

POWER SYSTEM OPERATING INCIDENT REPORT – SYDNEY WEST 330KV B1 BUSBAR TRIP ON 10 DECEMBER 2012

PREPARED BY: System Performance and Commercial

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FINAL

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Abbreviations and Symbols

Abbreviation	Term
kV	Kilovolt
MW	Megawatt
NEM	National Electricity Market

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Incident summary

Date and time of incident	10 December 2012 at 1002 hrs
Region of incident	New South Wales
Affected regions	New South Wales
Event type	BB - Busbar trip
Primary cause	PTN & CTR - Protection and Control
Impact	Nil
Associated reports	Nil

1 Introduction

At 1002 hrs on 10 December 2012, section 1 of the 330 kV B busbar (B1) at Sydney West 330/132 kV substation in New South Wales tripped. There was no high voltage fault present on the network at the time of the incident. The busbar was returned to service at 1102 hrs, and there was no loss of generation or customer load.

This report has been prepared under clause 4.8.15 (c) of the National Electricity Rules (NER) 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.

This report is largely based upon information provided by TransGrid. Data from AEMO's Energy Management System (EMS) and Electricity Market Management System (EMMS) has also been used in analysing the incident.

All references to time in this report are to National Electricity Market time (Australian Eastern Standard Time).

2 Pre-Contingent System Conditions

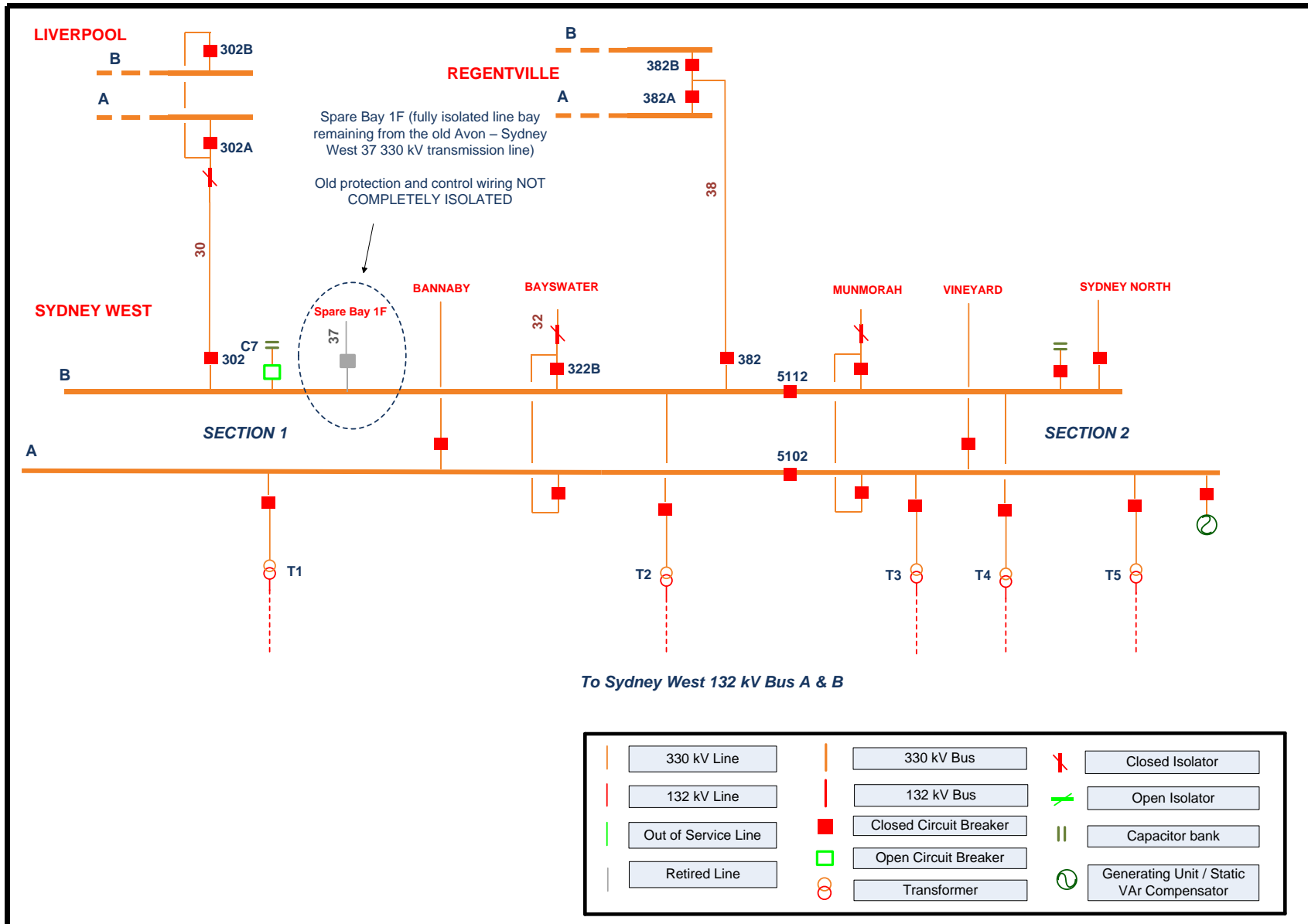
The status of the power system prior to the incident is shown in Figure 1. For clarity only equipment relevant to this incident has been included in the diagram.

Note that the C7 Capacitor was disconnected from the B1 330 kV busbar at Sydney West prior to the incident.

On the morning of the incident, work was being carried out in the 330 kV switchyard at Sydney West substation to remove the line bay of the retired Avon – Sydney West 37 330 kV transmission line (Spare Bay 1F) to make room for a new line bay.¹

¹ Prior to this, as part of an augmentation project the Avon – Sydney West 37 330kV transmission line had been disconnected from Sydney West leaving some bay equipment and associated protection and control wiring remaining. Both protection and control wiring were still partly energised post these works.

Figure 1 - Status of the power system prior to the busbar trip



3 Summary of Events

The following is a summary of events

Time	Events
1002 hrs	B1 330kV busbar at Sydney West tripped
1021 hrs	AEMO issued Market Notice No 40625 advising of the non credible contingency and associated constraints invoked
1059 hrs	Transgrid advised AEMO of the cause of the trip
1102 hrs	B1 330kV busbar at Sydney West returned to service
1103 – 1114 hrs	Sydney West – Bayswater 32, Sydney West – Regentville 38, Sydney West – Liverpool 30 330kV transmission lines and T2 330/132kV transformer returned to service
1120 hrs	AEMO revokes constraints
1131 hrs	AEMO issues Market Notice No. 40628 advising the market that the cause of the trip has been identified and the B1 330kV busbar at Sydney West has been returned to service

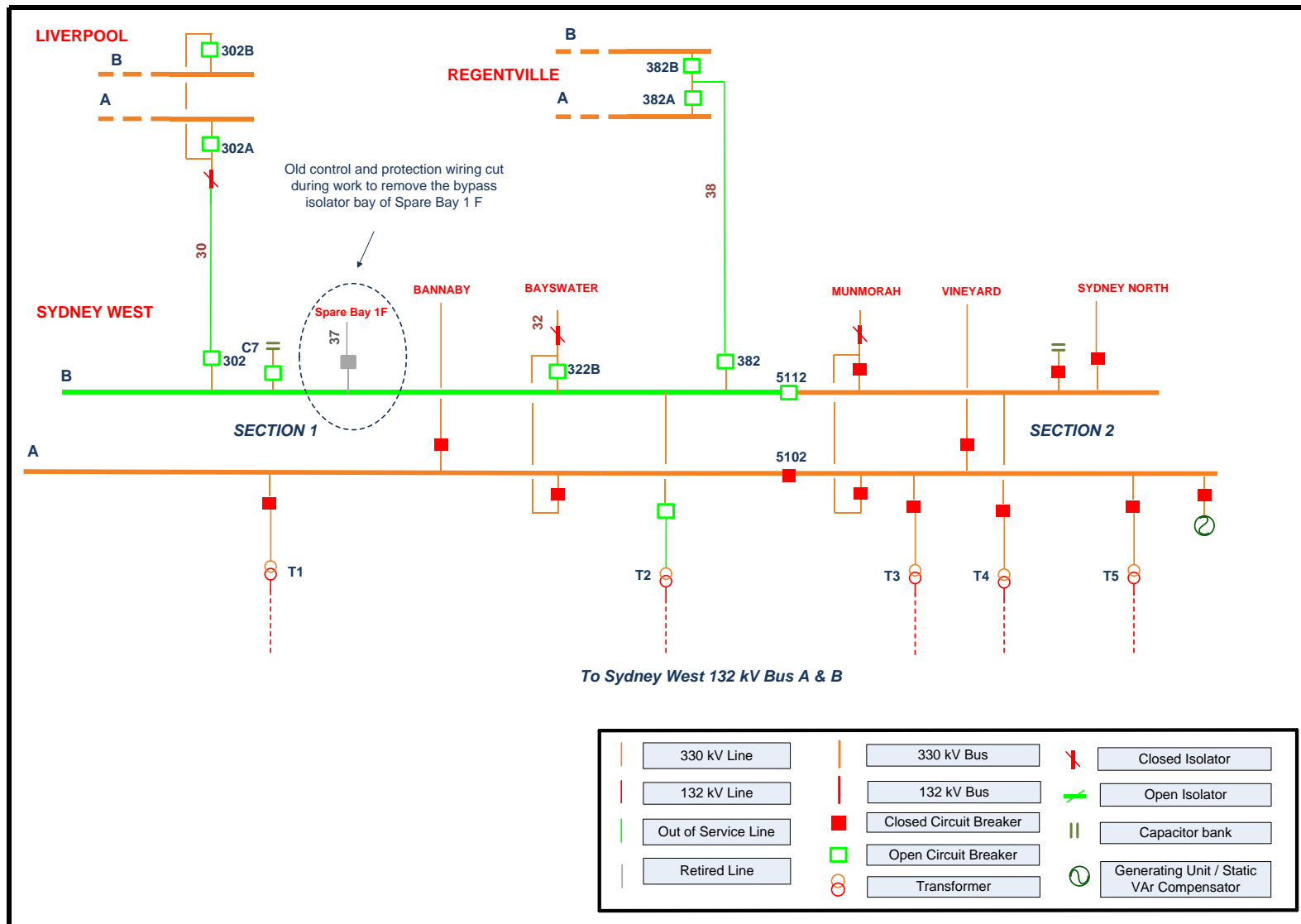
At 1002 hrs on the 10 December 2012, old protection and control wiring associated with the line bay of the retired Avon – Sydney West 37 330 kV transmission line (Spare Bay 1F) at Sydney West was cut during work to remove the line bypass isolator bay of Spare Bay 1F.²

Cutting the wiring resulted in a trip signal being sent to the B1 330 kV Sydney West busbar protection, tripping the busbar. The Sydney West – Liverpool 30 and the Sydney West – Regentville 38 330 kV transmission lines and the T2 330/132 kV transformer were off-loaded as a result of the busbar trip. The circuit breakers at the remote ends of each of these transmission lines also opened, de-energising these transmission lines³. The Sydney West – Bayswater 32 330 kV transmission line remained on-load via section 1 of the 330 kV A busbar. Figure 2 shows the status of relevant circuit breakers and transmission lines after the busbar tripped.

² During prior work on the line bay of the retired Avon – Sydney West 37 330 kV transmission line (Spare Bay 1F), both protection and control were not fully isolated.

³ This was confirmed to be consistent with TransGrid standard practise. When a busbar trip occurs intertrip signals are sent to the remote ends of transmission lines connected to the tripped busbar.

Figure 2 - Status of the power system immediately after the incident



4 Immediate Actions Taken

At 1005 hrs, TransGrid confirmed the trip of the B1 330 kV busbar at Sydney West and advised that they were investigating the cause.

At 1010 hrs, AEMO invoked the outage constraint set N-LPSW30+RGSW38.

At 1021 hrs, AEMO issued Electricity Market Notice No. 40625 advising of the occurrence of a non-credible contingency in NSW and the disconnection of the Sydney West – Liverpool 30 and Sydney West – Regentville 38 330 kV transmission lines.

At 1059 hrs, TransGrid advised AEMO that the cause of the busbar trip was attributed to old protection and control wiring that had not been fully isolated in prior works. TransGrid advised that it was during the removal of the old Avon – Sydney West 37 330 kV transmission line bypass isolator bay, that required the old protection and control wiring to be cut, that the trip occurred. TransGrid advised that the cause of the trip had been rectified and was unlikely to occur again.

5 Follow-up Actions

At 1100 hrs, TransGrid advised AEMO that the B1 330kV busbar at Sydney West was ready for service.

At 1102 hrs, the B1 330 kV busbar at Sydney West was returned to service. Following this, at 1103 hrs the Sydney West – Bayswater 32 330 kV transmission line was reconnected to the B1 330 kV busbar and the T2 330/132 kV transformer was returned to service.

At 1109 hrs, the Sydney West – Regentville 38 330 kV transmission line was returned to service.

At 1114 hrs, the Sydney West – Liverpool 30 330 kV transmission line was returned to service.

At 1120 hrs, with the Sydney West – Regentville 38 and Sydney West – Liverpool 30 330 kV transmission lines successfully returned to service, AEMO revoked the outage contingency set N-LPSW30+RGSW38.

At 1131 hrs AEMO issued Electricity Market Notice No. 40628 advising that the cause of the trip of the B1 330 kV busbar at Sydney West had been identified, that AEMO was satisfied another occurrence of this event was unlikely under the current circumstances, and that in accordance with section 12 of its Power System Security Guidelines⁴ AEMO would not be reclassifying this event as a credible contingency event.

6 Power System Security Assessment

The power system voltages and frequencies remained within the normal operating bands and the power system remained in a secure operating state throughout the incident.

7 Conclusions

The trip of the B1 330 kV busbar at Sydney West on the 10 December 2012 occurred when work involving redundant protection and control wiring at Sydney West substation initiated operation of a protection scheme. The protection and control wiring had not been fully isolated prior to the work. There was no loss of generation or customer load as a result of this incident.

AEMO is satisfied that TransGrid has carried out the appropriate work to mitigate the risk of a similar incident occurring in the future.

⁴ AEMO, Available <http://www.aemo.com.au/Electricity/Policies-and-Procedures/System-Operating-Procedures/Power-System-Security-Guidelines-SOOP>. Viewed 15 January 2012

AEMO correctly applied the criteria published in section 12 of its Power System Security Guidelines in assessing that the circumstances of this incident did not warrant reclassifying similar incidents as a credible contingency event.

8 Recommendations

There are no recommendations associated with this incident.