Trip of Braemar-Western Downs Transmission Line 8864 at Braemar end on 11 Sept 2014

AN AEMO POWER SYSTEM OPERATING INCIDENT REPORT FOR THE NATIONAL ELECTRICTY MARKET

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AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

VERSION RELEASE HISTORY

VERSION	DATE	BY	CHANGES	CHECKED BY	AUTHORISED BY
1	21 Nov 2014	S Darnell	FINAL	P Biddle	P Biddle

INCIDENT CLASSIFICATIONS

Time and date and of incident	1717 hrs Thursday 11 September 2014
Region of incident	Qld
Affected regions	Qld
Event type	OTH - Other
Primary cause	PTN & CTR – Protection and Control
Impact	Nil
Associated reports	Nil

ABBREVIATIONS

Abbreviation	Term
AEMO	Australian Energy Market Operator
CB	Circuit Breaker
kV	Kilovolt
NER	National Electricity Rules

IMPORTANT NOTICE

Purpose

AEMO has prepared this document to provide information about this particular Power System Operating Incident.

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1. OVERVIEW

This report reviews a power system operating incident that occurred on Thursday 11 September 2014 at Braemar Substation (Braemar) in Queensland. The incident involved the trip of a transmission line at one end, and was due to insufficient relay isolation during planned testing work at Braemar. No customer load was lost as a result of this incident.

AEMO is required to assess power system security over the course of this incident as the incident is classified as a non-credible contingency under the National Electricity Rules (NER).[1] Specifically, AEMO is required 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.[2]

AEMO concluded that the incident was caused by a failure to fully the isolate trip outputs of a relay, and that power system security was maintained over the course of the incident.

This report is based on information provided by Powerlink[3] and AEMO. National Electricity Market time (Australian Eastern Standard Time) is used in this report.

2. THE INCIDENT

On 11 September 2014, at 1717 hrs, the Braemar-Western Downs 8864 330 kV transmission line (Line 8864) opened at the Braemar end via circuit breaker 88642 (CB 88642) at Braemar. This resulted in Line 8864 being off-loaded. No load or generation was lost as a result of this incident and the line was returned to service at 1835 hrs the same day. See Appendix 1 for a diagram illustrating the incident and a chronological log of the incident.

The reason for investigating this incident is that Line 8864 opened at one end. Generally transmission lines open at both ends under fault conditions. The opening of a transmission line at one end is an unexpected event and is identified in power system security terms as a non credible contingency.[4]

3. POWERLINK INVESTIGATION

Powerlink investigated this incident and found that CB 88642 tripped during testing of No. 1 275kV busbar protection scheme as part of planned works on site at Braemar. The circuit breaker tripped when testers operated the busbar protection relay as part of a test. The relay tripped CB88642 because testers had not correctly isolated the trip outputs, on the busbar protection relay, for this CB. The testers were following correct work practices.

Line 8864 did not open at the Western Downs end because the remote end of the transmission line was not required to open for a busbar protection trip at Braemar. Other circuit breakers on No.1 275 kV busbar did not open because the trip outputs for those circuit breakers, on the busbar protection relay, had been isolated.

The testers subsequently isolated the trip output of the busbar protection relay prior to Powerlink reclosing the circuit breaker and returning Line 8864 to service.

[1] Clause 4.8.15(a)(1)(i) and AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents
[2] NER Clause 4.8.15 (b)
[3] Powerlink is the Transmission Network Service Provider in Queensland
[4] NER Clause 4.2.3 - Credible and non-credible contingency events; *AEMO Power System Security Guidelines,* Section 10 - Definition of a non-credible contingency events

4. POWER SYSTEM SECURITY

This section assesses how power system security was managed over the course of the incident[5].

1. No action was required immediately after the incident. The voltage on Line 8864 was within limits[6] and the power system was in a secure operating state.[7]
2. At 1745 hrs AEMO issued Market Notice 46449 to notify the market of the non-credible contingency event.[8]
3. At 1834 hrs Powerlink notified AEMO that the trip of 8864 was due to a protection problem associated with planned work at Braemar, and that the problem had been identified and resolved.
4. At 1835 hrs Powerlink closed CB 88642 at Braemar and returned Line 8864 to service.
5. AEMO then assessed whether or not to reclassify the incident as a credible contingency.[9] AEMO determined not to reclassify this incident as the cause of the incident had been identified and resolved and was thereby unlikely to reoccur.
6. At 1853 AEMO issued Market Notice 46450 to notify the market that and that AEMO would not reclassify the incident as a credible contingency.

For this incident the power system remained secure operating state over the course of the incident. AEMO issued appropriate notifications and correctly assessed the incident and did not reclassify the incident as a credible contingency.

5. CONCLUSIONS

AEMO concluded that:

1. Line 8864 opened at the Braemar end because a busbar protection relay was operated during a routine test whilst the trip outputs had not been fully isolated.
2. The trip outputs had not been fully isolated due to an error.
3. For this incident, the provision and response of facilities and service were appropriate maintain power system security over the course of the incident.
4. There are no outstanding issue to resolve as a result of this incident.

[5] AEMO is responsible for power system security in the NEM and is required to operate the power system in a secure operating state (NER Clause 4.2.4 (a)). AEMO must thereby ensure that the power system is maintained in, or returned to, a secure operating state following a contingency event

[6] Due to the Ferranti Effect, a transmission line voltage at the open end can increase above connected (sending) end. For this incident the line voltage remained in a satisfactory operating state

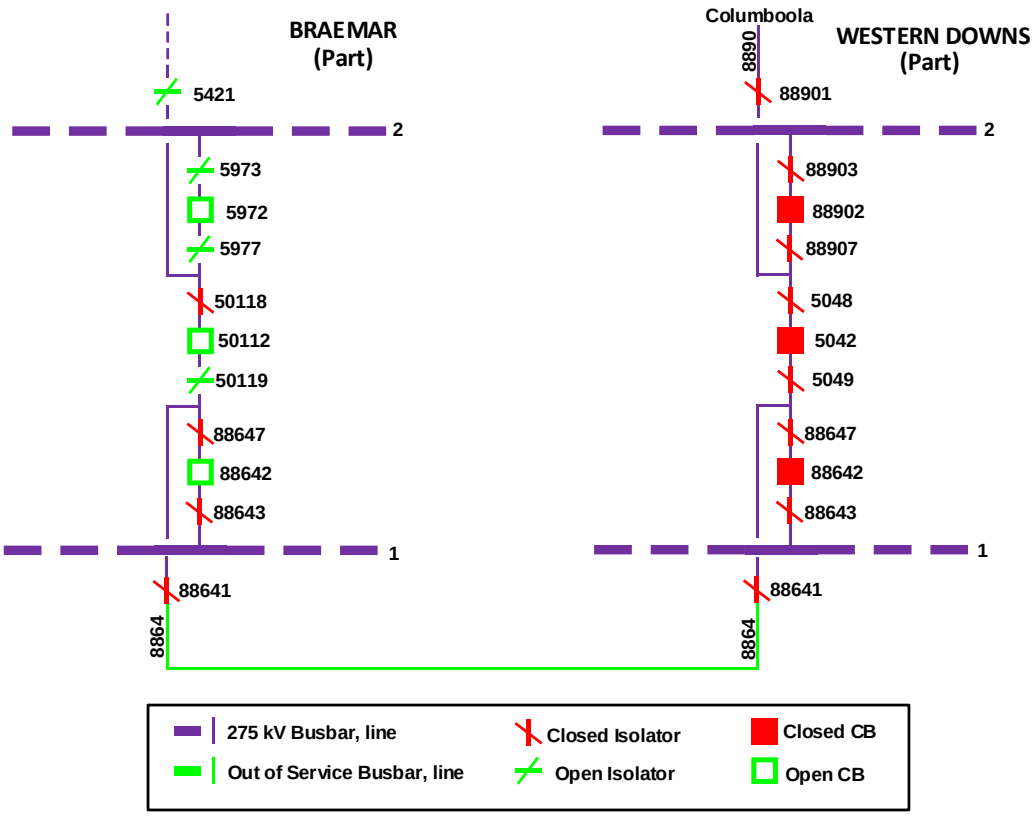
[7] AEMO is required to return the power system to a secure state within thirty minutes following a contingency event - NER Clause 4.2.6 (b)

[8] AEMO is required to notify the Market of a non-credible contingency event within two hours of the event - AEMO, *Power System Security Guidelines,* Section 10.3

[9] AEMO is required to assess whether or not to reclassify a non credible contingency event as a credible contingency - NER Clause 4.2.3A (c)) - and to report how re-classification criteria were applied - NER Clause 4.8.15 (ca). AEMO has to determine if the condition that caused the non-credible contingency event has been resolved

APPENDIX 1 – POWER SYSTEM DIAGRAM

The power system after the incident. Note circuit breakers 5972 and 50112 at Braemar substation were open prior to the incident.



Chronological log of events comprising the incident

Time and Date	Event
1717 hrs 11 Sept 2014	Circuit breaker 88642 at Braemar substation opened The Braemar-Western Downs transmission line 8864 off-loaded
1745 hrs 11 Sept 2014	Market Notice 46449 issued – Notification of a non-credible contingency event
1835 hrs 11 Sept 2014	Circuit breaker 88642 reclosed and the Braemar-Western Downs transmission line 8864 returned to service
1853 hrs 11 Sept 2014	Market Notice 46450 issued – Notification that the non-credible contingency event will not be reclassified as a credible contingency