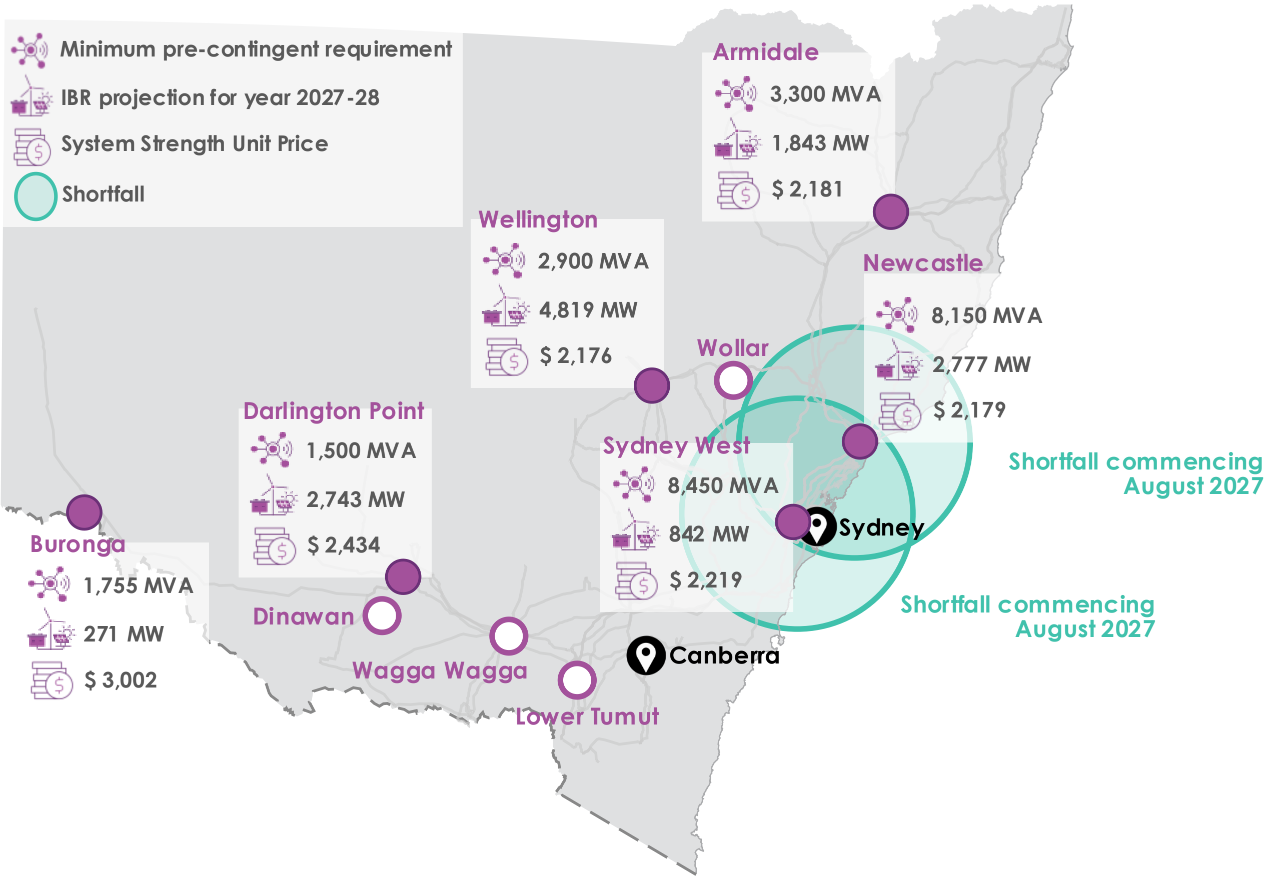
2.1 New South Wales

AEMO has not identified any changes to the minimum fault level requirements or system strength node definitions for New South Wales. IBR projections have been updated based on the 2024 ISP and reflect the announced deferral of Eraring Power Station's retirement and recent changes in generation and transmission timing and commitment. These changes have improved expected system strength availability in the region.

Figure 2 provides a summary of the system strength specification for New South Wales, including the location of system strength nodes, and the minimum fault level requirements and forecast IBR projections for each.

While system strength shortfalls are formally assessed and declared through the annual NSCAS report, the latest modelling identifies that the previously declared shortfalls at Newcastle and Sydney West have been deferred until 2027-28. Transgrid is assessing these and other regional needs through their current system strength Regulatory Investment Test for Transmission (RIT-T).

Figure 2 System strength node location and system strength standard in New South Wales



Scope of assessment

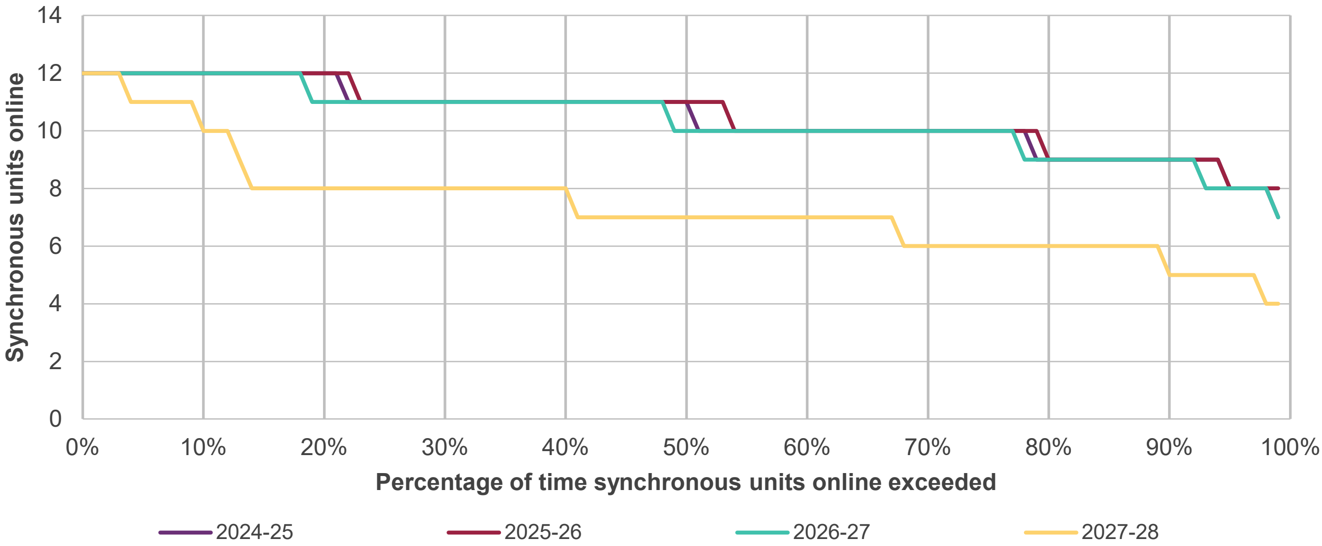
AEMO has assessed the suitability of system strength node locations in New South Wales, and their respective minimum fault level requirements and IBR projections, over a 10-year outlook. AEMO found no material system changes that would warrant reassessment of the current node definitions or minimum requirements; however the IBR projections have been updated to reflect the 2024 ISP modelling and project announcements.

In parallel, AEMO has modelled projected three phase fault level statistics at each node across a three-year period from December 2024 to December 2027. Appendix A1 provides more detail on the associated market modelling assumptions. These projected availabilities are formally compared against the associated minimum requirements to identify any system strength shortfalls as part of the 2024 NSCAS report[7], however projected fault level duration curves and statistics have been included in this report for completeness.

Projected reduction in available fault level from synchronous generation

Figure 3 presents the modelled number of large synchronous generating units online in New South Wales over a three-year period from December 2024 to December 2027. This highlights a significant forecast reduction over time, as falling levels of operational demand and increasing penetration of IBR act to reduce the utilisation of these units. These curves consider changes in dispatch patterns, and the projected withdrawal of existing generating units. AEMO has incorporated the delayed retirement of Eraring Power Station into this modelling as per the Generator Performance Engagement Agreement[8]. The modelling did not enforce operational unit commitment requirements, and instead reflects expected system strength availability in the absence of operational intervention or other response[9].

Figure 3 Synchronous units projected online under *Step Change* scenario, New South Wales



[7] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

[8] New South Wales Government, at https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/agreement-eraring.

[9] For example, on 15 November 2023, AEMO was required to issue Directions in New South Wales to maintain adequate system security (see Market Notices 111375, 111345, 111308 at https://www.aemo.com.au/market-notices).

2.1.1 Minimum fault level requirements and projections

AEMO has previously declared six system strength nodes in New South Wales; these remain unchanged for the 2024 *System Strength Report*. AEMO has also assessed whether any material system changes have occurred that would affect the associated minimum fault level requirements, and no adjustments have been made.

AEMO takes a conservative approach when lowering these security thresholds and does so only with positive confirmation and appropriate evidence from the relevant SSSP that the updated value remains sufficient to satisfy protection, voltage step change, and system stability requirements. Table 3 details potential future networks changes and how they may impact minimum requirements.

Table 3 New South Wales system material changes impacting system strength minimum requirements

Project	Existing node(s) primarily impacted	Earliest feasible advised timing[A]	Description of impact
Central West Orana (CWO) REZ network augmentation	Wellington 330 kilovolts (kV)	Jan-2028 (In service) Aug-2028 (Capacity release)	Reduction in effective network impedance and utilisation of synchronous condensers. Magnitude of benefit will be assessed as the project progresses.
Project EnergyConnect (PEC) Stage 1	Buronga 220 kV and Red Cliffs 220 kV	Sept-2024 (In service) Dec-2024 (Capacity release)	Network's ability to meet minimum fault level requirements will likely improve with reduction in effective network impedance. Additional circuit linking PEC stage 1 and 2 Buronga synchronous condensers will likely improve fault levels at Buronga and Darlington point. Magnitude of benefit will be assessed as the project progresses.
Project EnergyConnect (PEC) Stage 2	Darlington Point 330 kV	May-2026 (In service) July-2027 (Capacity release)	Network's ability to meet minimum fault level requirements will likely improve with reduction in effective network impedance. Additional transmission connecting Dinawan to Buronga and two synchronous condensers at Dinawan could improve fault levels at nearby nodes such as Darlington Point. Magnitude of benefit will be assessed as the project progresses. PEC Stage 2 does not include Buronga – Red Cliffs 220 kV double-circuit line which is expected in service in 30/8/2024.
New England REZ Network Infrastructure Project	Armidale 330 kV	2028-29 (Stage 1) 2034-35 (Stage 2)[B]	Reduction in effective network impedance will likely improve the network's ability to meet existing minimum requirements. Magnitude of benefit will be assessed once more detailed modelling information becomes available as the project progresses.
Sydney Ring – Southern Loop	Sydney West 330 kV Newcastle 330 kV	Sept-2028	
Sydney Ring - Northern Loop	Newcastle 330 kV	Dec-2028	
HumeLink	Darlington Point 330 kV, Sydney West 330 kV	Progressively July-2026 to Dec-2026	
Victoria – New South Wales Interconnector West (VNI West)	Darlington Point 330 kV, Buronga 220 kV, Sydney West 330 kV	Dec-2028 (In service) Dec-2029 (Capacity release)	
Generator retirements	Sydney West 330 kV Newcastle 330 kV		Retirement of existing synchronous machines will require souring of three phase fault level support from other areas.

A. Unless otherwise specified, project timings are based on Transmission augmentation information page August 2024.
B. Timing consistent with 2024 ISP optimal development path step change, AEMO is aware of delayed timing recently advised by EnergyCo and has provided reasoning for use of 2024 ISP timing in IBR section below.

AEMO has also considered possible future nodes in New South Wales, as described in Table 4. These nodes may be declared in a future *System Strength Report*, subject to the changing needs of the power system.

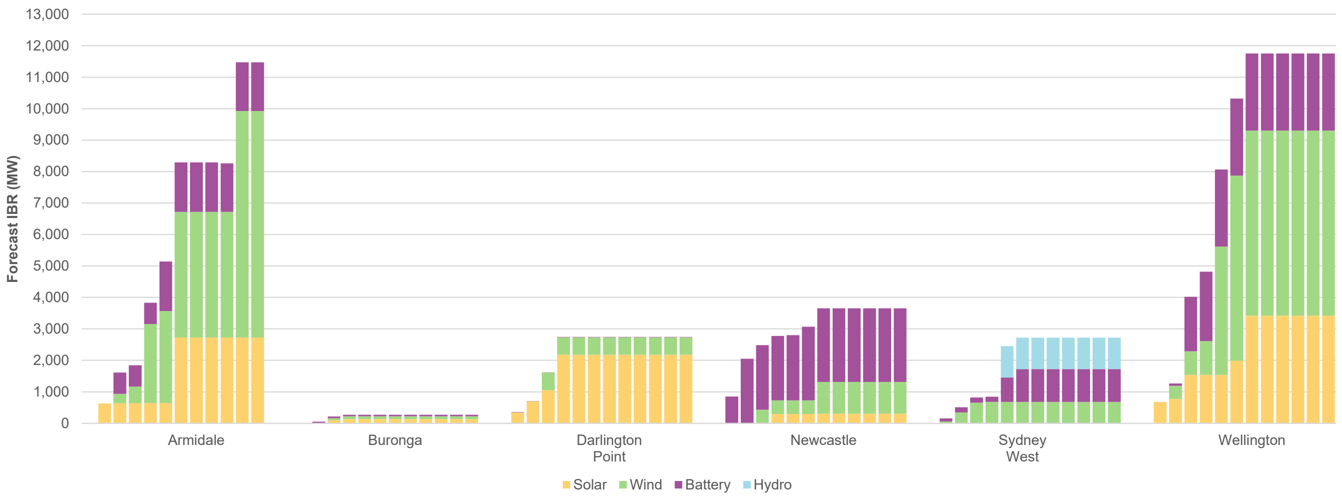
Table 4 Possible future nodes in New South Wales region and closures of existing nodes

System strength node	Effective date range	Purpose of new node
Dinawan 330 kV	Project EnergyConnect commissioning	May provide better location for IBR in Southern New South Wales.
Lower Tumut 330 kV	Eraring Power Station retirement	May allow for alternative synchronous sources in New South Wales.
Wollar 330 kV	Removal of Wellington node	May provide better locations for IBR in Central West Orana.

Summary of IBR projections for New South Wales

AEMO's forecast of IBR investment in New South Wales is summarised in Figure 4, with underlying data provided in Section 2.1.2. While these are primarily based on 2024 ISP results, AEMO has applied minor adjustments in allocating these forecasts to specific nodes based on local network knowledge and engineering judgement.

Figure 4 Forecasts of IBR and market network service facilities (MNSFs) for 11 years from 2024-25, New South Wales



Notes: The near-term years of the forecast may require adjustment by the SSSP as more information becomes available about committed plant, such as their technical characteristics or their elections under the system strength framework. Further detail is provided in Appendix 1.1.

Several key project assumptions have changed since publication of the 2024 ISP in July, which have been reflected in these IBR projections for New South Wales. In particular, the projections reflect:

- The status of committed and anticipated generation projects, as published in AEMO's October 2024 Generation Information Page[10].
- The status of network projects, as published in AEMO's August 2024 Transmission Augmentation Information Page[11], with the exception of the New England REZ Network Infrastructure Project discussed below.
- The announced two-year delay in retirement for Eraring Power Station to 2027-28[12]. This has been incorporated directly through updated modelling to reflects its impact on optimal investment in IBR.

[10] AEMO, October 2024, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

[11] AEMO, August 2024, at https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/transmission-augmentation-information.

[12] New South Wales Government, at https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/agreement-eraring.

These changes have impacted on the level of projected IBR investment in New South Wales, with the net effect being an increase in projected solar build at the Darlington point node, and a reduction in total battery capacity at Newcastle and Sydney West nodes when compared to the 2024 ISP results.

AEMO notes the announced timing change for the New England REZ Network Infrastructure Project which is documented on the Transmission Augmentation Information Page[13]. Given the resource quality of the zone and a policy commitment to its development, AEMO expects that similar levels of system strength will still be required to support the zone, with only the timing of that investment now affected. This may have implications on the distribution and timing of renewable development in other locations within the region.

AEMO therefore encourages Transgrid and EnergyCo to continue joint planning discussions, and to consider appropriate adjustments to the IBR projections based on the latest available information at time of RIT-T modelling, particularly where such assumptions can be consulted on through the RIT-T process itself.

Critical planned outages

SSSPs are expected to consider critical planned outages in their proposed system strength solutions on a case-by-case basis[14]. AEMO has declared several critical planned outages as impactful for maintaining system strength in New South Wales, and these are presented in Table 5.

Table 5 Critical planned outages in New South Wales for each system strength node

Affected node	Network outage	Reason for consideration as a critical outage
Armidale Newcastle	83 Liddell to Muswellbrook 330 kV line	Loss of another 330 kV line during this outage leaves Armidale connected to Queensland network. Post-contingency fault level at Armidale 330 kV bus depends on southern Queensland generation.
	8E Armidale to Saphire 330 kV line	
	8J Saphire to Dumaresq 330 kV line	
	8C Armidale to Dumaresq 330 kV line	
	84 Liddell to Tamworth 330 kV line	
	88 Muswellbrook to Tamworth 330 kV line	
	85 Tamworth to Uralla 330 kV line	
	86 Tamworth to Armidale 330 kV line	
	8U Uralla to Armidale 330 kV line	
Darlington Point	O51 Lower Tumut to Wagga Wagga 330 kV line	Can lead to a reduction in significant IBR that may have power system consequences. X5, 63 and 996 lines to be opened, Yass to Wagga 132 lines to be opened as necessary.
	62 Jindera to Wagga Wagga 330 kV line	
	63 Wagga Wagga to Darlington Point 330 kV line	
	X5 Darlington Point to Balranald 220 kV line	
	O60 Jindera to Dederang 330 kV line	
Newcastle	81 Liddell to Newcastle 330 kV Line	Loss of another 330 kV line will reduce the fault level contribution from Bayswater and Mt Piper significantly. Included for potential retirement of Eraring Power Station.
	82 Liddell to Tomago 330 kV Line	

[13] AEMO, 2024, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/transmission-augmentation-information.

[14] AEMC, 2021, Page 98, https://www.aemc.gov.au/rule-changes/efficient-management-system-strength-power-system.

2.1.2 Nodal assessment of minimum requirements, shortfalls, and IBR projections

Armidale 330 kilovolts (kV)

Figure 5 shows projected levels of available three phase fault level at the Armidale 330 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum pre-contingent fault level requirements in Table 6. System strength shortfalls are now formally assessed in the annual NSCAS Report[15], however none have been identified for the Armidale node. Table 7 shows projected IBR which forms the basis of the efficient level requirement for system strength at this node.

Figure 5 Armidale node fault level duration curves and minimum requirement

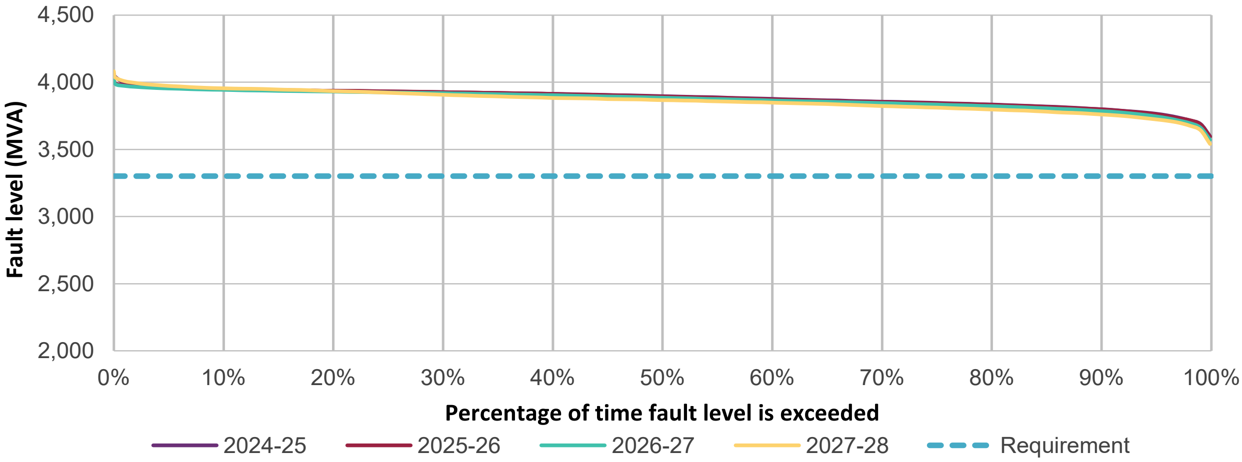


Table 6 Armidale node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Armidale 330 kV	Requirement (N)	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300
	Requirement (N-1)	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800
	Expected 99.87% of time	3,599	3,593	3,571	3,540							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 3.

Table 7 Armidale node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (megawatts (MW))										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Armidale 330 kV	Solar	721	0	634	640	644	644	644	2,726	2,726	2,726	2,726	2,726
	Wind	442	0	0	299	524	2,512	2,924	3,991	3,991	3,991	3,991	7,201
	Battery	30	0	0	675	675	675	1,574	1,574	1,574	1,574	1,544	1,544
	Total IBR	**1,193**	**0**	**634**	**1,614**	**1,843**	**3,831**	**5,142**	**8,291**	**8,291**	**8,291**	**8,261**	**11,471**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[15] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Buronga 220 kV

Figure 6 presents the projected levels of available three phase fault level at the Buronga 220 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent fault level requirements detailed in Table 8.

Figure 6 suggests a shortfall of approximately 305 megavolt amperes (MVA) at Buronga in 2025-26, however AEMO Victorian Planning is progressing options for a closely matched shortfall at Red Cliffs node in Victoria (including extension to an existing system services contract extension). On this basis, AEMO has not declared a shortfall at Buronga node. Table 9 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 6 Buronga node fault level duration curves and minimum requirement

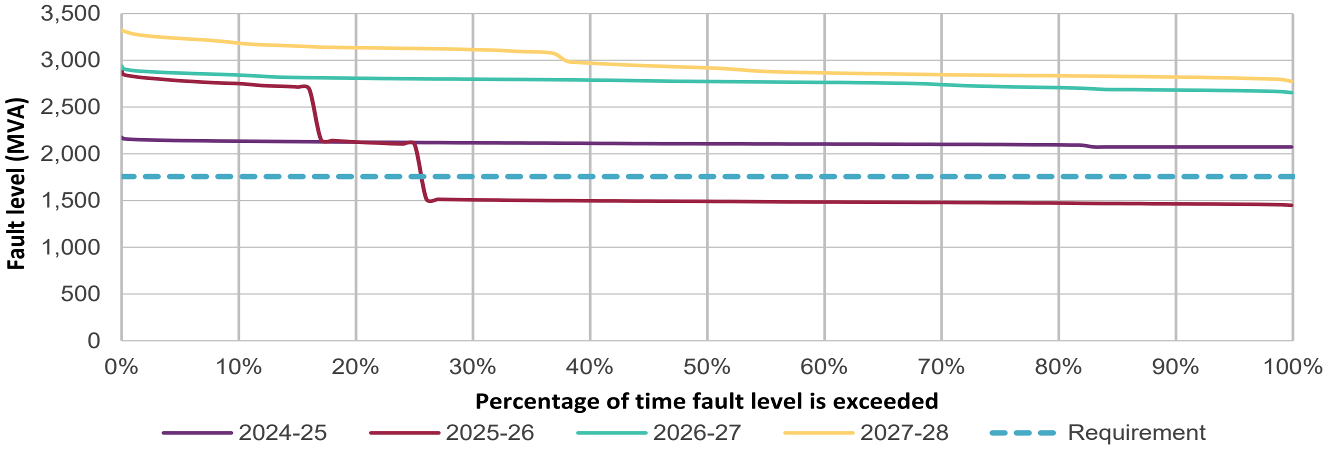


Table 8 Buronga node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Buronga 220 kV	Requirement (N)	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755	1,755
	Requirement (N-1)	905	905	905	905	905	905	905	905	905	905	905
	Expected 99.87% of time	2,074	1,450	2,653	2,774							
	Shortfall	0	305[A]	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 3.
A. Shortfall not declared on the basis AEMO Victorian Planning is exploring remediation options for a closely matched shortfall at Red Cliffs

Table 9 Buronga node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Buronga 220 kV	Solar	541	0	0	94	129	129	129	129	129	129	129	129
	Wind	199	0	0	70	92	92	92	92	92	92	92	92
	Battery	50	0	50	50	50	50	50	50	50	50	50	50
	Total IBR	**790**	**0**	**50**	**214**	**271**	**271**	**271**	**271**	**271**	**271**	**271**	**271**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Darlington Point 330 kV

Figure 7 presents the projected levels of available three phase fault level at the Darlington Point 330 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 10. System strength shortfalls are now formally assessed in the annual NSCAS Report[16], however none have been identified for the Darlington Point node. Table 11 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 7 Darlington Point node fault level duration curves and minimum requirement

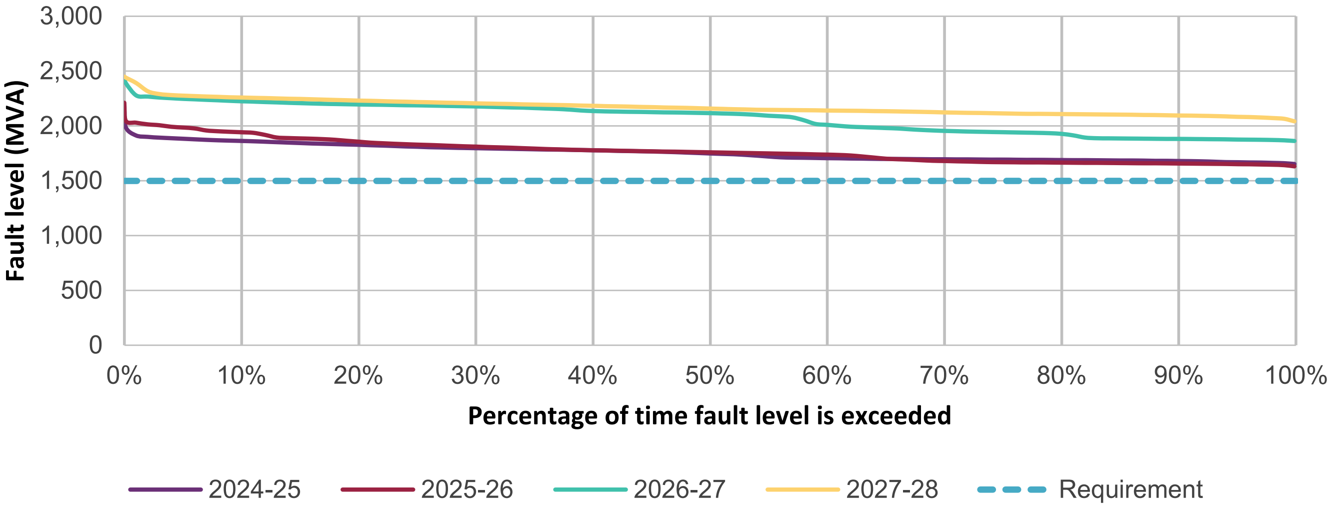


Table 10 Darlington Point node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Darlington Point 330 kV	Requirement (N)	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
	Requirement (N-1)	600	600	600	600	600	600	600	600	600	600	600
	Projected 99.87% of time	1,654	1,632	1,862	2,043							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 3.

Table 11 Darlington Point node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Darlington Point 330 kV	Solar	1,458	346	696	1,054	2,178	2,178	2,178	2,178	2,178	2,178	2,178	2,178
	Wind	0	0	0	555	555	555	555	555	555	555	555	555
	Battery	150	10	10	10	10	10	10	10	10	10	10	10
	Total IBR	**1,608**	**356**	**706**	**1,619**	**2,743**	**2,743**	**2,743**	**2,743**	**2,743**	**2,743**	**2,743**	**2,743**

[16] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Newcastle 330 kV

Figure 8 presents the projected levels of available three phase fault level at the Newcastle 330 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum pre-contingent fault level requirements detailed in Table 12. System strength shortfalls are now formally assessed in the annual NSCAS Report[17], including a shortfall of approximately 1,854 MVA in 2027-28. Table 13 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 8 Newcastle Point node fault level duration curves and minimum requirement

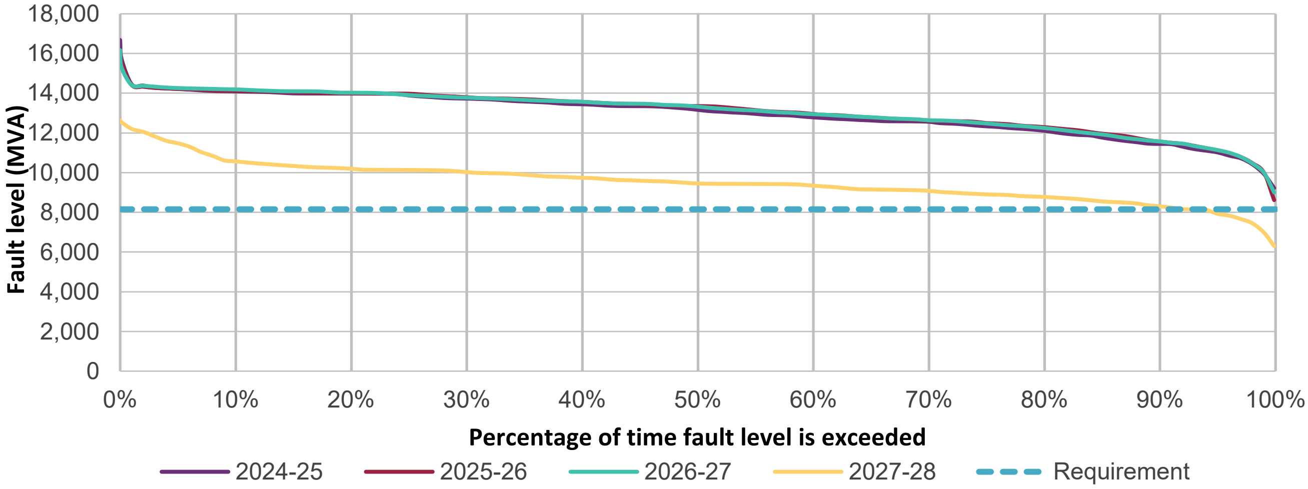


Table 12 Newcastle node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Newcastle 330 kV	Requirement (N)	8,150	8,150	8,150	8,150	8,150	8,150	8,150	8,150	8,150	8,150	8,150
	Requirement (N-1)	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100	7,100
	Projected 99.87% of time	9,230	8,618	9,005	6,296							
	Shortfall	0	0	0	1,854							

Note: Potential changes that would impact these requirements over time are documented in Table 3.

Table 13 Newcastle node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	Solar	0	0	0	0	294	294	294	311	311	311	311	311

[17] See https://www.aemc.gov.au/rule-changes/improving-security-frameworks-energy-transition.

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Newcastle 330 kV	Wind	0	0	0	433	433	433	433	1,005	1,005	1,005	1,005	1,005
	Battery	0	850	2,050	2,050	2,050	2,076	2,340	2,340	2,340	2,340	2,340	2,340
	Total IBR	**0**	**850**	**2,050**	**2,483**	**2,777**	**2,803**	**3,067**	**3,656**	**3,656**	**3,656**	**3,656**	**3,656**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Sydney West 330 kV

Figure 9 presents the projected levels of available three phase fault level at the Sydney West 330 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum pre-contingent fault level requirements detailed in Table 14. System strength shortfalls are now formally assessed in the annual NSCAS report[18], including a shortfall of approximately 1,401 MVA in 2027-28. Table 15 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 9 Sydney West Point node fault level duration curves and minimum requirement

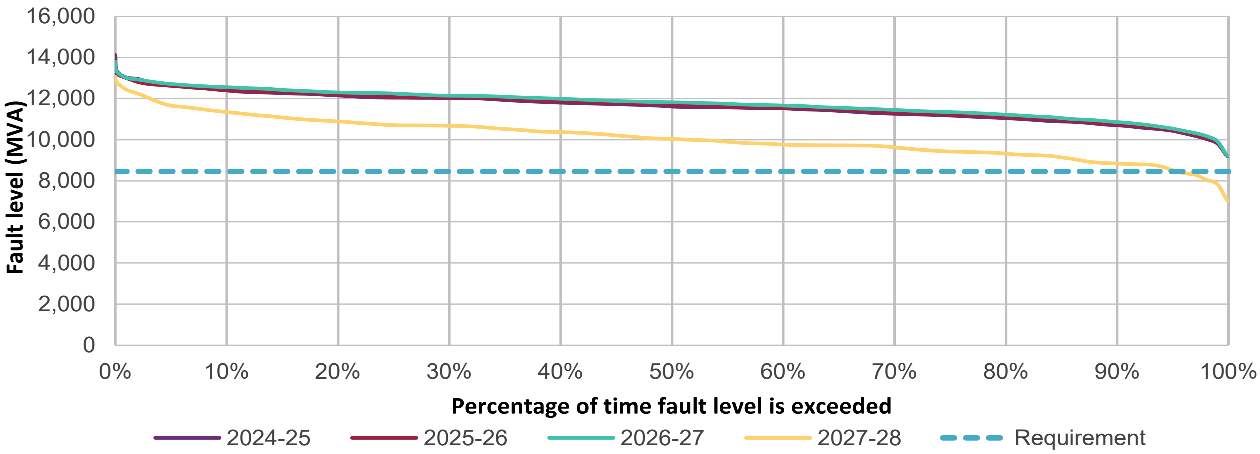


Table 14 Sydney West node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Sydney West 330 kV	Requirement (N)	8,450	8,450	8,450	8,450	8,450	8,450	8,450	8,450	8,450	8,450	8,450
	Requirement (N-1)	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050
	Projected 99.87% of time	9,198	9,193	9,212	7,049							
	Shortfall	0	0	0	1,401							

Note: Potential changes that would impact these requirements over time are documented in Table 3.

18 At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Table 15 Sydney West node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Sydney West 330 kV	Solar	10	0	0	0	0	0	0	0	0	0	0	0
	Wind	1,724	58	347	654	677	677	677	677	677	677	677	677
	Battery	60	100	165	165	165	779	1,043	1,043	1,043	1,043	1,043	1,043
	Hydro	0	0	0	0	0	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Total IBR	**1,794**	**158**	**512**	**819**	**842**	**2,456**	**2,720**	**2,720**	**2,720**	**2,720**	**2,720**	**2,720**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Wellington 330 kV

Figure 10 presents the projected levels of available three phase fault level at the Wellington 330 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 16. System strength shortfalls are now formally assessed in the annual NSCAS Report[19], however none have been identified for the Wellington node. Table 17 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 10 Wellington node fault level duration curves and minimum requirement

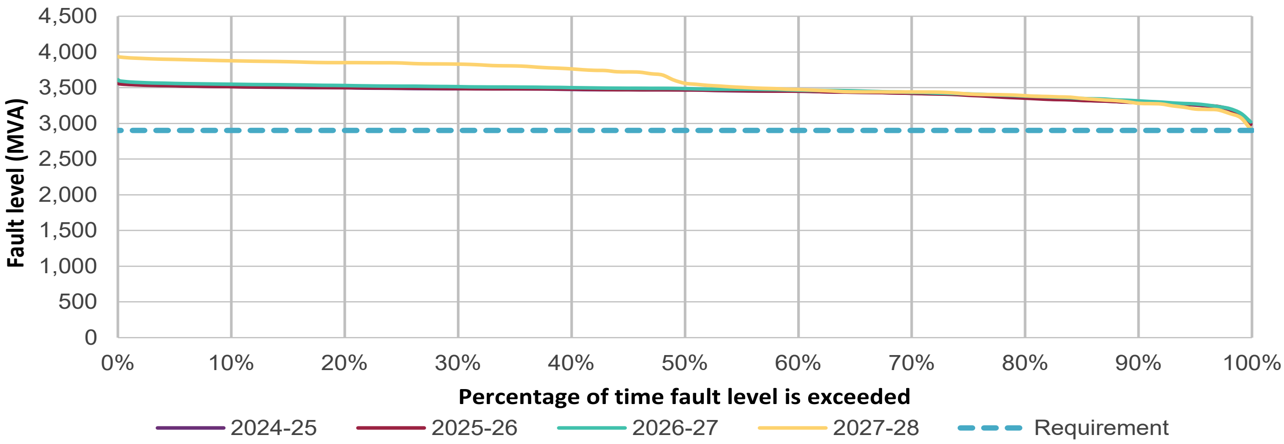


Table 16 Wellington node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Wellington 330 kV	Requirement (N)	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900
	Requirement (N-1)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Projected 99.87% of time	2,998	2,984	3,021	2,920							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 3.

[19] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Table 17 Wellington node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Wellington 330kV	Solar	1,368	680	777	1,537	1,537	1,537	1,993	3,420	3,420	3,420	3,420	3,420
	Wind	400	0	414	752	1,074	4,080	5,881	5,881	5,881	5,881	5,881	5,881
	Battery	0	0	77	1,730	2,208	2,450	2,450	2,450	2,450	2,450	2,450	2,450
	Total IBR	**1,768**	**680**	**1,268**	**4,019**	**4,819**	**8,067**	**10,324**	**11,751**	**11,751**	**11,751**	**11,751**	**11,751**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

2.2 Queensland

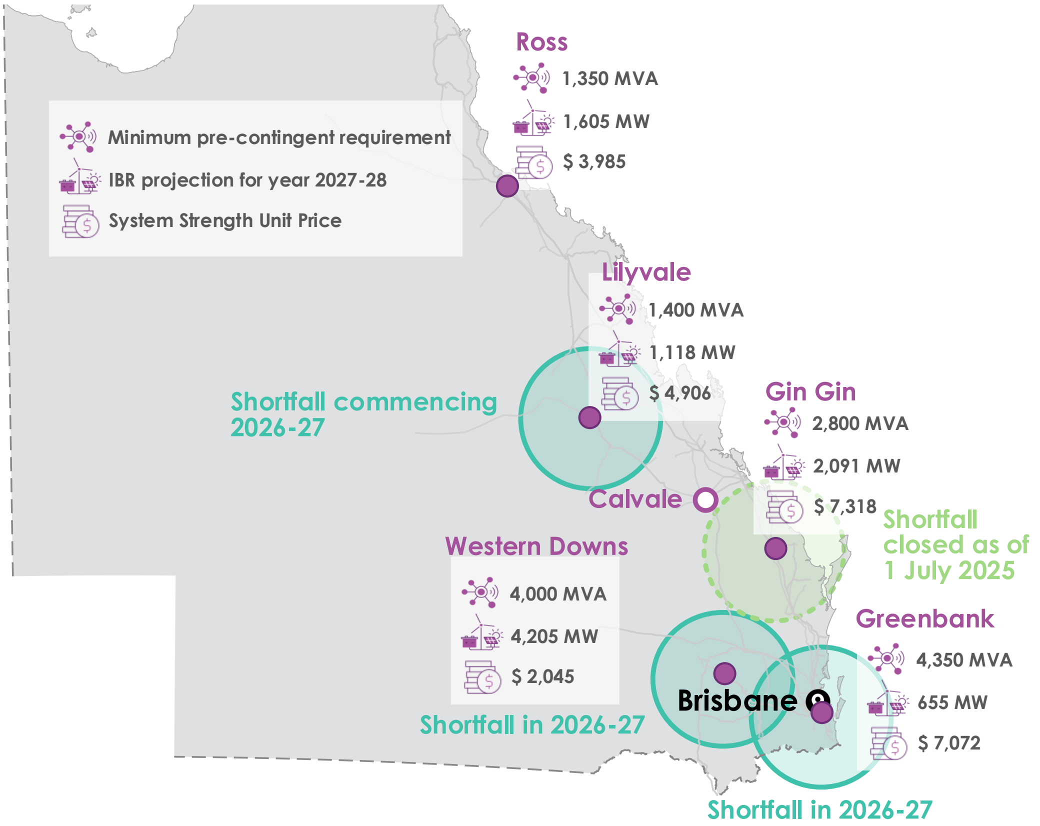
AEMO has not identified any changes to the minimum fault level requirements or system strength node definitions for Queensland. IBR projections have been updated based on the 2024 ISP, and reflect the deferred retirement of Eraring Power Station in New South Wales, with consequential impact on IBR projections in neighbouring regions.

Figure 11 provides a summary of the system strength specification for Queensland, including the location of system strength nodes, and the minimum fault level requirements and forecast IBR projections for each.

The latest modelling identifies a shortfall of between 105 MVA and 178 MVA across three nodes in Queensland in 2026-27, and Lilyvale alone in 2027-28. These shortfalls are primarily linked with decreased energy exports to New South Wales in the near-term, with more energy available following the delayed retirement of Eraring Power Station. That change has resulted in fewer thermal units expected to be online in Queensland, and lower fault levels than previously projected. Modelling results have been adjusted to reflect the impact of Powerlink commercial arrangements with a gas generator at Townsville capable of providing system strength services as by operating as a synchronous condenser when necessary.

Powerlink has separately progressed commercial arrangements to resolve the previously declared gap at Gin Gin from 1 July 2025, and are assessing the full set of Queensland system strength needs through a current RIT-T.

Figure 11 System strength node location and system strength standard in Queensland



Scope of assessment

AEMO has assessed the suitability of system strength node locations in Queensland, and their respective minimum fault level requirements and IBR projections, over a 10-year outlook. AEMO found no material system changes that would warrant reassessment of the current node definitions or minimum requirements, but the IBR projections have been updated to reflect the 2024 ISP modelling and project announcements.

In parallel, AEMO has modelled projected three phase fault level statistics at each node across a three-year horizon to 2027-28. Appendix A1 provides more detail on the associated market modelling assumptions.

These projected availabilities have been formally compared against the associated minimum requirements to identify any system strength shortfalls as part of the 2024 NSCAS Report[20], however projected fault level duration curves and statistics have been included in this report for completeness.

AEMO is aware that the addition of a clutch at Townsville Gas Turbine will alter the acceptable Central Queensland minimum unit combinations considered when assessing minimum fault level requirements at Ross. AEMO currently proposes no changes to minimum fault level requirements, however will continue engaging with Powerlink on future studies needed to address this issue.

[20] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Projected reduction in available fault level from synchronous generation

Figure 12 presents the modelled number of large synchronous generating units online in Queensland over a three-year period from December 2024 to December 2027. This highlights a significant forecast reduction over time, as falling levels of operational demand and increasing penetration of IBR act to reduce the utilisation of these units. These curves consider changes in dispatch patterns, and the projected withdrawal of existing generating units. The modelling did not enforce operational unit commitment requirements, and instead reflects expected system strength availability in the absence of operational intervention or other response.

Figure 12 Synchronous units projected online under *Step Change* scenario, Central and Southern Queensland

2.2.1 Minimum fault level requirements and projections

AEMO has previously declared five system strength nodes in Queensland; these remain unchanged for the 2024 *System Strength Report*. AEMO has also assessed whether any material system changes have occurred that would affect the associated minimum fault level requirements, and no adjustments have been made.

AEMO takes a conservative approach when lowering these security thresholds and does so only with positive confirmation and appropriate evidence from the relevant SSSP that the updated value remains sufficient to satisfy protection, voltage step change, and system stability requirements.

Table 18 details potential future networks changes and how they may impact minimum requirements.

Table 18 Queensland system material changes impacting system strength minimum requirements

Project	Existing node(s) primarily impacted	Earliest feasible advised timing[A]	Description of impact
Gladstone Grid Reinforcement	Gin Gin 275 kV	December-2029	Reduction in effective network impedance and utilisation of synchronous condensers. Magnitude of benefit will be assessed once more detailed modelling information becomes available as the project progresses.
QNI Connect	Western Downs	March-2032 (In service)	

Project	Existing node(s) primarily impacted	Earliest feasible advised timing[A]	Description of impact
		March-2033 (Capacity release)	
Queensland SuperGrid South	Gin Gin and Western Downs 275 kV	September-2031	
Generator retirements	All nodes		Retirement of existing synchronous machines will require sourcing of three phase fault level support from other areas of the network
Townsville Gas Turbine Clutch	Gin Gin 275 kV, Ross 275 kV	July 2025 [B]	Installation of a clutch at Townsville Power Station will allow for operation in synchronous condenser mode and remediate the declared gap at Gin Gin. This may have a consequential impact on the requirements at Ross node, and AEMO is continuing to engage with Powerlink to monitor this impact.

A. Unless otherwise specified, project timings are based on Transmission augmentation information page August 2024.
B. Timing as advised by Powerlink.

AEMO has also considered possible future nodes in Queensland, as described in Table 19. These nodes may be declared in a future *System Strength Report*, subject to the changing needs of the power system.

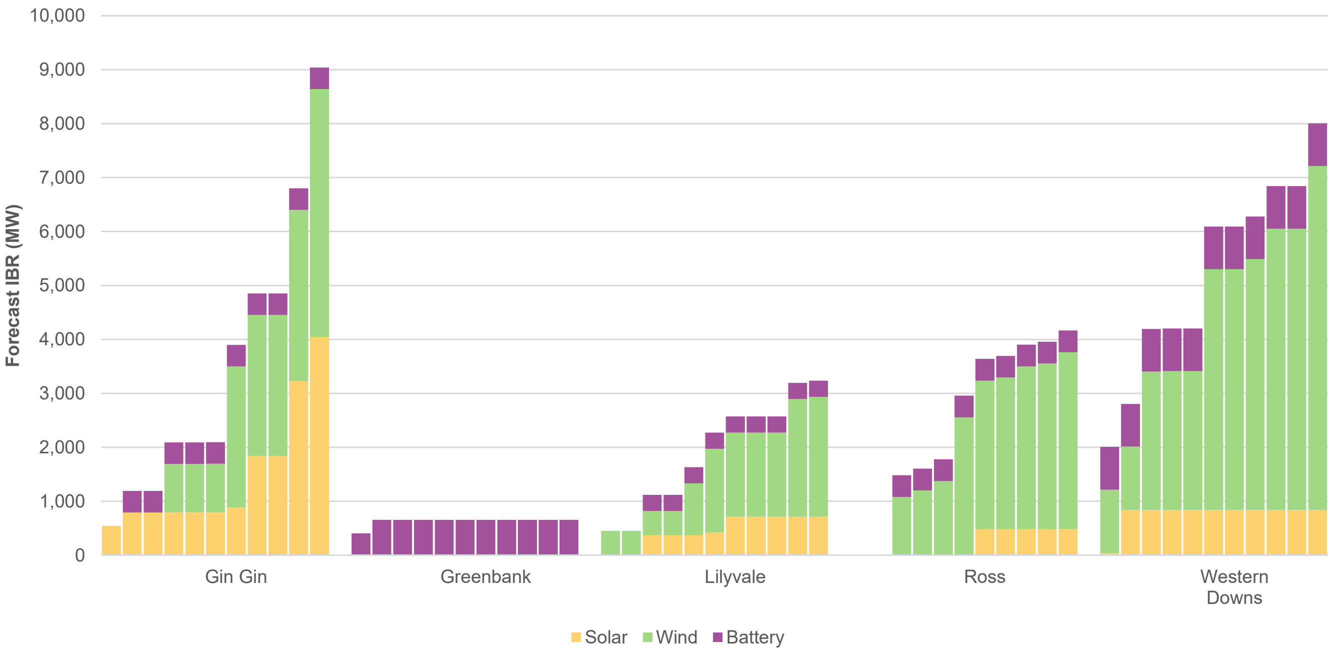
Table 19 Possible future nodes in Queensland region and closures of existing nodes

System strength node	Effective date range	Purpose of new node
Southern Downs (SQ), Far North Queensland (NQ)	In-flight REZ	These locations are defined as in-flight in the Queensland Energy and Jobs Plan (QEJP) draft REZ Roadmap.
Calliope (CQ), Callide (CQ), Flinders (NQ)	REZ could be declared by 2024	These locations are Phase 1 REZs in the QEJP draft REZ Roadmap, and could support local system strength assessment and investment.
Collinsville (NQ), Isaac (CQ), Capricorn (CQ), Woolooga (SQ), Darling Downs (SQ), Tarong (CQ)	REZ could be declared between 2024 and 2035	These locations are Phase 2 or Phase 3 REZs in the QEJP draft REZ Roadmap and could support local system strength investment.

Summary of IBR projections for Queensland

AEMO's forecast of the quantity and technology of IBR investment in Queensland is summarised in Figure 13, with underlying datasets for each node provided in Section 2.2.2. While these are primarily based on 2024 ISP results, AEMO has applied minor adjustments in allocating these forecasts to specific nodes based on local network knowledge and engineering judgement.

Figure 13 Forecasts of IBR and market network service facilities (MNSFs) for 11 years from 2024-25, Queensland



Notes: The near-term years of the forecast may require adjustment by the SSSP as more information becomes available about committed plant, such as their technical characteristics or their elections under the system strength framework. Further detail is provided in Appendix 1.1.

Several key project assumptions have changed since publication of the 2024 ISP in July, which have been reflected in these IBR projections for Queensland. In particular, the projections reflect the October Generation Information Page[21] and the impacts of an announced delay in retirement for Earing Power Station.

AEMO supports of SSSPs considering the latest available information and joint planning outcomes to adjust these values for use in their system strength RIT-Ts between annual publications of the *System Strength Report*.

Critical planned outages

SSSPs are expected to consider critical planned outages in their proposed system strength solutions on a caseby--case basis[22]. AEMO has declared several critical planned outages as impactful for maintaining system strength in Queensland, and these are shown in Table 20.

Table 20 Critical planned outages in Queensland for each system strength node

Affected node	Network outage	Reason for consideration as a critical outage
Lilyvale 132 kV	Lilyvale to Broadsound 275 kV line	Lilyvale 132 kV bus below minimum fault levels for another contingency. The outage conditions require radialising the Lilyvale 132 kV network.
	Lilyvale 275/132 kV transformer	
Lilyvale 132 kV	Stanwell to Broadsound 275 kV line	Loss of parallel feeder can result in impact on IBR in North Queensland with no direct 275 kV connection between Stanwell and Broadsound.

[21] AEMO, October 2024, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

[22] AEMC, 2021, Page 98, at https://www.aemc.gov.au/rule-changes/efficient-management-system-strength-power-system.

2.2.2 Nodal assessment of minimum requirements, shortfalls, and IBR projections

Gin Gin 275 kV

Figure 14 presents the projected levels of available three phase fault level at the Gin Gin 275 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 21. System strength shortfalls are now formally assessed in the annual NSCAS Report[23], however none have been identified for the Gin Gin node. Table 22 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 14 Gin Gin node fault level duration curves and minimum requirement

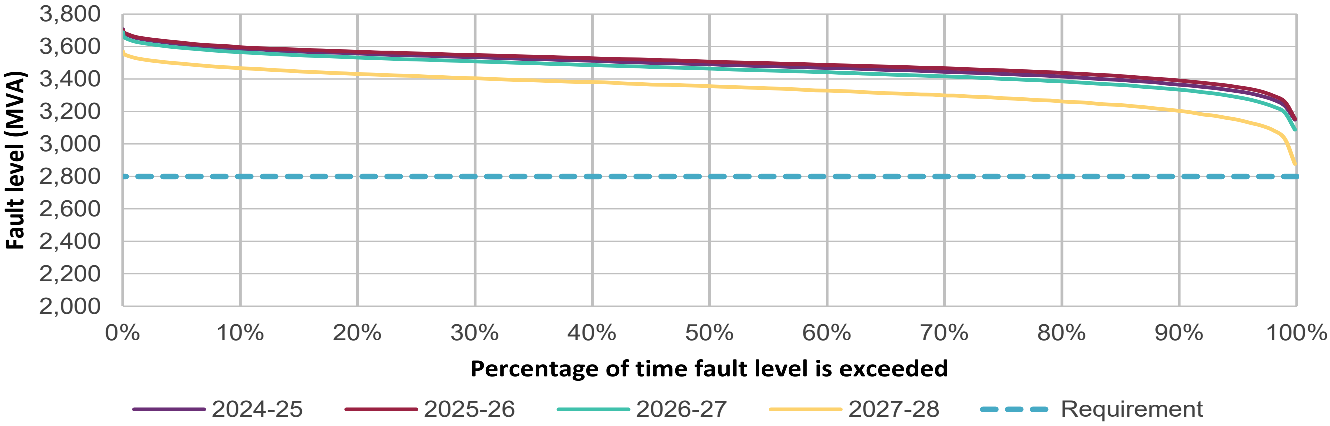


Table 21 Gin Gin node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Gin Gin 275 kV	Requirement (N)	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800
	Requirement (N-1)	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250
	Projected 99.87% of time	3,150	3,155	3,088	2,877							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 18.

Table 22 Gin Gin node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Gin Gin 275 kV	Solar	471	541	791	791	791	791	791	882	1,835	1,835	3,225	4,043
	Wind	0	0	0	0	900	900	904	2,617	2,617	2,617	3,175	4,600
	Battery	50	0	400	400	400	400	400	400	400	400	400	400
	Total IBR	**521**	**541**	**1,191**	**1,191**	**2,091**	**2,091**	**2,095**	**3,899**	**4,852**	**4,852**	**6,800**	**9,043**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[23] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Greenbank 275 kV

Figure 15 presents the projected levels of available three phase fault level at the Greenbank 275 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 23. System strength shortfalls are now formally assessed in the annual NSCAS Report[24]. AEMO has identified a 151 MVA shortfall in 2026-27 for Greenbank node. Table 24 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 15 Greenbank node fault level duration curves and minimum requirement

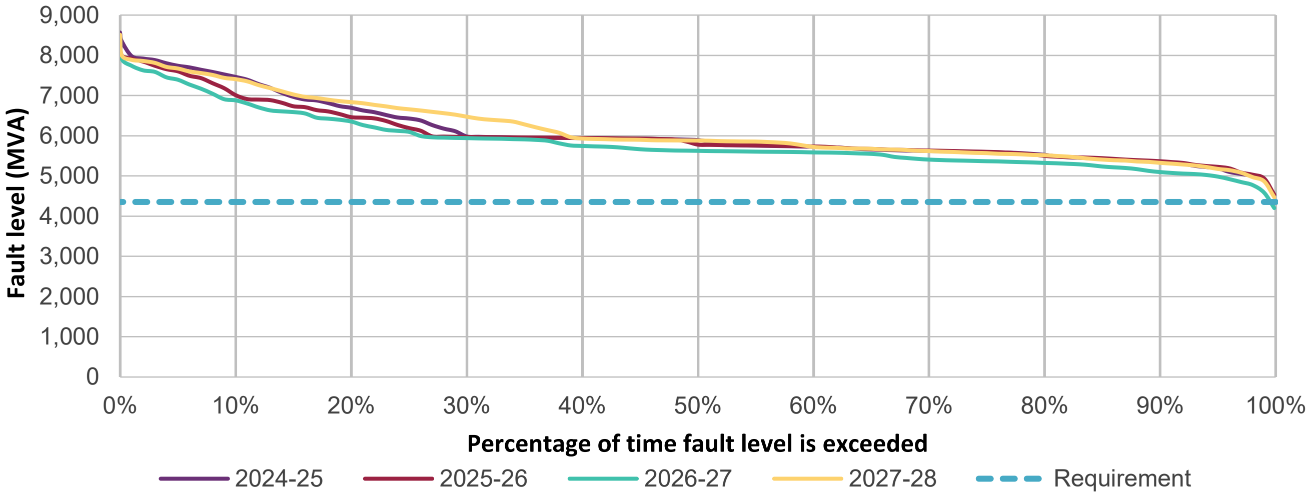


Table 23 Greenbank node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Greenbank 275 kV	Requirement (N)	4,350	4,350	4,350	4,350	4,350	4,350	4,350	4,350	4,350	4,350	4,350
	Requirement (N-1)	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750
	Projected 99.87% of the time	4,513	4,534	4,199	4,473							
	Shortfall	0	0	151	0							

Note: Potential changes that would impact these requirements over time are documented in Table 18.

Table 24 Greenbank node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Greenbank 275 kV	Solar	0	0	0	0	0	0	0	0	0	0	0	0
	Wind	0	0	0	0	0	0	0	0	0	0	0	0
	Battery	0	405	655	655	655	655	655	655	655	655	655	655
	Total IBR	**0**	**405**	**655**	**655**	**655**	**655**	**655**	**655**	**655**	**655**	**655**	**655**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[24] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Lilyvale 132 kV

Figure 16 presents the projected levels of available three phase fault level at the Lilyvale 132 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 25. System strength shortfalls are now formally assessed in the annual NSCAS Report[25], including a shortfall of between 105 MVA and 153 MVA from 2026-27. Table 26 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 16 Lilyvale node fault level duration curves and minimum requirement

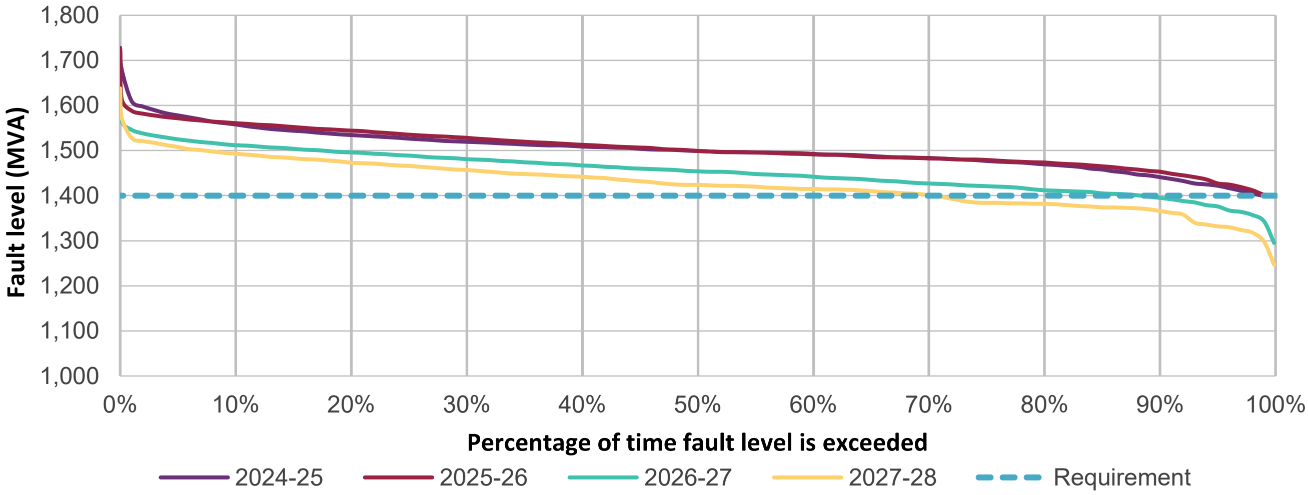


Table 25 Lilyvale node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Lilyvale 132 kV	Requirement (N)	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
	Requirement (N-1)	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150
	Projected 99.87% of time	1,400	1,400	1,295	1,247							
	Shortfall	0	0	105	153							

Note: Potential changes that would impact these requirements over time are documented in Table 18.

Table 26 Lilyvale node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Lilyvale 132 kV	Solar	389	0	0	368	368	368	418	712	712	712	712	712
	Wind	0	450	450	450	450	964	1,555	1,561	1,561	1,561	2,183	2,225
	Battery	0	0	0	300	300	300	300	300	300	300	300	300
	Total IBR	**389**	**450**	**450**	**1,118**	**1,118**	**1,632**	**2,273**	**2,573**	**2,573**	**2,573**	**3,195**	**3,237**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[25] See https://www.aemc.gov.au/rule-changes/improving-security-frameworks-energy-transition.

Ross 275 kV

Figure 17 presents the projected levels of available three phase fault level at the Ross 275 kV node. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent requirements detailed in Table 29. AEMO has considered the availability of commercial arrangements between Powerlink and a gas turbine at Townsville to provided system strength services when required. While this provides additional fault current, it may also have an impact on the minimum requirements at this node, and AEMO will continue to work with Powerlink to quantify whether these requirements remain appropriate. No system strength shortfalls are being declared for the Ross node. Table 30 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 17 Ross node fault level duration curves and minimum requirement

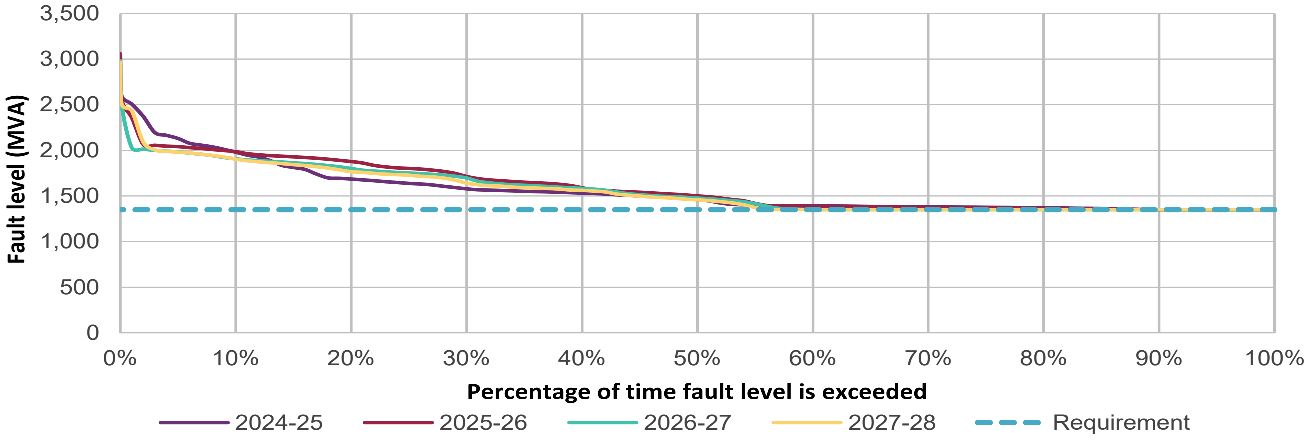


Table 27 Ross node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Ross 275 kV	Requirement (N)A	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350
	Requirement (N-1)A	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175
	Projected 99.87% of time	1,350	1,350	1,350	1,350							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 18.
A. AEMO has considered the availability of commercial arrangements to operate a gas turbine at Townsville as a synchronous condenser. While this increases the availability of fault current, it may also have an impact on the minimum requirements at the Ross node which have not been captured here. AEMO will continue to work with Powerlink to quantify any changes required to these minimum requirements.

Table 28 Ross node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Ross 275 kV	Solar	983	0	0	0	0	0	0	482	482	482	482	485
	Wind	381	0	0	1,076	1,201	1,372	2,556	2,753	2,810	3,018	3,070	3,278
	Battery	0	0	0	404	404	404	404	404	404	404	404	404
	Total IBR	**1,364**	**0**	**0**	**1,480**	**1,605**	**1,776**	**2,960**	**3,639**	**3,696**	**3,904**	**3,956**	**4,167**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Western Downs 275 kV

Figure 18 presents the projected levels of available three phase fault level at the Western Downs 275 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 29. System strength shortfalls are now formally assessed in the annual NSCAS Report[26], including a shortfall of approximately 173 MVA at Western Downs in 2026-27. Table 30 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 18 Western Downs node fault level duration curves and minimum requirement

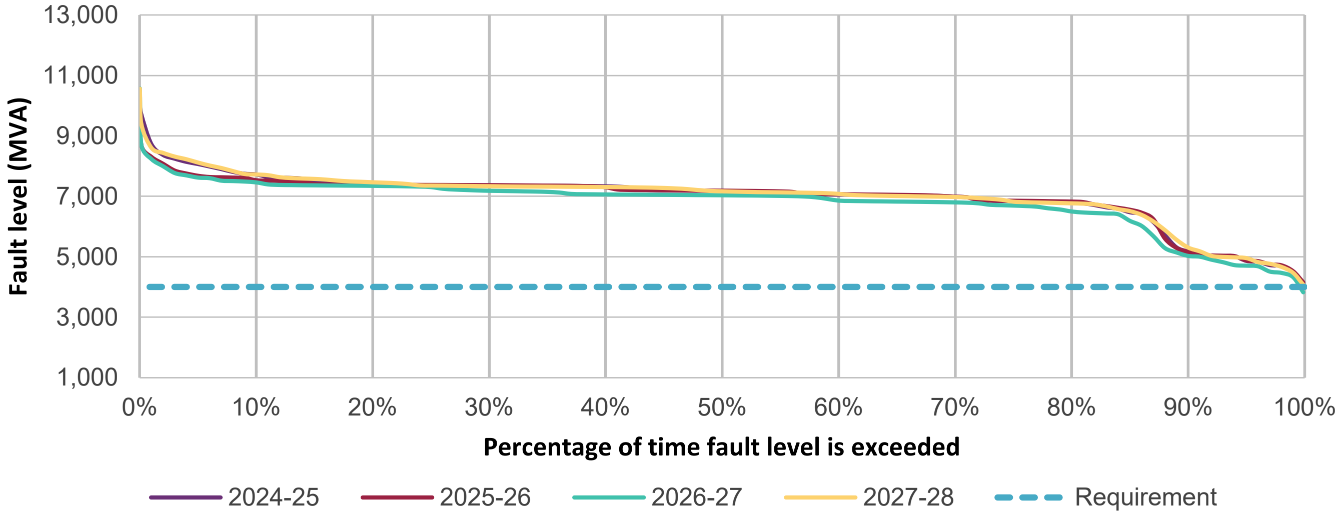


Table 29 Western Downs node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Western Downs 275 kV	Requirement (N)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
	Requirement (N-1)	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
	Projected 99.87% of time	4,121	4,150	3,827	4,078							
	Shortfall	0	0	173	0							

Note: Potential changes that would impact these requirements over time are documented in Table 18.

Table 30 Western Downs node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Western Downs 275 kV	Solar	1,689	40	839	839	839	839	839	839	839	839	839	843
	Wind	626	1,175	1,175	2,565	2,575	2,575	4,465	4,465	4,651	5,214	5,214	6,373
	Battery	200	791	791	791	791	791	791	791	791	791	791	791
	Total IBR	**2,515**	**2,006**	**2,805**	**4,195**	**4,205**	**4,205**	**6,095**	**6,095**	**6,281**	**6,844**	**6,844**	**8,007**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[26] See https://www.aemc.gov.au/rule-changes/improving-security-frameworks-energy-transition.

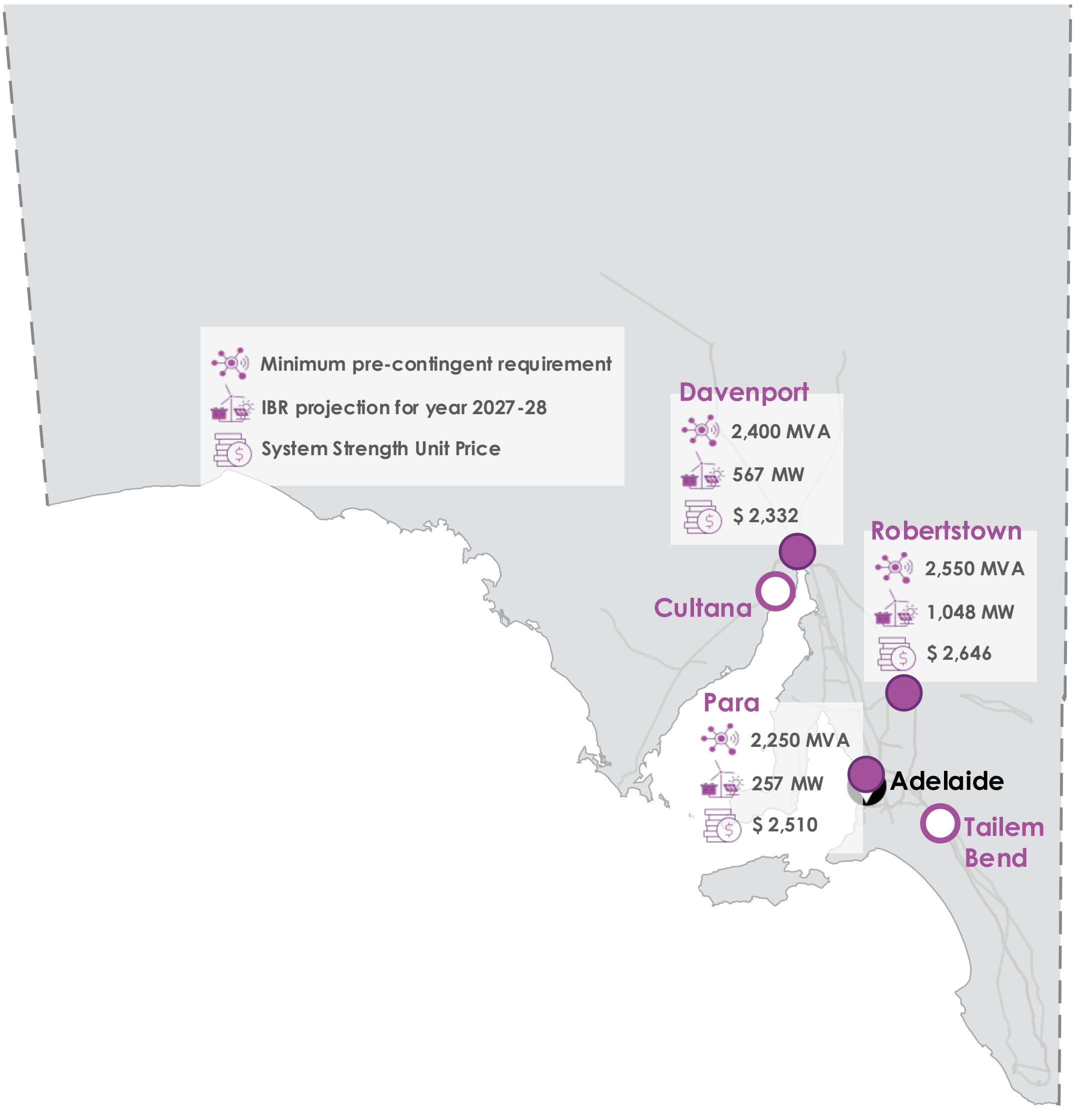
2.3 South Australia

AEMO has not identified any changes to the minimum fault level requirements or system strength node definitions for South Australia. IBR projections have been updated based on the 2024 ISP. AEMO has not identified any system shortfalls in South Australia for the period to 1 December 2027.

Figure 19 provides a summary of the system strength specification for South Australia, including the location of system strength nodes, and the minimum fault level requirements and forecast IBR projections for each.

While system strength shortfalls are formally assessed and declared through the annual NSCAS Report, the latest modelling does not indicate any expected shortfalls against the minimum requirements in South Australia over the assessment period to 1 December 2027.

Figure 19 System strength node location and system strength standard in South Australia



Scope of assessment

AEMO has assessed the suitability of system strength node locations in South Australia, and their respective minimum fault level requirements and IBR projections, over a 10-year outlook. AEMO found no material system changes that would warrant reassessment of the current node definitions or minimum requirements, but the IBR projections have been updated to reflect the 2024 ISP modelling and project announcements.

In parallel, AEMO has modelled projected three phase fault level statistics at each node across a three-year horizon to 2027-28. Appendix A1 provides more detail on the associated market modelling assumptions.

These projected availabilities have been formally compared against the associated minimum requirements to identify any system strength shortfalls as part of the 2024 NSCAS Report[27], however projected fault level duration curves and statistics have been included in this report for completeness.

2.3.1 Minimum fault level requirements and projections

AEMO has previously declared three system strength nodes in South Australia; these remain unchanged for the 2024 *System Strength Report*. AEMO has also assessed whether any material system changes have occurred that would affect the associated minimum fault level requirements, and no adjustments have been made.

AEMO continues to monitor potential changes that may impact minimum fault level requirements over the planning horizon. However, AEMO takes a conservative approach when lowering these security thresholds and does so only with positive confirmation and appropriate evidence from the relevant SSSP that the updated value remains sufficient to satisfy protection, voltage step change, and system stability requirements.

Table 31 details potential future networks changes and how they may impact minimum requirements.

Table 31 South Australia system material changes impacting system strength minimum requirements

Project	Existing node(s) primarily impacted	Earliest feasible advised timing[A]	Description of impact
Project EnergyConnect (PEC) Stage 1	All nodes in South Australia	September-2024 (In service) December-2024 (Capacity release)	The minimum requirement of two synchronous units online in requirement is expected to be relaxed upon completion of Project Energy Connect stage 2 commissioning.
Project EnergyConnect (PEC) Stage 2	All nodes in South Australia	May-2026 (In service) July-2024 (Capacity release)	
Mid North South Australia REZ Expansion	Para 275 kV and Robertstown 275 kV	TBD	Network's ability to meet minimum fault level requirements will likely improve with reduction in effective network impedance. Magnitude of benefit will be assessed once as the project progresses.

A. Unless otherwise specified, project timings are based on Transmission augmentation information page August 2024.

AEMO has also considered possible future nodes in South Australia, as described in Table 32. These nodes may be declared in a future *System Strength Report*, subject to the changing needs of the power system.

[27] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Table 32 Possible future nodes in South Australia region and closures of existing nodes

System strength node	Effective date range	Purpose of new node
Tailem Bend 275 kV	On connection of significant IBR in South East South Australia REZ	This node may provide better locations for forecast IBR in the South East South Australia REZ as it connects.
Cultana 275 kV	On connection of significant IBR near Cultana	This node may provide better locations for forecast IBR on the upper Eyre Peninsula as it connects.

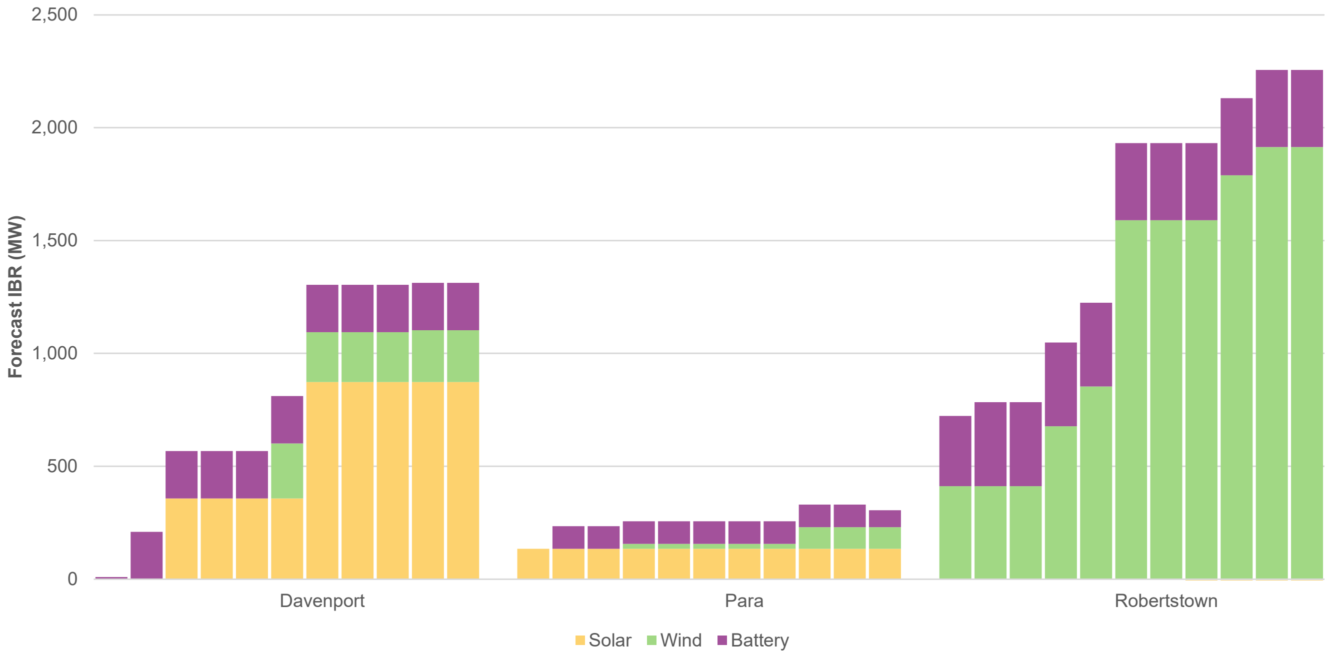
Summary of IBR projections for South Australia

AEMO's forecast of the quantity and technology of IBR investment in South Australia is summarised in Figure 20, with underlying datasets for each node provided in Section 2.3.2. While these are primarily based on 2024 ISP results, AEMO has applied minor adjustments in allocating these forecasts to specific nodes based on local network knowledge and engineering judgement.

The IBR projections have also been updated to reflect the status of committed and anticipated generation projects in AEMO's October Generation Information Page[28].

AEMO supports SSSPs considering the latest available information and joint planning outcomes to adjust these values for use in their system strength RIT-Ts between annual publications of the *System Strength Report*.

Figure 20 Forecasts of IBR and market network service facilities (MNSFs) for 11 years from 2024-25, South Australia



Notes: The near-term years of the forecast may require adjustment by the SSSP as more information becomes available about committed plant, such as their technical characteristics or their elections under the system strength framework. Further detail is provided in Appendix 1.1.

[28] AEMO, October 2024, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

Critical planned outages

SSSPs are expected to consider critical planned outages in their proposed system strength solutions on a caseby--case basis[29]. AEMO has declared several critical planned outages as impactful for maintaining system strength in South Australia, and these are presented in Table 33.

Table 33 Critical planned outages in South Australia for each system strength node

Affected node	Network outage	Reason for consideration as a critical outage
All nodes in South Australia	One synchronous condenser (post-Project EnergyConnect, including a Buronga synchronous condenser in New South Wales)	Significant system strength impact in South Australia for another contingency
	One South East to Heywood 275 kV line	
	One South East to Tailem Bend 275 kV line	
	Davenport to Mt Lock 275 kV line	
	Robertstown to Mokota 275 kV line	
	One Robertstown to Tungkillo 275 kV line	
	Robertstown to Canowie 275 kV line	
	Mokota to Willalo 275 kV line	
	Belalie to Willalo 275 kV line	
	Blyth West to Munno Para 275 kV line	

[29] AEMC, 2021, Page 98, Efficient Management of System Strength on the Power System, at https://www.aemc.gov.au/rule-changes/efficient-management-system-strength-power-system.

2.3.2 Nodal assessment of minimum requirements, shortfalls, and IBR projections

Davenport 275 kV

Figure 21 presents the projected levels of available three phase fault level at the Davenport 275 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 34. System strength shortfalls are now formally assessed in the annual NSCAS Report[30], however none have been identified for the Davenport node. Table 35 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 21 Davenport node fault level duration curves and minimum requirement

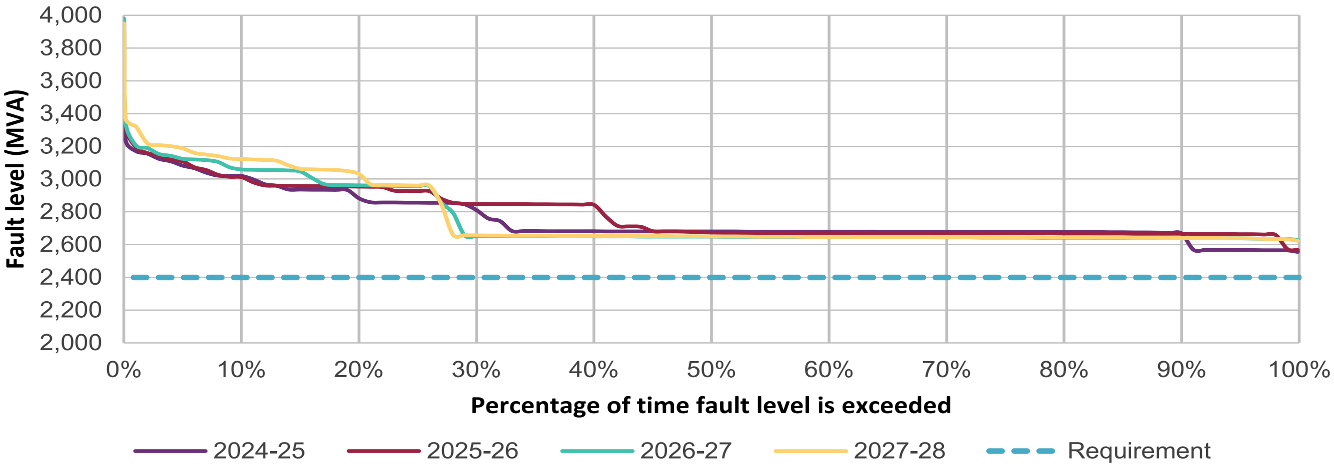


Table 34 Davenport node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Davenport 275 kV	Requirement (N)	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
	Requirement (N-1)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Projected 99.87% of time	2,555	2,567	2,629	2,624							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 31.

Table 35 Davenport node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Davenport 275 kV	Solar	349	0	0	357	357	357	357	873	873	873	873	873
	Wind	557	0	0	0	0	0	244	221	221	221	230	230
	Battery	0	10	210	210	210	210	210	210	210	210	210	210
	Total IBR	**906**	**10**	**210**	**567**	**567**	**567**	**811**	**1,304**	**1,304**	**1,304**	**1,313**	**1,313**

[30] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Para 275 kV

Figure 22 presents the projected levels of available three phase fault level at the Para 275 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 36. System strength shortfalls are now formally assessed in the annual NSCAS Report[31], however none have been identified for the Para node. Table 37 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 22 Para node fault level duration curves and minimum requirement

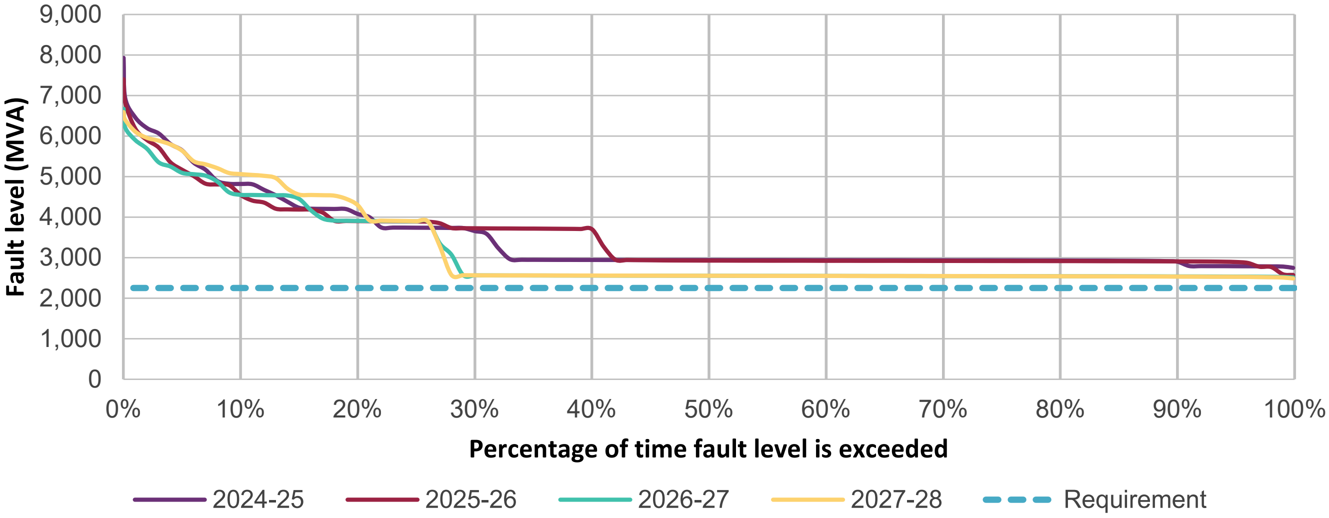


Table 36 Para node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Para 275 kV	Requirement (N)	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250
	Requirement (N-1)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	Projected 99.87% of time	2,745	2,574	2,511	2,485							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 31.

Table 37 Para node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Para 275 kV	Solar	188	135	135	135	135	135	135	135	135	135	135	135
	Wind	358	0	0	0	22	22	22	22	22	96	96	96
	Battery	323	0	100	100	100	100	100	100	100	100	100	75

[31] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	Total IBR	**869**	**135**	**235**	**235**	**257**	**257**	**257**	**257**	**257**	**331**	**331**	**306**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Robertstown 275 kV

Figure 23 presents the projected levels of available three phase fault level at the Para 275 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 38. System strength shortfalls are now formally assessed in the annual NSCAS Report[32], however none have been identified for the Robertstown node. Table 39 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 23 Robertstown node fault level duration curves and minimum requirement

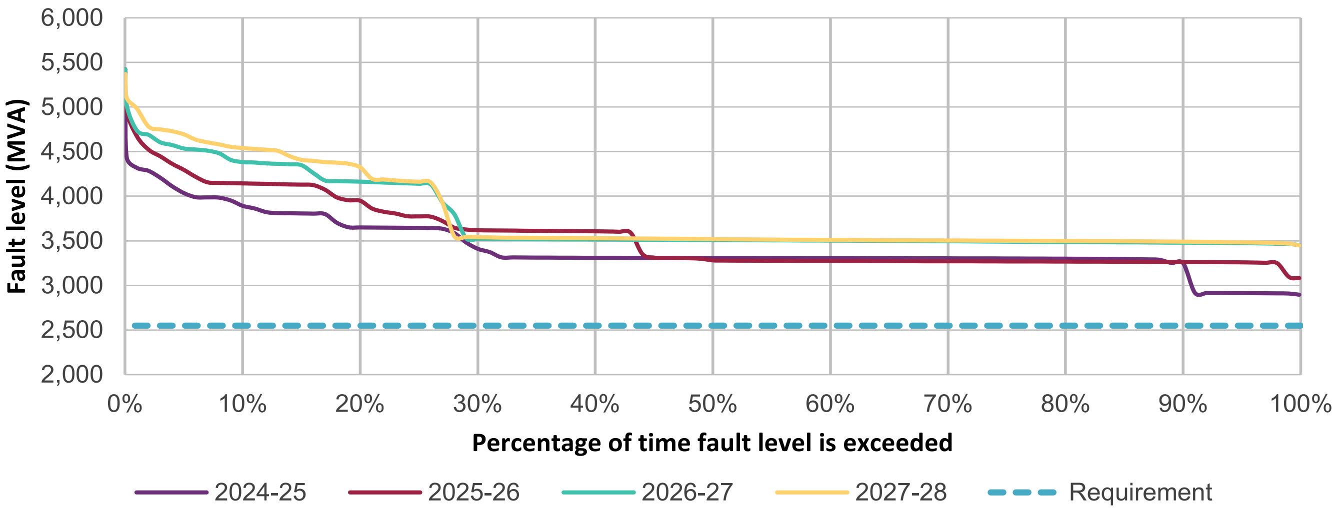


Table 38 Robertstown node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Robertstown 275 kV	Requirement (N)	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
	Requirement (N-1)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	Projected 99.87% of time	2,897	3,084	3,451	3,449							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 31.

[32] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Table 39 Robertstown node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Robertstown 275 kV	Solar	25	0	0	0	0	0	0	0	-6	-6	-6	-6
	Wind	1,434	413	413	413	677	854	1,590	1,590	1,590	1,790	1,915	1,915
	Battery	180	311	371	371	371	371	341	341	341	341	341	341
	Total IBR	**1,639**	**724**	**784**	**784**	**1,048**	**1,225**	**1,931**	**1,931**	**1,925**	**2,125**	**2,250**	**2,250**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

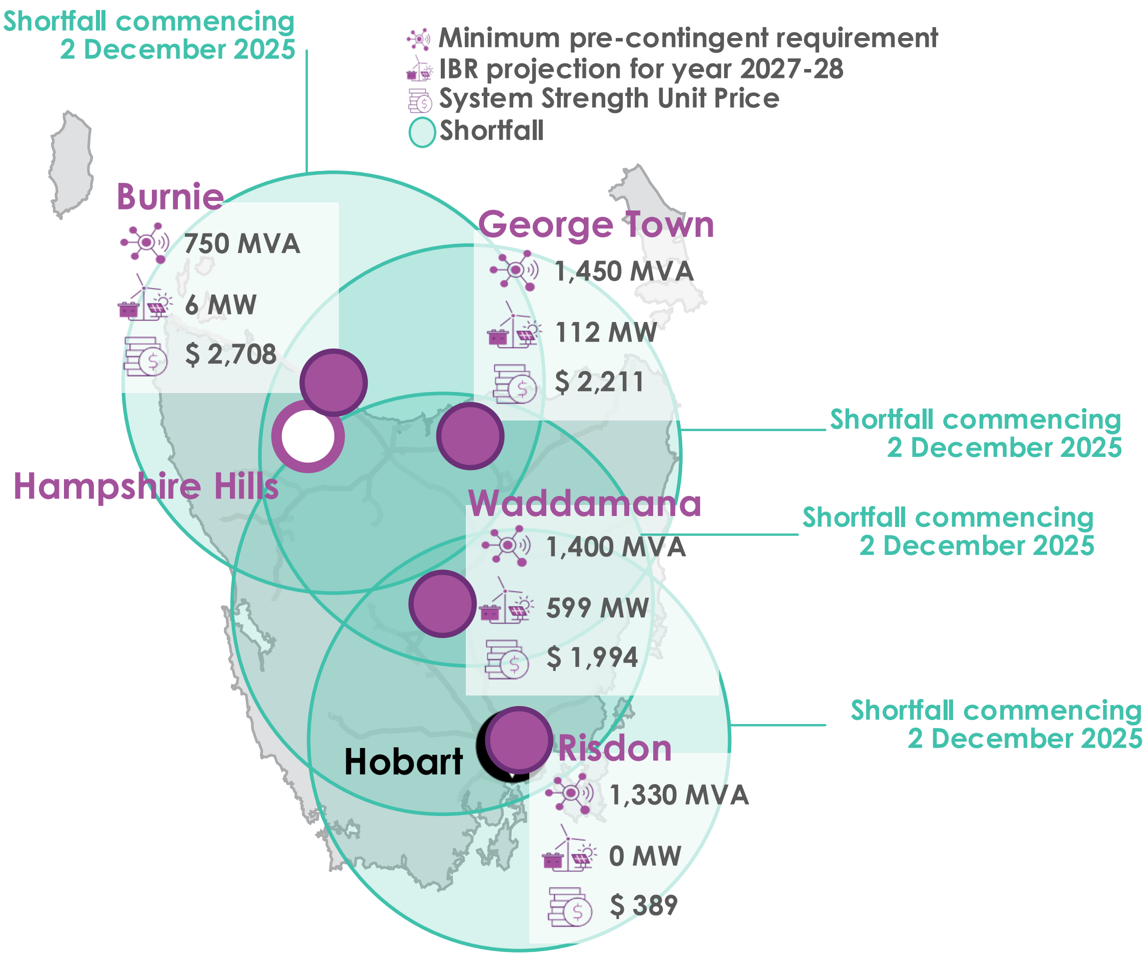
2.4 Tasmania

AEMO has not identified any changes to system strength node definitions in Tasmania, however AEMO has reduced minimum fault level requirement for the Burnie node following installation of two STATCOMS to increase power system stability. IBR projections have been updated based on the 2024 ISP.

Figure 24 provides a summary of the system strength specification for Tasmania, including the location of system strength nodes, and the minimum fault level requirements and forecast IBR projections for each.

While system strength shortfalls are formally assessed and declared through the annual NSCAS Report, the latest modelling has identified system strength shortfalls from 2 December 2025 when existing contractual arrangements cease. TasNetworks is already progressing a system strength RIT T to remediate theses needs.

Figure 24 System strength node location and system strength standard in Tasmania



Scope of assessment

AEMO has assessed the suitability of system strength node locations in Tasmania, and their respective minimum fault level requirements and IBR projections, over a 10-year outlook. AEMO found no material system changes that would warrant reassessment of the current node definitions. The IBR projections for each node have also been updated to reflect the 2024 ISP modelling and project announcements.

In parallel, AEMO has modelled projected three phase fault level statistics at each node across a three-year period to December 2027. Appendix A1 provides more detail on the associated market modelling assumptions.

These projected availabilities have been formally compared against the associated minimum requirements to identify any system strength shortfalls as part of the 2024 NSCAS Report[33], but projected fault level duration curves and statistics have been included in this report for completeness.

2.4.1 Minimum fault level requirements and projections

AEMO has previously declared four system strength nodes in Tasmania; these remain unchanged for the 2024 *System Strength Report*. AEMO has also assessed whether any material system changes would affect the minimum fault level requirements and has made one adjustment to the requirements at Burnie node.

The minimum pre-contingent fault level requirement for the Burnie 110 kV node has been reduced to 750 MVA to reflect commissioning of two STATCOMS developed nearby. The STATCOMs will provide dynamic voltage support to nearby wind farms, supporting ride through and stability performance, and addressing the underlying cause of the previously higher minimum fault levels at this node.

AEMO continues to monitor potential changes that may impact minimum fault level requirements over the planning horizon. However, AEMO takes a conservative approach when lowering these security thresholds and does so only with positive confirmation and appropriate evidence from the relevant SSSP that the updated value remains sufficient to satisfy protection, voltage step change, and system stability requirements.

Table 40 details networks changes and how they materially impact minimum requirements.

Table 40 Tasmania system material changes impacting system strength minimum requirements

Project	Existing node(s) primarily impacted	Earliest feasible timing[A]	Description of impact
Marinus Link Stage 1	Burnie 110 kV	June-2030 (In service) Dec-2030 (Capacity release)	Power system stability requirements may change dependant on the converter station design of Marinus Link DC.
Marinus Link Stage 2	Burnie 110 kV	June-2032 (In service) Dec-2032 (Capacity release)	Power system stability requirements may change dependant on the converter station design.
Waddamana to Palmerston transfer capability upgrade	Waddamana 220 kV	July-2029	The network's ability to meet minimum fault level requirements will likely improve with reduction in effective network impedance. This project will likely increase fault level contributions from hydro units. Benefit will be assessed as the project progresses.

A. Unless otherwise specified, project timings are based on Transmission augmentation information page August 2024.

[33] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

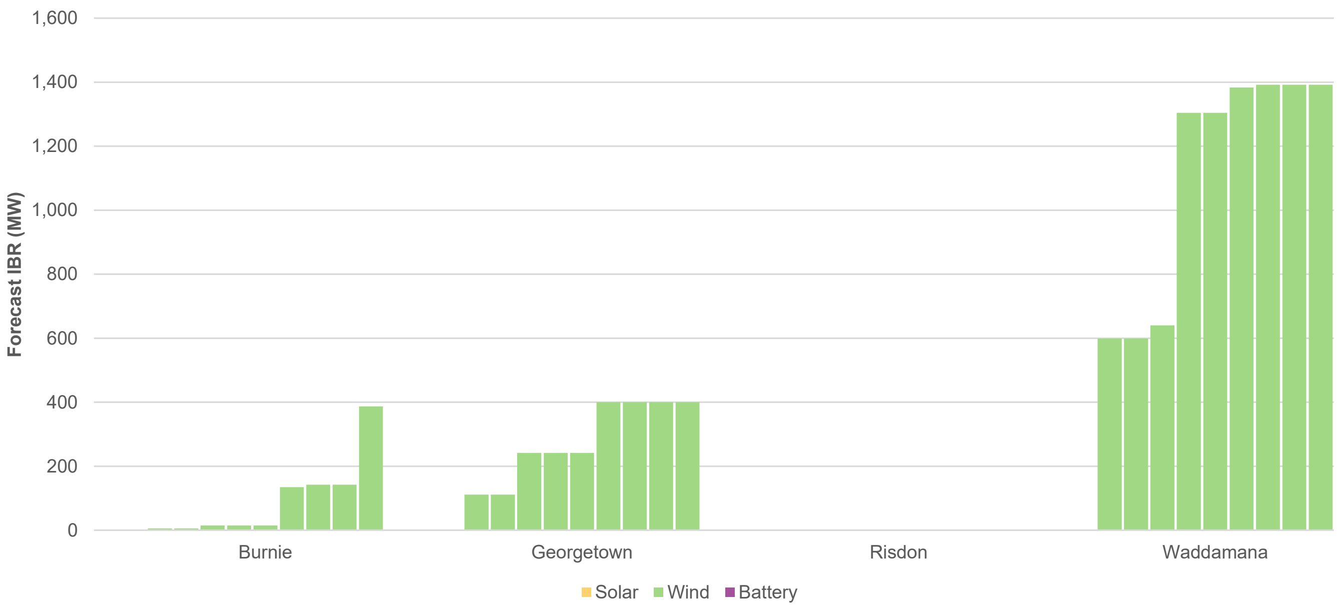
Summary of IBR projections for Tasmania

AEMO's forecast of the quantity and technology of IBR investment in Tasmania is summarised in Figure 25, with underlying datasets for each node provided in Section 2.4.2. While these are primarily based on 2024 ISP results, AEMO has applied minor adjustments in allocating these forecasts to specific nodes based on local network knowledge and engineering judgement.

The IBR projections have also been updated to reflect the status of committed and anticipated generation projects in AEMO's October Generation Information Page[34].

AEMO supports SSSPs considering the latest available information and joint planning outcomes to adjust these values for use in their system strength RIT-Ts between annual publications of the *System Strength Report*.

Figure 25 Forecasts of IBR and market network service facilities (MNSFs) for 11 years from 2024-25, Tasmania



Notes: The near-term years of the forecast may require adjustment by the SSSP as more information becomes available about committed plant, such as their technical characteristics or their elections under the system strength framework Further detail is provided in Appendix 1.1.

[34] AEMO, October 2024, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

2.4.2 Nodal assessment of minimum requirements, shortfalls, and IBR projections

Burnie 110 kV

Figure 26 presents the projected levels of available three phase fault level at the Burnie 110 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 41. System strength shortfalls are now formally assessed in the annual NSCAS report[35], including a shortfall of approximately 262 MVA at the Burnie node from 2025-26. Table 42 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 26 Burnie node fault level duration curves and minimum requirement

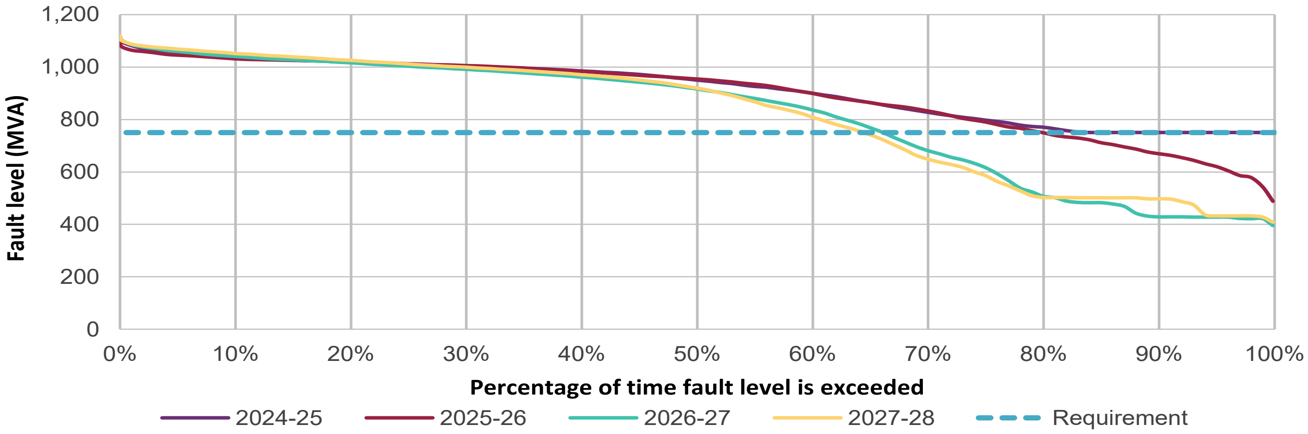


Table 41 Burnie node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Burnie 110 kV	Requirement (N)	750	750	750	750	750	750	750	750	750	750	750
	Requirement (N-1)	560	560	560	560	560	560	560	560	560	560	560
	Projected 99.87% of time	750	488	396	409							
	Shortfall	0	262	354	341							

Note: Potential changes that would impact these requirements over time are documented in Table 38.

Table 42 Burnie node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Burnie 110 kV	Solar	0	0	0	0	0	0	0	0	0	0	0	0
	Wind	250	0	0	6	6	15	15	15	134	142	142	387
	Battery	0	0	0	0	0	0	0	0	0	0	0	0
	Total IBR	**250**	**0**	**0**	**6**	**6**	**15**	**15**	**15**	**134**	**142**	**142**	**387**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[35] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

George Town 220 kV

Figure 27 presents the projected levels of available three phase fault level at the George Town 220 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 43. System strength shortfalls are now formally assessed in the annual NSCAS Report[36], including a shortfall of approximately 687 MVA at the George Town node from 2025-26. Table 44 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 27 George Town node fault level duration curves and minimum requirement

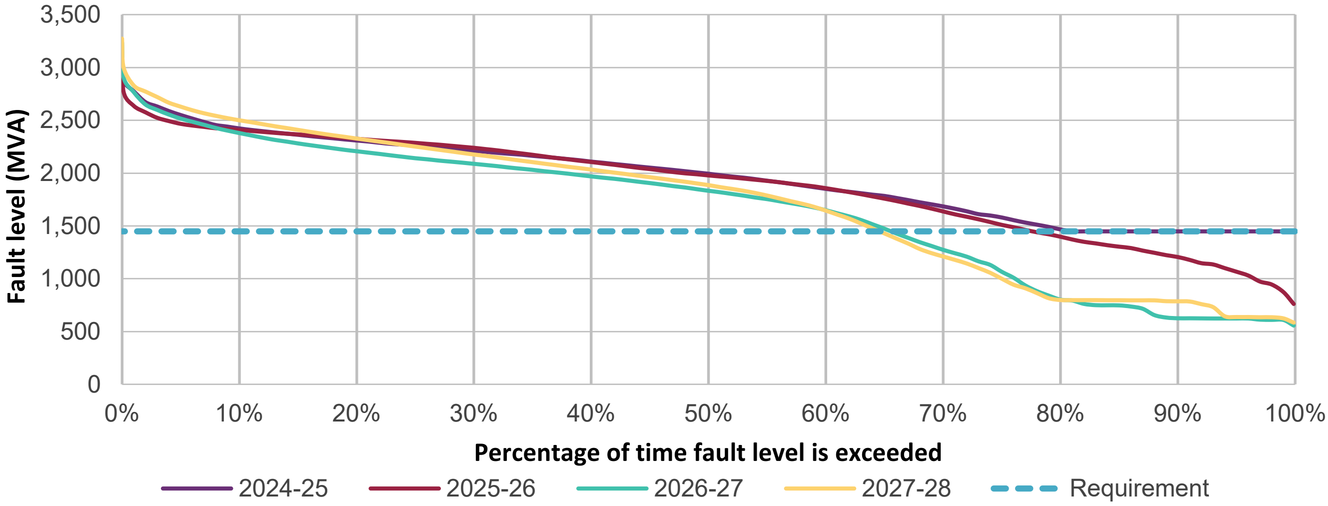


Table 43 George Town node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
George Town 220 kV	Requirement (N)	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450
	Requirement (N-1)	0	0	0	0	0	0	0	0	0	0	0
	Projected 99.87% of time	1,450	763	558	584							
	Shortfall	0	687	892	866							

Note: Potential changes that would impact these requirements over time are documented in Table 38.

Table 44 George Town node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
George Town 220 kV	Solar	0	0	0	0	0	0	0	0	0	0	0	0
	Wind	168	0	0	112	112	242	242	242	400	400	400	400
	Battery	0	0	0	0	0	0	0	0	0	0	0	0
	Total IBR	**168**	**0**	**0**	**112**	**112**	**242**	**242**	**242**	**400**	**400**	**400**	**400**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[36] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Risdon 110 kV

Figure 28 presents the projected levels of available three phase fault level at the Risdon 110 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 45. System strength shortfalls are now formally assessed in the annual NSCAS Report[37], including a shortfall of approximately 366 MVA at the Risdon node from 2025-26.Table 46 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 28 Risdon node fault level duration curves and minimum requirement

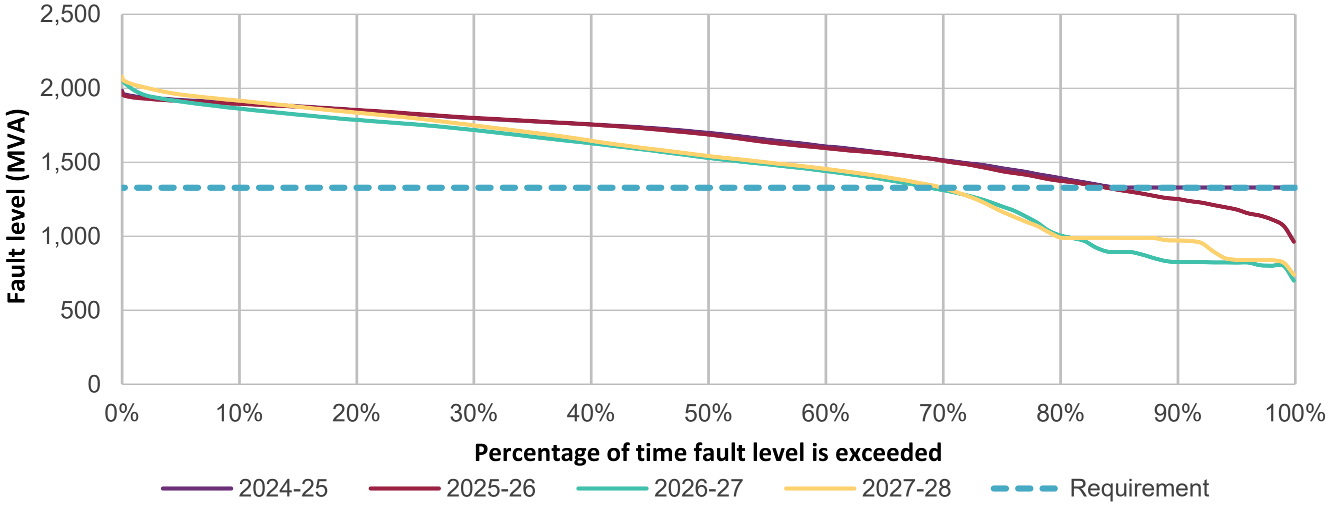


Table 45 Risdon node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Risdon 110 kV	Requirement (N)	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330
	Requirement (N-1)	0	0	0	0	0	0	0	0	0	0	0
	Projected 99.87% of time	1,330	964	700	741							
	Shortfall	0	366	630	589							

Note: Potential changes that would impact these requirements over time are documented in Table 38.

Table 46 Risdon node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Risdon 110 kV	Solar	0	0	0	0	0	0	0	0	0	0	0	0
	Wind	0	0	0	0	0	0	0	0	0	0	0	0
	Battery	0	0	0	0	0	0	0	0	0	0	0	0
	Total IBR	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[37] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Waddamana 220 kV

Figure 29 presents the projected levels of available three phase fault level at the Waddamana 220 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum pre-contingent fault level requirements detailed in Table 47. System strength shortfalls are now formally assessed in the annual NSCAS Report[38], including a shortfall of approximately 382 MVA at the Waddamana node from 2025-26. Table 48 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 29 Waddamana node fault level duration curves and minimum requirement

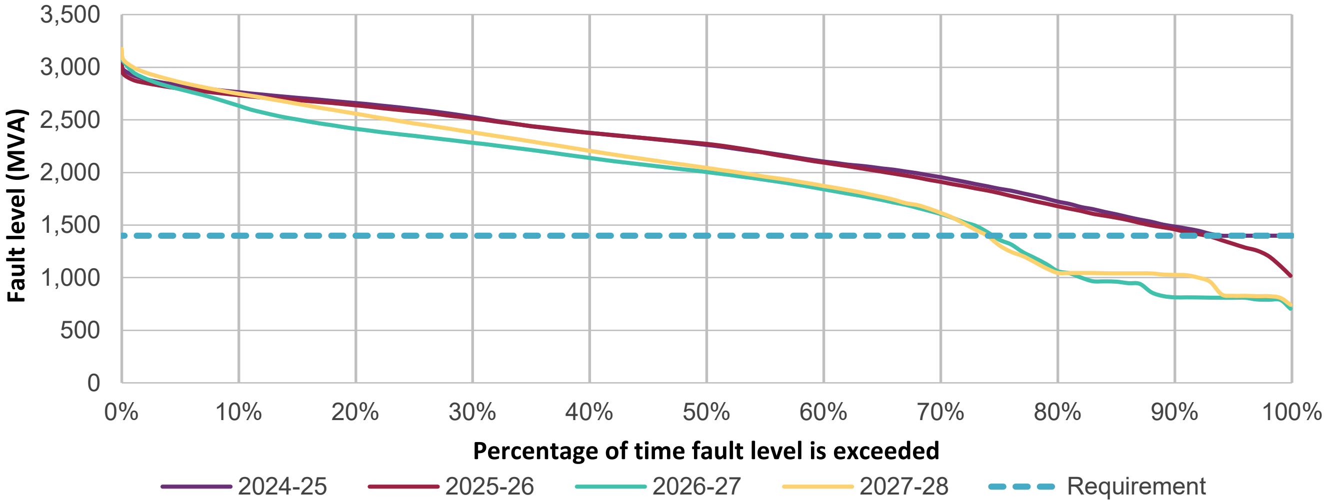


Table 47 Waddamana node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Waddamana 220 kV	Requirement (N)	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
	Requirement (N-1)	0	0	0	0	0	0	0	0	0	0	0
	Projected 99.87% of time	1,400	1,018	705	743							
	Shortfall	0	382	695	657							

Note: Potential changes that would impact these requirements over time are documented in Table 38

Table 48 Waddamana node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Waddamana 220 kV	Solar	0	0	0	0	0	0	0	0	0	0	0	0
	Wind	144	0	0	599	599	641	1,304	1,304	1,383	1,392	1,392	1,392
	Battery	0	0	0	0	0	0	0	0	0	0	0	0
	Total IBR	**144**	**0**	**0**	**599**	**599**	**641**	**1,304**	**1,304**	**1,383**	**1,392**	**1,392**	**1,392**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

[38] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

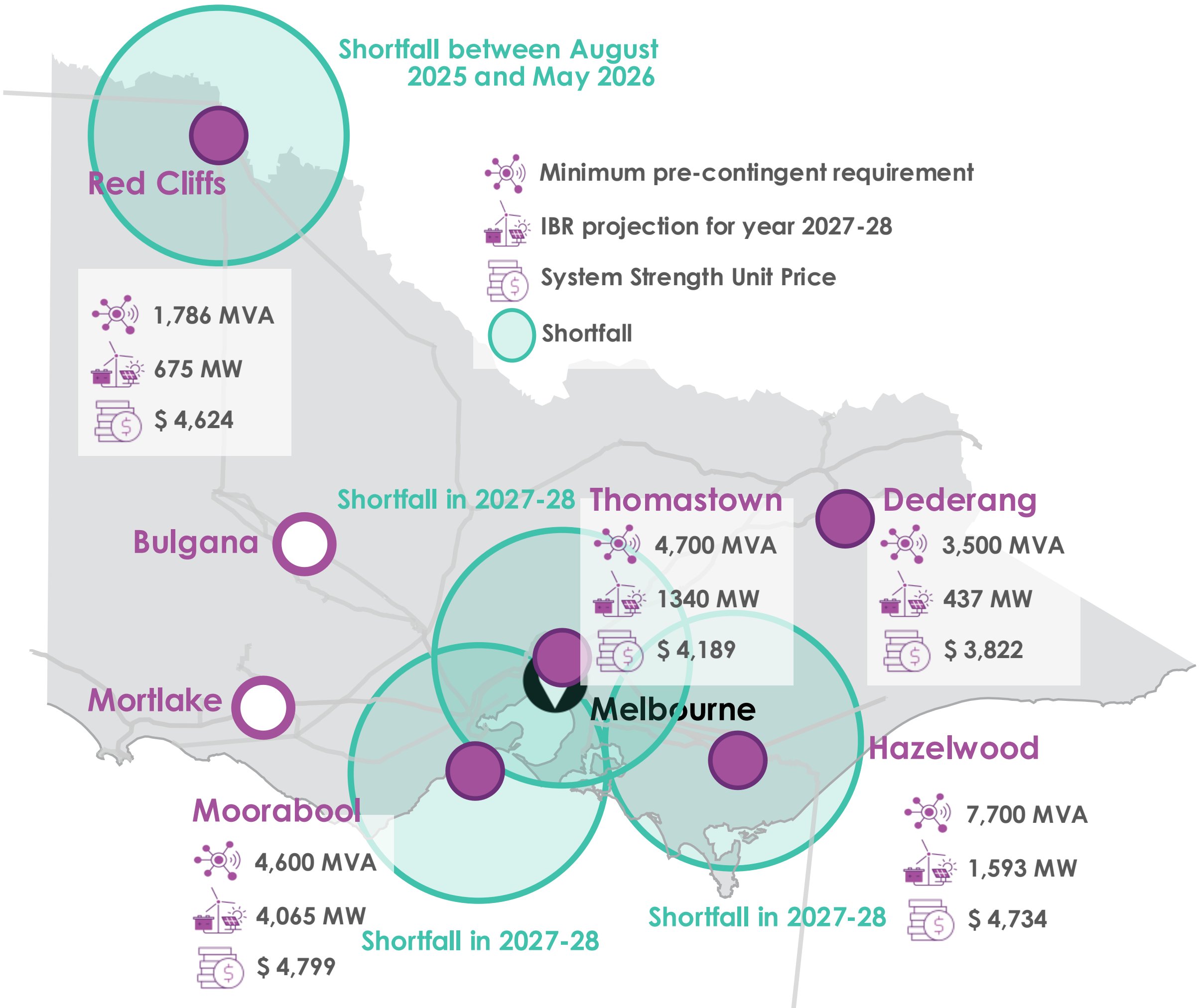
2.5 Victoria

AEMO has not identified any changes to the minimum fault level requirements or system strength node definitions for Victoria. IBR projections have been updated based on the 2024 ISP, and reflect the deferred retirement of Eraring Power Station in New South Wales and recent changes in generation and transmission timing and commitment, with consequential impact on IBR projections in neighbouring regions.

Figure 30 provides a summary of the system strength specification for Victoria, including the location of system strength nodes, and the minimum fault level requirements and forecast IBR projections for each.

While system strength shortfalls are formally assessed and declared through the annual NSCAS report, the latest modelling identifies new shortfalls of 517 MVA at Moorabool, 1,963 MVA at Hazelwood, and 561 MVA at Thomastown from 2027-28. AEMO Victorian Planning (AVP) is exploring options to meet these needs as part of their broader System Strength RIT-T for Victoria.

Figure 30 System strength node location and system strength standard in Victoria



Scope of assessment

AEMO has assessed suitability of system strength node locations in Victoria, and their respective minimum fault level requirements and IBR projections, over a 10 year outlook. AEMO found no material system changes that would warrant reassessment of the current node definitions or minimum requirements, however the IBR projections have been updated to reflect the 2024 ISP modelling and latest project announcements.

In parallel, AEMO has modelled projected three phase fault level statistics at each node across a three-year period from December 2024 to December 2027. Appendix A1 provides more detail on the associated market modelling assumptions.

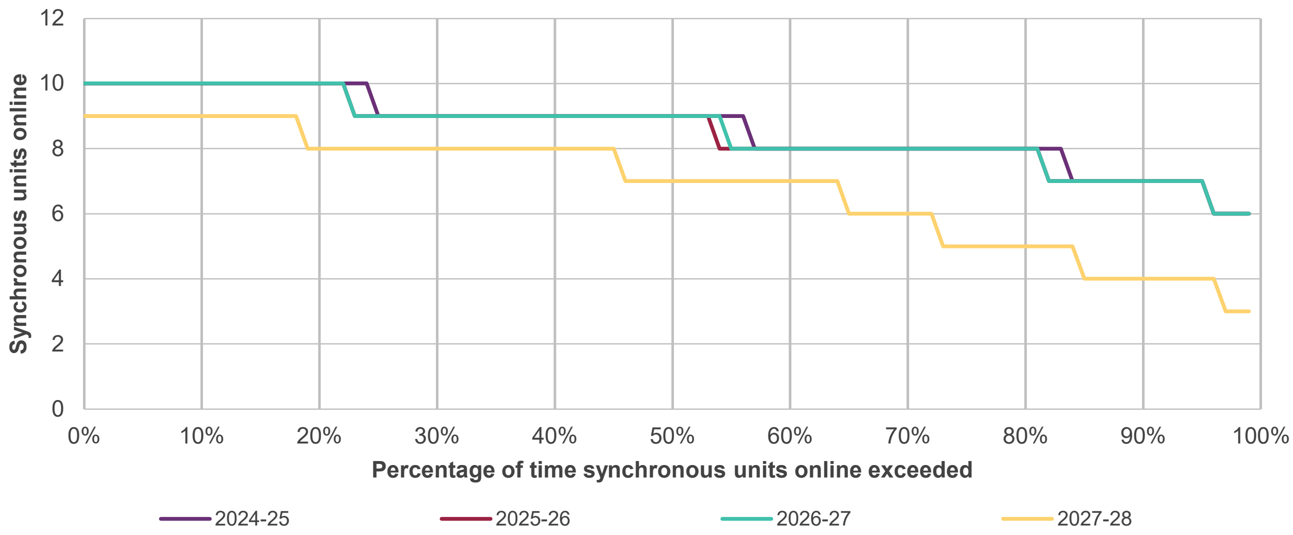
These projected availabilities have been formally compared against the associated minimum requirements to identify any system strength shortfalls as part of the 2024 NSCAS Report[39], but projected fault level duration curves and statistics have been included in this report for completeness.

Projected reduction in available fault level from synchronous generation

Figure 31 presents the modelled number of large synchronous generating units online in Victoria over a three-year period from December 2024 to December 2027. This highlights a significant forecast reduction over time, as falling levels of operational demand and increasing penetration of IBR act to reduce the utilisation of these units. These curves consider changes in dispatch patterns, and the projected withdrawal of existing generating units.

The modelling did not enforce operational unit commitment requirements, and instead reflects the expected system strength availability in the absence of operational intervention or other response [40].

Figure 31 Synchronous units projected online under *Step Change* scenario, Victoria



[39] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

[40] For example, on 24 October 2024, AEMO was required to issue Directions in Victoria to maintain adequate system security (see Market Notices 119269, 119270, 119271 at https://www.aemo.com.au/market-notices).

2.5.1 Minimum fault level requirements and projections

AEMO has previously declared five system strength nodes in Victoria; these remain unchanged for the 2024 *System Strength Report*. AEMO has also assessed whether any material system changes have occurred that would affect the associated minimum fault level requirements, and no adjustments have been made.

AEMO takes a conservative approach when lowering these security thresholds and does so only with positive confirmation and appropriate evidence from the relevant SSSP that the updated value remains sufficient to satisfy protection, voltage step change, and system stability requirements.

AEMO is aware of voltage oscillation events occurring in South-West Victoria under certain network outage conditions[41] and system normal topology[42]. A lack of system strength has also been observed during outage of Sydenham – Moorabool line on the 24 October 2024 requiring market direction of synchronous units[43]. New minimum synchronous unit combinations and constraints are being developed and AEMO will assess the ongoing adequacy of minimum fault level requirements against these new combinations as part of the 2025 System Strength Report. Table 49 details potential network changes and how they may impact requirements.

Table 49 Material changes impacting system strength minimum requirements, Victoria

Material change	Existing node(s) primarily impacted	Earliest feasible timing[A]	Description of impact
Project EnergyConnect (PEC) Stage 1	Buronga 220 kV and Red Cliffs 220 kV	Sept-2024 (In service) Dec-2024 (Capacity release)	Network's ability to meet minimum fault level requirements will likely improve with reduction in effective network impedance. Additional circuit linking PEC stage 1 and 2 Buronga synchronous condensers will likely improve fault levels at Red Cliffs. Magnitude of benefit will be assessed once more detailed modelling information becomes available.
PEC Stage 2	Darlington Point 330 kV	May-2026 (In service) July-2024 (Capacity release)	
Western Renewables Link (WRL)	Moorabool 220 kV, Thomastown 220 kV	July-2027	Network's ability to meet minimum fault level requirements will likely improve with reduction in effective network impedance. WRL yields greater interconnectivity with Ararat synchronous condenser and Melbourne. Magnitude of benefit will be assessed as the project progresses.
Ararat Sync Condenser	Moorabool 220 kV	Dec 2025	Magnitude of benefit to be assessed as the project progresses.
Project Marinus	Hazelwood 500 kV	Dec-2030 (Stage 1) Dec-2032 (Stage 2)	Power system stability requirements may change dependant on the converter station design of Marinus Link DC.
VNI West	Moorabool and Thomastown 220 kV	Dec-2028 (In service) Dec -2029 (Capacity release)	Network's ability to meet requirements will likely improve with reduction in effective network impedance. VNI West yields greater interconnectivity with synchronous resources in Southern New South Wales and Melbourne. Benefit to be assessed as project progresses.
Generator retirements and reduced unit commitment	Hazelwood 500 kV, Moorabool and Thomastown 220 kV		Reduced unit commitment, or retirement, of existing synchronous machines in the Latrobe Valley will require sourcing of three phase fault level support from other areas of the network.

A. Unless otherwise specified, project timings are based on Transmission Augmentation Information page August 2024.

[41] AEMO, Victorian Transfer Limit Advice – Outages, October 2024, at https://aemo.com.au/-/media/files/electricity/nem/security_and_%E2%80%8Creliability/congestion-information/victorian-transfer-limit-advice-outages.pdf?la=en

[42] AEMO, Victorian Transfer Limit Advice – System Normal, October 2024, at https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/congestion-information/2024/victorian-transfer-limit-advice-system-normal_v30.pdf?la=en

[43] See Market Notices 119269, 119270, 119271 at https://www.aemo.com.au/market-notices.

AEMO has also considered possible future nodes in Victoria, as described in Table 50. These nodes may be declared in a future *System Strength Report*, subject to the changing needs of the power system.

Table 50 Possible future nodes in Victoria region and closures of existing nodes

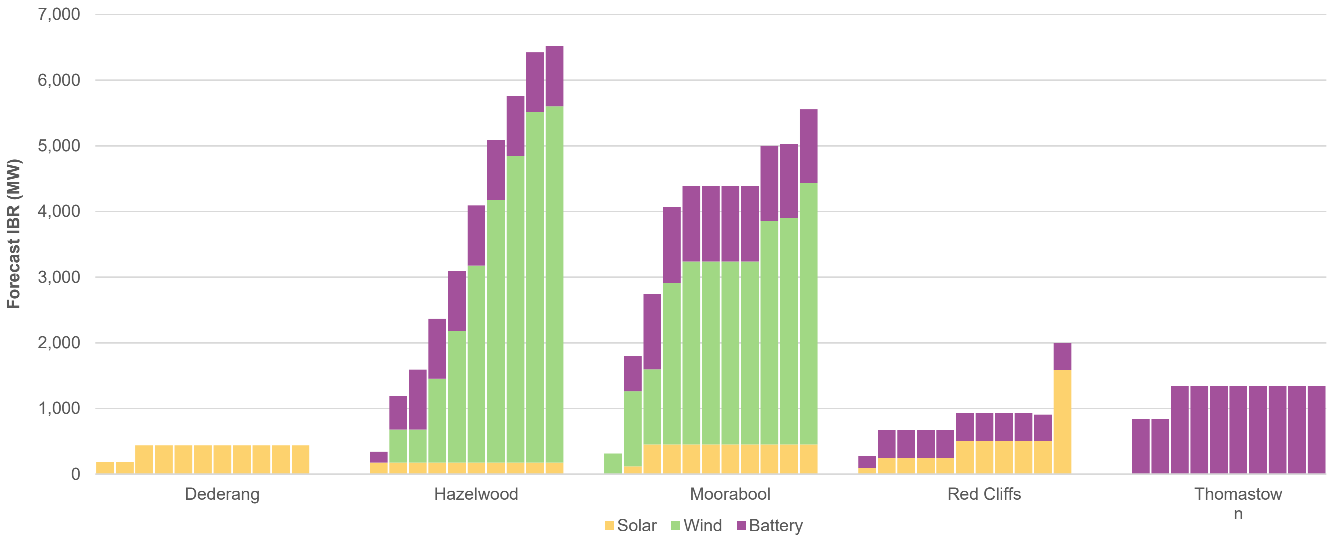
System strength node	Voltage and busbar	Effective date range	Purpose of new node
Mortlake	500 kV Bus 1	On connection of significant IBR in Victoria	This node is located within the South West REZ, where large amounts of future IBR may connect. It may also provide a node suitable for assessing critical planned outages on the interconnector with other regions.
Bulgana	220 kV Bus 1	On connection of significant IBR in Victoria	This node is located within the Western Victorian REZ, where future transmission augmentation projects will unlock network capacity to connect new IBR generation.

Summary of IBR projections for Victoria

AEMO's 11-year forecast of the quantity and technology of IBR investment in Victoria is summarised in Figure 32, with underlying datasets for each node provided in section2.5.20. While these are primarily based on 2024 ISP results, AEMO has applied minor adjustments in allocating these forecasts to specific nodes based on local network knowledge and engineering judgement.

AEMO expects that AVP, as the SSSP in Victoria, may engage in joint planning with neighbouring SSSPs to identify any investment efficiencies when assessing the nature of solutions required to meet these requirements. AEMO supports SSSPs considering the latest available information and announcements to adjust these values for use in their system strength RIT-Ts between publications of the *System Strength Report*.

Figure 32 Forecasts of IBR and market network service facilities (MNSFs) for 11 years from 2024-25, Victoria



Notes: The near-term years of the forecast may require adjustment by the SSSP as more information becomes available about committed plant, such as their technical characteristics or their elections under the system strength framework – for example to adjust requirements for projects connecting under the older framework. Further detail is provided in Appendix 1.1.

Several key project assumptions have changed since publication of the 2024 ISP in July, which have been reflected in these IBR projections for New South Wales. In particular, the projections reflect:

- The status of committed and anticipated generation projects, as published in AEMO's October 2024 Generation Information page[44].
- The status of committed, anticipated and actionable network projects, as published in AEMO's August 2024 Transmission Augmentation Information page[45].
- The announced two-year delay in retirement for Eraring Power Station to 2027-28, and the associated commercial obligations of that arrangement[46]. This has been incorporated directly through updated modelling that reflects the impact of additional unit commitment and energy production on optimal investment in IBR.

The net effect of these changes in Victoria has been a slight reduction in projected solar investment near the Red Cliffs node, balanced against an increase in solar investment projected at Darlington Point in New South Wales.

AEMO supports SSSPs considering the latest available information and joint planning outcomes to adjust these values for use in their system strength RIT-Ts between annual publications of the *System Strength Report*.

Critical planned outages

SSSPs are expected to consider critical planned outages in their proposed system strength solutions on a caseby--case basis[47]. AEMO has declared several critical planned outages as impactful for maintaining system strength in Victoria, and these are presented in Table 51.

Table 51 Critical planned outages in Victoria for each system strength node

Affected node	Network outage	Reason for consideration as critical
Dederang (Darlington Point in New South Wales)	Dederang to Wodonga 330 kV line	Fault level at Darlington Point drops below requirement for another contingency.
Moorabool **Thomastown**	Hazelwood to Loy Yang 1 or 2 or 3 500 kV line	One of the specified minimum synchronous unit combinations must be dispatched[A].
	Moorabool to Sydenham 1 or 2 500 kV line	
	South Morang to Rowville 500 kV line	
Moorabool	500/220 kV Transformer at Moorabool	Low fault level at Moorabool.
	Heywood to Mortlake 500 kV line	Significant system strength impact along Victoria to South Australia corridor for another contingency.
	Haunted Gully to Tarrone 500 kV line	
	Tarrone to Heywood 500 kV line	
	Mortlake to Moorabool 500 kV line[B]	
	Moorabool to Haunted Gully 500 kV line[B]	
	Moorabool to Sydenham 1 or 2 500 kV line	
	Cressy to Moorabool No.1 500 kV line[B]	
	Cressy to Moorabool No.2 500 kV line[B]	
	Cressy to Haunted Gully 500 kV line[B]	

[44] AEMO, October 2024, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information.

[45] AEMO, August 2024, at https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/transmission-augmentation-information.

[46] New South Wales Government, at https://www.energy.nsw.gov.au/nsw-plans-and-progress/regulation-and-policy/agreement-eraring.

[47] AEMC, 2021, Page 98, Efficient Management of System Strength on the Power System, at https://www.aemc.gov.au/rule-changes/efficient-management-system-strength-power-system.

Affected node	Network outage	Reason for consideration as critical
	Cressy to Mortlake 500 kV line[B]	

A. See https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/congestion-information/victorian-transfer-limit-advice-outages.pdf?la=en.
B. Mortlake to Moorabool and Moorabool to Haunted Gully lines are split into four new circuits upon commissioning of Cressy Terminal station.

2.5.2 Nodal assessment of minimum requirements, shortfalls, and IBR projections

Dederang 220 kV

Figure 33 presents the projected levels of available three phase fault level at the Dederang 220 kV node. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- requirements detailed in Table 52. System strength shortfalls are now formally assessed in the annual NSCAS Report[48], however none have been identified for the Dederang node. Table 53 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 33 Dederang node fault level duration curves and minimum requirement

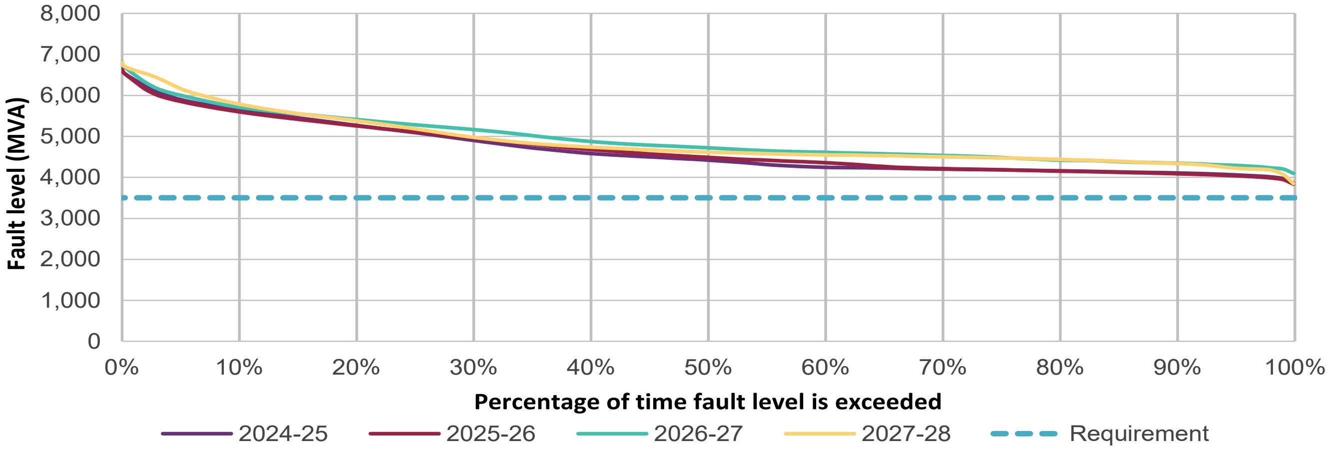


Table 52 Dederang node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Dederang 220 kV	Requirement (N)	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
	Requirement (N-1)	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300
	Projected 99.87% of time	3,862	3,833	4,099	3,847							
	Shortfall	0	0	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 49.

Table 53 Dederang node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	Solar	444	187	187	437	437	437	437	437	437	437	437	437

[48] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Dederang 220 kV	Wind	0	0	0	0	0	0	0	0	0	0	0	0
	Battery	0	0	0	0	0	0	0	0	0	0	0	0
	Total IBR	**444**	**187**	**187**	**437**	**437**	**437**	**437**	**437**	**437**	**437**	**437**	**437**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Hazelwood 500 kV

Figure 34 presents the projected levels of available three phase fault level at the Hazelwood 500 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 54. System strength shortfalls are now formally assessed in the annual NSCAS Report[49], including a shortfall of 1,963 MVA at Hazelwood node from 2027-28. Table 55 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 34 Hazelwood node fault level duration curves and minimum requirement

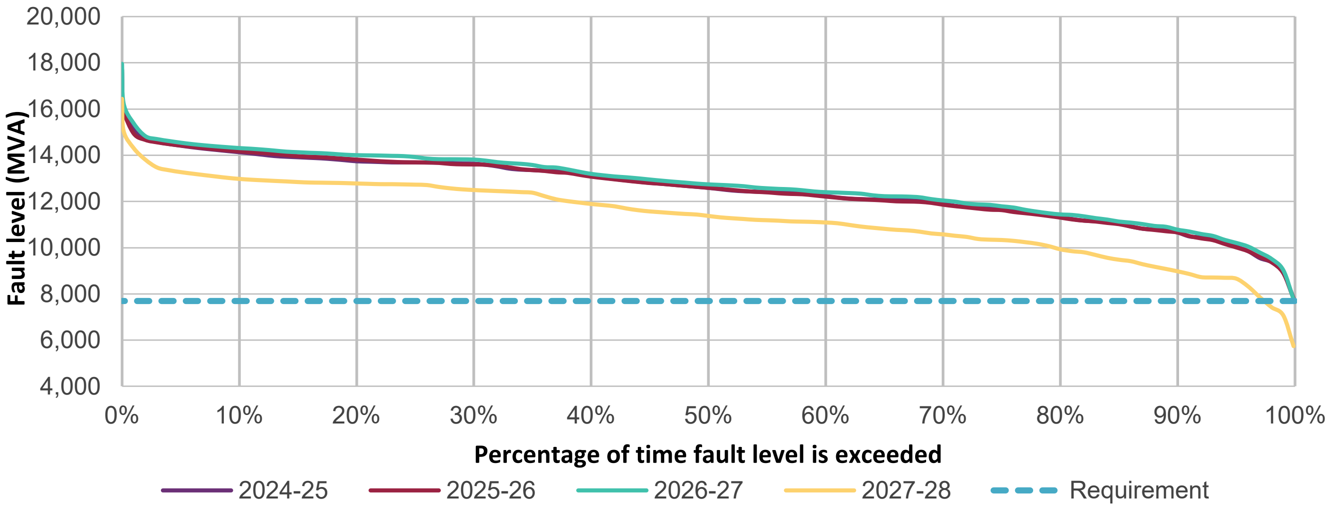


Table 54 Hazelwood node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Hazelwood 500 kV	Requirement (N)	7,700	7,700	7,700	7,700	7,700	7,700	7,700	7,700	7,700	7,700	7,700
	Requirement (N-1)	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150
	Projected 99.87% of time	7,805	7,800	7,762	5,737							
	Shortfall	0	0	0	1,963							

Note: Potential changes that would impact these requirements over time are documented in Table 49.

[49] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Table 55 Hazelwood node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Hazelwood 500 kV	Solar	0	0	178	178	178	178	178	178	178	178	178	178
	Wind	107	0	0	500	500	1,276	2,000	3,000	4,000	4,667	5,333	5,424
	Battery	200	0	165	515	915	915	915	915	915	915	915	920
	Total IBR	**307**	**0**	**343**	**1,193**	**1,593**	**2,369**	**3,093**	**4,093**	**5,093**	**5,760**	**6,426**	**6,522**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Moorabool 220 kV

Figure 35 presents the projected levels of available three phase fault level at the Hazelwood 500 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 56. System strength shortfalls are now formally assessed in the annual NSCAS Report[50], including a shortfall of 517 MVA at Moorabool from 2027-28. Table 57 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 35 Moorabool node fault level duration curves and minimum requirement

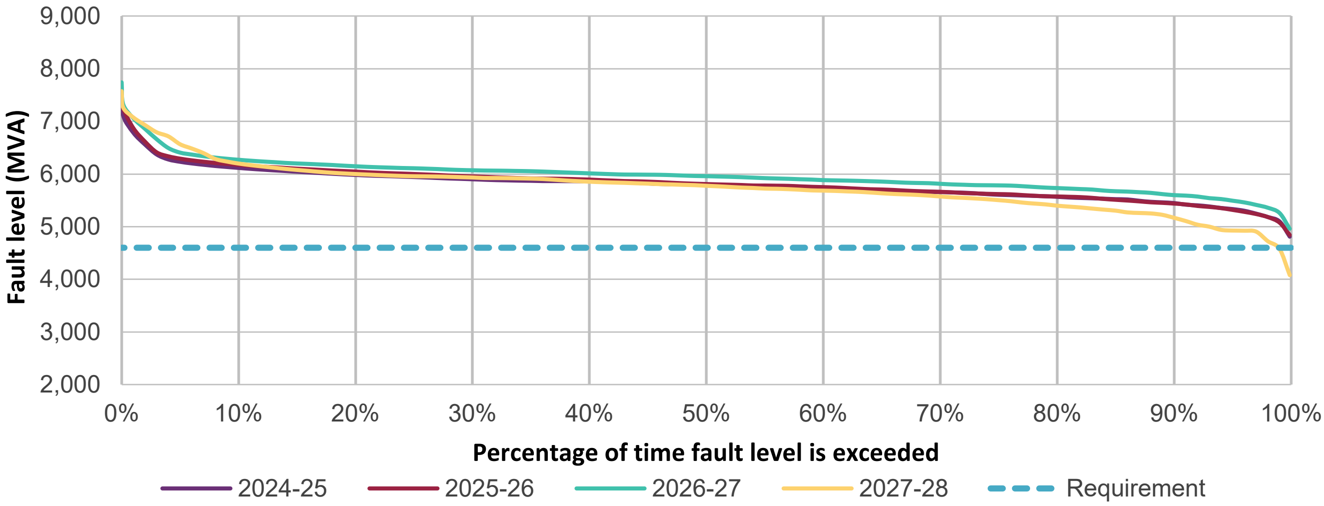


Table 56 Moorabool node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Moorabool 220 kV	Requirement (N)	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600
	Requirement (N-1)	4,050	4,050	4,050	4,050	4,050	4,050	4,050	4,050	4,050	4,050	4,050
	Projected 99.87% of time	4,813	4,844	4,963	4,083							
	Shortfall	0	0	0	517							

Note: Potential changes that would impact these requirements over time are documented in Table 49.

50 At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Table 57 Moorabool node utility-scale IBR projections

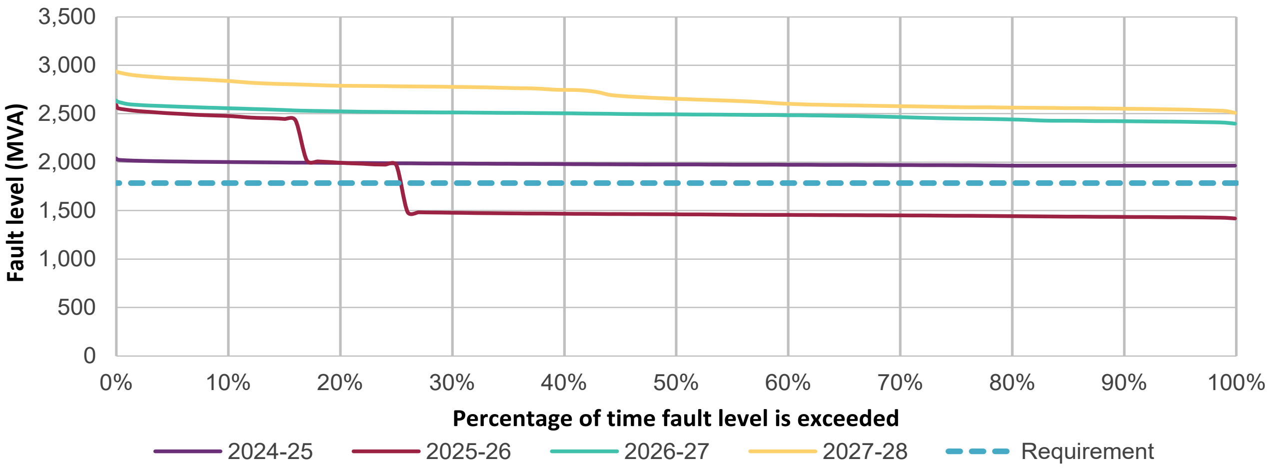
Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Moorabool 220 kV	Solar	0	0	119	452	452	452	452	452	452	452	452	452
	Wind	4,126	315	1,143	1,143	2,463	2,787	2,787	2,787	2,787	3,400	3,452	3,984
	Battery	350	0	534	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,120	1,120
	Total IBR	**4,476**	**315**	**1,796**	**2,745**	**4,065**	**4,389**	**4,389**	**4,389**	**4,389**	**5,002**	**5,024**	**5,556**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Red Cliffs 220 kV

Figure 36 presents the projected levels of available three phase fault level at the Red Cliffs 220 kV node. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- requirements detailed in Table 58. This identifies a shortfall of up to 368 MVA at Red Cliffs from 2025-26 when existing contracts expire. AEMO is not declaring a gap on the basis AEMO is aware AVP is exploring remediation options including 12-month extension of the existing system strength services contract and that PEC Stage 2 will be in service prior to extension expiration. Table 59 shows an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 36 Red Cliffs node fault level duration curves and minimum requirement



Note: Red Cliffs step changes (from left to right) in fault level in 2025-26 are liked to PEC Stage 2 coming in to service in May 2026, existing system strength services contracts expiring in August 2025.

Table 58 Red Cliffs node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Red Cliffs 220 kV	Requirement (N)	1,786	1,786	1,786	1,786	1,786	1,786	1,786	1,786	1,786	1,786	1,786
	Requirement (N-1)	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036
	Projected 99.87% of time	1,965	1,418	2,398	2,510							
	Shortfall	0	368	0	0							

Note: Potential changes that would impact these requirements over time are documented in Table 49.

Table 59 Red Cliffs node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Red Cliffs 220 kV	Solar	682	95	245	245	245	245	504	504	504	504	504	1,590
	Wind	0	0	0	0	0	0	0	0	0	0	0	0
	Battery	25	185	430	430	430	430	430	430	430	430	405	405
	Total IBR	**707**	**280**	**675**	**675**	**675**	**675**	**934**	**934**	**934**	**934**	**909**	**1,995**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

Thomastown 220 kV

Figure 37 presents the projected levels of available three phase fault level at the Thomastown 220 kV node over a three-year period from December 2024 to December 2027. AEMO compared the 99.87th percentile values from this chart against the minimum precontingent- fault level requirements detailed in Table 60. System strength shortfalls are now formally assessed in the annual NSCAS Report[51], including a shortfall of 561 MVA at Thomastown from 2027-28. Table 61 provides an overview of projected IBR by technology and year, which forms the basis of the efficient level requirement for system strength at this node.

Figure 37 Thomastown node fault level duration curves and minimum requirement

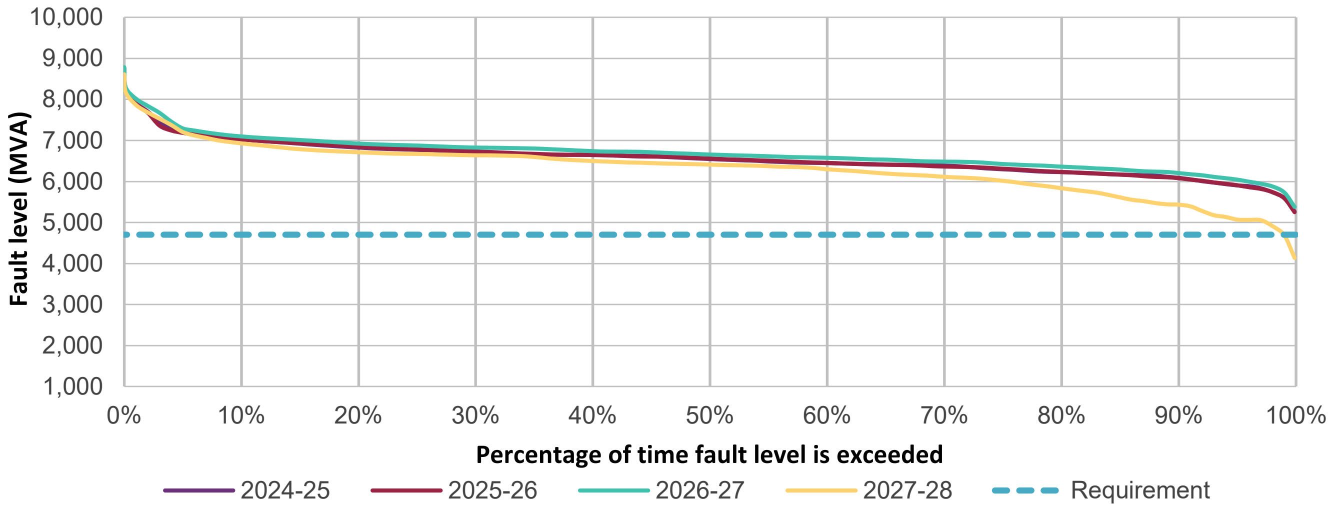


Table 60 Thomastown node minimum three phase fault level requirements and shortfalls

Node	Parameter	Minimum three phase fault level by financial year ending (MVA)										
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Thomastown 220 kV	Requirement (N)	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700	4,700
	Requirement (N-1)	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500
	Projected 99.87% of time	5,265	5,253	5,381	4,139							
	Shortfall	0	0	0	561							

Note: Potential changes that would impact these requirements over time are documented in Table 49.

[51] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

Table 61 Thomastown node utility-scale IBR projections

Node	Type	Existing (MW)	Projected IBR by financial year ending (MW)										
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Thomastown 220 kV	Solar	0	0	0	0	0	0	0	0	0	0	0	0
	Wind	58	0	0	0	0	0	0	0	0	0	0	0
	Battery	205	0	840	840	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,345
	Total IBR	**263**	**0**	**840**	**840**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,345**

Note: forecasts may require adjustment by the SSSP when preparing system strength services, with new information on newly committed IBR.

3 Next steps

This report updates AEMO's 10-year specification of system strength requirements. No new system strength nodes have been declared, and only isolated changes were identified to the existing minimum fault level requirements. The 10-year IBR forecasts have been updated for all nodes, and considered the 2024 ISP results alongside the latest announced timings for network projects, generator commissioning and plant retirements.

TNSPs are responsible for procuring assets and services to meet the minimum and efficient level requirements declared in this report from 1 December 2025. Shortfalls against requirements and potential gaps are now formally declared in the NSCAS report[52].

AEMO has also modelled the projected three phase fault level statistics at each node across a three-year period from December 2024 to December 2027. These projections are used to identify system strength shortfalls as part of the 2024 NSCAS report[53], and a summary of findings is presented in Table 62.

Table 62 Summary of new and existing system strength shortfalls

Region	Projected system strength shortfalls
 **New South Wales**	**The previous shortfalls at Newcastle and Sydney West have been deferred until 2027-28**. Sydney West and Newcastle shortfalls are linked with delayed retirement of Eraring Power station. Transgrid is progressing remediation against a full set of New South Wales requirements as part of its broader System Strength Regulatory Investment Test for Transmission (RIT-T) process, and AEMO will continue to work with Transgrid to track the progress of its remediation activities.
 **Queensland**	**AEMO has identified new system strength shortfalls of between 105 MVA and 178 MVA across three nodes in Queensland in 2026-27 and Lilyvale alone in 2027-28.** These shortfalls are primarily linked with decreased energy exports to New South Wales, with more energy available in that region following the delayed retirement of Eraring Power Station. That change has resulted in fewer thermal units expected to be online economically in Queensland, and lower fault levels than previously projected. Powerlink has remediation arrangements in place to address the previous shortfall at Gin Gin node and is progressing a RIT-T to meet system strength requirements across all Queensland nodes.
 **Tasmania**	**AEMO has confirmed ongoing shortfalls at all four nodes in Tasmania**, noting sufficient network support agreements in place until 2 December 2025. TasNetworks is progressing a Regulatory Investment Test for Transmission (RIT-T) to ensure sufficient ongoing support arrangements.
 **South Australia**	**AEMO has not identified any system strength shortfalls in South Australia.**
 **Victoria**	**AEMO has identified a need for system strength services of 368 MVA at Red Cliffs from 2025-26,** primarily linked with the expected end of existing system strength remediation contracts. AEMO Victorian Planning (AVP) is exploring options to extend this arrangement. **Shortfalls are also forecast to emerge against requirements at Moorabool, Hazelwood, and Thomastown from 2027-28,** and AVP is progressing a regional system strength RIT-T.

[52] AEMO, December 2024, https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report

[53] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system_security_planning/2024-nscas-report.

A1. Generator, network and market modelling assumptions

A1.1 Generator assumptions

Committed and anticipated generation projects

The system strength forecasts provided in this report consider existing generators already in service as well as any committed and committed* scheduled and semi scheduled generation projects. These projections for 2024-25 to 2028-29 incorporate projects from the October 2024 NEM Generation Information[54].

The system strength forecasts also consider anticipated projects captured in the October 2024 NEM Generation Information consistent with the references in the paragraph above, as well as any new generation forecast to be built under the market modelling results for the *Step Change* scenario prepared for the 2024 ISP[55].

Appendix A1.3 has more details about how projects have been incorporated in the market modelling results used in this report.

Generation withdrawal and operation

The system strength forecasts in this report are aligned with the generator withdrawals and operation in the *Step Change* scenario of the 2024 ISP[55].

A1.2 Transmission network augmentations

Committed, anticipated and actionable ISP transmission augmentation projects are considered and modelled in the system strength forecasts in this report. Committed and anticipated projects are modelled on time with respect to advised timing in the August 2024 Transmission Augmentation Information page[56]or later advised timing by the TNSP. ISP actionable projects are modelled with timing aligned with 2024 ISP detailed long term (DLT) modelling projections. The DLT was updated form the ISP step change ODP for the purposes of these studies to account for changes in Humelink's project status and the extension of Eraring. AEMO is aware of an announced timing change for the New England REZ Network Infrastructure Project[57]. This is expected to delay renewable investment in that zone compared to the ISP modelling. However, given the resource quality of the zone and a policy commitment to

[54] AEMO. October 2024 NEM Generation Information is available under the Archive section of AEMO's Generation information webpage, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information Criteria for committed and committed* and anticipated are explained in the Background Information tab of the spreadsheet.

[55] At https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp.

[56] AEMO, August 2024, at https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/transmission-augmentation-information.

[57] AEMO, 2024, at https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/transmission-augmentation-information.

its development, AEMO expects that similar levels of system strength will still be required to support the zone, with only the timing of that investment now in question.

A1.3 Market modelling of generator dispatch method

AEMO undertakes integrated energy market modelling to forecast future investment in and operation of electricity generation, storage and transmission in the NEM[58].

Projected generation and storage investment, and dispatch from the *Step Change* scenario results, are drawn from the results in the 2024 ISP, and have been used for system strength forecasts in this report, with some updates to reflect the latest information such as the Eraring extension and Humelink project advancement. These market modelling results:

- Cover the financial years from 2024-25 to 2027-28.
- Are based on the *Step Change* scenario generator, storage and transmission build outcomes for the 2024 ISP[59].
- Include generator dispatch projections from a time-sequential model using the 'bidding behaviour model' for realistic generator dispatch results given the generation and build outcomes. The bidding behaviour model uses historical analysis of actual generator bidding data and back-cast approaches for the purposes of calibrating projected dispatch[60].
- Apply the *Step Change* scenario 50% probability of exceedance (POE) demand projection from the 2023 Electricity Statement of Opportunities (ESOO) for the NEM.
- Apply projections of generation outages based on Monte Carlo simulation.
- Apply projections of planned plant maintenance. Maintenance events are assumed to be distributed throughout the year such that they minimise planned outages at times when it is most required when consumer demand is high, to avoid exacerbating reliability risks.
- Incorporate a range of market modelling iterations for each year of the study period, capturing multiple generator outage patterns. This better captures the variability in generator outage patterns, and hence gives better regard of typical dispatch patterns.

When applying the market modelling results to assess the system strength projections, some post model adjustments were made where necessary based on industry knowledge and known operational practices.

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[58] Information about AEMO's energy market modelling can be found in the 2024 *ISP Methodology*, at https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp/isp-methodology.

[59] At https://aemo.com.au/-/media/files/major-publications/isp/2024/supporting-materials/2024-isp-generation-and-storage-outlook.zip?la=en.

[60] Details for the bidding behaviour model are provided in AEMO's Market Modelling Methodologies report, July 2020, at https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptionsmethodologies/2020/market-modelling-methodology-paper-jul-20.pdf?la=en.

A1.4 Assessment of Minimum Fault Level requirements

Under NER 5.20.C.1, AEMO must determine a minimum three-phase fault level applicable at each system strength node, and any expected changes to this value over a 10-year window. In the planning horizon, AEMO calculates these minimum values based on needing sufficient security services available to cover the full range of typical operating conditions. Operationally, AEMO can further optimise and schedule only those security services which are expected to be needed[61].

The *System Strength Requirements Methodology*[62] sets out the full process by which AEMO calculates the minimum fault levels for each node to apply in the planning horizon. When calculating these values, AEMO generally considers the worst-case minimum requirement observed across three assessment axis:

- The minimum value required to satisfy protection requirements.
- The minimum value required to satisfy voltage step change.
- The minimum value required to ensure system stability under all typical operating conditions and configurations. In other words, the *maximum* observed fault current requirement for stable system operation across a range of tested system conditions[63].

In effect, these minimums represent the levels needed to ensure the system can operate securely under *all* typical operating conditions and configurations. This is different than an instantaneous minimum requirement, which could feasibly be lower under specific system conditions. That is, falling below the minimum requirements in this report doesn't automatically guarantee the system is unstable – but it does indicate that AEMO has identified at least some system conditions under which it would be[64].

This is a reasonable approach when needing to choose a single minimum value against which to assess security planning activities; however, AEMO acknowledges that the operational minimum requirements could be lower under specific system conditions and depending on the distribution of fault current sources at the time. Minimum fault current requirements are more complex than a single number can capture, however planning to a value lower than that published in this report would mean at least some system-normal operating conditions being insecure.

The system strength framework attempts to balance these planning and operational perspectives by seeking that SSSPs make available sufficient services that the minimum planning requirements could be met whenever necessary, but then relaxing this obligation operationally by requiring that AEMO only enable security services when needed to meet an expected operational shortfall.

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[61] AEMO has commenced development of a scheduling/enablement engine for system security contracts intended to go live from 1 December 2025. This will take as input the full set of system security contracts procured by the SSSPs and enable only those necessary to address any expected operational gaps in the zero to 12-hours ahead timeframe. AEMO's full implementation plan for this and the broader Improving Security Frameworks Rule Changes are available online at: https://www.aemo.com.au/initiatives/major-programs/nem-reform-program/nem-reform-program-initiatives/improving-security-frameworks-for-the-energy-transition

[62] At https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/system-strength-requirements/system-strength-requirements-methodology.pdf?la=en

[63] This includes stable operation IBR which fall under the previous system strength framework. Stable operation of IBR which fall under the existing system strength framework are not included in this requirement.

[64] If the minimum is set by the protection requirements, this is unlikely to vary depending on system conditions.

AEMO has historically assessed fault level projections against post-contingent requirements which, following a contingency, ensure the system is in a *satisfactory operating state*. This year's projections have been calculated based on pre-contingent three-phase fault levels and equivalent requirements, representing a *secure operating state*. This approach aligns more closely with the methodology used to calculate the requirements, and shifts both the availability and requirement by a consistent amount (i.e. by the impact of the worst contingency event considered). This does not represent a change to the fundamental system strength requirements themselves.

A2. Translation of minimum fault level requirements to real-time operations

AEMO is required to publish minimum fault level requirements for each system strength node applicable for the following year under NER 5.20C.1. Maintaining the system strength requirements at each node forms part of the general power system principles to operate a secure network as per NER 4.2.6(g).

The minimum fault level requirements translate to real time operations such that if the operational conditions match the planning assumptions studied then these minimum fault levels are expected to be maintained. This may be, if necessary, through the enablement of system strength services under NER 4.4.5(a).

The minimum fault level requirements have been assessed for pre-contingent system normal conditions given a particular set of planning assumptions. The requirements do not account for planned or unplanned outages or other operational conditions outside of an intact system that might occur in the network. Where circumstances outside of the planning assumptions may occur, the minimum fault level requirements may not be maintained even with the enablement of system strength services under NER 4.4.5(a). Under those conditions, AEMO and TNSPs will act on the latest limit advice to keep the power system secure as required under NER 4.3.2(a).

Table 63 lists the pre-contingency minimum fault level requirements for each system strength node as at 1 December 2024.

Table 63 Pre-contingent minimum fault level requirements as at 1 December 2024

Region	System strength node	Minimum fault level requirement (pre-contingency) (MVA)
New South Wales	Armidale 330 kV	3,300
	Buronga 220 kV (from December 2025)	1,755 (from December 2025)
	Darlington Point 330 kV	1,500
	Newcastle 330 kV	8,150
	Sydney West 330 kV	8,450
	Wellington 330 kV	2,900
Queensland	Gin Gin 275 kV	2,800
	Greenbank 275 kV	4,350
	Lilyvale 132 kV	1,400
	Ross 275 kV	1,350
	Western Downs 275 kV	4,000
South Australia	Davenport 275 kV	2,400
	Para 275 kV	2,250
	Robertstown 275 kV	2,550
Tasmanian	Burnie 110 kV	750
	George Town 220 kV	1,450
	Risdon 110 kV	1,330
	Waddamana 220 kV	1,400

Region	System strength node	Minimum fault level requirement (pre-contingency) (MVA)
Victoria	Dederang 220 kV	3,500
	Hazelwood 500 kV	7,700
	Moorabool 220 kV	4,600
	Red Cliffs 220 kV	1,786
	Thomastown 220 kV	4,700

A. These requirements are calculated to ensure system security for the 'worst credible contingency'. Non-credible events like the inability of synchronous generators to ride through a circuit breaker fail event have not been considered. AEMO's view is events like this and the resulting loss of resilience of the system should be taken into consideration by the SSSP when meeting the system strength standard.