

POWER SYSTEM OPERATING INCIDENT REPORT: TRIP OF MULTIPLE TRANSMISSION LINES IN QUEENSLAND ON 22 FEBRUARY 2012

PREPARED BY: Electricity System Operations Planning and Performance

DATE: 15 June 2012

FINAL

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Abbreviations and Symbols

Abbreviation	Term
BDN	Burton Downs
COP	Coppabella
KMIS	Kemmis
kV	Kilovolt
MRNB	Moranbah
ms	Millisecond
MW	Megawatt
NEBO	Nebo
NER	National Electricity Rules
SVC	Static Var Compensator

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1 Introduction

At 1336 hrs on 22 February 2012, the 7117 Kemmis (KMIS) – Moranbah (MRNB) tee Burton Downs (BDN) and 7118 Nebo (NEBO) – MRNB tee Coppabella (COP) 132 kV double circuit transmission lines in Queensland simultaneously tripped out of service due to high voltage faults on both lines. The high voltage faults occurred during a period of lightning activity in the region. Both lines successfully auto-reclosed and approximately 11 MW of load, comprising of load supplied from the BDN and COP substations, was interrupted during the auto-reclose time. The Static Var Compensator (SVC) at COP also tripped out of service due to the loss of its auxiliary supplies when the 7118 line tripped.

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.

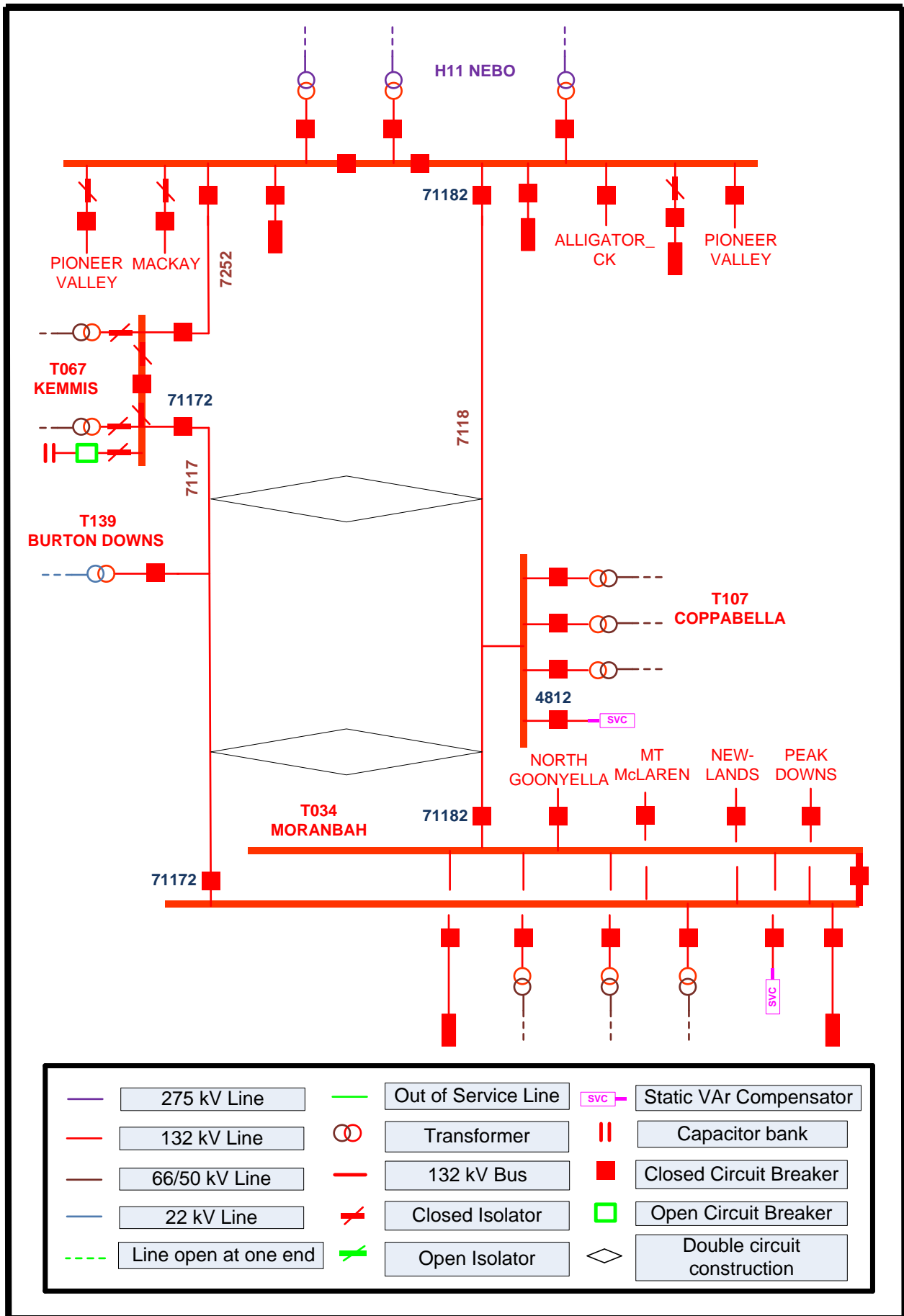
This report is largely based upon information provided by Powerlink. Data from AEMO's Energy Management System and Electricity Market Management System has also been used in analysing the incident.

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



3 Summary of Events

At 13:36:15 on 22 February 2012, the protection systems of the 7117 and 7118 lines operated to clear high voltage faults on both lines, tripping both lines out of service. Refer to Figure 2 for the status of the power system immediately after the lines tripped.

Approximately 11 MW of load, comprising of load supplied from the BDN and COP substations, was interrupted when the two lines tripped. The SVC at COP substation also tripped out of service due to the loss of its auxiliary supplies when the 7118 line tripped.

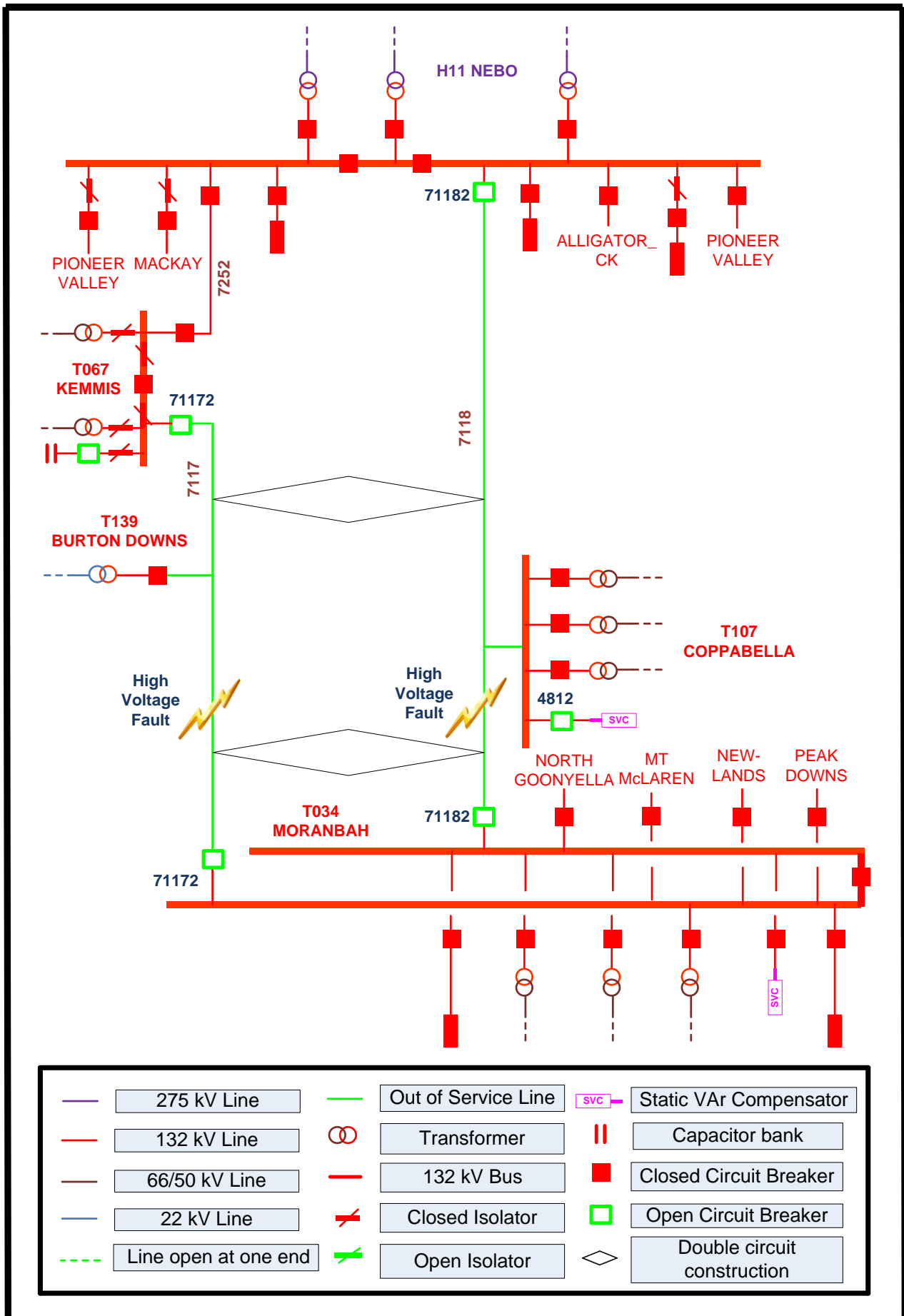
The high voltage faults occurred at the time of an electrical storm in the vicinity of the 7117 and 7118 lines. The line protection systems indicated the faults occurred at similar physical locations on each line. The faults on 7117 and 7118 lines were cleared in 70 ms from the KMIS and NEBO ends respectively, and in 150 ms from the MRNB end. The fault clearance times were within the required time frames specified in the NER¹.

At 13:36:16, the 7117 line successfully auto-reclosed at the MRNB end, restoring approximately 1 MW of load at BDN substation. At 13:36:17 the 7117 line successfully auto-reclosed at the KMIS end.

At 13:36:25, the 7118 line successfully auto-reclosed at the NEBO end only. This restored approximately 10 MW of load at COP substation.

¹ Refer Schedule S5.1a.8 of the NER.

Figure 2 - Status of the power system immediately after trip of the two lines



4 Immediate Actions Taken

At 1344 hrs, Powerlink closed the circuit breaker 71182 at MRNB substation, placing on load the 7118 line section from MRNB.

At 1458 hrs, Powerlink returned the SVC at COP substation to service.

At 1435 hrs, AEMO issued Electricity Market Notice No. 37970 advising of the simultaneous trip of the 7117 and 7118 lines as a non-credible contingency event.

At 1516 hrs, AEMO issued Electricity Market Notice No. 37973 to reclassify the simultaneous trip of the 7117 and 7118 lines as a credible contingency event due to lightning, effective from 1510 hrs. At 0300 hrs on 23 February 2012, AEMO issued Electricity Market Notice No. 37994 to cancel that reclassification as lightning activity in the vicinity of the 7117 and 7118 lines had ceased.

Lightning activity over the whole Moranbah–Collinsville–Proserpine–Nebo area warranted two other double circuit transmission lines in this area being reclassified for a similar period.

AEMO applied section 12 of its Power System Security Guidelines² in determining that the simultaneous trip of the 7117 and 7118 lines should immediately be reclassified as a credible contingency event, and in determining to subsequently revoke that reclassification.

5 Follow-up Actions

In accordance with section 12 of its Power System Security Guidelines, AEMO categorised the double circuit transmission line consisting of the 7122 and 7155 132 kV lines as vulnerable³.

6 Power System Security Assessment

The power system voltages and frequencies remained within the normal operating bands and the power system remained in a secure operating state throughout the incident.

A total 11 MW of load (approximately 10 MW at COP and 1 MW at BDN) was momentarily interrupted as a result of this incident.

The provision and response of facilities and services by Powerlink and AEMO were adequate to maintain power system security.

7 Conclusions

The simultaneous trip of the KMIS – MRNB tee BDN and NEBO – MRNB tee COP 132 kV double circuit transmission lines has been attributed to the lightning activity present at the time. The faults that resulted from this incident were successfully cleared by protection systems within the timeframes specified in NER. The power system remained in a secure operating state throughout the incident.

² Clause 4.2.3B of the NER requires that AEMO establish criteria to use when considering whether a non-credible contingency event is reasonably possible. This is published in AEMO operating procedure SO_OP3715 Power System Security Guidelines, which is available at: <http://www.aemo.com.au/electricityops/3715.html>

³ The future trip of vulnerable transmission lines is identified as being a probable event following a detected cloud to ground lightning strike in the vicinity of the lines.

The facilities and services provided by Powerlink and AEMO to manage the incident were adequate. 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

There are no recommendations arising from this incident.