FAR NORTH QUEENSLAND PHASE TRIP 29 SEPTEMBER 2010

PREPARED BY: Electricity System Operations Planning and Performance

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1 Introduction

At 1713 hrs on Wednesday 29 September 2010, a simultaneous single phase trip on Chalumbin – Ross 857 and 858 275kV transmission lines occurred. Protection systems operated to clear the fault and auto-reclose the two phases successfully. Kareeya Power Station, which was generating 92 MW, tripped at the same time. In addition, the Woree Static Var Compensator (SVC) also tripped and approximately 40 MW of Kamerunga load was interrupted when the No.1 and the No.2 transformers at Kamerunga Substation tripped.

This report has been prepared under clause 4.8.15 of the 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.

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

2 Summary of Events

2.1 Single Phase Trip of Ross – Chalumbin 275 kV Transmission Lines (857 & 858)

On 29 September 2010, lightning strikes were detected by Powerlink's Lightning Tracker System (LTS) in the area where the double circuit Chalumbin – Woree 275 kV transmission lines are located.

At 1327 hrs, AEMO reclassified the loss of Chalumbin – Woree 876 and 877 275kV lines as a credible contingency[1]. As a result of the reclassification, the Far North Queensland 132 kV network was reconfigured by Powerlink by opening the Edmonton – Innisfail and Woree – Tully 132 kV lines. Barron Gorge Power Station was not generating at the time of the event. Figure 1 below shows the statuses of relevant network elements before the incident occurred.

[1] Refer Market Notice 32922.

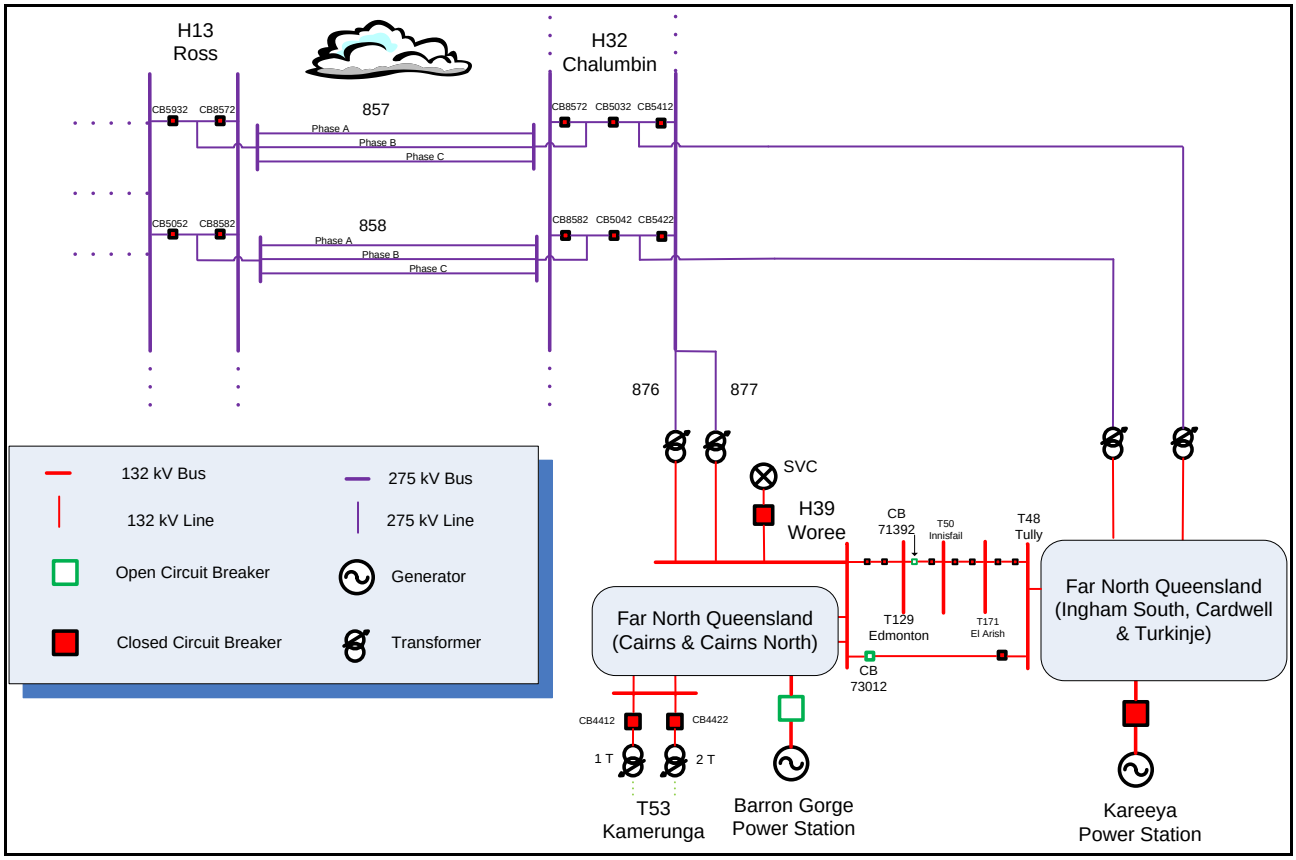

Figure 1 Simplified system condition before lightning occurred. Note that the 132 kV Far North Queensland system had already been split following reclassification by opening CB 71392 and 73012

At 17:13:48 hrs, a high voltage fault was detected on the A-phase conductors of both 857 and 858 275 kV transmission lines. Protection systems operated as designed to clear the high voltage fault by performing a single pole trip on A-phase of the transmission lines at Ross and Chalumbin. Far North Queensland load was maintained via the remaining phases during the auto-reclose dead time of 6 seconds. Figure 2 below shows the statuses of relevant network elements after the operation of protection systems.

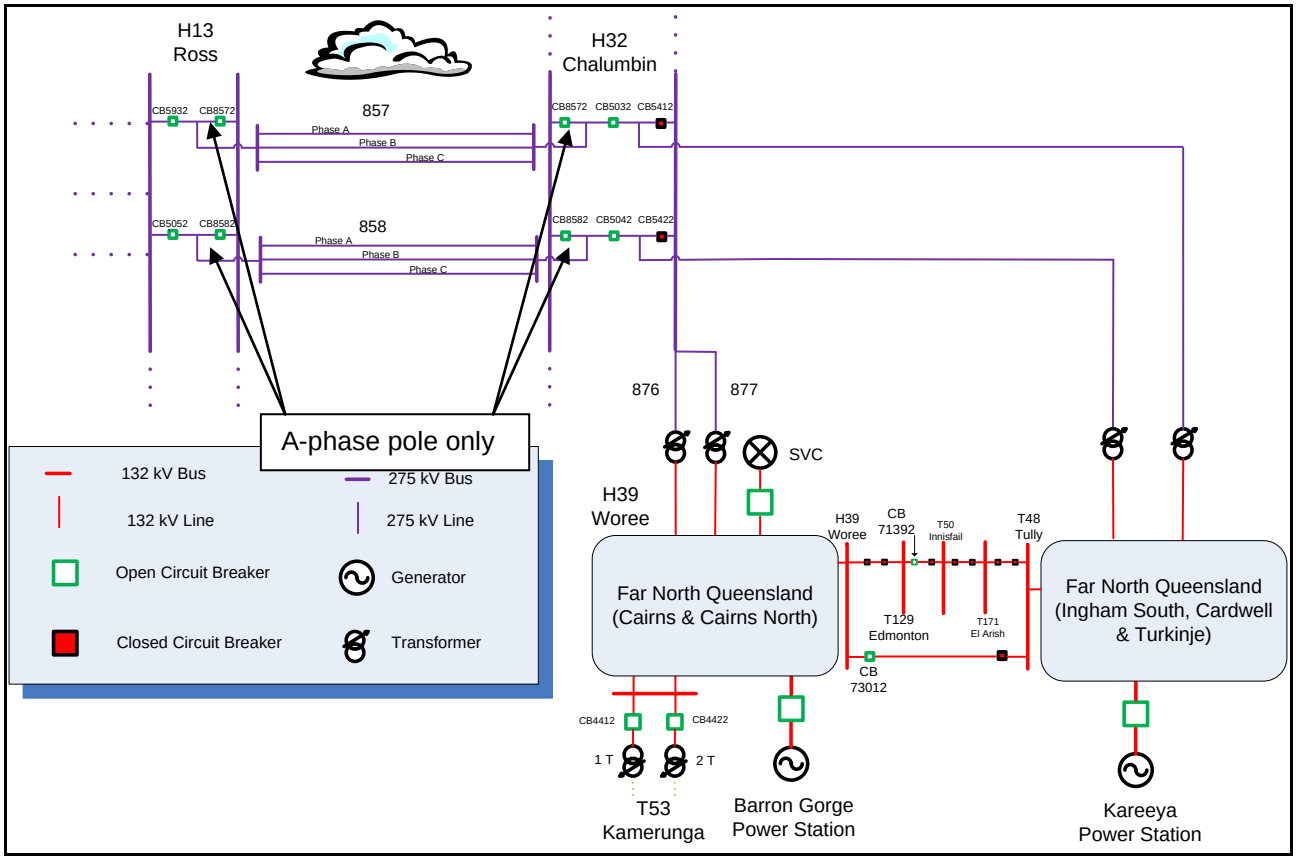

Figure 2 System conditions following the operation of protection systems

Post-incident investigations confirmed that severe lightning strikes as recorded on LTS caused the high voltage faults on 857 and 858 lines. A line patrol located flashed insulators on the A-phase of both transmission lines. In addition, the fault location as calculated by the protection relays matched the location of the lightning as recorded by the LTS.

At 17:13:54 hrs, both ends of the two transmission lines auto-reclosed to restore the lines. The statuses of relevant network elements after the operation of auto-reclose are shown in Figure 3 below.

At 1807 hrs following discussions with Powerlink, Market Notice 32930 was issued by AEMO to reclassify the simultaneous trip of the Ross – Chalumbin No. 857 and 858 275 kV lines as a credible contingency event.

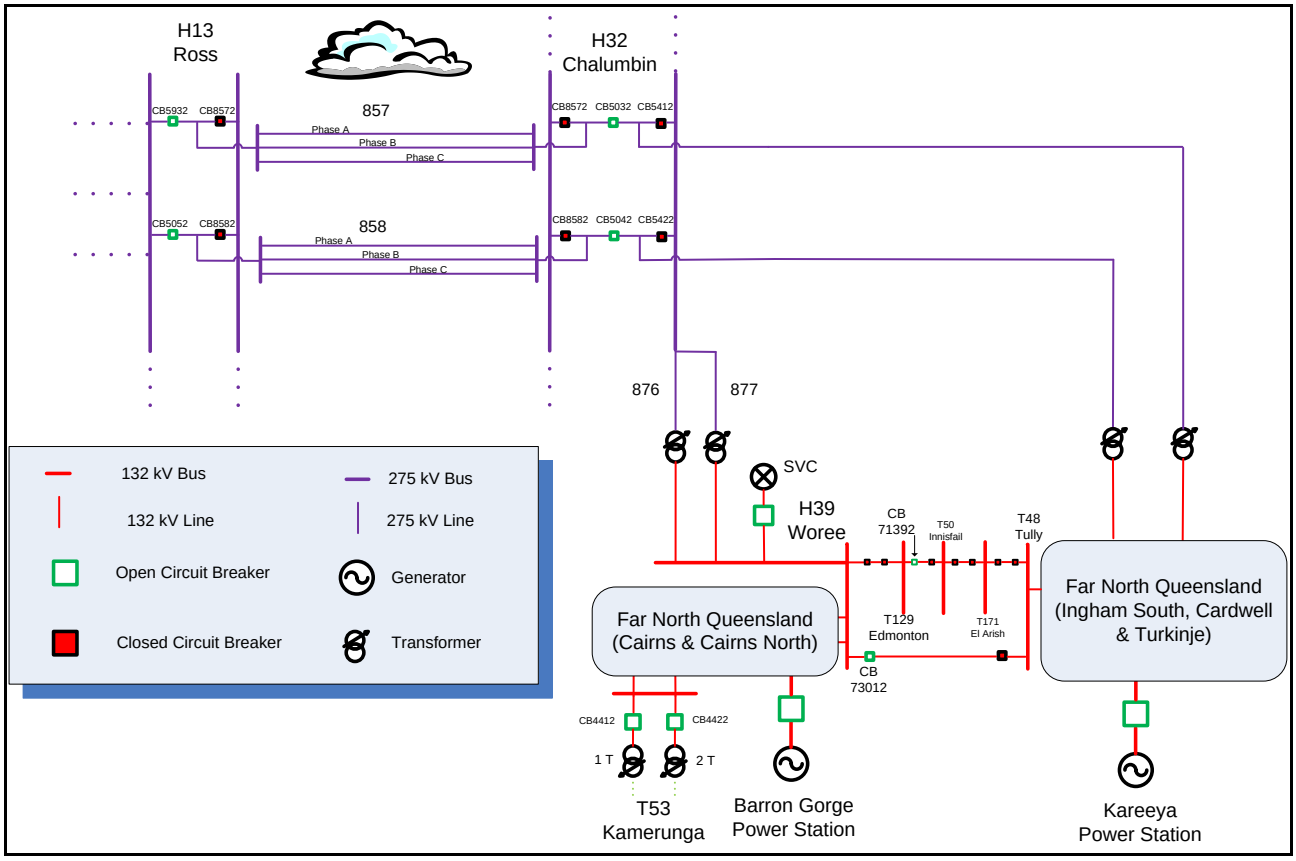

Figure 3 System condition immediately following autoreclose of transmission lines 857 and 858

The reclassification of the loss of the Ross – Chalumbin No. 857 and 858 275 kV lines as a credible contingency was cancelled at 19:05 hours and the Market Notice 32932 issued after the lightning activity receded.

Market Notice 32935 was issued at 20:47 hours to cancel the reclassification of the Chalumbin – Woree No. 876 and 877 275 kV lines. The reconfiguration of the Far North Queensland 132 kV system was subsequently removed by reclosing Woree CB 73012 and Edmonton CB 71392.

2.2 Trip of Kareeya Power Station

The only generation in service in Far North Queensland area was the Kareeya power station because Barron Gorge power station was not generating at the time. 1-5 generating units at Kareeya power station tripped on the operation of the Voltage Dependant Overcurrent protection system. The protection system operated to design specification. Kareeya power station was generating 92 MW at the time of the tripping.

The generation units at the station were sequentially brought back into service between 19:12 and 19:43 hours on 29 September 2010.

2.3 Trip of Kamerunga 132/122 kV No.1 and 2 Transformers

At Kamerunga substation, the No.1 and No. 2 132/22 kV transformers tripped during the auto-reclose dead time of the 275 kV lines. The transformers tripped due to the operation of the Directional Overcurrent Protection System. The 22 kV voltage profile changed following the single phase trip of 857 and 858 lines contributing to the operation of Directional Overcurrent Protection System. Approximately 40 MW of load within Ergon Energy was interrupted as a result of the tripping of Kamerunga No.1 and No. 2 transformers.

The No. 1 and No. 2 transformers were brought back to service at 17:39 hours and 18:45 hours respectively on 29 September 2010.

2.4 Trip of Woree SVC

This also tripped immediately following the A-phase trip of 857 and 858 lines. The over-voltage protection systems operated as designed during the auto-reclose dead time, consistent with the sudden change in power system conditions.

It was returned to service at 1830 hrs on 29 September 2010.

3 Power System Security Assessment

During this event the power system remained in a secure state. Power system frequency remained within the normal operating frequency band.

All protection systems operated as designed and all the affected power system elements were returned to service without any operational issues.

4 Follow Up Actions

None

5 Conclusion

On 29 September 2010, lighting activity was detected in the Far North Queensland region in the vicinity of the Chalumbin – Woree 876 & 877 275kV transmission lines. The loss of both lines were reclassified as a credible contingency event and the Far North Queensland 132 kV system was being operated with Woree CB 73012 and Edmonton CB 71392 open when this reviewable event took place.

At 1713 hrs, severe lightning activity resulted in a high voltage fault on the A-phase of both Ross – Chalumbin 857 & 858 275 kV transmission lines. Protection systems operated to clear the fault successfully by opening the A-phase of the lines at Ross and Chalumbin.

Successful single phase auto-reclose restored the 857 and 858 transmission lines within 5 seconds.

During the auto-reclose dead time, respective local protection systems operated to trip the 1-5 generating units at Kareeya power station (92 MW generation), Kamerunga transformers (40 MW load) and Woree SVC. These protection systems operated as designed and were triggered by the change in power system conditions following the faults on the two lines. All affected power system elements were brought back to service by 1945 hrs on 29 September 2010.

6 Recommendation

Nil