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Negotiated Access Standards Guideline

Hunter Central Coast Renewable Energy Zone

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Junayd Hollis

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Introduction

To support the efficient and effective connection of generation within the Hunter Central Coast Renewable Energy Zone (**HCC REZ**), Ausgrid has developed guidelines for Negotiated Access Standards (**NAS**) as part of agreeing Generator Performance Standards (**GPS**) in the connection process. This is to aid proponents in proposing suitable NAS in the event their connection is unable to meet the Automatic Access Standard (**AAS**).

Under the existing Chapter 5 process (5.3.4A), if a Connection Applicant is not able to meet the AAS, they must propose a standard that is as close as practicable to the corresponding AAS, having regard to:

- (1) the need to protect the plant from damage
- (2) power system conditions at the location of the proposed connection, and
- (3) the commercial and technical feasibility of complying with the AAS with respect to the relevant technical requirement.

When proposing an NAS under clause 5.3.4A, the Connection Applicant must provide reasons and evidence as to why the proposed NAS is appropriate.

This guideline is intended to support Connection Applicants in this process, by helping them to identify NAS that Ausgrid and AEMO (as applicable) are more likely to consider appropriate for acceptance. This is intended to facilitate a streamlined approach to GPS negotiations and speed up performance standards agreement and the issuing of the 5.3.4A letter.

The guideline has been developed considering two key factors:

1. The regulatory framework under which the HCC REZ will be delivered (i.e. the absence of an Access Scheme and Access Rights, consistent with the Chapter 5 Process)
2. The AEMO Access Standards Review (2023) and associated Rule Change proposals

All the NAS guidelines proposed in this document remain consistent with the existing access standard negotiating framework. The NAS identified in this guideline sits between the existing Minimum Access Standard (**MAS**) and the AAS. This guideline does not override the 5.3.4A process and Connection Applicants may propose (and justify) performance standards that fall anywhere between the MAS and AAS. Similarly, Ausgrid (and AEMO as applicable) will assess and consider proposed NAS on their individual merits, as related to the specific needs to the power system at the proposed connection point.

Technical Standards and References

A selection of technical references, standards and guidelines that will support proponents through the connection process are listed below in Table 1 and Table 2. This list is not exhaustive, and proponents should seek further information as required.

Table 1: Ausgrid Technical Standards and References

Ausgrid Documentation	
Network Standards and Technical Requirements	
NS 194 Protection Requirements of Embedded Generators > 30kW	NS 194B Guidelines for Rotating machines connected to the Ausgrid Network
NS 195 High Voltage Customer Connections	NS 238 Supply Quality
NS 143 Easements, Leases and Rights of Way	NS 178 Secondary Systems Requirements for Major Substations
Sample protection schematic	ES3 Metering Installation Requirements Part A
Network standards	
Process Information	

Ausgrid Documentation	
Connecting large registered embedded generators	HCC REZ Batch Process – Participation Technical Requirements
HCC REZ Batch Process – Commercial and Contractual Documentation	HCC REZ Negotiated Access Standards Guideline

Table 2: Third Party Technical Standards and References

External Documentation	
AEMO Documentation	
Generator Connection Application Checklist	Generator Performance Standards (GPS) Template
Modelling requirements (website)	Power System Model Guidelines
Guidelines for Assessment of Generator Performance Standards	System Strength Impact Assessment Guidelines (website)
Dynamic Model Acceptance Test Guideline	System Strength Withstand SCR Methodology Review
Power System Stability Guidelines	Access Standards Review
Other References	
National Electricity Rules	AEMO Rule Change Request

Abbreviations

AAS	Automatic Access Standards
AEMO	Australian Energy Market Operator
CWO	Central West Orana
GPS	Generator Performance Standard
HCC REZ	Hunter Central Coast Renewable Energy Zone
HVDC	High Voltage Direct Current
MAS	Minimum Access Standards
NAS	Negotiated Access Standard
NEM	National Electricity Market
NER	National Electricity Rules
RCP	Rule Change Proposal

Development of Negotiated Access Standard Guidelines

The key intent of these guidelines is to create process efficiency by supporting Connection Applicants to identify more appropriate NAS that are more likely to be acceptable to Ausgrid and AEMO.

This intends to simplify the negotiation process and remove subsequent iterations of individual performance standards. Ausgrid intends to avoid situations where GPS studies have already been conducted by a Connection Applicant, but a performance standard must be revised during the 5.3.4A process. This can mean several studies have to be reconducted, resulting in potential project delays and additional costs in modelling and re-negotiation.

The following assumptions have been made when developing the NAS guidelines:

- Proposed standards will not deviate from the current technical standards as prescribed in the NER
- Proposed standards will conform to the current NER performance standards negotiation framework
- Proposed standards will not be below MAS or above AAS.

The two major sources of reference material for consideration in developing Ausgrid's guideline for NAS are:

- the Central West Orana REZ (**CWO REZ**) performance standards, and
- the recommendations made in AEMO's Rule Change Proposal (**RCP**) "AEMO review of technical requirements for connection – National Electricity Rules Schedules 5.2, 5.3 and 5.3a".

The final implementation of the HCC REZ (without an Access Scheme or Access Rights and consistent with the Chapter 5 process) limits the applicability of many of the CWO REZ performance standards. However, their development provided useful information which Ausgrid has considered in developing its guidelines.

It should be noted that guidelines have not been provided for all performance standards. For these standards it was determined that no changes from the established performance standards would benefit the connection process in the HCC REZ.

AEMO Rule Change Proposal

The AEMO Access Standards Review RCP will also be used as the key reference document to identify Negotiated Access Standard Guidelines for HCC REZ.

Under NER clause 5.2.6A, every 5 years AEMO must conduct a review of Schedule 5.2, amongst others, which sets out the technical requirements for connecting generators to the NEM distribution and transmission network. This review is intended for AEMO to assess the potential need for amendment to these technical requirements.

The latest Access Standards Review, conducted in 2023, resulted in several recommendations to amend the performance standards requirements in Schedule 5.2, 5.3, and 5.3a to:

- align standards with best power system performance
- improve power system resilience
- streamline the connections process, and
- accommodate new technology associated with large loads, grid-forming inverters, synchronous condensers, and High Voltage Direct Current (**HVDC**) links.¹

AEMO has submitted two RCPs for Schedule 5.2 and 5.3a recommendations. One of the RCPs relates to the majority of the AEMO Access Standards review recommendations and has been requested to be fast-tracked.

These rule changes have been considered on a clause-by-clause basis by Ausgrid, considering the following:

¹ [AEMO Access Standards Review – Final Report, 2023](#)

- their deviation from the existing MAS and/or AAS (i.e., does it fit within the existing framework)
- the rationale or identified benefit of the change (i.e., does it reflect technology limitations)
- the benefit to Ausgrid and/or Connection Applicants if specific elements in the AEMO RCP were identified as a guideline for the HCC REZ.

Where Ausgrid believes the AEMO RCP for an individual clause falls within the existing MAS and AAS, and it can provide a benefit or overcomes a technology-based limitation, Ausgrid has used the relevant RCP changes to the NER clause as a guideline for its NAS.

Future Guideline Development

Ausgrid will continue to consider and review these guidelines to ensure they continue to remain suitable and applicable for the HCC REZ. Any review or reconsideration is likely to stem from one of the following:

- A clause guideline is found to be generally inconsistent with the system needs of the HCC REZ
- It is identified additional clause guideline(s) would benefit Ausgrid or Connection Applicants
- The implementation of the AEMO RCP (either as proposed or with modifications) that result in changes to the performance standards from which the clause guidelines were developed, or
- Any other changes to the MAS or AAS for a clause (or clauses) results in the guidelines falling outside the allowable negotiating range.

Ausgrid will update these guidelines (based upon the above triggers) as required.

Negotiated Access Standard Guidelines

Where a generating system is not able to meet the AAS, and sufficient justification of this has been provided, the Connection Applicant may propose an NAS. An NAS must be no less onerous than the corresponding MAS.

Agreeing an NAS may be an iterative process requiring collaboration between the Connection Applicant, Ausgrid and AEMO, especially when the proposed GPS wording deviates from standard wording. The process by which Ausgrid negotiates access standards (consistent with 5.3.4A) is described in Appendix A.

As described in section 0, NAS guidelines have been developed for performance standards as relevant. The table below outlines for which performance standards a guideline has been developed. Where an NAS guideline is provided, further elaboration of the individual performance standard and the guidance is provided in the relevant section below.

NER Clause	Technical Requirement	NAS Guideline (Yes/No)	Recommendation	AEMO Advisory Matter (Yes/No)
S5.2.5.1	Reactive Power Capability	Yes	Recommended NAS as per AEMO RCP	Yes
S5.2.5.2	Quality of Electricity Generated	No	As per NER	No
S5.2.5.3	Generating System Response to Frequency Disturbances	No	As per NER	Yes
S5.2.5.4	Generating System Response to Voltage Disturbances	Yes	Recommended NAS as per AEMO RCP	Yes
S5.2.5.5	Generating System Response to Disturbances following Contingency Events	Yes	Recommended NAS as per AEMO RCP	Yes
S5.2.5.6	Quality of Electricity Generated and Continuous Uninterrupted Operation	No	As per NER	No
S5.2.5.7	Partial Load Rejection	Yes	Recommended NAS as per AEMO RCP	Yes
S5.2.5.8	Protection of Generating Systems from Power System Disturbances	No	As per NER	Yes
S5.2.5.9	Protection Systems that Impact on Power System Security	No	As per NER	Yes
S5.2.5.10	Protection to Trip Plant for Unstable Operation	Yes	Recommended NAS as per AEMO RCP	Yes
S5.2.5.11	Frequency Control	No	As per NER	Yes
S5.2.5.12	Impact on Network Capability	No	As per NER	Yes
S5.2.5.13	Voltage and Reactive Power Control	No	As per NER	Yes
S5.2.5.14	Active Power Control	No	As per NER	Yes
S5.2.5.15	Short Circuit Ratio	No	As per NER	Yes
S5.2.5.16	Voltage Phase Angle Shift	No	As per NER	Yes

Certain performance standards are deemed “AEMO advisory matters” and AEMO must also be satisfied with the acceptability of any NAS. It should be noted that all NAS guidelines have been developed based on the AEMO RCP.

S5.2.5.1 Reactive power capability

This clause focuses on the capability of a generating system or integrated resource system to deliver reactive power at its connection point. Supply or absorption of reactive power is essential for maintaining a suitable voltage profile in the power system and helps maintain system security under a range of operating conditions.

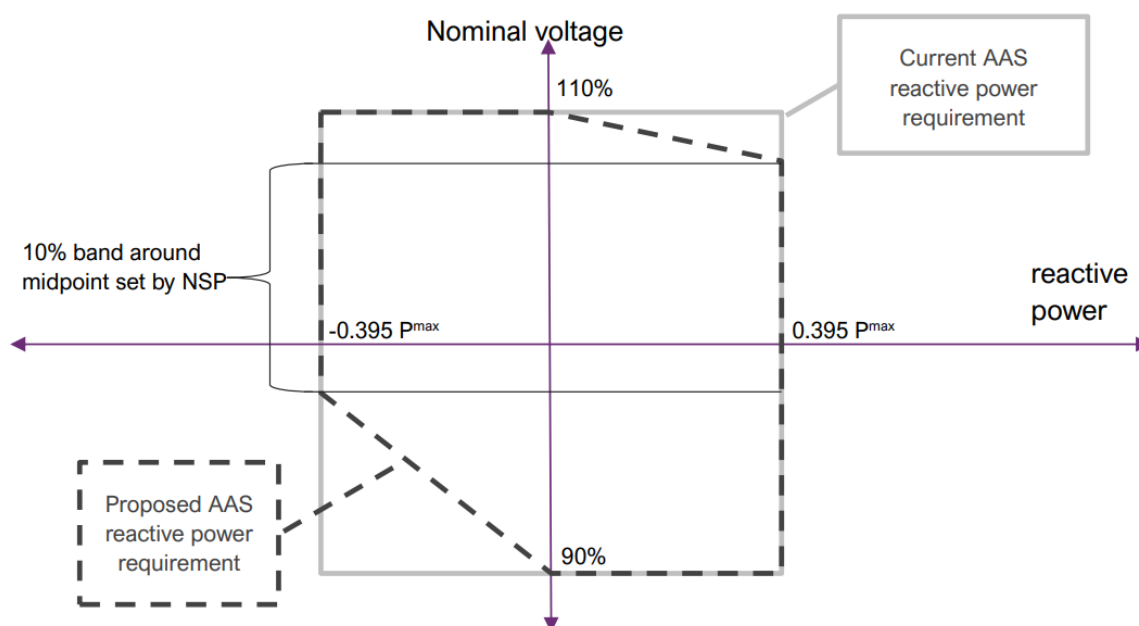
The current AAS requires a generating system or integrated resource system to deliver reactive power at its connection point at a constant rate over the voltage range 90% to 110% of normal voltage at the connection point.

Adding reactive power capability for injection at high voltages and absorption at low voltages is not desirable as it is counter to power system needs, causing already high voltages to increase, and already low voltages to reduce, putting unnecessary stress on the generating system.

Meeting this requirement can add capital costs to the generating system project and, if a lower access standard were to be negotiated, requires additional time and resource to negotiate.

Negotiated Access Standard Guideline: Where a Connection Applicant cannot meet the AAS for this clause, they should consider their ability to meet the AEMO RCP specification as per the figure below. This is further described in 5.1.1 of the [Overview of rule change proposals to improve NEM access standards](#).

Figure 1 Proposed AAS and current voltage range for full reactive power requirement



The remainder of the performance requirements for S5.2.5.1 are per the NER.

S5.2.5.4 Generating system response to voltage disturbances

This clause outlines durations and associated voltage ranges for which generating systems are required to remain in continuous uninterrupted operation (**CUO**) during voltage disturbances.

The current NER does not provide different requirements to recognise the difference between a plant connected at a transmission voltage level and those connected at lower voltages. This can cause difficulties when assessing performance under some sub-transmission connection arrangements.

Negotiated Access Standard Guideline: Where a Connection Applicant cannot meet the AAS for this clause and their connection is at nominal voltage less than 66 kV with no automatic tap-changing transformer between the units and the connection point, consideration should be given to the approach described in 5.4.1 of the [Overview of rule change proposals to improve NEM access standards](#) when proposing an NAS.

Specifically, Connection Applicants should consider an NAS that reflects the voltage disturbance performance if voltage variations are measured at the electrically closest location with a nominal voltage of 66 kV or higher, instead of the connection point. This location must have a nominal voltage higher than the connection point.

The remainder of the performance requirements for S5.2.5.4 are as per the NER.

S5.2.5.5 Generating system response to disturbances following contingency events

This is a complex clause, with multiple sub-clauses looking at different performance metrics under different fault scenarios and conditions. It is not practical to consider the full breadth of scenarios and conditions which may require a Connection Applicant to propose an NAS.

The AEMO Access Standards review conducted a detailed review of this clause and identified numerous challenges and opportunities for improvement throughout the clause. As Ausgrid, AEMO and Connection Applicants must negotiate any NAS within the existing NER, it is proposed a “principles-based approach” is taken to negotiating any NAS for this clause.

Negotiated Access Standard Guideline: Where a Connection Applicant cannot meet the AAS for this clause (or part of this clause), a principles-based approach should be taken to determining any NAS. These principles should reflect the intention of the AEMO RCP for the relevant sub-clause. Connection Applicants must note there may be principles that cannot be fully applied under the existing NER, however the intention should be considered when developing the NAS as much as possible.

This should specifically be considered in relation to changes or clarification related to defined terms, the understanding of MFRT fault sequences, identifying the end of a fault, the impacts on reduced fault levels relative to plant tuning, the measurement and assessment rise and settling times and reactive current injection.

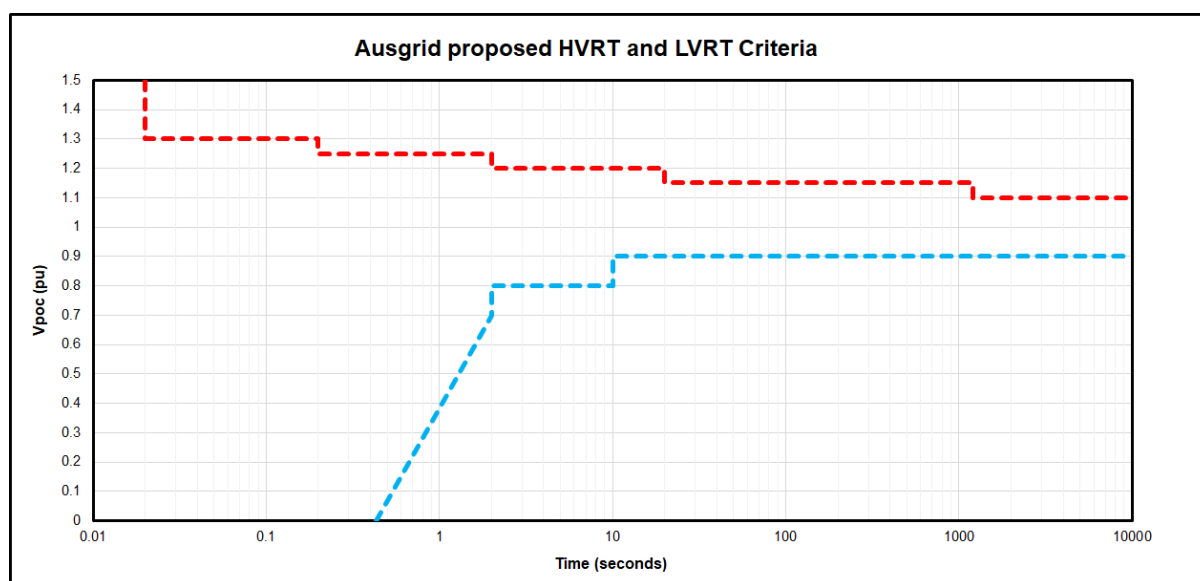
These principles are described in 5.5 of the [Overview of rule change proposals to improve NEM access standards](#).

Additional Guidance: Ausgrid has provided further guidance to support Connection Applicants in meeting clause (c) of S5.2.5.5. This guidance is intended to help Connection Applicants satisfactorily meet the CUO obligations when considering the application of different fault types and depths in a SMIB model and various credible contingencies in the NEM model. To support Connection Applicants achieving this, Ausgrid has developed the following LVRT and HVRT criteria. These criteria build upon the requirements of S5.2.5.4 for voltage ranges below 0.70 p.u. and reflect the system performance of the Ausgrid network, which includes different system impedances and protection clearing times installed in Ausgrid's distribution network. This is shown in Table 3 and Figure 1.

Table 3: S5.2.5.5 LVRT and HVRT Guidance

Connection Point Voltage (Vpoc)	Ride-Through Duration
Vpoc > 130% of normal voltage	0.02 seconds
125% < Vpoc < 130% of normal voltage	0.2 seconds
120% < Vpoc < 125% of normal voltage	2 seconds
115% < Vpoc < 120% of normal voltage	20 seconds
110% < Vpoc < 115% of normal voltage	20 minutes
90% < Vpoc < 110% of normal voltage	Continuously
80% < Vpoc < 90% of normal voltage	10 seconds
70% < Vpoc < 80% of normal voltage	2 seconds
0% < Vpoc < 70% of normal voltage	Linear ramp from 430 ms to 2 seconds
Vpoc = 0% of normal voltage	0.430 seconds

Figure 1: S5.2.5.5 LVRT and HVRT Guidance



S5.2.5.7 Partial load rejection

Under this clause, the requirement to remain in continuous uninterrupted operation (**CUO**) following a load reduction event is currently subject to the loading level remaining above the minimum generation required for continuous stable operation. It has been determined that applying this rule to asynchronous generation and synchronous condensers provides little benefit as, for these plant type, either of Schedule 5.2 obligations are sufficient to specify performance.

The AEMO RCP therefore proposes limiting the application of this clause to synchronous generation. This would reduce the duplication of performance requirements and reduce the compliance assessment burden for asynchronous and synchronous condenser plant.

Negotiated Access Standard Guideline: Where a Connection Applicant connecting either asynchronous plant or synchronous condensers cannot meet the AAS for this clause, any NAS at or exceeding the MAS is likely to be acceptable, as the AEMO RCP intends to remove this obligation for these plant types. This

requirement cannot be completely removed until the implementation of the AEMO RCP, which is described in 5.6.1 of the [Overview of rule change proposals to improve NEM access standards](#).

The remainder of the performance requirements for S5.2.5.7 are as per the NER.

S5.2.5.10 Protection to trip plant for unstable operation

The AAS for this clause requires generating systems to have a protection system that disconnects the plant “promptly” when it is operating unstably. This is intended to protect the network from active power, reactive power and voltage instabilities caused or amplified by a generating system. There are existing challenges with the ability to determine the contribution of a plant to the instability (as opposed to the instability being visible at the connection point). The current NAS provides some flexibility in how and when the instability may be removed but is not specific.

The AEMO RCP aims to target other ways to address the problem by targeting multiple strategies for eliminating instability in preference to tripping the plant.

Negotiated Access Standard Guideline: Where a Connection Applicant is proposing an NAS for this clause, consideration should be given to the principles (hierarchy of actions) described in the AEMO RCP. This is described in 5.8 of the [Overview of rule change proposals to improve NEM access standards](#).

It is noted that the NER allows negotiation for the provision of such additional control system facilities as a commercial arrangement if a Network Service Provider considers that power transfer capabilities of its network would be increased through provision of additional control system facilities to a generating system.

The remainder of the performance requirements for S5.2.5.10 are as per the NER.

Appendix A: Ausgrid process for Negotiated Access Standards

Information Phase	Negotiation process for access standards
Need for a negotiated access standard first identified	<p>a) The connection applicant applies to Ausgrid to negotiate an access standard, or</p> <p>b) Ausgrid determines that a negotiated access standard is required based on the provided information</p>
Initial meeting	<p>Ausgrid will arrange an initial meeting with the Connection Applicant as soon as practical to review and discuss:</p> <ul style="list-style-type: none"> • Contact arrangements. • AEMO involvement in the process. • Negotiation principles, including the need for good faith on both sides and confidentiality requirements. • The negotiation process described in this document. • The specific matters under consideration for the negotiations. • Additional information that Ausgrid may provide and that may assist the Connection Applicant to negotiate on an informed basis. <p>A preliminary negotiation program will also be discussed and determined at this initial meeting. In the case of complex negotiations this schedule may include a series of regular meetings and a set of key milestones.</p>
Information request	<p>In some cases, Ausgrid may require additional information from the Connection Applicant in order to continue with the negotiations on an informed basis. Ausgrid will (if practicable) request this additional information in writing.</p> <p>Note, however, that throughout the negotiations, Ausgrid may reasonably require additional information and there is no limit on the number of information requests it may make.</p>
Information disclosure	<p>Ausgrid provides any remaining information requested by the Connection Applicant as soon as practical.</p> <p>The Connection Applicant also prepares and provides the information requested by Ausgrid as soon as practical.</p> <p>A meeting between Ausgrid and the Connection Applicant may be needed at this stage to review and clarify the information each party has requested and received. Where Ausgrid considers it to be necessary or at the Connection Applicant's request, Ausgrid will arrange such a meeting.</p>
Negotiations commence	<p>Ausgrid will arrange a meeting to further discuss and refine the negotiation program based on the information provided and target date for completion. Negotiation may also commence at this meeting, facilitated by the Ausgrid representative. In straightforward cases, an agreement may be reached at this meeting.</p>
Negotiations	<p>Interactions including meetings and/or discussions proceed in line with the negotiation program. By agreement, Ausgrid will generally record these interactions through meeting minutes and file notes to clearly document the key issues and actions required to reach an effective outcome. Subject to progress, adjustments to the negotiation program may be required.</p>
Negotiations conclude	<p>Agreement is reached for all matters under negotiation allowing a Negotiated Access Standard to be finalised.</p>