Sydney Trains
Engineering System Integrity
Engineering Instruction
Electrical Distribution Unit

EI D 25-10

Electrical Network Hazardous Conditions

This Engineering Instruction includes urgent engineering information. Adherence to the information in this Instruction is **MANDATORY**.

Date in Force: 20 August 2025

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Audience:

- All Persons Authorised to Work on the Sydney Trains Electrical Distribution and 1500 V Rail Traction Systems
- Managers of Persons working on Sydney Trains Electrical Distribution and Rail Traction System
- Asset, Interface and Project Managers

Main Points:

- Hazardous conditions shall be reported in accordance with Sydney Trains SMS Procedures.
- Hazardous conditions with an imminent risk to persons shall be reported immediately to ICON as well as reported in accordance with Sydney Trains SMS.

Primary Affected Document: RL D 79804 Electrical Safety Incidents

Document Control

Version	Date	Summary of change
1.0	20/08/2025	First issue.

Scope

This Engineering Instruction is a reminder that any hazardous condition identified in relation to the Sydney Trains Electrical Distribution or 1500 V D.C. Rail Traction Network must be recorded and managed through the Safety, Health, and Environmental Management (SHEM) system. Additionally, imminent safety hazards must be immediately reported to ICON-Electrical (9379 4911) and action taken to make safe/protected log the incident in SHEM.

Background

As an Electrical Network Operator, Sydney Trains must ensure the safety of its electrical network. This includes the safe design, construction, commissioning, operation, and decommissioning of the network and its components.

Conditions may arise within our network that pose safety hazards to workers, passengers, and the public. These hazards can stem from activities conducted by Sydney Trains or external parties that affect the safe operation of the electrical network. In such cases, Sydney Trains is obligated to take reasonable action to manage and mitigate the identified hazards, ensuring the safety of the electrical network.

Hazardous conditions that impact the safe operation of Sydney Trains Electrical Networks but are not asset defects must be addressed in accordance with the Sydney Trains Safety Management System. Examples include:

- **Unauthorised construction:** Building structures or stockpiling materials near aerial lines without prior approval.
- **Unsafe asset construction:** Designing, constructing, and installing assets without considering safe access for maintenance, exposing maintainers to hazardous electrical equipment.
- **Vegetation interference:** Planting vegetation beneath aerial lines that could grow large enough to interfere with their safe operation.
- **Encroachment risks:** Placing or constructing objects or structures that allow individuals to encroach upon hazardous electrical equipment, whether unintentionally (workers) or deliberately (unauthorised access).
- **Restricted access:** Changes obstructing, infringing or restricting access to Electrical Infrastructure, including within National Parks or easements on third-party property.
- **Ground level changes:** Altering the ground level under aerial lines or near electrical poles, both within the rail corridor and in public areas.
- **Spills:** Spills under aerial lines that create network hazards, such as grain spills attracting birds/wildlife with the potential to cause fire ignition.

Conditions classified as asset defects, rather than hazards impacting the electrical network, include:

- **Existing vegetation** encroaching the safe approach distance to electrical infrastructure.
- **Foreign objects** in contact with or near electrical infrastructure.
- **Instances of trespass or vandalism.**
- **Faults or failures** in electrical infrastructure.

These conditions are recorded in the Sydney Trains Asset Management System (EAM) as defects.

Organisational Procedure *SMS-06-OP-3028* defines the principles and methodology for managing WHS risks and are recorded using *SMS-06-FM-4107 WHS Risk Assessment Form*. Where risks cannot be eliminated, Line Managers or responsible individuals must apply the hierarchy of control principles to minimise the risks to the lowest level reasonably practicable.

After completing the initial hazard assessment and mitigation, line managers may find they are unable to permanently resolve the hazard. In such cases, the hazardous condition should be transferred to an individual accountable for managing and mitigating the hazard. Examples include:

- **TfNSW Project Works:** Hazards created by Transport for NSW project activities may be best managed by the Project Interface Manager.
- **Sydney Trains Works:** Hazards originating from Sydney Trains activities may be best managed by the Project Manager.
- **Asset conditions:** Hazards arising from asset conditions may be best managed by the Asset Manager.
- **Conditions from facility works** (e.g. Stations or Depots) may be best managed by the Facility Manager.

The transfer of a hazardous condition shall only occur following consultation and agreement between parties, and the transfer of accountability is conducted within SHEM.

All implemented and planned activities undertaken to mitigate and control a hazardous condition affecting Sydney Trains Electrical Network shall be recorded in SHEM.

The Electrical Distribution Unit (EDU) reserves the right to evaluate and direct the undertaking of any necessary measures, to ensure the safety of workers and the public from hazards arising from third-party activities impacting the electrical network.

Relevant Procedures

- SMS-06-OP-3028 Reporting and Managing Work Health and Safety (WHS) hazards
- SHEM Unsafe Acts/Unsafe Conditions
- SHEM: Report Unsafe Acts or Conditions
- SHEM: Process an Unsafe Act or Unsafe Conditions
- NMD-ME-GUI-480 - Corrective Maintenance Timeframes for Substations and Sectioning Huts
- NMD-ME-PRO-401 - Corrective Maintenance Timeframes on Aerial Line Assets
- NMD-ME-PRO-476 - Corrective Maintenance Timeframes on Overhead Wiring Assets

Action required

Persons who identify (or undertake the initial response to third party-reported) unsafe conditions impacting the safety of the electrical infrastructure shall:

- report the unsafe condition to ICON Electrical on 1800 060 015 or 9379 4911, and
- take reasonable steps to mitigate the hazard, and
- record the unsafe condition in SHEM, including actions taken to make safe.

When raising an unsafe condition in SHEM, commence the brief description with “Electrical Hazard” followed by the description of the hazard. This ensures EDU is aware of the report.

Where the hazardous condition poses an imminent risk of harm, ICON Electrical shall be contacted immediately and in consultation with either the Line Manager, Regional Electrical Engineer, Electrical Network Manager or Principle Electrical Safety Investigator, ICON-Electrical and the responsible line manager shall take appropriate action to mitigate the electrical hazard. These actions may include:

- isolation of the electrical infrastructure
- providing security on site to prevent unauthorised access to hazard
- inhibiting Auto Reclose where available (high-voltage feeders only)
- reporting the unsafe condition to the relevant electricity network operator (shared poles owned by Ausgrid or Endeavour Energy)
- installing a barrier to protect persons from the electrical hazard
- modifying the asset to address the safety hazard
- recommending that the Associate Director EDU direct the dismantling or removal of the object or thing creating the hazardous condition.

ICON Electrical staff receiving advice of an unsafe condition shall remind the person making the report to ensure the unsafe condition is registered in SHEM.

Line Managers responsible for work on or near electrical assets shall:

- assess the risk and assure themselves that the hazard is mitigated appropriately
- consult with SEQR Safety Professional when assessing the hazard
- where a hazardous condition can be addressed within their responsibility, the Line Manager shall apply the *SMS-06-OP-3026: Work Health and Safety (WHS) Risk Management* procedure
- determine the time frame to address defects and hazardous conditions in accordance with the relevant Corrective Maintenance Timeframe documents
- if a hazardous condition cannot be addressed within the timeframe or under their responsibility, they shall consult with and transfer the condition to a Line Manager who can resolve it.

All Actions taken to mitigate a Hazardous Condition affecting the Sydney Trains Electrical Networks shall be recorded in SHEM, including transfer to an appropriate Line Manager.

Contact

For further information consult with your Line Manager, SRA Professional or the Electrical Distribution Unit.

E: railelectricalsafety@transport.nsw.gov.au

RL D 79804

Electrical Safety Incidents

1 Principle

An electrical safety incident is an unplanned, undesired event that adversely affects the safety and operation of the Sydney Trains Electrical Distribution Network. Electrical Safety Incidents that occur on the electrical distribution network shall be managed consistently as per ENSR.

2 Incident Management

Sydney Trains safety incidents are managed in accordance with the Sydney Trains' safety management system.

For information relating to reporting safety-related incidents and investigating the associated incidents, refer to *SMS-17-SP-3077 Incident Notification, Reporting and Investigation*.

Sydney Trains Electrical Distribution Unit (EDU) notifies the Electrical Regulator (IPART) of Reportable Safety Incidents, Major Reportable Safety Incidents, Reportable Asset Incidents and Major Reportable Asset Incidents.

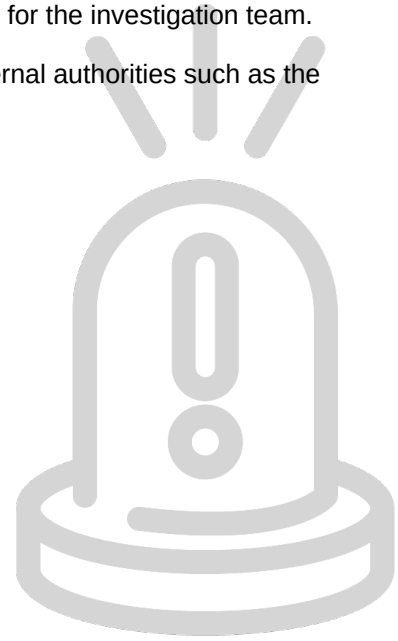
3 Investigations

The Business unit accountable for the process that involved the incident are responsible for undertaking the initial workplace (or equivalent) investigation. EDU on request will provide support to the business unit in completing the workplace (or equivalent) investigation.

The Principal Electrical Safety Investigator or another EDU investigator will attend site as required and as soon as practical for the purposes of an initial assessment and oversight of evidence collection.

Where significant or systemic (or equivalent) investigations commence, the Principal Electrical Safety Investigator provides subject matter expertise for the investigation team.

Significant incidents may also result in an investigation by external authorities such as the Office of Transport Safety Investigations (OTSI) or SafeWork.



Transport Sydney Trains

4 Emergencies

In the event of an incident requiring urgent action, where the incident might:

a. involve death or serious injury, or

b. health or safety effects, or

c. significant damage to property or infrastructure, or

d. environmental impact,

a person may take appropriate action as necessary to prevent or mitigate further danger, if they have considered it is safe to do so. In addition, apparatus may be de-energised by any person to eliminate the danger, provided it is safe to do so and ICON Electrical is to be consulted.

Workers must advise ICON Electrical as soon as practicable of electrical incidents.

ICON Electrical: 9379 4911

NOTE

The *Guide for Emergency Service Personnel accessing and operating within the Rail Corridor* (available from Sydney Trains intranet) details:

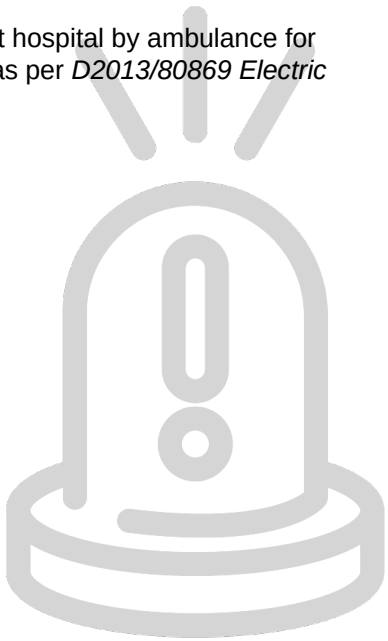
- **major hazards that could be encountered in the Rail Corridor**
- **procedures to be used before and while in the Rail Corridor, e.g. all personnel must be briefed on the dangers involved in entering the Rail Corridor.**

5 Reporting dangerous conditions and practices

When a person observes a dangerous condition or work practice in connection with the electrical equipment, the details shall be immediately reported to their line manager and ICON Electrical. The line manager shall record the details and, in conjunction with ICON Electrical, take appropriate remedial action.

6 Electric Shock

All persons receiving an electric shock are to attend the nearest hospital by ambulance for assessment, regardless of how minor the contact may appear as per *D2013/80869 Electric Shock Protocol*.



7 Emergency Procedure following contact with live overhead power lines or apparatus

(Reproduced from the SafeWork NSW Code of Practice for Work Near Overhead Power Lines)

Should contact be made with a live overhead power line or a flash-over occurs between a live overhead power line and a crane or an item of mobile plant, the following actions shall be taken:

- An attempt should be made to break the machinery's contact with the live overhead power line by moving the jib or driving the machine clear.
- If it is not possible to break the contact with the live overhead power line, the operator of the crane or mobile plant should remain inside the cabin of the crane or on the plant item. The network operator should be called immediately to isolate power to the live overhead power line. The operator must remain in place until the power has been isolated, and the 'all clear' given by the network operator.

WARNING

When a crane or item of plant inadvertently contacts overhead power lines, circuit protective devices may operate to automatically turn the power off. However some protection devices are designed to automatically reclose thereby re-energising the powerlines after a short period of time, typically 1 – 4 seconds

- Warn all other personnel and members of the public to keep 8 metres clear from the crane or item of plant. Do not touch or allow persons to touch any part of the crane or plant item and do not allow persons to approach or re-enter the vehicle until an Authorised Person has determined the site safe.

If it is essential to leave the cabin or the operator's position due to fire or other life threatening reason, then jump clear of the equipment. Do not touch the equipment and the ground at the same time. When moving away from the equipment, the operator should hop or shuffle away from the plant item (with both feet together) until at least 8 metres from the nearest part of the crane or plant. Under no circumstances run or walk from the crane or item of plant as voltage gradients passing through the ground may cause electricity to pass through the body resulting in an electric shock:

- Untrained, unequipped persons should not attempt to rescue a person receiving an electric shock. All too often secondary deaths occur because others get electrocuted trying to help earlier victims. If the crane or plant operator is immobilised, ensure the power supply has been isolated and the site has been made safe before giving assistance.

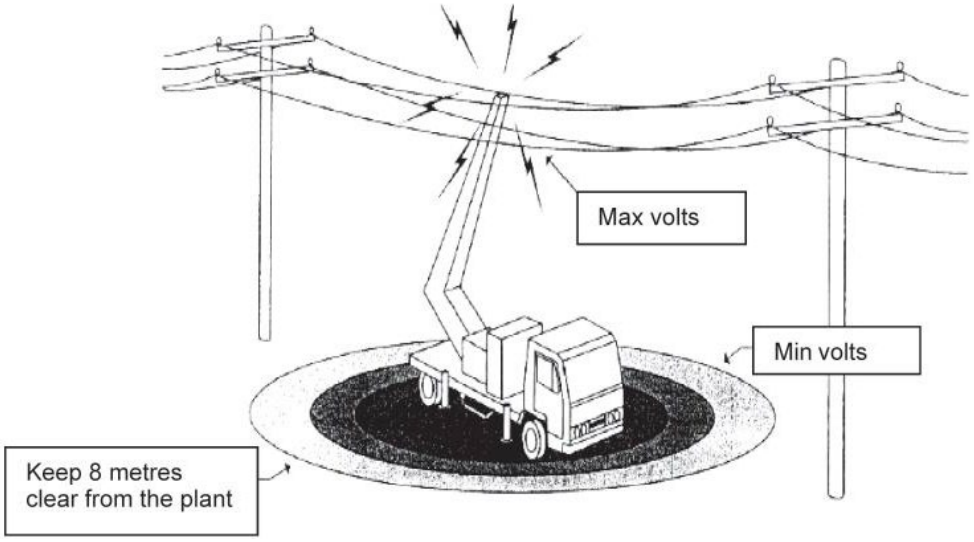


Figure 1: Affected area surrounding mobile plant when in contact with a live overhead power line

Post – incident inspection by a competent person

When a crane or item of mobile plant has been in contact with a live overhead power line, it should checked by a competent person for any damage to the components of the crane or mobile plant. Any actions recommended by the competent person are to be completed before the crane or mobile plant is returned to service.

Tyres on cranes and mobile plant that have been in contact with overhead power lines where electrical flash-over and current flow occurs through the rubber tyres should be considered as a potential hazard.

These rubber tyres may catch fire, with the obvious potential for them to explode. Additionally, a lesser known danger may occur, which results when combustion takes place within the tyre, with no apparent external signs. When excessive heat is developed in or applied to a tyre as in the case from contact with overhead power lines, it can initiate a process known as pyrolysis, which is the decomposition of a substance by heat. This can generate a build up of flammable gases and pressure within the tyre, which may ultimately rupture or explode.

Vast amounts of energy can be released by a tyre explosion, often leading to significant equipment damage, serious injuries or fatalities. Pyrolysis related explosions are very unpredictable and have been known to occur immediately or up to 24 hours after initiation. An explosion can occur where no fire is visible and the danger area can be up to 300 metres from the tyre.

Any rubber tyred crane or plant item involved in an incident where contact is made with overhead power lines which results in discharges or flash-over of electrical current through the tyres should be considered as a potential hazard. The risk should be managed by:

- parking the crane in an isolation zone, with a minimum 300 metre radius
- removing all personnel from the area, and not allowing access to isolation zone for 24 hours
- alerting fire fighting services.

8 Reference documents

D2013/80869 Electric Shock Protocol

Guide for Emergency Service Personnel accessing and operating within the Rail Corridor

RL D 79800 Electrical Network Safety Rules

SafeWork NSW Code of Practice for Work Near Overhead Power Lines

SMS-17-SP-3077 Incident Notification, Reporting and Investigation

9 Document properties

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Document Approver	Associate Director Electrical Distribution Unit
Document Authoriser	Engineering Technical Publications Manager
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Version	Date	Author/ Prin. Eng.	Summary of change
1.0	1 February 2022	ENSR Project Team	First issue as Sydney Trains document. Extracted from PR D 78000 Electrical Network Safety Rules and PR D 78101 General Requirements for Electrical Work. Reviewed as part of the ENSR Project.
1.1	9 February 2022	Wayne Halls	Added Section 7 Emergency Procedure following contact with live overhead power lines or apparatus