POWER SYSTEM INCIDENT REPORT

TRIP OF 8811 CALVALE – TARONG 275KV LINE, TARONG UNIT 2 AND COLUMBOOLA 132KV CB 73562 ON 05 NOVEMBER 2009

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FINAL

1. INTRODUCTION

At approximately 17:49hrs on Thursday 5th of November 2009, severe thunderstorms were experienced in the vicinity of Calvale – Tarong 275kV lines (Bureau of Meteorology - BOM issued a Severe Thunderstorm Warning) and one of the Calvale – Tarong lines - 8811 experienced a single phase trip and auto-reclose. The No.2 generating unit at Tarong Power Station (TPS) tripped from 350MW of load at around the same time.

At approximately 17:50hrs, one of the 132kV feeders from T194 Columboola substation (Ergon Energy) to Condamine power station also tripped but there was no generation at Condamine power station at the time[1].

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 and services and the appropriateness of actions taken to restore or maintain power system security.

Information for this report has been provided by Powerlink, Tarong Energy, Ergon Energy and QGC Sales Pty. Ltd. Additional information has been obtained from AEMO's Energy Management System and Market Management System.

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

2. SUMMARY OF EVENTS

At approximately 17:49hrs on Thursday 5th of November, severe thunderstorms were experienced in the vicinity of Calvale – Tarong 275kV lines. A market notice was issued at 13:47 hrs, reclassifying loss of 8810 & 8811 Calvale – Tarong double circuit 275kV lines as a credible contingency from 1345 hrs onwards. The figure 1 in the following page illustrates the relevant part of the power system prior to this system incident.

At approximately 17:49:52hrs, 8811 Calvale – Tarong line experienced a single phase trip and auto-reclose operation due to a B phase to ground fault on the line. The following circuit breakers (CBs) operated during the tripping:

- H18 Tarong CB88112 (B phase pole only)
- H18 Tarong CB5082
- H24 Calvale CB88112 (B phase pole only)
- H24 Calvale 5072

Almost at the same time, the No.2 generating unit at TPS tripped from 350MW. The investigations revealed this was due to the activation of a Low Pressure (LP) turbine differential expansion protection system. Tarong Energy has informed that a newly installed LP turbine differential expansion protection system appears to have been subjected to induced noise from the intense thunderstorm activity, resulting in the tripping of No.2 generating unit. The other generating units that were in service at Tarong power station at the time were not affected by the thunderstorm activity. Restoration of the No. 2 generation unit commenced at 19:07 hrs on the same day. The loss of No.2 generating unit did not

[1] The Condamine power station is connected to the NEM transmission network via 7355 and 7356 Condamine to Columboola 132kV lines. These two lines are approximately 2-3 km long. The Condamine power station and these tow short lines are owned by the QGC Sales Pty. Ltd.

cause any power system security issues. The figure 2 shows the affected circuit breakers at H18 Tarong terminal station, H24 Calvale terminal station and at Tarong power station.

At approximately 17:50:02 hrs, the 132kV feeder 7356 from T194 Columboola substation to Condamine power station tripped and locked out at Columboola on the receipt of a protection inter-trip from Condamine power station. It should be noted that the feeder 7356 does not have a CB at the Condamine end. None of the generating units at Condomine power was in service at the time. Figure 3 illustrates this event.

Ergon Energy has also observed that there were some lightning strikes in the vicinity of T194 Columboola when the thunderstorms passed through that area on this day.

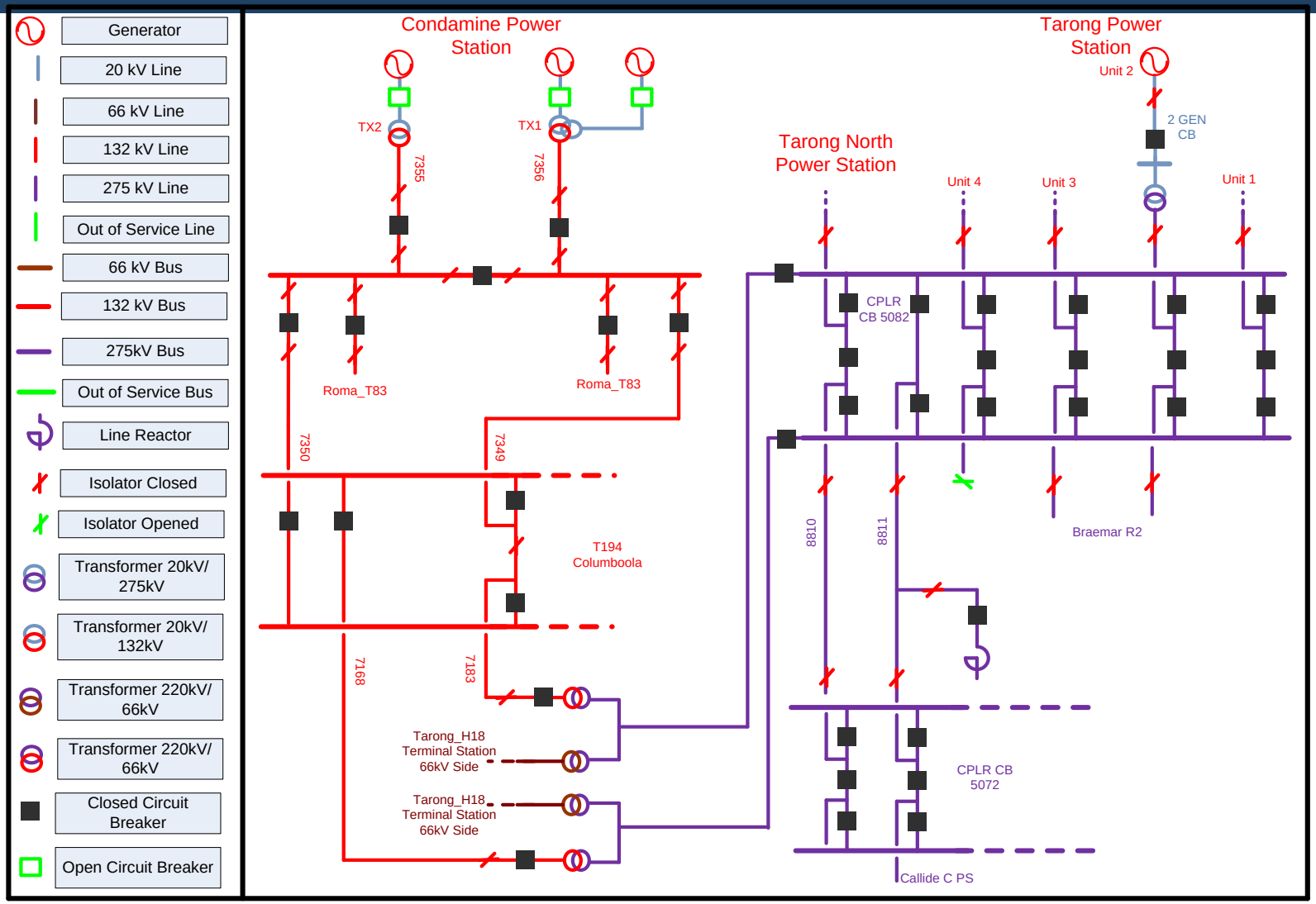

FIGURE 1: SYSTEM STATUS PRIOR TO OCCURENCE OF EVENT

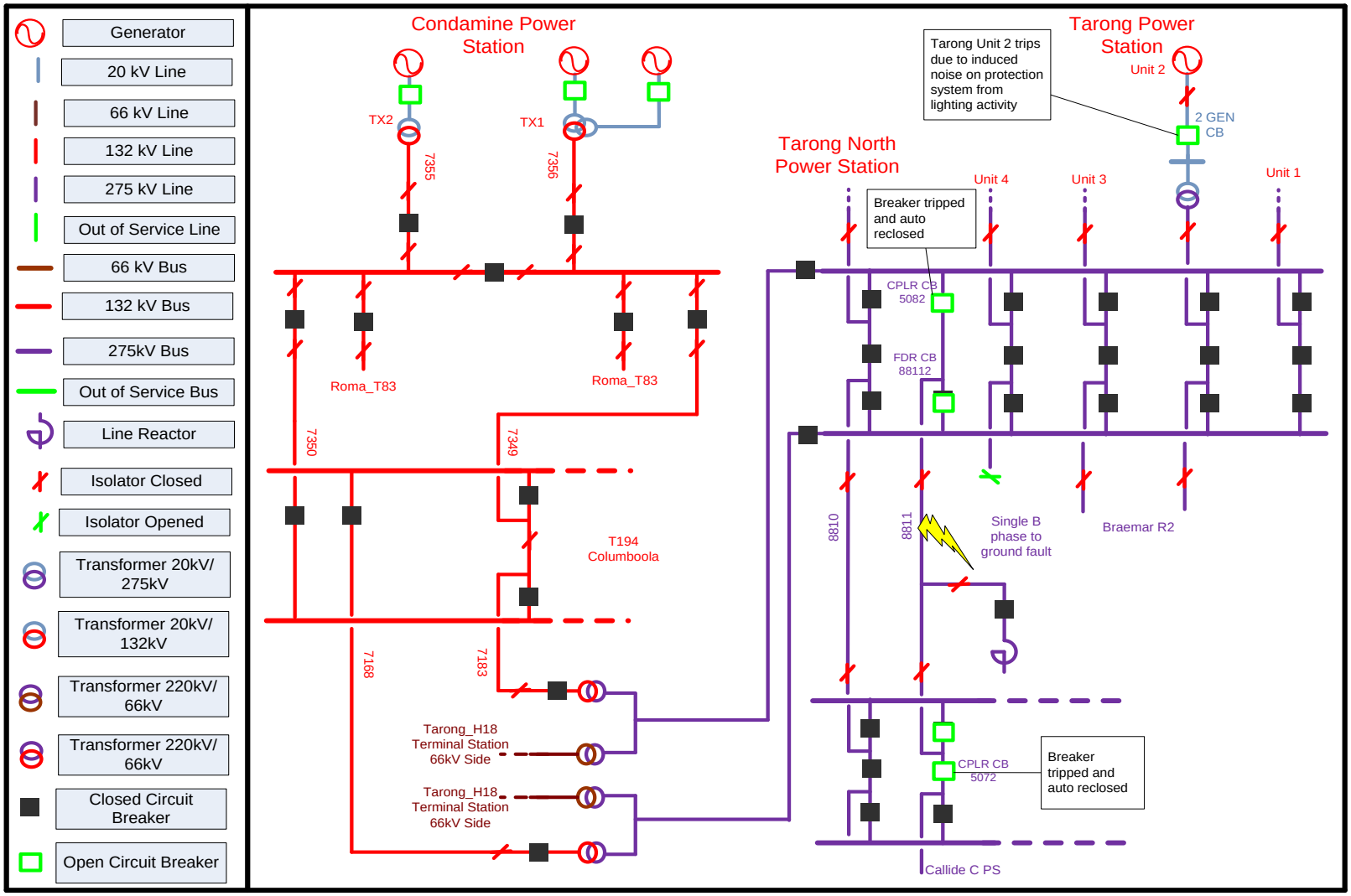

Figure 2: TRIPPING OF FEEDER 8811 AND TARONG POWER STATION UNIT2 BEFORE CIRCUIT BREAKER AUTO-RECLOSEING WAS COMPLETED (ONLY B PHASE WAS AFFECTED)

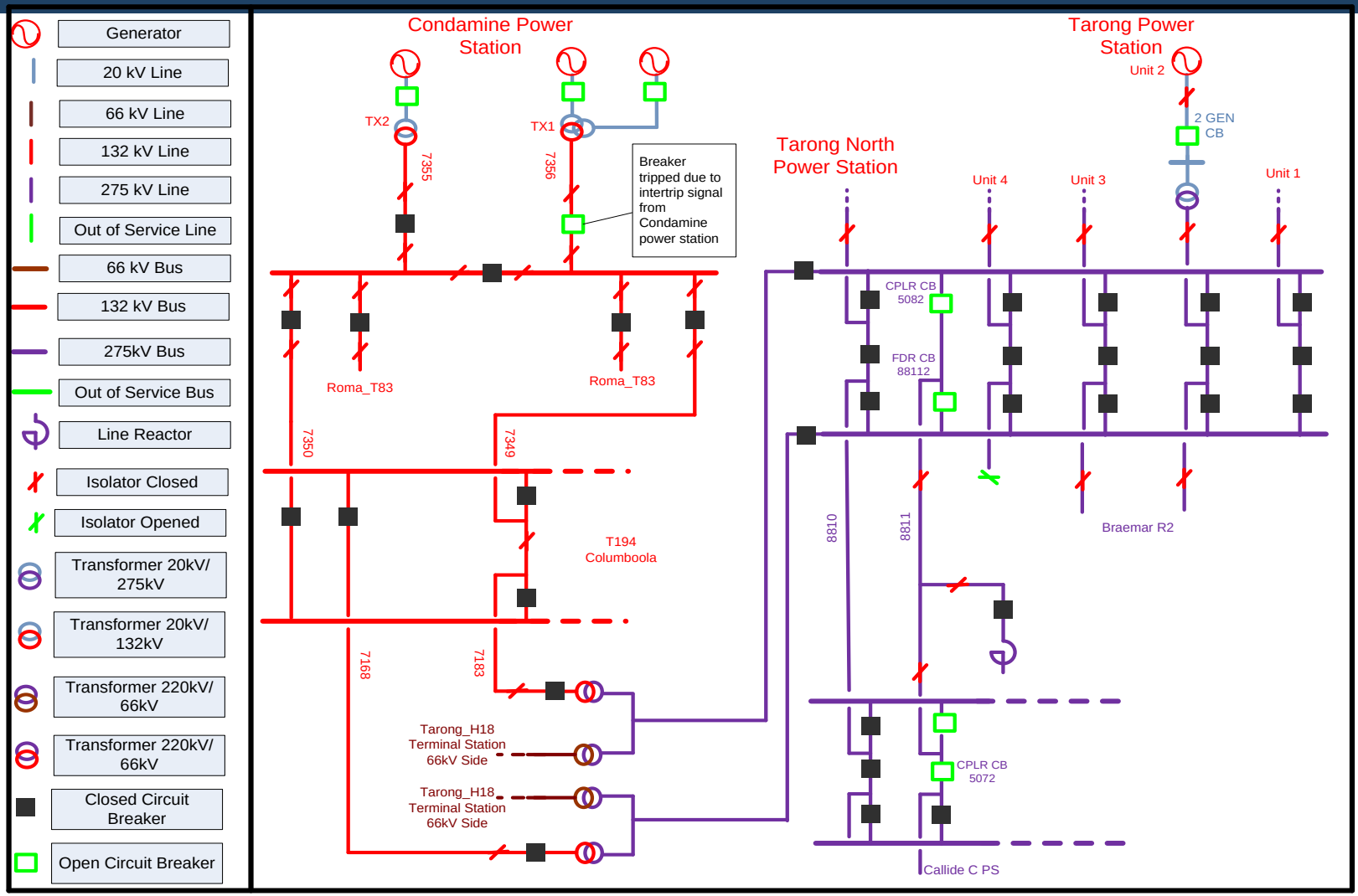

FIGURE 3: CIRCULT BREAKER 73562 TRIPPED DUE TO AN INTERTRIP SIGNAL FROM CONDOMINE POWER STATION

3. ANALYSIS OF EVENTS

Single phase trip and auto-reclose of 8811 Calvale – Tarong 275kV line

Investigation carried out by Powerlink indicated the protection systems of 8811 line at Tarong and at Calvale operated on the detection of a high voltage B phase to ground fault.

The fault was cleared from the power system by operation of the line protection systems and circuit breakers. The auto-reclose function operated to close B phase poles of circuit breakers 88112 at Calvale and Tarong to return Feeder 8811 to service within 10 seconds.

Protection systems at Calvale and Tarong substations operated correctly to clear the fault on 8811 line.

Tripping of No.2 generating unit at Tarong Power Station

Tripping of the No.2 generating unit at Tarong Power Station was due to operation of the Low Pressure (LP) turbine differential expansion protection system, during intense lightning activity in the vicinity of the power station. The No.2 generating unit had undergone a recent control system refit prior to the event, which also included replacement of the above protection system. Following its investigation, Tarong Energy has identified that the LP turbine differential expansion protection of the No.2 generating unit can be subjected to induced noise during intense lightning events, causing the protection to operate.

To avoid such erroneous trips, the LP turbine differential expansion trip signal has been blocked within the control system of the No.2 generating unit as a temporary measure, and a manual procedure has been put in place to manage LT turbine differential expansion. Similar LP turbine differential expansion trip signal blocking has been in place on Tarong No.1 generating unit since early 2009. The control refitting has not been applied to Unit 3 and 4 and hence both the units are not affected at this stage.

Tripping of 7356 line T194 Columboola 132kV substation

The 132kV CB73562 at Columboola substation tripped and locked out on the receipt of a protection inter-trip from Condamine PS. Ergon Energy reported that the protection inter-trip was initiated from the No.1 differential protection associated with the No.1 132/11kV transformer at Condamine power station. Ergon Energy has also observed that there were some lightning strikes in the vicinity of T194 Columboola substation when the thunderstorms passed through that area on that day. None of the generating units at Condamine power station were in service at the time of the trip.

Investigation is still being progressed by the Condamine power station to determine the exact cause of the protection inter-trip being sent to Columboola substation during this event.

4. FOLLOW UP ACTIONS

Tarong Energy applied a temporary block of the the LP turbine differential expansion protection trip signals of the No.2 generating unit and a manual procedure has been put in place.

Condamine power station is progressing an investigation to identify the exact cause of sending a protection inter-trip to Columboola substation during this event.

5. POWER SYSTEM SECURITY

There were no power system security issues affecting the power system during in this event. There were no load interruptions resulting from this event.

6. RECOMMENDATION

1. Tarong Energy will investigate the corrective action required to minimise the susceptibility of the protection systems of No.1 and 2 generating units to externally induced noise. Tarong Energy will inform the outcomes of this investigation to AEMO by the end of December 2010.

2. QGC Sales Pty.Ltd will investigate the unexpected protection operation at the Condamine power station during this event and identify any required corrective actions to minimise similar events in future. QGC Sales Pty Ltd will complete this action and inform the outcomes to AEMO by the end of August 2010.