

POWER SYSTEM OPERATING INCIDENT REPORT – TRIP OF WALLERAWANG UNIT 7 AND WALLERAWANG – ORANGE NORTH 132 KV LINE ON 2 JULY 2012

PREPARED BY: Systems Capability

DATE: 16 October 2012

FINAL

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Abbreviations and Symbols

Abbreviation	Term
AER	Australian Energy Regulator
CB	Circuit Breaker
MW	Megawatt
NER	National Electricity Rules

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1 Introduction

At 1606 hrs Monday 2 July 2012, the 944 Wallerawang – Orange North 132kV line and Wallerawang Unit 7 in New South Wales tripped. The Wallerawang – Orange North line tripped due to a fault on the line, whilst Wallerawang Unit 7 tripped due to the incorrect operation of the generator transformer No. 7 (T7) restricted earth fault protection. The suspected faulty protection equipment was isolated and Wallerawang Unit 7 was returned to service at 2227 hrs Monday 2 July. The Wallerawang – Orange North line was returned to service at 1830 hrs Tuesday 3 July. The problem with the restricted earth fault protection wiring was corrected on the 27 July 2012. No load was interrupted as a result of this event.

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.

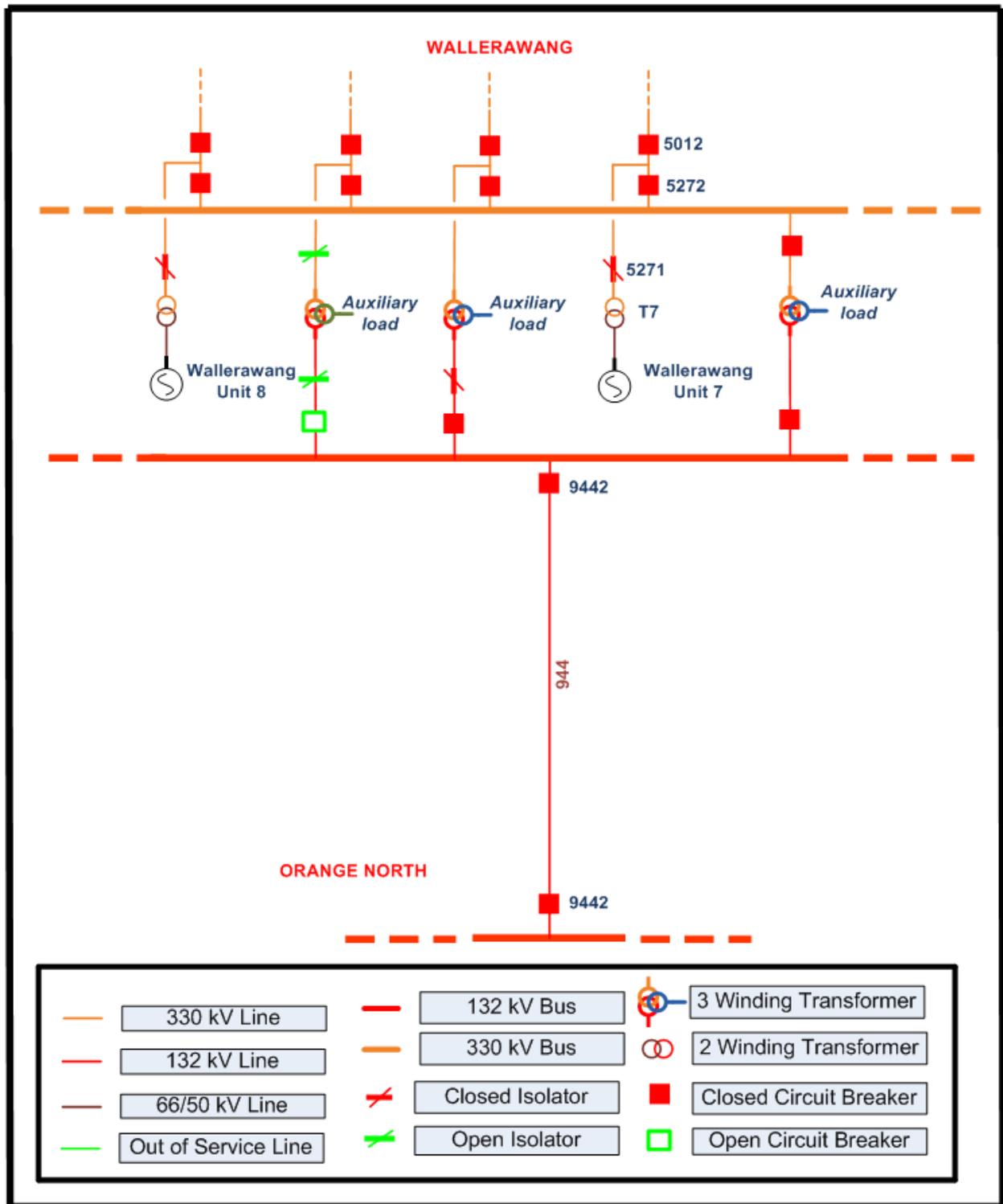
This report is largely based upon information provided by TransGrid, TRUenergy Pty Ltd and Delta Electricity / West. Data from AEMO's Energy Management System (EMS) has also been used in analysing the incident.

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. Wallerawang Unit 7 was generating approximately 472 MW at the time of the incident.

Figure 1 - Status of the power system prior to the incident



3 Summary of Events

At 1606 hrs Monday 2 July 2012 a fault occurred on the 944 Wallerawang – Orange North 132kV line. The fault was cleared by circuit breakers (CB's) 9442 at Orange North and Wallerawang. From the Orange North protection system data, the fault location is estimated to have been approximately 78 km from Orange North. An auto-reclose attempt was unsuccessful and the Wallerawang – Orange North line remained de-energised.

Coincident with the fault on the Wallerawang – Orange North line the Wallerawang Unit 7 generator transformer restricted earth fault protection operated to trip Wallerawang Unit 7 from approximately 472 MW (CB's 5272 and 5012 opened). Refer to Figure 2 for the status of the power system immediately after the incident. No load was interrupted as a result of this incident.

Following the Wallerawang Unit 7 trip, the Wallerawang shift manager contacted TransGrid and was advised that the Wallerawang – Orange North line had tripped due to an earth fault on the line.

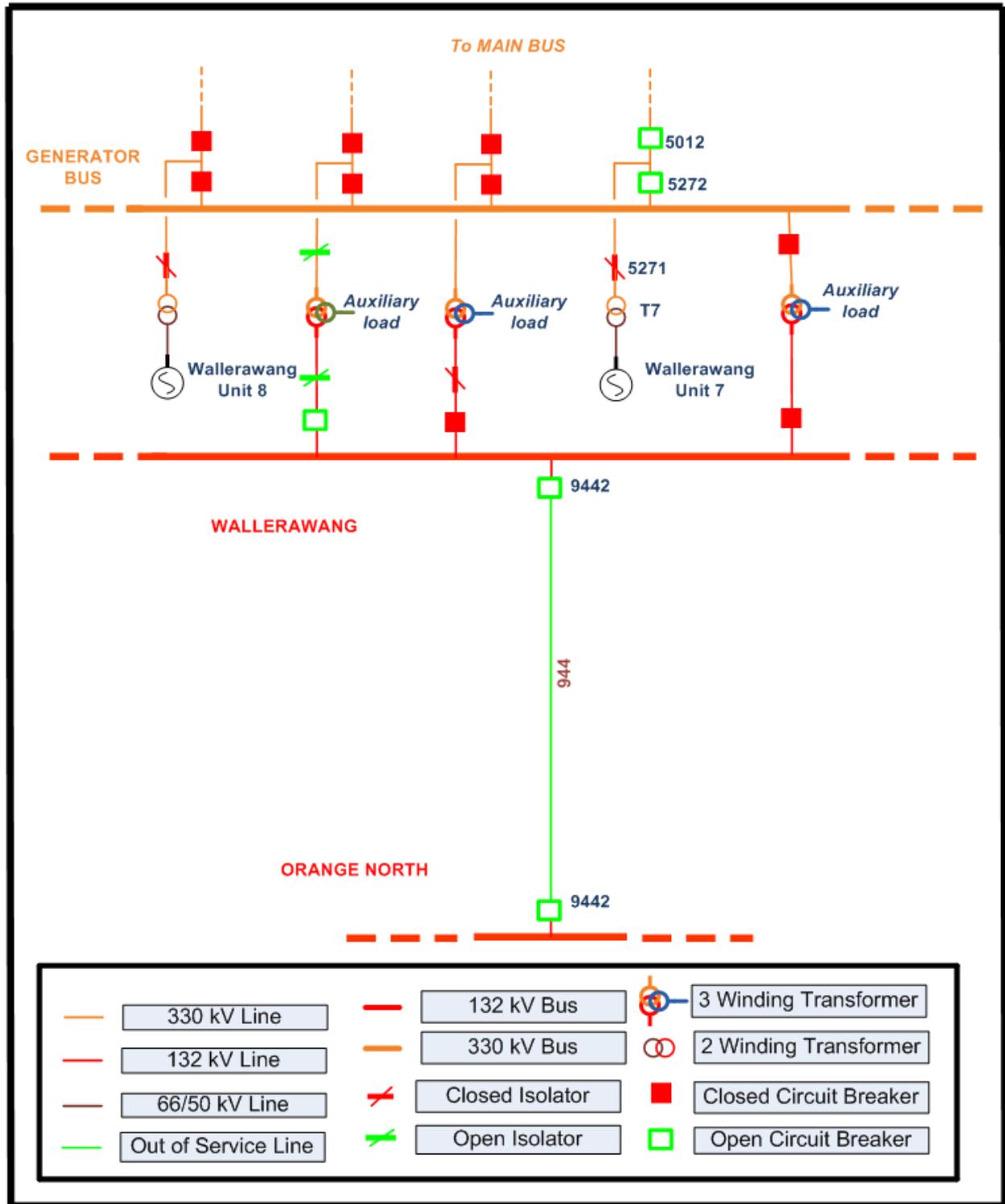
After analysis of high speed fault recorder and generator transformer protection system records as well as discussions with TransGrid, Delta Electricity / West determined the cause of the restricted earth fault protection operation to be either a wiring fault or mal-operation of the protection relay. CB 5272 was isolated by TransGrid at the request of Delta Electricity / West until such time as investigations into the protection problem could be completed.

At 2227 hrs Monday 2 July, Wallerawang Unit 7 was returned to service on the bay couple CB 5012 only.

The Wallerawang Unit 7 generator restricted earth fault protection was isolated at 2005 hrs 3 July after it was confirmed that the current transformer summation circuit wiring was the most likely cause of the protection operation. All other required protection systems remained in service.

At 1830 hrs Tuesday 3 July, the Wallerawang – Orange North line was returned to service. The cause of the fault could not be determined.

Figure 2 - Status of the power system immediately after the incident



4 Immediate Actions Taken

At 1836 hrs on 2 July, AEMO issued Electricity Market Notice No.39154 advising of a non-credible contingency event in the NSW region.

AEMO did not reclassify the loss of both the Wallerawang – Orange North line and Wallerawang Unit 7 as a credible contingency event, as AEMO was advised that the cause of the trip of Wallerawang Unit 7 had been identified and the faulty protection had been isolated. This determination is consistent with section 12 of AEMO's Power System Security Guidelines¹.

5 Follow-up Actions

At 1656 hrs on 9 July CB 5272 was returned to service. The Wallerawang Unit 7 generator transformer restricted earth fault protection remained out of service.

On the 27 July 2012 the cause of the mal-operation of the Wallerawang Unit 7 generator transformer restricted earth fault protection was identified as incorrect wiring of the restricted earth fault protection system. The wiring was corrected on 27 July 2012.

Delta Electricity / West found that the same wiring mistake exists at Wallerawang Unit 8, however the restricted earth fault has not yet been enabled on this unit. Work to correct the wiring mistake at Wallerawang Unit 8 has been scheduled for the next planned outage.

Due to the nature of the event, AEMO's initial opinion was that the Wallerawang Unit 7 trip did not constitute a breach of the Wallerawang Unit 7 performance standard, however after discussion between AEMO, the AER and the participant it was determined that the unit trip was a non-compliance of the unit's performance standards. On 8 August 2012, TRUenergy gave AEMO a notice in accordance with NER Clause 4.15(f) detailing the non-conformance of Wallerawang Unit 7 with the performance standard and notifying AEMO that Wallerawang Unit 7 had returned to compliance with the performance standard on the 27 July 2012.

6 Power System Security Assessment

The power system remained in a secure operating state throughout the incident.

7 Conclusions

A fault on the Wallerawang – Orange North line resulted in the inadvertent trip of Wallerawang Unit 7. The cause of the Wallerawang – Orange North line fault could not be determined. The cause of the trip of Wallerawang Unit 7 has been identified as incorrect wiring of the restricted earth fault protection. The incorrect wiring was corrected on the 27 July 2012.

TRUenergy gave AEMO notice of the non-conformance of Wallerawang Unit 7 with the registered performance standard and has since advised AEMO that Wallerawang Unit 7 has returned to compliance with the performance standard.

AEMO is satisfied that TRUenergy has carried out the appropriate work to mitigate the risk of a similar incident occurring in the future.

AEMO correctly applied the criteria published in section 12 of its Power System Security Guidelines in assessing that the circumstances of this incident did not warrant reclassifying similar incidents as a credible contingency event.

¹ System Operating Procedure SO_OP3715 "Power System Security Guidelines" is available at the following webpage: <http://www.aemo.com.au/Electricity/Policies-and-Procedures/System-Operating-Procedures/Power-System-Security-Guidelines-SOOP>

8 Recommendations

There are no recommendations arising from this incident.