POWER SYSTEM OPERATING INCIDENT REPORT – SIMULTANEOUS TRIP OF ERARING – VALES POINT 330KV 24 LINE AND TOMAGO POTLINE 3, 4 OCTOBER 2012.

PREPARED BY: System Performance & Commercial

DATE: 10 December 2012

FINAL

Disclaimer

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Abbreviations and Symbols

Abbreviation	Term
CB	Circuit Breaker
EMMS	Electricity Market Management System
EMS	Energy Management System
kV	Kilovolt
MW	Megawatt
UFLS	Under-Frequency Load Shedding

Incident summary

Date and time of incident	1215 hours, 4 October 2012.
Region of incident	New South Wales.
Affected regions	New South Wales.
Event type	TL: Loss of transmission elements and load interruption.
Primary cause	PTN & CTR: Protection and Control.
Impact	VS – Very Significant.
Associated reports	NIL.

1 Introduction

At 1215 hours on 4 October 2012, the Eraring – Vales Point 330 kV 24 transmission line tripped and automatically reclosed. Immediately following the line trip, Tomago potline 3 tripped from approximately 300 MW.

This report has been prepared under clause 4.8.15 (c) of the National Electricity Rules (NER) 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.

This report is largely based upon information provided by TransGrid, Tomago Aluminium and Macquarie Generation. Data from AEMO's Energy Management System (EMS) and Electricity Market Management System (EMMS) has also been used in analysing the incident.

All references to time in this report are to National Electricity Market time (Australian Eastern Standard Time).

2 Pre-contingent system conditions

The status of the power system prior to the incident is shown in Figure 1. For clarity only equipment relevant to this incident has been included in the diagram.

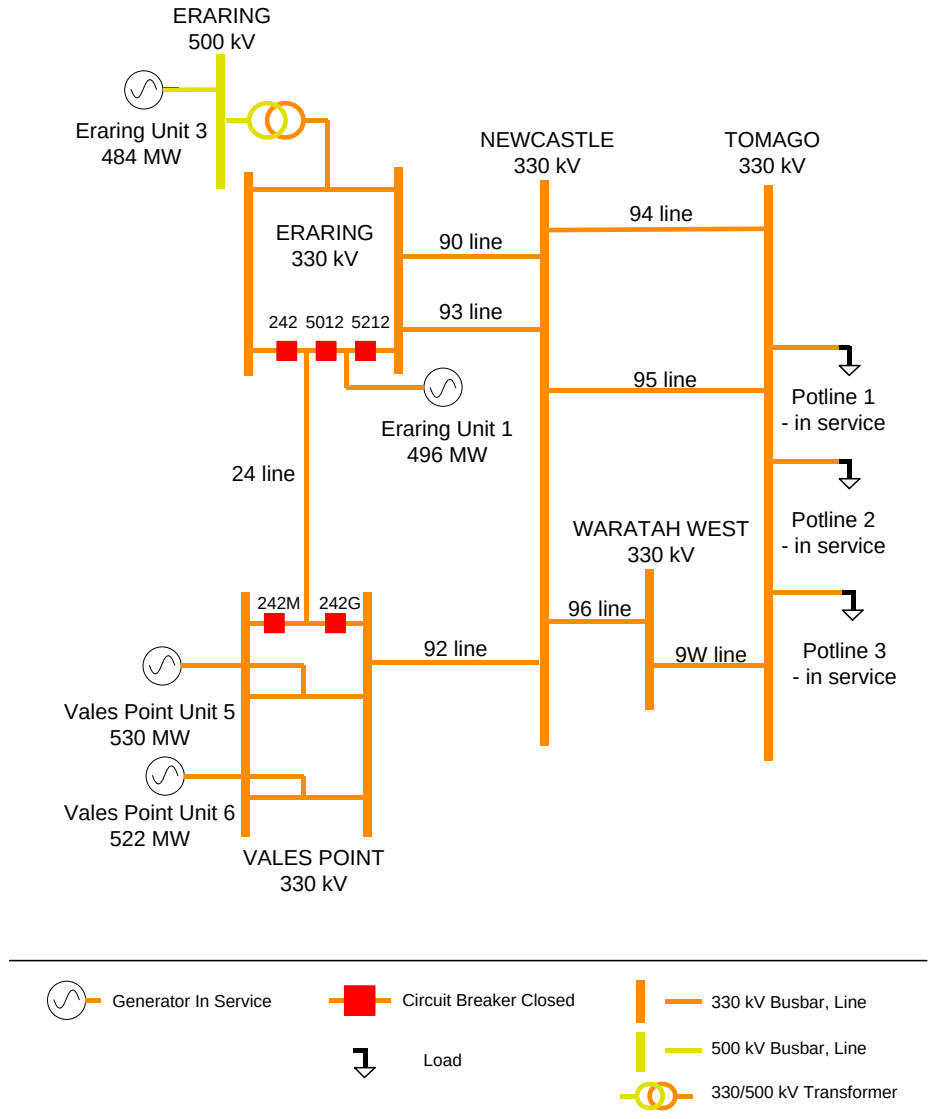

Figure 1 - Status of the power system prior to the incident, 1210 hours 4 October 2012.

3 Summary of events

At 1215 hours on 4 October 2012, the Eraring – Vales Point 330 kV 24 transmission line tripped and automatically reclosed. The trip was due to a red phase fault to ground, associated with a bushfire in proximity to the line. Protection operated to trip the line approximately 80ms after the initial fault. Approximately 100 ms after this, protection associated with Tomago potline 3 operated to disconnect the potline from the power system.

Table 1: Summary of events:

Time	Events
04/10/2012 12:15 hours	Red phase to ground fault on Eraring – Vales Point 330kV 24 line due to bushfire in proximity to line.
04/10/2012 12:15 hours	CBs 242G and 242M at Vales Point 330 kV substation, and CBs 242 and 5012 at Eraring 330 kV substation tripped, removing Eraring – Vales Point 330kV 24 line from service.
04/10/2012 12:15 hours	Tomago potline 3 trips from approximately 300 MW.
04/10/2012 12:15 hours	CB 242G at Vales Point 330 kV substation, and CBs 242 and 5012 at Eraring 330 kV substation automatically reclose, returning Eraring – Vales Point 330kV 24 line to service.
04/10/2012 12:20 hours	After failing to automatically reclose, CB 242M at Vales Point 330 kV substation is closed manually.
04/10/2012 12:45 hours	Tomago potline 3 returns to service.
04/10/2012 12:47 hours	AEMO issued Market notice No 39929 advising the market of the non-credible contingency event.
04/10/2012 13:00 hours	Eraring – Vales Point 330kV 24 line trips and successfully recloses.
04/10/2012 13:02 hours	Eraring – Vales Point 330kV 24 line trips and successfully recloses.
04/10/2012 13:05 hours	Eraring – Vales Point 330kV 24 line trips and successfully recloses.
04/10/2012 13:05 hours	Decision to switch off the auto reclose function Eraring – Vales Point 330kV 24 line.
04/10/2012 13:16 hours	Eraring – Vales Point 330kV 24 line trips to lockout.
04/10/2012 15:24 hours	TransGrid advised AEMO that it considered the threat of the bushfire to have subsided and the Eraring – Vales Point 330kV 24 line is returned to service with the auto reclose function also in service.

The status of the power system immediately after the incident is shown in Figure 2.

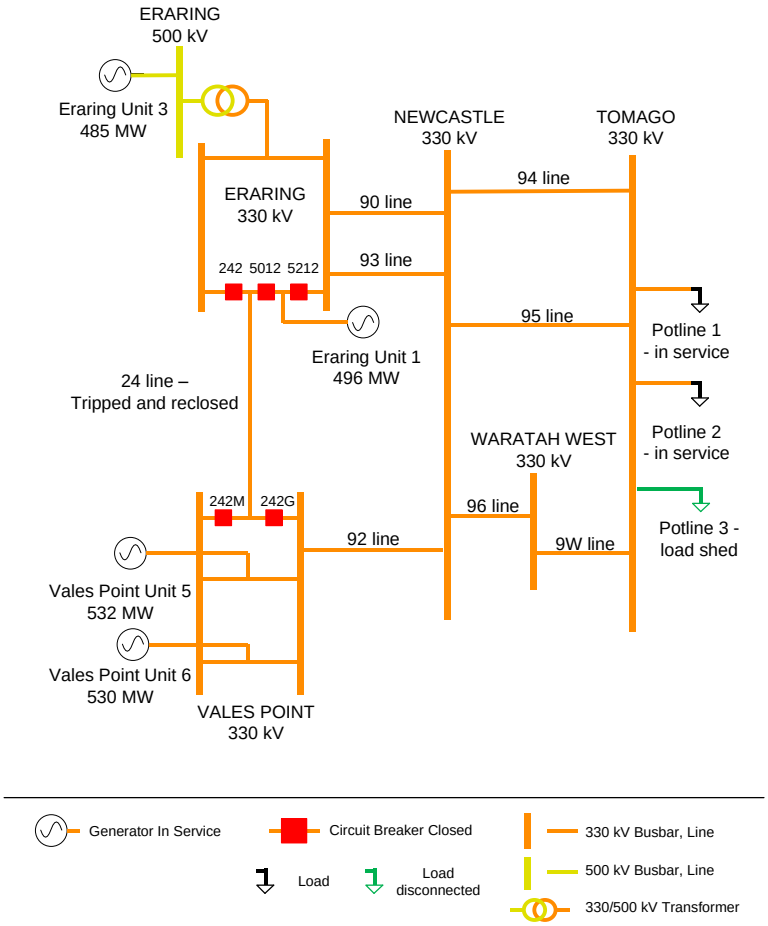

Figure 2 - Status of the power system after the incident, 1220 hours 4 October 2012.

4 Immediate Actions Taken

At 1245 hours Tomago potline 3 was returned to service. At 1247 hours AEMO issued Market Notice 39929, advising participants that a non-credible contingency occurred, and that AEMO had re-classified the simultaneous trip of Eraring – Vales Point 330 kV 24 line and Tomago potline 3 as a credible contingency.

Eraring – Vales Point 330 kV 24 line tripped and automatically reclosed at 1300, 1302 and 1305 hours. Following the trip at 1305 hours, TransGrid disabled the automatic reclose function for Eraring – Vales Point 330 kV 24 line. After a further trip at 1316 hours, Eraring – Vales Point 330 kV 24 line remained out of service. With the line remaining out of service, AEMO invoked constraint set N-ERVP_24 at 1320 hours.

At 1524 hours, TransGrid considered the bushfire to have subsided and returned Eraring – Vales Point 330 kV 24 line to service. AEMO revoked constraint set N-ERVP_24 at 1530 hours.

5 Follow-up Actions

Tomago Aluminium subsequently investigated the cause of the trip of potline 3. The cause was determined to be the operation of the Tomago Under-Frequency Load Shedding (UFLS) scheme. The scheme trips a selected potline at a relay set-point of 49.0 Hz after a time delay of 150 ms. Mainland frequency did not drop as low as 49.0 Hz during the event. No other Mainland loads with similar UFLS settings tripped during the event. This demonstrates incorrect operation of the Tomago UFLS scheme.

The Tomago UFLS scheme was last calibrated on 24 January 2012. Further investigation and review found that frequency disturbances both prior and post this event did not result in the operation of the Tomago UFLS scheme. In conclusion there is insufficient data available to demonstrate any persistent fault in the Tomago UFLS scheme. Nevertheless AEMO has requested that the UFLS scheme owner Macquarie Generation carry out further work to verify that it is working correctly.

6 Power System Security Assessment

Eraring – Vales Point 330 kV 24 line protection operated within approximately 80 ms after the initial fault. The power system remained in a secure operating state throughout the event. The provision and response of facilities were adequate to maintain power system security.

7 Conclusions

At 1215 hours, 4 October 2012, Eraring – Vales Point 330 kV 24 line tripped as a result of a fault associated with a bushfire in proximity to the line. Tomago potline 3 tripped as a result of incorrect operation of the Tomago UFLS scheme.

AEMO correctly applied the criteria published in section 12 of its Power System Security Guidelines in assessing that the circumstances of this incident warranted reclassifying similar incidents as a credible contingency event.

8 Recommendations

It is recommended that Macquarie Generation carry out work to recalibrate all plant associated with the Tomago UFLS scheme, and provide test results from the calibration to Tomago Aluminium. This shall be completed before 31 January 2013.

After Macquarie Generation has carried out this work, AEMO will review the reclassification of the non-credible contingency declared in Market Notice 39929.