Cane rail safety

A supplement to the Sugar mill safety Code of Practice 2024

2024

Workplace Health and Safety Queensland
worksafe.qld.gov.au

Queensland Government

This Queensland code of practice has been approved by the Minister for State Development and Infrastructure, Minister for Industrial Relations and Minister for Racing under section 274 of the *Work Health and Safety Act 2011*.

This code commences on 23 September 2024.

It replaces the Cane rail safety – a supplement to the Sugar industry code of practice 2005.

PN11198

Contents

Scope and application

This document is a supplement to the *Sugar mill safety Code of Practice*, and forms part of that code. The purpose of this supplement is to assist persons to manage workplace health and safety risks posed by **cane rail operations.** This supplement applies to managers of cane railway systems, as well as their workers, operators and workplace health and safety officers and representatives. It should be read in conjunction with the *Work Health and Safety Act 2011* (WHS Act), *Work Health and Safety Regulation 2011* (WHS Regulation), the *Sugar mill safety Code of Practice* and other relevant codes of practice.

This document is to be used by persons with health and safety duties under the WHS Act.

This document describes methods for controlling major hazards associated with cane rail operations; the machinery, equipment, substances and work practices; and what should be considered to safeguard the health and safety of workers, the public and others.

This code does not cover cane growing and harvesting or sugar manufacturing processes within the mill premises.

1. Introduction

1.1 About this this supplement

This supplement:

- provides information about some of the hazards and risks associated with cane rail operations
- describes methods for controlling major hazards associated with cane rail operations, including machinery, equipment and work practices
- provides information as to what should be considered to safeguard the health and safety of workers, the public and others; and
- clarifies the roles and responsibilities of cane rail operators.

1.2 How this document is organised

A cane railway system can be broken into four basic operational parts:

(a) the delivery and collection of cane bins system (operations)
(b) track and civil infrastructure (including maintenance)
(c) sidings and delivery points (field interface)
(d) rolling stock (locomotives, brake wagons, maintenance plant and cane bins).

Within the hazard-specific sections, the document is generally structured in the following format:

#1 - The major hazard area i.e., Rolling stock, including a hazard list for that area
#2 - The specific hazard i.e., Train to train contact
#3 - Control measures for the specific hazard i.e., an outline of the issues which should be considered as control measures for the specific hazard.

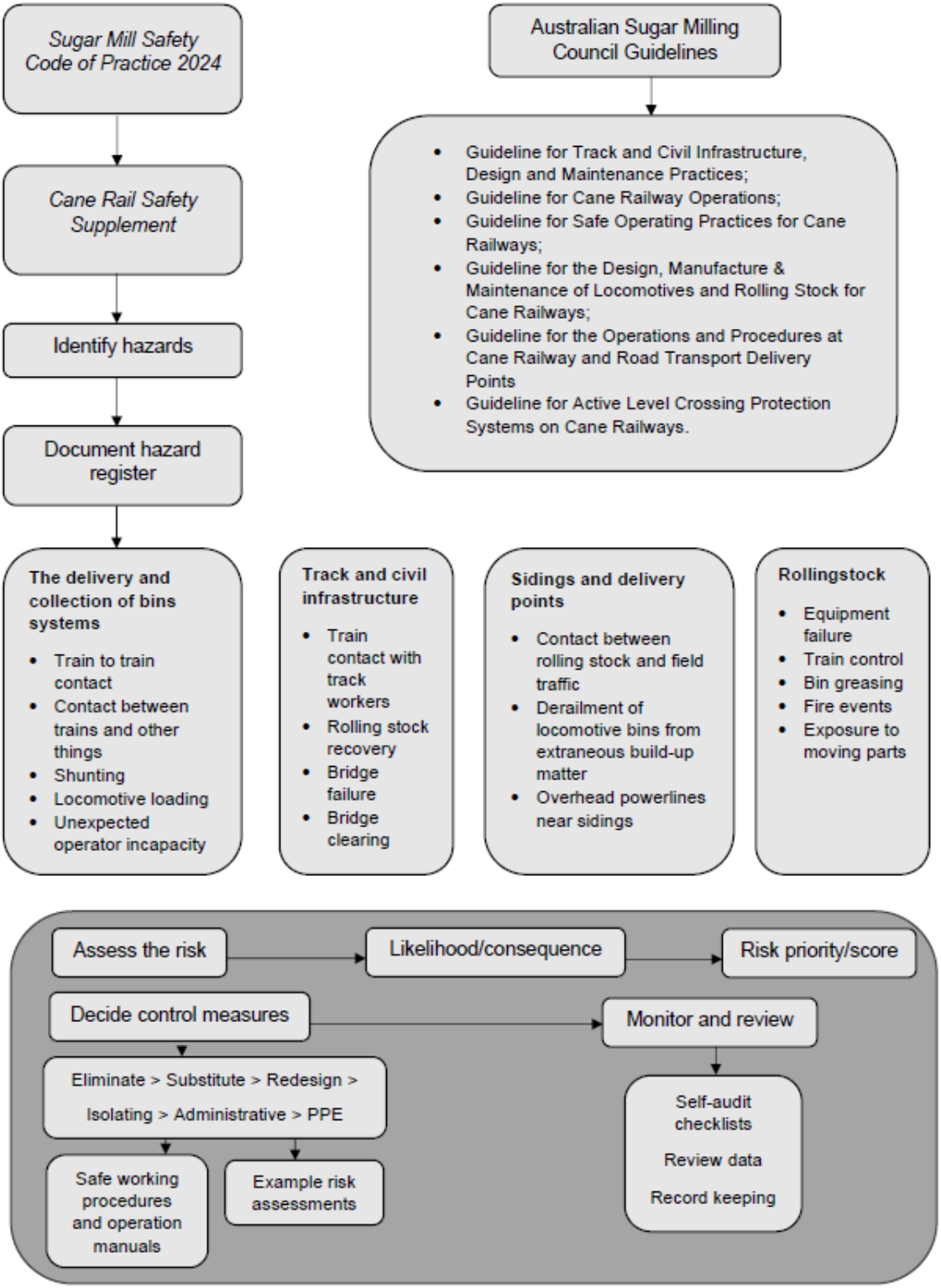

Figure 1: Hazard register and controls

1.3 What is reasonably practicable?

WHS Act section 18: In this Act, reasonably practicable, in relation to a duty to ensure health and safety, means that which is, or was at a particular time, reasonably able to be done in relation to ensuring health and safety, taking into account and weighing up all relevant matters including:

a) the likelihood of the hazard or the risk concerned occurring; and

b) the degree of harm that might result from the hazard or the risk; and

c) what the person concerned knows, or ought reasonably to know, about -

   i. the hazard or the risk; and

   ii. ways of eliminating or minimising the risk; and

d) the availability and suitability of ways to eliminate or minimise the risk; and

e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

For further information on the standard of ‘reasonably practicable’ in health and safety duties, please refer to Section 1.3 of the Sugar mill safety Code of Practice.

2. Cane rail operations

2.1 What is a cane rail system?

A cane railway system is a predominantly narrow gauge rail network that is used to deliver sugar cane from the field to a sugar mill. Cane railway systems transport millions of tonnes of cane every year from farming operations to the local mills for processing. Sugar cane trains operate at speeds of up to 40 km/h, can weigh up to 2,000 tonnes, and measure up to one kilometre in length.

Queensland has approximately 4,000 route kilometres of sugar cane railways across various networks. All networks are 610 mm (2 feet) gauge, except for the lines servicing Pioneer Mill at Brandon, which use 1,067 mm (3 feet, 6 inch) gauge, and a dual gauge line connecting Kalamia Mill at Ayr and Invicta Mill at Giru. The railways are all owned, operated, and maintained by the sugar milling companies. At numerous locations, the sugar cane railways intersect with the Queensland Rail North Coast Line. Oftentimes, drawbridge or diamond crossings exist where these lines intersect. Safe movement of trains and maintenance of these crossings is managed by interface agreements between Queensland Rail and cane rail operators.

The cane railways also cross many roads throughout the sugar industry regions. The Department of Transport and Main Roads (TMR) requires cane railway operators with rail networks that cross State controlled roads to have Ancillary Works and Encroachment Agreements in place for each such crossing and some local government authorities have interface agreements covering the crossing of their road networks.

The rail network crosses and/or interacts with:
(a) roads (managed by state, council and private road managers)
(b) rivers and streams
(c) the Queensland Rail network
(d) rural, commercial and residential areas
(e) shared workspaces, for example, delivery points
(f) workers and other people involved with the harvest and haulage of cane; and
(g) utilities (such as power, water and communications).

Cane rail networks operate on a 24-hour, seven day a week basis in most mill areas, usually from May to December, which is the harvest and crushing season. Trains can also operate outside the crushing season for a range of purposes including maintenance and locomotive driver training.

The cane rail network has been developed over many years with some mills operating cane railways since the late 1800s. The gradual development of the network over such a long period of time has seen many changes to the local landscape, particularly through the encroachment of housing, other industries, and alternative farming enterprises around the railway system.

3. Managing health and safety

When managing health and safety in cane rail operations, operators should consider the following issues as key components of the management system:
(a) hazard registers
(b) risk management
(c) consultation
(d) training, competency and record keeping
(e) emergency procedures and response
(f) asset register that identifies bridges, culverts, etc and inspection dates
(g) fatigue management
(h) human factors; and
(i) management of change.

Note: The Sugar mill safety Code of Practice provides information that is also suitable to cane rail operations in relation to:
- risk registers
- hierarchy of controls
- consultation
- workplace inspections
- recording incidents at the workplace
- training
- housekeeping
- safety signs
- emergency plans and procedures.

The following sections provide information specific to cane rail operations.

Further details on these issues is also provided in Rail Industry Safety and Standards Board (RISSB) Australian Standards (AS) 7474 Rail industry – System safety.

3.1 Safety management plan

Owners of cane railways should maintain a register of hazards and controls (i.e. a risk register) that is reviewed on a regular basis to ensure currency and adequacy of the controls. Risk Registers are to be supported by a safety management plan.

To support the operation and maintenance of a cane railway, owners should develop a detailed safety management plan guided by reference to AS 7474 Rail industry – System safety and the Cane rail safety Supplement.

The intent of this plan is to identify key requirements for the elimination or reduction of safety related risks and include detail such as rail network rules.

It is important that a safety management plan also addresses the potential for the introduction of new risks when any change is made using a management of change process.

The management of change should:

- identify all reasonably foreseeable hazards associated with any change
- be conducted by persons who have relevant experience and/or qualifications
- improve safety of persons potentially impacted by the change, including workers and the public
- provide justification that the risks associated with the change have been duly addressed.

Included in the safety management plan should be a governance framework aligned with the scope of each owner's cane railway operation.

This framework should include:

- organisational structures
- roles and responsibilities
- competence and qualifications.

It is recommended that owners undertake regular independent safety assessments of their safety management plan by engaging an independent third party.

3.2 Inspection schedule

The person conducting a business or undertaking (PCBU) should establish an inspection schedule allocating responsibility to appropriate persons for completion of the inspections. Whilst inspection programs should be undertaken at various times, the frequency of inspections will depend on the nature and circumstances of the area being inspected. Issues such as the level of risk and extent of control that the cane rail operator has over the workplace (e.g. remote locations) will influence the frequency of inspections.

The inspection schedule for owners should be mandated to address the preparedness of the cane railway for operations during a crushing season. The focus should be on safety critical infrastructure, plant, and systems.

As part of this inspection schedule, all branch lines should be inspected, and identified as fit for service, including any operating restrictions. Advice of the inspection schedule should be included in pre-season inductions for train crew and traffic officers.

3.3 Locomotive training and competency

The below information is provided in addition to Section 3.7 Training in the Sugar mill safety Code of Practice, with specific content for locomotive operators.

Verification of competency
A verification of competency (VOC) is a method of assessment that enables a PCBU to confirm the current and ongoing competency of a worker or contractor, and to assess any appropriate training, instruction or supervision needs for those operating plant.

Train drivers should hold VOC for each class of locomotive they are required to operate.

Further information on the role of VOCs, including recommendations on appropriate assessment content and timeframes, can be found in guidance materials published on the Workplace Health and Safety Queensland website.

Refresher training
Should a worker be separated from their duties for more than the duration of a maintenance season (such as due to the seasonality of their role or through injury), the worker should undergo inductions which include refresher training and assessment in critical aspects of rail operations.

3.4 Fitness for duty

Fitness for work assessment
The National Transport Commission's (NTC) National Standard for Health Assessment of Rail Safety Workers recommends that rail operators establish and maintain a system which identifies the health and fitness standards required for all persons engaged in safety related work within the rail network.

All rail safety operators are required to have the equivalent of a Category 2 medical standard as per NTC guidelines (National Standard for Health Assessment of Rail Safety Workers).

Any fitness for work assessment for cane railway operators should be developed in consultation with medical experts and representative workers in those areas where fitness standards are being developed. A schedule for cane railway personnel to attend fitness assessments for work should also be considered in line with Category 2 medical standards.

Alcohol and drugs
Rail safety critical workers should not be impaired by alcohol or drugs. Workers involved in rail incidents should be tested for alcohol and drugs immediately following an incident. It is recommended that random testing of workers for alcohol and drugs be implemented by cane rail operators.

Fatigue management
A detailed fatigue management policy should be in place identifying ways and means that a supervisor and his/her crew could manage fatigue through a shift.

This policy may include some of the following fatigue management tools:

- rotating roles with a peer during the shift to a less fatiguing task
- undertaking work for the shift under close supervision and monitoring (for example, yard work or short runs close to the mill as opposed to long runs away from the mill)
- two person operation as opposed to single person operation
- extra, regular short breaks throughout the shift
- no driving of light vehicles (such as to and from work)
- considering opportunity for the worker to rest between shifts when rostering
- the use of FAID as a risk-scoring tool
- a designated location and management support, to enable short power naps during the shift.

Fatigue assessments need not be onerous and can be undertaken at the commencement of a shift at a designated ‘at risk’ time in a swing. They may also highlight longer term issues that could be affecting train crew. For example, if the crew are undertaking a swing of consecutive night shifts, consider undertaking a fatigue self-assessment at the mid-way point of the swing.

An example of a fatigue self-assessment is included in section 8.3.

Fatigue self-assessments can also be used by owners to monitor, review, or design new shift patterns, including the balance between the number of shifts/shift length and recovery periods off duty.

3.5 Rail emergency management

A number of emergency situations may arise within cane rail operations including but not limited to:

- train contacts
- level crossing incidents
- natural events (floods, fires, cyclones)
- control system failure (radio network or individual failure)
- secondary contacts (contacts which occur in the vicinity of the track but do not involve rolling stock)
- power failures to control rooms
- chemical/fuel spills
- electrical incidents (including fallen powerlines).

Further information on legal requirements and supporting guidance is provided in Section 3.11 Emergency plans and procedures in the Sugar mill safety Code of Practice.

3.6 Maintaining records of rail incidents

Section 38 of the WHS Regulation requires that control measures must be reviewed (and revised, if necessary) if they do not control the risk they were implemented to control so far as is reasonably practicable.

Keeping records of rail incidents will assist the cane rail operator to assess whether the control measures identified in the safety management plan are sufficient or need to be improved. Records can be kept together or separately.

The cane rail operator should make sure that any records of the following rail incidents are kept and regularly updated (including but, not limited to, notifiable incidents).
The following is a list of notifiable and other incidents that must be kept (in the case of notifiable incidents) and examples of other types of incidents that should be recorded:

- person struck by a train (deceased)
- person struck by a train (injured)
- worker fatality due to a medical condition whilst operating a train
- train derailment (resulting in fatality / serious injury or illness)
- train derailment (no injury)
- derailment of six bins or more
- other derailment resulting in immediate risk to the safety of persons
- train collision with vehicle at level crossing
- train collision with livestock
- bridge / culvert collapse (during train movements)
- signals passed at danger (SPADs), including:
    - crew breach signal / waypoint
    - two trains in conflict without authority
    - conflicting movement, due to a traffic officer breach giving incorrect authority
    - worker/person(s) on track without authority
- GPS/vigilance failure
- runaway or breakaway of a train on a running line
- uncontrolled operation of a train, including:
    - remote shunting unit (RSU) failure to return to safe mode
- faulty operation of infrastructure leading to train movement on wrong track
- failure of warning infrastructure (including signals, boom gates and flashing lights)
- deliberate acts of vandalism to trains or infrastructure
- rolling stock failure resulting from:
    - complete bearing failure
    - broken axles or wheels
    - side rod or crank pin failure
    - draw gear/coupling failure.

Note: Further information on notifying Work Health and Safety Queensland of notifiable incidents is provided in WHS Act sections 35-39 (including definitions for ‘serious injury or illness’ and ‘dangerous incident’).

Providing access to records of rail incidents

WHS Act section 70(c): The PCBU must allow any health and safety representative for a work group to have access to information that the person has relating to:

i. hazards (including associated risks) as the workplace affecting workers in the work group; and

ii. the health and safety of the workers in the work group.

WHS Act section 79(3): The PCBU must allow any health and safety representative for a work group to have access to information that the person has relating to:

i. hazards (including associated risks) as the workplace affecting workers in the work group; and

ii. the health and safety of the workers in the work group.

WHS Act section 171 (1): If an inspector enters a workplace under this division, or has within the last 30 days entered a workplace under this division, the inspector or another inspector may:

a) require a person to tell the inspector who has custody of, or access to, a document; or

b) require a person who has custody of, or access to, a document mentioned in paragraph (a) to give the document to the inspector; or

c) require a person at the workplace to attend before the inspector at a stated reasonable time and place to answer questions put by the inspector.

The cane rail operator must allow any health and safety representative (HSR) or health and safety committee (HSC) for a relevant work group to have access to records of rail incident data if requested. This will assist the HSRs and HSCs to perform their functions as prescribed by the WHS Act.

Additionally, the cane rail operator must provide an inspector with the record, or a copy of the record, if requested by an inspector exercising power of entry. This request may be in response to a specific safety incident, an emerging safety issue, or as part of a proactive audit of cane rail operations.

4. The delivery and collection of cane bins system

Note: The reference to cane includes all other products and materials carried on the cane rail system.

The rail network requires the scheduled delivery and retrieval of a mill's cane bin fleet. Empty cane bins are delivered across the mill's network to be loaded with harvested cane billets. Full bins of cane billets are hauled to the mill for crushing within a specific time period to prevent deterioration of the product. In general, trains move at low speeds (typical maximum of 40 kilometres per hour). Appendix 8.4 is a visual representation of the cane rail network.

Operational systems within the cane railway network include traffic offices, communication networks and control mechanisms for maintaining train separation. A number of methods for traffic control are in use within the industry including GPS (satellite) tracking, electronic mimic boards and manual mimic boards. Rail operators who manage train separation by electronic tools must have integrity of the system to prevent collisions. These systems must have a recording function for playback of events for investigation purposes.

Rail operators should test systems to ensure functional integrity on a regular basis. However, the primary tool for communicating instructions to maintain train separation is voice radio. All voice activity pertaining to train separation must be recorded.

Signalling and communication systems such as active level crossing protection systems are an important part of cane railway operational safety systems at road crossings.

Trains can be operated by two-person or single-person configuration. In a single person operation, trains can operate remotely and be unmanned in the cab during shunting procedures.

4.1 General hazards

The cane railway track crosses main roads, local government roads and minor roads with varying speed limits and traffic flows. Hazards associated with the delivery system within the operation of the rail network are:

(a) contacts between trains, head-to-head and head to tail
(b) contacts between trains and other things (e.g. vehicles, workgroups, plant, machinery and equipment, people and animals)
(c) de-railing and re-railing
(d) shunting
(e) yard shunting (other than by locomotives i.e. push tractors and winches)
(f) locomotive/load characteristics
(g) unexpected operator/s incapacity and impairment of operators (including traffic controllers)
(h) runaway train sections on steep grades
(i) visibility at/around residential driveways and cane fields.

These hazards should be included in the rail operator's hazard register and the risk associated with them assessed particular to that operation. The range of control measures provided in the following sections should be considered (this should also be considered alongside the How to manage work health and safety risks Code of Practice).

4.2 Train-to-train contact

The risk of contact between trains both head-to-head and head to tail can be determined through consideration of a number of factors including:

(a) human factors
(b) electronic separation coded prevention of unintended collision (system override / collision avoidance systems)
(c) the number of trains in operation at any one time
(d) level and frequency of communication
(e) the size of the trains
(f) the size of the network
(g) rail infrastructure design i.e. crossing loop identification, points signals and clearance points indicators
(h) weather conditions
(i) day or night operation
(j) visibility
(k) system and/or power failure

(l) braking performance of the train
(m) track gradient.

Risk assessments should consider these issues when assessing the risk of train-to-train contact.

4.2.1 Possible controls for train-to-train contact

An overall safety system should be developed by the rail operator to ensure the safety of train crews, other workers and members of the public.

Safe occupancy methods are outlined in AS 7474 Rail industry – System safety.

Route maps should be developed showing system crossings and loops, track speeds, gradients and relevant safety information.

The process of risk reduction is not limited to the use of one type of control. Hazards can be controlled by multiple methods (e.g. process and procedures). These controls can then be supported by technology (e.g. GPS and electronic mimic boards). This provides levels of hazard control, which reduces the risk of serious injury or damage. All train movements must have some documented process of movement recorded (paper or electronic).
Other controls could include:

- use of engineering controls to prevent collisions
- use of signals and points identification.

Rail operators must maintain a record of all voice transactions between trains and the traffic office.

Policies and procedures covering traffic office operations must be clear that traffic officers have a primary focus on the safe operation of trains running on the network.

Documented safe operating procedures are only one method of ensuring train separation. All persons with responsibility for the safe operation of trains on the network and adhering to procedures should be trained in any documented control system and regularly assessed for competence by the rail operator. This training should be conducted regularly based on level of risk of the role. This should be documented and recorded. In the event of GPS failure, paper systems and/or alternative back-up systems should be used to record transactions to ensure train separation. Track owners should ensure compliance with the relevant procedures.

The use of high visibility end of train markers (tail stick/s), headlights, flashing beacons and high visibility markings on locomotives and bins provide another means of reducing the risk of train-to-train contact. Guidance can be sought from RISSB AS 7531 Lighting and Visibility.

Contact between moving rolling stock and stationary rolling stock can also occur if turnouts are left in a position that directs the locomotive into a siding that is already occupied. The line may also terminate or run into a loading pit. Main line turnouts should always be left set for the main line unless directed otherwise by an authorised person, (usually the traffic controller) or by documented standard mill procedure. Points indicators should be positioned such that they are visible to operators in a manner that will enable a train to be stopped

before reaching the point of diversion at the turnout. Achievement of this may depend on the operating mode of the train e.g. speed limits, availability of brake wagons and the time of year, for example, before and after harvest of adjacent sugar cane crops. Regard should also be had to restricted speed.

When using administrative controls, procedures, signage and personal protective equipment (PPE) should also be made available to provide several layers of protection to minimise the identified risks. Multiple layers of controls provide a back-up which minimises the risk of damage and/or trauma.

An example risk assessment has been included in Appendix 7.4 Contact between trains – Head-to-head and head to tail.

4.2.2 Signalling

Cane rail operations require different types of signalling. These must be maintained for visibility and accuracy. These signals are required for train separation, clearances, track speed, forward warning of track speed restriction, and may include:

- forward clearance points
- rail crossing signs
- advisory signs
- check point signs
- trailable point signs
- track speed signage
- caution boards
- whistle boards
- manual call points.

When installing trackside signage, the signage should not obstruct walkways and should be installed a safe distance from the track.

Any trackside signage should be mounted on appropriate posts. It is recommended that the use of round galvanized steel posts with an appropriate cap be used. Star pickets or driving used railway line into the ground is not recommended as these pose risks of injury.

For further information as to the quality standards of this signage, please refer to AS 7632– Railway Infrastructure – Signage.

4.3 Contact between trains and other things

Cane railway rolling stock may operate on a 24-hour, seven day a week basis and pass through a broad range of terrain including:

(a) urban and rural areas
(b) individual farms and properties, with driveways and property access points
(c) alongside roads and road bridges
(d) across rivers and streams (from large to small bridges)
(e) all types of roadways and other rail networks.

Cane rail rolling stock can be exposed to the risk of contact with a range of objects, which may include:

(a) other vehicles (e.g. cars, trucks, tractors, harvesters and motorcycles)
(b) livestock (e.g. horses and cattle)
(c) members of the public (pedestrians, cyclists)
(d) other items (obstructions) left foul on the rail network
(e) unauthorised or authorised civil works which foul the track or effect track geometry
(f) items stored by property owners on or near the track (e.g. farm machinery and irrigation equipment)
(g) property belonging to other statutory bodies and local authorities (e.g. TMR, Telstra or Ergon Energy).

Rail networks across the industry are at risk of damage from a range of sources. These include vandalism and malicious (deliberate) interference, as well as natural occurrences such as floods, wildfires and cyclones. Cane rail operators must, to the extent that it is reasonably practicable, ensure a safe system of work is established which minimises the risk of injury to cane railway personnel from these hazards. Following natural occurrences, a visual inspection (e.g. prior to the commencement of the crushing season or following significant in-season weather events) must be undertaken of the network and/or known locations where damage can or has occurred (e.g. following river/overland flooding events).

4.3.1 Possible controls for contact between trains and other things

Part of the rail operator's overall safety system should ensure the safety of train crews, other workers, and members of the public in relation to contact between trains and other things.

Single operator mode locomotives should have a clear means to identify that the operator is not necessarily in the cab and can be operating the loco from a remote unit. Identification methods could include signage on the locomotive, audible warning devices and/or separate beacons or warning lights that are triggered when the train is being operated remotely.

Train crew should maintain constant vigilance looking frequently in both directions for approaching hazards.

4.3.2 Road crossings

Methods for controlling the risk of contact with other things are available, including:
(a) grade separation
(b) active control, and
(c) passive control.

Assessing the risk and required level of protection, the use of passive, active and grade separation to control the risk of contacts on road and rail crossings is a complicated task. The rail operator should use a competent person to assess the risks involved with crossings prior to determining of an appropriate control.

All active level crossings must have signage displayed that includes the crossing ID, the relevant track owner and emergency contact details. This is to simplify notification to track owners in the event of emergency (e.g. crossing blocked by broken down vehicle; flashing lights activated without a train being present) and allows for the precise location of the incident to be communicated to the track owner. See Figure 2.

Figure 2

Passive level crossings contain a lower level of risk, however, these should also have appropriate signage displayed, where possible, or a program in place to introduce such signage, that includes the crossing ID, the relevant track owner and emergency contact details.

In addition to these crossings that have risk control methods in place, there are many non-controlled occupational crossings that are predominantly used by landholders accessing their own properties. So far as is practicable, the rail operator should assist known regular users of occupational crossings to conduct a risk assessment concerning their use of the crossing and make landholders aware of the planned start of increased train movements associated with the annual crushing season. Where reasonably practicable, this information should include relevant track owner and emergency contact details.

Risk assessment should use an established method that focuses on issues such as:

(a) train and traffic volume
(b) previous incident history
(c) crossing position and layout
(d) train and vehicle crossing speeds
(e) crossing visibility.

Rail operators should assess the risk of failure of active crossing protection systems and implement controls which minimise those risks. A documented process should be in place which outlines what steps locomotive operators should take in the event of the failure of active crossing protection systems.

Note: Appropriate tools to assess risk at level crossings and identify suitable controls, which encompass (a) to (e) above are the Australian Level Crossing Assessment Model (ALCAM) and the Manual of Uniform Traffic Control Devices (MUTCD), Part 7: Railway Crossings.

4.3.3 Queensland Rail crossings

Queensland Rail controlled drawbridges and or diamond crossings have a derailment device installed which will force the locomotive or uncontrolled rolling stock off the track should it attempt to enter the crossing without a clearance. All drivers should be aware of any derailment devices within the network and traverse them with caution.

Queensland Rail has cane crossing agreements with cane rail operators for networks that intersect with Queensland Rail lines. These agreements include an Interface Risk Management Plan jointly developed by Queensland Rail and the cane rail operators.

4.3.4 Shared sidings

The risk of contact with other plant at sidings is minimised when only one item of plant (train, haul out or other vehicle) is operating in the siding at any one time.

As far as reasonably practicable, other than rail operations, no activity should take place within a minimum of 2.5 metres of the centre line of the track (except at designated crossing points and sidings) unless a documented safe working procedure is prepared, disseminated and implemented by the encroaching party in consultation with the appropriate mill owner.

Agreement of the safe working procedure by the track owner must be given prior to any encroachment of the rail easement. The safe working procedure should consider, but not be limited to, the need to:

(a) maintain a safe distance between the encroaching party and trains on the same track
(b) safeguard the movement of trains at turnouts and crossings where affected by the encroaching party's activities
(c) maintain the safety of personnel and equipment on or near the track
(d) ensure relevant communication procedures are in place between all relevant parties, including farm/property owners adjacent to the rail corridor
(e) undertake risk identification, for example, the use of harvesters adjacent to the cane rail corridor, and to use H boards as required.

4.3.5 Bridges

Where appropriate, signage should be installed at locations such as river bridges and Queensland Rail crossings, warning that cane trains use these bridges/crossings. Signage should also be used prohibiting access by unauthorised persons.

4.3.6 General

Documented procedures are a way of controlling the risks associated with train operation. All persons with responsibility for following procedures should be trained in any documented control system and assessed for competence by the rail operator.

Other controls include the use of signs, temporary or permanent speed limits at crossings, the use of flagmen (traffic controllers), warning devices, and other options, such as:

(a) the use of fencing through rail corridors
(b) technology (e.g. electronic mimic boards, GPS tracking and reporting)
(b) the use of the locomotive horn when approaching crossings or sidings
(c) flashing lights on locomotives and brake wagons
(d) high visibility paint and patterns—refer to AS 7531Rolling Stock Lighting and Visibility (Standard for visibility for locomotives)
(e) electronic warning systems
(f) reflective devices
(g) reflective paint
(h) end of train marker (high visibility tail stick/s).

When using administrative controls, a suite of procedures, signage and PPE must be used to give several layers of protection to minimise the risks.

This way if there is a failure in one or two of the controls, then the others will provide backup and minimise the damage and/or trauma.

4.4 Shunting

Shunting is to push or pull (a train or part of a train) from the main line to a siding or from one line of rails to another. This includes the collection or delivery of cane bins from a rake of cane bins on a train at the sugar mill or at sidings or loops throughout the cane rail network. Safe operation should always be paramount in any activity at a siding or in mill yards where people and vehicles could be present.

Shunting introduces a range of hazards due to the following factors:

(a) Shunting may involve the entry between bins or bin and locomotive to couple or uncouple an existing rake, to another rake or to the locomotive.
(b) The worker uncoupling the bins is sometimes not in visual contact with or visible by the operator.
(c) Shunting takes place during day and night operations in a range of work environments.
(d) While shunting, bins can be temporarily left on the main line.
(e) Unless secured, bins can move unexpectedly and can travel for long distances driven by wind and/or gravity.
(f) Rope or slings being used in shunting may ‘snapback’ when under tension causing a risk of injury to workers.

4.4.1 Possible controls for shunting hazards

Fly shunting is **prohibited** (uncontrolled movement of bins).

Loose shunting (bins are loose but are under control) should only be used following a risk assessment and implementation of appropriate controls. This risk assessment should be documented and incorporated into work instructions that are rigorously audited. Rail operators should develop shunt plans for identified sidings.

Ropes should only be used for loose shunting when no other option is reasonably practicable and after a risk assessment which identifies appropriate controls. Persons shunting and others should remain in the line of sight of driver until the train is stationary. With any rope or sling when used in a towing or winching capacity, the risk of injury to workers from snapback when a rope or sling fails under tension is significant. Owners of cane railways should include this risk in their hazard registers and have appropriate controls identified and in place. Workers should maintain an exclusion zone to be outside of the snapback zone when loose shunting.

Principally the risk involved in shunting is the risk of receiving crush injuries between bins or bin buffers when coupling up. This risk is eliminated when no work takes place between bins whilst they or the locomotive are moving. Workers should not walk within the profile of the track whilst shunting, particularly when protecting propelling movements. Instead, walkways (‘safe places’) should be used (See Figure 3). Training for workers must include recognition

of the danger zone, and how to apply continual vigilance when undertaking shunting activities on the ground.

Use of push tractors to shunt bins in sidings can create hazards, particularly where there are no direct communications (e.g. radio between tractor operators and rail crew during shunting). Procedures must be developed to ensure safe processes are in place and understood regardless of whether there are direct communications available between rail crew and tractor operators in the siding.

Planning and design of new rail installations should include consideration of issues such as access for maintenance of trackside areas and installations that encourage safe practices.

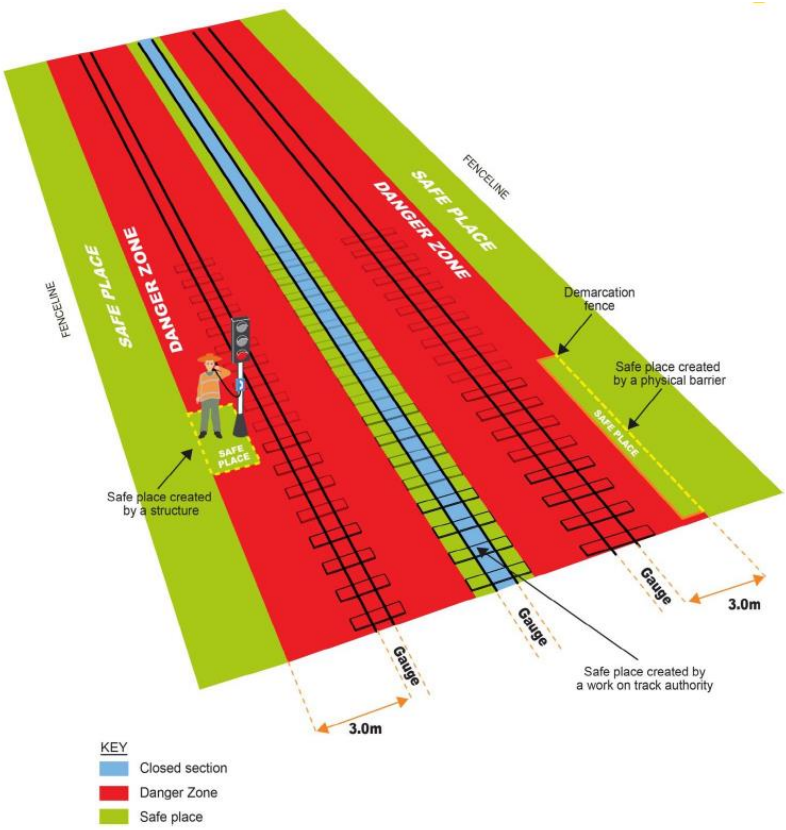

Figure 3: Danger Zones and Safe Places (QR2001)

Note: In certain circumstances, the distance from the danger zone to the safe place is 2.5m (not 3m)

Maintenance of trackside areas including vegetation control, levelling, removal of trip hazards and covering of drains are typical controls that reduce injury risk whilst shunting.

Rail operators should review injury reports and utilise risk management processes to determine where warning devices, signs, permits to work, supervision and work instructions are necessary.

All shunting activities involving propelling movements should be assessed for any additional risks of collision and/or striking others.

Adequate lighting should be provided in areas that are used on a regular basis during the night, for example:

(a) full and empty yards
(b) trans-loaders; and
(c) marshalling yards.

When leaving bins in sidings or on the main line while shunting, they should be restrained so that they cannot move in any direction. This is normally achieved using brake wagons, chocks or mechanical restraints.

Weather conditions may influence the number of chocks required to secure the bins, particularly wind speed and rain. In extremely adverse conditions or when stored for long periods of time, it may be necessary to chain the bins to the track or derail a bin on each

end of the rake to ensure security. A safe work procedure should be established for securing bins to ensure they are stored in a manner whereby unintended movement is not possible.

For networks that have single driver operations, sidings and yards must be assessed to ensure shunting procedures do not reduce loco driver visibility.

The risk of derailment is increased if turnouts are left partially open (split). When changing the direction of the turnout, the operator should ensure that the tumbler has moved fully, the switchblade is fully closed, and no foreign material is wedged between the switchblade and the stock rail.

Clearance points should be identified.

Other shunting movement controls involve the use of multiple communication methods such as:

(a) voice radio communication
(b) hand signals
(c) torch signals
(d) headlight signals
(e) locomotive horn codes
(f) documented shunting procedures for generic and specific sidings.

The following control measures can reduce the risk of injury for locomotive crews while shunting. Crew members must:

(a) never jump off a locomotive–always dismount by stepping off
(b) not access or egress from a locomotive unless travelling at a speed of walking pace or less and crew are trained to access and egress at this speed
(c) move briskly but not run
(d) not ride on cane bins
(e) not cross the path of a moving locomotive or cane bins
(f) when stepping from the locomotive, leave on the side on which the work is to take place. If the operator is required to depart the locomotive it should be at a stop and brakes applied
(g) leave the locomotive on the side on which the work is to take place
(h) ensure they remain visible to other relevant workers
(i) ensure walkways for shunting activities are maintained
(j) ensure a five-metre separation distance for people in front of and behind plant on the corridor.

4.5 Locomotive loading

The design and manufacture of locomotives and bins is a specialised practice outside of the scope of this code of practice, however, to meet work health and safety obligations, rail operators should refer to *AS 7501 – Rolling Stock Compliance Certification.*

However, rail operators should ensure that hazards associated with the loading characteristics (maximum trailing load) of the locomotive should be assessed and controlled, including the use of brake wagons. Load limits should ensure trains can safely ascend and descend grades in all environmental conditions, and, where brake wagons are used, the load limits should include provision for the failure of a brake van.

Guidance should be sought from existing Australian Standards and reference to the Australian Sugar Milling Council (ASMC) sugar industry guideline for the Design, Manufacture and maintenance of Locomotives and Rolling Stock for Cane Railways. Another option for rail operators would be to consult with a competent person to verify locomotive operations are compliant.

4.5.1 Possible controls for locomotive loading hazards

Controls include:

(a) determining the maximum haulage rate of the locomotive including modifications
(b) considering all possible weather conditions
(c) considering track issues such as grade, slope and bridge capacity
(d) considering reduced capacity at the start of the season (e.g. reduced adhesion due to periods of no or low use) and notifying operators of trains
(e) determining braking capacity and brake wagon requirements
(f) coupling capacity
(g) duty cycle
(h) modification of haulage rates for locomotives with reduced engine capacity or operating without brake wagons
(i) consideration of those gradients where the potential for break-away of cane bins should be managed with brake wagons
(j) brake wagons to be function-tested as part of pre-start procedures.

4.6 Unexpected operator incapacity

The operation of locomotives is almost entirely dependent on the action of the operator (driver) and should the operator driver become incapacitated, adequate emergency systems should be established which ensure workplace health and safety.

It is difficult to eliminate the risk of operator incapacity, however, control measures should be considered that minimise the risk.

4.6.1 Possible controls for unexpected operator incapacity

Specific guidance and requirements related to fitness to work assessments, alcohol and drugs and fatigue management are provided in Section 3.4 Fitness for Duty of this supplement. These systems, when effectively implemented, will minimise the risk of unexpected operator incapacity.

However, as the risk will not be fully eliminated, implementation of vigilance systems on cane railway vehicles should be considered as a control measure for unexpected driver incapacity. Operator assistants training must include how to stop and shut down the locomotive in an emergency.

4.7 Interface agreements between rail/road user owners and regulators

Rail operators should consider impacts on rail corridors and other transport operations and ensure that all required agreements/permits/approvals are in place (e.g. Ancillary Works and Encroachment Agreements with TMR covering crossings by cane railways of State controlled roads) as well as approvals where required with local authorities.

5. Track and civil infrastructure

Note: Section 5 includes references to the use of plant that is not specific to cane rail operations. Further information on how to comply with the legislative duties for specific to plant can be found in the Managing risks of plant in the workplace Code of Practice and the Rural plant Code of Practice.

Track and civil infrastructure includes bridges, track repair, derailment recovery and maintenance activities.

Cane railway track is usually of a smaller gauge than a national and state railway and in general the track gauge is 610 millimetres (two feet). The track consists of components including sleepers, fastenings, rail, fishplates, turnouts and is usually supported by a layer of ballast on top of a compacted sub grade.

Infrastructure includes all bridges, crossings (including level, occupational and grade separated crossings and diamond/drawbridge crossings), check rails, earth works and other civil works necessary for the support or protection of the cane railway system.

Rail operators must keep records detailing cane railway infrastructure, including locations and details of bridges and rail crossings. The records should include details of

- inspection and testing
- assessment of inspection and test results; and
- execution of corrective or preventative actions.

Owners of cane railways should adopt a whole-of-life approach to the management of track structure. This approach should include the requirements in relation to track structure in terms of design, supply, construction, and maintenance of track and track structures.

The use of RISSB AS 7639 is suggested to manage track quality and integrity during the design phase, through construction and ongoing maintenance phases.

Hazards

The repair and maintenance of railway tracks involves common hazards which are discussed in this document such as:

(a) contact between trains and rail workers
(b) rolling stock recovery (including terrain issues)
(c) bridge failure and bridge clearing (floods)
(d) third party interaction; and
(e) cranage under or near overhead powerlines.

A range of general hazards should be managed within track maintenance, for example:
(a) manual handling (e.g. rails and sleepers)
(b) falls from heights (e.g. from bridge work)
(c) heat and ultraviolet radiation
(d) mobile plant
(e) working environment
(f) dust and noise
(g) excavation/trenching
(h) slips, trips and falls
(i) work adjacent to live traffic (e.g. blowing out points)
(j) hot works (e.g. welding, grinding and thermal cutting).

Working near overhead powerlines including local supply and Queensland Rail/Aurizon lines can also cause hazards. Hazards from overhead or underground electric lines may arise from:
a) a person or something the person is holding, or is in contact with, coming closer than the relevant exclusion zone distance to an overhead electric line
b) operating plant coming closer than the relevant exclusion zone distance to an overhead electric line
c) damage to overhead electric lines or related equipment
d) damage to underground electric lines exposing live parts; and
e) building structures near overhead electric lines.

These issues are addressed in general terms within the Sugar mill safety Code of Practice and a range of guidance material issued by Workplace Health and Safety Queensland.

5.1 Train contact with track workers

A major hazard of on-track work is contact between workers and rolling stock. Track maintenance may be carried out 24 hours a day, seven days per week in both the crush and non-crush periods. During the crushing season, all cane railway traffic management is controlled by the traffic office (control centre). During the maintenance season, traffic management can vary between the traffic office or an appointed track manager (for maintenance purposes). Both modes of management of operations should have systems in place that provide for the management and recording of train movements.

Track workers are usually heavily involved in rolling stock recovery after derailment and repair of any subsequent damage.

The required control measures to manage the risk of contact between workers and rolling stock should be determined utilising risk management procedures that consider:
(a) the amount of time required on track
(b) the type of equipment necessary to perform the repairs
(c) the visibility from the work area to both approaches
(d) emergency exit provisions (particularly for bridge and cutting work)
(e) whether lookouts are required and use of signage with “W” boards
(f) the placement of early warning devices; and
(g) the potential for detached rolling stock to enter the worksite.

Rail operators should consider systems for isolation of track for maintenance activities in work environments:
(a) with no traffic
(b) with traffic in the work zones
(c) adjacent to live traffic.

5.2 Possible controls for train contact with track workers

The risk of workers on the track coming into contact with rolling stock must be controlled and a documented risk management process must be in place. Risks can be minimised by ensuring that work does not take place within the contact zone of the track by:
(a) identifying isolation on TrackSAFE electronically
(b) physical isolation of track using points clips and locks to direct rail traffic away from a track worksite
(c) closing a section of track to train entry
(d) using derailers to prevent rolling stock entry into the work area
(e) adjacent road protection.

An example of an administrative control which can be put in place at short notice is to nominate an exclusion zone around the track, a minimum of 2.5 metres from the centre of the track (3 metres or more where possible), within which track workers and their equipment cannot enter until other controls are put in place.

Another control measure is to erect track protection signs, such as speed restrictions, stop or slow signs and other warning signs (e.g. workers on track). The location of signage should adopt an industry standardised approach to distance and style. For further information, please see AS 7632 – Railway Infrastructure – Signage and ASMC Guideline for Cane Railway Operations.

Control measures should be determined using a risk management approach dependent on:
(a) the surrounding terrain and the opportunity to remove equipment and on track workers in the event of a locomotive entering the area
(b) the level of lighting and weather conditions (particularly those affecting visibility)
(c) the line of sight on each approach to the work area
(d) the likely speed and minimum stopping distance for any approaching trains.

The following are examples of control measures that can be used to help prevent rolling stock coming into contact with workers:
(a) defined track occupancy permission or authority.
(b) voice radio communication systems (including portable and vehicle radios)
(c) hand signals
(d) flashing warning beacons
(e) high visibility personal protective equipment
(f) high visibility equipment marking (on items of plant)
(g) lookouts on each approach should there be the risk of a locomotive approaching. It would be unnecessary to have a lookout on each approach if one end of the track is a tail with no locomotive in that section.

5.3 Rolling stock recovery

Derailments occur on any rail network and the recovery of rolling stock introduces a range of hazards that needs to be considered. Derailments can occur on any section of the track (including on bridges) and can be caused by a number of factors such as:

(a) build up of foreign material (such as in sidings)
(b) track component failure
(c) rolling stock failure
(d) vandalism and malicious interference
(e) third party contact with rolling stock
(f) emergency braking
(g) operator error.

Rolling stock recovery normally includes the use of items of plant such as cranes, low loaders, excavators and a range of smaller vehicles. Access to the site of the derailment can often be difficult and can require passing through other properties or driving directly along the main line.

Hazards such as difficult terrain, overhead electric lines, unstable ground, culverts and drains are often encountered on the rail network. Other issues include exposure to traffic on roads and control of members of the public (e.g. tourists and sightseers). A single operator covering their own stock can also pose a number of hazards. Use of mobile crane to recover stock is preferred where possible.

Hazards from overhead or underground electric lines may arise from:

a) a person or something the person is holding, or is in contact with, coming closer than the relevant exclusion zone distance to an overhead electric line
b) operating plant coming closer than the relevant exclusion zone distance to an overhead electric line
c) damage to overhead electric lines or related equipment
d) damage to underground electric lines exposing live parts
e) building structures near overhead electric lines.

Work in or around live electric lines is governed by the *Electrical Safety Act 2002* and the *Electrical Safety Regulation 2013*.

Detailed guidance is provided by the Electrical safety Code of Practice – Working near overhead and underground electric lines.

5.3.1 Possible controls for rolling stock recovery

Rolling stock recovery provides a range of hazards similar to that of normal on track work (such as train contact). Controls common to rolling stock recovery and track work should be used.

Whilst the recovery of rolling stock is undertaken with some urgency, recommendation is made for a pre-work Job Hazard Analysis (JHA) (or similar) of the intended worksite prior to any recovery work commencing. This analysis should involve all workers undertaking work at the recovery to identify hazards and controls. This should be documented on a JHA form and be endorsed by all members of the workgroup. Any personnel joining the workgroup after work has commenced, must be inducted onto the work site by the worksite supervisor

using the JHA. The new worker must then sign onto the JHA to show they are aware of the hazards at the worksite and understand the controls that are in place.

Should the need arise to recover derailed rolling stock when a train is operating in single operator mode, assistance should be sought/provided by a competent person. The use of mobile cranes to recover rolling stock should be the preferred method of recovery.

Should rolling stock recovery be occurring on a bridge or otherwise at a height, the Managing the risk of falls at workplaces Code of Practice should be considered.

5.4 Downed power lines

Workers should be trained on risks in the event of downed power lines. This is particularly relevant for train crew when power lines are downed during a derailment.

The training should include, but not be limited to:

- when is it safe to leave the locomotive cab
- how to leave the locomotive cab safely if you must evacuate
- the double trip process employed by power generators (re-energising lines after an initial trip)
- Single Wire Earth Return (SWER) lines (which lack a circuit breaker).

Further information on identifying, assessing and controlling electrical risks in relation to power lines is included in the Electrical safety Code of Practice – Working near overhead and underground electric lines.

5.5 Bridge failure

Failure of bridges or bridge components exposes operators to significant risk of injury or death from falls from heights, crush injuries and in some circumstances, drowning. RISSB AS 7636 Railway Structures can be referred to for the minimum requirements for the design, manufacture, construction, maintenance, decommissioning and disposal of rail structures (including bridges).

5.5.1 Possible controls to reduce bridge failure

The risk of a bridge failure should be assessed, and the following items considered in terms of exposure and consequence:

(a) the size of the structure
(b) its age and condition
(c) the weight and number of bins for each locomotive crossing
(d) the speed of the locomotive crossing
(e) the approaches and what limits they place on locomotive speed
(f) construction material of the bridge
(g) exposure of the bridge to corrosive elements.

A range of control measures should be used for rail bridges including:
(a) regular inspections by a competent person
(b) a documented and regular maintenance system
(c) load and speed limits
(d) event triggered inspections
(e) life of the structure based on duty cycles.

5.6 Bridge clearing

During flooding large river bridges can trap various types of debris and other material which increase the side loading on the structure. In some cases, this additional load can cause the structure to fail.

Identified hazards for bridge clearing during flooding events includes flood water, risk of drowning, pile and pier undermining, wildlife (such as crocodiles) and destabilisation. Inspections of bridges should be carried out by a competent person.

5.6.1 Possible controls for bridge clearing

Clearing bridge structures during significant weather events should be specifically risk assessed for each event including issues such as:
(a) the seriousness of the flood (i.e. water level)
(b) consideration of tidal flow (if relevant)
(c) the loading level on the bridge
(d) the skills of the person clearing the bridge
(e) the speed of the water flow; and
(f) the system used to clear debris and whether the system increases the risk of injury.

Consequences and the likelihood of those consequences should consider:
(a) the likelihood of a person falling into the water
(b) what event sequence would occur should the structure fail during bridge clearing
(c) the expected exposure time for the work to take place
(d) risk of entanglement; and
(e) environmental and wildlife risks.

Bridges under significant flood loading should be closed to rail traffic unless travel over the structure is approved by a qualified engineer or the structure can be traversed without risk for authorised use.

A range of control measures should be used including:
(a) not traversing while the rail is under water
(b) performing bridge clearing once water levels or debris loading have reached a certain point
(c) using a clearing system which does not require entry onto the bridge (e.g. bank side snigging)
(d) flood protection structures
(e) improving bridge design
(f) fall protection systems which eliminate the potential for falling in the water
(g) use of flotation devices/lifejackets; and
(h) methods of rescue.

Note: The PCBU(s) should refer to the Managing the risks of falls at workplaces Code of Practice for information on their duties and requirements related to working at height, including fall protection systems.

5.6.2 Track maintenance

Track owners should identify relevant assets on their cane railway line, for example, bridges, culverts and other formations, and keep and maintain records of this infrastructure which detail:

- inspection and testing
- assessment of inspection and test results
- execution of corrective or preventative actions.

Guidance for construction and maintenance of rail infrastructure is provided in the ASMC industry guideline for Track and Civil Infrastructure Design and Maintenance Practices and RISSB Standards AS7636, AS7638 and AS7639.

Track owners should have a system of vegetation control in place to maintain rail corridors, sidings and walkways. These controls can include clearing, cutting and chemical treatment. These activities can occur from rail based plant or road accessed dedicated plant. Rail operated plant need to maintain visibility standards. Use of dedicated equipment for access must consider working at heights and other risks involved in the use of this plant. Plant used in spray control of chemical should minimise the risk of spray drift when undertaking spraying operations for vegetation control and weather conditions should be considered. Records of spray control methods should be kept by the PCBU.

6. Sidings and delivery points (field interface)

Note: Section 5 includes references to the use of plant that is not specific to cane rail operations. Further information on how to comply with the legislative duties for plant can be found in the Managing risks of plant in the workplace Code of Practice and the Rural plant Code of Practice.

The sidings and delivery points in a cane railway system form the working interface between a sugar factory's transport system and cane harvesting operations. The site location and layout of these sidings and delivery points are important for the safe and efficient procedures and operations to transfer harvested cane to the factory. The sugar industry uses a wide range of designs for these delivery points to serve the factory's transport systems (see page 11 – ASMC industry Guideline for the Operations and Procedures at Cane Railway and Road Transport Delivery Points).

Sidings are used for the storage or shunting of rolling stock and are a key interface with field based equipment such as in field transporters and harvesters.

Rail delivery points (sidings) consist of tracks connected to the running lines via a series of turnouts. The typical siding configurations are either loops or fish tails. For roll-on roll-off operations, one track holds empty cane bins which are collected by the contractors and the other track holds the full cane bins subsequently returned by the contractors.

Where the contractor operating in a siding uses tipper/elevator haul outs, loading of bins can occur on both lines of a loop, provided there is sufficient access between adjacent tracks for the tipper/elevator haul outs to operate.

Delivery points can also include infrastructure for larger scale road transport delivery vehicles, such as trans-loaders (which transfer cane from road containers to rail bins) or roll on roll off facilities.

Locomotives perform three basic functions within sidings, namely; delivering empty bins, collecting full bins and shunting operations. The type of siding and its layout with respect to the main line significantly influences the process for the delivery and collection of bins.

Note: Shunting-type activities using tractors or other farm plant can also occur on ‘horse lines’ owned by farmers, which are not part of the railway network owned by cane rail operators. On the relatively few ‘horse lines’ in use across the industry, tractors (or other farm plant) haul cane bins to or from sidings that are part of a cane mill’s rail network.

A delivery point is a shared workplace. All persons involved with activities at a siding have duties to ensure that the way they undertake their activities does not pose a risk to themselves, workers or others.

Harvesting and haul out personnel must complete an appropriate Siding Induction prior to operating within a siding.

During the harvesting season sidings are used by a number of industry participants including cane railway crew, growers and their workers, harvesting contractors and haul out drivers. Cane railway maintenance workers can also be carrying out work in sidings as required during the harvesting season.

Sidings are usually only used by one harvesting contractor at a time unless the siding design/layout can accommodate multiple contractor delivery.

The interaction between cane railway rolling stock, harvesting haul out equipment and/or road transport operations at sidings can create the potential for serious incidents to occur if adequate controls are not in place. As a general rule, right of way between cane railway operations in sidings and field equipment in the sidings is determined by which operator enters the siding first. This ‘first-in’ rule means that the first operator at the siding is considered to be in control of that siding (unless prior agreement is reached), and the second operator must give way to these operations.

6.1 Hazards

Rail sidings are a high traffic area during the cane harvesting season. The main hazards within the siding environment are:

(a) contact between field traffic (e.g. harvester and associated cane haul out vehicles) and trains
(b) derailment of locomotives and bins from extraneous matter build up
(c) working environment (e.g. slips trips and falls, lighting and visibility)
(d) spillage from haul outs
(e) contact between workers and transporters, cane bins and/or locomotives
(f) overhead power lines
(g) other persons entering the siding (visitors, children, field workers, etc.)

(h) inexperienced workers
(i) failure to maintain a clear main line, including setting points for the main line
(j) uncontrolled bin movement due to gradients and/or placement of bins.

Controls for these hazards include:

(a) exclusion zones around mobile plant
(b) siding inductions for workers
(c) appropriate housekeeping
(d) conducting risk assessments
(e) implementing safe work procedures
(f) track and delivery point maintenance
(g) signage to advise trains are in the area
(h) identified clearance points
(i) establishing and maintaining risk registers for sidings, which could include:
    a. establishing procedures for pushing bins out onto the mainline or fouling the mainline
    b. establishing procedures to prevent interference with mainline points by persons other than train crew or track maintenance personnel
    c. ensuring all bins in sidings are restrained appropriately to prevent unintended movement and potential escape onto the mainline
    d. the use of high visibility clothing by workers in sidings
    e. the use of appropriate safety lighting on mobile plant to ensure it is visible in the hours of darkness.

6.2 Contact between rolling stock and harvesting traffic

Contact between rolling stock and harvesting/field traffic may cause significant injury or death. Cane railway rolling stock is heavy moving plant, ranging between one tonne and 40 tonnes, operating on a fixed track with no avoidance systems within the operating envelope except by stopping. As there are no braking systems on bins, clearance points should be considered in siding procedures to prevent collisions.

Field equipment varies in size but can haul loads from four to 25 tonnes.

An example risk assessment has been included in Appendix 7.6.

6.2.2 Possible controls for contact between rolling stock and harvesting traffic

The risk of contact between moving plant is minimised if only one item of plant is operating in a siding at any one time, for example, there is an increased risk if a locomotive arrives at the siding while an in-field transporter is already unloading. The locomotive should wait until the transporter has finished unloading and left the siding before entering the siding.

Similarly, if a transporter arrives at a siding and a locomotive is in the siding shunting bins, the transporter should wait until the locomotive crew have completed shunting and left the siding before entering.

In the absence of a detailed risk assessment and jointly prepared work instruction, haul out vehicles or transporters and locomotives should not be operating in a siding at the same time. However, the right of way should be given to whoever is occupying the siding first.

Cane railway operators must ensure procedures are in place covering all duty holders operating in a siding. These procedures should include detailed traffic management plans, specifics of siding gradients, details of clearance points, as well as specifying the risks associated with the activity of loading cane bins.

All operators working at sidings must have appropriate sidings induction training before commencing work at the siding. This can be district based for generic siding inductions and can be site-specific for working in particular sidings.

A range of warning signs (such as 'H' or harvester boards) have been designed by industry which provide additional warning to locomotive drivers of harvesting operations in the close vicinity of the cane railway. A duty holder who harvests or engages harvesting groups must advise the track owner of expected activities that will be occurring within the vicinity of the cane railway, particularly in the 2.5 metre corridor. See Figure 4.

Figure 4 – Example 'H' warning sign

Ideally, direct radio contact should be possible between harvesting groups and locomotives. Regardless of this, procedures must be in place to ensure communication takes place between the cane railway operators and harvesting groups when H boards are required to be placed adjacent to the track.

6.3 Locomotive and bin derailment from extraneous matter build-up

Accumulated material around sidings has caused derailment of rolling stock by forcing the wheels of the equipment off its running line. In busy sidings and track areas, which are used on a regular basis, considerable amounts of material can be left behind from:

(a) spillage from haulage equipment
(b) extraction from harvesters working close by
(c) spillage from bin derailments
(d) disturbed ballast/siding surface; and
(e) other sources.

6.3.1 Possible controls for extraneous matter build-up

Hazards associated with spilt billets and trash are minimised when the material is regularly removed. The person who spilt the billets should remove spilt billets and/or trash from the siding before leaving the siding.

Note: Every person has a duty **not** to endanger the health and safety of others. Spilt billets and other extraneous matter on or near rail lines have the potential to inflict serious damage to both people and equipment. Where a siding is dirty and there is a risk of derailment, the train crew / driver must make a decision on the basis of assessed risk. Spilled cane also reduces adhesion between the loco and the rail, resulting in reduced hauling capacity of the loco. This can cause wheel spin and damage the loco. Friction may also create a fire risk.

6.3.2 Work environment

Delivery sidings are located in numerous areas within a railway transport system. These areas include easements in farmland, on roadsides, in cuttings, close to intersections, other farming areas (e.g. banana farms), near rivers and creeks, drains and channels. The working environment should be considered within any risk management process and consider hazards such as:

(a) water transfer systems (such as irrigation channels)
(b) drains and culverts
(c) lighting (if work takes place regularly at night)
(d) visibility (due to track curves, crops and dust and weather conditions
(e) unauthorised persons
(f) the risk of slips, trips and falls from extraneous matter (spilt billets)
(g) walkway conditions
(h) washouts and drainage issues/wet ground conditions
(i) truck dumps and pits and associated access/egress points
(j) multi-user tumblers and stoppers
(k) manual handling (e.g. rails and sleepers)
(l) heat and ultra-violet radiation
(m) mobile plant
(n) dust and noise
(o) work adjacent to live traffic
(p) overhead powerlines including local supply and Queensland Rail/Aurizon (see below)
(q) nearby residences, businesses or schools.

6.3.3 Possible controls for work environment

A range of controls is available for working environment including:

(a) training
(b) marking of hazards
(c) crop harvest scheduling
(d) warning methods (e.g. flashing lights, high visibility paint or locomotive horn)
(e) mirrors on track curves or sidings that have permanent restricted vision physical barriers
(f) vegetation control
(g) maintaining safe walkways
(h) evaluating the work environment after weather events
(i) ensuring safe access and egress for drivers when using truck dumps and pits
(j) detailed safe work procedures, training and instruction for sidings where additional controls are used, for example, stoppers.

Please see the Managing the work environment and facilities Code of Practice for further information.

6.4 Contact between persons, transporters, cane bins and/or locomotives

Safe operation should always be paramount in any activity at a siding where people and plant are present. Persons working in or around sidings and delivery point can be classified into two categories:

(a) authorised or permitted persons (i.e. someone with a genuine need to be on site who maintains a current siding induction competency); and
(b) unauthorised persons (e.g. unescorted visitors).

Contact between persons and equipment working in the delivery area can cause significant injury. Unintended contact between haul outs and bins may cause derailments. This can create additional risks for workers and others during the recovery process.

The use of single operator locomotives can also create additional hazards at a siding. Visibility can be reduced when a single operator is positioned on the ground, and where they may not be aware of other person/s entering the siding during shunting operations being controlled remotely.

Authorised third parties involved in growing or harvesting activities should complete and maintain a current siding induction competency. Training should be developed in consultation with industry groups and other relevant stakeholders. Duty holders must ensure users of sidings have completed relevant training and induction procedures prior to accessing sidings.

6.4.1 Possible controls for contact between persons, transporters, cane bins and/or locomotives

Duty holders should use control measures for authorised persons, including:

(a) reducing or removing the need to exit transport equipment in delivery areas
(b) providing high visibility clothing
(c) avoiding being on the ground in the delivery point area whilst bins are being delivered, shunted or moved
(d) creating and identifying exclusion zones for non-essential personnel
(e) maintaining contact with operators of equipment working in the area (e.g. notifying by radio when exiting vehicles)
(f) conducting relevant inductions, for example, siding inductions
(g) always exiting the locomotive on the side on which the work is to take place, and if possible, working on the opposite side of the mainline to the siding
(h) looking out for moving bins or vehicles in sidings especially when cutting bins on the mainline
(i) looking out for approaching farm tractors, cane haul out units or other vehicles when placing empty cane bins or removing full cane bins from a siding
(j) being aware that some sidings may have two or more harvest groups loading and may be working on two different lines in the siding or at opposite ends of the siding
(k) avoiding commencing shunting until the siding is clear of haul out vehicles
(l) where possible, avoiding walking down the centre of any lines in the siding
(m) where possible, avoiding leaving the locomotive to commence any activity in a siding that runs parallel to the mainline, and is currently occupied by a haul out unit or requires the driver’s assistant to work between the mainline and the siding
(n) reviewing shunting procedures for single operator shunting to ensure risks are being managed for both workers and the public.

If the risk of unauthorised people entering the work area has been identified, duty holders should ensure warning signs are used, installed and maintained. Should unauthorised persons enter the work area, operations should cease until they are no longer on site.

6.5 Overhead electric lines and exclusions zones

The *Electrical Safety Act 2002* (ES Act) and *Electrical Safety Regulation 2013* (ES Regulation) prescribe ways to control the risks associated with electricity for duty holders.

The ES Act outlines general electrical safety duties. The ES Regulation states the allowable distance for working near a live electrical part. Electrical Safety codes of practice give practical advice on safe systems of work and exclusion zones.

6.5.1 Overhead powerlines

Overhead power lines are a significant hazard when located in sidings or close to track operations. They require specific controls.

Contact with overhead power lines can cause death. Even if a person does not touch the power lines they are still in danger, as electricity can arc (or jump gaps). Working near overhead electrical power lines is therefore a very dangerous activity unless the appropriate precautions are taken.

The ES Regulation states that workers and equipment (e.g. hand-held or powered tools or mobile work platforms) must stay outside the defined exclusion zones around overhead power lines.

Exclusion zones apply whenever work is carried out, or plant or vehicle is in operation, around a live overhead electric line the risk cannot be eliminated by turning off the power.

Exclusion zones extend in all directions, not just sideways. The exclusion zone will vary depending on the:

(a) voltage of the line
(b) whether the line is insulated or bare; and
(c) the level of competence, training and authorisation of the person carrying out the work.

Duty holders must obtain safety advice from the local electricity entity responsible for the overhead electric line prior to commencing work near electric lines.

If a duty holder expects work may cause a person and/or equipment to come closer than the exclusion zone of overhead power lines, they must seek advice as to how to stay out of the exclusion zone. To do this, they must give the local electricity supplier written notice that work is intended in this area. Within seven days of receiving notice, the electricity provider will provide written safety advice.

Work cannot start near the overhead power lines without this safety advice. It is critical that duty holders assess the work requirements prior to arriving and take the necessary steps to minimise the risks involved with work near overhead power lines.

6.5.2 Controls for overhead power lines near sidings

The ES Act and the ES Regulation provides specific guidance on working near overhead and underground electric lines which has mandatory requirements. In particular:

(a) isolating supply lines for work within exclusions zones
(b) prohibiting work within exclusion zones for working near overhead electric lines
(c) use of authorised persons.

There are a number of devices available that either assist in preventing contact with overhead and underground electric lines when undertaking maintenance or recovery or reduce the degree of risk in the event of contact.

Such devices include:

(a) Ensuring work does not encroach into the exclusion zone—all work is to be conducted outside the exclusion zone.
(b) Ensuring workers have received training in relation to cutting or trimming trees around overhead electric lines.
(c) When using items of plant near overhead electric lines (e.g. cranes) ensuring that there is a safety observer whose job is to watch the worker and their equipment and warn them if they begin to get close to their exclusion zone around the power lines, and to keep people away from the area at ground level where falling items (e.g. branches etc.) may land.
(d) Allowing for sway and sag of the overhead electric lines (sway is usually caused by wind and sag occurs when the temperature of the overhead electric line fluctuates)
(e) Reporting all injuries, electric shocks and near misses to the person conducting a business or undertaking (PCBU). The PCBU is required to notify the local electricity entity of certain electrical events.

Wherever overhead or underground power lines are present in cane rail sidings, this should be captured in the cane railway hazards register.

Resources such as Before You Dig Australia and Look Up and Live may also be of assistance in managing the risks of overhead or underground power lines.

7. Rolling stock

Rolling stock includes any on track vehicle or equipment that operates on the cane railway track system. It includes locomotives, bins of various designs and carrying capacities, brake wagons and track maintenance equipment (such as tampers). In large mill areas this can include bin fleets which number in the thousands and large locomotive fleets. In general, the carrying capacity of bins varies from four to 15 tonnes and the actual load will vary dependent on the type of cane and its weight relative to its volume. Cane bins have no braking system and movement cannot be controlled unless attached to a locomotive or brake wagon.

Locomotives range in size, capacity and construction and include side rod and bogie drive systems. Generally, locomotives range from 18 to 40 tonnes in weight, however, through the process of reconfiguration, operational capacities may increase. This can alter the operational function of the locomotive from its original manufacturing specifications.

Locomotive minimum operating standards should be implemented. Minimum operating standards must be met for a locomotive to enter/continue in traffic safely. Minimum operating standards for cane rail rollingstock include:

- a functioning two-way radio (including one handheld radio) or a mobile phone can be used following a risk assessment
- functioning headlights at both ends
- functioning klaxon
- functioning vigilance system (or a second person if vigilance system has failed and locomotive needs to return to home depot)
- all glass is secure
- Restricted Stock Unit (RSU) man down test and functioning remote
- working sand
- all doors are able to close.

Hauling capacity of locomotives is dependent on the terrain (grade of track), track conditions (wet, dry or speed limited) and track capacity (in particular bridge loading) track geometry (radius of curves), locomotive mass, engine power, braking capacity and drawbar and coupling strength.

The adoption of remote operation technology has enabled cane railway operators to deploy upgraded locomotives in a single-person operation. This requires locomotives to be reconfigured and rebuilt to meet additional safety requirements, including active GPS and man down technology. Driver vigilance systems, or a secondary protection measure such as an additional person where there is a failure of the vigilance system, should be used in single-person operations.

Brake vans are heavy unpowered rolling stock which are attached to the last cane bin of a train to assist in braking (stopping) the train. There are two basic types of brake wagon which have:

- three independent axles, or
- two two-axle bogies.

The brake wagons are controlled from the locomotive by the locomotive driver using a multi-position switch. The braking signals are transmitted from the locomotive to the brake wagon by radio which is quite separate from that used for voice communications.

Brake wagons should have functioning anti-roll back control. These should be maintained and tested as a part of pre-start procedures. Failure of a brake wagon risks train handling. Additional functions, such as speed variation alarms, can assist with managing this risk.

Track maintenance rolling stock can be self-powered and can be deployed in work groups with multiple operators (e.g. re-sleepering machines, ballast regulators, track jacks). Each operator must be competent with the machine they are operating and be trained and assessed as competent in network operating rules to safely drive plant in the rail network.

Hazards

Rolling stock presents a range of hazards that are normally associated with mobile plant such as:

(a) visibility of rolling stock (to prevent collision with plant and other things, e.g. headlights)
(b) equipment failure (axles, brakes, engine and transmission, coupling failure)
(c) fire (on board and external)

(d) coupling and uncoupling (crush risk)
(e) derailment
(f) hot boxes (bearing failure)
(g) exposure to moving parts
(h) slips trips and falls
(i) coupling systems—pin, dumbbell and Willison
(j) bin greasing
(k) structural failure (e.g. broken couplings and runaways)
(l) working environment (e.g. noise, cab layout and access/egress)
(m) control system failure.

Issues that occur during the operation of equipment should also be considered in any hazard control process, such as:
(a) train control (acceleration/braking or train draft/buff)
(b) incorrect or insufficient chocking
(c) incorrect coupling
(d) mixed size/designs classes of bins in use at mills.

7.1 Equipment failure

The majority of hazards associated with rolling stock occur due to equipment failure (e.g. couplings, brakes, transmission, hot boxes and control system failure).

The risk of injury from equipment failure can be eliminated or minimised by implementing appropriate control measures.

7.1.1 Possible control measures for rolling stock failure

Inspections
Inspections can identify potential problems that were not anticipated during plant design, deficiencies in the plant or equipment due to wear and tear, corrosion or damage. Rail operators should ensure that a regular system of inspection is put in place for locomotives and brake wagons, which includes, but is not limited to:
(a) a pre-season inspection
(b) basic start checks (such as fluid levels, brake block inspection, lights and radios); and
(c) operational inspections on a regular basis (scheduled maintenance).

Start checks should, where possible, be conducted from ground level to avoid risks of falls.

Maintenance
Plant must be maintained according to the manufacturer’s specifications, or in the absence of specifications, in accordance with the recommendations of a competent person.

Records
Records should be maintained for all items of rolling stock. Records should include information such as:
(a) the unique plant and component identification number
(b) as built and approved drawings and calculations
(c) compliance or test certificates
(d) inspection results

(e) major repair details
(f) maintenance activities or modifications (including the details of the competent person who undertook the work and the date the work was completed).

New or modified rolling stock
Alterations to existing locomotives may create additional risks that duty holders must manage. Consultation with workers, operators, testing of loco capacity and recording of modifications must occur. This includes:
(a) recording major modification details, including any design changes
(b) retaining maintenance records, including new or changed components
(c) recording hauling capacities for each class of locomotive
(d) recording the braking capacity of the loco with or without a brake wagon.

New and/or modified rolling stock may require an assessment by a competent person to be completed prior to operational use. For further guidance, please see AS 7501 – Rolling stock compliance certification.

As any modifications may introduce new risks, after any alterations to rolling stock, all controls must be reviewed. A systematic process should be followed in assessing whether any changes, for the purpose of rail safety management, have the potential to alter existing risks or introduce new hazards.

Competency and training for maintainers
Rail operators should ensure that employees using or maintaining plant are capable of safely and correctly performing those tasks. A number of methods of evaluating competency are available and the following should be considered:
(a) the persons qualifications
(b) previous work experience and performance
(c) training and supervision provided
(d) formal competency assessment
(e) authority to operate
(f) fitness for work.

7.2 Train handling

Train handling is the ability for the driver to use their judgement and skill to properly control the train by ascertaining the characteristics of the train and the track gradient and curvature to assist them in the proper use of power and brakes to adjust and control the speed and slack.

The operator in control of a train has a direct relationship with train incidents that may occur. The following are examples of operator-related hazards that can negatively impact safe train handling:
(a) lack of route competence
(b) excessive engine braking
(c) incorrect use of brake wagons
(d) non-management of buff and draft forces
(e) braking and brake feathering (depleting air supply)
(f) speed
(g) not trained and/or competent for the class of locomotive being operated

(h) driver fatigue; and
(i) loss of situational awareness.

7.2.1 Possible control measures for train handling

Correct methods for braking, minimising high buffing, draft and surge forces, chocking bins and coupling/uncoupling bins are usually learnt through training systems provided by the rail operator. Use of driver trainers/simulators may assist with assessing and maintaining competency.

No course exists, at the time of development of this code of practice, within the National Competency Standards, for operators of cane railway locomotives or traffic officers, however, a number of industry developed courses are available. Industry-developed systems and procedures for training and the use of train control, locomotives and train handling may be of assistance.

Rail operators should ensure that appropriate training is provided and that documented evidence of training can be produced if required.

Training and competency should be assessed prior to workers operating a TrackSAFE (or equivalent train separation tool), locomotive and/or track machines. Any competency assessment should include issues such as:
(a) network rules and procedures
(b) train movement
(c) single operator control of locomotives
(d) signalling and communications
(e) examination of trains
(f) track and trackside work, including any changes to track infrastructure
(g) operational safety
(h) Queensland Rail crossing procedure
(i) road/rail crossing procedures
(j) locomotive knowledge (for each type of loco operated by that driver)
(k) train handling
(l) route knowledge
(m) coupling systems
(n) coupling crush risks
(o) emergency procedures (following an incident)
(p) communication (radio) procedures
(q) procedures for yards and bin handling equipment
(r) any rolling stock modifications.

7.3 Bin greasing

Bin bearing greasing is a regular maintenance activity for bin fleets which can take place several times in any season dependent on fleet usage.

The expulsion of excess grease onto track systems following greasing operations can create additional hazards for rolling stock such as:
(a) reduced adhesion
(b) reduced acceleration control
(c) wheel lock up and flat spotting.

The bin greasing process also creates hazards for workers carrying out this task due to their close vicinity to moving rolling stock.

7.3.1 Possible controls for bin greasing

Greasing, by trained operators, should take place at locations which have at a minimum:
(a) safe access for workers
(b) sufficient lighting and ventilation
(c) adequate space to perform the task
(d) a method of emergency control; and
(e) detailed risk assessment.

A range of control measures should be considered for track hazards which may result from the bin greasing process, including:
(a) minimising excess grease loss (e.g. removal before leaving greasing area)
(b) scheduling greasing operations to minimise grease build up on track (allowing regular periods for cleaning or reduction in build-up)
(c) regular cleaning of track areas which are hazardous; and
(d) ensuring that bin greasing locations do not expose workers to moving plant whilst undertaking greasing activities.

7.4 Fire events

Sugar cane trash by its nature is a flammable substance which is sometimes burnt prior to harvesting cane. Cane rail tracks traverse throughout cane fields, bush and forestry areas and paddocks which can have significant fire loads. The risk of uncontrolled fires (wildfires) is one which should be addressed by rail operators.

Build-up of foreign material on locomotive engines and brake wagons has the potential to cause on board or external fires due to the heat produced in engines and braking systems. In turn fires can then be fuelled by oil, diesel or other flammable substances used by the locomotive.

7.4.1 Possible controls for fire hazards

All locomotives and brake wagons should be equipped with functional firefighting equipment and operators instructed regularly in the equipment’s use.

Significant external fire events may require:
(a) track closure
(b) removal of rolling stock from at risk locations
(c) follow up track inspection after significant fire events
(d) notification to emergency services
(e) firefighting and back burning to protect track structures (e.g. timber bridges).

7.5 Exposure to moving parts

Dependent on the type of locomotive, hazards exist from exposure to moving parts such as:
(a) side rod systems
(b) wheels
(c) transmission systems
(d) engine components (e.g. belting)
(e) buffers.

Operators can be protected from these hazards in a number of ways. Risk assessments should also consider the likelihood of operators or others being exposed to pinch points or moving parts that may require guarding.

7.5.1 Possible controls for exposure to moving parts

Rail operators should apply guarding techniques for moving parts as outlined in the Managing risks of plant in the workplace Code of Practice. Other techniques which may minimise the risk of exposure include:
(a) using barriers and guards, for example, 060 locos (where still in use) where side rods and access points meet
(b) providing adequate lighting
(c) keeping the locomotive in a clean condition (housekeeping); and
(d) ensuring fluid checks are completed from ground level.

7.6 Slips, trips and falls

The incidence of injury is increased where the following hazards exist either on the locomotive and/or in the delivery siding, including:
(a) poor housekeeping
(b) poor lighting
(c) uneven ground
(d) build up of cane billets
(e) weather conditions (wet/rainy)
(f) improperly stored operational equipment
(g) siding design—the cant or slope of the ballast
(h) design of steps on locomotives
(i) design of locomotives for checking of sand, fluids and oils
(j) footwear worn
(k) open drains
(l) proximity of turnout operating gear; and
(m) stepping on or off rolling stock.

7.6.1 Possible controls for exposure to slips, trips and falls

Rail operators should manage the risks of slips, trips and falls by using engineering controls to minimise the risk of exposure. This may include:
(a) locomotive design or modification to include sight glasses, and to ensure gauges and fill points are accessible from ground level
(b) ensuring workers alight or board a locomotive safely
(c) fitting nonslip treads to locomotive steps

(d) use of adequate lighting on steps
(e) installing nonslip handrails
(f) providing head lamps that provide for two free hands when stepping on or off the locomotive
(g) keeping the locomotive in a clean condition (housekeeping)
(h) maintenance of plant targeting the prevention of slips, trips and falls occurring on footplates and steps
(i) minimising excess material in the cabin or walkway areas by providing adequate storage, for example, designated space for locomotive or bin operational tools and/or personal items.

An example risk assessment has been included in section 7.5 Slips trips and falls – locomotive steps. RISSB Standard 7522 defines standards for access and egress.

7.7 Rolling stock visibility

Cane trains and track vehicles operate over roadways and adjacent to public roads and private residences. The potential for collision with others is a major hazard to train operators, members of the public and other road users. Train drivers rely on the operational capacity of the locomotive to prevent collisions, and also rely on being visible to others when approaching and/or intersecting with the public road network or the Queensland Rail network.

7.7.1 Possible controls for ensuring rolling stock visibility

Locomotives in use by rail operators should have functioning headlights, warning beacons, side lights and the availability of horns when in motion. Other rail vehicles including driver-operated tampers and on-track vehicles (e.g. weed sprayers), must be visible in order to identify them as moving plant. The use of functioning headlights, warning beacons and horns may reduce the risk of collisions.

Cane bins may also be difficult to sight in low-light. Visibility of cane bins can be improved by using paint and/or reflectors at the front and sides of the bin. For further information, please see AS 7531 Lighting and Visibility.

8. Appendices

8.1 Glossary

Active control (for active crossings): control of the movement of vehicular or pedestrian traffic across a railway level crossing by devices such as flashing light signals, gates or barriers, or a combination of these, where the device is activated prior to and during the passage of a train through the crossing.

Bin (wagon): for the purposes of this code of practice–the container used to hold harvested cane for transport by rail to a mill or raw sugar to a port.

Brake van (also known as a brake wagon): means an item of equipment used for the gradual braking and or stopping and holding a rake of bins during operations and shunting activities. Brake wagons are controlled by radio telemetry from a locomotive by the driver. The terms brake wagon and brake van may be used interchangeably in the industry.

Cane railway: means the network of tracks traversing land surrounding a sugar mill which are used principally for the transport of harvested cane to the mill.

Check rails: rails positioned to guide bin wheels through the crossing area of a turnout.

Civil infrastructure: track formation and drainage (but excluding track), fixed structures beside, over or under track, including supports for signalling and telecommunications equipment but excluding that equipment.

Competence: the possession of skills and knowledge, and the application of them to the standards required.

Constant vigilance: looking frequently in both directions for approaching Rail Traffic whilst in the danger zone.

Danger zone: everywhere within 2.5m horizontally from the nearest rail and any distance above or below this 2.5m, unless a safe place exists or has been created.

Sidings/delivery points: sections of the cane railway to which cane is delivered by various road or field transport methods. In general, sidings consist of two tracks connected to the main or branch line via a series of turn outs. One track holds empty cane bins which are collected by cane harvesting operators and the other track holds full bins which have been returned by the cane harvesting operators. For infield tipper operations both full bins and empty bins may be held on the same track.

Diamond crossing: a special track structure where one track crosses another track at the same level.

Drawbridge crossing: a crossing of another railway system (such as Queensland Rail) by a cane railway track in which the rails of the cane railway do not actually intersect the other track but form a drawbridge on top of the other track. The cane rails are normally in the raised position and are lowered to allow the passage of a cane locomotive/train. The passage of the cane train is controlled by a red/green aspect.

Fly shunting: a process of shunting in which a vehicle, which is not coupled to the shunting locomotive, is propelled forward and then allowed to continue uncontrolled, moving under its own momentum. Fly shunting is prohibited.

Gauge: the distance between the inside faces of the rail head (in the case of most cane railway networks this is 610mm (24 inches)

Locomotive: the on-rail vehicles used exclusively to haul full of empty bin trains for normal operation requirements or ballast wagons for track maintenance purposes.

Loose shunting: a process of shunting in which a single unit or several units of rolling stock not close coupled to the shunting locomotive, are propelled forward and then allowed to continue controlled, moving under its own momentum.

Occupational crossing: a defined section of track over which farm roads and access tracks cross the cane railway.

Operator: the person or body responsible by reason of ownership, control or management, for the provision, maintenance or operations of trains, or a combination of these; or a person or body acting on its behalf.

Organisation: an owner or an operator, or a person or body, which is both owner and operator.

Owner: the person or body responsible by reason of ownership, control or management, for the construction and maintenance of track, civil and electric traction infrastructure, or the construction, operation or maintenance of train control and communication systems, or a combination of these, or a person or body acting on its behalf.

Passive control (for passive crossings): control of the movement of vehicular or pedestrian traffic across a railway level crossing by signs and devices, none of which are activated during the approach or passage of a train, and which relies on the road user detecting the approach or presence of a train by direct observation.

Position of safety: includes a place where a structure or physical barrier has been erected to provide protection, a place that is not in the danger zone, or further than 2.5 meters from the nearest rail.

Restricted speed: a speed that allows rail traffic to stop short of an obstruction within a safe distance of a clear line that is visible ahead.

Rolling stock: any vehicle, item of plant or equipment that operates on or uses a railway track.

Route competency: the application of knowledge and skills that enables an individual to safely, and effectively operate rail traffic over a route.

Safety system: an integrated system of operating procedures and technology for the safe operation of trains and the protection of people and property on or about the railway.

Shunting: to push or pull (a train or part of a train) from the main line to a siding or from one line of rails to another.

Signalling and telecommunication infrastructure: the signalling equipment and telecommunication equipment provided and used as part of the safe working and operating systems of the railway, but excluding supports for such equipment.

Situational awareness: one's ability to predict and understand the current situation based on environmental surroundings.

TMR: the Queensland Department of Transport and Main Roads. TMR are responsible for road regulation and infrastructure.

Track: the combination of rails, fasteners, fish plates, sleepers, ballast, turnouts and substitute devices where used.

Train handling: the ability for the driver to use their judgement and skill to properly control the train by ascertaining the characteristics of the train and the track gradient and curvature to assist them in the proper use of power and brakes to adjust and control the speed and slack.

Turnouts: in track structures, which provide for one track to join or cross another.

Visibility standards: the maintenance and function of lights to improve rolling stock's ability to be seen and to assist the crew in viewing of the immediate area in front of the train.

Yard: a group of connected rail tracks used for storing, holding and sorting cane railway bins

8.2 Further information

8.2.1 Workplace Health and Safety Queensland and the Electrical Safety Office

Further information is available from www.worksafe.qld.gov.au or by calling 1300 362 128.

Legislation

- *Work Health and Safety Act 2011*
- *Work Health and Safety Regulation 2011*
- *Electrical Safety Act 2002*
- *Electrical Safety Regulation 2013*

Registrable plant and registrable plant design must be registered with Workplace Health and Safety Queensland. See Schedule 5 of the WHS Regulation for more information.

Codes of Practice

- Electrical safety Code of Practice - Electrical equipment rural industry

- Electrical safety Code of Practice - Working near overhead and underground electric lines
- Electrical safety Code of Practice - Works
- Electrical safety Code of Practice - Managing electrical risks in the workplace
- First aid in the workplace Code of Practice
- Hazardous manual tasks Code of Practice
- How to manage work health and safety risks Code of Practice
- Managing risks of plant in the workplace Code of Practice
- Electrical contractor guide
- Rural Plant Code of Practice
- Excavation works

8.2.2 Australian Standards (including RISSB standards)

This code includes references to Australian Standards and Rail Industry Safety and Standards Board (RISSB) standards, which set out guidelines for safe work practices and procedures. Unless otherwise specified, these are included for information only.

- AS 2550.1 Cranes, Hoists and Winches – Safe Use – Part 1: General requirements
- AS 7474 Rail industry – system safety
- AS 7451 Train integrity
- AS 7501 Rolling stock compliance certification
- AS 7502 Road rail vehicles
- AS 7513 Rolling stock interior environment
- AS 7522 Access and egress
- AS 7531 Rolling stock lighting and visibility
- AS 7632 Railway infrastructure – signage
- AS 7636 Railway structures
- AS 7638 Railway earthworks
- AS 7639 Track structure and support

8.2.3 Australian Sugar Industry Guidelines

The Australian Sugar Milling Council (ASMC) guidelines are a series of documents developed for the sugar industry cane railways sector. Each of the guidelines were comprehensively reviewed utilising an industry expert working group in 2021. The series includes:

- Guideline for Track and Civil Infrastructure, Design and Maintenance Practices;
- Guideline for Cane Railway Operations;
- Guideline for Safe Operating Practices for Cane Railways;
- Guideline for the Design, Manufacture & Maintenance of Locomotives and Rolling Stock for Cane Railways;
- Guideline for the Operations and Procedures at Cane Railway and Road Transport Delivery Points; and
- Guideline for Active Level Crossing Protection Systems on Cane Railways.

See Standards Australia website www.standards.org.au for advice.

8.2.4 Risk Assessment Models

- Australian Level Crossing Assessment Model (ALCAM).
- Manual of Uniform Traffic Control Devices (MUTCD), Part 7 Railway Crossings

Note: RISSB is the custodian of ALCAM. Contact www.alcam.com.au for advice.

See Australian Sugar Milling Council website www.asmc.com.au for advice.

The MUTCD can be purchased from SAI Global.

8.3 Example fatigue management assessment tool

CIRCLE THE MOST APPROPRIATE RISK CATEGORY FOR EACH QUESTION LISTED BELOW		LOW RISK	MEDIUM RISK	HIGH RISK
1. How many hours sleep have you had in the last 24 hours?		7 or more	5 to <7	Less than 5
2. How many hours sleep have you had in the last 48 hours?		14 or more	12 - <14	Less than 12
3. How many hours have you been awake (i.e. how long will you be awake by the end of your shift)?	A _____			
4. How many hours sleep in the last 48 hours?	B _____	A - B is 0 or negative	A - B is equal to 1 or 2	A - B is 3 or more
	A - B = _____			
5. Do you feel alert? **RATING** **DESCRIPTION** 1 Feeling active, alert or wide awake 2 Functioning at a good level, but not at peak, able to concentrate 3 OK, but not fully alert 4 A bit groggy, hard to concentrate 5 Sleepy, groggy, would like to lie down		1- 2	3	4 - 5
6. How many alcoholic drinks did you have before your sleep?	Male	0 - 4	5 - 6	7 or more
	Female	0 - 2	3 - 4	5 or more
7. Are you on any medication or other substances that could cause drowsiness or cause you to be unfit for work?		No		Yes
8. Do you have any stress, health problems or other personal problems that are significantly affecting your concentration and/ or sleep?		No		Yes
Score the responses as instructed: 1) Add up the number of answers circled in each risk category		Number of Low Risk boxes ticked _____	Number of Medium Risk boxes ticked _____	Number of High Risk boxes ticked _____
2) Times this number by the multiplier number to get a Risk Score for each risk category	Multiplier	**x 0**	**x 1**	**x 2**
	Risk Score			
Add your Risk Scores together and use this number to follow the Recommended Action listed on the following page				

LEVEL OF RISK	RECOMMENDED ACTION
LOW RISK **Total Score = 0 - 4** **AND; individual is** ▪ Alert ▪ Normal eye blinks (less than 1 second) ▪ Coordinated body movements ▪ Tolerant of others	▪ Continue to monitor. ▪ Remind individuals about fatigue and alertness management strategies (interaction with others, coffee, exercise, cold air on face, etc).
MEDIUM RISK **Total Score = 5 - 9** **OR; the individual reports they are fatigued and/or are showing some of the following signs:** ▪ Irritable/impatient ▪ Longer eyelid closure (1-2 seconds) ▪ Wandering thoughts ▪ Rubs eyes or face ▪ Facial contortions ▪ Restless movements ▪ Yawning	As above plus … ▪ Discuss possible reasons for fatigue ▪ Rotate tasks ▪ Encourage the use of alertness strategies ▪ Provide opportunity for a short breaks/brief nap of no more than 15 minutes. ▪ Low range 5-6, re-assess following break/brief nap. ▪ If level doesn't improve remove from safety sensitive work. ▪ Have personnel work together (if possible). ▪ Assess fitness for work before you allow person to return to work. ▪ Schedule regular supervision for remainder of shift.
HIGH RISK **Total Score = 10-14** **OR; the individual reports they are significantly fatigued and/or may be showing the following serious signs:** ▪ Quiet and withdrawn ▪ Long eyelid closure (2 or more seconds) ▪ Fixed staring ▪ Frequent yawning ▪ Micro sleeps	▪ Immediately prevent person from working and discuss the possible causes and action required. ▪ Determine if the individual can be placed on alternate duties for the remainder of shift and managed at work. ▪ If unable to be managed on alternate duties, send the individual home (provide transportation) and report incident in 1SAP.

I have had a one-on-one discussion with my Supervisor and have responded honestly to all questions. I agree to follow the controls listed below to manage any identified fatigue issues:

Action Taken:

☐ No action required –individual to report any further fatigue issues to supervisor

☐ Controls implemented as detailed below:

_____

☐ Individual placed on the following alternate duties for the remainder of shift: _____

☐ Individual sent home and reported in1SAP . Transport arrangements: _____

Employee/Contractor Signature: _____ Supervisor Signature: _____

Employee/Contractor Name: _____ Supervisor Name: _____

Date: Time:

8.4 Network map