POWER SYSTEM OPERATING INCIDENT REPORT – SIMULTANEOUS TRIP AND AUTO-RECLOSE OF TARONG BLACKWALL 875 AND TARONG BLACKWALL 827 275 KV TRANSMISSION LINES ON 21 MARCH 2013

PREPARED BY: System Performance & Commercial

DATE: 14 May 2013

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
NEM	National Electricity Market
NER	National Electricity Rules

Contents

Incident summary

Date and time of incident	21 March 2013 @ 0908 hrs
Region of incident	Queensland
Affected regions	Queensland
Event type	TT – Loss of multiple transmission elements
Primary cause	PTN & CTR – Protection and Control
Impact	NIL
Associated reports	NIL

1 Introduction

On 21 March 2013, a total of five trip and auto reclose operations of Tarong – Blackwall 875 and 827 275 kV Transmission Lines occurred in a sequence between 0908 hrs and 0928 hrs. For a period of six seconds during this duration, both transmission lines were out of service at the same time.

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 (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

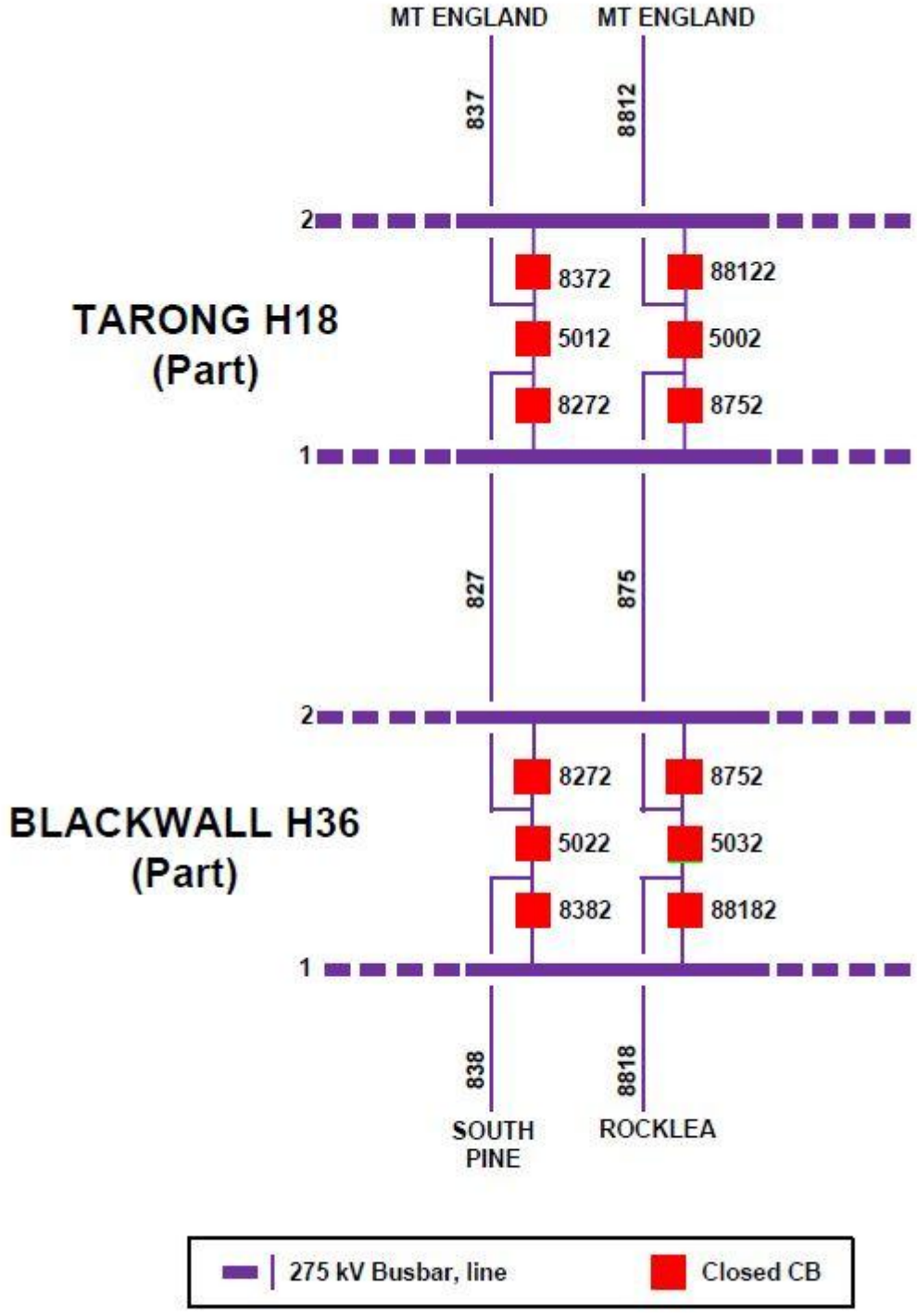
Tarong – Blackwall 875 and 827 275 kV Transmission Lines have duplicate high speed protection systems which function as one set of Current Differential protection and two sets of Distance protection.

Prior to 0908 hrs on 21 March 2013, Powerlink was conducting planned work to change a communications bearer[1] utilised by the current differential protection systems associate with Tarong – Blackwall 875 and 827 275 kV Transmission Lines as part of planned augmentation work. There was no impact or change to the distance protection systems associate with both transmission lines. The new communications bearer immediately caused an issue with the current differential protection on both 875 and 827 275 kV Transmission Lines following this change.

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.

[1] Telecommunications bearer is used to communicate and transfer the line loading data between each end of the transmission line to determine if the transmission line is healthy or has a fault.

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



3 Summary of Events

The following is a summary of events:

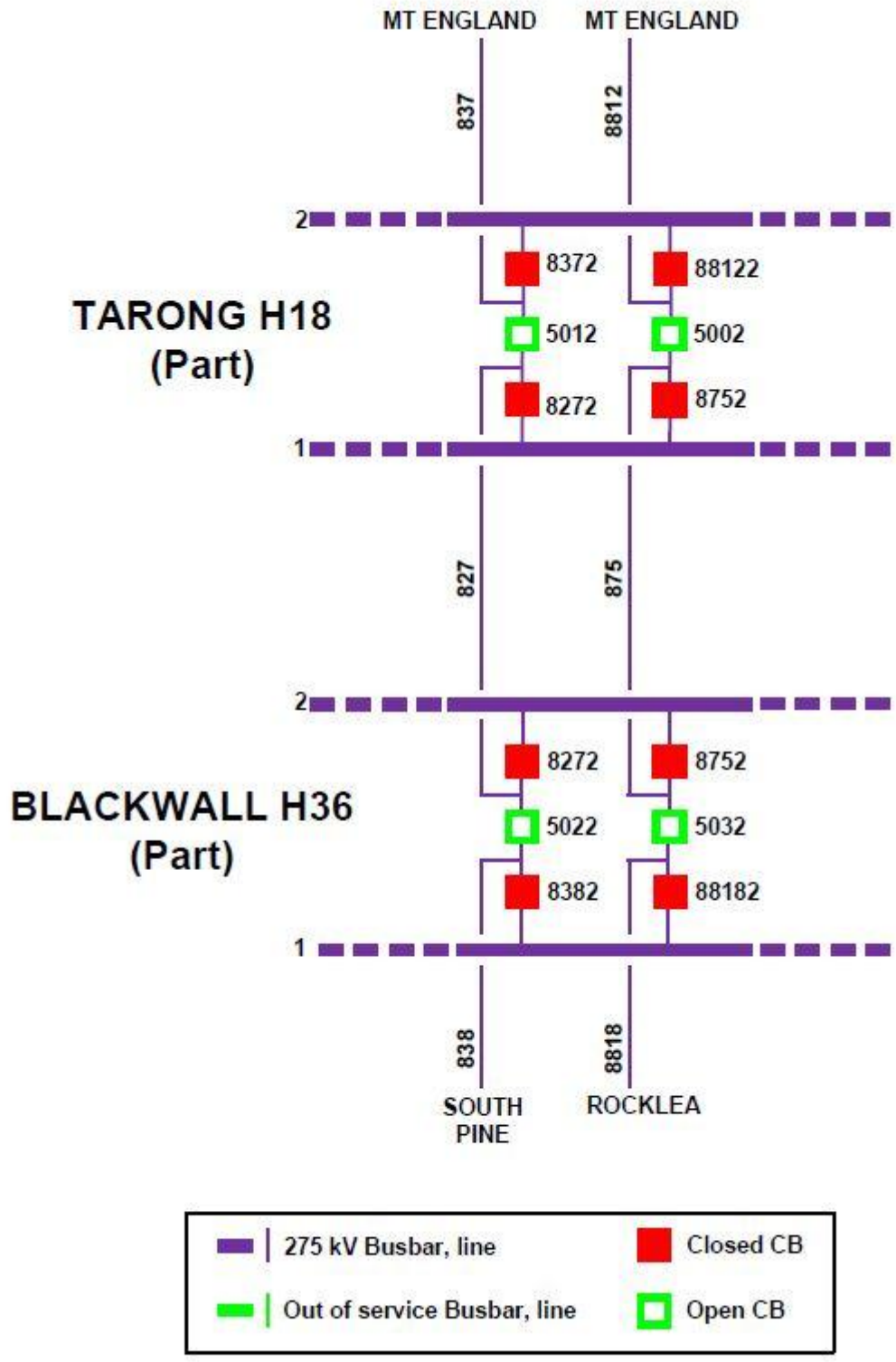
Table 1: Summary of Events

Time	Events
21/03/2013 09:08:27 hrs	Tarong – Blackwall 875 275 kV Transmission Line tripped.
21/03/2013 09:08:32 hrs	Tarong – Blackwall 875 275 kV Transmission Line auto reclosed. CB 5002 and CB 5032 remained OPEN after auto reclose operation.[2]
21/03/2013 09:15:38 hrs	Tarong – Blackwall 875 275 kV Transmission Line tripped.
21/03/2013 09:15:43 hrs	Tarong – Blackwall 875 275 kV Transmission Line auto reclosed. CB 5002 and CB 5032 remained OPEN after auto reclose operation.
21/03/2013 09:17:58 hrs – 09:18:13 hrs	Tarong – Blackwall 875 and 827 275 kV Transmission Lines simultaneously tripped and auto reclosed. For a six second period from 09:18:03 hrs – 09:18:09 hrs, both Tarong – Blackwall 875 and 827 275 kV Transmission Lines out of service. CB 5002, CB 5032, CB 5012 and CB 5022 remained OPEN after auto reclose operation.
21/03/2013 09:28:29 hrs	Tarong – Blackwall 875 275 kV Transmission Line tripped.
21/03/2013 09:28:39 hrs	Tarong – Blackwall 875 275 kV Transmission auto reclosed. CB 5002, CB 5032, CB 5012 and CB 5022 remained OPEN after auto reclose operation.
21/03/2013 1000 hrs	AEMO issued the Electricity Market Notice No.41956 advising the market of a non-credible contingency.

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

[2] This is a normal outcome for an auto reclose operation. Auto reclose operation normally only operates to reclose the line CBs and not the coupler CBs.

Figure 2 - Status of the power system after the incident



4 Immediate Actions Taken

Powerlink immediately disabled and isolated the current differential protection systems for intial investigation for a short period. At the completion of the intial investigation, Powerlink returned the telecommunications bearer associated with the current differential protection systems back to its original configuration pending a further detailed investigation. Both transmission lines are each protected by two sets of distance protection and the current differential protection with original configuration.

Based on advice from and the actions taken by Powerlink, AEMO applied SO_OP3715 Power System Security Guidelines[3] in determining that the simultaneous trip of Tarong – Blackwall 875 Transmission Line and Tarong – Blackwall 827 275 kV Transmission Line was unlikely to re-occur and would not be classified as a credible contingency.

At 1000 hrs on 21 March 2013, AEMO issued the Electricity Market Notice No.41956 advising the occurrence of this non-credible contingency event.

5 Follow-up Actions

Powerlink investigations have determined that a stability issue in the telecommunications bearer resulted in unexpected operation of the protection systems associated with Tarong – Blackwall 875 and 827 275 kV Transmission Lines

The telecommunications bearer was returned to the original configuration pending a further detailed investigation. Powerlink will advise AEMO about the findings for the detailed investigation by 30 June 2013.

6 Power System Security Assessment

There was no loss of load or generation as a result of this event. There was also no high voltage fault on transmission network plant or equipment for this event.

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.

7 Conclusions

On 21 March 2013 between 0908 hrs and 0928 hrs, the Tarong – Blackwall 875 and 827 275 kV Transmission Lines tripped and auto reclosed multiple times. For the six second period at 0918 hrs, both Tarong – Blackwall 875 and 827 275 kV Transmission Lines were out of service at the same time until auto reclose funcions operated and returned those transmission lines to service.

All trips occurred due to unexpected operation of each transmission line's current differential protection systems due to a stability issue in the telecommunications bearer. The telecommunications bearer has been returned to its original configuration to restore current differential protection functionality.

AEMO correctly assessed and applied the criteria published in SO_OP3715 in that the loss of both Tarong – Blackwall 875 and 827 275 kV Transmission Lines was not declared a credible contingency.

AEMO is satisfied with the appropriateness of actions taken by Powerlink.

[3] 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/Electricity/Policies-and-Procedures/System-Operating-Procedures/Power-System-Security-Guidelines-SO_OP3715

8 Recommendations

There are no recommendations arising from this incident.