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RAIL INDUSTRY SAFETY AND STANDARDS BOARD

Light rail network safeworking

Code of Practice

Light rail network safeworking
Code of Practice
Draft for public comment

This Rail Industry Safety and Standards Board (RISSB) product has been developed using input from rail experts from across the Rail Industry. RISSB wishes to acknowledge the positive contribution of all subject matter experts and development group representatives who participated in the development of this product.

The RISSB Development Group for this Code of Practice consisted of representatives from the following organisations:

Yarra Trams	RBTU	Rail Assurance Consulting Australia
SNC-Lavalin Atkins	Rail Safety Consulting Australia	ALTRAC Light Rail
Torrens Connect	COTMA	Indec

Development of this Code of Practice was undertaken in accordance with RISSB's accredited processes. It was approved by the Development Group, endorsed by the Standing Committee, and approved for publication by the RISSB Board.

I commend this Code of Practice to the Australasian rail industry as it represents industry good practice and has been developed through a rigorous process.

Deb Spring

Chief Executive Officer
Rail Industry Safety and Standards Board

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Document control

Document title	Version	Date
Light rail network safeworking - Code of Practice	PC Draft	

Document history

Publication version	Date	Reason for and extent of changes
PC Draft	19/01/2022	Draft for public consultation

Approval

Name	Date
Rail Industry Safety and Standards Board	

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1 Introduction

1.1 Purpose

The purpose of this Code of Practice (CoP) is to provide rail transport operators (RTO) operating light rail networks a consistent approach to safeworking.

This Code should be read in conjunction with AS 7601.1 which provides requirements and recommendations for the management of light rail vehicle movements.

This Code is intended to be applied by all light rail operators within Australia and New Zealand.

1.2 Scope

The scope incorporates setting out principles for the safe operation of a light rail network, including:

- a) fundamental principles of safeworking ;
- b) safe operation of rolling stock, including maintenance vehicles;
- c) management of failure situations;
- d) management of access to the light rail corridor;
- e) managing works on, or in proximity to, a light rail network, including operation of on track vehicles, plant and equipment associated with those works;
- f) management of access to hazardous equipment.

1.3 Out of scope

This CoP does not include requirements, recommendations or guidance relating to:

- a) commissioning of light rail vehicles and light rail networks;
- b) training and competencies;
- c) manufacturer's internal light rail systems used only for testing and commissioning purposes;
- d) activities covered by Work, Health and Safety legislation;
- e) design of light rail networks and rolling stock;
- f) developing network procedures and instructions.¹

¹ The development and maintenance of network rules is covered in the RISSB Development and Maintenance of Network Rules Code of Practice.

1.4 Defined terms and abbreviations

Generic rail industry terms and definitions are provided in the RISSB Glossary
<https://www.rissb.com.au/products/glossary/>

Light rail specific terms are provided in AS 7601.1

junction

location where two or more light rail tracks intersect or merge

light rail network

passenger carrying rail network operating with light rail vehicles or trams, typically used in urban areas and often having a shared right-of-way with road traffic employing line of sight methods to control movements

light rail signal

signals, other than T-Lights and other traffic signals, used exclusively by LRV drivers to undertake the safe movement of an LRV

light rail vehicle

LRV

vehicle, including trams, used to transport passengers on a light rail network

LRV driver

person who operates an LRV

line of sight

movement of an LRV where the driver controls the speed of the LRV to maintain, in all circumstances, a safe distance from other light rail vehicles and other obstructions with respect to braking capability (excluding emergency brake applications)

maintenance vehicle

any vehicle used by operations in the maintaining of the light rail or tram network

network rule²

minimum mandatory requirement or an action to be adhered to by personnel working within or managing a railway network to mitigate risk

OESS

onboard energy storage system

operations control centre

location from where network operations are managed

PICOW

person in charge of work. Also known as a protection officer.

shared corridor

area where LRVs share the roadway with road and pedestrian traffic

SFAIRP

so far as is reasonably practicable

traffic signal

signal that controls vehicle and pedestrian traffic at an intersection or on a road by means of red, yellow, green or white light displays, and includes solid and arrow signals, pedestrian signals, bicycle crossing signals, B (bus) and T (tram) signals, overhead lane control signals, and twin red or yellow signals.

WOTA

work on track authority

The Macquarie Dictionary definition applies where terms are not defined within the RISSB Glossary or above.

1.5 References

1.5.1 Normative

The following documents are referenced in the body of this CoP in such a way that some of the content forms requirements for the CoP.

- AS 7472 Railway Operations – Management of Change.
- AS 7601.1 Light rail and road interfaces Part 1: Management of LRV movement

1.5.2 Informative

The following are informative references that are relevant in supporting the development of this CoP:

- AS 7717 Signal testing and commissioning
- ISO 31000 Risk management - Guidelines
- Austroads Guide to traffic management part 9: Transport control systems – strategies and operations Rail Safety National Law.
- Rail Safety National Regulations.
- RISSB Code of Practice – Development and maintenance of network rules.
- RISSB Code of Practice – Safety critical communications.
- RISSB Operational concept for the Australian railway network.
- Office of the National Rail Safety Regulator Guideline – Safety management system.
- Office of the National Rail Safety Regulator Interface Agreement fact sheet
- Harmonised Australian Network Rules – various
- RISSB Australian Rail Risk Model

² Networks rules do not include road rules which are covered in applicable legislation

2 Fundamental principles

The safe operation of light rail networks shall be based on the following fundamental principles:

- a) Separation of LRVs.
- b) LRV and infrastructure operational interfaces.
- c) Separation of LRVs and rail safety workers.
- d) Separation of LRVs and non-rail safety workers.
- e) Separation of hazardous equipment and unauthorised persons.

Further detail on these principles are provided within this Code.

Development of network rules shall be based on safe so far as is reasonably practicable (SFAIRP) principles, reflecting risks as assessed by the RTO.

These fundamental operating principles shall be addressed through the development and maintenance of network rules, policies and procedures. Guidance on the development of network rules is provided in the RISSB Code of Practice – Development and maintenance of network rules.

3 Separation of light rail vehicles

3.1 General operating principles

RTOs shall develop policies, network rules, and procedures to prevent collision between LRVs. This includes:

- a) following moves;
- b) opposing moves;
- c) reversing moves
- d) conflicting moves;
- e) permissive moves;
- f) network operations;
- g) degraded working;
- h) emergency situations.

In shared corridors RTOs should align policies, network rules, and procedures with road rules applicable to the shared corridor.

3.2 Following moves

LRVs shall maintain a safe distance when travelling in the same direction through either:

- a) line of sight with sufficient braking distance to an established minimum separation point; or
- b) a block system.

Further information is provided in AS 7601.1

3.3 Opposing moves

Conflicting moves between opposing LRVs can be prevented by:

- a) separation of routes using double lines;
- b) block separation until opposing move vacates the line.

RTOs shall establish network rules and procedures for managing conflicting opposing moves. This may include operations at:

- a) terminal locations;
- b) bidirectional single line sections;
- c) location where LRVs could travel in the wrong direction on double line sections (due to failures, etc).

Bi-direction single lines shall be managed in accordance with AS 7601.1

3.4 Reversing and shunting moves

3.4.1 Reversing moves

Reversing moves are those where an LRV moves in a direction against the normal flow of traffic.

Collision between a reversing LRV and an LRV travelling in the normal direction shall be managed through:

- a) maintaining a safe line of sight distance;
- b) maintaining a safe distance between opposing LRVs;
- c) communication between both LRV drivers.

The network control officer may also assist by providing direction to LRV drivers.

In fault situations it could be necessary to move an LRV in the wrong direction whilst driving from the trailing / rear cab. RTOs shall establish rules and procedures for safely operating LRV from the trailing / remote cab. This should include using a 2nd person at the leading end of the LRV directing the LRV driver.

3.4.2 Shunting moves

Collision between LRVs can occur in depots and yards where LRVs are moved between tracks. Shunting could also include non-passenger carrying moves at terminal locations.

Shunting may also be conducted using remote controlled vehicles or other assisting vehicles. These vehicles shall have specific policies and procedures to cover operation, both in depots and on the light rail network.

To reduce the risk of collision the RTO shall have network rules and procedures to prevent following and/or opposing LRVs colliding with the shunting LRV. This may include:

- a) LRV drivers always operating from the lead cab unless in a fault situation, in which case only with the guidance of a 2nd person;
- b) having a defined location at which following / opposing LRV are restrained until the shunt move is complete. The defined location may be denoted by line marking, sign, or signal.

In larger yards and depots LRV moves may be managed locally by a person in a network control officer role.

3.5 Conflicting moves

At junctions and other locations encompassing points and crossings there is a risk of collision between LRVs.

To mitigate this risk, movement of LRVs at light rail track junctions shall be managed to avoid derailments and / or collisions between LRVs and road vehicles (where applicable). This shall include network rules clearly defining how movements at junctions and crossings are safely managed.

3.6 Permissive moves

The use of line of sight as a movement permission is commonly used in LRV networks. The RTO shall establish network rules and procedures that cover:

- a) minimum separation between LRVs;
- b) limitation of LRV approach speed;
- c) when an LRV needs to stand off until permitted to approach an obstruction.

3.7 Network operations

Network operations control should be established to provide oversight of the network. This may be from a central location or divided between localised areas, such as division between network control and yard operations.

The RTO should have network rules and procedures that cover:

- a) network control operations;
- b) electrical infrastructure operations;
- c) interfaces between areas of control (where applicable);
- d) communications between network control officers, other rail safety workers, and other people (i.e. members of the public).

3.8 Degraded working

3.8.1 General principle

Degraded working can introduce additional risks to the normal operation of an LRV network. The general principles of managing degraded working include:

- a) identifying the failure;
- b) communicating the failure to relevant stakeholders;
- c) establishing permissive operations (with or without Police assistance);
- d) where necessary, restraining LRV traffic until safe operations can be assured.

3.8.2 Failure of road signals

Failure of road signals shall be managed in accordance with applicable road rules and interface agreements. As a minimum an RTO should develop procedures for passing failed road signals that consider:

- a) applicable road rules;
- b) agreements with road managers or relevant government organisations;
- c) requirements of road managers or those responsible for the operation of traffic signals, ie traffic management organisations;
- d) manual management of traffic where road signals have failed and:
 - i. police or traffic management personal are in attendance;
 - ii. police or traffic management personal are not in attendance.

3.8.3 Failure of light rail signals

Management of the failure of light rail signals shall be described in network rules and procedures. As a minimum network rules and procedures should consider:

- a) safe movement of LRVs;
- b) effects on road and pedestrian traffic management and signalling;
- c) any interlocked trackwork that could require manual movement and securing.

3.8.4 Failure and recovery of LRVs

The failure of LRVs can cause significant impacts to both road and light rail traffic. RTOs should have procedures for managing LRV failures involving:

- a) partial failure (LRV can move but is restricted in operation);
- b) full failure (LRV cannot move under its own power).

Procedures should cover:

- a) towing or pushing failed LRV in correct direction of line travel to a servicing location;
- b) towing or pushing failed LRV in correct direction of line travel or setting back until a crossover is reached before heading to a servicing location in the correct direction of line travel;
- c) towing or pushing failed LRV by entirely setting back to a servicing location.

Procedures should cover these moves being carried out by an assisting LRV or a recovery vehicle.

3.8.5 Infrastructure faults or failure (electricity)

Electrical faults can introduce additional risks to those in normal operation. RTOs shall have policies and procedures in place to minimise the risk of electrocution of rail safety workers, stakeholders, members of the public, etc.

Failure of the overhead traction system or systems that are associated with onboard energy storage systems (OESS) shall be managed in accordance with legislative requirements and electrical safety guidelines.

RTOs shall have procedures in place to manage the failure of overhead traction systems, including managing:

- a) loss of electrical return or connectivity (insulated) between the vehicle and the rail;
- b) downed and / or damaged wires;
- c) damaged poles and other infrastructure;
- d) power failures.

3.9 Emergency situations

The general principles of emergency management are:

- a) risk identification and mitigation;
- b) preparedness;
- c) response; and
- d) recovery.

Emergency situations can arise due to an incident directly or indirectly involving the light rail network. This could include government declarations. When an emergency occurs the LRV driver shall work in coordination with the network control officer (or equivalent for small / heritage operations) and emergency personnel managing the situation.

In some situations the overhead traction system could require isolation. In this case the LRV driver shall contact the network control centre (or equivalent) to request immediate de-energization of the overhead traction system.

RTOs shall develop plans and procedures for managing emergency situations, including:

- a) emergency isolations;
- b) safety of passengers on LRVs and in the corridor;
- c) network running and stabling of LRVs within the network;
- d) network interactions with road traffic in shared corridor and intersections, i.e. shared bus corridor;
- e) network communications;
- f) passenger communications in LRVs or at stops.

4 Light rail vehicle and infrastructure operational interfaces

4.1 General operating principles

Network rules shall be developed by RTOs covering the interface between LRV and structures / obstructions. This should include:

- a) maximum permanent and temporary permitted line speeds;
- b) restrictions and conditions of operations;
- c) maintenance of clearance between LRV and structures and obstructions.

Where extensions to existing networks interface there may also be a requirement to manage that interface.

4.2 Permanent and temporary permitted line speeds

Network rules shall be developed that provide instruction to LRV drivers regarding maximum permitted line speeds. This should cover:

- a) permanent line speeds;
 - i. main line speeds;
 - ii. yard speeds;
 - iii. junction speeds;
 - iv. facing and trailing point speeds.
- b) temporary line speeds e.g. how LRV drivers are made aware of temporary line speeds.

4.3 Establishment of restrictions and conditions on operations

Light rail networks could have locations which require specific operation instructions for safe operation. This could include:

- a) loading gauge restrictions;
- b) operating system restrictions;
- c) limitations on line capacity and overhead power current limitations;
- d) interface operations at rail level crossings;
- e) tram stops and platforms;
- f) locations where infrastructure requires a reduced speed or other operating condition.

Where a condition of operation is identified the RTO shall have procedures and / or network rules that define how that condition is managed. This shall include methods of notifying LRV drivers, affected rail safety workers and other stakeholders of the restriction or condition.

RTOs shall establish methods of managing conformance against:

- a) maximum permanent and temporary permitted speeds;
- b) other restrictions and conditions of operation.

4.4 Maintenance of clearance between LRV and structures and obstructions.

It is important that the clearance between LRVs and infrastructure / obstructions is maintained. The RTO shall have policies and procedures for:

- a) ensuring restrictions and conditions are maintained so that interface parties do not obstruct the loading gauge or specified clearances with infrastructure or their operations including works;
- b) checking clearances, based on defined clearance envelopes;
- c) managing any reports of infrastructure or obstructions that could affect the safe operation of the light rail network. These could be received from rail safety workers, members of the public, or other stakeholders.

Environmental situations can also occur which will impact the safe operation of the light rail network. RTOs shall have procedures for managing environmental situations. These should include coverage of:

- a) natural events, including flooding, earthquake, lightning strikes, etc;
- b) downed trees;
- c) extreme weather conditions.

4.5 Interface with networks under construction

When a new section of track is built adjacent to an existing track an interface agreement shall be developed between the RTO of the existing network and the construction organization that describes how the interface is managed. Where the RTO is the construction organization an interface management plan should replace the interface agreement.

Interface agreements should cover the following:

- a) Access to the site (as this may be through the existing light rail corridor).
- b) Demarcation of the construction site from the existing light rail network.
- c) Road vehicle and pedestrian management in shared corridors.
- d) Existing passenger infrastructure and pedestrian infrastructure where applicable.
- e) Safeworking requirements.
- f) Management of the interface once the:
 - i. new track is connected to the existing track;
 - ii. electrical infrastructure is connected to the network.
- g) Testing of the new track and electrical infrastructure.
- h) Commissioning of the new track and electrical infrastructure.

5 Separation of light rail vehicles and rail safety workers

5.1 General operating principles

In accordance with the Rail Safety National Law any work that has the potential to affect the safe operation of a light rail network is considered rail safety work. To allow rail safety work to be conducted an RTO must have processes in place to ensure the safety of those conducting the work and the safety of the light rail network.

Network rules, policies and procedures shall be developed to prevent collision between LRVs and rail safety workers. These should cover areas such as:

- a) planning;
- b) supervision;
- c) methods of maintaining separation through:
 - i. defining corridor envelopes;
 - ii. restricted clearance areas, e.g. tunnels;
 - iii. work on track authorities;
 - iv. restricting access to defined danger zones;
 - v. preventing LRV movement when unsafe to do so.

5.2 Corridor envelopes

5.2.1 General

Light rail network operations can be affected by adjacent infrastructure works and road and pedestrian traffic. To assist in the determination of safeworking requirements the light rail corridor should be defined.

Light rail corridors should be classified as either a:

- a) shared corridor; or
- b) segregated corridor.

A shared corridor is typically where there is no restriction on public access to the light rail track. This can include tracks within a road corridor, adjacent to a road corridor or through parklands. A shared corridor can also be where road traffic is separated from the light rail vehicle traffic by median strips or similar but where emergency vehicles and pedestrians still have access.

A segregated corridor is one where public access is restricted, through fencing or signage, to platforms and crossing locations only.

5.2.2 Corridor envelopes

General

For the purposes of safeworking it is important to understand whether work is being carried out within, adjacent, or outside the light rail corridor. To assist in this determination the corridor should be divided into the following zones:

- a) Swept corridor.
- b) Danger zone.
- c) Light rail corridor (shared or segregated).

Swept corridor

The swept corridor generally refers to the area within the dynamic kinematic envelop of an LRV. RTOs may identify the swept corridor by defining and marking on the pavement the swept path.

Danger zone

The danger zone is generally considered one metre outside the swept corridor or within 3 metres of any overhead line equipment. RTOs shall define their own distances in accordance with network specific risk assessments.

Light rail corridor

The light rail corridor can be defined as the area that encompasses all infrastructure that can affect the light rail network. This could include businesses and infrastructure located adjacent to a light rail track in a shared corridor, or buildings to which network infrastructure is attached to.

5.3 Work on track authorities

An RTO shall have policies and procedures for managing work on track. These shall cover the process of obtaining, issuing / activating, managing (suspension and reinstating), and releasing / fulfilling work on track authorities.

Work performed within light rail corridors shall be managed to safe SFAIRP principles.

Management of work on track may be achieved through network rules, a permit system, or a combination of both. Further information is provided in Appendix A.

5.4 Managing rail safety workers entering a danger zone (depots)

The risk of collision between rail safety workers and an LRV can be high in depots, where multiple movements can occur with minimal warning with rail safety workers in the immediate vicinity.

RTOs should establish both engineering and administrative controls to minimise the risk of collision. This could include:

- a) engineering controls, such as:
 - i. defined paths;
 - ii. barriers to fixed and routine work areas and access points;
- b) administrative controls, such as network rules and / or procedures requiring an LRV driver to ascertain it is safe to move prior to moving an LRV

5.5 Preventing LRV movement when unsafe to do so

When maintenance or a pre service examination is being conducted it is important that the LRV is not moved until safe to do so. It could also be necessary to prevent LRV movement in locations other than depots, for example in an emergency or due to in service faults / failures.

RTOs shall have network rules and procedures that prevent the movement of LRVs when work is being conducted. This may include a lockout system or signage advising LRV drivers that the LRV cannot be moved.

6 Separation of light rail vehicles and non-rail safety workers

6.1 General operating principles

Light rail networks operate in both shared and segregated corridors. In both corridors non-rail safety workers have access to the network. This includes passengers, pedestrians, and road users.

RTOs shall establish policies, network rules, and / or procedures that address the following areas:

- a) Management of public access to corridor, including depots, facilities and other locations.
- b) Works conducted by non-rail safety workers.
- c) Interface management.
- d) Management of emergency situations involving non-rail safety workers (e.g. members of public and emergency services personnel)

6.2 Management of passengers

RTOs shall establish policies, network rules, and / or procedures to minimise the risk of incidents involving LRV passengers.

These should address:

- a) ingress and egress of passengers;
- b) locations for ingress and egress of passengers;
- c) management of emergency situations involving passengers.

6.3 Works conducted by non-rail safety workers

Given the nature of light rail operations in shared corridors it is not practical to require all activities or works within the light rail corridor to be conducted by people who are rail safety workers. To enable work within the light rail corridor RTOs shall have a system to allow works to be conducted safely.

RTOs shall have a system for managing work being conducted by non-rail safety workers. Further information is provided in Appendix A.

Where work is being conducted off track adjacent to a live (operational) network a means to ensure that the work team do not encroach the danger zone should be provided. For example, this can be achieved through temporary fencing, slew restrictors, proximity warning devices, or a PICOW supervising the work.

Where works are being conducted during network closures or local possessions this could reduce or eliminate the need to separate works from the light rail network. This should be assessed on a case by case basis.

6.4 Interface management

6.4.1 Interface agreements

In accordance with Rail Safety National Law an RTO must develop and maintain interface agreements with road managers. Interface agreements must also be in place for locations where rolling stock crosses the boundary between one RTO and another RTO or private siding owner (such as between a light rail network and private maintenance facility) or where external RTOs are contracted to conduct maintenance activities on the light rail network .

Depending on the situation RTOs operating a light rail network may require interface agreements with:

- a) asset owners;
- b) rail infrastructure managers (RIM) (manager of the infrastructure);
- c) rolling stock operators (RSO) (operator of the network);
- d) third party suppliers;
- e) local councils;
- f) road and utilities authorities.

Interface agreements should include consideration of:

- a) management of risks at interface points;
- b) operation of LRVs at interface points;
- c) maintenance of shared infrastructure such as road traffic signals (where applicable);
- d) roles and responsibilities of each party to the interface agreement;
- e) any WOTA system in place to enable work to be conducted within the light rail corridor (see Appendix A).

Further information on the development of interface agreements is provided in the ONRSR Interface Agreement fact sheet.

6.4.2 Other interfaces

Emergency services

RTOs should have in place agreements, protocols or management plans with emergency services on how emergency situations will be managed. These agreements should consider:

- a) access to:
 - i. LRVs, including moving / jacking an LRV;
 - ii. assets such as depots and substations associated with the light rail network;
 - iii. operational and back up operational control centres;
- b) management of:
 - i. road traffic and pedestrian traffic where applicable;
 - ii. LRV crew and onboard passengers;
 - iii. safeworking;
 - iv. derailments;
 - v. electrical equipment, including dewirement or entanglement, downed live OHW, live LRV body, damage to the OESS, etc;
 - vi. collisions;
 - vii. live substations.

Further information on management of emergency situations is provided in section 3.9 of this Code.

Adjacent infrastructure

Businesses located along a light rail line may affect, and be affected by, light rail operations. RTOs should assess adjacent business activities to assess whether an interface agreement, protocol or management plan should be developed, or the interface can be managed on an as required basis. For example a light rail stop located opposite a large sports stadium may need a permanent interface agreement to manage the regular crowds of people attending events.

7 Separation of hazardous equipment and unauthorised persons.

7.1 General operating principles

Light rail networks require use of potentially hazardous equipment, such as overhead traction systems or OESS. It is important that only authorised personnel have access to these systems.

RTOs shall establish policies, network rules, and / or procedures that address the following areas:

- a) Exclusion zones.
- b) Access to exclusion zones.

7.2 Establishment of exclusion zones

Exclusion zones shall be established by RTOs for areas containing high voltages and other potentially dangerous equipment. This could include:

- a) defined areas onboard an LRV (e.g. high voltage cabinets);
- b) high voltage cabinets in depots;
- c) access points to high voltage (overhead or OESS) wiring;
- d) electrical sub-stations;
- e) other identified high risk locations.

7.3 Access to exclusion zones

Access to exclusion zones shall be managed through engineering controls, policies, network rules, procedures.

Engineering controls may include safe separation by barriers or equipment locks requiring keys issued to authorised workers.

Maintenance of electrical infrastructure shall only be carried out by persons authorised to do so in accordance with legislative requirements and RTO policies and procedures.

Works shall only be carried out once all necessary electrical permits have been approved. Types of electrical permits required shall be clearly identified in RTO policies and procedures.

Prior to works being carried out on substations stakeholders identified in the applicable interface agreement shall be consulted.

Appendix A Work on track authority systems

A.1 General

An RTO shall introduce a WOTA system that supports the network rules and procedures. As well as providing permission to work within the light rail corridor, a WOTA system can be used to assess whether it is safe to allow the work to commence. The actual requirements shall be confirmed during the assessment and planning stages.

Works that appear to be in breach of the WOTA system, such as work being conducted within the light rail corridor that has the potential to affect the light rail network, shall be reported in accordance with RTO procedures.

A.2 Accessing the network

A WOTA system can be used to assess any activity or work that could:

- a) encroach the danger zone;
- b) affect any light rail network infrastructure;
- c) affect light rail operations.

It is important that all activities and works are thoroughly planned to reduce risks. This could include any works within and in proximity to (i.e. construction, third party developments, council maintenance etc) the light rail corridor.

Planning should involve all relevant stakeholders, especially those who will be directly responsible for supervising the activity or work on the day.

Further guidance on mitigating risks through good planning practices is provided in RISSB Good Practice in Mitigating Safety Risks when Planning Works in the Rail Corridor.

The WOTA application should be completed by the person in charge of the activity or work, or the person who will be in charge of the site on the day of the activity / work.

An RTO should have differing authorities for different activities based on the risk to the light rail network. Example authorities are provided in the below table

Authority type	Purpose
Off track authority	Activity or work within the corridor, but will not impact the network infrastructure or operations
On track authority	Activity or work within the corridor that risks impacting the network infrastructure or operations
Isolation / substation authority	Activity or work within the corridor that has the potential to impact the electrical infrastructure of the network, or requires the electrical infrastructure to be isolated/off for the work to be done safely in proximity

Other authority types such as waivers may be required depending on the operational risk profile of the network and the nature of the activity or work being performed.

RTOs should have a process to allow emergency access to the light rail corridor to enable an activity or work to be conducted in an emergency situation.

A.3 Authority assessment

Assessment of whether a WOTA is required should consider if the:

- a) activity is within the danger zone or light rail corridor (see section 2.3);
- b) activity has the potential to foul the danger zone;
- c) activity is likely to divert pedestrians or road traffic into the danger zone;
- d) construction activities;
 - i. have the risk having materials falling onto overhead line cables;
 - ii. use cranes or other equipment at any distance or height over the light rail infrastructure, including sub-stations, OHW, etc;
 - iii. involve excavating, trenching or directional drilling adjacent to or beneath the track;
 - iv. could causing vibration that can affect the light rail infrastructure such as demolition or foundation construction work.

Where there is any uncertainty as to whether the planned activities or work could affect the light rail infrastructure or operations the RTO should conduct a site visit and risk assess the WOTA requirements. This site assessment should be conducted by person/s familiar with light rail operations and the activity or work being planned so that a thorough assessment can be made.

WOTA applications should include, as a minimum:

- a) worksite protection plan, including:
 - i. a site map of the area potentially affecting the light rail network;
 - ii. description of work;
 - iii. time to complete works;
 - iv. personnel involved;
 - v. other relevant information.
- b) signals / points / signage to be used to protect the site;
- c) PICOW details;
- d) isolation requirements (as necessary);

An assessment of a WOTA should consider the likely impacts of the activity or work to the infrastructure and operations of the light rail network, and what (if any) safeworking procedures apply. Typically the assessment will result in one of the following actions:

Assessment	Resulting action	Type of authority / permit
Activity or work risk cannot be reduced to SFAIRP	WOTA declined. Activity or work to be reassessed before resubmitting application.	N/A
Activity or work poses high risk to light rail network	WOTA approved with conditions (partial or full network closure, electrical isolation, etc)	WOTA Isolation / substation permit
Activity or work poses medium risk to light rail network	WOTA approved with conditions (on site safeworking personnel to manage LRV movements, delay to operational services)	WOTA
Activity or work poses low risk to light rail network	WOTA approved with conditions (on site safeworking personnel to manage LRV movements, minimal impact to operational services)	WOTA
Activity or work risk reduced SFAIRP	WOTA approved with minimal conditions (activity must be within agreed limits, no onsite personnel required)	Off track authority

A.4 Supervision of work within the light rail network

Activities or works that have a risk of impacting the light rail network shall be supervised. This may require the attendance of a PICOW to ensure work is carried out in accordance with the safeworking requirements stipulated in the WOTA.

Where it is unclear during the WOTA application process whether a PICOW is required a site assessment shall be carried out. This assessment should be conducted with the site supervisor or person applying for the WOTA.

Where an activity or work is to be conducted outside the danger zone the RTO may require the work supervisor or person carrying out the work to complete a safety induction covering the risks of working near a light rail network.

A.5 Work within shared corridors

Activities or works within a shared corridor pose several risks that are not present in segregated corridors. These additional risks could include:

- a) road traffic, including cyclists;
- b) pedestrian traffic, including motorised mobility devices and recreational devices;
- c) adjacent activities or works not directly related.

RTOs should provide procedures and guidance materials on how to safely manage activities or works within a shared corridor. This should cover:

- a) stakeholder consultation and management;
- b) road and pedestrian traffic management;
- c) protection requirements;
- d) light rail traffic management;

- e) legislative requirements e.g. noise restrictions;
- f) management of 3rd party assets and infrastructure;
- g) management of emergency works.

A.6 Work performed on track – minor works

Work performed on track in a live environment carries risk of collision between workers and LRVs. Where minor works are being conducted it may be possible to operate LRVs if safety risks can be reduced SFAIRP.

Depending on the WOTA issued LRVs may run as normal, be restricted (lower speeds, temporarily stopped, etc) or be prevented from operating on a defined section.

A safe system of work for minor works should include:

- a) restriction on the type of work being performed;
- b) restriction on the tools and plant permitted to be used (e.g. easily removable from track);
- c) speed restrictions for approaching LRV;
- d) qualified safeworking personnel. This could include a PICOW or a road traffic controller with suitable qualifications in light rail safeworking;
- e) clear line of sight between approaching LRV and the worksite.

A.7 Work performed on track – major works

Major work on an LRV network includes any work that makes the track or infrastructure unsafe for the passage of LRVs. This can include track renewal, electrical traction system component replacement or heavy maintenance, and other lineside infrastructure works in network possessions or shutdowns.

This work is often carried out at night to reduce the impact to the light rail network. When planning this work the additional risks involved through night work shall be assessed and managed to safe SFAIRP principles.

Appendix B Work in the light rail corridor – key roles

A number of roles are required to enable the safe assessment, approval, and supervision of activities and work within a light rail network. Suggested roles and responsibilities are described below:

Role title	Tasks
Assessment officer	<p>Assess all WOTA applications (see section 5.3)</p> <p>Issue all pre-work documentation to the PICOW</p> <p>Determine whether a PICOW is required to stay on site for the duration of the WOTA</p>
Person in charge of work (PICOW) or Protection Officer (PO)	<p>Arrange for safe movement of LRV past the activity location or worksite</p> <p>Be responsible for ensuring all works within the scope of their WOTA comply with the WOTA conditions</p> <p>Contact the site supervisor before taking a on track or isolation authority, to confirm works & location of works and/or any other arrangements.</p> <p>Briefing / communicating with workers on the contents and application of the WOTA and the measures in place as far as the conditions of the WOTA goes, including isolation arrangements.</p> <p>Activate the WOTA</p> <p>Liaise with the onsite electrical isolation officer when an isolation is required, and ensure the correct process is fulfilled</p> <p>Inform the site supervisor when the WOTA is in place.</p> <p>Ensure the works do not cause risk or damage to the light rail network</p> <p>Ensure all workers and equipment are clear of the danger zone and that the worksite is safe for network operation before fulfilling/closing out the WOTA with network control/the operation control centre.</p> <p>Close out / fulfill WOTA with network control / operation control centre once work has been completed</p>
Onsite electrical officer	<p>Responsible for performing electrical isolations in accordance with legislative requirements and RTO policies / procedures</p>
Site supervisor	<p>Supervision and management of personal carrying out the work as stipulated on the WOTA / permit</p>

The above table only covers the basic requirements of the noted roles. RTOs shall develop clearly defined roles and responsibilities for all personnel involved in the safe assessment and supervision of activities and works within the light rail corridor.



For information regarding products developed by RISSB contact:
Rail Industry Safety and Standards Board

Brisbane Office
Level 6, 200 Creek Street
Brisbane, QLD, 4000

PO Box 518
Spring Hill, QLD, 4004

T +61 7 3724 0000
E Info@rissb.com.au

Light rail network safeworking
Code of Practice
Draft for public comment

