AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Trip of Wurdong 275 kV No. 1 Busbar on 14 June 2018

November 2018

Reviewable operating incident report under the National Electricity Rules

Important notice

PURPOSE

AEMO has prepared this report in accordance with clause 4.8.15(c) of the National Electricity Rules, using information available as at the date of publication, unless otherwise specified.

DISCLAIMER

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INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of incident	0806 hrs Thursday 14 June 2018
Region of incident	Queensland
Affected regions	Queensland
Event type	Busbar trip
Generation Impact	No generator was disconnected or limited as a result of this incident
Customer load impact	No customer load was disconnected as a result of this incident
Associated reports	Nil

ABBREVIATIONS

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

Contents

1. Overview

This report relates to a reviewable operating incident (being a non-credible contingency event)[1] that occurred on Thursday, 14 June 2018 at Wurdong substation in Queensland. This incident involved the trip of the 275 kV No. 1 busbar (No. 1 busbar) at the substation, and was caused by the unexpected operation of protection equipment during planned secondary systems replacement works.

There was no loss of generation or customer load as a result of this incident.

As this was a reviewable operating incident, AEMO is required to assess power system security over the course of this incident and 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 has concluded that:

1. The trip of the No.1 busbar occurred due to insufficient isolation of protection systems during planned secondary systems upgrade work.
2. All protection systems operated as designed.
3. The power system remained in a secure operating state during the course of this incident
4. The cause of this incident was identified and AEMO was satisfied that a reoccurrence of this incident was unlikely, therefore the incident was not reclassified as a credible contingency.

This report is prepared in accordance with clause 4.8.15(c) of the National Electricity Rules (NER). It is based on information provided by AEMO and Powerlink.

2. The incident

At 0806 hrs on Thursday, 14 June 2018, the No. 1 busbar at Wurdong substation tripped during planned secondary systems replacement works associated with circuit breaker (CB) 8192. No other transmission elements were impacted, except the Wurdong No.3 275 kV capacitor (No. 3 capacitor) which is connected to the No. 1 busbar. See Appendix A1 for a diagram of Wurdong Substation before and immediately after the event.

No generation or customer load was lost as a result of this incident.

The No. 1 busbar and No. 3 capacitor were returned to service at 1013 hrs and 1014 hrs respectively on 14 June 2018. As the probability of a busbar trip is very low, it is considered a non-credible contingency event[3].

[1] See NER clause 4.8.15(a)(1)(i), as the event relates to a non-credible contingency event; and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

[2] See NER clause 4.8.15(b).

[3] See NER clause 4.2.3.

3. Powerlink investigation

Prior to this incident, all equipment at Wurdong substation was in service except for CB 8192 which was open and isolated as part of planned secondary systems replacement works.

When CB 8192 was closed (while still isolated and earthed) as part of the planned works, the No. 1 busbar 'X' and 'Y' protections operated, resulting in the trip of the No. 1 busbar. This was not an expected outcome.

Investigations revealed that the closing of CB 8192 resulted in a circulating induced current through the CB and its associated current transformers (CTs), of sufficient magnitude to cause the busbar protection systems to operate. There was no high voltage fault on the power system.

Normally during this type of work the current contribution to the busbar protection schemes from the CTs being worked on would be isolated to prevent unexpected operation of the busbar protection. In this instance this had not been done. In response to this event, Powerlink has reviewed its work planning process.

Prior to returning the No. 1 busbar to service, the CT inputs from CB 8192 were isolated to reduce the risk of any further similar incidents during the planned work. The planned work was completed and CB 8192 returned to service on 29 June 2018.

4. Power system security

AEMO is responsible for power system security in the National Electricity Market (NEM). This means AEMO is required to operate the power system in a secure operating state to the extent practicable and take all reasonable actions to return the power system to a secure state following a contingency event in accordance with the NER[4].

The power system remained in a secure operating state following the trip of the No. 1 busbar and no action was required by AEMO. No constraints were required to maintain power system security over the course of the incident.

4.1 Reclassification

AEMO assessed whether or not to reclassify this incident as a credible contingency event[5].

For this incident AEMO received information from Powerlink prior to the busbar being returned to service, and was satisfied that the cause had been identified and the incident was unlikely to reoccur. On this basis AEMO determined that reclassification as a credible contingency event was not required.

[4] Refer to AEMO's functions in section 49 of the National Electricity Law and the power system security principles in clause 4.2.6 of the NER.

[5] AEMO is required to assess whether or not to reclassify a non-credible contingency event as a credible contingency event – NER clause 4.2.3A(c), and to report how the reclassification criteria were applied – NER clause 4.8.15(ca).

5. Market information

AEMO is required by the NER and operating procedures to inform the market about incidents as they progress. This section assesses how AEMO informed the market[6] over the course of this incident.

For this incident, AEMO was required to inform the market on the following matter:

1. The occurrence of a non-credible contingency event – notify within two hours of the event[7].
   - AEMO issued Market Notice 63204 at 0855 hrs – 49 minutes after the event.

Over the course of this incident, AEMO issued appropriate, timely, and sufficiently detailed market information.

6. Conclusions

AEMO has assessed this incident in accordance with clause 4.8.15(b) of the NER. In particular, AEMO has assessed the adequacy of the provision and response of facilities or services, and the appropriateness of actions taken to restore or maintain power system security.

AEMO has concluded that:

1. The trip of the No.1 busbar occurred due to insufficient isolation of protection systems during planned secondary systems upgrade work.
2. All protection systems operated as designed.
3. The power system remained in a secure operating state during the course of this incident.
4. The cause of this incident was identified and AEMO was satisfied that a reoccurrence of this incident was unlikely, therefore the incident was not reclassified as a credible contingency.

[6] AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see AEMO website at http://www.aemo.com.au/Market-Notices.

[7] 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. Available at: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3715---Power-System-Security-Guidelines.pdf.

A1. Power system diagram

The diagrams below show the status of switchgear at Wurdong substation before and immediately after this incident.