



Important notice

Purpose

AEMO has prepared this report in accordance with clause 4.8.15(c) of the National Electricity Rules, using information available as at the date of publication, unless otherwise specified.

Disclaimer

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Contact

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

The NEM operates on Australian Eastern Standard Time (AEST). All times in this report are in AEST.



Abbreviations

Abbreviation	Term
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
CB	Circuit Breaker
kV	Kilovolt
MW	Megawatts
NEM	National Electricity Market
NER	National Electricity Rules
TNSP	Transmission Network Service Provider

Incident review

This reviewable operating incident¹ report is prepared in accordance with clause 4.8.15(c) of the National Electricity Rules (NER). It has been prepared using information provided by ElectraNet² and from AEMO systems.

Table 1 Summary of event

Details	
Reviewable operating incident type	Non-credible contingency event impacting critical transmission elements.
Incident details	This report relates to a reviewable operating incident ³ that occurred on 12 September 2021 in South Australia. The incident was a non-credible contingency involving the simultaneous trip of circuit breakers at Canowie 275 kV substation, resulting in disconnection of Canowie – Robertstown and Canowie – Mount Lock 275 kV lines at one end only. This simultaneous trip also disconnected Hallett substation, Hallett Wind Farm and Hallett Power Station from the system and caused Hornsdale Wind Farm 3 to reduce output by 33 MW.
Incident classification	Protection/control system – protection signalling equipment mal-operation.
Generation impact	121 MW of generation was lost as a result of this incident.
Customer load impact	No load was lost as a result of this incident.
Pre-incident conditions	Prior to the event, the operating condition of the power grid is as follows: <ul style="list-style-type: none"> • Hallett Wind Farm was generating 88 MW, • Hornsdale Wind Farm was generating 304 MW, • Hornsdale Power Reserve was charging at 40 MW load, and • Hallett Power Station was not operating.
Incident key events	<ol style="list-style-type: none"> 1. At 1822 hrs on 12 September 2021, Canowie 275 kV substation's circuit breakers CB 6501 and CB 6502 tripped which resulted in the following: <ul style="list-style-type: none"> – Opening of the Canowie-Mount Lock 275 kV line at the Canowie end only and disconnection of Hallett substation, Hallett Wind Farm and Hallett Power Station (see Figure 1), and – Hornsdale Wind Farm 3 reduced output by 33 MW. 2. At 1826 hrs, CB 6501 at Canowie was manually closed and the Canowie – Mount Lock 275 kV line was returned to service. 3. At 2120 hrs, CB 6502 at Canowie was manually closed. 4. At 2150 hrs, Hallett substation and Hallett Wind Farm returned to service.
Incident cause	<p>Post incident investigation by ElectraNet has confirmed that:</p> <ul style="list-style-type: none"> • The Canowie 275 kV substation had unexpectedly received a Robertstown Set 2 Direct Intertrip Receive signal and Robertstown Islanded Permissive signal. Based on the Robertstown Set 2 Direct Intertrip Receive signal, the protection system at Canowie 275 kV substation operated and opened CB 6501 and CB 6502. This mal operation resulted in the line trips and generation disconnection/reduction described in the incident key events section of this report. • No circuit breakers or protection relays at Robertstown operated. <p>Further investigation of the Canowie – Robertstown protection signalling equipment showed that a transient error was introduced to the telecoms network time synchronisation system during maintenance work on 10 September 2021 at Robertstown substation. This was caused by a human error and caused synchronisation and buffer issues</p>

¹ Reviewable operating incidents are defined by NER clause 4.8.15(a) and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

² ElectraNet is a Transmission Network Service Provider (TNSP) for South Australia.

³ See NER clause 4.8.15(a)(1)(i), as the event relates to a non-credible contingency event; and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

Details	
	in the Robertstown substation's protection signalling equipment. These signalling issues caused a trip of the Canowie 275 kV circuit breakers on 12 September 2021.
Power system response (facilities and services)	<p>In response to the trip of the Canowie – Mount Lock 275 kV line circuit breaker at the Canowie substation, the Hornsdale Wind Farm stage 3 inter-tripping scheme operated. This scheme tripped 11 wind turbines at Hornsdale Wind Farm stage 3, in line with its expected performance. This resulted in a reduction of 33 MW output from Hornsdale 3 Wind Farm.</p> <p>There were no other material impacts on the broader power system, load or generation.</p>
Rectification	On 13 October 2021, ElectraNet adjusted the settings on Robertstown substation protection signalling equipment and cleared the error. ElectraNet reviewed the maintenance procedures used on 10 September 2021 at Robertstown substation and determined that no changes were required to these procedures.
Power system security	The power system remained in a secure operating state throughout this incident and the Frequency Operating Standard ⁴ was met.
Reclassification	<p>AEMO assessed whether to reclassify this incident as a credible contingency event⁵.</p> <p>AEMO identified that the system impact of this incident was similar to having a fault on the Canowie-Robertstown 275 kV line, which is an existing credible contingency event, therefore AEMO correctly identified that reclassification was not required.</p>
Market information	<p>For this incident, AEMO issued the following market notices (all market notices for this incident were issued in accordance with NER requirements):</p> <ul style="list-style-type: none"> • AEMO issued Market Notice 90395 at 1939 hrs on 12 September 2021 to advise of a non-credible contingency event.
Conclusions	<p>AEMO has concluded that:</p> <ol style="list-style-type: none"> 1. The simultaneous trip of the Canowie 275 kV substation circuit breakers was caused by the maloperation of the Canowie – Robertstown protection signalling equipment. This mal operation was caused by a network synchronisation error introduced during maintenance work carried out two days prior to the incident. The trip of these circuit breakers caused the disconnection of Hallett substation, Hallett Wind Farm, Hallett Power Station, and operation of the Hornsdale Wind Farm 3 inter-tripping scheme. 2. AEMO correctly identified there was no requirement to reclassify this incident as a credible contingency. 3. The power system remained in a secure operating state throughout this incident and the Frequency Operating Standard was met. 4. ElectraNet adjusted the settings on the Robertstown substation's protection signalling equipment and cleared the error.

⁴ Please see https://www.aemc.gov.au/sites/default/files/2020-01/Frequency_operating_standard_-_effective_1_January_2020_-_TYPO_corrected_19DEC2019.PDF.

⁵ AEMO is required to assess whether or not to reclassify a non-credible contingency event as a credible contingency event – NER clause 4.2.3A(c) – and to report how the reclassification criteria were applied – NER clause 4.8.15(ca).

Figure 1 Incident diagram after protection signalling equipment mal operation

