AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Trip and reclose Munmorah – Tuggerah 2M and Munmorah – Sydney West 26 330 kV lines on 9 January 2020

June 2020

Reviewable Operating Incident Report under the National Electricity Rules

INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of incident	2348 hrs on 9 January 2020
Region of incident	New South Wales
Affected regions	New South Wales
Event type	Protection mal-operation
Generation Impact	No generating unit was disconnected or had its output limited as a result of this incident
Customer Load Impact	No customer load was disconnected as a result of this incident
Associated reports	Nil

ABBREVIATIONS

Abbreviation	Term
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
kV	Kilovolt
NER	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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1. Overview

This report relates to a reviewable operating incident[1] that occurred on 9 January 2020 in New South Wales. The incident involved the Trip of the Munmorah – Tuggerah (2M) 330 kV line and Munmorah – Sydney West (26) 330 kV line at the Sydney West end only.

No generation or customer load was lost as a result of this incident.

As this was a reviewable operating incident, AEMO is required to assess the adequacy of the provision and response of facilities and services and the appropriateness of actions taken to restore or maintain power system security[2].

AEMO has concluded that:

1. The trip of the 2M line was due to a fault caused by a bushfire, and all protection systems operated as designed and as expected to clear the fault.
2. The trip of the 26 line at Sydney West was due to a protection system setting error. TransGrid identified and corrected the protection system settings.
3. AEMO correctly reclassified the simultaneous trip of the 2M and 26 transmission lines as a credible contingency from 0020 hrs on 10 January 2020.
4. The power system remained in a secure operating state throughout this incident.

This report is prepared in accordance with clause 4.8.15(c) of the National Electricity Rules (NER). It is based on information provided by TransGrid[3] and AEMO.

National Electricity Market time (Australian Eastern Standard Time [AEST]) is used in this report. At the time of this incident, local time in New South Wales was AEST plus one hour.

2. The incident

2.1 The incident

At 2348 hrs on 9 January 2020, the 2M line tripped at both ends and successfully auto-reclosed 15 seconds later. At the same time, the 26 line tripped at the Sydney West end only, and then successfully auto-reclosed 17 seconds later.

2.2 TransGrid investigation

The following is based on information provided by TransGrid.

2.2.1 Trip of 2M line

At 2348 hrs on 9 January 2020, the 2M line tripped due to a blue phase to earth fault shown by TransGrid's fault recording system at Tuggerah.

[1] 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.

[2] See NER clause 4.8.15(b).

[3] TransGrid is the Transmission Network Service Provider (TNSP) for New South Wales.

Both No. 1 and No. 2 protections of the 2M line detected the earth fault and operated correctly and as expected to clear the fault within the timeframes specified in the NER[4].

TransGrid advised that there were several bushfires around the state and confirmed that a fire was burning under the 2M transmission line at the time of the incident.

Approximately 15 seconds after the 2M line tripped, it auto-reclosed successfully.

2.2.2 Trip of 26 line at Sydney West

Coincident with the trip of the 2M line, the 26 line tripped at the Sydney West end only. The 26 line is geographically remote from the 2M line. This was not an expected outcome for the fault on the 2M line.

At Sydney West, the protection flagging from the No. 1 Protection relay showed that it received an intertrip signal from Munmorah and tripped on accelerated Zone 2 protection.

The 26 Line No. 1 Protection Scheme is a Permissive Overreach Scheme. The fault on 2M line was within Zone 2 of the protection system on 26 line at Sydney West. However, the protection system on 2M line should clear the fault before Zone 2 protection on 26 line times out, unless an intertrip is received from the Munmorah end. As both the Zone 2 fault and the intertrip signal from Munmorah were present, the 26 line No. 1 Protection operated at Sydney West. Although this operation was as per design, it was not an expected outcome for a fault on 2M line.

Investigation of the 26 Line No. 1 protection relay at Munmorah by TransGrid revealed that an incorrect setting was because of human error and had been applied during a replacement of the relay in July 2019. The incorrect settings resulted in the initiation of an intertrip signal for a fault on 2M line in the reverse direction, instead of for a fault on 26 line and operating in the forward direction.

At approximately 2000 hrs on 10 January 2020, TransGrid confirmed that The Munmorah 26 Line No. 1 protection relay settings had been appropriately corrected by TransGrid Construction team, and the protection returned to service. TransGrid also confirmed that there was no evidence of the same error being made elsewhere in the power system.

3. Power system security

AEMO is responsible for power system security in the National Electricity Market (NEM). This means AEMO is required to operate the power system in a secure operating state to the extent practicable and take all reasonable actions to return the power system to a secure state following a contingency event in accordance with the NER[5].

The power system was in a secure operating state throughout this incident. As both the 2M and 26 lines returned to service within 17 seconds, no action was required by AEMO to restore or maintain power system security.

3.1 Reclassification

AEMO assessed whether or not to reclassify this incident as a credible contingency event[6].

As TransGrid could not determine the cause(s) of the incident, AEMO determined that a simultaneous trip of the 2M and 26 lines was likely to reoccur and correctly reclassified the simultaneous loss of the 2M and 26

[4] NER clause S5.1a.8.

[5] Refer to AEMO's functions in section 49 of the National Electricity Law and the power system security principles in clause 4.2.6 of the NER.

[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).

transmission lines as a credible contingency from 0020 hrs on 10 January 2020. This reclassification was cancelled at 2010 hrs on the same day, after TransGrid advised AEMO that the Munmorah 26 Line No. 1 protection relay settings were corrected, and the non-credible contingency was unlikely to reoccur.

4. Market information

AEMO is required by the NER and operating procedures to inform the market about incidents as they progress. This section assesses how AEMO informed the market[7] over the course of this incident.

For this incident, AEMO informed the market on the following matters:

1. A non-credible contingency event – notify within two hours of the event[8].
   - AEMO issued Market Notice 72435 at 0016 hrs on 10 January 2020, 28 minutes after the event, to advise of the non-credible contingency event.
2. Reclassification, details, and cancellation of a non-credible contingency – notify as soon as practical[9].
   - AEMO issued Market Notice 72436 at 0020 hrs on 10 January 2020 to advise that the simultaneous trip of the 2M and 26 lines had been reclassified as a credible contingency.
   - AEMO issued Market Notice 72453 at 2010 hrs on 10 January 2020 to advise that the reclassification of the 2M and 26 lines had been cancelled, because the cause had been identified and a reoccurrence of the incident was unlikely.

5. Conclusions

AEMO has assessed this incident in accordance with clause 4.8.15(b) of the NER. In particular, AEMO has assessed the adequacy of the provision and response of facilities or services, and the appropriateness of actions taken to restore or maintain power system security.

AEMO has concluded that:

1. The trip of the 2M line was due to a fault caused by a bushfire, and all protection systems operated as designed and as expected to clear the fault.
2. The trip of the 26 line at Sydney West was due to a protection system setting error. TransGrid identified and corrected the protection system settings.
3. AEMO correctly reclassified the simultaneous trip of the 2M and 26 transmission lines as a credible contingency from 0020 hrs on 10 January 2020.
4. The power system remained in a secure operating state throughout this incident.

[7] AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see https://www.aemo.com.au/Market-Notices.

[8] AEMO is required to notify the Market of a non-credible contingency event within two hours of the event – AEMO, Power System Security Guidelines, Section 10.3, available at https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3715---Power-System-Security-Guidelines.pdf.

[9] AEMO is required to notify the market of a reclassification – NER clause 4.2.3(g), details of the reclassification – 4.2.3(c), and when AEMO cancels the reclassification – 4.2.3(h).