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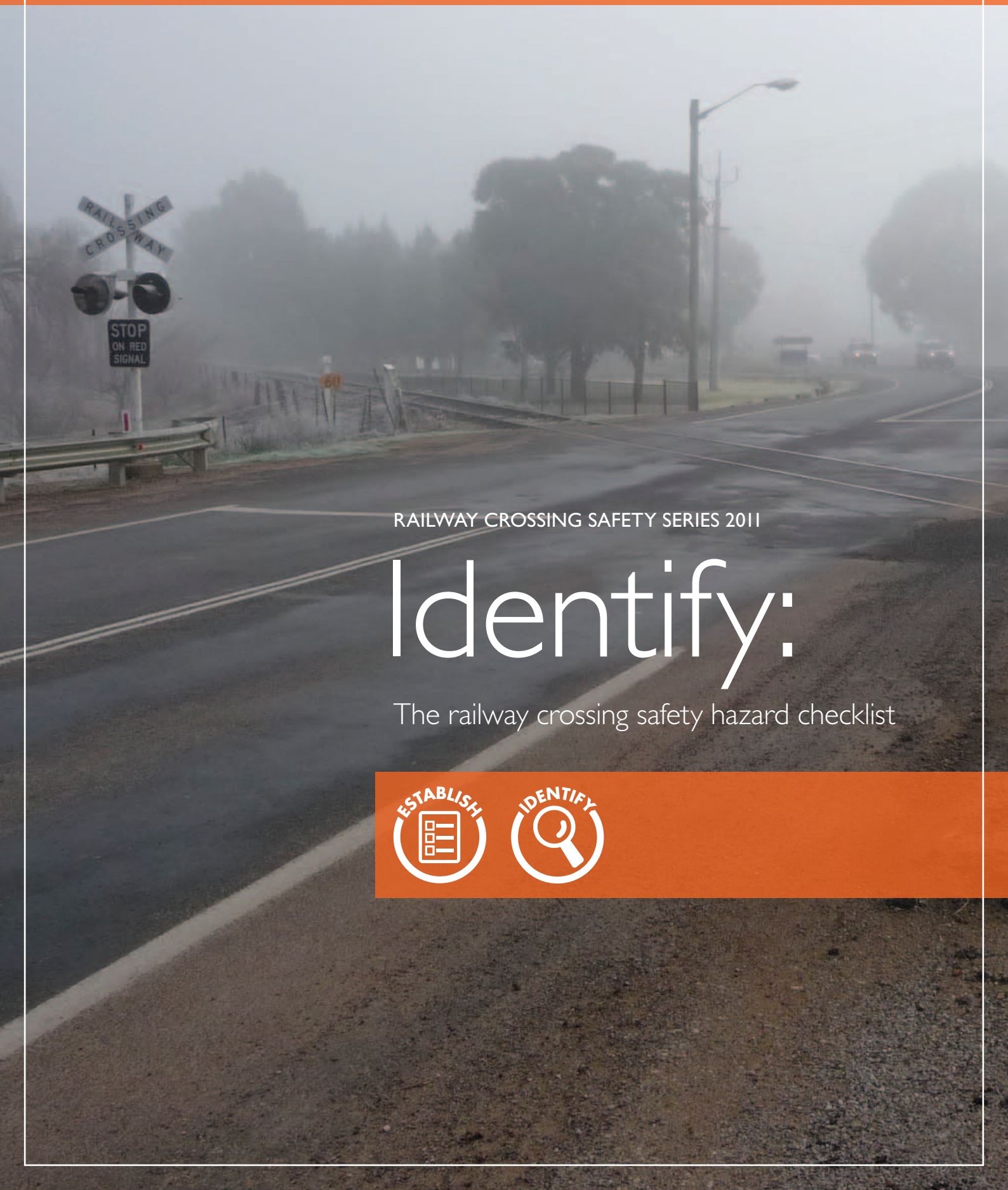


RAILWAY CROSSING SAFETY SERIES 2011

Identify:

The railway crossing safety hazard checklist

ESTABLISH IDENTIFY

Contents

IT IS RECOMMENDED THAT THIS DOCUMENT IS PRINTED OUT IN FULL COLOUR TO AID WITH NAVIGATION THROUGH THE DOCUMENT SERIES

Section 1
Introduction

Identify: The railway crossing safety hazard checklist has been developed to help RTA planners conduct site inspections at railway crossings (RCs). Site inspections are undertaken as an integral part of the risk assessment procedure and enable planners to identify potential safety hazards and hazardous events. This document contains the checklist and also provides guidance on how to complete site inspections using the guideline.

1.1 Purpose

Identify: The railway crossing safety hazard checklist has been designed as a series of prompts to supplement and aid planners' knowledge and experience of RCs. It will help them identify, so far as is reasonably practicable (SFAIRP), hazards and hazardous events. Please note that not all questions in the checklist may be relevant to a specific RC.

Planners may need to liaise with other internal and external parties that have obligations at an RC in order to fully understand the hazards and hazardous events present. The specific areas that may require input from other parties are indicated in the checklist.

The checklist focuses on safety hazards and hazardous events at RCs, as well as issues related to general traffic, and heavy vehicle, bus, pedestrian, cyclist and train movements in the vicinity of an RC, which are impacted by its operation.

1.2 Background

Please note that the site inspection process for RCs detailed in this document has not been developed as a replacement for the road safety audit process and its policy. Rather, the RC checklist has been developed as a specific application of the Road Safety Audit process and principles to aid in the risk management process for RCs.

For more information on the Road Safety Audit policy and guideline see:

- RTA Technical Direction TD 2003/RS03 Version 2, August 2005, Policy for Road Safety Audits of Construction and Reconstruction Projects.
- RTA Accident Reduction Guide Part 2 Road Safety Audits, 2005.

Section 2
Site inspections and the risk assessment procedure

Site inspections form a key part of the risk assessment procedure by providing a means of reviewing any existing safety risks at the RC.

The results of the site inspection provide the basis for the first three steps of the five step RC risk assessment procedure. These steps are:

1. **Establish** RC objectives and scope of risk assessment.
2. **Identify** hazards, hazardous events and safety risks (risk identification).
3. **Assess** likelihood and consequence of identified safety risks (risk analysis).

For more information on these steps in the risk assessment procedure please see *Plan: Establishing a railway crossing safety management plan*, Appendix A.

Section 3
How to undertake a site inspection using this checklist

Site inspections are an integral component of the risk assessment procedure. They ensure that all hazards, hazardous events and operational issues at a railway crossing (RC) are identified and considered. Accordingly, *Identify: The railway crossing safety hazard checklist* must be used by planners to guide them in the identification of infrastructure and operational characteristics that are pertinent to risk assessment. The following sections provide guidance on how to successfully undertake a site inspection using *Identify: The railway crossing safety hazard checklist*.

3.1 General guidelines for undertaking a site inspection

3.1.1 What you need to know before undertaking a site inspection

Before undertaking a site inspection of an RC planners must have familiarised themselves with all existing information regarding both the road and the land use associated with the RC, as well as the RC configuration, operational conditions and arrangements.

3.1.2 What you must consider when undertaking a site inspection

When planners are undertaking a site inspection they must identify the hazards and hazardous events which are the responsibility of the RTA.

In addition, planners undertaking a site inspection should liaise with all the other agencies that share responsibility for the RC. Specifically, planners should notify the other agencies of any safety hazards and hazardous events that relate to their responsibilities.

Please note that when undertaking a site inspection, planners must examine the RC from either a road vehicle driver, pedestrian or cyclist's perspective, depending upon which is relevant (all three perspectives may be relevant). This examination must include 'the RC area of influence' (see Section 3.2.3 for further information on the RC area of influence) which is made up of:

- Road and pedestrian/cyclist/shared path approaches up to the rail reserve.
- The rail reserve.

3.2 Specific guidelines for undertaking a site inspection

3.2.1 Who to consult when undertaking a site inspection

In order to conduct a safety inspection at an RC, planners must be aware of all the parties responsible for managing the RC and their respective obligations. RCs are typically operated and maintained by roads authorities and rail infrastructure managers. On State roads, the RTA is generally responsibile for the road pavement and traffic control devices whereas councils are generally responsible for the footpath and other areas outside the road pavement; refer to Arrangements with Councils on the RTA internet site www.rta.nsw.gov.au/doingbusinesswithus/lgr/index.html for further information. Police are responsible for road user enforcement activities on public roads.

A site inspection should include input from all relevant parties or organisations. This will ensure that planners identify the full range of hazards, hazardous events and operational issues associated with each organisation's obligations.

Typical RC responsibilities are listed below in Table 1. However, planners must inspect the applicable Interface Agreement to determine the generally agreed areas of maintenance responsibilities for the parties. Changes to the pre-agreed general maintenance responsibilities are permitted on a site specific basis, however this must be negotiated and agreement reached between the parties to the Interface Agreement. Any changes must be documented in the safety management plan.

TABLE 1: GENERAL MAINTENANCE RESPONSIBILITIES AT AN RC ON A STATE ROAD

Agency	Area	Responsibility
RTA	Road approaches to an RC outside of rail boundaries on State roads.	• Road regulatory, advisory and warning signposting; pavement markings; delineation devices outside the rail maintenance boundary; safety barriers not associated with protecting rail infrastructure as noted below. • Traffic management devices on the road network on the approach and departure to an RC, such as traffic control signals. • Road pavement to the pre-agreed rail maintenance boundary, generally 1m from the head of the rail.
Local council	Footpath approaches to an RC; the clear zone and public land adjacent to the road; rail rights of way outside of rail boundaries on State roads.	• Road and pedestrian lighting. • Land use planning and development assessment. • Landscaping, roadside vegetation and infrastructure in the clear zone and footpaths.
Rail infrastructure manager	Railway approaches and the roadway area within the rail boundaries.	• Roadway within the railway maintenance boundary. • Appropriate signs; flashing lights; boom gates; warning bells; and equipment associated with all of the above which is within the rail reserve. • Safety barriers installed to protect rail infrastructure noted in above dot point. • Tracks and railway right of way on approaches to an RC.
Police	The railway reserve, and road and rail approaches.	• Enforcement of road users.
Property owner	Private roads and land both adjacent to, and outside, the railway crossing, road and rail boundaries.	• Road approaches to an RC outside of the rail boundaries which pass through private land. • Landscaping and roadside infrastructure and vegetation as per the local council.

3.2.2 A hazard or hazardous event in the context of a site inspection

A hazard or hazardous event is anything that causes a risk. For example, it could be:

- A physical object such as a drainage structure in the clear zone.
- An environmental condition such as sun glare in the morning/afternoon.
- Road user behaviour such as a driver crossing the centre line on a narrow road.

3.2.3 Determining the scope of the site inspection: the railway crossing area of influence

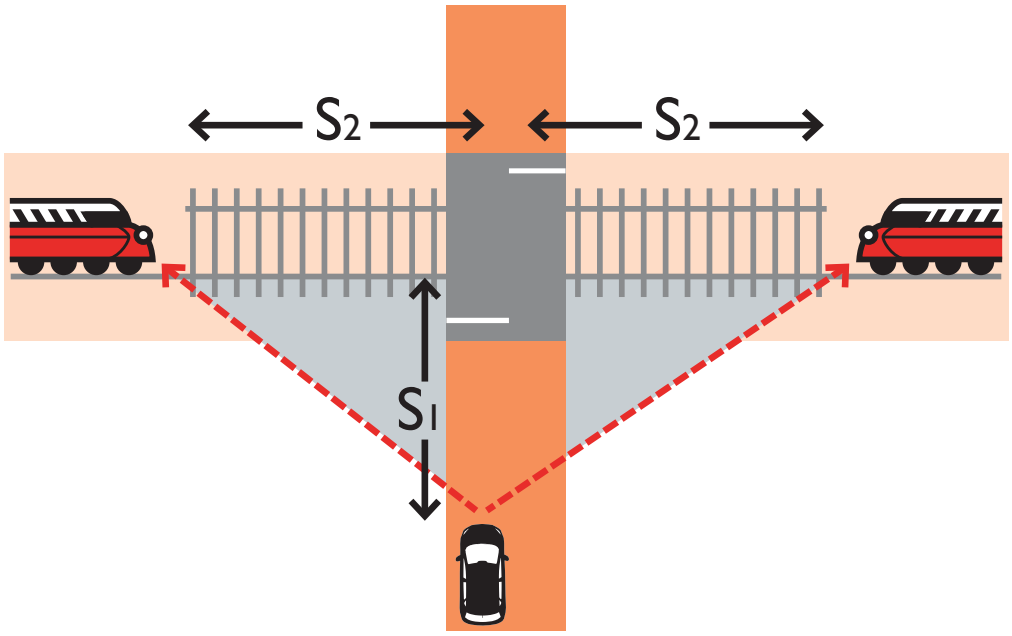
RCs exist where roads (and/or pedestrian or cyclist crossings) intersect with railways at-grade. The 'area of influence' of an RC (refer to Figure 1: Railway crossing area of influence) must be included in site inspections. The 'area of influence' will extend beyond the immediate boundaries of the RC, but the exact dimensions may vary depending upon the geometry and conditions present at a specific RC and its railway and road approaches.

The area of influence may only encompass the area between the first warning sign relating to the RC on one approach and the first warning sign on the opposing approach: or it may extend further to include queued traffic and associated approach sight distance when the RC is operating. Additionally, it may include a side road that contains warning signs relating to the RC and that experiences traffic impact from the operation of the RC.

The area of influence requires careful consideration, especially when looking at the impact of the operation of the RC on traffic, inclusive of that period of time up until traffic flow returns to normal. For instance, where traffic along a high speed road is travelling at high speed again, or until long traffic delays caused by waiting for trains have cleared.

The length of the road approach included in the site inspection varies and depends upon the road environment, including the angle of intersection, the vertical or horizontal road curvature of the approach and departure to an RC, and traffic operations, such as the presence of traffic queuing at the RC. Similarly, the length of the railway approach included may vary depending on the geometry of the railway approaches and the operating speed of trains.

FIGURE 1: RAILWAY CROSSING AREA OF INFLUENCE



S1 Road approach stopping sight distance

S2 Minimum distance of train from RC for road vehicle driver to sight train and stop before RC

Road approaches to RC

Road area within rail reserve

Rail approaches to RC

Area adjacent to rail and road approaches

3.2.4 Documents to consult when undertaking a site inspection

In addition to acquiring knowledge of general safety and traffic engineering reference documentation, planners conducting RC inspections should be familiar with the documents and information listed below:

- Policy to Establish and Manage Railway Crossing Safety Management Plans.
- *Plan: Establishing a railway crossing safety management plan.*
- *Assess: Applying risk tolerance and risk assessment criteria to railway crossings.*
- *Evaluate: Applying the railway crossing cause consequence bow tie models.*
- AS 1742.7 – *Manual of Uniform Traffic Control Devices Part 7: Railway Crossings.*
- Austroads Guides (eg *Guide to Traffic Management – Part 6*; *Guide to Road Design – Part 4*).
- NSW legislation related to railway crossings [eg NSW *Rail Safety Act 2008*, *Roads Act 1993*, *Road Transport (Safety & Traffic Management) Act 1999*, *NSW Road Rules 2008*].
- The Australian Level Crossing Assessment Model (ALCAM) characteristics, controls and mechanisms for the specific railway crossing.
- The ALCAM output for the specific railway crossing.
- Existing railway crossing infrastructure asset and operation safety hazard checklists, and risk assessment and road safety audit reports.
- Operation data for the specific railway crossing (ie crash and 'near miss' data, traffic and train use, RTA traffic signal fault log data etc.).

3.3 Understanding the checklist and how to use it

A checklist is provided in this document for conducting site inspections. This section describes key features of the checklist and provides guidance on how to use it.

3.3.1 Understanding the checklist

3.3.1.1 Part A

Part A of the checklist (Sections 1-4) is used by planners to establish the context of the RC. This is done through the collection of relevant information.

Part A – Sections 1 to 4 (Establishing the context of an RC)	
Section 1	Contains general information for identifying the location of an RC, stakeholder representatives and the RC area of influence.
Section 2	Documents the objectives for the RC.
Section 3	Outlines the existing safety management measures at an RC including road and rail infrastructure and system operations.
Section 4	Lists road and railway infrastructure, operations, ALCAM, and other relevant information.

3.3.1.2 Part B

Part B of the checklist (Sections 5-18) is used by planners to collect information that identifies hazards, hazardous events and other operational issues at an RC.

Part B – Sections 5 to 18 (Identifying hazards, hazardous events, and other issues at an RC)	
Section 5	Provides a summary of potential safety risks, hazards and hazardous events, and other issues at an RC.
Sections 6 to 12	Provides a range of site-specific risk categories, safety hazards and hazardous events at an RC. Topics covered include: • Road alignment, cross section and pavement. • Road layout and controls. • Traffic signals and road signs. • Road pavement marking and delineation. • Road related area. • Railway crossing signals and boom barriers. • Traffic operations.
Sections 13 and 14	Provides information relating to Restricted Access Vehicles (RAV) and non-motorised road users at an RC.
Section 15	Provides information on the rail infrastructure (other than railway crossing signals and boom barriers), railway and train operations at an RC.
Sections 16 and 17	Outlines enforcement and behavioural initiatives undertaken at an RC.
Section 18	Provides an opportunity to add further comments.
Section 19	Provides an opportunity to add photographs, plans and any other relevant documentation of the RC, road network within the RC area of influence, and special infrastructure and other features.

3.3.2 How to use the checklist

The following sections provide guidance on how to complete the checklist before, during and after undertaking site inspections.

3.3.2.1 How to complete Part A of the checklist

In order to complete Part A of the checklist planners should investigate and source data from existing systems such as ALCAM or the RTA intranet.

3.3.2.2 How to complete Part B of the checklist

Part B is completed during the site inspection. Information on the hazards, hazardous events and operational performance issues of the railway crossing provided by other agencies may also be added before or after the site inspection.

Part B of the tool has been designed in the following manner:

ROAD OR RAIL INFRASTRUCTURE ASSET TYPE AND OPERATION AND ROAD USER OPERATIONS CATEGORY (SUCH AS 'ROAD ALIGNMENT, CROSS SECTION OR PAVEMENT').

Potential road use or infrastructure asset area of impact (such as 'Road user sight distance').	Assessment decision (Yes / No / Not applicable).	Detailed description of the hazard or hazardous event at the RC.
Question to provoke identification of a hazard or hazardous event (such as, 'Do obstructions such as curves or crests exist that reduce sight distance for drivers approaching the RC?').	If the hazard or hazardous event exists a 'Yes' response would be provided.	An example of a detailed description of a hazard: 'The southbound approach to the RC has a horizontal curve that reduces road user sight distance lower than the minimum specified in AS [specify standard], Austroads or RTA guideline.'

3.3.2.3 Incorporating input from other agencies when completing the checklist

Planners may require input from other responsible agencies and/or external parties at an RC. Sections of the checklist and the associated issues that are likely to require input from the respective responsible agencies are noted in the checklist. Table 2 below summarises the organisations from which planners may require input (Organisation), what inputs may be required (Issue to be considered), and when planners will require them (Section).

TABLE 2: RESPONSIBLE AGENCY INPUTS TO THE CHECKLIST

Section	Issue to be considered	Organisation
4	Enforcement	Police
16	Illegal road user activity at RC	Police
10	Street lighting	Local council
10	Land use	Local council
4	Pedestrian and cyclist flows	Rail organisation
4	Railway operations	Rail organisation
11	Signals and boom barrier operation	Rail organisation
14	Pedestrian barriers and fencing	Rail organisation
15	Rail track condition, train activity, rail sight distances and visibility for train driver	Rail organisation

Section 4
Glossary

- **Active advance warning sign**: a sign that provides advance warning of the impending or current operation of flashing signals at a railway crossing through the use of flashing yellow signals within the advance warning sign. These comprise the RX-11 assembly provided in AS 1742.7.
- **Active control**: controlling the movement of vehicular or pedestrian traffic across a railway crossing using devices such as flashing 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. These comprise the RX1, RX2 and RX5 assemblies as defined in AS 1742.7. See also the glossary entry for 'passive control'.
- **ALCAM**: the Australian Level Crossing Assessment Model. A quantitative risk assessment and risk ranking tool used to assess and prioritise railway crossing risks across New South Wales. See www.transport.nsw.gov.au/sites/default/file/levelcrossings/ALCAM_In_Detail-NSW.pdf.
- **Barrier**: an alternative term for a safety management measure.
- **Bow tie model**: a qualitative risk assessment technique that 'links' the relationships between the causes of crashes ('risks'), the initiatives or controls designed to mitigate the potential for a crash ('safety management measures'), the crashes ('incidents'), the initiatives or controls designed to reduce the negative outcomes of an incident ('post-incident management measures'), and the outcome of an incident despite the initiatives and controls ('consequences'). The bow tie model is an integral part of the RTA railway crossing risk assessment and management procedure.
- **Broadly acceptable**: a level of risk deemed to be Low or Negligible and, when considered in the context of all risks being managed by the organisation, requiring no further action to comply with the 'so far as is reasonably practicable' principle.
- **Clear zone**: the area adjacent to the traffic lane that should be kept free from features that would potentially be hazardous to errant vehicles. The decision of whether or not to include a clear zone is based on the consideration of the recovery area for every errant vehicle, the cost of providing that area, and the probability of an errant vehicle encountering a hazard. The clear zone should be kept free of non-frangible hazards where economically and environmentally possible. Alternatively, hazards within the clear zone should be treated to make them safe or be shielded by a safety barrier (Austroads, 2008).
- **Consequence**: the outcome of an incident that has arisen from a risk. In the context of a railway crossing, a consequence may involve the injury and/or death of road or rail users, delays to people and freight on the road or rail networks, and property and environmental damage. Note that:
  - There can be more than one consequence from one incident.
  - Consequences can be expressed qualitatively or quantitatively.
  - Consequences are considered in relation to the achievement of RTA objectives, especially those related to road safety.
- **Coordination provisions of the NSW *Rail Safety Act 2008***: the purpose of these provisions is to ensure that rail infrastructure managers and roads authorities identify risks to safety arising from rail or road crossings, so far as is reasonably practicable, determine measures to manage, so far as is reasonably practicable, those risks, and seek to enter into agreements to manage those risks.

  The provisions are intended to ensure that risks arising from rail or road crossings are identified and that the accountabilities for risk control measures are clearly articulated.

- **Crash**: see the glossary entry for 'incident'.
- **Design for safety**: design that uses a safe systems approach. See also the glossary entry for 'safe systems approach'.
- **Frangible**: Roadside furniture designed to collapse on impact. The severity of potential injuries to the occupants of an impacting vehicle is reduced, compared to those that could occur if the furniture was unyielding.
- **GIS database**: see the glossary entry for 'Railway crossing GIS database'.
- **Hazard or hazardous event**: a source of potential harm or a situation with a potential to cause harm (as defined in AS 4360: 2004). A hazard is anything that may cause a risk – here 'risk' includes physical risks (eg, objects), environmental conditions (eg, fog) and road user behaviour (eg, crossing the centre line). See also the glossary entry for 'risk'.
- **Hazard identification**: the process of identifying and characterising hazards that exist or potentially exist.
- **Hierarchy of control**: a legal and logical preference of treating or controlling risk. For example, using the principles of SFAIRP and incremental road safety to spread limited resources across many demands.
- **Incident:** a crash at, or as a result of the operation of, a railway crossing. Incidents occur where safety management measures either fail, or are not present, when required. Incidents can include: a vehicle or pedestrian being struck by a train; a vehicle or pedestrian being struck by a vehicle; and railway crossing infrastructure being struck by a vehicle.
- **Infrastructure**: the network and devices used to carry or display the information, services and equipment required for the operation of railway and road systems. These include railway crossing control systems and equipment, such as flashing lights, boom gates, signal huts or culverts to clear stormwater.
- **Interface agreement**: an agreement in writing regarding the management of risks to safety that are identified and managed under Division 3 of the NSW *Rail Safety Act 2008*. An interface agreement includes provision for:
  - The implementation and maintenance of measures to manage those risks.
  - The evaluation, testing and (if appropriate) revision of those measures.
  - The respective roles and responsibilities of each party to the agreement in relation to these measures.
  - A process for reviewing and revising the agreement.
- **ITSR**: the Independent Transport Safety Regulator. See www.transportregulator.nsw.gov.au
- **LCSC**: the Level Crossing Strategy Council. See www.transport.nsw.gov.au/levelcrossings
- **Level crossing**: the area where a road and a railway meet at substantially the same level. Please note, however, that a level crossing does not include the road related area, such as the road shoulder, the dividing strip and pedestrian paths (see Rule 120 of the *NSW Road Rules 2008*). 'Level crossing' is used colloquially as an alternative term for a railway crossing.
- **Likelihood**: a general description of probability or frequency. In the context of a railway crossing, likelihood refers to the probability of an incident occurring.
- **Local road**: an administrative category of roads in NSW. Local roads are under the care, control and funding of local governments. See www.rta.nsw.gov.au/doingbusinesswithus/downloads/lgr/reg_table_for_internet_31jan11.pdf for a list of roads classified as regional or State (local roads can be identified as those not appearing on the list).
- **May**: 'may' is used in this document to make *recommendations* of good practice.
- **Must**: 'must' is used in this document to give mandatory directives.
- **Near miss**: a failure by a safety management measure that does not result in a crash. In the operation of a railway crossing, the Independent Transport Safety Regulator defines a near miss as "Any occurrence where the driver of a moving train takes emergency action, or would have if there was sufficient time, to avoid impact with a person, vehicle or other obstruction, and no collision occurred. Emergency action includes continuous audible warning and/or brake application."

  Source: www.rsrp.asn.au/files/publications/12_30..pdf

- **Operational issues**: events or potential events that may impact upon the safe and efficient movement of road or rail traffic.
- **Over Size Over Mass**: a category of heavy vehicle which includes vehicles that, either on their own or with their loads included, exceed a relevant mass or dimension limit of the *Road Transport (Vehicle Registration) Regulation 2007* or *Road Transport (Mass, Loading and Access) Regulation 2005*. Examples include special purpose vehicles (eg, mobile cranes), vehicles carrying an indivisible load (eg, a wind power generator blade), and agricultural vehicles (eg, tractors and airseeders). In such cases, authority to travel is provided by a vehicle permit system (see www.rta.nsw.gov.au/heavyvehicles/oversizeovermass/index.html or www.rta.nsw.gov.au/heavyvehicles/downloads/operating_conditions-oversize_overmass.pdf).
- **Passive control**: controls the movement of vehicular or pedestrian traffic across a railway crossing using signs or devices which rely on the road user detecting the approach or presence of a train by direct observation. In other words, in passive control the signs and devices are not activated during the approach or passage of a train. For definitions of crossing control types see page 15 of ITSR www.rsrp.asn.au/files/publications/12_30..pdf.
- **Person**: refers to a natural person, or a company, partnership, joint venture, the association or corporation of another body corporate, or any governmental authority.
- **Planner**: the officer responsible for the planning and management of a safety management plan at a railway crossing. The planner is normally appointed by the directorate delegated to deliver the project on behalf of the project sponsor, but in some cases the planner is appointed by the project sponsor.
- **Policy Manager, Road User Priority and Access**: the position responsible for the policy, strategy and program management of railway crossings in the RTA's Traffic Management Branch, Network Services Directorate.
- **Post-incident management measure**: any measure which aims to:
  - Limit the severity of an incident (crash) once it has occurred.
  - Reduce the likelihood of consequences (that is, injuries and fatalities to road and rail users) of that incident.
  - Reduce the likelihood of a secondary incident occurring (that is, a subsequent crash) as a result of the initial incident.
  - Reduce the likelihood of consequences occurring as a result of a secondary incident, should it occur.
- **Project Manager (railway crossings)**: the RTA's Infrastructure Services, Road Safety and Traffic Management section officer responsible for the day-to-day management of railway crossings in their region.
- **Public road**: any road that is opened or dedicated as a public road, whether under the *Roads Act 1993* or any other law; and any road that is declared to be a public road for the purposes of the *Roads Act 1993* but does not include a Crown road.
- **Rail infrastructure manager**: the person who has effective management and control of the rail infrastructure of a railway, whether or not the person owns the rail infrastructure, or has a statutory or contractual right to use the rail infrastructure or to control and/or provide, access to it. In NSW rail infrastructure managers include:
  - The Australian Rail Track Corporation (ARTC).
  - The Rail Corporation New South Wales (RailCorp).
  - The Country Rail Infrastructure Authority (CRIA).
  - The Transport Infrastructure Development Corporation (TIDC).
  - Rail infrastructure managers of isolated lines and private sidings.

  (Source: Section 4 of the NSW *Rail Safety Act 2008*.)
- **Rail transport operator**: may be a rail infrastructure manager, or a rolling stock (train) operator, or a person who is both (NSW *Rail Safety Act 2008*). Typically, the term 'rail transport operator' is used to refer to any person who operates rolling stock on the railway.
- **Rail reserve**: the land dedicated for the operation of a railway.

- **Railway**: a guided system designed for the movement of rolling stock, which has the capability to transport passengers or freight on a railway track together with its infrastructure and rolling stock.
- **Railway crossing**: the area where a road and a railway cross at substantially the same level. This includes the land, features and infrastructure bounded by the rail reserve and prolongation of the road boundary.
- **Railway crossing area of influence**: in the roads authority context, this includes the railway crossing and an agreed distance along the approach roads that are considered to be essential to ensure the safe operation of both the railway crossing and the traffic which is affected by the operation of the railway crossing. The length of road agreed upon typically relates to the provision of traffic control devices such as warning signs. However, the area of influence may extend further along the road, as the length of vehicle queues may influence road safety further than the warning signs. For instance, a crash at the back of the queue of traffic might be associated with the operation of the railway crossing.
- **Railway crossing GIS database**: a spatial database used to store information regarding railway crossings. Among its uses is the mapping of railway crossings with other spatial information such as road crashes. This database is managed by the RTA's Road Information and Asset Management Technology section.
- **RC**: railway crossing.
- **RC Risk Register**: a list of those sites where risk is deemed to be above a 'broadly acceptable' level. These sites are prioritised for treatment when funds are available. The register is held by the Policy Manager, Road User Priority and Access, Traffic Management Branch. See also the glossary entry for 'broadly acceptable'.
- **Recovery measure**: another term for a post-incident management measure.
- **Regional road**: an administrative category for roads in New South Wales. Regional roads are roads under the care and control of local governments, with funding provided by local government and supplemented by the RTA under the 'block grant agreement'. For information on the block grant agreement see www.rta.nsw.gov.au/doingbusinesswithus/lgr/index.html. For a list of classified roads, including their administrative category, see www.rta.nsw.gov.au/doingbusinesswithus/downloads/lgr/reg_table_for_internet_31jan11.pdf.
- **RAV**: Restricted Access Vehicle. A vehicle that is larger than a general access vehicle, as defined in the *Road Transport (Mass, Loading and Access) Regulation 2005*. These vehicles are restricted to travel on specified (gazetted) routes in New South Wales. Common configurations include B Double and Road Trains. See also the glossary entry for 'Over Size Over Mass Vehicle' for another category of vehicle/load that is larger than the general access limits.
- **Risk**: the chance of something happening that will have an impact on RTA road safety objectives. A risk is:
  - Often specified in terms of an event or circumstance and the consequence that may flow from it.
  - Measured in terms of a combination of the consequences, their likelihood and exposure.
- **Risk analysis**: the assessment of the risks presented by an RC in terms of the likelihood and consequences of incidents that might arise from these risks, taking into account the existing safety management measures at that railway crossing.
- **Risk assessment**: the overall process of identifying, analysing and evaluating risks, hazards and hazardous events at a railway crossing. See also the glossary entries for 'risk analysis' and 'risk evaluation'.
- **Risk assessment criteria**: standards for the comparison and evaluation of risks at railway crossings. See *Assess: Applying risk tolerance and risk assessment criteria to railway crossings*, Section 5, for a discussion of these criteria.
- **Risk assessment procedure**: a five-step procedure used to identify, assess, evaluate and manage safety risks and safety management measures at railway crossings. This five step procedure is detailed in Appendix A of *Plan: Establishing a railway crossing safety management plan*.
- **Risk category**: a way in which risks at a railway crossing are grouped according to the different types of road user behaviour from which they arise. See *Evaluate: Applying the railway crossing cause consequence bow tie models*, Section 2.1.

- **Risk control**: the part of risk management that involves the implementation of policies, standards, procedures and physical changes to eliminate or minimise adverse risks (AS 4360).
- **Risk evaluation**: the process of comparing the existing level of risk at a railway crossing with the new level of risk that would eventuate from the implementation of changes to risk management, should any be deemed necessary, arising from the risk analysis process. Risk evaluation therefore often involves a comparison of the effects of existing safety management measures with the effects of revisions to the existing safety management measures. Often a number of alternative revisions are considered during risk evaluation.
- **Risk level**: a qualitative measure that brings together the likelihood and consequence of a risk, on a scale from Negligible to Extreme, to allow the ranking of risks and the prioritising of mitigation or safety management measures where the level of risk is above the 'broadly acceptable' threshold. See also the glossary entry for 'broadly acceptable'.
- **Risk level**: this is determined taking into account the risk assessment criteria of likelihood and consequence, and assigned through use of the risk level matrix. See *Assess: Applying risk tolerance and risk assessment criteria to railway crossings*, Section 5.
- **Risk level matrix**: a matrix which uses the risk assessment criteria as they apply to a particular railway crossing to generate a risk level for that particular risk. See *Assess: Applying risk tolerance and risk assessment criteria to railway crossings*, Section 5.5.
- **Risk management**: an overall process of hazard identification, risk assessment and risk management, which includes the implementation, and active monitoring and review, of controls, policies, procedures and practises, to manage those risks, so that they are maintained at a level that is as low as is reasonably practicable.
- **Risk ranking**: An output of ALCAM which sorts the relative safety of public railway crossings throughout NSW from greatest risk to lowest. A railway crossing ranked 'one' is judged to have the highest risk.
- **Risk rating**: the overall risk level of a railway crossing.
- **Risk tolerance**: the amount of risk that the RTA is prepared to accept, tolerate, or be exposed to, before it judges that action is necessary to reduce or eliminate that risk. Decisions regarding risk tolerance take into account all the risks to the RTA in the context of exhaustible resources. Risk tolerance is a function of ranking a risk against all other assessed risks and determining at what risk level risk mitigation action should be taken, SFAIRP. For the purposes of railway crossing risk assessments, levels of Negligible and Low are considered to be broadly acceptable.
- **Risk type**: a way in which risks at a railway crossing are grouped which takes into consideration both road user behaviour and the control, design and operational elements at a railway crossing. Risk types are organised as sub-categories of risk categories. See *Evaluate: Applying the railway crossing cause consequence bow tie models*, Section 2.1.
- **Road carriageway**: the portion of a road or a bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes (*Austroads Glossary of Terms 2010*).
- **Road project**: a project funded or commissioned by the RTA that results in a new road or new traffic management infrastructure, or a physical change to the infrastructure of an existing road which, subsequent to this change, will become part of the State road network in NSW. Examples of road projects include:
  - A new motorway or improvement to an existing motorway.
  - A new arterial road or an upgrade to an existing freeway or arterial road, including road widening, traffic control signals, intelligent transport systems and traffic control facilities.
  - An enhancement to the road-based public transport network, such as a transitway or bus priority measure on an existing freeway or arterial road.
- **Road Safety Audit policy:** released as a Technical Direction by the NSW Centre for Road Safety TD 2003/RS03, Version 2 in August 2005. This provides an imperative to conduct road safety audits. See www.rta.nsw.gov.au/roadsafety/downloads/tds/td2003rs03-aug05.pdf.

- **Road Safety Audit process**: a formal examination of an existing road, or a future road or traffic project, in which an independent qualified team looks at the project's potential crash and safety performance. The process may be applied to an existing road network, to concept or detail designs prior to road construction, during road construction or before opening the road to traffic.
- **Road**: a private road or a public road that has, as one of its main uses, the driving or riding of motor vehicles, and includes any relevant road-related area within the meaning of the *NSW Road Rules 2008*.
- **Road user**: a driver, rider, passenger or pedestrian (*NSW Road Rules 2008*).
- **RTA**: the Roads and Traffic Authority of New South Wales.
- **Safe systems approach**: an approach that provides for safety to be considered throughout all phases of a road project, as all phases can be seen as contributing to the provision of a safer system. For example, a safe systems approach to a road project would include the following: designing the road, roadside areas and traffic management measures to provide a forgiving environment for all road users (safer roads); public education (safer people); and, vehicle safety standards (safer vehicles).
- **Safety control measure**: an alternative term for a safety management measure. See also the glossary entry for 'safety management measure'.
- **Safety management measure**: *any* measure (including legal measures, physical actions, engineering measures, educational measures and so on) that aims to prevent or mitigate an incident.
- **Safety management plan**: a railway crossing safety management plan is a contract between the RTA and other relevant parties which details how safety risks, safety management measures and post-incident management measures will be managed at a railway crossing, so far as is reasonably practicable.
- **Safety risk**: another term for 'risk'. See also the glossary entry for 'risk'.
- **SFAIRP**: see the glossary entry for 'so far as is reasonably practicable.'
- **Shall**: 'shall' is used in this document to give mandatory directives.
- **Should**: 'should' is used in this document to make *recommendations* of good practice.
- **So far as is reasonably practicable**: what is (or was at a particular time) reasonably practicable in relation to ensuring safety with regard to risk, taking into account:
  - The likelihood of a risk eventuating.
  - The degree of harm that would result if a risk eventuated.
  - What the person concerned knows, or ought reasonably to know, about a risk and any ways of eliminating or reducing a risk.
  - The availability and suitability of ways to eliminate or reduce risk.
  - The cost of reducing or eliminating a risk.

  (Source: Section 6 (2), NSW *Rail Safety Act 2008*)
- **State road**: an administrative category for roads in NSW. The RTA takes responsibility for managing the primary traffic function of State roads, including funding and determining priorities. The RTA also regulates the activities of third parties – including local councils and contractors – on the road. This is to ensure that road safety and traffic efficiency are promoted and consistently applied across the major traffic routes throughout the State, and that the road asset is protected. Activities that are located outside of the primary traffic area do not relate to traffic control, such as footpaths, are generally the responsibility of local councils. See www.rta.nsw.gov.au/doingbusinesswithus/downloads/lgr/reg_table_for_internet_31jan11.pdf for a list of roads classified as State roads.
- **Unincorporated area**: the area in the far west of NSW that does not have a local government. The *Western Lands Act 1901* established the position of the Western Lands Commissioner who is responsible for administering the Act, subject to the control and direction of the Minister for Lands. The Unincorporated Area is managed by the NSW Department of Lands under direction of the Western Lands Commissioner. See www.edo.org.au/edonsw/site/factsh/fs02_6.php.

Section 5
Railway Crossing Safety Hazard Checklist

Checklist – Part A

1 General information

Site No.:

Railway crossing (RC) reference number: (use 'LXM ID)

Railway crossing location:

RTA officers:

Officers/representatives present from other agencies (*eg* rail, local council, police):

Line section: Km:

GPS location: (GDA94, decimal deg) E: Road name and no.:

S:

RTA region: Local government area:

Name of nearest crossroad: Distance offset and direction of nearest crossroad:

RC area of influence:

Day-time inspection date: Time:

Night-time inspection date: Time:

2 Railway crossing objectives

Objectives for RC:

3 Road and railway safety management control measures and agency responsibilities

Control measure	Yes / No	Condition (ie approach / departure / superseded / special design features)	Photographs
RC control			
Give Way sign assembly (RX-1: R1-2, R6-24/R6-25, W7-2-1/ W7-2-2)			
Stop sign assembly (RX-2: R1-1, R6-24/R6-25, G9-48, W7-2-1/ W7-2-2)			
Bells, lights and signs (RX-5, R6-24/R6-25, W7-2-1/W7-2-2, R6-9)			
Gate assembly (R6-8; RX-6: R6-24/R6-25, W7-2-1/W7-2-2)			
Boom gates			
Communication to road traffic control signals			
Communication to active advanced warning			
Passive pedestrian controls (W7-14-4, W7-14-6, G9-68, R2-4)			
Pedestrian maze			
Active pedestrian controls (RX-12: W7-14-6, G9-68, R2-4)			
Cyclist controls (G9-58)			
Other control measures			
RC signposting			
Advanced warning (W7-7, W7-4, RX-10, RX-3-1/ RX-3-2/ RX-3-3)			
Width Marker (D4-3, RX-9)			
Stop Sign Ahead (W3-1)			
Flashing Signals Ahead (W7-4)			
Active advanced warning (with flashing lights) (RX-11)			
Keep Tracks Clear (G9-67-1, G9-67-2)			
Chevron Alignment marker (D4-6)			
Other signs (ie RX-4, RX-7, RX-8, W7-12, W7-13, W7-15, W7-17)			

Control measure	Yes / No	Condition (ie approach / departure / superseded / special design features)	Photographs
RC pavement markings			
Give Way line			
Stop line (TF-2)			
Edge line (E1)			
Centre/Barrier line (BB or BS)			
'Rail X' markings			
Box markings (cross hatching)			
Other control measures			
Delineation			
Flexible guide posts			
Raised pavement markers			
Other control measures			
Safety barriers			
Safety barriers only associated with protecting rail infrastructure			
Safety barriers associated with protecting road hazards other than rail infrastructure, such as steep batter slopes			
Road network			
Road pavement (Rail maintenance area)			
Road pavement (Road maintenance area)			
Traffic control signals			
Shoulder			
Clear zone			
Footpath / shared path			
Landscaping, roadside vegetation and infrastructure in clear zone and footpaths			
Other control measures			
Street lighting			
Road			
Pedestrian			
RC flood lighting			

4 Road and railway infrastructure, operations, ALCAM and other relevant information

Number of tracks:	Number of road lanes (split into directions):
Speed limit on trains: km/h	Speed limit on road: km/h
Train frequency per day:	AADT (vehicles per day):
Train frequency per peak period:	Traffic volume per peak period (specify peak period; ie 6–10am, 3–7pm):
Any special operational conditions that apply to the train (eg sound horn, display headlights, reduce speed, flag person control, push button control):	

Pedestrian, cyclist, wheelchair, mobility scooter flows per day:	
Pedestrian, cyclist, wheelchair, mobility scooter flows per peak period:	
Width of crossing between rail boundaries (metres):	
Crossing angle of intersection:	
Is this a Restricted Access Vehicle route (RAV or PBS)?	☐ Yes ☐ No Type:
Are pedestrian facilities present?	☐ Yes ☐ No Type:
Are bicycle facilities present?	☐ Yes ☐ No Type:
Other road intersections or RCs in this RC's area of influence:	☐ Yes ☐ No Type:
Crash and incident information	
No. of incidents at RC in past 5 years (incidents include near miss events)[1]:	*(Insert no. and brief description of nature and analysis of incidents)*
No. of crashes at RC in past 5 years (a crash can involve a train, road vehicle, pedestrian, cyclist, or road or rail infrastructure)[2]:	*(Insert no. and brief description of nature and analysis of crashes)*
No. of crashes on road network in last 5 years that may have occurred as a result of the operation of the RC[3]:	
Traffic control signal faults:	*(Insert no. of traffic signal faults in the RTA's SCATS database and brief description of nature and analysis of faults)*
ALCAM information:	
ALCAM priority ranking:	

[1] Information source is ITSR reports for an RC.
[2] Information source is RTA Crash reports.
[3] Information source is RTA Crash reports.

ALCAM Risks*[4] *(Insert risks identified in ALCAM)*

Enforcement campaigns (current or past) at railway crossing:
(If so, when, how long and what level of resources were required)

Behavioural campaigns at this railway crossing or those in the general area:
(If so, when, how long and what level of resources were required; eg during holiday periods)

Agreed, planned and proposed changes to railway crossing in the short-term:
(If so, what changes are programmed, planned or proposed, when and by whom, within the next 3 years?)

Information from other sources:

Sketch of railway crossing, road network within area of influence and special infrastructure and other features:

(Provide a hand drawn plan or marked up aerial photograph below)

[4] An ALCAM level crossing information request template is available for use.

Checklist – Part B

5 Summary of potential safety risks, hazards, hazardous events and other issues (identified in Sections 6 to 18)

Brief description of potential road/rail safety risks, hazards, hazardous events and issues:

Brief description of existing road/rail infrastructure, maintenance and operation safety management measures to minimise safety risks:

Comments on additional safety management measures to minimise safety risks (ie feasibility of RC closure, road user enforcement and infrastructure upgrade options:

Other issues or comments:

Assess each of the potential design, infrastructure and operational categories in Sections 6–14 from **a road vehicle driver, pedestrian or cyclist perspective**. Assessment should be from the perspective of a 'typical' road user. Where specific vehicle types are highlighted, and legally permitted to use the road (such as Restricted Access Vehicles), the assessment should be from the perspective of a 'typical' professional driver.

6	Road alignment, cross-section and pavement	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
6.1	**Road user sight distance**		
6.1.1	Do obstructions such as curves or crests exist that reduce sight distance for drivers approaching the RC?		*If the answer to this question is 'No' then the road alignment on approach to the RC would typically be straight and the driver sight distance to RC controls meets the Australian Standard AS 1742.2*
6.1.2	Are curve and crest advisory warning signs on approach and departure to the RC where curves and crests exist non-standard, in the wrong location or in poor condition?		
6.1.3	Are curve and crest line marking, pavement marking and delineation on approach and departure to the RC non-standard, in the wrong location or in poor condition?		
6.1.4	Do obstructions such as curves or crests exist that reduce sight distance for drivers to other vehicles that may be stopped during the operation of the RC (ie circumstances such as a vehicle stationary at stop line of RC or in queue of traffic waiting for RC to open to traffic flow)?		
6.2	**Road vehicle travel speed**		
6.2.1	Do drivers travel at speeds higher than what is appropriate for the road horizontal and vertical alignment on approach and departure to the RC (including longitudinal profile of the road over the rails)?		
6.2.2	Are any necessary speed advisory warning signs installed on approach and departure to the RC non-standard, in the wrong location, in poor condition or missing?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

6.3	**Lane discipline**		
6.3.1	Are traffic lane and carriageway widths narrow for the road classification and type of road vehicle use (accounting for any vehicle restrictions that may be present)?		*(Refer to SNP Road Network Classifications and Austroads Guide to road design, and RTA Supplements)*
6.3.2	Are shoulder or verge widths narrow for the road classification and type of road vehicle use?		*(Refer to SNP Road Network Classifications and Austroads Guide to road design, and RTA Supplements)*
6.3.3	Do road users deviate from their correct lane when on approach, departure or travelling through an RC?		
6.4	**Water on road and unsafe road user behaviour**		
6.4.1	Does the road crossfall lead to poor drainage of the roadway during a significant rain event?		*(Refer to Austroads Guide to road design, and RTA Supplements)*
6.4.2	Do the road drainage structures result in road users being exposed to a crash potential?		
6.5	**Road vehicle control**		
6.5.1	Does the road pavement create the potential for drivers to skid into the RC during inclement weather?		
6.5.2	Does the road pavement create the potential for drivers to skid into the clear zone during inclement weather?		
6.5.3	Does the road pavement create the potential for drivers to skid into the RC when approaching at the posted speed limit?		
6.5.4	Does the road pavement create the potential for drivers to lose control and enter the RC when approaching at speeds above the posted speed limit?		

7	Road layout and controls	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
7.1	**Readability and safe use of the road by drivers**		
7.1.1	Are there any sections of road or traffic facilities on the approach or departure to an RC, other than those provided for the RC, which may cause confusion to a driver such as: • Many signs with different messages • Excessive pavement markings or road signage • Old pavement markings • Disused pavement or rail tracks		
7.1.2	Does the alignment of kerbs, traffic islands and medians at the RC lead to driver confusion or unsafe driver behaviour?		
7.1.3	Are turning radii and tapers at nearby intersections and driveways inconsistent with road design guidelines, do they lead to driver confusion or unsafe driver behaviour?		*(Refer to Austroads Guide to road design, and RTA Supplements)*
7.1.4	Do traffic management measures in the vicinity of the RC, other than those provided for the RC, cause driver distraction or confusion?		
7.1.5	Where the RC is located near the end of a high speed road section (eg on the terminating approach to a T-junction), are the traffic management measures leading to unsafe actions by approaching drivers?		
7.2	**Road user sight distance**		
7.2.1	Do intersections, driveways and any infrastructure implemented to manage them reduce driver sight distance to the RC?		
7.2.2	Do pedestrian mazes, fences or other structures implemented at an RC restrict visibility from side roads or driveways?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

7.3	**Protection from objects in the clear zone**		
7.3.1	Are safety barriers unsuitable for the purpose, non-standard, installed incorrectly or in poor condition?		*(Refer to Austroads Guide to road design, and RTA Supplements)*
7.3.2	Is there the potential for road users to be 'speared' by safety barriers located in the clear zone or median?		
7.3.3	Is the delineation and visibility of safety barriers inadequate?		
7.4	**Safe access to adjacent rail property**		
7.4.1	Is the design of the access driveway to railway maintenance areas inadequate?		
7.4.2	Does the use of the access driveway to the railway maintenance area lead to a crash potential for motor vehicles or other road users?		

8	Traffic signals and road signs	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
8.1	**Conflicting traffic control signals**		
8.1.1	Do nearby traffic control signals conflict visually with RC signals?		
8.2	**Traffic control signal operations**		
8.2.1	Is the traffic signal phasing provided for train operations working incorrectly?		
8.2.2	Is there evidence of failure in the operation of the traffic control signals (ie have traffic signals 'blacked out' at any time)?		
8.3	**Awareness and interpretation of RC Signs**		
8.3.1	Are static and active advance warning signs for the RC non-standard in respect to AS 1742.7 2007 for the type of RC control?		*If the answer to this question is 'No' then the signs for RC meet the Australian Standard AS 1742.7.*
8.3.2	Are any RC signs missing, incorrectly located or aligned?		
8.3.3	Are RC signs incorrectly constructed with respect to: lateral clearance in clear zone; measures to protect road users from hitting a sign; and minimum sign height?		
8.3.4	Are RC signs ineffective for known operating conditions (eg day, night, rain, fog, rising or setting sun, oncoming headlights, poor lighting)?		
8.3.5	Is the operation of active advance warning signs non-standard in respect to AS 1742.7?		
8.4	**Awareness and interpretation of general traffic signs**		
8.4.1	Do signs restrict sight distance to RC, particularly for turning vehicles?		
8.4.2	Are there any redundant signs?		
8.4.3	Do signs with reference to RC create driver confusion and potential unsafe behaviour?		
8.4.4	If restrictions apply to any class of vehicle (eg heavy vehicles), are signs provided to inform and regulate drivers inadequate?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

9	Road pavement marking and delineation	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
9.1	**Awareness and interpretation of RC line marking and pavement marking**		
9.1.1	Is longitudinal line marking: non-standard with respect to AS 1742.7 2007 for the type of RC control; confusing to road users; positioned incorrectly; or in poor condition?		*If the answer to this question is 'No' then the longitudinal line marking for the RC meets the Australian Standard 1742.7.*
9.1.2	Are pavement markings (Rail X and box markings, if provided): non-standard with respect to AS 1742.7 2007 for the type of RC control; confusing to road users; positioned incorrectly; or in poor condition?		*If the answer to this question is 'No' then the pavement marking for the RC meets the Australian Standard 1742.7.*
9.1.3	Are stop or holding lines: non-standard with respect to AS 1742.7 2007 for the type of RC control; confusing to road users; positioned incorrectly; or in poor condition?		
9.2	**Awareness and interpretation of general line marking and pavement markings**		*If the answer to this question is 'No' then the stop or holding lines for the RC meet the Australian Standard 1742.7.*
9.2.1	Are line marking and pavement markings (centre lines, edge lines, transverse lines, cross hatching) deficient for known operating conditions (eg day, night, rain, fog, rising or setting sun, oncoming headlights, light coloured pavement surface, poor lighting)?		
9.2.2	Particularly at skewed crossings, is longitudinal pavement marking inadequate to guide a road user safely through a crossing?		
9.3	**Awareness and interpretation of road delineation**		
9.3.1	Are delineation devices (eg width markers, guide posts, chevron alignment markers, reflectors etc) inadequate and incorrectly placed?		*If the answer to this question is 'No' then the delineation devices for the RC meet the Australian Standard 1742.7 and RTA guidelines.*
9.3.2	Is delineation ineffective for known operating conditions (eg day, night, rain, fog, rising or setting sun, oncoming headlights)?		
9.3.3	Where RRPMs (Retro-reflective Raised Pavement Markers) are used, have they been incorrectly installed?		
9.3.4	If installed, are RRPMs in poor reflective order?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

10	Road related area	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
10.1	**Road user sight distance**		
10.1.1	Is the RC in an area where other roadside infrastructure creates driver distraction?		
10.1.2	Do advertising signs on the approach and departure to an RC cause driver distraction?		
10.1.3	Does vegetation growth restrict driver sight distance to an RC?		
10.1.4	Is there potential for temporary events (eg parked vehicles, stockpiles) to obstruct driver sight distances?		
10.2	**Visibility of railway crossing by road user at night**		*(Responses in this section may require input from local council)*
10.2.1	If provided, is lighting below standard or not operating correctly?		
10.3	**Protection of road users in clear zones**		
10.3.1	Does the clear zone on approach and departure to an RC contain rigid fixtures (eg trees, sign posts, road lighting, electricity poles, bus shelters etc) that create a crash potential for errant vehicles?		
10.3.2	Are the types of road light poles used non-standard or inadequately protected if within the clear zone (eg slip-base not at correct height, rigid poles not protected)?		
10.3.3	If rigid fixtures are present, are they inadequately shielded or non-frangible?		
10.4	**Potential short-term reduction in road user visibility of RC**		
10.4.1	Does the RC area of influence contain construction or maintenance equipment and any signing or temporary traffic control devices that are no longer required?		
10.4.2	Do weather events (eg fog) reduce driver sight distance at the RC?		*(If yes, outline frequency and severity)*
10.5	**Land use development**		*(Response to be provided by local council)*
10.5.1	Is there recent development on land adjacent to an RC that has lowered road user sight distance to an RC?		
10.5.2	Is there development proposed on land adjacent to an RC that may lower road user sight distance to an RC?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

11	Railway crossing signals and boom barriers	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
11.1	**Infrastructure and systems operation**		*(Some responses to be provided by the rail infrastructure manager)*
11.1.1	Are RC signals and boom barriers (if provided) incorrectly located, including lateral clearance and height?		
11.1.2	Are the railway signals uncoordinated with nearby traffic control signals?		
11.1.3	Are the delays to vehicles due to train activity excessive, (ie > 50 per cent of traffic signal cycle time)?		
11.1.4	Are signals, boom barriers and bells incorrectly operating? Are pre-warning times and sequences prior to the arrival of the train not in accordance with appropriate codes of practice?		
11.1.5	Are the railway signals incorrectly coordinated with the train signalling system?		
11.2	**Road user visibility**		
11.2.1	Are signals not focused correctly to be visible to approaching road users? Are the focal alignments for both cars and trucks incorrect?		
11.2.2	Is the number and location of RC signal displays inadequate?		
11.2.3	Is visibility to signals obscured by temporary events such as high vehicles stopped in side roads?		
11.2.4	Are RC active advance warning signs or supplementary signals (if provided), incorrectly located at the end of likely vehicle queues so that they may not be visible to approaching motorists to allow them to stop safely?		
11.2.5	Are there any lantern visibility problems caused by the rising or setting sun?		
11.2.6	Are signal displays focused and aligned so that they can be seen by the motorists for whom they are not intended?		
11.2.7	Where signal displays are not visible from an adequate distance, are supplementary signals or active advance warning signs required?		
11.2.8	Is warning required to vehicles entering from side roads and driveways?		
11.2.9	Is there possible driver distraction from roadside advertising signs and hoardings?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

12	Traffic operations	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
12.1	**Road vehicle driver behaviour**		*(Excludes Restricted Access Vehicle (RAV) use)*
12.1.1	Is the RC close to a railway station, transport terminal or bus stop where drivers may be rushing, impatient and inattentive?		*If yes, describe when and for how long?*
12.1.2	Is the RC located in an urban area that experiences high levels of congestion during certain parts of the day, which may cause drivers to rush, be impatient and inattentive?		*If yes, describe when and for how long?*
12.1.3	Is the RC located in a rural area where drivers may experience fatigue and lose concentration?		
12.2	**Stopping of traffic and buses on railway crossing**		*(Excludes Restricted Access Vehicle (RAV) use)*
12.2.1	Can queuing over, or stopping on, the RC suddenly occur due to unexpected downstream events (eg right-turning vehicles, pedestrian crossing)?		*If yes, describe when and for how long?*
12.2.2	Where queuing and stopping over the RC occurs, are safety management measures non-existent, inappropriate or ineffective in advising drivers not to stop on the RC?		
12.2.3	Are the safety management measures used to clear vehicles stopped on an RC while a train is approaching ineffective?		
12.3	**Queuing and stopping of general traffic and buses on approach to railway crossing**		*(Excludes Restricted Access Vehicle (RAV) use)*
12.3.1	Is the length of road provided to queue general traffic and buses from the RC to the upstream intersection during the operation of the RC inadequate for the peak traffic demand?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

13	Restricted Access Vehicles (RAV)	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Notes to assist planners are in italics – these can be deleted when completing the checklist)*
13.1	**RAV driver behaviour**		
13.1.1	Is the RC located in an urban area that experiences high levels of congestion during certain parts of the day, which may cause RAV drivers to rush, be impatient and inattentive?		*If yes, describe when and for how long?*
13.1.2	Is the RC located in a rural area where RAV drivers may experience fatigue and lose concentration?		
13.2	**Lane discipline and driver sight distance**		
13.2.1	Is the pavement and shoulder width narrow for RAV traversing the crossing?		
13.2.2	Is RAV driver sight distance provided along the rail lines at passive controlled crossings inadequate to see approaching trains with sufficient time to cross safely (eg adjacent yards/sidings, earthworks cuttings, vegetation, buildings, sun glare)?		
13.3	**Stopping of RAV on railway crossing**		*If yes, when and for how long?*
13.3.1	Do RAV stop on the RC?		
13.3.2	Can queuing over or stopping of RAV on the RC suddenly occur due to unexpected downstream events (eg right-turning vehicles, pedestrian crossing)?		*(For how long is the RC blocked?)*
13.3.3	Where queuing and stopping of RAV over the RC occurs, are safety management measures non-existent, inappropriate or ineffective in advising drivers not to stop on the RC?		
13.3.4	Are the safety management measures used to clear RAV stopped on an RC while a train is approaching ineffective?		
13.4	**Queuing and stopping of RAV on approach to railway crossing**		
13.4.1	Is the length of road provided for queuing of RAV from the RC to the upstream intersection during the operation of the RC inadequate for the peak demand?		
13.5	**Illegal use of railway crossing by RAV**		
13.5.1	If RAV are restricted at a crossing, is advanced signing of restrictions and alternate routes inadequate?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

14	Non-motorised traffic	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Some responses for this section to be provided by the rail infrastructure manager)*
14.1	**Readability by pedestrians and cyclists**		
14.1.1	Are there any sections of travel paths or railway which may cause confusion, such as: • Excessive pavement markings or signage. • Old pavement markings. • Disused path pavement or rail tracks?		
14.2	**Protection of non-motorised road users at railway crossing**		
14.2.1	Are the RC treatments inadequate for the number of pedestrians (including those with a disability), cyclists, wheelchairs or mobility scooters using the RC?		
14.2.2	Are the pedestrian maze and/or gates non-standard with respect to AS 1742.7, not operating correctly or in poor condition?		
14.2.3	Are pedestrian signalling, warning lights, audible warning devices and fencing non-standard with respect to AS 1742.7, not operating correctly or in poor condition?		
14.2.4	Is pedestrian fencing inappropriate in its design?		
14.2.5	Are road safety barriers along the road inadequate to protect pedestrian and cyclist flows?		
14.2.6	Is the crossing angle or rail flangeway gap likely to trap a wheelchair/bicycle wheel or cause the wheelchair/bicycle to topple?		
14.3	**Condition of infrastructure**		
14.3.1	Are rail tracks raised with the path surface so that tripping by pedestrians and dislodgment of cyclists may occur?		
14.3.2	Are approach and departure paths at the RC unstable, soft, uneven or rough so that slips may occur?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

14.3.3	Are the provisions for the elderly, the disabled, children, wheelchairs and baby carriages through the RC (eg holding rails, kerb and median crossings, ramps) inadequate?		
14.4	**Pedestrian type, condition and behaviour**		
14.4.1	Are schools, playgrounds or aged care establishments in close proximity that may result in a high proportion of these types of pedestrians using the RC?		
14.4.2	Are licensed premises in close proximity that may result in alcohol-impaired pedestrians using the RC?		
14.4.3	Is the RC close to a railway station, transport terminal or bus stop where pedestrians may be rushing, impatient and inattentive?		
14.4.4	Is there potential for elderly or disabled pedestrians to slip, trip or fall over if hand rails are not provided?		
14.5	**Safe movement by cyclists**		
14.5.1	Is the pavement width inadequate for the number of cyclists using the RC?		
14.5.2	Are bicycle-safe grates required at drainage pits?		
14.6	**Sight distance**		
14.6.1	Is pedestrian sight distance provided along the rail lines at passive controlled crossings inadequate to see approaching trains with sufficient time to cross safely?		
14.6.2	Is cyclist sight distance provided along the rail lines at passive controlled crossings inadequate to see approaching trains with sufficient time to cross safely?		

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

15	Rail infrastructure and train operations	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Some responses for this section to be provided by Rail Infrastructure Manager)*
15.1	**Road user sight distance**		
15.1.1	Is road vehicle driver sight distance provided along the rail lines at passive controlled crossings inadequate to see approaching trains with sufficient time to cross safely?		
15.1.2	Do adjacent yards/sidings, earthworks, cuttings, vegetation, buildings, sun glare, etc reduce road vehicle driver sight distance along the rail lines at passive controlled crossings (so that road vehicle drivers cannot see approaching trains with sufficient time to cross safely)?		
15.2	**Rail track condition**		
15.2.1	Is the following rail track infrastructure at, and on, the approaches to the RC in poor condition: • Crossing and approach surface		
	• Fencing		
	• Rail surface		
	• Track gauge		
	• Sleepers		
	• Rail fasteners		
	• Top ballast (if applicable)		
	• Track drainage		
	• Rail joints		
	• Flangeway clearance		
	• Guard rail		
	• Check rail		

15.3	Train operations		
15.3.1	Is train driver sight distance in the rail corridor on the approach to an RC inadequate (eg adjacent yards/sidings, earthworks cuttings, vegetation, buildings, sun glare)?		
15.3.2	Are there sight distance constraints for the train driver outside of the rail corridor (eg earthworks, cuttings, buildings, adjacent yards or sidings, vegetation, sun glare at certain times of day)		
15.3.3	Are there seasonal variations in train activity?		
15.3.4	Are there: • Long trains		
	• Slow moving trains		
	• Multiple tracks with simultaneous or overtaking trains		
	• Shunting		

16	Enforcement	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event* *(Response to be provided by police)*
16.1	Are there illegal traffic operations that require enforcement (current or in the past) at the RC (eg driving through passive control without looking/stopping, driving through flashing lights, driving around boom gates, pedestrian or cyclist ignoring signs or signals, etc)?		
16.2	Are there any constraints to implementing further enforcement campaigns?		*(If so, why?)*

* If 'Yes' assessment provide a detailed explanation of the hazard or hazardous event.

17	Behavioural campaigns	Assessment (Yes / No / N/A)	Description of specific hazard or hazardous event[5]
17.1	Are there illegal traffic operations that require behavioural campaigns (current or in the past) at the RC (eg driving through passive control without looking/stopping, driving through flashing lights, driving around boom gates, pedestrians or cyclists ignoring signs or signals, etc)?		
17.2	Are there any constraints to implementing further behavioural campaigns?		*(If so, why?)*
17.3	Where unsafe actions are reported at the RC, could a behavioural campaign be implemented to assist road users to act more safely, e.g. how to use the RC, safety issues at RCs?		

18	Additional comments
18.1	
18.2	

19 Photographs, plans and any other relevant documentation of the RC, road network (within area of influence) and special infrastructure / other features, etc

19.1 Photographs

Insert photographs (and explanatory notes)

19.2 Plans

Insert plans (and explanatory notes)

19.3 Relevant documentation

Insert relevant documentation (and explanatory notes)

This document is part of the Railway Crossing Safety Series 2011, the documents that make up the series are:

- Plan: Establishing a railway crossing safety management plan *(policy number PN239G)*
- Identify: The railway crossing safety hazard checklist *(policy number PN241G)*
- Assess: Applying risk tolerance and risk assessment criteria to railway crossings *(policy number PN238G)*
- Evaluate: Applying the railway crossing cause consequence bow tie models *(policy number PN240G)*

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