Transport for NSW

Level Crossing Strategy Council - Yearly Report 2014/15

October 2015

NSW GOVERNMENT | Transport for NSW

Front Cover – Police awareness and enforcement operation at Broken Hill

Contents

Glossary

Active Control	Lights, bells, boom gates regulate motorists
	Lights, bells, booms, and locking swing gates regulate pedestrians
ALCAM	Australian Level Crossing Assessment Model
ARTC	Australian Rail Track Corporation
CRC	The Country Rail Contracts unit of the Infrastructure and Services Division of TfNSW (and its predecessor, the Country Rail Infrastructure Authority - CRIA).
CRN	Country Regional Network (the part of the NSW Rail Network that is owned by CRC).
DDA	The Disability Discrimination Act 1992 (Commonwealth)
IPWEA	Institute of Public Works Engineering Australasia
ITSR	The Independent Transport Safety Regulator
JHR	John Holland Rail
LCCWG	Level Crossing Communication Working Group
LCIP	Level Crossing Improvement Program
LCSC	Level Crossing Strategy Council
LCWG	Level Crossing Working Group
LGNSW	Local Government NSW
NSW Trains	The NSW Government agency that provides passenger train and coach services for regional NSW and outer-metropolitan Sydney
NLCSC	National Level Crossing Safety Committee
ONRSR	The Office of the National Rail Safety Regulator
Passive Control	STOP or GIVE way signs regulate motorists
	Signs warn pedestrians
	Pedestrian maze control and signage regulate pedestrians
Red Man	A flashing warning sign of a ‘Red Man’, warns pedestrians of oncoming trains
RIM	Rail infrastructure manager; a term defined in the Rail Safety National Law (NSW) that refers to, among other things, the person who has effective control and management of the rail infrastructure of a railway.
RMS	Roads & Maritime Services (and its predecessor, the Roads & Traffic Authority - RTA)
Sydney Trains	The NSW Government agency that provides passenger train services for the Sydney suburban area.
TfNSW	Transport for NSW (and its predecessor, the Department of Transport)

1 Year in review: 2014/15

In 2014/15, rail and road managers invested a total of $19.62 million on level crossing safety initiatives in NSW, $7.27 million of which was provided through the NSW Level Crossing Improvement Program (LCIP). The LCIP is managed by Transport for NSW (TfNSW) and provides funding to accelerate improvements to level crossings at priority sites across NSW, raise community awareness of level crossing safety issues and promote new technology to improve level crossing safety. It is additional to the funds that rail and road managers spend on maintaining and upgrading level crossings on their networks.

During 2014/15, the LCIP funded 8 level crossing major upgrades at Summerland Way, Koolkhan; Bruxner Highway, Casino; The Escort Way, Borenore; Goondah Road, Bowning; Mangoola Road, Mangoola; Rossglen Road, Rossglen; Warral Road, Warral; and Tapscott Road (Dunavants), Moree. Development work for upgrades in future years formed a major part of the 2014/15 LCIP, with concept and detailed designs prepared for two projects at Griffith and Dubbo, and design, procurement and pre-work at Cookamidgera. Minor construction works were completed at 43 locations.

In addition to infrastructure works, the LCIP also funded other level crossing safety initiatives during the year; including:

- the level crossing education campaign, “Don’t rush to the other side”
- four level crossing police enforcement campaigns in regional NSW
- Australian Level Crossing Assessment Model (ALCAM) data collection for 174 sites
- the trial and assessment of Low Cost Level Crossing Warning Devices
- level crossing strategy and policy development.

TfNSW has allocated $29.2 million ($7.3 million per annum) for the LCIP between 2014/15 and 2017/18. This allows for the planning and completion of future priority level crossing upgrades.

The following subsections provide an overview of all level crossing improvements delivered by rail and road managers in 2014/15 (including LCIP funded projects).

Appendix A: provides a summary of all projects funded under the LCIP in 2014/15 and Appendix B: sets out the expenditure on level crossing upgrades in NSW funded through the LCIP and by rail and road managers from 2008/09 to 2014/15.

1.1 Agency level crossing activities

In addition to the LCIP, Sydney Trains, Australian Rail Track Corporation (ARTC), Country Rail Contracts (CRC) / John Holland Rail (JHR), Roads and Maritime Services (RMS), and NSW Trains implemented their own programs of level crossing safety improvements.

Sydney Trains

Sydney Trains Capital Level Crossing Upgrade program under the LCIP continued in 2014/15 with the construction and commissioning of two projects at Moray Street, East Richmond and Darkes Road, Dapto. Major Periodical Maintenance was undertaken to commission new ‘Cerberus’ level crossing monitors at Blackheath, Zig Zag and Bell. Other works included eight pedestrian red light conversions to ‘Red Man’ type at Bell, and six

swing gate replacements at Woonona. In total, Sydney Trains spent $2.78 million on safety improvement works for level crossings on its network in 2014/15.

ARTC

During 2014/15, ARTC undertook works at 80 sites costing $5.36 million at level crossings across its network in NSW. Regions where works were undertaken include the South, North Coast, North West, Central West, Hunter, and Illawarra. Works included upgrading road surfaces, improving sighting distances, and upgrading active crossing equipment and signage.

CRC and JHR

CRC and its contracted rail infrastructure manager, JHR, undertook level crossing safety improvements at three sites on the CRN at a cost of $1.16 million in 2014/15, with works including improvements to train detection systems and signalling technology and pedestrian level crossing upgrades. This was additional to CRC/JHR's ongoing program of inspecting, maintaining and improving sighting distances at various level crossings through vegetation control, removal of obstructions such as embankments, and signalling upgrades.

RMS

During 2014/15, RMS continued to assist councils and rail infrastructure managers with the upgrade of level crossings across NSW. Apart from the sites noted in this report, RMS also provided advice to councils on appropriate safety management measures for level crossings.

Works undertaken by RMS separate to the LCIP were limited to the Troy Junction site in Dubbo NSW. In 2014/15 the construction upgrade of Troy Junction in Dubbo was completed. The total value of the project was $4.5 million, of which $3.05 million was provided by RMS. The upgrade will improve access to the Dubbo sale yards and industrial area.

NSW Trains

Level crossings remained an area of concern for NSW Trains – in particular the high level of pedestrian violations at certain locations on the South Coast and in the Newcastle area. NSW Trains maintained active involvement in community awareness, engineering improvement, and police enforcement elements of the LCIP, and to support the cooperative Transport cluster approach to the allocation of resources to improve level crossing safety in NSW.

2 Level crossings in New South Wales

Under the *Rail Safety National Law (NSW)*, rail and road infrastructure managers have an obligation to manage risks at level crossings. Safety regulatory oversight is provided by the Office of the National Rail Safety Regulator (ONRSR) for railway operations and rail infrastructure and the road/rail interface. Enforcement of road laws is undertaken by the NSW Police Force.

2.1 Level Crossing Strategy Council

The Level Crossing Strategy Council (LCSC) is a NSW interagency forum that coordinates level crossing safety initiatives by rail infrastructure managers and road managers and other key stakeholders. The LCSC comprises senior executive level representation from:

- Transport for NSW (Chair)
- Roads and Maritime Services
- Country Rail Contracts
- John Holland Rail
- Sydney Trains
- NSW Trains
- Australian Rail Track Corporation
- the Office of the National Rail Safety Regulator
- NSW Police Force
- Local Government NSW.

Guided by the Strategic Plan for NSW Level Crossings 2010–2020, the LCSC develops policy, reviews incident and safety trends, monitors new technologies, and oversees the development and delivery of the annual capital works program, and education and awareness campaigns.

The LCSC is supported by the Level Crossing Working Group and Level Crossing Communication Working Group, which comprise officer-level representatives from member agencies. TfNSW provides secretariat support and assistance to the LCSC, LCWG and LCCWG, coordinates the implementation of the Level Crossing Improvement Program (LCIP), and manages the application of the Australian Level Crossing Assessment Model in NSW.

2.2 Level Crossing Improvement Program

The Level Crossing Improvement Program was established in 2000 to fund a range of level crossing safety initiatives in NSW. Funding under the LCIP is supplementary to the existing capital and maintenance programs of rail and road managers to improve and maintain safety at the level crossings on their networks.

Key elements of the LCIP are: to accelerate upgrades and safety improvements at priority level crossings, media awareness and police enforcement campaigns in regional NSW, and data collection to ensure accurate information is available on the status of NSW public level crossings.

The projects funded under LCIP each year are developed by TfNSW, with the assistance of the LCWG, and endorsed by the LCSC. The LCWG monitors program delivery and promotes collaboration and consultation between delivery agencies.

A methodology is in place to determine the level crossings eligible for funding under the LCIP and the priorities for improvements. This methodology, commonly known as the LCIP (Infrastructure Works) Eligibility Criteria, was revised in 2013 to ensure available funding is applied effectively to level crossing safety improvements. The 2013 methodology applies to the development of the LCIP between 2014/15 to 2017/18, and will then be reviewed.

In the first instance the methodology, distributes the LCIP funding across the following three categories:

- upgrading level crossings controlled by flashing lights to boom gates and flashing lights (approximately 33.5 per cent of upgrade funding)
- upgrading level crossings controlled by passive signage (e.g. give way or stop sign) to boom gates and flashing lights (approximately 53 per cent of upgrade funding)
- minor works at passively controlled level crossings (approximately 13.5 per cent of upgrade funding).

A prioritisation process is then used to identify the crossings to be upgraded within the first two categories. This process firstly uses an ALCAM ranking to generate a shortlist of sites. This shortlist is then refined through consultations with relevant stakeholders to nominate sites required for major upgrades. Consultations involve a review of level crossing incident data for NSW and consideration of local knowledge from rail and road managers and other relevant stakeholders.

Separate criteria are used to determine which passively controlled crossings are eligible to receive LCIP funding for minor works.

2.3 Program evaluation

In line with central Government requirements for the evaluation and review of Government programs, the LCIP was identified for evaluation in 2014/15. To meet Government expectations and to better understand the economic benefits provided by the LCIP, TfNSW commissioned a business case study and program evaluation.

The business case involved an economic appraisal over a 30-year evaluation period for four types of interventions typical to the LCIP. It was conducted using accepted economic guidelines including those approved by TfNSW and NSW Treasury. It found that each intervention resulted in a positive economic outcome.

The Evaluation involved determining whether the LCIP had demonstrable effects against specifically defined target outcomes over the past four financial years (2010/11 to 2013/14). It found that the LCIP delivered a positive economic benefit, and played a substantial role in fulfilling objectives and targets of the Level Crossing Strategy Council's *A Strategic Plan for NSW Level Crossings 2010-20.*

The Evaluation is available on the TfNSW website.

2.4 National Level Crossing Safety Committee

The National Level Crossing Safety Committee (NLCSC) is an Australasian interagency forum that was re-established in 2014 to coordinate efforts to improve safety at level crossings and re-establish a national level crossing strategy.

The NLCSC terms of reference, finalised at the November 2014 meeting, outline the strategic objectives of the NLCSC, which are to:

- reduce the likelihood of crashes and near misses at railway crossings
- improve coordination between road and rail infrastructure managers, governments and other member organisations through maximising knowledge sharing, skills and practice; and
- develop and recommend initiatives to align and coordinate safety mitigation strategies developed by member organisations where it is agreed a national perspective provides safety benefits.

At its first meeting in August 2014, the NLCSC agreed to update the National Railway Level Crossing Strategy 2010-2020, which was originally created by the Australian Transport Council in 2009. This is being progressed through working groups focused on:

- Education—led by TfNSW
- Engineering—led by the Department of Transport and Main Roads (TMR), Queensland
- Enforcement—led by the Public Transport Authority (PTA), WA
- Data—led by Public Transport Victoria (PTV).

2.5 National Education Working Group

TfNSW convened a meeting of the education working group in December 2014 to consider the requirements and potential scope of a national level crossing safety education campaign.

There was broad supported for developing a new national level crossing safety education campaign to promote a nationally consistent safety message. It was considered that a new campaign would allow jurisdictions to share resources and knowledge to obtain a better value-for-money outcome, and take into account advancements in behavioural research.

As chair of the NLCSC Education Working Group, TfNSW agreed to be the lead agency to develop a proposal for a national level crossing safety education campaign for consideration by the NLCSC.

2.6 Level crossing closures

The only means of completely eliminating risk at a level crossing is to close that crossing. The closure of public and private level crossings is pursued, where appropriate, by LCSC member rail and road managers.

Thorough inspection and detailed assessment of crossings, including alternative means of access, is considered before closure. Consultation with the relevant local council, adjacent landowners, the community, the RMS, emergency services and other rail and road users is also conducted prior to recommending closure. The *Transport Administration Act 1988*

(section 99B) provides that level crossings can only be closed with the approval of the Minister for Transport and Infrastructure.

Since 2002, a total of 164 level crossings has been gazetted for closure, most of which are on private property. In 2014/15, three level crossings were closed as part of the truncation of the Newcastle branch line, and the new Omega Bridge was completed as an alternative to the level crossing at Fern Street, Gerringong, on the South Coast.

ARTC

In 2014/15, no level crossings on the ARTC network in NSW were approved for closure.

CRC

In 2014/15, no level crossings on the CRN were approved for closure.

SYDNEY TRAINS

In 2014/15 three level crossings on the Sydney Trains network were closed as part of major projects:

- Stewart Avenue, Newcastle – Newcastle Line Truncation
- Merewether Street, Civic– Newcastle Line Truncation
- Railway Street, Wickham– Newcastle Line Truncation

2.7 Level crossing incident data

Of the 1,370 public road level crossings in NSW, 390 have active traffic controls; 169 have flashing lights and bells and 221 have flashing lights, bells and boom gates. The majority of other crossings are controlled by “give-way” or “stop” signs.

In 2014/15, one fatality was recorded resulting from collisions between trains and pedestrians at level crossings in NSW. No fatalities were recorded resulting from collisions between trains and road vehicles. There were four crashes between a train and road vehicle during the year, all at crossings with passive controls. Overall, the number of crashes between a train and a road vehicle has decreased over the past 26 years in NSW. Figure 1 through to Figure 4 show the number of collisions and fatalities at level crossings from 1989/90 to 2014/15.

Figure 1: Train Colliding with Road Vehicle at Level Crossing, 1989/90 to 2014/15 in NSW

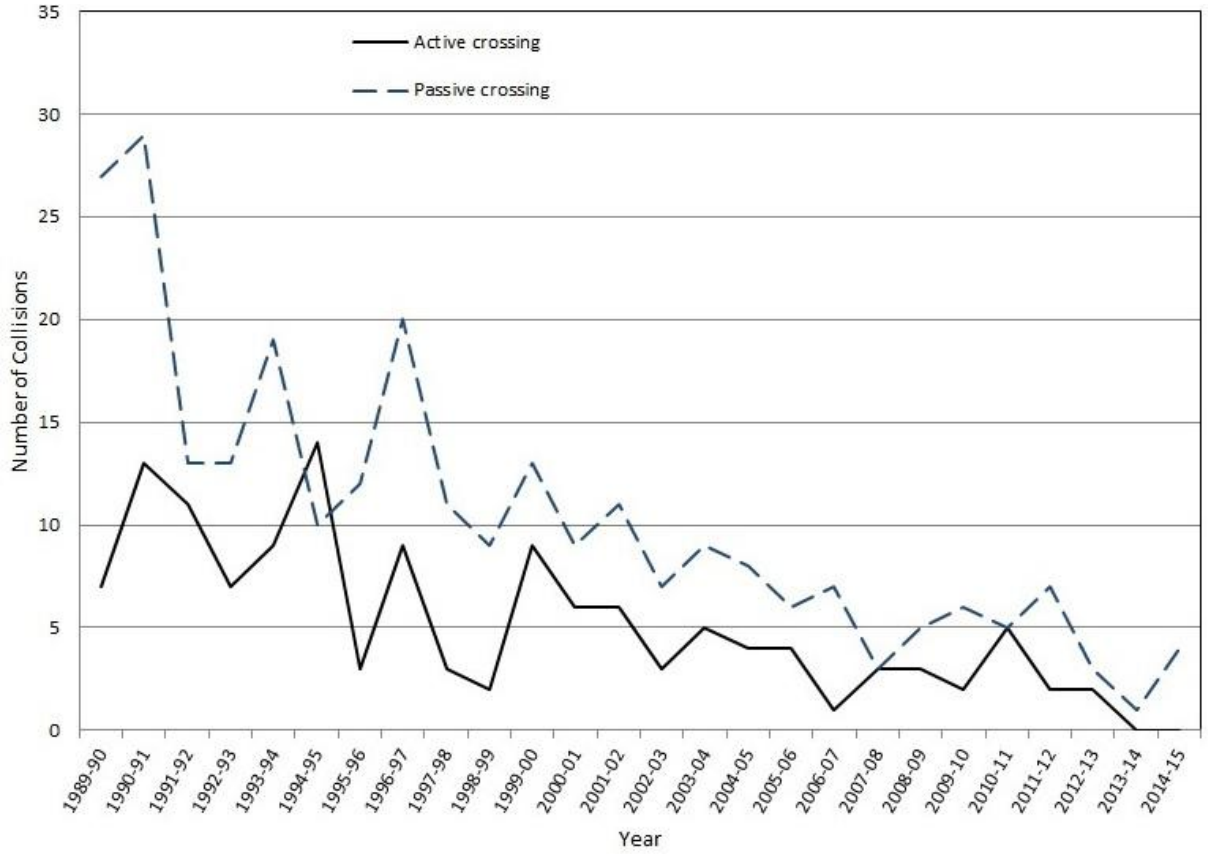


Figure 2: Fatalities: Train Colliding with Road Vehicles at Level Crossing, 1989/90 to 2014/15 in NSW

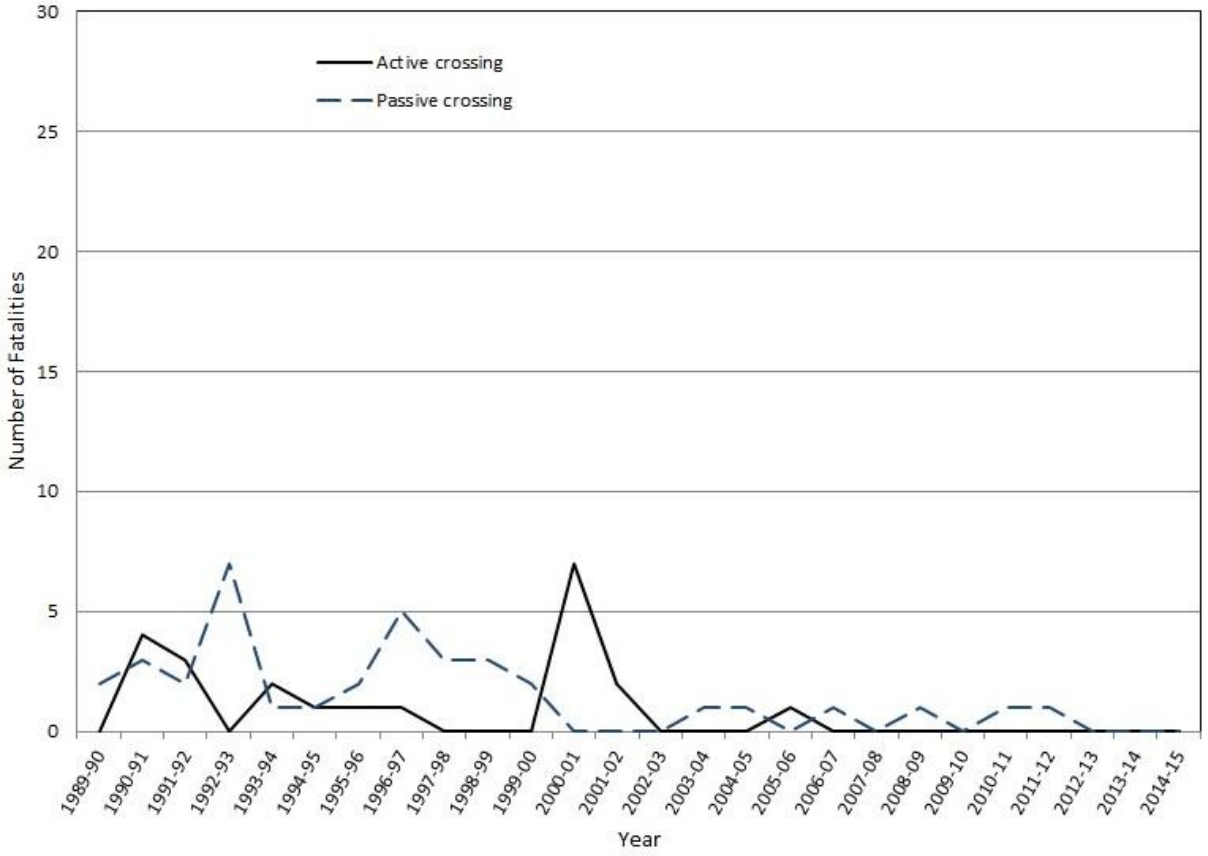


Figure 3: Train Colliding with Person at Level Crossing, 1989/90 to 2014/15 in NSW

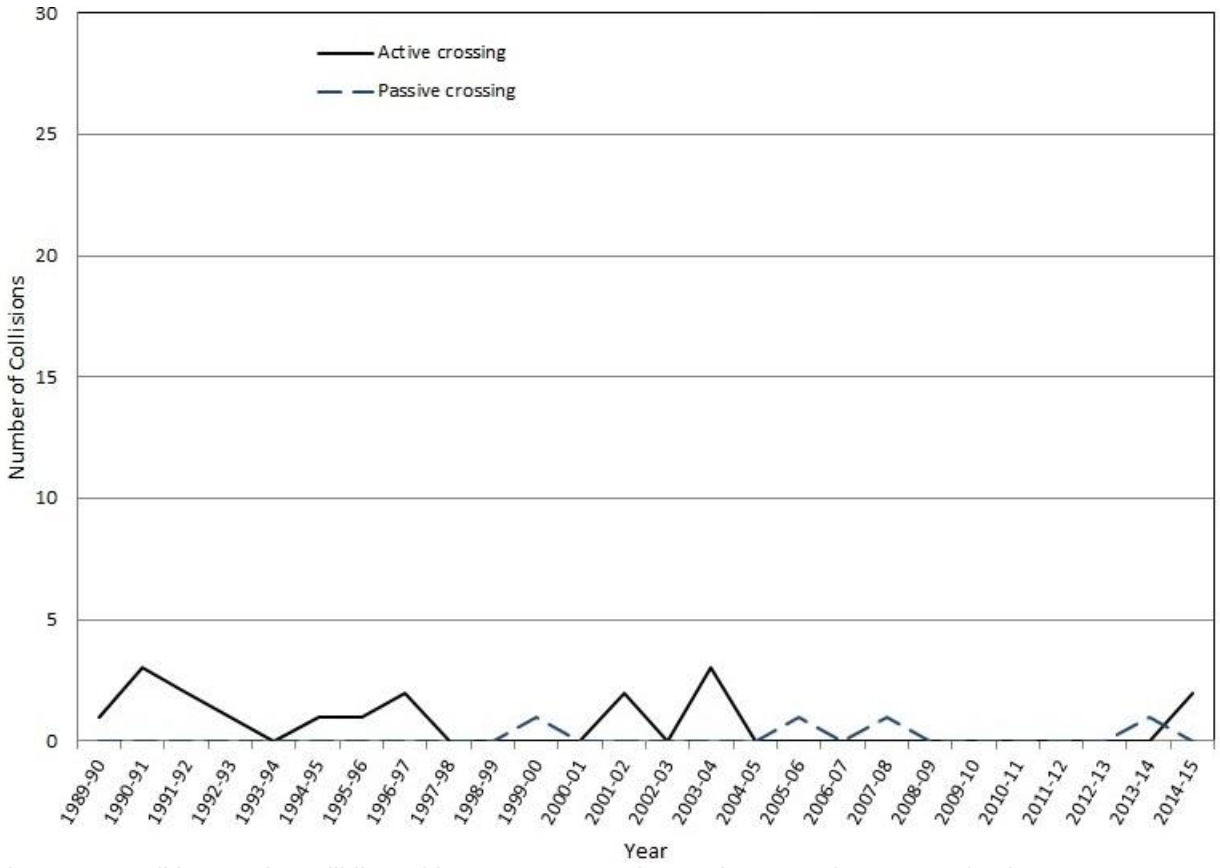
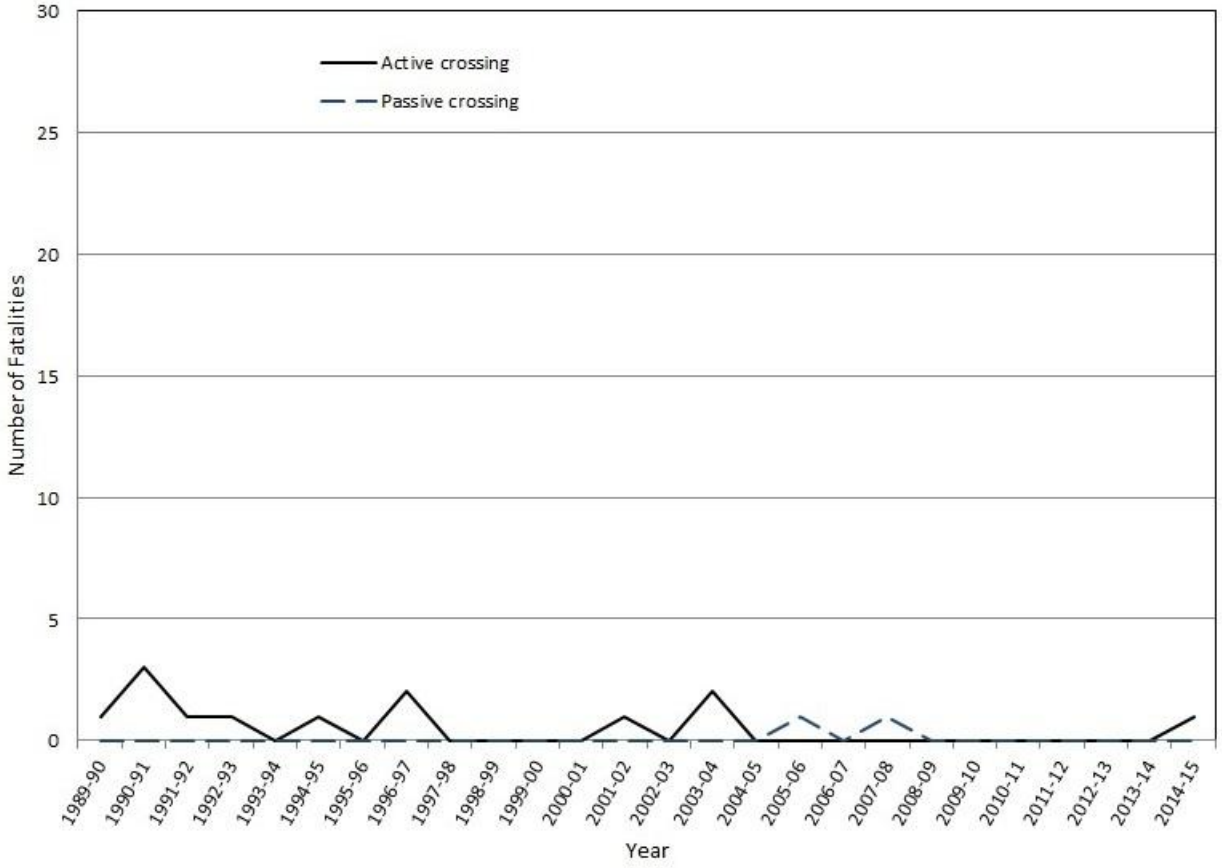


Figure 4: Fatalities: Train Colliding with Person at Level Crossing, 1989/90 to 2014/15 in NSW



3 Level Crossing Improvement Program 2014/15 - infrastructure works

3.1 Major works completed

During 2014/15 eight major construction projects were commissioned across the NSW rail network under the LCIP. These are shown in Table 1 and described in more detail below.

Table 1: LCIP Major Construction Works Completed in 2014/15

Street	Location	Network
Summerland Way	Koolkhan	ARTC Lease
Bruxner Highway	Casino	ARTC Lease
The Escort Way	Borenore	CRN
Goondah Road	Bowning	ARTC Lease
Mangoola Road	Mangoola	ARTC Lease
Rossglen Road	Rossglen	ARTC Lease
Warral Road	Warral	CRN
Tapscott Road (Dunavants)	Moree	ARTC Lease

3.1.1 Summerland Way, Koolkhan

This active level crossing was upgraded from flashing lights and bells to flashing lights, bells and retro-reflective boom gates with high intensity LED lights. The upgrade also included road works, new signage and line marking for both the rail and roadway. The upgrade was commissioned on 1 November 2014 at a total cost of $1,159,348.

Figure 5: Summerland Way, Koolkhan

Summerland Way, Koolkhan (Before)

Summerland Way, Koolkhan (After)

3.1.2 Bruxner Highway, Casino

This active level crossing was upgraded from flashing lights and bells to flashing lights, bells and retro-reflective boom gates with high intensity LED lights. The upgrade was commissioned on 29 June 2015, at a total cost of $927,000.

Figure 6: Bruxner Highway, Casino

Bruxner Highway, Casino (Before)

Bruxner Highway, Casino (After)

3.1.3 Escort Way, Borenore

This active level crossing was upgraded from flashing lights and bells to flashing lights, bells and retro-reflective boom gates with high intensity LED lights. The upgrade was commissioned on 24 May 2015 at a total cost of $504,000.

Figure 7: Escort Way Borenore

Escort Way Borenore (Before)

Escort Way Borenore (After)

3.1.4 Goondah Road, Bowning

This passive level crossing was upgraded from stop signs to flashing lights, bells and retro-reflective boom gates with high intensity LED lights. The upgrade also included road works, new signage and line marking for both the rail and roadway. The upgrade was commissioned on 20 June 2015 at a total cost of $1,057,646.

Figure 8: Goondah Road, Bowning

Goondah Road, Bowning (Before)

Goondah Road, Bowning (After)

3.1.5 Mangoola Road, Mangoola

This passive level crossing was upgraded from stop signs to flashing lights, bells and retro-reflective boom gates with high intensity LED lights. The upgrade was commissioned on 26 March 2015 at a total cost of $809,979.

Figure 9: Mangoola Road, Mangoola

Mangoola Road, Mangoola (Before)

Mangoola Road, Mangoola (After)

3.1.6 Rossglen Road, Rossglen

This passive level crossing was upgraded from stop signs to flashing lights, bells and retro-reflective boom gates with high intensity LED lights. The upgrade also included road works, new signage and line marking for both the rail and roadway. The upgrade was commissioned on 21 December 2014 at a total cost of $1,202,382.

Figure 10: Rossglen Road, Rossglen

Rossglen Road, Rossglen (Before)

Rossglen Road, Rossglen (After)

3.1.7 Warral Road, Warral

This passive level crossing was upgraded from stop signs to flashing lights, bells and retro-reflective boom gates with high intensity LED lights. The upgrade also included road works, new signage and line marking for both the rail and roadway. The upgrade was commissioned on 16 June 2015 at a total cost of $1,467,000, including a contribution of $990,000 from the LCIP.

Figure 11: Warral Road, Warral

Warral Road, Warral (Before)

Warral Road, Warral (After)

3.1.8 Tapscott Road (Dunavants), Moree

The level crossing was upgraded from stop signs to flashing lights, bells and retro reflective boom gates with high intensity LED lights. The upgrade was commissioned on 12 June 2015 at a total cost of $663,000.

Figure 12: Tapscott Road (Dunavants), Moree

Tapscott Road (Dunavants), Moree (Before)

Tapscott Road (Dunavants), Moree (After)

3.2 Development work undertaken

Development work for upgrades in future years is a key element of the LCIP. The concept and design work undertaken during 2014/15 is shown in Table 2 below.

Table 2: LCIP Concept and Detailed Designs Completed in 2014/15

Street	Location	Network
Ebert Street	Griffith	CRN
Wheelers Lane	Dubbo	CRN

3.2.1 Wheelers Lane, Dubbo

The Dubbo triangle is on the ARTC network at the junction of the rail lines between Dubbo and Narromine, and Coonamble and Orange, and links to the CRN at Wheelers Lane to the east and Troy Junction to the north. Prior to 2014/15 train arrangements at the Dubbo triangle require manual operation of switches which delayed trains in the Dubbo railway yard and impacted on the level crossings at Wheelers Lane and Cobbora Road.

The Dubbo triangle was upgraded in 2014/15, which involved the motorisation of the points at the Dubbo triangle to eliminate manual operation of switches on two legs of the triangle. This means faster train services between Dubbo and local grain receival sites, and shorter waits for road users and road freight operators at the Wheelers Lane level crossing. This crossing is scheduled to be upgraded in 2016/17 from flashing lights and bells to flashing lights, bells and retro-reflective boom gates with high intensity LED lights.

The total cost of the project is $1.593 million (excluding overheads), which includes a $200,000 contribution from the LCIP, $300,000 from ARTC, $333,000 from CRC with the remaining $760,000 drawn from the TfNSW Regional Freight Rail Siding Extension Program.

3.3 Accelerated projects

Accelerated projects undertaken during 2014/15 are shown in Table 3.

Table 3: LCIP Accelerated Projects Completed in 2014/15

Street	Location	Network
Flagstone Street	Cookamidgera	CRN
The Escort Way	Borenore	CRN

3.4 Minor works

In 2014/15, the LCIP funded minor construction works at 43 level crossings (see Table 4 below) in regional NSW including:

- 28 locations in New England
- 8 locations on the Mid-North Coast
- 6 locations in the Central West
- 1 location in the Hunter

Table 4: LCIP Minor Works in 2014/15

Street / Location	Scope	Network
Crowthers Road, Stratford	Improved sighting distances, with vegetation control	ARTC Lease
Off Koladong Road, Taree	Improved sighting distances with vegetation control and/or tree removal, upgrade upside road approach to reduce grade and remove hump	ARTC Lease
Malah Road, Warragai Creek	Widen road, build up approaches to remove hump, bitumen approaches, remove non-frangible material, install flexible guideposts, upgrade signage and road markings.	ARTC Lease
Off Casino Rd, Gurranang	Upgrade signage, install flexible guideposts, improve road approaches both sides, lay two coat bitumen seal, road marking and improve sighting distance by cutting back bank down end up side	ARTC Lease
Poley House Road, Braunstone	Improved sighting distances with vegetation control and/or tree removal, paint stop lines on access approaches	ARTC Lease
Public Road, Warrell Creek	Upgrade signage, install flexible guideposts and remove non-frangible material, upgrade fencing and gates, improve sighting distance down end both sides	ARTC Lease
River Road, Kundabung	Cut bank down side city end, upgrade signage and install flexible guideposts	ARTC Lease

Street / Location	Scope	Network
Watson Taylor Road, Johns River	Improved sighting distance with removal of non-frangible material from the rail corridor and re-instate fences/gates to boundary	ARTC Lease
Yellow Rock Road, Raleigh	Improved sighting distances with vegetation control and/or tree removal	ARTC Lease
Public Road (Secondary Saleyards), Dubbo	Road surface upgrade including removing hump, and upgrading from gravel to steel panel	ARTC Lease
A'Courts Road, Ballimore	Road surface upgrade including removing hump, and upgrading from gravel to steel panel	ARTC Lease
Bolton Creek Road, Weetaliba	Road surface upgrade including removing hump, and upgrading from gravel to steel panel	ARTC Lease
Nieble siding Road, Connemarra.	Road surface upgrade including removing hump, and upgrading from gravel to steel panel	ARTC Lease
Sanitary Depot, Binnaway	Road surface upgrade including removing hump, and upgrading from gravel to steel panel	ARTC Lease
Digilah Road, Merrygoen	Road surface upgrade including removing hump, and upgrading from gravel to steel panel	ARTC Lease
28 miscellaneous sites	Upgrade signage	ARTC Lease

4 Level Crossing Improvement Program 2014/15 - awareness and enforcement campaigns

4.1 Level crossing awareness and education campaign

The 'Don't rush to the other side' level crossing campaign, which provides a timely reminder to drivers that level crossings should not be approached with complacency, continued to run throughout 2014/15 on behalf of the LCSC.

The campaign targeted both light vehicle drivers who live within 10 kilometres of a level crossing in regional NSW and heavy vehicle drivers. In 2014/15, the messaging used in conjunction with the 'Pearly Gates' imagery was tailored for heavy vehicle drivers for the first time using radio, digital and print media, highlighting the increasing importance of this group and making it more relevant for them.

The tailored messaging focussed on the following key issues:

- the penalties (fines, loss of demerit points) for ignoring the signals at level crossings
- awareness of the dangers of 'short-stacking' (or queuing across the tracks at level crossings) while waiting for traffic, etc
- awareness that the stopping distance for heavy vehicles is longer

New radio scripts were also developed for light vehicle drivers to promote the risks of level crossings and the need to obey traffic controls.

The paid advertising campaign was fully integrated and ran across television, outdoor, radio, digital and print (heavy vehicle magazines) media in regional NSW. Radio played a greater role in order to reach both light and heavy vehicle drivers while they were in their vehicles.

In 2014/15, for the first time there were three periods of paid advertising. This included November 2014 to coincide with harvest season when more trains are operating and more vehicles are on the road, as well as February 2015 and May/June 2015 during the traditional peaks in level crossing collisions.

During the year, four additional localised radio campaigns ran to support local Police enforcement operations in Curlewis, Tichborne and Welcome, Broken Hill, and Casino, Kyogle and Wiangaree.

Letterbox flyers were also distributed to residents and businesses within 10 kilometres of the targeted crossings.

Campaign tracking research carried out on 2014/15 activity by an independent research agency showed the campaign is performing well.

A summary of the results indicates:

- 64 per cent of the target audiences saw the campaign. This is above the industry average of 37 percent.[1]

[1] Ipsos norms

- 78 per cent of the target audience agreed strongly that the ad communicated to them that dangerous behaviour at level crossings can lead to negative consequences, while 72 per cent stated they should always look and obey the road signs and signals when approaching a level crossing. Both are above the industry average of 37 per cent.[1]
- 66 per cent of the target audience also found the campaign believable.

To help to continue to raise the profile of level crossings and generate talkability, TfNSW again participated in a number of public relations road-show events featuring the 'Pearly Gates' and a crashed car which had been involved at a level crossing incident. The events included:

- Rail Safety Week – August 2014
- Henty Machinery Field Days – September 2014
- Australian National Field Days – October 2014
- International Level Crossing Awareness Day – June 2015

Figure 13: 2014 Henty Machinery Field Days

It is proposed to continue the 'Don't rush to the other side' campaign throughout 2015/16.

4.2 Level crossing Police enforcement campaign

The joint TfNSW – New South Wales Police Force Level Crossing Awareness and Enforcement Campaign continued during 2014/15. Four campaigns were held during the reporting year at: Curlewis, Parkes, Broken Hill and Casino.

NSW Police Force is responsible for the enforcement of the *Road Rules 2014* including level crossing offences. Legal actions (Table 5) for level crossing offences (driving) have now been trending upwards for five years due a heightened awareness of level crossing safety brought about through the Level Crossing Awareness and Enforcement Campaign.

For the third consecutive financial year, no fatal crashes occurred between a train and a road vehicle at a level crossing.

Table 5: NSW Police Level Crossing Legal Actions between 2010/11 and 2014

Financial Year	Legal Actions
2010/11	219
2011/12	281
2012/13	306
2013/14	371
2014/15	488

Figure 14: Police enforcement Broken Hill

In August 2014, Senior Sergeant Timms attended the 2014 Global Level Crossing Symposium (GLXS2014) in Urbana Illinois. GLXS2014 was attended by delegates from North and South America, Europe, Africa and Australia. The symposium was made aware of the Level Crossing Awareness and Enforcement Campaign, which is an example of world's best practice.

5 Level Crossing Improvement Program 2014/15 - ALCAM development and data collection

The Australian Level Crossing Assessment Model (ALCAM) is used to assess potential risks at level crossings and to assist in the prioritisation of safety improvements at level crossings according to their comparative safety risks. ALCAM is currently applied across Australia and in New Zealand, and is overseen by the National ALCAM Committee.

5.1 National ALCAM Committee

The National ALCAM Committee comprises representatives of all Australian states and territories, and New Zealand. The role of the Committee is to manage development of the ALCAM and to ensure consistency in its application. Currently, NSW is represented on the National ALCAM Committee by TfNSW.

In 2011, the National ALCAM Committee presented a $1.6 million business case to the previous Rail Level Crossing Group to redesign and redevelop the ALCAM Level Crossing Management system (LXM) from a Microsoft Access database to an internet based platform. The business case was endorsed by the Rail Level Crossing Group.

A major review of the ALCAM road model took place concurrently with the development of the web based system. The ALCAM methodology was independently reviewed by third party risk specialists and a number of significant enhancements to the model were implemented. These were calibrated against incident data and include a new Traffic Exposure Model, revised Infrastructure Model and new event tree Consequence Model.

The LXM Redevelopment Project was completed on budget, with the web based system going live in December 2014. The new system incorporates the new ALCAM road model.

It is vital for the new ALCAM model that there is continuation of the support functions and maintenance to ensure system functionality and users are provided with adequate technical support. Ongoing support and maintenance will include LXM support, hosting, support and maintenance, and enhancements, and will be managed by VicTrack on behalf of the National ALCAM Committee. The total estimated cost of providing the ongoing support and maintenance is $330,000 per year. This will be borne by the National ALCAM Committee members based on the Committee's existing cost-sharing principle. TfNSW will contribute $50,000 per annum for the next three years from the LCIP towards ongoing support and maintenance.

5.2 NSW ALCAM data collection

Details on traffic controls, crossing characteristics and other related risks are currently collected on all public level crossings on a cyclical basis over a five year period in NSW. These details are loaded into the ALCAM database to update the characteristics and risk profiles for level crossings in NSW.

During 2014/15, data was collected for 215 level crossings on the CRN in NSW. This was completed by using the updated new data collection template, which was developed by TfNSW in 2014.

6 Level Crossing Improvement Program 2014/15 – new technology

6.1 Trial of affordable level crossing warning devices

The Australasian Centre for Rail Innovation (ACRI) was established in 2014 following the completion of the Rail Cooperative Research Centre. ACRI, major Australian railways, government transport departments and Australian universities have evaluated affordable warning systems at sites in Queensland, New South Wales and Victoria as part of a national affordable level crossing trial.

Three suppliers were selected to participate in the trial at three test sites with different characteristics (speeds, rolling stock, train traffic volumes, environmental conditions, etc), which were hosted by ARTC, Queensland Rail and V/Line. Each supplier installed its trial system in parallel with an existing baseline level crossing warning system. The sites were monitored over 12 months, during which data was collected in a wide range of operating and environmental conditions. The trial was conducted in shadow-mode; that is, road user warning interfaces were excluded to ensure level crossing safety was not compromised.

A comparative logging system operated at each site to enable comparison of the operating performance of the trialled systems with the baseline system. Environmental monitoring equipment provided the envelope of environmental conditions under which the equipment was known to have operated.

For two suppliers, most failures identified during the trial related to reliability, and the rail industry is now working on their type approval. The third supplier's system was never operational. The trial showed that not all sites are suitable for lower-cost solutions; for example, reliability issues were caused when hi-rail vehicles accessed the track.

Potential options to circumvent these issues could include an island track circuit to avoid miscounts associated with an island axle counting section. Sites with low rail-traffic volumes can be problematic for lower cost devices using axle counters. In case of miscounts and continuous activation (right-side failure), the batteries can be completely discharged, resulting in a wrong-side failure once the warning fails to operate.

Application conditions need to be carefully considered to ensure that the safety and reliability of systems meet the requirements for a specific site. These devices could potentially work well at a suitable site where the systems are fit for purpose.

6.1.1 Review of s3 (stop sign) level crossing sighting distance

Australian Standard AS1742 Manual of Uniform Traffic Control Devices Part 7 (AS1742 Part 7) provides a method of calculating the sighting distance required to safely proceed at passive level crossings. This distance becomes greater with higher line speeds and slower, heavier vehicles so that it may require quite a large sighting distance.

The formula within AS1742 part 7 relating to vehicles at stop signs has been demonstrated to be unreliable for heavy vehicles at high train speeds. At the upper end of the sighting distances proposed, industry has raised concern about whether a driver would be able to reliably identify a train and assess its rate of approach (i.e. speed) in order to make an informed decision on whether it would be safe to proceed across the level crossing.

To determine whether drivers can make reliable judgements to proceed in these circumstances, various data were collected and analysed. This was to assess both the sighting distance at which a train becomes identifiable, and estimate the rate of approach of that train at distances greater than 750 metres (and up to 1,500 metres).

A site was selected in Victoria (on the V/Line Werribee line) that carried high speed train traffic, and 36 motor drivers with adequate eye acuity, seated in a vehicle, observed 4 trains in the 100 to 140 km/h range. The distances where they first saw the train and where they first identified its movement were recorded. Speed estimates were also collected at four locations within the distance range of interest.

It was found that 100 per cent of the surveyed drivers could identify a train at 750 metres, whereas only 85 per cent of drivers could identify a train at 1,450 metres. However a driver's ability to identify the train as a threat may significantly depend on being able to perceive that the train is actually moving. At 750 metres 85 per cent of people tested could recognise the train was approaching, while the number could be lower than 40 per cent at 1,450 metres. Drivers were not able to accurately judge the approach speed of trains, with large underestimations at any distance. The outcomes of the research are now being included in the revision of AS1742 Part 7.

Figure 15: Level crossing sighting distances

Impact of waiting times on risk and standardisation of waiting times

Increased road and rail traffic in Australia has seen active crossings closed for extended periods in peak hours, which causes road congestion. These extended delays influence drivers' decisions to comply with road rules at level crossings. While such a correlation is not clear, various personal and environmental factors appear to influence non-compliance.

This project examines the extent to which drivers' behaviour becomes more risky with longer waiting times. A mixed methods approach, including both quantitative and qualitative research, as well as telematics measured in the Advanced Driving Simulator will be used. The outcomes of this project will be useful for determining the relevance of configuring signalling systems to operate at standard warning times for all crossings, at a level lower than that which generates significant risky behaviour.

7 LCSC agency level crossing initiatives

7.1 Sydney Trains level crossing initiatives

7.1.1 Major works

Moray Street, East Richmond

Stage one of the East Richmond Level Crossing Upgrade project was commissioned on 4 September 2014, with the replacement of the existing partially active pedestrian level crossing to a fully active system. Major Works Division delivered the project which involved upgrading the existing pedestrian mazes at Moray Street to a new automated swing gate crossing type with 'Red Man' LED flashing lights and audible pedestrian warning. The upgrade also included DDA compliant ramps, walkways, and new pedestrian lighting.

The works were undertaken continuously over a two week closedown period from 22 August to 4 September during which the Moray Street Level Crossing was closed to the public. It was opened to the public ahead of schedule at a total cost of $655,000.

Figure 16: Moray Street, East Richmond

Figure 17: Moray Street, East Richmond

Darkes Road, Dapto

2014/15 also saw the delivery of a fully active road crossing at Darkes Road, Dapto. Darkes Road was one of the few remaining road crossings on the Sydney Trains network without any boom controls. The scope of the project involved upgrading the existing flashing lights and bells to new high intensity LED flashing lights, bells and retro-reflective boom gates. The upgrade included road-widening, new road line-marking and signage.

The project was commissioned over two stages at a total cost of $1.91 million. Stage 1 commissioning occurred on 26 January 2015, which comprised the relocation of through cables to the new signalling bungalow with the final commissioning completed on 10 May 2015. This project was also managed and delivered by the Major Works Division.

Figure 18: Darkes Road, Dapto

Figure 19: Darkes Road, Dapto

7.1.2 Design works

In 2014/15 Sydney Trains undertook design work for a number of sites, as detailed in Table 6 below.

Table 6: Sydney Trains Design Works in 2014/15

Name and Location	Scope of Works
Bourke Street & Moray Street, East Richmond	Installation of: Flashing lights and boom gates DDA compliant pedestrian swing gates Backup power supply Improvements to road width, kerbs and road medians.
Darkes Road, Dapto	Installation of: Flashing lights and boom gates Backup power supply Improvements to road width, kerbs and road medians. Detailed design to be completed by August 2014

7.1.3 Minor works

In 2014/15 Sydney Trains funded minor works totalling $215,900 at the following pedestrian level crossing locations as shown in Table 7 below.

Table 7: Sydney Trains Minor Works in 2014/15

Name and Location	Scope of Works
Blackheath, Zig Zag and Bell	Cerberus monitor commissioning into the monitoring system
Bell	8 Conversion of Pedestrian red Lights to Red Man type
Woonona	6 Swing Gates replaced

7.2 ARTC level crossing initiatives

During 2014/15 ARTC undertook work to the value of $5.36 million across its network in NSW, as shown in Table 8, for road and pedestrian crossings.

Table 8– ARTC Level Crossing Projects in 2014/15

LOCATION	COST	SITES	PROJECT SCOPE
Albury - Macarthur	$173,000	4	Pedestrian level crossing upgrades and maintenance
Albury - Macarthur	$751,000	9	Level crossing upgrades and maintenance
Broken Hill - Parkes – Cootamundra	$213,000	7	Level crossing maintenance
Camurra to North Star	$71,000	2	Upgrade road surface, signage and install steel panel
Dungog to Monkerai	$75,000	4	Lift out panel, tamp, improve drainage, signage, delineators and non-frangibles to standard, work with Council to correct road geometry
Goobang Junction to Troy Junction	$105,000	1	Upgrade road surface, signage and install concrete panel
Gulgong to Merrygoen	$32,000	2	Upgrade road surface, signage and install steel panel
Hunter Valley - Various	$686,000	9	Level crossing road surface upgrades and reconditioning
Hunter Valley - Various	$105,000	2	Level crossing road surface upgrades and drainage works
Hunter Valley - Various	$45,000	3	Level crossing reconditioning
Hunter Valley - Various	$10,000	1	Level crossing drainage works
Hunter Valley - Various	$918,000	2	Level crossing track panel upgrade and drainage works
Hunter Valley - Various	$177,000	1	Level crossing track panel upgrade, road surface renewal, re-railing and drainage works
Hunter Valley - Various	$378,000	1	Level crossing track panel upgrade, road surface renewal and drainage works
Hunter Valley - Various	$86,000	5	Level crossing track panel upgrades, drainage works and signage improvement
Hunter Valley - Various	$476,000	1	Level crossing track panel upgrade to rubber, road surface renewal, improve pedestrian crossing walkways, pedestrian maze renewal and drainage works
Hunter Valley - Various	$131,000	2	Level crossing track panel upgrades to rubber
Hunter Valley - Various	$78,000	1	Level crossing track panel upgrade to rubber and drainage works
Hunter Valley - Various	$90,000	1	Level crossing upgrade to axle counter
Hunter Valley - Various	$8,500	1	Level crossing lamp upgrade from incandescent to LED
Lawrence Rd to Rappville	$2,000	1	Remove old rail posts, install frangible posts and upgrade signage
Merrygoen to Gap	$187,000	1	Upgrade road surface, signage and install concrete panel
Merrygoen to Gap	$45,000	6	Upgrade road surface, signage and install steel panel
Mt George to Killawarra	$125,000	3	Mt George level crossing sighting distance improvement and speed-board rationalisation
Taree to Melinga	$6,000	1	Install second-hand steel panel
Troy Junction to Merrygoen	$220,000	2	Upgrade road surface, signage and install steel panel
Ulan to Gulgong	$86,000	6	Upgrade road surface, signage and install steel panel
Unanderra - Moss Vale	$83,000	1	Level crossing upgrades and maintenance
Total	**$5,362,500**	**80**	

7.3 CRC and JHR level crossing initiatives

CRC and JHR continued to improve level crossing safety on the CRN with a combination of signalling upgrades and an upgrade to a pedestrian level crossing to ensure compliance with standards and improved signalling technology.

Table 9 - CRC and JHR Level Crossing Projects in 2014/15

Location	Cost	Sites	Project Scope
Kitchener Street, Tamworth	$178,000	1	Upgrade passive pedestrian level crossing with new maze and associated fixtures
Blumer Avenue, Griffith	$490,000	1	Upgrade level crossing to axle counter detection.
Whybrow Street, Griffith	$490,000	1	Upgrade level crossing to axle counter train detection
Total	**$1,158,000**	**3**	

8 Interface agreements

The *Rail Safety National Law* (NSW) requires rail infrastructure managers and road managers to identify and assess risks to safety at level crossings, and for the purpose of managing those risks, to enter into interface agreements. Rail and road managers are actively working towards meeting these obligations and are currently negotiating interface agreements.

RMS

During 2014/15, RMS received 25 proposed road-rail interface agreements from rail infrastructure managers (RIMs). These include: 17 from JHR, two from BlueScope Steel (AIS) Pty. Limited, four from ARTC, and one from Boggabri-Maules Creek Rail Pty Ltd.

Once these interface agreements have been executed, RMS is to commence the preparation of safety management plans for all appropriate locations.

Sydney Trains

Over the past 12 months, Sydney Trains has been working with 41 road managers to facilitate the development of Interface Agreements. In 2014/15, Sydney Trains completed all of the Interface Agreements and these were subsequently issued to the various road managers for execution. A total of 31 agreements have now been signed off and executed.

ARTC

ARTC's review in 2014/15 of the requirements placed on road managers when working in the rail corridor resulted in ARTC's Safety and Environment Committee approving a permanent exemption for road manager staff requiring track safety awareness when working in the ARTC rail corridor provided (1) the road manager had entered into an interface agreement with ARTC, and (2) had a rail protection officer on site for the duration of the works. This was an extension of the existing case-by-case exemption for specialist work in the rail corridor allowable in ARTC's policy and recognition that an interface agreement assists in the management of risks at interfaces including maintenance works. This position was communicated to road managers in August 2014.

Progress on the signing of interface agreements has been slow with a total of seven interface agreements having been signed. Another eight are in the process of being signed, leaving 48 under negotiation.

Discussions with NSW Trains on the development of an interface agreement for pedestrian access at NSW Trains stations concluded that the interface agreement for those interfaces should be between ARTC and Sydney Trains as ARTC and Sydney Trains are jointly responsible for maintaining that infrastructure, whereas NSW Trains is the lessee of the station. Sydney Trains has accepted that position and development of the interface agreement is progressing.

The requirement for an interface agreement between ARTC and Sydney Trains for bridges (primarily public overbridges) within the Sydney metropolitan area appears resolved. An existing interface agreement has been identified which can incorporate the Sydney Trains owned structures, and finalisation of the required amendments is progressing.

CRC and JHR

JHR is obliged to enter into interface agreements with 91 public road managers on the CRN. Two have been entered into, 19 are awaiting other party signature and risk assessments before they can be executed, and a further 18 require risk assessments before they can be executed.

JHR is also obliged to enter into interface agreements with about 600 private road managers. Of these, seven have been entered into while 141 await other party signature before they can be executed.

9 Funding for level crossings in NSW

Table 10 provides a summary of the total expenditure on level crossing safety improvements in NSW since 2003/04.

Table 10: Funding for Level Crossing Safety Improvements in NSW from 2003/04 to 2014/15

Year	Program / Agency	Expenditure ($ millions)	Total ($ millions)
2003/04	CRIA LCIP	2.00 3.00	5.00
2004/05	LCIP	5.00	5.00
2005/06	RailCorp LCIP	1.30 6.00	7.30
2006/07	RailCorp ARTC CRIA LCIP	2.40 1.65 0.28 7.00	11.33
2007/08	RailCorp ARTC CRIA LCIP	2.65 6.90 1.94 7.00	18.49
2008/09	RailCorp ARTC CRIA RTA LCIP	2.81 2.47 4.53 2.94 5.28	18.03
2009/10	RailCorp ARTC CRIA RTA LCIP	3.27 42.77[2] 3.87 3.30 6.57	59.77
2010/11	RailCorp ARTC CRIA LCIP[3]	3.60 1.65 3.37 7.33	15.94
2011/12	RailCorp ARTC CRIA LCIP[4]	3.20 29.21 2.88 7.40	42.69

[2] One-off funding for the Boom Gates for Rail Crossings Program was provided as part of the Commonwealth Government's Nation Building Program.
[3] Includes $2 million funding provided from the RTA.
[4] Includes $2.5 million provided by RailCorp and $4.8 million provided by RMS

Year	Program / Agency	Expenditure ($ millions)	Total ($ millions)
2012/13	RailCorp ARTC CRC RMS LCIP[5]	1.90 12.90 1.04 1.30 7.51	24.65
2013/14	Sydney Trains ARTC CRC RMS LCIP[6]	1.80 8.17 2.82 0.46 7.60	20.85
2014/15	Sydney Trains ARTC CRC RMS LCIP[7]	2.78 5.36 1.16 3.05 7.27	19.62

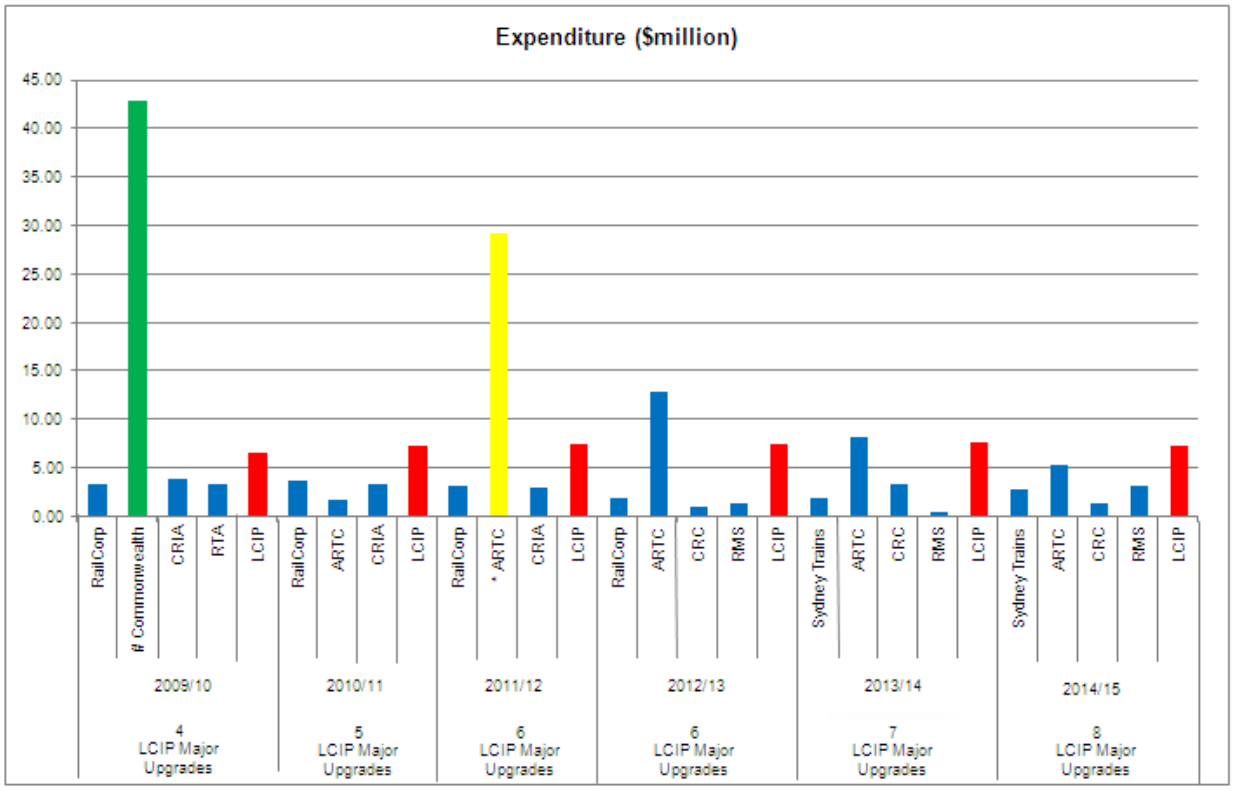
[5] Includes $2.5 million provided by RailCorp and $5.0 million provided by RMS
[6] Includes $2.5 million provided by RailCorp and $5.0 million provided by RMS
[7] Includes $2.5 million provided by RailCorp and $5.0 million provided by RMS

Appendix A: Total LCIP 2014/15 expenditure

Table 11: Appendix A Total LCIP 2014/15 Expenditure

Street	Location	Cost
Construction Projects		
Summerland Way	Koolkhan	$174,000
Bruxner Highway	Casino	$800,000
Goondah Road	Bowning	$899,000
Mangoola Road	Mangoola	$683,000
Rossglen Road	Rossglen	$195,000
Warral Road	Warral	$990,000
Tapscott Road (Dunavants)	Moree	$663,000
	Total	**$4,404,000**
Concept & Detailed Design		
Ebert Street	Griffith	$91,000
Wheelers Lane	Dubbo	$223,000
	Total	**$314,000**
Accelerated Projects		
Flagstone Street	Cookamidgera	$668,000
The Escort Way	Borenore	$504,000
	Total	**$1,172,000**
Minor Works		
43 Level Crossings on ARTC Lease Network		
	Total	**$138,000**
Other Level Crossing Initiatives		
Level Crossing Awareness and Enforcement Campaign		$757,000
ALCAM Development & Data Collection		$278,000
Level Crossing Policy and Strategy Development		$185,000
Assessment & Trial of New Technology		$8,000
	Total	**$1,228,000**
	Grand Total	**$7,256,000**

Appendix B: Expenditure on level crossing upgrades in NSW funded through the LCIP and by rail and road managers 2009/10 – 2014/15



Note: # – Federal stimulus funded projects under the Nation Building Program: *Boom Gates for Rail Crossings* (*55 sites)*.

Note: * – During 2011/12, ARTC undertook works in excess of $29 million to enhance or eliminate level crossings across its network in NSW. This included $23 million spent on two major grade separation projects as part of the Maitland to Minimbah Third Track and other safety improvements within the network.