TRIP OF VALES POINT 330 KV MAIN BUSBAR ON 27 JULY 2017

REVIEWABLE OPERATING INCIDENT REPORT UNDER THE NATIONAL ELECTRICITY RULES

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AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of incident	0758 hrs Thursday 27 July 2017
Region of incident	New South Wales
Affected regions	New South Wales
Event type	OE
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

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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1. OVERVIEW

This report relates to a reviewable operating incident[1] that occurred on 27 July 2017 at Vales Point substation in New South Wales. This incident involved the trip of the 330 kilovolt (kV) Main busbar at Vales Point, and occurred during the removal of redundant secondary systems cabling.

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

As 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:

- The outage of the Vales Point 330 kV Main busbar and the offloading of the No.2 330/132 kV Transformer were caused by inadvertent protection operation during work on secondary systems cabling.
- There was no high voltage (HV) fault on the busbar.
- TransGrid has revised its work practices as a result of this incident to prevent a reoccurrence.
- The power system was not in a secure operating state for 19 minutes.

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 TransGrid[3] and from AEMO Energy Management Systems.

National Electricity Market (NEM) time (Australian Eastern Standard Time) is used in this report.

2. THE INCIDENT

At 0758 hrs on Thursday 27 July 2017, the Vales Point 330 kV Main busbar tripped during removal of redundant secondary systems cabling as part of the ongoing rebuild project of the substation. No transmission lines were offloaded. Refer to Appendix A for a diagram illustrating the power system immediately after the incident.

At 0959 hrs on the same day, while the busbar was still out of service, the Vales Point Generating Unit 6 tripped from approximately 340 megawatts (MW), resulting in the off-loading of the Munmorah – Vales Point 330 kV 23 transmission line (23 line) due to the ongoing outage of the busbar.

The Vales Point 330 kV Main busbar was returned to service at 1018 hrs.

At 1113 hrs on the same day, circuit breaker (CB) 5422 opened, offloading the No.2 Transformer in the Vales Point substation. CB 5422 was returned to service at 1203 hrs.

No load or generation was lost as a result of the trip of the Main busbar or the No.2 Transformer.

The reason for investigating this incident is that the probability of a busbar fault is very low, and is thereby an unexpected event known in power system security terms as a non-credible contingency.[4]

3. TRANSGRID INVESTIGATION

The following is based on information provided by TransGrid as transmission network service provider (TNSP) of the area in question.

[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] TransGrid is the transmission network service provider (TNSP) in the New South Wales region.
[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 event.

At 0758 hrs on Thursday 27 July 2017, the Main busbar at Vales Point 330 kV substation tripped. CBs 242M, 232, and 922 opened. CB 222M was already out of service at the time for planned maintenance work.

A review of the sequence of events indicated this incident was initiated by a direct trip from the busbar local backup protection scheme. Following investigations at the site, the busbar was returned to service at 1018 hrs after confirmation that there was no HV fault on the busbar.

At 0958 hrs, while the Main busbar was still out of service, the Vales Point Power Station Unit 6 tripped, opening CBs 5062 and 5262, resulting in the off-loading of 23 Line This trip was initiated from the Vales Point Power Station, and was unrelated to the trip of the Main busbar.

The Main busbar was returned to service at 1018 hrs on 27 July 2017.

At 1113 hrs, CB 5422 opened unexpectedly, offloading the No.2 330/132 kV transformer. CB 5422 was returned to service at 1203 hrs on 27 July 2017.

At Vales Point substation, there is an ongoing project to rebuild half the Switchyard and install new control buildings and associated services. As part of this project, the existing main busbar protection schemes had earlier been transferred to a new scheme, and the redundant cabling was in the process of being removed.

The trip at 0758 hrs was caused by site staff cutting a cable between the Main Busbar Protection Panel and the decommissioned Local Backup Timing Panel. Although this cable had earlier been disconnected from the busbar protection panel, it remained connected to the decommissioned Local Back-up Timing Panel. The cutting of this cable shorted cores within the cable and initiated the Local Backup trip.

The trip of CB 5422 at 1113 hrs was caused by site staff attempting to remove a cable within the old No.2 Transformer protection panels.

All work on site was stopped immediately, pending investigation. The work program was revised such that no cable removal tasks would take place until the whole busbar and protection schemes had been recommissioned into their final configuration. Work on site was allowed to recommence the following Monday 31 July 2017.

Staff were also to be retrained in the processes for identification, proving isolations, and removal of redundant cables prior to recommencing cable removal.

4. POWER SYSTEM SECURITY

AEMO is responsible for power system security in the 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.[5]

This section assesses how AEMO managed power system security over the course of this incident.

The power system remained in a secure operating state following the trip of the Main busbar at 0758 hrs, and no action was required by AEMO.

With the offloading of 23 line at 0958 hrs, a trip of the Tuggerah to Sydney North 330 kV 21 line could have resulted in overloading in the 132 kV Sydney network. As such, AEMO asked TransGrid to investigate with AusGrid[6] the potential to split the 132 kV network. However, the Vales Point 330 kV Main busbar, and consequently 23 Line, were returned to service at 1018 hrs, 19 minutes after the offloading of 23 Line. This action returned the power system to a secure operating state.

No constraints were required to maintain power system security over the course of the incident.

[5] 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
[6] AusGrid is the Distribution Network Service Provider for the Sydney region.

4.1 Reclassification

AEMO assessed whether or not to reclassify the event as a credible contingency.[7]

For this incident, AEMO received information from TransGrid at about 0840 hrs, and was satisfied that the cause had been identified and the incident was unlikely to reoccur.

AEMO issued Market Notice 58877 at 0906 hrs to notify the market that the incident would not be reclassified as a credible contingency.

For the trip of the Vales Point busbar, the power system remained in a secure operating state. The power system was not in a secure operating state for 19 minutes as a result of the offloading of 23 Line.

AEMO correctly assessed the incident and did not reclassify the incident as a credible contingency, and appropriate notifications were issued.

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[8] over the course of this incident.

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

- A non-credible contingency event - notify within two hours of the event.[9]
  - AEMO issued Market Notice 58876 at 0811 hrs, 13 minutes after the event
- Updates to the non-credible contingency event – as information becomes available.[10]
  - AEMO issued Market Notice 58877 at 0906 hrs, 68 minutes after the event, to notify the market that the cause of the incident had been identified and it would not be reclassified as credible.

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:

- The outage of the Vales Point 330 kV Main busbar and the offloading of the No.2 330/132 kV Transformer were caused by inadvertent protection operation during work on secondary systems cabling.
- There was no high voltage fault on the busbar.
- TransGrid has revised its work practices as a result of this incident to prevent a reoccurrence.
- The power system was not in a secure operating state for 19 minutes.

[7] 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.

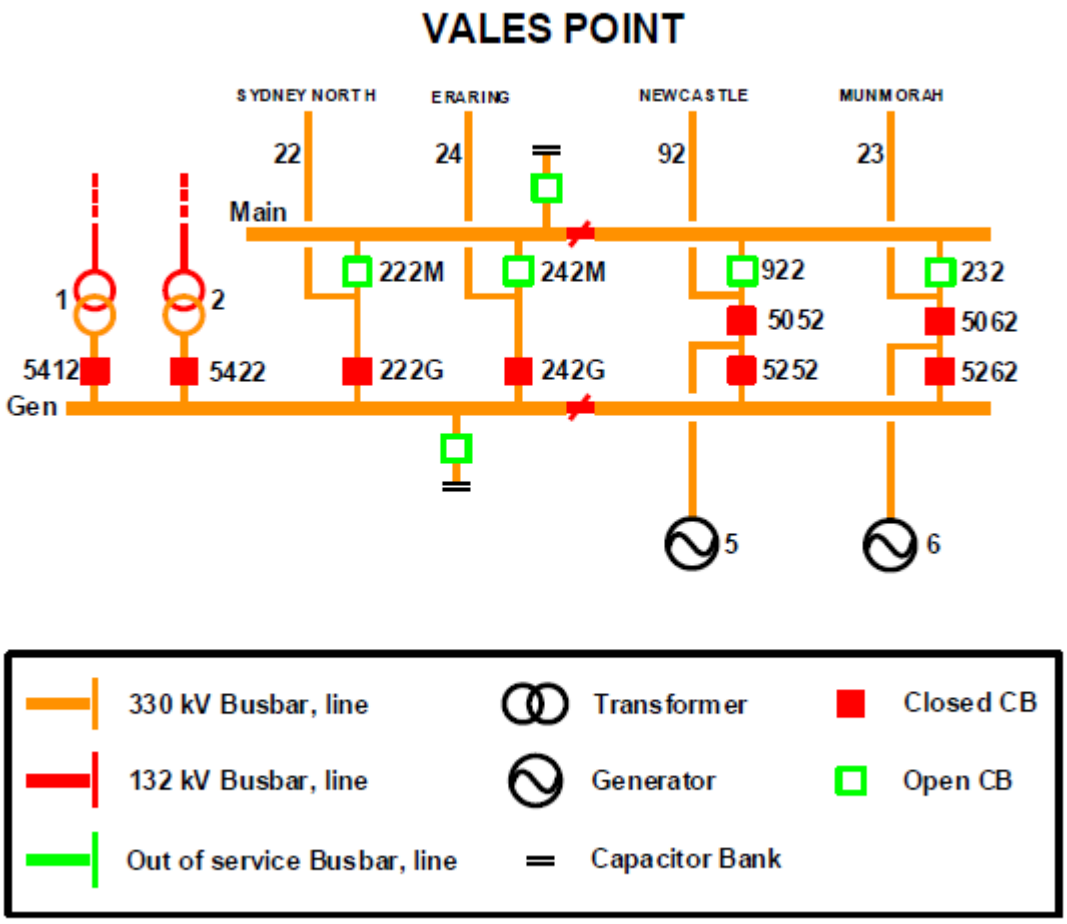
[8] AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see AEMO website: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Market-notices-and-events.

[9] 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.

[10] AEMO is required to notify the Market as it becomes aware of new and material information – NER Clause 4.2.3A(d).

APPENDIX A. POWER SYSTEM DIAGRAM

The figure below shows the power system immediately after the trip of the busbar at 0758 hrs.



Note: this particular configuration of the substation is due to the ongoing rebuild project, and was in effect between 15 June 2017 and 2 August 2017.