POWER SYSTEM INCIDENT REPORT

TRIP OF TAMWORTH NO.3 330KV BUSBAR SECTION ON 1 JUNE 2010

PREPARED BY: Electricity System Operations Planning and Performance

FINAL

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1 Introduction

At 1723 hrs on 1 June 2010, the No.3 330kV busbar section at Tamworth substation tripped. Two transmission lines and transformers connected to this busbar section also tripped as a consequence. The busbar trip was due to the explosive failure of the current transformer (CT) associated with 852 circuit breaker (CB) at Tamworth substation. There was no load interruption and No.3 330kV busbar section at Tamworth substation was returned to service approximately 3 hours later, at 2023 hrs.

This report has been prepared under clause 4.8.15 of the National Electricity Rules to assess the adequacy of the provision and response of facilities & services and the appropriateness of actions taken to restore or maintain power system security.

This report is largely based upon information provided by TransGrid. Data from AEMO's Energy Management System has also been used in analysing the event.

All references to time in this report refer to Market time (Australian Eastern Standard Time).

2 System conditions at the time of the event

Prior to the system incident, reactors R1 and R2 and the capacitor C1 on No. 3 330kV busbar were not in service. The figure 1 shows the status of all relevant circuit breakers and isolators at Tamworth Substation prior to the system incident.

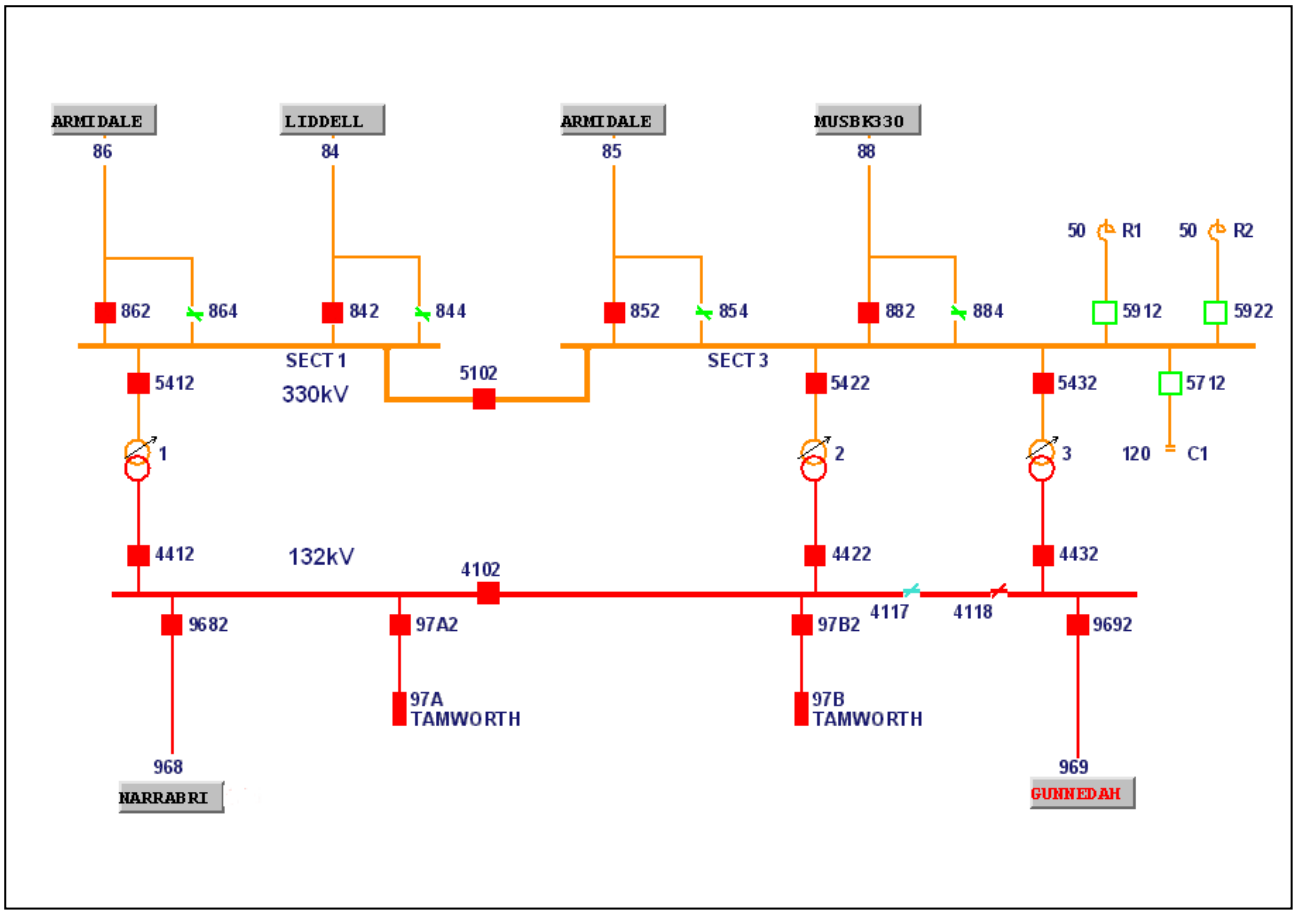

Figure 1: Status of relevant conductors, circuit breakers and system components at Tamworth Substation prior to the system incident event

3 Summary of the system incident

At 1723 hrs on 1 June 2010, the No.3 330kV busbar section at Tamworth substation tripped. The trip was due to the explosive failure of the CT associated with the “White phase” of CB 852 at Tamworth Substation. The explosion resulted in the operation of the protection systems associated with the No.3 busbar section, effectively tripping all network components connected to it. The following circuit breakers tripped:

- CB 852 off-loading No.85 330kV Armidale to Tamworth transmission line. The line also tripped at Armidale on the operation of protection inter-trips.
- CB 882 offloading No.88 330kV Muswellbrook to Tamworth transmission line. The line also tripped at Muswellbrook on the operation of protection inter-trips.
- CB 5422 and CB 4422 off-loading No.2 330/132 kV transformer.
- CB 5432 and CB 4432 off-loading No.3 330/132 kV transformer.
- CB 5102 splitting No. 3 busbar section from No. 1 busbar section.

The figure 2 illustrates the status of network components at Tamworth substation after the trip of the No. 3 330kV busbar section.

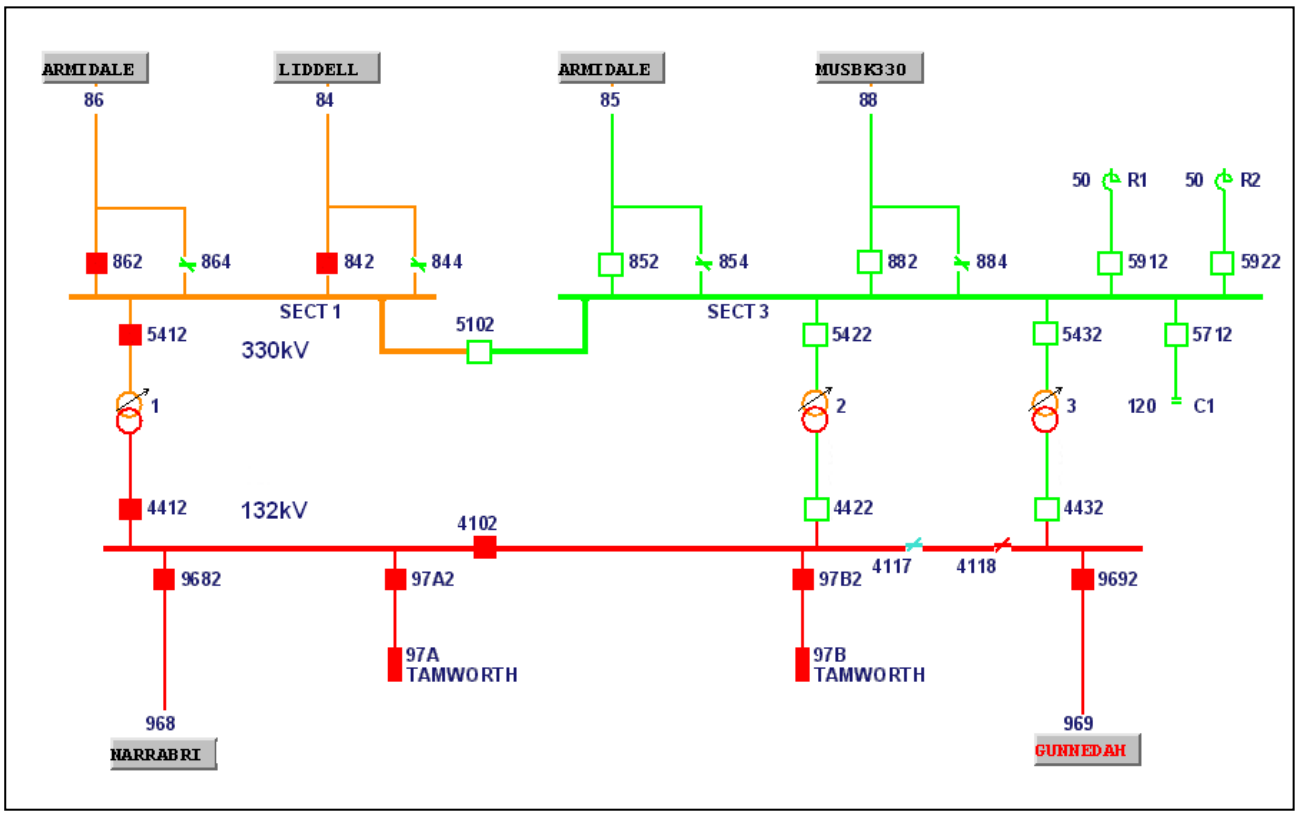

Figure 2: Status of relevant conductors, circuit breakers and system components at Tamworth Substation post system incident event

4 Immediate action taken

At 1727 hrs, TransGrid rearranged the power system by manually opening the CB 96M2 at 132kV Moree substation, thereby off-loading the No.96M 132kV line between Moree and Narrabri substation. This effectively split the 132kV network between Tamworth and Armidale substations.

In addition, TransGrid also disabled the auto-reclose function on the No.964 132kV line, consistent with the operating procedures. This was to ensure the out of step reclosure of No.964 line would not take place in the event of separation between Queensland and New South Wales regions.

Figure 3 shows the power system between Muswellbrook and Armidale substations after this system rearrangement.

In order to manage post contingency events, AEMO invoked the following constraint sets at approximately 1730hrs:

- N-TW_330_BUS3
- F-N-MUTW_88
- N-MUTW_88
- F-N-ARTW_85
- N-ARTW_85

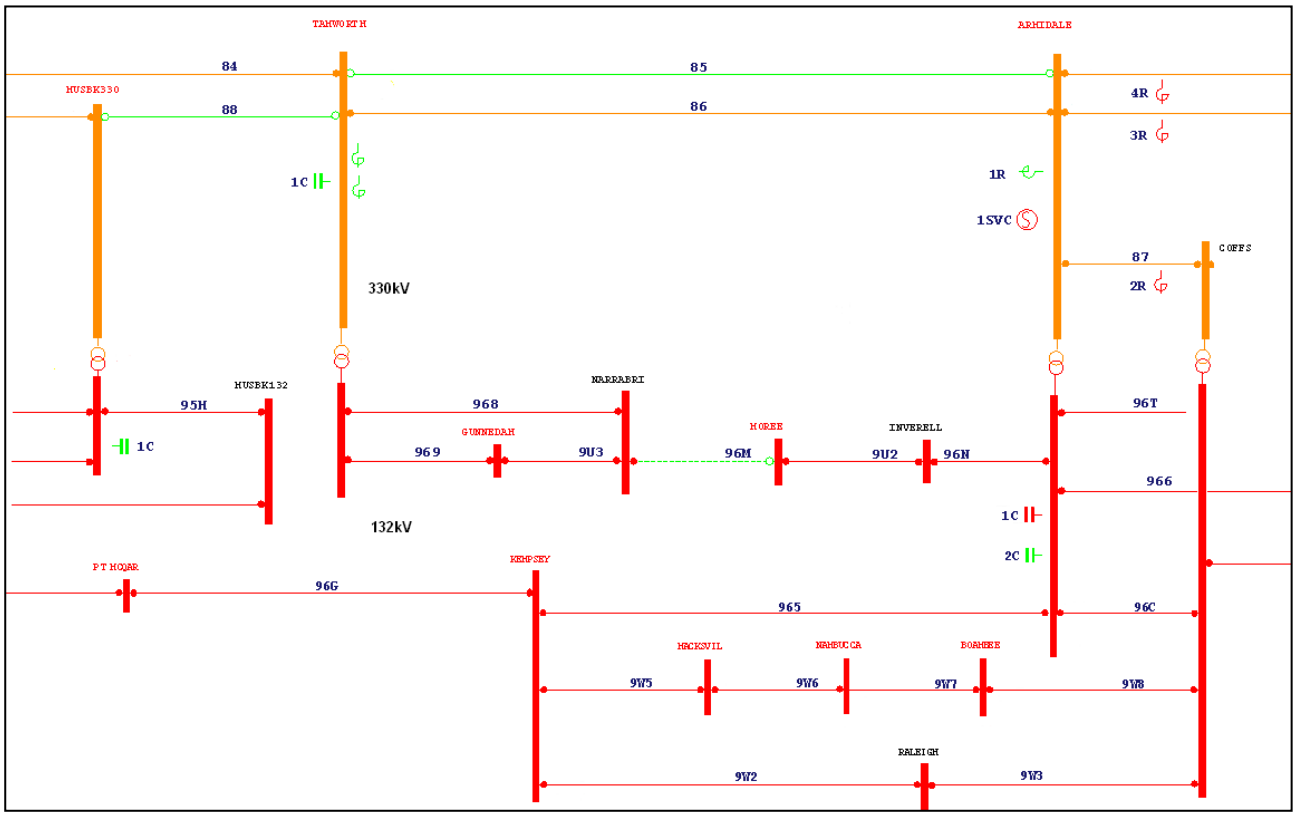

Figure 3: Status of 330kV and 132kV System between Tamworth and Armidale Substation after trip of Section 3 busbar

The No. 3 busbar section at Tamworth substation was returned to service at 2023 hrs on 1 June 2010, this was followed shortly after by the return to service of the No.88 330kV line at 2025hrs. AEMO then revoked the following constraint sets:

- N-TW_330_BUS3
- F-N-MUTW_88
- N-MUTW_88

The constraint sets “N-ARTW_85” and “F-N-ARTW_85” remained invoked until the No.85 330kV line was returned to service at 1718hrs on 2 June 2010.

AEMO issued the following market notices to inform participants of the incident and the progress of power system restoration.

- Notice No.31977 Power System Event (issued at 17:32 hrs on 1 June 2010),
- Notice No.31978 Update – Power System Event (issued at 18:03 hrs on 1 June 2010),

- Notice No.31979 Update – Power System Event (issued at 18:37 hrs on 1 June 2010),
- Notice No.31983 Update – Power System Event (issued at 21:02 hrs on 1 June 2010).

5 Follow-up Action

TransGrid investigation into the incident identified that a loosely connected CT oil sampling device (DLA link) that visually appeared to be closed correctly, was the most likely cause of the CT failure.

Following this event, TransGrid amended its service instructions for testing of CTs to require additional checking of the DLA link to ensure that it is properly secured. In addition, TransGrid has undertaken to check DLA links on current transformers that have undergone maintenance over the previous six months as a precautionary action.

6 Power System Security Assessment

The protection systems operated correctly to isolate the faulty network element. There were no power system security violations identified during this power system incident

7 Conclusion

At 1723 hrs on 1 June 2010, the No.3 330kV busbar section at Tamworth substation tripped as a result of the failure of the CT associated with CB 852. TransGrid's investigation indicated that the explosion was most likely caused by a loosely connected DLA link on the CT. The protection systems operated correctly to isolate the faulty network element.

AEMO and TransGrid managed the power system security during this incident in accordance with the procedures.

TransGrid has taken appropriate corrective action by amending its service instructions for testing CTs as well as checking the DLA links on CTs that have undergone maintenance over the past six months to avoid similar CT failures.

8 Recommendations

TransGrid will inform AEMO once the checking of CTs that have been maintained over the past 6 months has been completed.