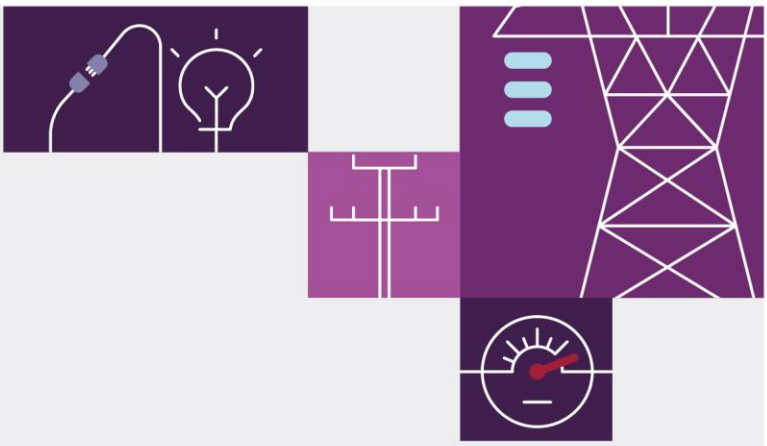
Trip of Terang Terminal Station No. 2 220 kV Busbar on 10 May 2022

October 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
BBTS	Berrybank terminal station
CB	circuit breaker
CBF	circuit breaker fail
CBM	circuit breaker management
GFT	generator fast trip
kV	kilovolt
MLTS	Moorabool terminal station
MSWF	Mortlake South wind farm
MW	megawatts
NEM	National Electricity Market
NER	National Electricity Rules
NSP	network service provider
SCADA	supervisory control and data acquisition
TGTS	Terang terminal station
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 AusNet Transmission Group Pty Ltd[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 10 May 2022 in Victoria. This incident involved the trip of the Terang No. 2 220 kilovolts (kV) busbar.
Incident classification	Other causes – human error – insufficient isolations established for secondary testing work.
Generation impact	Nil
Customer load impact	Nil
Pre-incident conditions	An AusNet delivery partner was working on the Mortlake South Wind Farm (MSWF) circuit breaker management (CBM) relay at Terang Terminal Station (TGTS) on 10 May 2022. The work included testing newly added Supervisory Control and Data Acquisition (SCADA) points in the relay related to the Generator Fast Trip (GFT) A and B schemes[4]. Shortly before the incident, the testing staff had implemented secondary isolations on the MSWF CBM protection panel to allow testing of the new SCADA points. Figure 1 shows the configuration at TGTS immediately prior to the incident.
Incident key events	1. At 1355 hrs on 10 May 2022, during testing of the MSWF GFT circuit breaker fail (CBF) protection, the TGTS No. 2 220 kV busbar unexpectedly tripped (see Figure 2). 2. At 1418 hrs on 10 May 2022, the TGTS No. 2 220 kV busbar was returned to service.
Incident cause	Post incident investigation by AusNet has confirmed: • The MSWF Line X protection relay is designed to issue a CBF trip signal (after a timed delay) to the TGTS No. 2 220 kV bus protection to trip the TGTS No. 2 220 kV busbar if it receives both “differential communications fail”, and “CB closed” status signals. • Isolations implemented to allow the planned SCADA alarm testing were insufficient. Because of this, a simulated “CB closed” status was sent to the MSWF Line X protection relay during testing of the SCADA points. • The MSWF Line X protection relay was in service at TGTS but the MSWF line itself had not been commissioned at the time of the incident. Therefore, the MSWF protection relay had a status of “differential communications fail”. This, in combination with the simulated “CB closed” status from the CBM relay, caused the MSWF Line X protection relay to issue a CBF trip signal to the TGTS No. 2 220 kV bus protection to trip the busbar. • The root cause of the incident has been identified as human error – the testing team did not isolate the “CB closed” status output from the CBM relay to the protection relay to avoid sending a CBF trip signal to the TGTS No. 2 220 kV bus protection relay.
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] AusNet Transmission Group Pty Ltd is a transmission network service provider (TNSP) for Victoria.

[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.

[4] This is sometimes referred to as Wind Farm Fast Trip. This scheme is implemented to trip the MSWF when it is isolated from the 220 kV network at TGTS.

	Details
Rectification	The MSWF CBF trip signal to the No. 2 220 kV bus protection was isolated to prevent further inadvertent trips before the MSWF line is fully commissioned.
Power system security	The power system remained in a secure operating state throughout this incident and the Frequency Operating Standard[5] was met.
Reclassification	AEMO assessed whether to reclassify this incident as a credible contingency event[6]. The cause of this incident was identified and rectified by AusNet prior to returning the busbar to service and AEMO was satisfied that another occurrence of this event was unlikely under the current circumstances. Therefore, AEMO correctly identified that reclassification was not required.
Market information	AEMO issued Market Notice 96237 at 1440 hrs on 10 May 2022 (approximately 45 minutes after the incident) – advice of the non-credible contingency event (this market notice was issued in accordance with NER requirements).
Conclusions	AEMO has concluded that: 1. During the testing of SCADA alarms, the MSWF Line X protection relay sent a CBF trip signal to the TGTS No. 2 220 kV bus protection to trip the busbar. 2. Based on information provided by AusNet at the time of the incident, AEMO was satisfied that the reason had been identified and a reoccurrence of this incident was unlikely, therefore the incident was correctly not reclassified as a credible contingency. 3. The power system remained in a secure operating state throughout this incident. 4. The root cause of the incident has been identified as human error – the testing team did not isolate the "CB closed" status output from the CBM relay to avoid it sending a simulated "CB closed" status signal to the line protection relay. 5. Following the event, AusNet isolated the MSWF CBF trip signal to the No. 2 220 kV bus protection to prevent further trips until the MSWF line is commissioned.
Recommendations	1. AEMO recommends that network service providers (NSPs) review working practices and procedures to ensure they include a cross check of all available sources to identify the sources of tripping (for example, site drawings, databases, and as built diagrams) prior to commencing work and performing necessary isolations. 2. AEMO plans to share the findings from this event (and other similar events involving human error) at the Power System Security Working Group by Q1 2023.

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

[6] 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 Pre-incident diagram – Terang Terminal Station

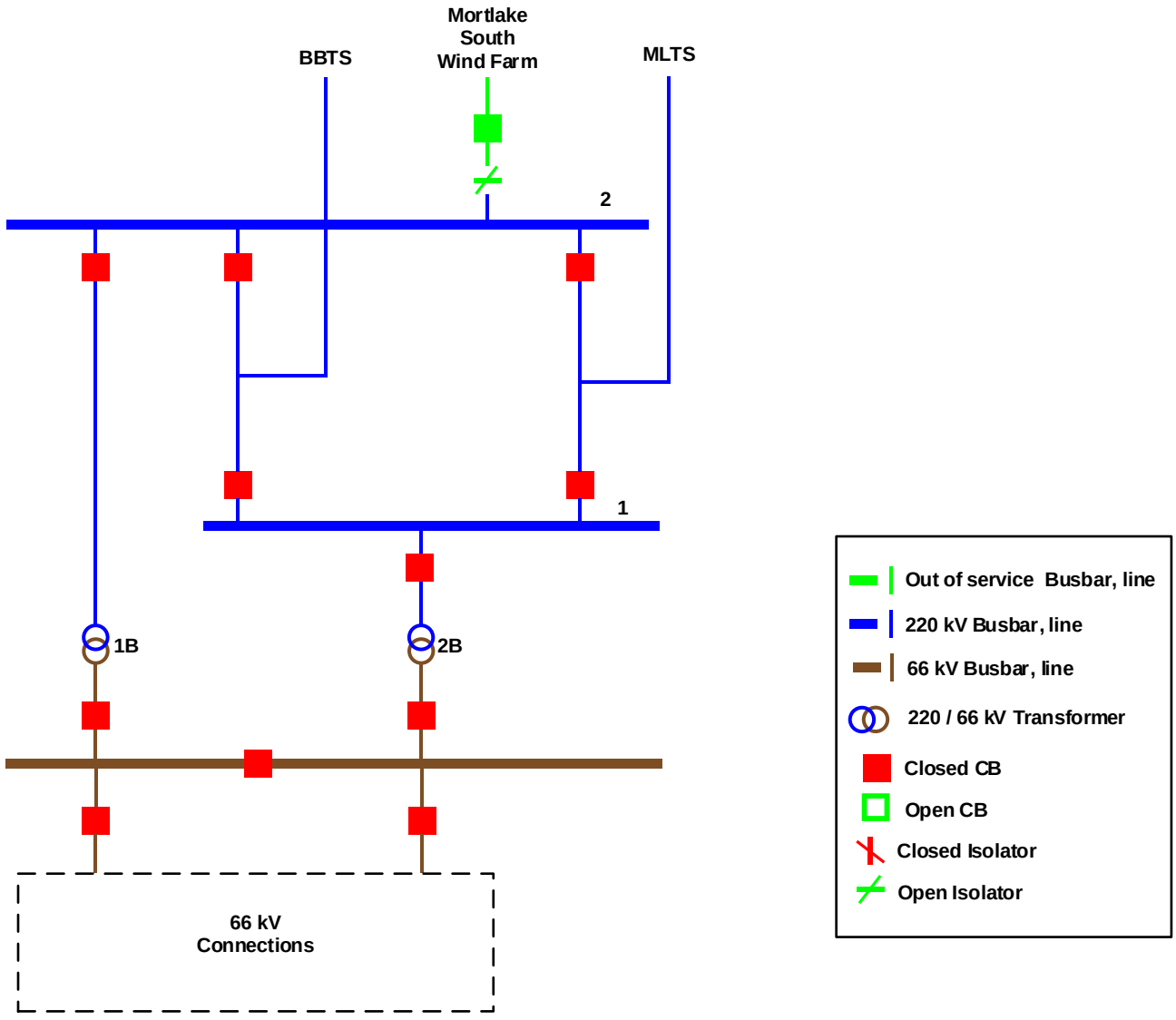

Figure 2 Post-incident diagram – Terang Terminal Station