POWER SYSTEM OPERATING INCIDENT REPORT – TRIP OF TARONG NO. 2 275KV BUSBAR ON 8 JANUARY 2013

PREPARED BY: System Performance & Commercial

DATE: 28 February 2013

FINAL

Disclaimer

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Abbreviations and Symbols

Abbreviation	Term
AEMO	Australian Energy Market Operator
CB	Circuit Breaker
CT	Current Transformer
EMMS	Electricity Market Management System
EMS	Energy Management System
kV	Kilovolt
NER	National Electricity Rules
PTP	Permission To Proceed

Contents

Incident summary

Date and time of incident	8 January 2013 @ 0904 hrs
Region of incident	Queensland
Affected regions	Queensland
Event type	Busbar Trip
Primary cause	Protection & Control
Impact	Nil
Associated reports	Nil

1 Introduction

At 0904 hrs on 8 January 2013, the No. 2 275 kV busbar at H18 Tarong Substation in Queensland tripped. This occurred during a planned outage of the H18 Tarong circuit breaker (CB) 88122 for maintenance activities. There was no change in generation or load as a result of this event.

At 0930 hrs on 8 January 2013, the No. 2 275 kV busbar at H18 Tarong Substation in Queensland was returned to service and re-energised.

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 Queensland. 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

H18 Tarong Substation has two 275 kV busbars that connect the Tarong North and Tarong Power Stations to the transmission network. Prior to the time of the incident both No.1 and No. 2 275 kV busbars at Tarong Substation were in service.

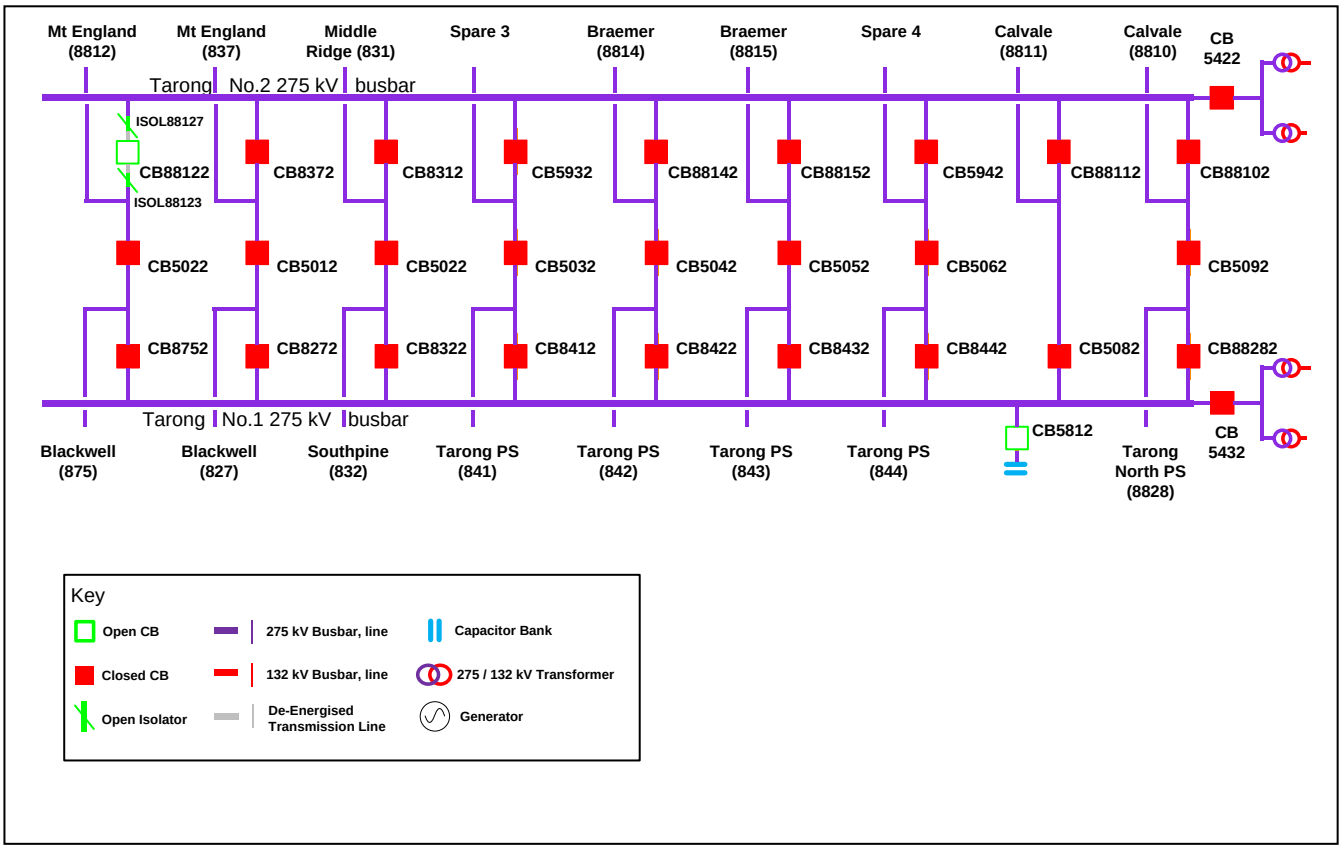
At 0802 hrs on 8 January 2013, AEMO issued Permission To Proceed (PTP) for a planned outage of the following plant at Tarong:

- 275 kV CB 88122

The planned outage period commenced at 0810hrs.

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

Table 1 contains a summary of events.

Table 1 - Summary of events

Time	Events
08/1/2013 0802 hrs	PTP issued for the planned outage of H18 Tarong CB 88122.
08/1/2013 0810 hrs	H18 Tarong CB 88122 opened
08/1/2013 0811 hrs	H18 Tarong Isolators 88123 and 88127 opened, to isolate CB 88122
08/1/2013 0904 hrs	H18 Tarong CB 88122 closed
08/1/2013 0904 hrs	H18 Tarong No. 2 275 kV busbar tripped due to operation of the busbar protection system.
08/1/2013 0918 hrs	AEMO issued the Electricity Market Notice No. 40964.
08/1/2013 0930 hrs	H18 Tarong No. 2 275 kV busbar returned to service.
08/1/2013 1607 hrs	AEMO issued the Electricity Market Notice No. 40972.

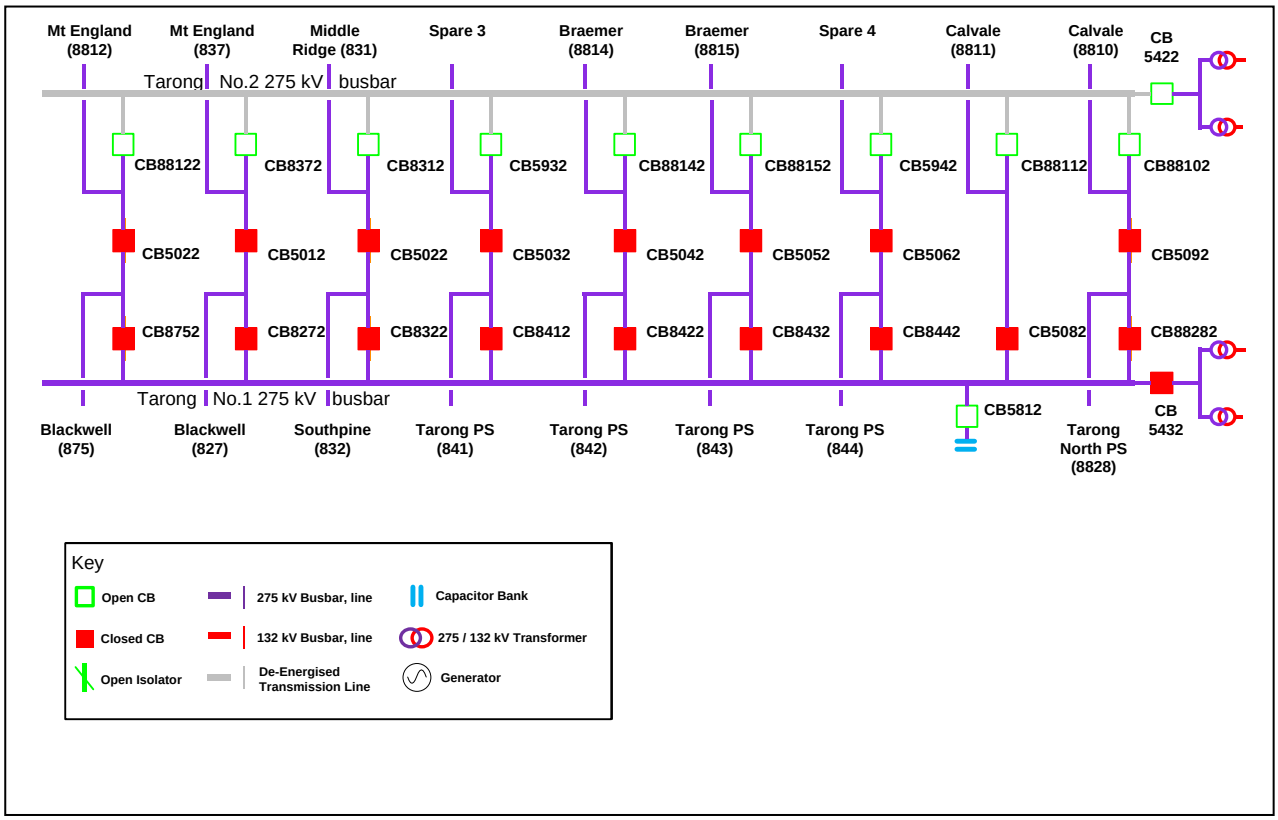
On 8 January 2013, planned maintenance activity was being conducted on the H18 Tarong 275 kV CB 88122. This work required the closure of the CB 88122 as part of a maintenance activity. At 0904 hrs when CB 88122 was closed, an induced current flowed through the CB and the associated current transformer (CT), which were both isolated from the transmission network and

connected to earth potential at the time. The current within the CT was sufficient to trigger the busbar protection scheme and tripped the No. 2 275KV busbar.

The operation of the busbar protection system was not an expected outcome of the work being performed at the time of the event.

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

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



4 Immediate Actions Taken

At 0918 hrs on 8 January 2013, AEMO issued Electricity Market Notice No.40964 advising that the H18 Tarong No. 2 275 kV bus in the Queensland region had tripped.

A check of the protection system was carried out by Powerlink staff, who found no issues with this system, before returning the equipment to service.

At 0930 hrs on 8 January 2013, the Tarong No. 2 275 kV busbar was returned to service.

AEMO deferred issuing a subsequent Market Notice until an initial investigation of the cause was completed.

5 Follow-up Actions

From an initial review of system monitoring records after the event, Powerlink determined that a current created by induction flowed through the CB and associated CT.

After receiving advice of this initial investigation, at 1607 hrs AEMO issued Electricity Market Notice No.40972 advising that the H18 Tarong No. 2 275 kV bus had been returned to service and

that the event would not be reclassified as a credible contingency event. This assessment was based on the identification of the event cause (induced current on the CT) and the determination that another occurrence of this event is unlikely under the existing circumstances.

Powerlink have advised that an investigation has been initiated to review the source of the unexpected current present on the identified plant that caused the protection system to operate. This investigation is expected to be completed by 30 April 2013. Powerlink have also advised that, until a final solution is determined and implemented, planned maintenance activities have been amended to include additional secondary isolation actions.

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.

Immediately following the incident an assessment was made by AEMO to determine appropriate actions to maintain power system security. This assessment determined that the constraint set already invoked for the planned outage of CB 88122 was sufficient to provide power system security for the unplanned outage of H18 Tarong No. 2 275 kV busbar.

AEMO deferred issuing a second market notice, advising of the line return to service and incident classification assessment, until an initial investigation by Powerlink was complete. This enabled the initial investigation outcome to be considered. No constraints had been invoked or revoked as a result of the incident.

The provision and response of facilities and services, including system operation by AEMO, were adequate to maintain the power system security.

The root cause of the incident is still under investigation by Powerlink however, AEMO is satisfied that Powerlink has taken appropriate measures to date to mitigate the risk of a similar event occurring in the future. Final resolution of the event is pending Powerlink's investigation into the root cause.

AEMO correctly applied the criteria published under NER clause 4.2.3B in section 12 of its of SO_OP_3715 Power System Security Guidelines in assessing that the circumstances of this incident did not warrant reclassifying similar incidents as a credible contingency events.

7 Conclusions

The trip of H18 Tarong No. 2 275 kV busbar on 8 January 2013 was caused by a current induced within a current transformer in a section of the substation that had been isolated from the network and had earths applied. The protection system responded to this induced current by operating the busbar protection system.

The actions taken by Powerlink to date in response to the event have been appropriate. An investigation by Powerlink remains in progress.

The criteria published in section 12 of SO_OP_3715 Power System Security Guidelines for the reclassification of contingency events were correctly applied.

8 Recommendations

It is recommended that Powerlink advise AEMO of the outcome of its investigation so any new information can be reviewed to assess if further follow-up action is required.