

# Management of Safety Risks at Level Crossings





VICTORIA

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Victorian  
Auditor-General

# Management of Safety Risks at Level Crossings

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# VAGO

Victorian Auditor-General's Office  
*Auditing in the Public Interest*

The Hon. Robert Smith MLC  
President  
Legislative Council  
Parliament House  
Melbourne

The Hon. Jenny Lindell MP  
Speaker  
Legislative Assembly  
Parliament House  
Melbourne

Dear Presiding Officers

Under the provisions of section 16AB of the *Audit Act 1994*, I transmit my report on  
*Management of Safety Risks at Level Crossings*.

Yours faithfully



D D R PEARSON  
*Auditor-General*

24 March 2010



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# Audit summary

## Background

The audit examined the rate of progress in improving safety and reducing accidents at level crossings by assessing the management of these risks and the effectiveness of the treatments to address them.

Most level crossing collisions happen because pedestrians or drivers are unaware of an approaching train, misjudge its arrival at the crossing, choose to ignore warning signals, or deliberately avoid the barriers designed to protect them.

Physically separating or closing roads and footpaths that cross railway tracks would solve the problem. However, the costs of doing this and the impact on the mobility of the people affected, mean these solutions will be the exception rather than the rule.

Managing safety risks is a shared responsibility between the rail and road organisations that manage, government agencies that oversee and regulate, and the people who use, level crossings.

The Minister for Public Transport released the 10-year *Towards Zero* strategy in November 2009. Its objective is to reduce deaths and injuries and ultimately to achieve the goal that no lives are lost through accidents at level crossings.

Between 2000–01 and 2008–09 level crossing accidents caused 73 deaths, an average of eight per year. While this is minimal compared with the road toll of about 300 deaths annually, these events are catastrophic for the people affected.

There is also a risk of a level crossing collision where many people are killed and seriously injured. This happened when a goods vehicle hit a passenger train in June 2007 at Kerang in regional Victoria, killing 11 people and seriously injuring 12. The damage, beyond loss of life, can amount to millions of dollars.

## Conclusion

The rate of progress in improving safety and reducing accidents has been satisfactory. There are, however, elements of the risk management framework and its application that can be improved.

## Findings

### Risk management framework

The Victorian Railway Crossing Safety Steering Committee and the use of an evidence-based approach to assess and prioritise risks are important parts of the risk-management framework. These have set the scene for better management of level crossing safety.

There is, however, room to strengthen the framework's effectiveness by:

- improving how the committee is informed of the views of the rail managers, who run train services and maintain the infrastructure, about their risks and priorities
- assembling information that will allow the committee to effectively manage and monitor the delivery of the *Towards Zero* strategy
- improving the understanding of what causes level crossing collisions.

### Measuring and improving the safety outcomes

The decline in level crossing collisions over the past 10 years suggests that the department's actions have improved level crossing safety when it is recognised that risk of conflict between road traffic and trains has risen with increased volumes.

The department needs to improve how it measures and reports on the cost-effectiveness of the committee's programs. The department does not have an accurate grasp of the cost-effectiveness of the treatments it deploys. Whilst it mostly understands the costs, it has not adequately evaluated the benefits. The department has acted to improve in this area by commissioning research and starting to apply the recommendations about how it evaluates treatments.

The department has not adequately assessed treatments before their deployment, or once deployed, evaluated them. This means it has only a partial understanding of the realised benefits.

There is a clear inconsistency in the way VicTrack and V/Line calculate what they charge the department for level crossing upgrades. The department needs to understand the differences to gain assurance about the cost-efficiency of the upgrades it funds.

The information the department publishes is not sufficient to understand how its plans and programs are progressing and how successful they have been in delivering on the department's objectives.

## Recommendations

Number	Recommendation	Page
	The Department of Transport should:	
1.	Work with the rail managers to strengthen the processes it uses to inform the committee about the rail managers' views when making decisions about level crossing priorities and upgrades.	18
2.	Lead the road and rail managers to develop a detailed, three-year plan that provides an adequate basis for managing and monitoring the <i>Towards Zero</i> strategy.	18
3.	With Public Transport Safety Victoria's support, agree on and document the actions needed to deliver a better understanding of level crossing collisions as part of the detailed plan underpinning the <i>Towards Zero</i> strategy.	18
4.	Review the legislation and develop recommendations to improve the effectiveness of the level crossing closure process.	18
5.	Understand why the charges for level crossing upgrades completed by different organisations have varied, with the view to improving efficiency.	32
6.	Publish an analysis of the issues raised by its survey of level crossings, identifying the works required, agency responsible and an estimate of the cost.	32
7.	Improve the approach to assessing risk mitigation treatments before their deployment and evaluating treatments once deployed.	32
8.	Improve the way it reports on level crossing safety.	32



# Audit Act 1994 section 16— submissions and comments

## Introduction

In accordance with section 16(3) of the *Audit Act 1994* a copy of this report, or relevant extracts from the report, was provided to the Department of Transport and Public Transport Safety Victoria with a request for comments or submissions.

The comments and submissions provided are not subject to audit nor the evidentiary standards required to reach an audit conclusion. Responsibility for the accuracy, fairness and balance of those comments rests solely with the agency head.

## Submissions and comments received

### **RESPONSE provided by the Secretary, Department of Transport**

The following is an extract of the response provided by the Secretary, Department of Transport. The full response is provided in Appendix A of this report.

*Response: Your recommendations in respect of improving elements of the risk management framework and its application are accepted.*

*In relation to recommendation one, I would like to take the opportunity to emphasise the need for accredited rail operators to proactively participate in the process of prioritising level crossing upgrades as part of the ongoing program of reducing the overall risk to the public both road and rail users.*

*This is a necessary part of the shared responsibility for safety at level crossings between the various parties involved in risk management*

### **RESPONSE provided by the Director, Public Transport Safety Victoria**

The following is an extract of the response provided by the Director, Public Transport Safety Victoria. The full response is provided in Appendix A of this report.

*Response: I confirm that PTSV is satisfied with the factual content of the report and does not have any further comment on the proposed report.*



# 1 Background

## 1.1 Introduction

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Most railways in Victoria were not developed to physically separate the pathways of trains from road traffic and pedestrians. Today approximately 2 700 road and pedestrian level crossings operate in Victoria where traffic should stop when a train passes through the crossing.

Of the 1 872 road crossings:

- 803, 43 per cent, have active devices that warn drivers of approaching trains, and these include all 185 road crossings in Melbourne
- 1 069, 57 per cent, have passive devices, 'give way' or 'stop' signs, to remind drivers that they may come across a train when using the crossing.

The 843 pedestrian level crossings are located either on one or both sides of road crossings, or as a stand-alone crossing serving a nearby station. These also have a mixture of active warning devices and passive signs.

Level crossing collisions are the major cause of accidental deaths and injuries involving trains. Between 2000–01 and 2008–09, there were 73 deaths from level crossing collisions, an average of eight per year. This compares with an annual state road toll in 2008 of around 300 deaths and 6 500 injuries.

While the toll from level crossing collisions is much smaller than the road toll, each of these events is a disaster for the people affected. There is also the risk of a level crossing collision where many lives are lost. This happened when a goods vehicle hit a passenger train near Kerang in June 2007, killing 11 people. As well as the high human toll, level crossing collisions can also be very costly financially, with damage bills of millions of dollars when trains are seriously damaged or derailed.

Most level crossing collisions happen because pedestrians or drivers are unaware of an approaching train, misjudge its arrival at the crossing, choose to ignore warning signals, or deliberately avoid the barriers designed to protect them.

The safety risks at level crossings could be resolved by separating roads and footpaths from rail tracks using tunnels or bridges or by closing lightly trafficked roads so they no longer cross train tracks. However, these solutions are often impractical because of the high costs of separation and the effect of road closures on local communities.

## 1.2 The *Towards Zero* strategy

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The Minister for Public Transport released a 10-year strategy in November 2009, with the objective of reducing the number of deaths and injuries at level crossings, and ultimately to achieve the goal that no lives are lost at level crossings. This strategy was developed by the Victorian Railway Crossing Safety Steering Committee.

The strategy includes a one-page action plan for 2009–2011 and will draw on \$100 million allocated in the *Victorian Transport Plan* to keep upgrading regional level crossings from passive signs or active crossings with flashing lights to active warning devices with half boom barriers.

The strategy also aims to:

- better understand the behaviours that cause collisions
- investigate and, if cost-effective, apply other treatments, in the short-term, to improve safety
- develop ongoing, awareness, education and enforcement campaigns to complement the improvements to the infrastructure and traffic regulations
- investigate emerging technologies for warning road users about approaching trains, with a view to piloting and applying those that prove cost-effective.

The extra \$440 million allocated in the *Victorian Transport Plan* for separating the road from the railway at a small number of major metropolitan crossings is not included in the strategy. The main purpose of these projects is reducing congestion and delays, rather than the safety benefits and is not the responsibility of the Victorian Railway Crossing Safety Steering Committee.

## 1.3 Roles and responsibilities

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Managing the safety risks at level crossings is a shared responsibility between the drivers and pedestrians using level crossings, the organisations that manage railways, crossings and their approach roads, and the agencies that oversee and regulate the managers on behalf of government.

### Road users

To navigate a level crossing safely, drivers and pedestrians need enough information to decide whether it is safe to cross the railway, or whether they need to stop and wait for a train to pass. Road users are responsible for being aware of this information, heeding the warnings and obeying level crossing regulations.



## Rail and road managers

The organisations that manage level crossings and their approach roads are jointly responsible for providing the information and controls drivers and pedestrians need to use a crossing safely. They are also responsible for maintaining the approach road and rail corridors, the level crossing, the warning signs and other equipment in a workable condition.

### *Rail managers*

Under the *Rail Safety Act 2006* rail managers must identify all risks to the safe operation of their services, including at level crossings, and they must address these risks 'as far as is reasonably practicable'. This term means that in deciding what to do the rail manager must take account of the likelihood of a risk eventuating and the injury and damage it might cause, the options for treating the risk and the likely costs of acting on these options.

V/Line is responsible for managing most of the level crossings in regional Victoria. Metro Trains Melbourne (Metro) replaced Connex on 30 November 2009 as the manager responsible for metropolitan level crossings. The Australian Rail Track Corporation (ARTC) is responsible for managing a small number of crossings.

### *Road managers*

Under the *Road Management Act 2004* VicRoads and local councils must manage roads to promote safe and efficient state and local road networks. To this end, road managers should act so 'that the public road network and infrastructure are as safe for users as is reasonably practicable'. This also applies to the approach roads leading to level crossings.

## Better coordination of risk management at level crossings

In 2007, the government amended the *Rail Safety Act 2006*, to require rail and road managers to seek to enter into *Safety Interface Agreements* for each level crossing. These provisions will apply from 1 July 2010. The agreements will document a joint view of the risks at each level crossing, the best treatments to use, and the organisation with lead responsibility for managing these risks.

## Oversight and regulatory agencies

### *The Department of Transport*

Under the *Transport Act 1983*, the department's objectives include providing a safe public transport system and advising the Minister for Public Transport about policies and measures to improve safety at level crossings. The department is responsible for:

- overseeing rail manager contracts that include obligations to operate rail services that are safe to use

- managing funding under the *Victorian Transport Plan* for separating roads and railways at a small number of locations, and upgrading controls across a larger number of regional level crossings
- leading the Victorian Railway Crossing Safety Steering Committee (the committee).

While closing level crossings eliminates the risk of a collision, only road managers can close roads leading to level crossings. The department does not have the authority to close road crossings.

### *The Victorian Railway Crossing Safety Steering Committee*

The committee was set up as a ministerial advisory body under the *Transport Act 1983*, in 2005. Under the department's leadership, the committee is responsible for delivering the *Towards Zero* strategy.

The committee includes road manager representatives, the regional rail manager, V/Line and other stakeholders with an interest in level crossing safety. It does not include representatives from the metropolitan and interstate rail managers, although these organisations are represented on some of the working groups dealing with specific railway level crossing risk management issues.

The committee advises the Minister for Public Transport on the best way to manage safety risks at level crossings. It sets priorities for the level crossing upgrade program and steers programs that research, develop, and apply new treatments to improve safety.

Various agencies are responsible for implementing the programs which the committee oversees. For example, VicTrack is responsible for delivering the government's program of level crossing upgrades through a memorandum of understanding with the department.

### *Public Transport Safety Victoria*

On behalf of the Safety Director, Public Transport Safety Victoria (PTSV) regulates safety in line with *Rail Safety Act 2006*. As part of the rail managers' Victorian accreditation, PTSV must assess their competence and capacity to manage risks, including the risk of collisions at level crossings.

From July 2010, PTSV will be responsible for making sure that rail and road managers comply with the Act's requirements for *Safety Interface Agreements*, documenting the coordinated management of risks at level crossings.

## Parliamentary inquiry

In December 2008, the Road Safety Committee of Parliament reported on its inquiry into *Improving Safety at Level Crossings*, which examined existing, new and developing technologies. It concluded that safety at crossings would be improved by closing surplus level crossings, reducing speed limits on some approach roads and trialling and applying lower-cost warning technologies. It made 44 recommendations, including that VAGO review the cost-efficiency of the crossing upgrade program.

## 1.4 Audit scope and objectives

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The audit examined the rate of progress in improving safety and reducing accidents at level crossings by assessing the:

- framework to manage these risks
- identification, analysis and prioritisation of the risks
- treatments chosen and their implementation
- effectiveness of these treatments in improving safety and reducing accidents.

The audit included the Department of Transport, as the agency overseeing the effectiveness of the rail and road managers and their handling of safety risks at level crossings. It also included PTSV, as the agency that assesses the competence and capacity of rail managers to manage risk, including the risk of collisions at level crossings.

The audit was conducted in accordance with the Australian Auditing Standards. The audit assessed the management of level crossing safety risks from 2005 and examined level crossing collision and fatality data from 1991–92 to 2008–09.

The cost of the audit was \$360 000.

## 1.5 Structure of report

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Part 2 describes whether the approach has:

- established a clear risk management framework
- accounted for and prioritised the risks.

Part 3 covers the safety outcomes and examines whether:

- this information shows that level crossings are becoming safer
- the department has adequately measured the effectiveness of risk treatments.



# 2 Risk management framework

## At a glance

### Background

The government has built on the legislative framework, which makes rail and road managers responsible for level crossing safety, to achieve its policy goals. It has funded safety programs and given the Department of Transport (the department) a leadership role on the Victorian Railway Crossing Safety Steering Committee (the committee).

We examined how well the department has managed this expanded framework to accurately assess and prioritise level crossing risks.

### Conclusion

The operation of the committee and the application of an evidence-based approach to assessing and prioritising risks have contributed to the better management of level crossing safety.

However, there is a need to improve the framework by strengthening its processes for understanding the rail managers' views on upgrade priorities, creating a detailed plan and developing a better understanding of the causes of collisions.

### Recommendations

The Department of Transport should:

- work with the rail managers to strengthen the processes it uses to inform the committee about the rail managers' views when making decisions about level crossing priorities and upgrades
- lead the road and rail managers to develop a detailed, three-year plan that provides an adequate basis for managing and monitoring the *Towards Zero* strategy
- with Public Transport Safety Victoria's support, agree on and document the actions needed to deliver a better understanding of level crossing collisions as part of the detailed plan underpinning the *Towards Zero* strategy
- review the legislation and develop recommendations to improve the effectiveness of the level crossing closure process.

## 2.1 Introduction

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Effective risk management requires:

- a framework with clear objectives, involving organisations that help manage the risks, and a sound, adequately resourced plan, with clear deliverables, responsibilities and time lines
- using information and expertise to accurately assess the risks and prioritise their treatment.

## 2.2 Conclusion

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The risk management framework has been strengthened since 2005 through the operation of the committee and the application of an evidence-based approach to assessing and prioritising risks.

However, to be fully effective the department needs to improve the framework by strengthening its processes for understanding the rail managers' views on upgrade priorities, documenting a detailed plan and developing a better understanding of collision causes.

## 2.3 Findings

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### 2.3.1 The adequacy of the risk management framework

The legislative framework for managing level crossing risks has been supplemented and strengthened. While these actions have helped to better manage the risks, the department needs to further improve the framework and the way it is used.

#### The need to supplement the legislative requirements

Legislation makes level crossing safety the direct responsibility of the rail and road managers controlling the crossings and their approach roads.

Public Transport Safety Victoria (PTSV) accredits rail managers to verify they are capable of operating a railway. Part of this involves verifying that their approach to risk management is in accordance with the *Rail Safety Act 2006*.

The audit found:

- V/Line is meeting legislative requirements around risk management
- Connex had also met these requirements, but PTSV identified some outstanding issues, some relating to the risk management framework. The new rail manager will give PTSV a detailed plan by March 2010 to address these.

However, rail managers' compliance with the legislative requirements is not enough to secure safety at level crossings.

First, rail managers will balance risks against the costs of treating them. This limits the options for addressing safety risks at level crossings. For example, rail managers are unlikely to choose expensive level crossing upgrades without additional, external funding.

Second, an effective framework needs to include measures and organisations beyond the direct control of the rail managers. For example, campaigns to promote and enforce safe behaviour at level crossings rely on the involvement of the police and the Victorian Railway Crossing Safety Steering Committee (the committee), led by the department. The rail managers are not well placed to organise this type of cooperation.

Third, research and development are critical components of an effective management framework. These help to identify the problem, evaluate how successful measures are, and develop new treatments. The type and scale of research and development needed to meet the government's long-term zero fatality goal requires effort and involvement in national initiatives that are beyond the scope of rail managers.

### Building a more comprehensive risk management framework

The department has supplemented rail managers' work with funding for extra safety programs. In addition, the framework was improved through:

- the passage of legislation in 2006 and 2007, clarifying the roles and responsibilities of rail and road managers and requiring them to coordinate their response to the risks
- creating the Victorian Railway Crossing Safety Steering Committee in 2005.

### *Amending the legislation to promote a coordinated response*

The *Rail Safety Act 2006* was amended in 2007 to introduce *Safety Interface Agreements*. The amendment requires road and rail managers to agree on and document how they will manage risks at level crossings.

The amendment is effective from 1 July 2010, but some road and rail managers were unclear about whether the safety interface agreements had to be in place at this time. Some of PTSV's early presentations stated that agreements should be established by the commencement date.

PTSV has since received legal advice that parties must take reasonable steps to enter into agreements but there is no requirement to have done this on or before the commencement date. PTSV will continue to advise all parties to make all reasonable efforts to enter into agreements from the commencement date.

The legislation does not provide a clear deadline for when the rail and road managers should have these agreements in place.

### *The work of the Victorian Railway Crossing Safety Steering Committee*

Under the department's leadership, the committee and its working groups are responsible for developing and overseeing a state-wide risk management framework and have:

- become the main source of policy and program advice to government
- combined the expertise to determine how to achieve government's policy goals
- developed a long-term strategy and a three-year action plan, incorporating treatments to improve safety, and research programs to improve understanding of safety risks and develop new, more cost-effective treatments.

The committee advises the Minister for Public Transport about level crossing safety. It is well organised, with regular and well-documented meetings and clear lines of accountability between it and the working groups.

### *Improving the risk management framework*

While these have been positive developments, the risk management framework can be strengthened by, in partnership with the road and rail managers:

- better incorporating rail managers' knowledge and views in the decisions the committee makes about level crossing safety
- developing a comprehensive plan to help manage the strategy.

### *Incorporating rail managers' views on risk management*

The department has processes to capture rail managers' knowledge and views about level crossing safety through the participation of the rail managers in the committee and working group meetings. However, the department needs to improve these processes to effectively inform the committee's decisions.

The rail managers are important to level crossing safety because they have:

- a legal responsibility to assess level crossing safety and to work with road managers to decide how to treat the risks
- been contracted and accredited as capable of managing these risks
- developed an operational understanding of the risks and how they should be managed.

The regional, metropolitan and interstate rail managers are members of one or more working groups where they can discuss the level crossing upgrade program or other level crossing improvement initiatives.

Since August 2007, the regional rail manager, V/Line, has been a member of the committee and was represented at meetings in 2009 that endorsed the principles for prioritising upgrades and the forward program for 2009–10 to 2011–12.



In August 2009 the committee:

- endorsed the upgrade program for 2009–10 to 2011–12
- noted that the program included all the issues raised by the rail managers
- agreed to reassess these priorities if new information led the rail managers to raise further issues.

However, the meeting papers did not describe the issues rail managers raised or how they were resolved.

The regional and metropolitan rail managers were also present at a working group meeting where the forward program was tabled and the minutes record no comments on the content.

The department wrote to the regional rail manager in November 2009 asking that it confirm its agreement with the upgrade program priorities, or to identify other sites to substitute for those in the program.

V/Line's response showed that its priorities were very different to those in the committee's forward program. Only seven of the thirty-five crossings on V/Line's priority list had been included in the endorsed three-year upgrade program.

The department also wrote to the former metropolitan rail manager, Connex and the interstate rail manager, ARTC, in November 2009 to find out if they had any outstanding issues with the upgrade program. It has not had written responses from either organisation. The department has not yet written to the new metropolitan rail manager, Metro, which took over from Connex in late November 2009.

The department needs to work with the rail managers to strengthen its consultation and communication processes by requiring a written response from the rail managers on issues where their views are critical in framing the committee's recommendations.

### *Documenting a comprehensive plan to help manage the strategy*

The department had not documented an adequate plan for monitoring and managing the first three years of the strategy when it was published.

The 16-page strategy includes the government's long-term goal of no level crossing fatalities, and broadly describes the programs that will make this possible.

The document states that the committee will:

- manage the 10-year strategy, using a series of three-year action plans to make sure treatments are targeted and regularly measured
- measure progress quarterly and present an annual review of issues and achievements to the Minister for Public Transport.

The strategy includes a one-page action plan summarising the programs and actions for 2009–2011.

This action plan does not include:

- a three-year objective, or how the department will measure progress in delivering on the plan and moving towards the strategy's, long-term goal
- some of the commitments the government made in the June 2009 response to the parliamentary inquiry, such as developing an accident investigation database at the state level and documenting how to address the risks identified by the survey of level crossings
- enough information to understand, what will be delivered, when this will happen and how success will be judged.

The detailed project planning for each part of the strategy falls to the organisations responsible with their completion. This information can be used to describe the key deliverables, timelines and measures of success, to help better manage and monitor the action plan.

Figure 2A describes how the infrastructure evaluation component might be reflected in a summary plan.

**Figure 2A**  
**Example plan content for the infrastructure evaluation program step**

**Strategy for infrastructure evaluation and response to the parliamentary inquiry**

The strategy describes this program step as:

- A full evaluation of the effectiveness of rumble strips, automated advanced warning signs, reduced road speed limits and yellow box marking completed by 2010, with results incorporated into all the committee's future upgrade programs.

The department's response to the parliamentary inquiry on level crossings was:

- VicRoads will use existing research into the various railway level crossing treatments to compile a guide to assist in the development of railway level crossing programs. The guide will identify situations where each specific treatment would be effective and the estimated crash risk reduction that would be achieved with each treatment.

**Example of the information that could be included in a monitoring plan**

Summarised information could include:

- the products and services linked to each evaluation, the specific completion dates and the performance measures used, for example a positive peer review and the committee's sign off
- the deadline for delivering a guide to level crossing treatments incorporating the evaluation results and the arrangements for its review and acceptance
- a time line for incorporating the results into the committee's upgrade program.

Source: Victorian Auditor-General's Office.

The action plan published as part of the *Towards Zero* strategy is not detailed or specific enough to tell the community what it will deliver and the likely outcome.

### 2.3.2 Assessing the risks and prioritising upgrades

The committee has developed and applied an evidence-based approach for assessing and prioritising risks and is working to improve:

- its understanding of what causes level crossing accidents
- the way it assesses the risks and determines priorities.

#### Developing a better understanding of level crossing collisions

Some of the methods used to collect, record, collate and analyse information have hindered understanding of the causes of level crossing accidents. These methods need to be improved.

Research commissioned by the department from Monash University concluded in February 2009 that there was an urgent need to build a better understanding of where the problems lie. Critical to this was establishing databases containing accurate data on collisions and the characteristics of level crossings that might help explain them.

The research also concluded there was a need to understand user perception and behaviour at level crossings and how people respond to technology and other treatments. This goes beyond the historical analysis of collision data for predicting people's responses to different interventions.

The parliamentary inquiry adopted a similar position. It recommended that the department consolidate and regularly publish information that would help road and rail managers manage the risks more effectively.

The data issues that have prevented a better understanding of collisions include:

- the absence of a single, accepted identifier for level crossings in Victoria
- changing definitions, for example of what constitutes a serious injury, which was amended to achieve a consistent measure nationally
- various investigation agencies, such as the state's Office of the Chief Investigator and the Australian Transport Safety Bureau, collecting information that is difficult to match because they do not use a consistent template
- no depository linking information on collisions and the characteristics of level crossings.

The department has tried to improve its understanding of level crossing collisions and their causes through research commissioned from Monash University and the ARRB Group. It has accepted the recommendations from this research and is deciding how to apply them through the Railway Crossing Technical Group working group.

PTSV is also working to improve this situation by:

- fixing inconsistencies in past collision records
- populating a database with the information collected through accident investigations by state and commonwealth agencies.

While the department does not have a detailed plan to improve its understanding of level crossing collisions, it is developing one. However, this plan was not included in the strategy's first three-year action plan.

### Improving risk assessment and prioritisation

The committee's approach to prioritising risks is based on a model that conforms to a better-practice risk management framework. This model does not include information on collisions and near misses, and uses a different method to V/Line. However, the committee and its working groups do take account of collisions and near misses by regularly reviewing information on near misses and discussing fatal collisions and whether the location should be a higher priority for treatment.

This inconsistency reflects the lack of collaboration between the department and the rail manager in prioritising risks.

#### *The committee's approach*

Like other Australian states and territories, the committee uses the Australian Level Crossing Assessment Model (ALCAM) to assess risk at level crossings. This model uses information from 2007 site surveys about the physical attributes, control mechanisms and road and rail traffic volumes and composition for all the state's level crossings.

In addition, ALCAM data is updated from time to time to reflect infrastructure changes based on information provided by the rail and road managers.

ALCAM calculates an initial risk score for each crossing based on its physical attributes and the mechanisms used to control conflicts between trains and road traffic. For example level crossings:

- where drivers can see an approaching train some way into the distance will have a lower initial score than similar crossings with a more restricted view
- with bells and boom barriers that warn drivers about an approaching train will have a lower initial score than a similar crossing controlled by a stop sign.

ALCAM determines a final risk score by multiplying the initial score with the volume of road and rail traffic at each crossing and a measure of the expected consequence if a collision happened. These volumes will influence how great the risk is and the how crossings are initially ranked.

These scores do not factor in people's experience of level crossing collisions and near misses. The collision risk is calculated without considering the site's collision history because the locations of past collisions are generally not seen as good indicators of future collisions because:

- collisions are rare, with an average of 30 annually during the past decade spread across the state's 2 700 crossings
- it is for the most part a matter of chance that a collision happened at a particular location rather than one of the many other level crossings with characteristics that made them equally or less safe
- under these circumstances collisions are unlikely to be a reliable indicator of risk and form a poor basis for setting upgrade priorities.

For these reasons, the committee uses ALCAM to identify sites with features that expertise and experience suggest will increase the risk of a collision. However, information on collisions and near misses is considered by the committee as part of the prioritisation process. The committee prioritised the upgrade of several crossings where there had been a history of incidents or a collision causing several fatalities.

ALCAM can test how different risk mitigation treatments change the risk score. For example, in some situations removing vegetation that blocks a driver's view of an approaching train could mitigate the risks. In other situations, getting a lower risk score might require installing active warning measures.

In September 2008 the committee approved business rules for selecting and prioritising level crossings that will be upgraded as part of a four-year program. VicTrack is responsible for applying these rules and doing the level crossing upgrades.

Figure 2B shows that the application of the business rules includes:

- an initial ranking based on the risk score and ruling out some sites that have adequate controls, or where risks can be addressed with low-cost measures
- grouping high priority sites that are close to each other into cost-effective work packages
- excluding crossings that should be considered for closure or road reengineering
- setting the forward program through an annual update in March.

**Figure 2B**  
**Business rules for setting level crossing upgrade priorities**

<p><b>Initial ranking and exclusions</b></p> <ol style="list-style-type: none"><li>1. Initial priority listing, based on model's risk score.</li><li>2. Exclude crossings with boom barriers.</li><li>3. Revise order of priorities where low cost treatments, like removing vegetation to improve the view of an approaching train, would reduce the risk score.</li><li>4. Exclude crossings previously placed in the upgrade program.</li></ol> <p><b>Grouping sites to form upgrade work packages</b></p> <ol style="list-style-type: none"><li>5. Draw from the top 200 priority sites to form groups that are near to each other.</li><li>6. Include extra, lower-priority, adjacent sites in the work packages if it is cost-effective to leverage these upgrades off the investment in the priority sites.</li><li>7. Exclude sites where closure or road realignment has been agreed with local councils and the rail and road managers.</li><li>8. Include additional sites nominated by councils that have agreed to close a crossing.</li></ol> <p><b>Programming and annual program update</b></p> <ol style="list-style-type: none"><li>9. Develop the forward program based on the risk level of the packages and location.</li><li>10. Update and review the priority assessment every March and refresh the four-year program by defining those packages that will be completed in the year.</li></ol>
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*Source:* Victorian Auditor-General's Office, based on 'Business rules for development of level crossing forward program', 8 September 2008.

Apart from the upgrade program, the committee also oversees work to pilot, evaluate and apply other treatments to reduce accidents at level crossings.

ARRB Consulting's study in 2009 reviewed the structure of ALCAM and its use.

The review of ALCAM recommended:

- making two small changes to how the risk score is calculated that are logical but are unlikely to significantly change the upgrade priorities
- assessing how ALCAM measures risk exposure as the product of rail traffic, road traffic and a score representing the likely consequence of a collision.

The second point is important because the current measure, which is based on traffic volumes, creates very high-risk scores, regardless of the crossings' physical characteristics and controls. The review noted that road crash research showed that an exposure measure that added, rather than multiplied the vehicles entering a junction produced the best fit between predicted and actual crash rates.

The department showed us evidence of current research by the national ALCAM group into the appropriateness of current exposure measures and the validation of ALCAM against incident and accident information.

### *Strengths of the committee's approach*

The committee's approach for determining level crossing upgrades:

- uses a model which structurally complies with the Australian and New Zealand risk management standard because it measures the probability of a collision and its potential severity
- groups the delivery of nearby crossing upgrades to make their delivery more cost-effective
- permits alternative treatments, such as crossing closures, road realignments and improving sightlines, if feasible and cost-effective
- has been effective in delivering upgrades on time and within the allocated funding.

### *V/Line's approach*

Section 2.3.1 discusses the need for the committee to integrate rail managers' views on risk management more effectively into its decision making.

V/Line's letter to the department in December 2009 lists upgrade priorities that are very different to the committee's. It described an approach to prioritise the treatment of crossings where:

- the mix of road and rail traffic and the type of control represented a risk of a collision harming many rail passengers, or
- the combination of physical, traffic and control characteristics, combined with a history of collisions or near misses suggested a high risk of an accident.

From V/Line's perspective the greatest risk of a major accident, with the loss of many lives, was where a passenger service operated by Diesel Multiple Units (DMUs) collided with a heavy goods vehicle crossing the railway tracks in front of it. In these circumstances it was likely that the front carriage carrying passengers would bear the brunt of the collision with fatal consequences.

For passenger carriages hauled by a locomotive the consequences were less severe because the locomotive would take most of the force of a front on collision and the passenger carriages would be shielded by this.

V/Line's priority is to treat all crossings on rail corridors served by DMUs that do not have active warning systems, such as bells, flashing lights and half-boom barriers.

V/Line's principles lead to a priority list that is very different to the committee's. In part this is because V/Line has focused on the type of risk that will affect its passengers and staff. The department also has to consider other types of risk, for example where a freight train might collide with a bus carrying passengers or school children.

Consequently, there is no agreement about upgrade priorities between the department and V/Line. There is also no written evidence that the metropolitan and interstate rail managers agree with the department's approach to level crossing safety. The department is reviewing V/Line's priorities before collaborating on revised priorities for the committee's review.

Where practical, the department and V/Line agree that it is preferable to close rather than upgrade level crossings. The department has worked with V/Line and councils to close level crossings but so far few have actually closed. This is because under legislation there must be agreement between affected parties and the road manager.

The department's proposal to simplify this process and allow the secretary of the department to nominate level crossings on roads to be closed by road authority legislation is yet to be progressed.

To date, the department has considered closing crossings when V/Line has approached it, or when upgrading crossings on a specific section of line. The department has focused on closures as part of works to address level crossing risks in particular areas or corridors.

The current legislative process makes it difficult to close crossings, even those with little traffic and with alternative crossings nearby. The department has developed a proposal for making the closure process more effective by amending the legislation.

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## Recommendations

The Department of Transport should:

1. Work with the rail managers to strengthen the processes it uses to inform the committee about the rail managers' views when making decisions about level crossing priorities and upgrades.
  2. Lead the road and rail managers to develop a detailed, three-year plan that provides an adequate basis for managing and monitoring the *Towards Zero* strategy.
  3. With Public Transport Safety Victoria's support, agree on and document the actions needed to deliver a better understanding of level crossing collisions as part of the detailed plan underpinning the *Towards Zero* strategy.
  4. Review the legislation and develop recommendations to improve the effectiveness of the level crossing closure process.
-



# 3 Measuring and improving safety outcomes

## At a glance

### Background

The reason for managing level crossing safety risks is to reduce the number and severity of collisions, injuries and deaths. It is critical that the department understands these safety outcomes and evaluates the effectiveness of risk mitigation treatments so it can advise government how to invest the available funding cost effectively.

### Conclusion

The decline in level crossing collisions over the past 10 years suggests that the department's actions have improved level crossing safety when recognising that the risk of conflict between road traffic and trains has risen with increased volumes.

The department needs to improve how it measures and reports on the cost-effectiveness of the committee's programs. The department does not have an accurate grasp of the cost-effectiveness of the treatments it deploys. Whilst it generally understands the costs, it has not adequately evaluated the benefits in the past. However, recent evaluations have improved in this respect.

### Recommendations

The Department of Transport should:

- understand why the charges for level crossing upgrades completed by different organisations have varied, with the view to improving efficiency
- publish an analysis of the issues raised by its survey of level crossings, identifying the works required, agency responsible, and an estimate of the cost
- improve the approach to assessing risk mitigation treatments before their deployment and evaluating treatments once deployed
- improve the way it reports on level crossing safety.

## 3.1 Introduction

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This part examines whether:

- risk mitigation treatments have improved level crossing safety
- the department can show these treatments have been cost-effective
- the department's reporting of its programs and their impacts is adequate.

To understand performance, we examined how safety risks have changed over the past 20 years. We also looked at changes in the number of level crossing collisions and fatalities.

To understand cost-effectiveness, we examined how well the department has measured the costs and benefits of the risk mitigation treatments it uses. Understanding the cost-effectiveness of the treatments is core to managing available funding to best effect.

To assess reporting, we examined the information in the Victorian Railway Crossing Safety Steering Committee's (the committee) annual report, and compared it to the work the committee is doing.

## 3.2 Conclusion

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The decline in level crossing collisions over the past 10 years suggests that the department's actions have improved level crossing safety when recognising that the risk of conflict between road traffic and trains has risen with increased volumes.

The department needs to improve how it measures and reports on the cost-effectiveness of the committee's programs. The department does not have an accurate grasp of the cost-effectiveness of the treatments it deploys. Whilst it generally understands the costs, it has not adequately evaluated the benefits in the past. However, recent evaluations have improved in this respect.

## 3.3 Findings

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### 3.3.1 Evidence on performance

The available evidence shows mixed results about how successful the improvement programs for level crossing safety have been.

On a positive note, the number of level crossing collisions has gone down considerably in the past 18 years. This drop has happened despite an increase in road and rail traffic, which poses greater risk.

In contrast, the average number of fatalities annually has increased in the past six years, compared with the previous six years. A change in how injuries are measured to achieve a consistent national measure meant that we could not compare injury trends.

It was not evident that this type of analysis of collisions and fatalities had been used to inform and evaluate level crossing safety actions.

### The collision risks at level crossings

Since 2000 the growth in the volume and type of road and rail traffic in Victoria has increased the likelihood and consequences of level crossing collisions in Melbourne and regional Victoria.

In Melbourne there:

- are many more trains using the railway, with 1 500 more weekly passenger services in 2009 compared with 1999
- is more road traffic and congestion, with a 43 per cent increase in road vehicle kilometres between 1999 and 2007
- has been a significant increase in bus services, and bus kilometres were up 39 per cent between 1999–00 and 2008–09.

More road and train traffic means it is likely that more cars, trucks and buses must stop to let a train pass through a level crossing, leading to more traffic queuing.

In regional Victoria:

- there are more trains serving stations, with more than 400 new weekly passenger services over the past five years
- many of these extra services run faster because they are new vehicles that run on upgraded tracks
- there is more road traffic, with the kilometres travelled up by 23 per cent between 1999 and 2007
- there is more goods traffic, with the kilometres travelled up 46 per cent between 1999 and 2007
- there are more regional bus services, with an increase of 53 per cent in bus kilometres between 1999–00 and 2008–09.

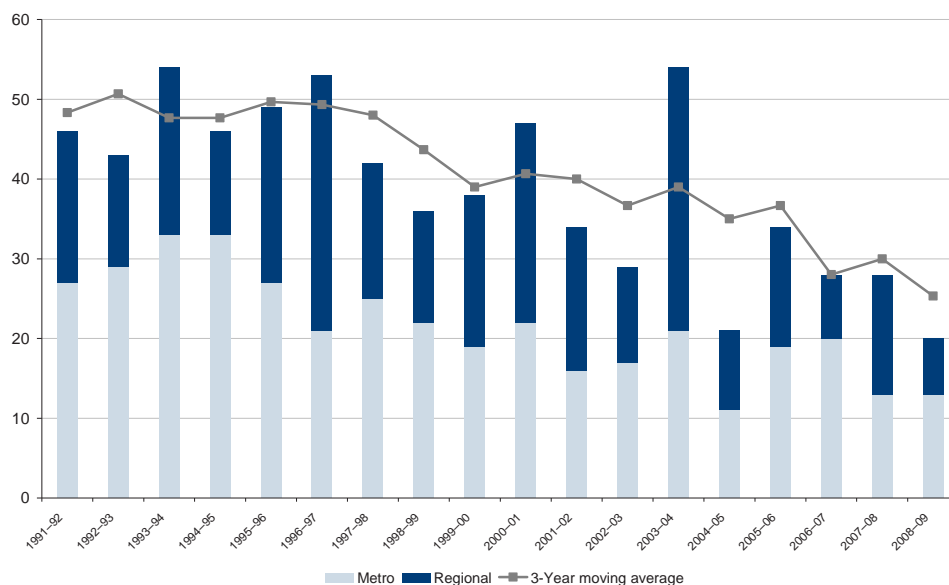
These trends have increased the potential for collisions between road vehicles and trains at level crossings in regional Victoria. They have also increased the chance that collisions will involve passenger trains and goods vehicles or buses.

### Level crossing collisions

The number of level crossing collisions has been on a strong downward trend during the past 18 years. Given the collision potential has increased, this trend suggests that measures to improve safety have successfully reduced collisions.

Figure 3A shows this trend and the number of collisions at metropolitan, regional and tourist level crossings.

**Figure 3A**  
Annual collisions by location 1991–92 to 2008–09



Note: Two collisions at 'tourist' level crossings in 1999 and 2005 have not been included here or subsequent figures.

Source: Victorian Auditor-General's Office from data provided by PTSV.

Figure 3B shows how the trends differed for metropolitan and regional crossings by comparing average collisions.

**Figure 3B**  
Average annual collisions by location 1991–92 to 2008–09

Level crossing location	1991–92 1993–94	1994–95 1996–97	1997–98 1999–00	2000–01 2002–03	2003–04 2005–06	2006–07 2008–09
Metropolitan	29.7	27.0	22.0	18.3	17.0	15.3
Regional	18.0	22.3	16.7	18.3	19.3	10.0
<b>Total</b>	<b>47.7</b>	<b>49.3</b>	<b>39.0</b>	<b>36.7</b>	<b>36.7</b>	<b>25.3</b>

Source: Victorian Auditor-General's Office from data provided by PTSV.

Between 1991–92 and 1993–94 there was an average of 48 collisions annually. This had nearly halved to 25 collisions annually for the three years to June 2009. This was due to a:

- 50 per cent fall at metropolitan crossings, from an average of 30 to 15 collisions annually
- 44 per cent fall at regional crossings, from an average of 18 to 10 collisions annually.

These gains were the result of:

- a consistent downward trend in metropolitan collisions annually, with the greatest decline between the mid-1990s and the early 2000s
- an increase in regional collisions to 1996–97, a period of stability and then a significant decline since 2005–2006.

There is strong correlation between the major gains in the first half of this decade and, the improvements at metropolitan crossings through the deployment of boom barriers. But over the last three years these major gains have been in regional Victoria and there have been more collisions at metropolitan than regional crossings. Funding in this period has been focused on the upgrade of regional crossings.

The statewide upgrade program includes all level crossings and focuses on regional crossings with passive controls or active controls with flashing lights and bells because it excludes crossings that already have boom barriers. All metropolitan crossings have boom barriers and are therefore excluded from the upgrade program.

To address the safety risks at metropolitan level crossings the committee continues to consider, pilot and, if justified, apply a range of risk mitigation measures. We did not find that these measures had been formed into the same type of consolidated approach to addressing risk observed for the regional level crossing upgrades.

### Level crossing fatal collisions

The information on fatalities at level crossings needs to be interpreted cautiously. Although annually there is an average of between 20 and 50 level crossing collisions, few of these result in a fatality. It is not possible therefore to draw any statistically significant inferences from this data.

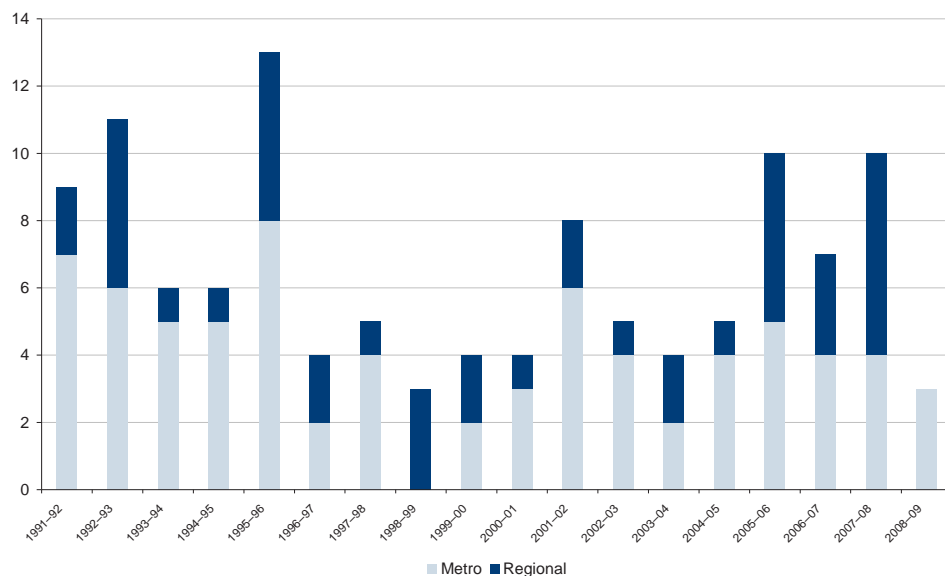
The smaller number of fatal collisions shows more variation and no consistent trend when compared with the overall number of collisions. The trend in overall collisions is therefore a more reliable measure of how effectively the department is managing level crossing safety.

Figure 3C shows the numbers of fatal collisions up to June 2009.

The average number of fatal collisions fell, from eight annually in the six years from 1991–92 to 1996–97, to five a year up to June 2003. This figure increased to an average of seven a year for the six years up to June 2009.

In the past 18 years, only five fatal collisions caused multiple deaths. Four of these happened at regional level crossings. It is rare for a level crossing collision to result in multiple deaths.

**Figure 3C**  
**Fatal collisions at metropolitan and regional level crossings**



Source: Victorian Auditor-General's Office from data provided by PTSV.

### Level crossing fatalities

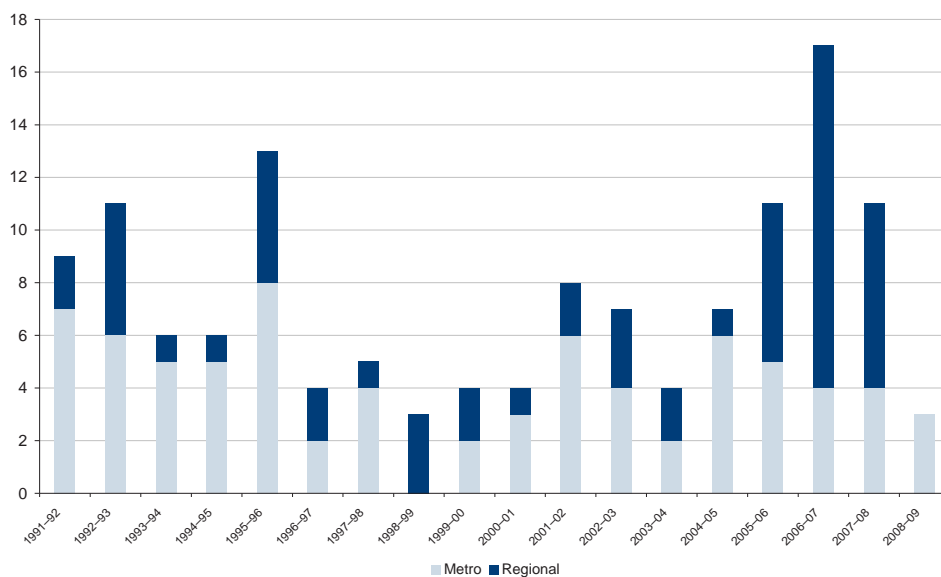
Like fatal collisions, the trend in fatalities does not mirror the steady downward trend in level crossing collisions. Figure 3D shows annual metropolitan and regional crossing fatalities in the past 18 years.

The average number of fatalities annually fell, from eight in the period between 1991-92 and 1996-97, to five for the six years between 1997-97 and 2002-03. However, since July 2003 this figure has increased to nine annually.

One of the difficulties in interpreting information on level crossing fatalities is that a major accident can have a significant effect on these trends. This happened when the Kerang collision killed 11 people in 2007 and, if this one collision was left out the average fatalities would go from nine to seven over the six years to June 2009. This however, is still higher than the figure for the previous six years.

In 2008-09 the number of fatalities fell to three and, for the first time in the past 18 years, there were no fatal accidents at regional level crossings. The number of collisions at regional crossings also halved from fifteen to seven. It is not possible to look at this one-year decline and attribute the change to the department's efforts to improve level crossing safety.

**Figure 3D**  
**Fatalities at metropolitan and regional level crossings**



Source: Victorian Auditor-General’s Office from PTSV data.

### 3.3.2 Cost-effectiveness evidence

While the department, for the most part, understands the costs of its programs, it needs to improve how it assesses risk mitigation treatments before deployment and evaluates them once deployed.

Most government funding for level crossing safety is directed at the program that upgrades crossings from passive signs or flashing lights and bells to active warning devices including boom barriers. VicTrack manages this program for the department.

#### Delivering the upgrade program as planned

The scale of the program has increased from 13 road and pedestrian crossing upgrades delivered in 2004–05 to more than 50 upgrades planned for 2009–10.

VicTrack has improved its delivery of these upgrades by:

- developing a greater in-house contract management capability
- changing the way crossings are contracted so there is more certainty about estimated costs and time lines.

Before March 2007 VicTrack competitively tendered for the delivery of packages of level crossing upgrades as single contracts including both the design and construction. VicTrack specified timeframes for upgrades in the contract documentation. However, these timeframes and the estimated costs were treated as indicative only, because they were not based on final designs that had been agreed by the rail managers.

For example, in December 2005, VicTrack contracted a package of 11 level crossing upgrades in regional Victoria specifying delivery by June 2006. Of these upgrades:

- none were commissioned by June 2006
- two were completed in the last quarter of 2006
- three were completed in 2007
- five were completed by July 2008
- one is scheduled for completion in March 2010.

The reasons for these delays were:

- difficulties in finalising an acceptable design because of issues that arose after detailed site investigations
- a change in scope requiring all these crossings to be upgraded to boom barriers when originally four were scheduled to be upgraded to flashing lights only
- weaknesses in VicTrack's contract management
- poor performance by the successful tenderer.

This contrasts with VicTrack's more recent performance. For example we examined two of the contracts awarded in 2008. From the 26 crossing upgrades included:

- one was completed early
- 14 were completed on time
- seven were completed within 35 days of the planned date
- three were completed within 90 days of the planned date
- one was completed 150 days after the planned date.

VicTrack now finalises the design of upgrades as a separate contract that precedes the construction contract. So tenderers make bids for the construction, including price and time, based on a final design. VicTrack schedules the design and construction phases in line with the required number of upgrades each year.

If an upgrade is significantly delayed VicTrack replaces it with another project, based on its risk ranking and its proximity to the other crossings included in the package so that it can be completed cost-effectively.

## Understanding the costs

The average cost of a crossing upgrade is approximately \$500 000.

While the upgrade program is now well managed, the department needs to understand why V/Line and VicTrack charged significantly different amounts for level crossing upgrades.



The department agreed to fund V/Line for the upgrade of two crossings it classified as its highest priority, but which were not seen as such a high priority within the department's ongoing upgrade program.

V/Line charged the department approximately \$300 000 for each of the two sites, about \$200 000 less than VicTrack typically charges. We found that the reasons for the differences included that V/Line:

- did not charge preliminary design fee, and a contractor normally charged \$50 000
- had lower health and safety costs, and a contractor charged on average \$13 000
- completed some of the works as part of its regular maintenance program
- did not charge for overheads and profit.

The audit compared V/Line's costs for upgrading a passive crossing to include flashing lights and half boom barriers, with a sample of 12 VicTrack upgrades, converting active crossings with flashing lights to half boom barriers, with advanced warning signs for some of these sites.

The materials requirements for these crossings were similar because the VicTrack upgrades included replacing existing equipment such as the flashing lights. The comparison showed a large difference in the documented materials costs between VicTrack and V/Line. However, these organisations do not record their detailed costs in the same way and we could not confirm that the comparison was on a like-for-like basis.

The department believed that some of these cost differences might be due to VicTrack having to provide spares for every upgrade, whereas V/Line did not. When we examined the data we found that the comparative materials costs did not include the cost of spares.

The department needs to explain the reasons for differences in the cost of materials and to find out whether it can achieve further cost-efficiencies.

Upgrading level crossings adds to the asset base and may require the rail manager to commit resources for operational and maintenance tasks. When assessing any safety investments the department needs to calculate the whole-of-life costs of an investment, including operations and maintenance. The department has explained that it plans to develop a whole-of-life assessment model for new level crossing equipment or safety applications, which should be ready by mid-2010.

The department explained that upgrading level crossings adds to the asset base and in annual bidding processes the department makes an allowance for the additional maintenance and power consumption for new assets.

### Other programs

Two other issues relating to program costs are:

- the accuracy of the estimated cost to address sightline issues at regional level crossings
- how and when the department will deliver on its commitment to publish an analysis of the work required to address the risks identified by ALCAM including the costs of these works.

As part of the major \$33 million program of works announced within three weeks of the Kerang collision, the government committed \$3 million to improve sight distances, at about 75 crossings where poor visibility was a safety risk.

This was a broad estimate, based on an average cost to fix the sightline issues, of \$40 000 per crossing.

In the committee minutes V/Line reported in:

- May 2008 that it had received the survey analysis describing more than 6 000 visibility issues and was prioritising these
- February 2009 that it had asked the department for additional funding
- August 2009 that it had funding from the department for this type of work.

The department has advised that it has asked V/Line to provide progress information for this initiative.

The department does not have up-to-date information about the cost, scope and progress of this and the other initiatives included in the major program announced after the Kerang collision.

The department supported the parliamentary inquiry's recommendations to publish an analysis of the issues raised by its level crossing surveys, identifying the works needed and the responsible agencies. It also committed to completing and publishing a costed program of recommended risk mitigation works. The department explained that it is waiting for information from road and rail authorities to cost this program.

The department, with road and rail authorities, has yet to determine when it will deliver on these commitments.

### Assessing and evaluating the benefits

The department's assessment of the potential benefits of risk mitigation treatments before they are installed, and evaluation of their effectiveness once installed, has been mixed, and needs to improve.

The department commissioned a Monash University report in early 2009, which found that few risk mitigation treatments worldwide were rigorously evaluated to understand their long-term impacts. The department is taking steps to improve the scientific rigour that the report recommended in its evaluations of level crossing treatments.

### *Upgrading crossings to active controls*

The upgrade program has been the mainstay of the efforts to improve level crossing safety over the several decades. To date, upgrades have included:

- warning systems for road users at passive crossings, such as the use of bells, flashing lights, and in some cases half boom barriers to alert drivers of approaching trains
- additional safety measures, such as half boom barriers, for active crossings that have bells and flashing lights.

From July 2009 onwards all crossing upgrades will include the installation of half boom barriers and also automated advanced warning signs where drivers only have a short distance in which to see the crossing.

The decision to upgrade to active controls was based on:

- studies from the 1980s and 1990s showing active controls reduced collisions
- a 2002 Australian Transport Safety Bureau study on level crossing accidents
- a PTSV study on Victorian level crossings incidents between 2007 and 2008.

These studies showed that:

- warning lights reduced collisions by between 45 and 70 per cent
- adding boom barriers made a further, significant safety improvement.

The change in collisions and fatalities during the past two decades shows that active risk mitigation treatments for all of Melbourne's and many of regional Victoria's crossings have reduced collisions and fatalities.

However, without proper evaluation the department cannot gauge how cost-effective different types of risk mitigation treatments are, and why collisions keep happening at some actively managed crossings.

Over the five years to June 2009, 60 per cent of fatalities occurred at actively managed crossings, with half of these in Melbourne. To further reduce collisions and fatalities will involve improving safety at crossings that already have active controls.

The Monash University report concluded that, 'it is not possible to assign research priorities to countermeasures for active crossings as at present it is not clear what causes violations and crashes at these crossings'.

The department said since 2009 it has been improving its evaluation process. However, it needs to develop a structured long-term program to properly evaluate the risk mitigation treatments used through the level crossing upgrade program.

### *Developing treatments to complement active controls*

As it has in the past, the committee is developing a range of other risk management treatments for level crossings in metropolitan Melbourne and regional Victoria. These include:

- yellow box markings of the crossing to dissuade road users from entering the crossing without a clear exit path

- compliance cameras to detect infringements at active crossings
- rumble strips to raise driver alertness before reaching a crossing
- automated warning signs well in advance of crossings, especially when drivers don't have much time to see warning signs at a crossing
- linking crossing warning lights and barriers so they coordinate with nearby traffic signals.

The department's performance was mixed in assessing the value of these measures and then, once deployed, evaluating their effectiveness.

The department started using some risk mitigation treatments, such as rumble strips and advanced warning signs, before it had finished assessing their value.

For other treatments, such as linking crossings to adjacent traffic signals, we found evidence of studies commenced but not followed through.

Documented evaluation plans for each potential risk mitigation treatment should be prepared. These should include a robust method for assessing value before treatments become fully operational. Similarly, benefits should be measured through ongoing evaluation after implementation.

### 3.3.3 Reporting on performance

The information published is not sufficient to understand how plans and programs are progressing and how successful they have been in delivering on the department's objectives.

#### Parliamentary inquiry's recommendations

The 2008 parliamentary inquiry recommended that the department:

- produce an annual progress report on the work of the committee and all of its working groups
- publish an analysis of the ALCAM survey results, including an overview of the works required, and who is responsible for resolving the issues the survey identified
- jointly prepare a funded, three-year program with the level crossing stakeholders to address the safety issues the ALCAM surveys identified. The program should be regularly monitored and the results published annually.

The department fully supported the first two recommendations. However, it only partially supported the third recommendation, agreeing to complete and cost a program to mitigate the risks identified by its field surveys. It did not support completing these works within a funded, three-year program.

## Progress on reporting on performance

The department included the committee's annual report in its 2008–09 annual report, published in November 2009. The four-page report includes summaries of:

- the level crossing upgrade program, including a list of the completed crossing upgrades for 2008–09
- the committee's work to review, monitor and respond to the work of other state and federal bodies with an interest in level crossing safety
- the work of the committee's four working groups on:
  - research and development of new types of risk mitigation treatments
  - work on the human factors affecting safety
  - communications to promote safer behaviour
  - activities related to ALCAM, including a listing of the outstanding and closed issues that the surveys identified.

The department's website also has information on the committee and its programs to improve level crossing safety.

## Assessment of the department's reporting

The department has followed the parliamentary inquiry's recommendation that it publish an annual progress report for the committee. However, the audit found that this information and the material on the department's website did not provide enough detail to properly understand the committee's work and its effectiveness in improving level crossing safety.

The progress report does not describe some of the work it is doing, for example, the evaluation and application of yellow box markings, enforcement cameras, rumble strips, and advanced warning signs.

While it reports on the number of upgrades, there is no information on level crossing crashes and incidents, or evidence about how the committee's activities have made a difference.

The department has not addressed the other inquiry recommendations, including publishing its analysis of the level crossing survey issues, the works needed to address these, and the estimated cost of these works. It needs to produce a time line for when this information will be available.

The department explained that these issues were available to road and rail managers through an online database but we do not think this addressed the intent of the parliamentary committee's requirement of a high level summary of the issues, the agencies responsible and the estimated cost of addressing them.

The department explained that it is getting the cost information for the level crossing survey issues from road and rail managers, but it did not give a time line for their completion.

## Improving its reporting

Developing and publishing the type of detailed three-year plan, described in Part 2, will show the community what the committee is doing and its effect on level crossing safety.

The department's reporting, through its annual report and the department website, should inform the community about:

- its progress against the program steps and major tasks set out in the plan
- the key deliverables, by publishing feasibility studies, evaluation reports and guides where this information will not compromise a program
- expenditure against approved budgets
- performance by analysing trends in level crossing safety and producing measures to show how its activities and programs have furthered its objectives.

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## Recommendations

The Department of Transport should:

5. Understand why the charges for level crossing upgrades completed by different organisations have varied, with the view to improving efficiency.
  6. Publish an analysis of the issues raised by its survey of level crossings, identifying the works required, agency responsible and an estimate of the cost.
  7. Improve the approach to assessing risk mitigation treatments before their deployment and evaluating treatments once deployed.
  8. Improve the way it reports on level crossing safety.
-

# Appendix A.

## *Audit Act 1994* section 16— submissions and comments

### Introduction

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In accordance with section 16(3) of the *Audit Act 1994* a copy of this report, or relevant extracts from the report, was provided to the Department of Transport and Public Transport Safety Victoria with a request for comments or submissions.

The comments and submissions provided are not subject to audit nor the evidentiary standards required to reach an audit conclusion. Responsibility for the accuracy, fairness and balance of those comments rests solely with the agency head.

## Submissions and comments received

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**RESPONSE** provided by the Secretary, Department of Transport



### Department of Transport

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17 March 2010

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Our Ref:

Mr D D R Pearson  
Auditor-General  
Victorian Auditor-General's Office  
Level 24, 35 Collins St  
MELBOURNE VIC 3000

Dear Mr <sup>Des</sup> Pearson

#### **PROPOSED AUDIT REPORT-MANAGEMENT OF SAFETY RISKS AT LEVEL CROSSINGS**

I refer to your above report issued on 3 March 2010 and note your conclusion that the rate of progress in improving safety and reducing accidents has been satisfactory.

Your recommendations in respect of improving elements of the risk management framework and its application are accepted.

In relation to recommendation one, I would like to take the opportunity to emphasise the need for accredited rail operators to proactively participate in the process of prioritising level crossing upgrades as part of the ongoing program of reducing the overall risk to the public both road and rail users.

This is a necessary part of the shared responsibility for safety at level crossings between the various parties involved in risk management.

Yours sincerely

Jim Betts  
SECRETARY





**RESPONSE provided by Director, Public Transport Safety Victoria**



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Mr Des Pearson  
Victorian Auditor-General's Office  
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**MELBOURNE VIC 3000**

Dear Mr Pearson

**AUDIT ACT 1994, s16(3) – PROPOSED AUDIT REPORT MANAGEMENT OF SAFETY RISK AT LEVEL CROSSINGS**

Thank you for your letter of 3 March regarding the above. I understand my responsibilities for protecting the confidentiality of the proposed report.

I confirm that PTSV is satisfied with the factual content of the report and does not have any further comment on the proposed report.

I look forward to receiving the final report in due course.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Alan Osborne', is written over a light blue horizontal line.

**ALAN OSBORNE**  
Director, Public Transport Safety

11/03/2010

Ref: FOL/09/20581









# Auditor-General's reports

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## Reports tabled during 2009–10

Report title	Date tabled
Local Government: Results of the 2008–09 Audits (2009–10:1)	November 2009
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