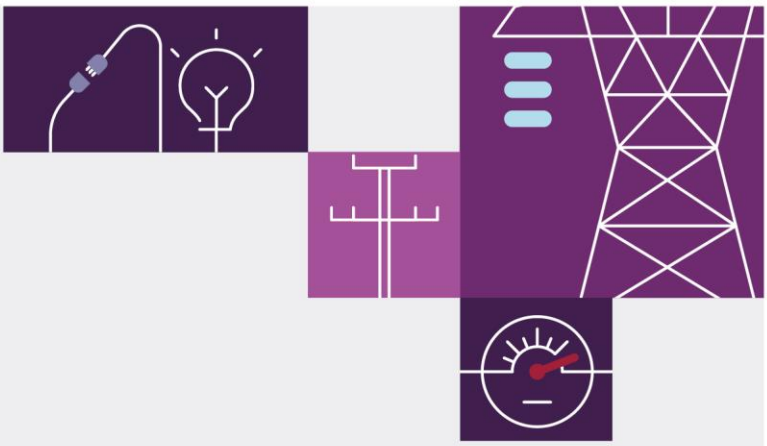
Trip of Woree No. 1 132 kV Busbar and Woree No. 1 275/132 kV Transformer on 26 April 2022

September 2022

Reviewable Operating Incident Report under the National Electricity Rules



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.

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Abbreviations

Abbreviation	Term
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
CB	Circuit breaker
EQL	Energy Queensland Limited
kV	Kilovolt
MW	Megawatts
NEM	National Electricity Market
NER	National Electricity Rules
TNSP	Transmission network service provider

Incident review

This reviewable operating incident[1] 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 Powerlink[2] 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 26 April 2022 in Queensland. The incident involved the trip of the No. 1 132 kilovolts (kV) Busbar and No. 1 275/132 kV Transformer at Woree Substation.
Incident classification	Transmission equipment failure – Insulation breakdown internal to the Woree No. 1 Transformer 132 kV circuit breaker (CB) 4412.
Generation impact	Nil.
Customer load impact	34 megawatts (MW) of customer load was lost at Cairns North associated with this event.
Incident key events	1. At 1629 hrs on 26 April 2022, the Woree No. 1 132 kV Busbar and Woree No. 1 275/132 kV Transformer tripped, disconnecting all lines connected to the Woree No. 1 132 kV Busbar. The trip of the Cairns North to Woree 132 kV No. 2 circuit, associated with the Woree No. 1 132 kV Busbar trip, disconnected 34 MW of load supplied from Energy Queensland Limited's (EQL)'s Cairns North Substation from the system. See Figure 1 for the network status during the event. 2. Following the trip of the Woree No. 1 132 kV Busbar and Woree No. 1 275/132 kV Transformer, the Woree No. 1 Transformer 132 kV CB 4412 was isolated from the Woree No. 1 132 kV Busbar for repair. 3. Approximately 13 minutes later, at 1642 hrs, the load disconnected at Cairns North was restored via the Cairns North to Woree 132 kV No. 1 circuit. 4. At 0147 hrs on 27 April 2022, the Woree No. 1 132 kV Busbar was returned to service. 5. At 1812 hrs on 21 May 2022, the Woree No. 1 Transformer 132 kV CB 4412 and No. 1 275/132 kV Transformer at Woree Substation were returned to service.
Incident cause	Post incident investigation by Powerlink has confirmed – • On 26 April 2022 at Woree Substation, an internal single phase to earth fault occurred within Woree No. 1 Transformer 132 kV CB 4412 (see Figure 1). The cause of the fault was assessed and determined to be an insulation breakdown internal to the CB pole. • The occurrence of a high voltage single phase to earth fault associated with the Woree No. 1 Transformer 132 kV CB 4412 resulted in the operation of a Bus zone protection and Transformer protection. The Bus zone protection and Transformer protection operated as expected and the Woree No. 1 132 kV Busbar and Woree No. 1 275/132 kV Transformer tripped accordingly. Upon receipt of the trip signals, all relevant CBs operated and opened successfully, and the identified fault was cleared in less than 72 milliseconds. • As expected for the Busbar protection operation, the Cairns North to Woree 132 kV No. 2 circuit tripped, disconnecting 34 MW of load supplied from EQL's Cairns North Substation.
Power system response (facilities and services)	There were no other material impacts on the broader power system, load or generation.

[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] Participant is a Transmission Network Service Provider (TNSP) for Woree Substation.

[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
Rectification	Following the trip of the Woree No. 1 Busbar on 26 April 2022, Powerlink isolated the Woree No. 1 Transformer 132 kV CB 4412 from the Woree 132 kV Busbar to undergo repair and returned the Busbar to service. The CB faulty phase pole was removed from CB 4412 and a replacement pole was installed. Powerlink completed tests on CB 4412 after the repair process to ensure it was ready for service. Following successful completion of testing, CB 4412 was reconnected to the Woree No. 1 132 kV Busbar and the No. 1 275/132 kV Transformer was returned to service on 21 May 2022. Powerlink advised it does not consider the CB insulation breakdown fault experienced during this incident to be a systemic issue.
Power system security	The power system remained in a secure operating state throughout this incident. The Frequency Operating Standard[4] was met for this incident.
Reclassification	AEMO assessed whether to reclassify this incident as a credible contingency event[5]. The cause of this incident was identified and isolated by Powerlink prior to the return to service of Woree No. 1 132 kV Busbar. Therefore, AEMO correctly identified reclassification was not required.
Market information	For this incident, AEMO issued the following market notices (all market notices for this incident were issued in accordance with NER requirements): • AEMO issued Market Notice 95955 at 0451 hrs on 26 April 2022 – Advise of a non-credible contingency event involving the trip of Woree No. 1 132 kV Busbar and disconnection of 34 MW of bulk electrical load. • AEMO issued Market Notice 95956 at 0159 hrs on 27 April 2022 – Update on the advice of non-credible contingency event. The cause of this non-credible contingency event has been identified and AEMO is satisfied that another occurrence of this event is unlikely under the current circumstances.
Conclusions	AEMO has concluded that: 1. The Woree No. 1 132 kV Busbar and Woree No. 1 275/132 kV Transformer tripped due to the operation of Busbar and Transformer protection. This protection operated in response to a single phase to earth fault on the Woree No. 1 Transformer 132 kV CB 4412. Associated with this event, 34 MW of load was shed at Cairns North Substation. 2. Powerlink has successfully replaced the faulty phase pole in the Woree No. 1 Transformer 132 kV CB 4412 and returned Woree No. 1 132 kV Busbar and Woree No. 1 275/132 kV Transformer back to service. 3. AEMO correctly identified there was no requirement to reclassify this incident as a credible contingency. 4. The power system remained in a secure operating state and the Frequency Operating Standard was met for this incident.

[4] Frequency Operating Standard, effective 1 January 2020, available at https://www.aemc.gov.au/media/87484.

[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).

The diagram below provides an overview of the affected parts of the power system immediately after the incident.

Figure 1 Incident diagram