Sydney Trains
Electricity
Distribution Unit

Electricity Network Safety Management System Performance Report

2023 – 2024

TRIM: DSYD/198703

https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/sydney-trains-electricity-network-safety-management-system

NSW GOVERNMENT

Version control

Version	*Date*	*Comment*
1.0	14 October 2024	First Issue

Contents

1 Annual Performance Report

1.1 Introduction

This report presents the performance achieved by Sydney Trains' Electricity Network Safety Management System (ENSMS) produced in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014 and based on the template provided by the regulator (IPART) in their Electricity Networks Reporting Manual, September 2022.

- The reporting period for the ENSMS performance (A.1...A.15) is 1 July 2023 to 30 June 2024
- The reporting period for bushfire preparedness (B.1...B.4) is 1 October 2023 to 30 September 2024.

Overall, the safety performance for 2023-24 presents a similar result to the previous year with incident rates lower than the long-term average. There is a concern related to the increased vegetation growth versus the risks arising from fall-ins and fire ignitions. In response to this concern, Sydney Trains has completed all planned vegetation activities in accordance with the target dates.

Over the last 10 years there has been an improvement in the condition of the network, confirmed by the asset failure rates lower than the long-term average. Sydney Trains delivered a maintenance program that took place every weekend in 2023/24 to perform several years' worth of maintenance works across the rail network by rostering additional crews into the task.

There has been a recent increase in unauthorised access and copper theft; potential controls are being investigated.

1.2 Context

Sydney Trains is the operator and maintainer of the electric passenger heavy-rail network throughout the greater metropolitan Sydney region as shown on Sydney Trains website at https://www.transport.nsw.gov.au/data-and-research/passenger-travel/train-patronage/train-loads/train-loads-sydney-trains-network

As an essential part of this enterprise, Sydney Trains operates a high-voltage electricity distribution network which provides reliable power to the railway assets including traction for the rolling stock, signalling and other infrastructure necessary for the safe operation of the railway.

In this context the "customer" is the railway network operation - Sydney Trains does not supply electricity to retail customers outside the rail corridor.

1.3 High-voltage distribution network scope

The high-voltage distribution network comprises electricity assets between "bulk supply points" (where electricity is received from other Electrical Network Operators and distributed throughout our network to substations for the provision of traction power (1500VDC) and Signalling and station low-voltage.

Table A.2 includes electric shock and fatalities from low voltage (LV, 1500VDC as well as high-voltage (HV)).

Tables A.3-A.15 include data for the HV distribution network only; data is excluded for assets that do not form part of the HV distribution network, such as:

- 1500VDC traction assets
- Rolling stock
- Rail infrastructure, signalling, voice/data communications systems and facilities.

1.4 Data source

The performance statistics are extracted from Sydney Trains Enterprise Asset Management (EAM) system for the year ending 30 June 2024. EAM is a single system developed to satisfy the needs of the whole railway enterprise and support long-term trend analysis; hence there are limitations on the data available for this report and in some tables the categorisations used do not entirely match those in the IPART manual.

2 Summary of Safety Performance Statistics

Incident statistics are reported in four groups as required by the IPART Reporting Manual, as depicted in figure 1 below.

Tier 1 and Tier 2 performance measures, which are lagging indicators, align with the network operator's incident reporting requirements and the objectives of the ESSNM Regulation. They are relevant to all network operators and reflect the outcomes achieved from the actions taken to manage risks associated with the regulatory objectives.

Tier 3 and Tier 4 performance measures, which are leading indicators, are also aligned with incident reporting requirements (where applicable) and are intended to monitor the risk controls that each network operator has put in place as articulated through its SMS Formal Safety Assessments. Tier 4 measures are leading indicators that monitor operational activities associated with maintaining the control environment. Tier 3 measures are leading indicators that signal the potential for a Tier 1 or 2 incident to occur.

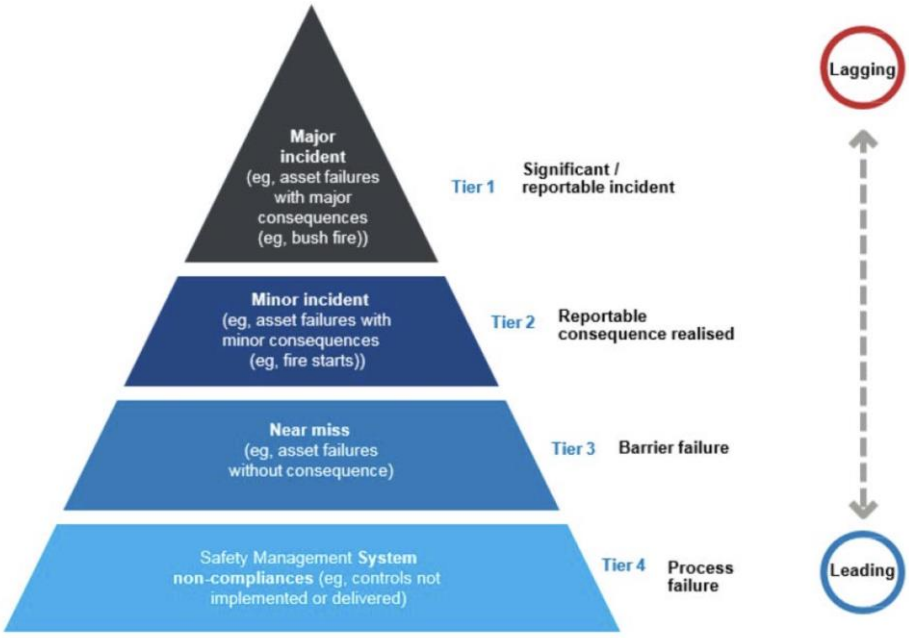

Figure 1 - Incident Tiers defined by IPART

Tier		Refer	Summary of Performance Statistics – 2023-24
1	Major incidents with consequences >$500k	Table A.1	None
2	Minor incident - reportable consequence realised	Table A.2	None
3	Barrier failure – asset failures without consequence and control failure near misses	Tables A.3 – A.5	There has been a substantial increase in copper theft incidents in the reporting period.
4	Process failure – controls not implemented or delivered	Tables A.9-A.15	As per tables pp 10-11

A.1 - Major Incidents

Tier 1 incidents are defined as a 'Major Incident' in accordance with the Electricity networks reporting manual – Incident reporting (Reporting Manual - Incident Reporting).

ESSNM Objective		Description of each major incident reported
Safety of members of the public		None
Safety of persons working on the network		None
Protection of property	Third-party property	None
	Network property [A]	None
Safety risks arising from loss of electricity supply [B]		None

Notes:

A. For the purpose of this report, a "major incident" involves losses exceeding $500,000 in relation to damage caused to electricity works as defined in the IPART Reporting Manual.

B. As defined for major reliability incidents in IPART's Reporting Manual.

A.2 – Safety Incidents

Tier 2 incidents are defined as an 'Incident' in accordance with the IPART Reporting Manual - Incident Reporting.

ESSNM Objective		Description of each major incident reported
Safety of members of the public	0	
Safety of persons working on the network	0	
Protection of third-party property	0	
Safety risks arising from loss of electricity supply	0	

A.3 - Network asset failures

Performance Measure	Population	5-year average annual functional failures [A,F]	Annual functional failures for reporting period					
			Unassisted			Assisted		
			No fire	Fire		No fire	Fire	
				Contained	Escaped		Contained	Escaped
Towers	0	0	0	0	0	0	0	0
Poles (including street lighting columns/poles & stay poles)	12371	2	0	0	0	0	0	0
Pole-top structures	N/A	5	0	0	0	0	0	0
Conductor - HV OH (including sub-transmission) [A, B, C]	1310	5	1	1	0	0	1[G]	0
Conductor - HV UG (including sub-transmission) [A, C]	440	3	3	0	0	0	0	0
Conductor - LV OH[A,C]	N/A	1	0	0	0	0	0	0
Conductor - LV UG[A, C]	N/A	1	0	0	0	0	0	0
Power transformers [D]	308	3	0	0	0	0	0	0
Distribution transformers	646	1	0	0	0	0	0	0
Reactive plant [E]	12	1	1	0	0	0	0	0
Switchgear - distribution (Overhead)	431	9	1	0	0	0	0	0
Switchgear - distribution (Ground based)	1737	22	9	1	0	0	0	0
Protection relays or systems	2342	8	13[H]	0	0	0	0	0
Substation SCADA system	171	4	3	0	0	0	0	0
Protection Batteries	170	4	4	0	0	0	0	0

Notes:

A. Refer Glossary for definitions and acronyms.

B. Transmission and sub-transmission voltages are generally 33kV AC nominal and above. Transmission conductors form part of a transmission network. Sub-transmission conductors form part of a distribution network.

C. Overhead service and underground service as defined in the NSW Service and Installation Rules.

D. Power Transformers are transformers where the secondary/output voltage is 5kV nominal or above.

E. Reactive plants are reactors and capacitors.

F. Average based on actuals for the past 5 years.

G. Birds on HV ariel made contact between conductors and ignited a grass fire " fire contained".

H. Includes 11 Intelligent Light Information System (ILIS) faults. As a result of ongoing failures of ILIS, a program has commenced for installation of Bus Zone protection for the switchgear with failing ILIS.

I. Excludes fire caused by others.

A.4 - Vegetation contact with conductors

Performance measure	Event count - Current reporting period	Event count 2023	Event count 2022	Event count 2021	Event count 2020
Fire starts – grow-in	0	0	0	0	0
Fire start – fall-in and blow-in	0	0	0	0	0
Interruption – grow-in	5	0	0	1	1
Interruption – Fall-in and blow-in	1	0	0	1	1

A.5 - Unintended contact, unauthorised access, and electric shocks

Detail	Event count - Current reporting period	Event count 2023	Event count 2022	Event count 2021	Event count 2020
	Electric shock and arc flash incidents				
Public	0	0	0	1	0
Public worker	0	0	0	0	0
Network Employee / contractor	1[a]	0	0[b]	1	3
Accredited Service Provider	0	0	0	0	0
Livestock or domestic pet	0	0	0	0	0
	Contact with energised overhead equipment				
Public road vehicle	0	0	0	0	2
Plant & equipment	0[c]	1[c]	0	1	3
Agricultural or other	0	0	0	0	1
Network vehicle	0	0	0	0	0
	Contact with energised underground equipment				
Plant & equipment	0	0	0	0	1
Person with hand tool	0[d]	0[d]	0[d]	1	0
	Unauthorised access				
Distribution Substations	11[g]	2	0	0	4
Towers/poles [e]	9[g]	0	0	3	2
Other (e.g. communications equipment)	0	1	0	0	0
	Safe Approach Distance				
Structure/materials infringing SAD / Easement[A]	0	1	0[f]	1	3
Network employee / contractor	0	1	0	0	4
Public	0	0	0	0	0
Public worker	0	0	0	0	0
TOTAL	**22**	**6**	**0**	**8**	**23**

Notes:

a) All electric shocks are reported except those resulting from static discharge or defibrillators, where the system is nominally extra low voltage, Low Voltage Installations or involving the DC rail traction system. Staff member received an electric shock whilst conducting pole base inspections - No Injury

b) Incidents that result in a burn or other injury requiring medical treatment resulting from exposure to an arc.

c) Events caused by network assets, network asset defects or network activities, including shocks received, are reported. Installation events not associated with network assets are not reported.

d) Includes all classes of authorised persons (network employee and network contractor).

e) Does not normally include contact with a pole, pillar, distribution substation etc. unless the contact results in subsequent contact with an energised asset.

f) Includes plant and equipment packed up for travel (i.e. plant travelling on a public road to or from worksite).

g) All incidents are related to copper theft of earth wires on Pole Substations and Pole earth wire down leads.

A.6 - Quality of Supply

Sydney Trains does not collect data in respect of quality of supply for the high-voltage distribution network as the distribution network is a mesh with multiple redundancy - and dedicated to supplying the railway (i.e. signalling and rolling stock). The railway has its own standards for those which differ from consumer electricity standards.

A.7 - Network Reliability

Network reliability is measured in the form of "delay-minutes" to rolling stock for the 1500VDC supply to rolling stock; these events pose a business risk, not a safety risk. Short disruptions in the 1500VDC supplies to signalling and rolling stock are frequent events (daily) and the network includes redundancy to accommodate these with no operational impact.

A.8 - Network-initiated property damage events

Detail	Event count - Current reporting period	Event count 2023	Event count 2022	Event count 2021	Event count 2020
	Third party property (assets including vehicles, buildings, crops, livestock)				
Damage (e.g. Fire, physical impact or electrical)	0	0	0	0	0
	Network property (including non-electrical assets, vehicles, buildings)				
Damage (e.g. Fire, physical impact or electrical)	0	0	0	0	0

Note: This excludes assets destroyed in 2019-2020 bushfire season (refer ENSMS Performance Report 2019-2020 section Table A1 for details).

A.9 - Formal Safety Assessments (FSA) or Associated Risk Treatments

FSA	Amendment / Improvements
Safety risks arising from Loss of Supply	Risk accepted and transferred to strategic and tactical risk registers in 2023. Review concluded no change to the risk analysis presented in the FSA.
Safety risks to Workers and Public	Minor changes to the risk matrices to reflect organisational changes 2020-24, an update to the Enterprise Risk Matrix, additional hazards and controls identified. No changes to the likelihood, consequences or safety argument. Review concluded no change to the risk analysis as presented in the FSA
Safety risks arising from Bushfire	Minor changes to the risk matrices to reflect organisational changes 2020-24, an update to the Enterprise Risk Matrix, additional hazards and controls identified. No changes to the likelihood, consequences or safety argument. Review concluded no change to the risk analysis as presented in the FSA

A.10 - Design, construction, and commissioning

Performance Measure	Event count - Current reporting period	Event count 2023	Event count 2022	Event count 2021	Event count 2020
Project closeout reports completed	92	75	38	166	78
Project closeout reports audited Refer Table A14	0	0	0	0	0

Sydney Trains uses the number of “approved installations connected” as a metric of the changes on the network – this is the nearest equivalent to “projects” in the sense described in the IPART manual. This includes LV and HV installations by Sydney Trains, TfNSW and Technically Assured Organisations. The Electricity Distribution Unit inspects all electrical installations prior to energisation. In previous years, only project count was reported, in 2020 onwards, the report is accounting for approved installations.

A.11 - Asset inspections

Sydney Trains does not have transmission equipment.

Performance measure	Inspection tasks		Corrective action tasks Open = inspections planned and not overdue. Outstanding = inspections overdue.		
	Annual Target	Achieved	Tasks identified (all categories)	Open	Outstanding
Transmission substation	0	0	0	0	0
Zone substations	0	0	0	0	0
Distribution substation	12161	10376	0	1785	0
Transmission OH	0	0	0	0	0
Transmission UG	0	0	0	0	0
Distribution OH	3811	2266	0	1545	0
Distribution UG	111	100	0	11	0

A.12 - Inspections (vegetation) aerial or ground based

Performance measure	Population (Feeders)	Target (poles)	Achieved	Outstanding	Comments
Inspections – North Region	33 Feeder	2302	2302	0	
Inspections – Blue Mountains	23 Feeders	2064	2064	0	
Inspections – South & Illawarra	13 Feeders	721	721	0	
Inspections - Metropolitan	0 Feeders	0	0	0	
Inspections - Total	69 Feeders	5087	5087	0	

Sydney Trains has completed its inspection program as-on 30 September, with zero inspections outstanding. The “regions” above refer to the maintenance territories. Within the metropolitan region Sydney Trains has no aerial lines in bushfire-prone areas.

A.13 - Public electrical safety activities

Network operator public safety programs / campaigns	Details
Public Safety	Rail Safety Week 2024 included sessions for electrical safety awareness for the general public and ordinary persons (i.e. workers across the transport cluster without electrical accreditation).

A.14 - Internal audits performed on any aspect of the ENSMS

Audit scope	Identified non-conformances	Actions
Electrical Isolation Planning Procedure	None	None
Asset Acceptance (handover) Electrical Distribution Network – External Projects	1	Update Asset Handover for Maintenance Procedure to address issues of handover misalignment (Completed)

A.15 - External audits performed on any aspect of the ENSMS

Audit scope	Identified non-conformance	Actions
As per IPART notification Reference #D23/7010 Conducted by Kellogg Brown & Root Pty Ltd	None	All issues arising from the audit have been addressed in accordance with our ENSMS as of 05 September 2024. • 11 Other Issues of Note • 4 Non-Compliant (Non-Material) • 4 Existing Defects • 1 non-compliant structure under feeder easement Department of Education removed Blaxland PS Metal structure under aerial lines, installed insulated panels in fence line

3 Bushfire Preparedness Status

3.1 Bushfire risk profile across network operator's supply area

Sydney Trains has mapped its electricity distribution network (figure 2, below) and assessed the risk present at each pole location, based on the local conditions (local terrain, vegetation, soil type, wind) and the proximity of urban development potentially at risk. The risk is assigned a priority (1 = highest, 4 = lowest) at each pole and used to prioritise the planning of inspections, maintenance and the treatment of hazard trees. This includes both the **risk from** fires caused by network assets to external property and lives, as well as the **risk to** the network (with the potential to disrupt rail services and destroy assets) from external fires. Figures 2A and 2B (below and next page) provide an overview of the average season bushfire risk profile for the network. The colour coding represents risk (blue lowest, red highest).

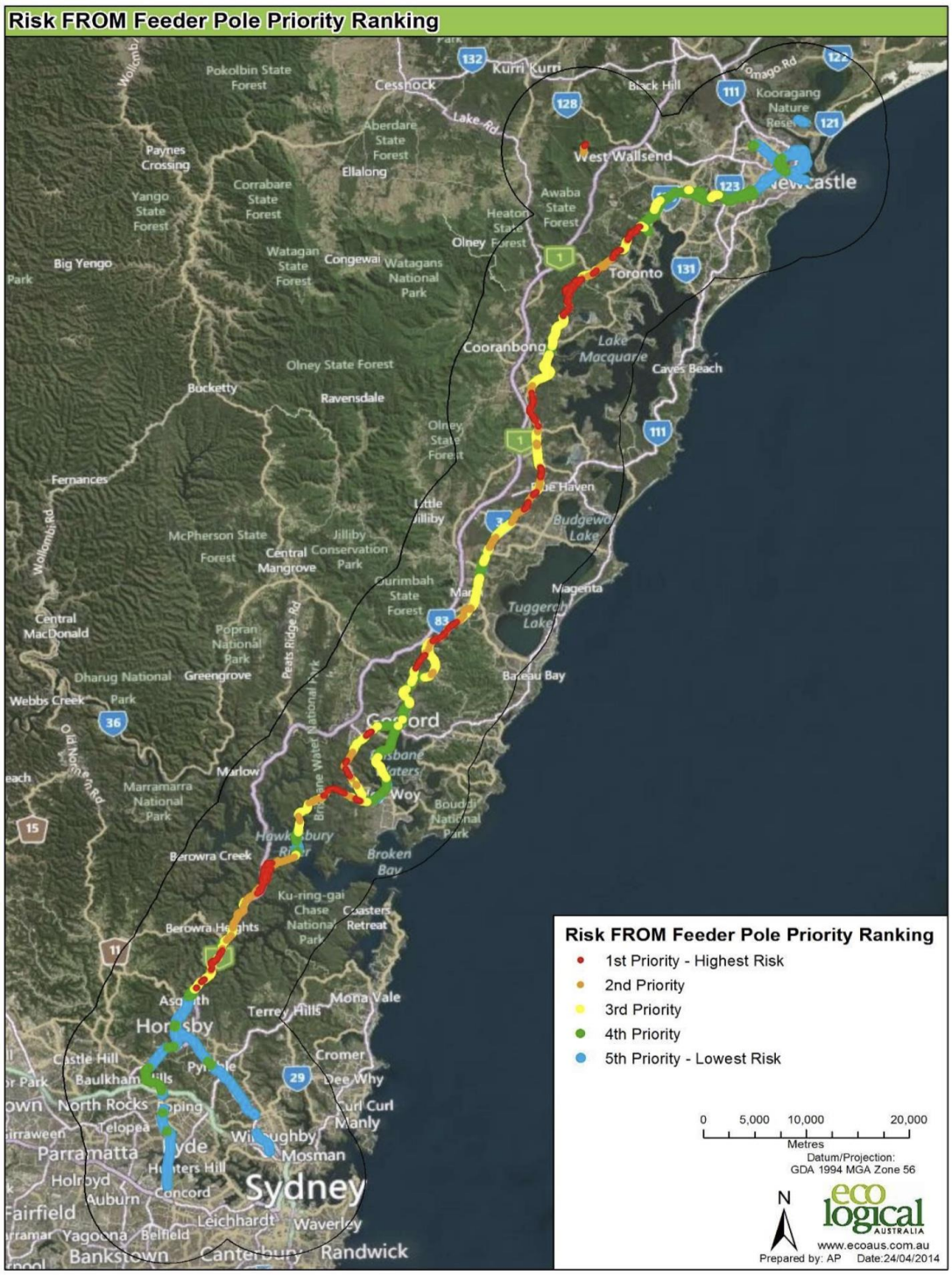

Figure 2A. Map of the bushfire risk profile of the Northern region.

Key risk areas include:

- In the North, pockets of elevated risk where the feeder routes pass through or adjacent to the blue-gum forest at Cheltenham, Lane-Cove National Park, and national parks between Asquith and Woy-Woy;
- In the West, the risk extends from Emu Plains to the outskirts of Lithgow.
- In the South, where the feeder routes pass through Royal National Park and small pockets of dense vegetation near Stanwell Park.
- Along the Illawarra route - is a mid-range risk in one small area, but generally the risk is not as high as it is further inland.

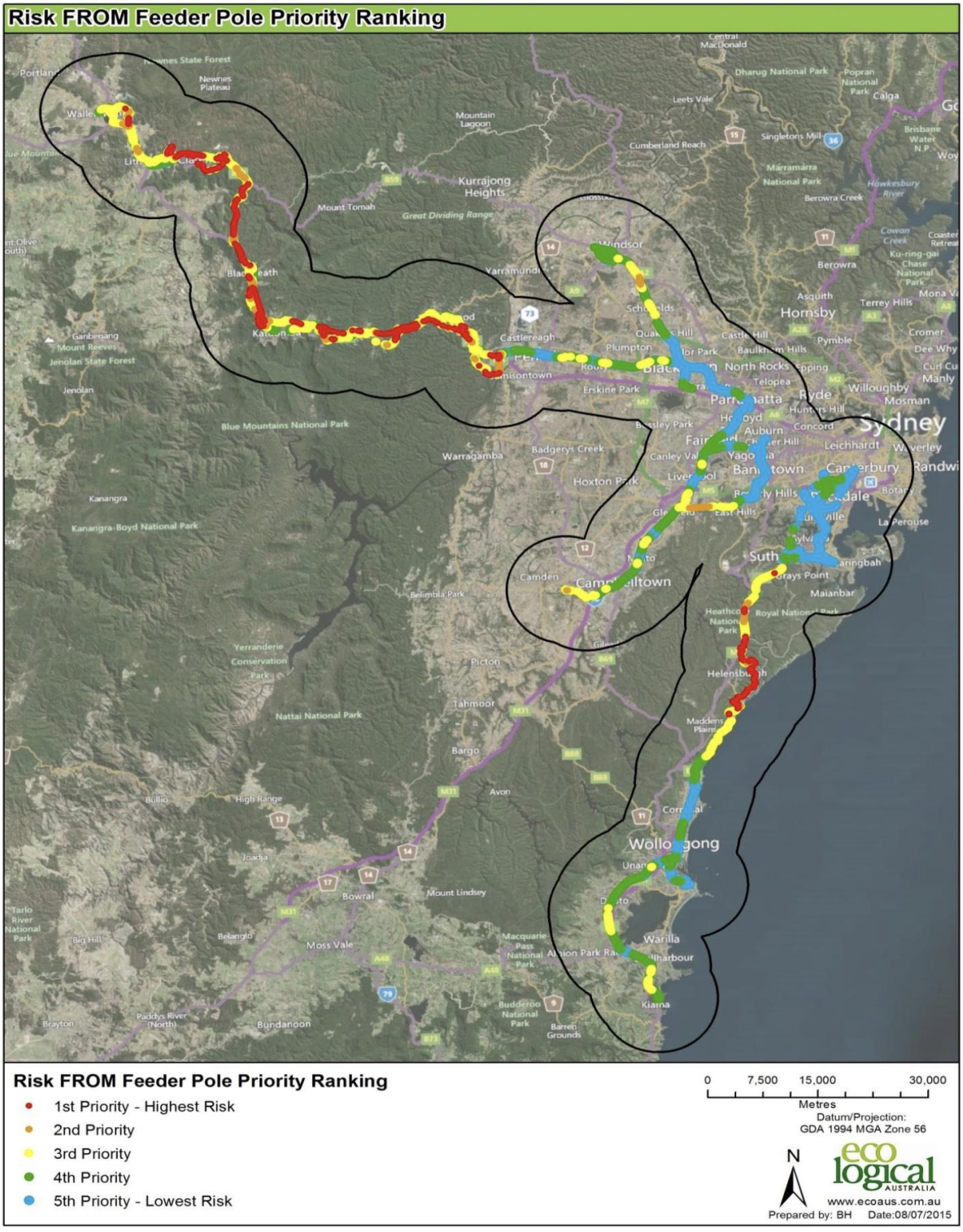

Figure 2B. Map of the bushfire risk profile of the Sydney Trains network.

3.2 Bushfire risk management

Bushfire risk management activities are detailed in Sydney Trains Bushfire Risk Management Plan, published on RAILSAFE. There are three key aspects:

- Periodic inspections of the assets to identify potentially hazardous conditions or defects.
- Periodic inspection of the vegetation to identify:
    - trees near aerial lines
    - ground-level vegetation around poles
    - hazard trees with the potential to fall or drop branches on aerial lines.
- Planned removal of the defects identified.

Sydney Trains defect targets are:

- Zero defects outstanding in priority 1 or 2 locations by 30 September.
- Zero defects (other categories) outstanding by 15 December.

3.3 Declaration of areas by Rural Fire Service and network operator's actions

Sydney Trains did not receive any directions from the Rural Fire Service in the reporting period.

B.1 - Aerial consumer mains on bush fire prone private land

Sydney Trains has no private LV lines on private land and no HV customers.

B.2 - Pre-summer bushfire inspections

Performance measure	Population (Feeders)	Target (poles)	Achieved	Outstanding
Inspections – North Region	33 Feeder	2302	2302	0
Inspections – Blue Mountains	23 Feeders	2064	2064	0
Inspections – South & Illawarra	13 Feeders	721	721	0
Inspections - Metropolitan	0 Feeders	0	0	0
Inspections - Total	69 Feeders	5087	5087	0

B.3 - Vegetation Tasks

Region **Open =** inspections planned and not overdue, **Outstanding =** inspections overdue.	**Vegetation Defects - by bushfire risk priority**			
	1 (worst) Defects to be completed between 1-7 days	**2** Defects that are to be completed between 8-31 days.	**3-4** Defects to be completed after 31 days or more.	**Hazard Trees**
North - Central Coast				
Open	0	0	0	163
Outstanding	0	0	0	0
Blue Mountains				
Open	0	0	0	58
Outstanding	0	0	0	0
South & Illawarra				
Open	0	0	0	2
Outstanding	0	0	0	0
Metropolitan				
Open	0	0	0	0
Outstanding	0	0	0	0
Defects - Total	0	0	0	221

All open hazard trees are planned to be treated by 30 November 2024 and all vegetation defects are planned to be completed by 15 December 2024. Hazard Trees are all planned to be removed within specified timeframes provided by a Level 5 Arborist.

B.4 - Network asset tasks

Region **Open =** inspections planned and not overdue, **Outstanding =** inspections overdue.	**Asset Defects - by bushfire risk priority**		
	1 (worst) Defects to be completed between 1-7 days	**2** Defects that are to be completed between 8-31 days.	**3-4** Defects to be completed after 31 days or more.
North - Central Coast			
Open	0	4[A]	118
Outstanding	0	0	5
Blue Mountains			
Open	0	1[A]	12
Outstanding	0	0	121
South & Illawarra			
Open	0	0	8
Outstanding	0	0	0
Metropolitan			
Open	0	0	23
Outstanding	0	0	0
Defects - Total	0	5	287

A. Termites treated - defect stays open for 3 months until follow up pole base assessment is completed.

Note: The defects open in priority 2 locations at that time will have been closed in October, by the time this report is published. Defects in priority 3-4 locations are planned for completion as per the rules defined by Sydney Trains defect management systems, including bushfire risk priority at the location and network reliability.

4 Notes

4.1 Glossary

The following abbreviations, acronyms and definitions are used in this report.

AS	Australian Standard
assisted failure	a functional failure of a piece of equipment where the equipment was subject to an external force or energy source against which the standards for design and maintenance do not attempt to control (see also *unassisted*)
EAM	Enterprise Asset Management (system), a whole-of-business data system adopted by Sydney Trains
ENSMS	Electricity Network Safety Management System
ESSNM	Electricity Supply (Safety and Network Management) Regulation 2014
FSA	Formal Safety Assessment
Functional Failure	Failure of equipment to perform its intended function, due to any cause. This does not include degraded conditions which require maintenance but do not compromise its primary function e.g. missing label or low oil.
HV	high voltage, nominal voltage 1kV AC and above
IPART	Independent Pricing and Regulatory Tribunal of NSW, a state government authority
LV	low voltage, nominal voltage below 1kV AC, nominal
N/A	Not Available / Not Applicable
OH	Overhead
overhead service	as defined in the NSW Service and Installation Rules
power transformers	transformers where the secondary/output voltage is 5kV nominal or above
reactive plants	includes reactors and capacitors
SAD	Safe Approach Distance
TfNSW	Transport for New South Wales, a state government authority
UG	Underground
unassisted failure	A functional failure of a piece of equipment where the cause of the failure is neither an assisted failure nor a maintenance-induced failure.
underground service	as defined in the NSW Service and Installation Rules
WHS	Workplace Health & Safety

4.2 Referenced Documents

	Electricity Supply (Safety and Network Management) Regulation 2014
	Electrical Networks Reporting Manual, IPART, September 2022
AS5577-2013	*Electricity network safety management systems*
ISSC20	*Guideline for the Management of Activities within Electricity Easements and Close to Electricity Infrastructure*

Appendix A – Endorsement

Annual ENSMS Performance Report for 2023-2024

Submitted by Sydney Trains ABN 38 284 779 682

To: The Chief Executive Officer

Independent Pricing and Regulatory Tribunal

PO Box K35

Haymarket Post Shop

NSW 1240

Sydney Trains reports as follows:

1. This report documents the performance of Sydney Trains Electricity Network Safety Management System during the year 2023-2024 with all obligations to which Sydney Trains is subject to under the Electricity Supply (Safety and Network Management) Regulation 2014.
2. This report documents compliance with bushfire preparedness requirements for the period 1 October 2023 through to 30 September 2024.
3. This report has been prepared by Sydney Trains with all due care and skill in full knowledge of conditions to which it is subject and in compliance with IPART's Electricity Network Reporting Manual.
4. This report provides information on all obligations with which Sydney Trains did not fully comply during the financial year 2023-2024.
5. This compliance report is approved by the Chief Executive:

Date: 28/10/2024

Signed: 

Name: Matt Longland

Designation: CE Sydney Trains

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