Transport for NSW

Level Crossing Strategy Council Yearly Report 2022-23

November 2023

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NSW GOVERNMENT

Front cover: Cowcumbla St Level Crossing, Cootamundra (LX ID 597).

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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
CITI	Cooperative Intelligent Transport Initiative
C-ITS	Cooperative Intelligent Transport Systems
CRD	Client Requirement Document
CRN	Country Regional Network (the part of the NSW rail network owned by Transport for NSW excluding any part under an ARTC lease or licence)
CRSMS	The Centres for Road Safety and Maritime Safety (part of the Safety, Environment and Regulation division of Transport for NSW)
DSRC	Dedicated Short-Range Communications
GCP	Grade Crossing Predictor
IoT	Internet of Things
ITSOC	Infrastructure and Transport Senior Officials' Committee
LCCWG	Level Crossing Communication Working Group
LCIP	Level Crossing Improvement Program
LCSC	Level Crossing Strategy Council
LCWG	Level Crossing Working Group
LGA	Local Government Area
LGNSW	Local Government NSW
LXM	Level Crossing Management
NSW TrainLink	The NSW Government agency [constituted as NSW Trains] 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.
PTC	Police Transport Command
RIM	Rail Infrastructure Manager, a term defined in the RSNL that refers to, among other things, the person or organisation that has effective control and management of the rail infrastructure of a railway
RISSB	Rail Industry Safety Standards Board
RPAS	Remote Piloted Aircraft System (Drone Technology)
RSNL	The Rail Safety National Law
ROM	Regional and Outer Metropolitan (a division of Transport for NSW)
RSO	Rolling Stock Operator
Sydney Trains	The NSW Government agency that provides passenger train services for the Sydney suburban area and is the RIM for the Greater Sydney metropolitan rail network
TfNSW	Transport for NSW
UGLRL	UGL Regional Linx

Year in Review: 2022-23

In 2022-23 Rail Infrastructure Managers (RIMs) and Road Managers invested $8.46 million on safer level crossing initiatives in NSW of which $1.92 million was allocated through the NSW Level Crossing Improvement Program (LCIP).

Transport for NSW (TfNSW) manages the LCIP, which provides funding to accelerate improvements to priority level crossings across NSW, raise awareness of level crossing safety issues and promote new technology to improve level crossing safety. LCIP funding is additional to the funds RIMs and Road Managers spend on maintaining and upgrading level crossings on their networks.

Challenges associated with the 'fixed price' contract model for the Country Regional Network (CRN) and change in CRN Service Provider from John Holland Rail to UGL Regional Linx (UGLRL) have continued to impact level crossing upgrades on the CRN. Due to inflationary pressures, Australian Rail Track Corporation (ARTC) paused their upgrades that were carried over from 2021-22 as well as upgrades scheduled for 2022-23.

Although the engineering aspects of the LCIP were stalled in 2022-23, the LCIP funded a range of level crossing safety initiatives during the year, including:

- The level crossing safety education campaign 'Don't rush to the other side'
- Level crossing awareness and enforcement campaigns in regional NSW
- Australian Level Crossing Assessment Model (ALCAM) data collection

The TfNSW Transport Infrastructure Plan provides the LCIP $7.3 million in funding a year to 2031-32, which enables the planning and completion of future priority level crossing upgrades. In June 2017 the LCIP converted to a three-year rolling program to provide RIMs and local governments with improved long-term planning and consultation capacity in design and delivery for both LCIP and agency-funded level crossing upgrade projects. This also gives communities greater certainty in managing disruption while works are underway.

This report provides a consolidated overview of level crossing improvements delivered by RIMs and Road Managers in 2022-23 (including LCIP funded projects).

Appendix A provides a summary of all projects funded under the LCIP in 2022-23.

Appendix B sets out the expenditure on level crossing safety initiatives in NSW funded through the LCIP and by RIMs and Road Managers from 2016-17 to 2022-23.

Australian Rail Track Corporation

ARTC have reported that project costs have increased over time for a variety of reasons, including rising material and equipment costs and restricted specialised signalling resources. Owing to these cost increases, ARTC decided to pause completing the six LCIP level crossing upgrades until the LCIP funding contributions are increased. ARTC and TfNSW personnel are in constant communication to understand the funding concerns and explore potential solutions to enable these level crossing upgrades to progress.

Country Regional Network

Financial year 2022-23 has proved to be another challenging year for delivery of LCIP projects on the CRN. Five CRN LCIP projects were not able to be delivered resulting in a significant underspend of the LCIP contribution for the CRN. Challenges associated with the CRN 'fixed

price' contract model and change in CRN Service Provider have continued to impact delivery of the LCIP. The five LCIP projects commenced in 2021-22 have continued into 2022-23.

The ongoing delays to the LCIP projects have continued as a result of inadequate resourcing within CRN Service Provider UGLRL and UGLRL's selected design consultants, together with issues of UGLRL executing subcontractor agreements. This has resulted in the non-delivery of any CRN upgrades in 2022-23.

It is anticipated that four of the five projects will be commissioned in mid-2024 and the fifth project will follow in mid-2025.

Level Crossings in New South Wales

Under the Rail Safety National Law (NSW), RIMs and Road 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. The NSW Police Force enforces the Road Rules 2014 (NSW).

Level Crossing Strategy Council

The Level Crossing Strategy Council (LCSC) is an NSW interagency forum that coordinates level crossing safety initiatives by RIMs, Road Managers and other key stakeholders. The LCSC is chaired by TfNSW and comprises executive representation from:

- TfNSW (Safety, Environment and Regulation; Regional and Outer Metropolitan; Customer Strategy and Technology)
- ARTC
- UGL Regional Linx
- Local Government NSW
- NSW Police Force
- NSW TrainLink
- Sydney Trains

ONRSR also attends LCSC meetings to provide a national perspective in discussions on rail safety related issues and to offer independent comment/advice on level crossing safety strategy and policy. ONRSR does not have an endorsement or approval function in LCSC deliberations.

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

Level Crossing Strategy Council Strategic Plan 2021-30

The Level Crossing Strategy Council Strategic Plan 2021-30 (Strategic Plan) was developed by TfNSW Safety, Environment and Regulation – Transport Safety, and endorsed by the LCSC on 23 February 2021. The Strategic Plan guides the LCSC to continue to develop policy, review incident and safety trends, monitor new technologies, and oversee the development and delivery of the annual capital works program, and education and awareness campaigns.

Under the Strategic Plan, rail and road stakeholders will commit to working collaboratively to address 12 areas of strategic focus across three key themes for safer level crossings in NSW: safe people; vehicles, speeds and infrastructure; and harnessing knowledge for safety.

The Strategic Plan is available on the TfNSW website.

Level Crossing Improvement Program

The LCIP 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 RIMs and Road Managers to improve and maintain safety at the level crossings on their networks.

Key elements of the LCIP include: accelerate engineering upgrades and safety improvements at priority level crossings; education campaigns 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 Safety, Environment and Regulation – Transport Safety, with the assistance of the LCWG and endorsed by the LCSC. The LCWG monitors program delivery and promotes collaboration and consultation between delivery agencies. In 2017, the LCSC endorsed an approach to establish the LCIP as a three-year program to commence from the 2017-18 financial year.

A draft new three-year LCIP for 2023-24 to 2025-26 was developed in consultation with key stakeholders during November 2022 and the CRN component of the program was endorsed by the LCSC in April 2023.

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, ensures available funding is applied effectively to level crossing safety improvements.

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
- upgrading level crossings controlled by passive signage (e.g., give way or stop sign) to boom gates and flashing lights
- minor works at passively controlled level crossings.

A prioritisation process is then used to identify the crossings to be upgraded within the first two categories. This process first uses an ALCAM ranking to generate a shortlist of sites. The 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 RIMs, Road Managers and other relevant stakeholders.

National Level Crossing Safety Committee

The National Level Crossing Safety Committee (NLCSC) is an initiative of the Australasian rail industry. It operates as an inter-agency forum to coordinate national efforts for safer level crossings and reports to the Infrastructure and Transport Senior Officials Committee (ITSOC). Its focus is on maximising knowledge-sharing and best practice, and on strategic opportunities such as greater national consistency in data collection/use and technology trials and take up.

The strategic objectives of the NLCSC are to:

- reduce the likelihood of crashes and near misses at railway crossings
- improve coordination between Road Managers, RIMs, governments and other member organisations through maximising knowledge-sharing, skills and practice
- 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.

NLCSC includes representatives from Australasian jurisdictions, government and private rail operators, RIMs, rail industry associations, regulators, and the Australia New Zealand Policing Advisory Agency. Its secretariat support function is provided by the TrackSAFE Foundation.

Throughout 2022-23, the NLCSC developed the first draft of the National Level Crossing Safety Strategy and Work Plan 2023-2032. The Strategy and Work Plan are expected to be published in late 2023.

National Level Crossing Safety Forum

In August 2022, TrackSAFE Foundation hosted the Level Crossing Safety Forum which aimed to collect information of relevance to the key elements of the new National Level Crossing Safety

Figure 1: Bernard Carlon (Chief CRSMS) and Inspector Kelly Wixx (NSWPF) co-present at the National Level Crossing Safety Forum.

Strategy for consideration by the NLCSC. TfNSW in association with NSW Police Force provided a presentation at the Forum related to TfNSW LCIP Awareness and Enforcement campaigns.

Bernard Carlon, Chief of Centres for Road Safety and Maritime Safety (CRSMS) and the Chair of the LCSC, along with Inspector Kelly Wixx of NSW Police Force, jointly provided the presentation on the NSW LCIP Awareness and Enforcement campaigns safety initiative.

The presentation was well received and provided an opportunity for NSW to share its expertise with other jurisdictions and national bodies.

Level Crossing Closures

The only means to completely eliminating risk at a level crossing is to close the crossing. The closure of public and private level crossings is pursued, where appropriate, by LCSC member RIMs and Road Managers.

Thorough inspection and detailed assessment of crossings, including alternative means of access (such as grade separations), are considered before closure. Consultation with the relevant road authorities, adjacent landowners, the community, 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 or the Minister for Regional Transport and Roads. The TfNSW Level Crossing Closures Policy provides additional information related to level crossing closures.

Since 2003, a total of 200 level crossings have been gazetted for closure, most of which were on private property. As shown in Table 1 below, five level crossings were gazetted for closure in 2022-23.

Table 1: Level crossings gazetted for closure in 2022-23.

Location	Rail KM	Line Section	Status
Camurra	692.800	North Star	Private
Milguy	701.875	North Star	Private
Milguy	708.755	North Star	Private
North Star	750.095	North Star	Private
Forest Lodge Bethungra	462.435	Main South	Public

Level Crossing Incident Data

Of the 1,307 public road level crossings in NSW, 449 have active traffic controls including: 150 have flashing lights and bells, 297 have flashing lights, bells and boom gates and two have manually operated booms/gates. The majority of other crossings are passively controlled by 'give-way' or 'stop' signs.

There were seven collisions between a train and a road vehicle in NSW in 2022-23, all of which occurred at crossings with passive control equipment. Three collisions involved light passenger vehicles and four involved heavy vehicles. These collisions have resulted in three minor injuries.

There was one collision between a train and a pedestrian at a passive level crossing during the year, which resulted in a fatality.

Figure 2 through to Figure 5 shows the number of collisions and fatalities at level crossings from 1989-90 to 2022-23.

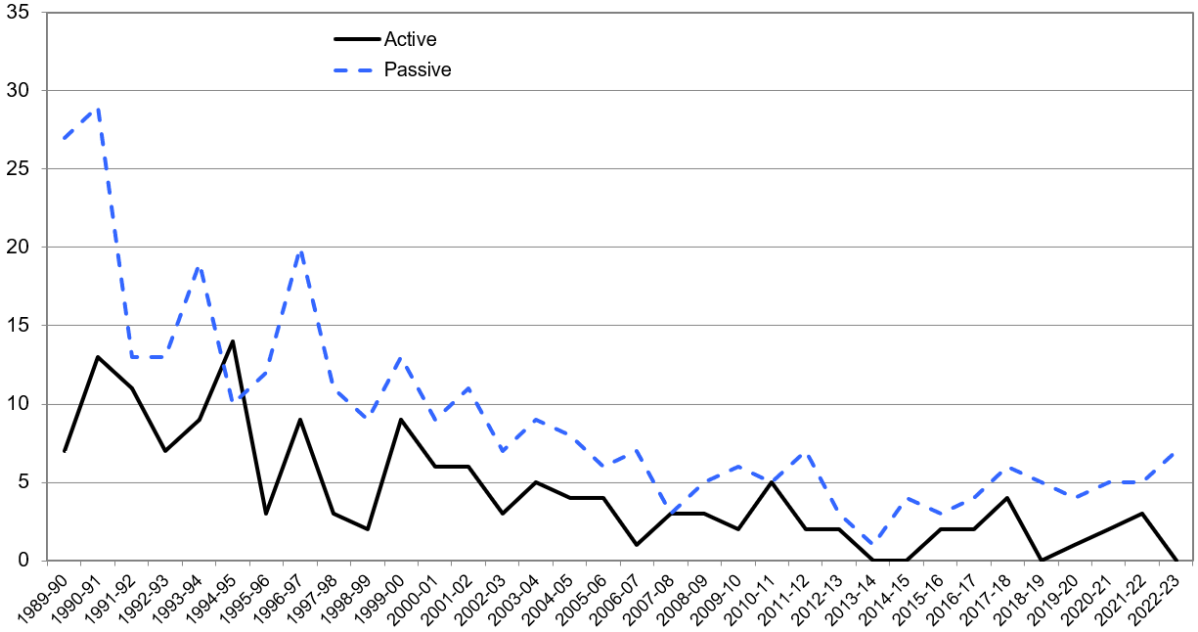


Figure 2: Train colliding with road vehicle at level crossing in NSW 1989-90 to 2022-23.

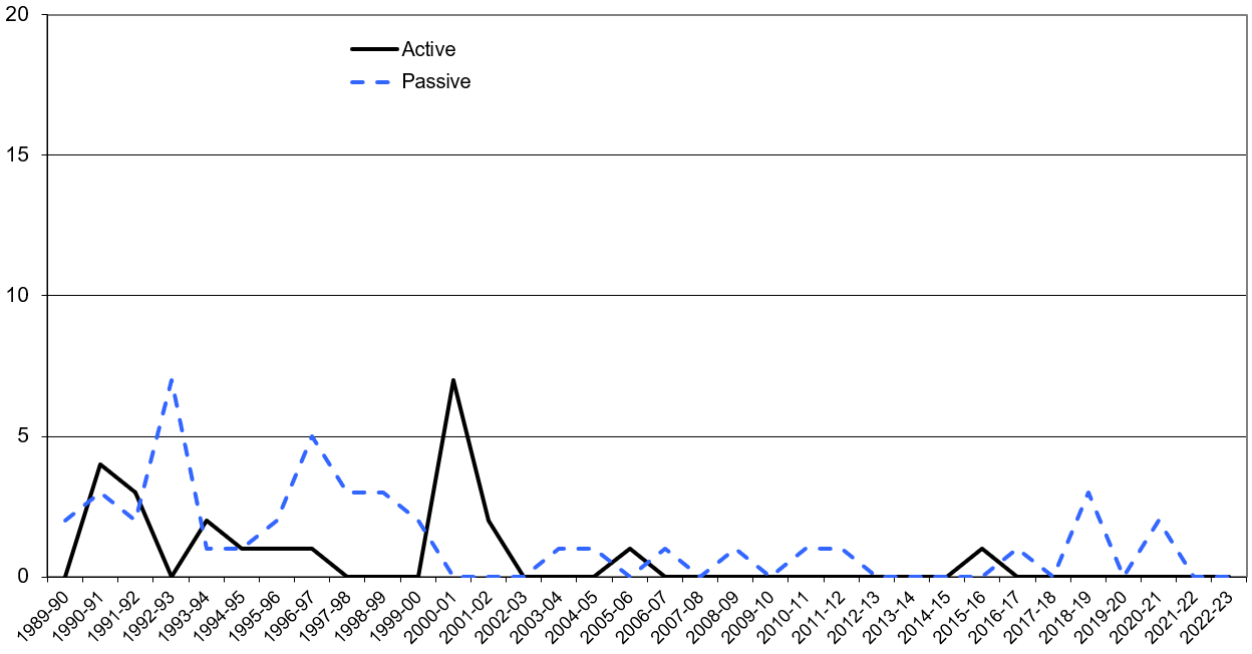


Figure 3: Fatalities: train colliding with road vehicles at level crossings in NSW -1989-90 to 2022-23.

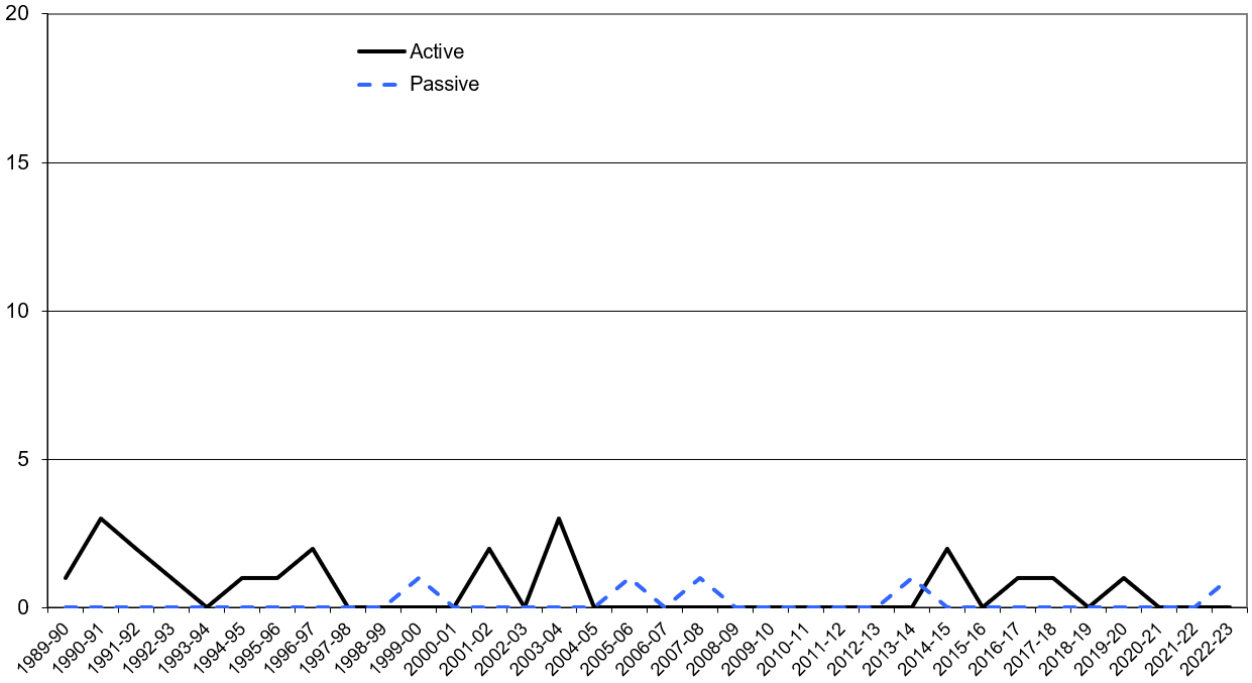


Figure 4: Train colliding with pedestrian at level crossings in NSW -1989-90 to 2022-23.

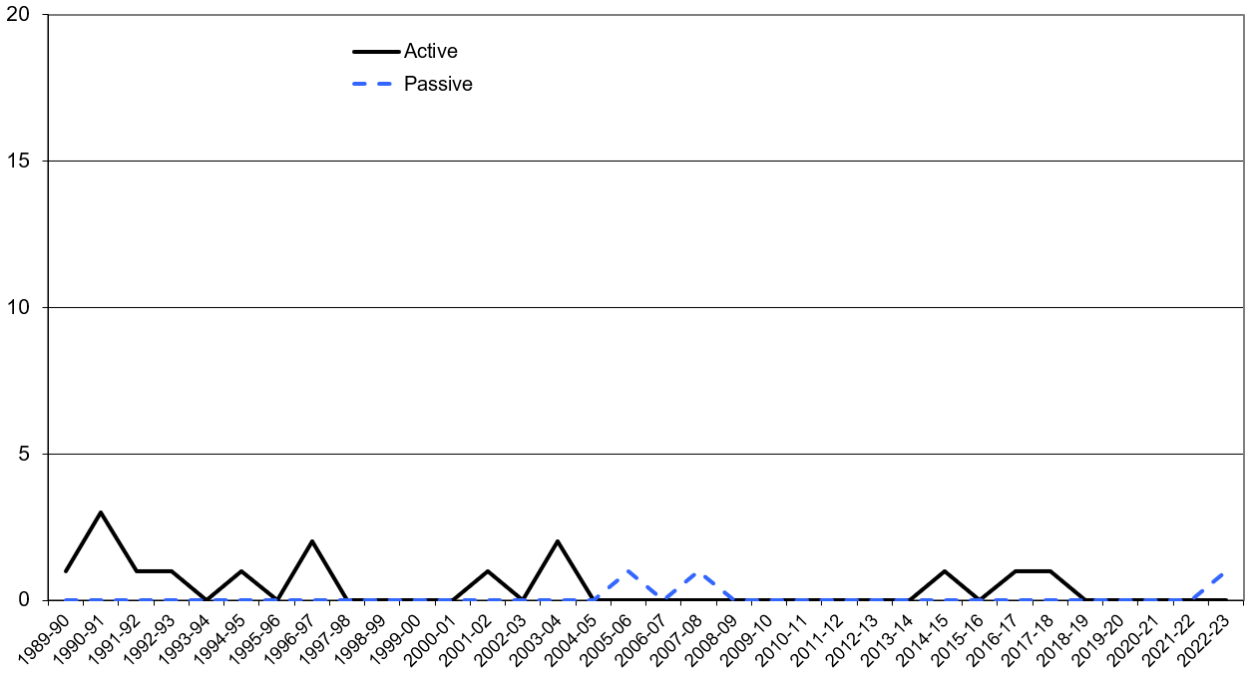


Figure 5: Fatalities: train colliding with pedestrian at level crossings in NSW -1989-90 to 2022-23.

Level Crossing Improvement Program 2022-23: Infrastructure Works

Major Works Completed

During 2022-23 there were no major construction projects commissioned across the NSW rail network under the LCIP, resulting in a significant underspend of the engineering component of the LCIP for 2022-23. There were challenges for both the CRN and ARTC as outlined below.

Country Regional Network

Challenges associated with the CRN 'fixed price' contract model and changes in CRN Service Provider, which occurred mid last financial year, continued to disrupt design and procurement. This and inadequate resourcing within CRN Service Provider UGLRL and UGLRL's selected design consultants, together with issues with UGLRL executing subcontractor agreements, impacted the delivery of the CRN LCIP projects. Despite these challenges and delays, some steady progress has been made throughout 2022–23 in moving towards construction of the projects by progressing detailed designs and procurement of long lead equipment.

ARTC

Due to concerns over inflationary pressures, ARTC paused all LCIP upgrades that were carried over from 2021-22 as well as those scheduled for 2022-23. As part of the development process, project cost estimates were updated by ARTC and it was identified that project costs have significantly increased over time. ARTC reported that cost increases have occurred for a number of reasons including: cost escalation related to COVID-19 reaching as high as 15 percent p.a.; material supply increases in the order of 30 percent in part driven by copper price increases of 90 percent from 2020 to early 2023; and increased project scope and complexity requiring additional civil works, cable routes and trackside equipment.

ARTC and TfNSW personnel met regularly throughout 2022-23 to discuss funding concerns and explore potential solutions to enable these LCIP level crossing upgrades to progress. Both ARTC and TfNSW leadership have committed to continuing to work together to understand the cost issues and to consider possible resolutions that would enable full program delivery.

Review of Level Crossing Costings and Timelines

SER commissioned an independent accredited signalling contractor to conduct comprehensive desk-top costing and delivery timelines in response to input from RIMs facing increased costs and delays in LCIP projects. 21 distinct level crossing upgrade configurations were assessed, and Transport was able to better understand the expected market costs and delivery schedules for regional type upgrades as a result. This information can then be used to inform future level crossing improvement programmes.

Development Work

Development work for upgrades in future years is a key element of the LCIP. Although there were no major upgrades in 2022-23, development work went ahead to a total value of $577,663.

Table 2: LCIP development work in 2022-23.

Location	Electorate	Network	Cost
LX ID 370 Goldfields Way, Old Junee	Cootamundra	CRN	$65,401
LX ID 686 Overshot Road, Euchareena	Dubbo	CRN	$180,999
LX ID 705 Beni Street, Wongarbon	Dubbo	CRN	$84,535
LX ID 980 Akuna Road, Parkes	Orange	CRN	$27,878
LX ID 951 Convent Lane, Borenore	Orange	CRN	$193,650
LX ID 1807 Turanville Road, Togar	Upper Hunter	ARTC	$25,200
Total Development Work			**$577,663**

Education and Communication

Level Crossing Safety Education Campaign

The level crossing safety education campaign provides a timely reminder to drivers that level crossings should not be approached with complacency. The campaign continued throughout 2022-23 and focussed on light vehicle drivers who live within 10 kilometres of a level crossing in regional NSW. The paid advertising campaign was fully integrated and ran across television, outdoor billboards, radio, digital, social media, and cinema.

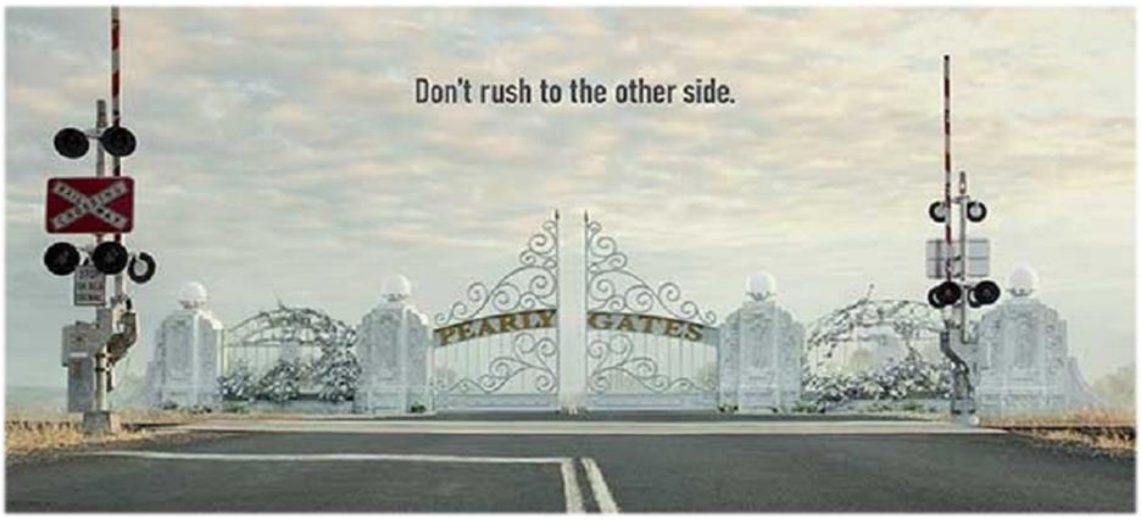


Figure 6: 'Don't rush to the other side' campaign branding.

The level crossings campaign included creative rotation per burst with the Train Driver and Pearly Gates video executions across all video channels. Both creative executions performed with positive results. Train Driver is slightly stronger in the diagnostics by showing new information and maintaining low 'wear-out' results. Pearly Gates is seen as more unique and achieved greater recognition as has been longer in market.

All social content was distributed across TfNSW and key stakeholder channels to further engage and encourage mindfulness when next approaching a level crossing.

There were three periods of paid advertising in 2022-23:

- 16 October – 5 November 2022 to coincide with harvest season when more trains are operating, and more vehicles are on the road.
- 5 February – 11 March 2023 continuing in harvest season.
- 14 May – 30 June 2023 during the traditional peaks in level crossing collisions.

During the Awareness and Enforcement campaigns (see below), TfNSW ran localised radio campaigns and letterbox drops to inform residents of upcoming local Police enforcement operations at level crossings, and to remind them of the penalties for disobeying the road rules. To complement this, the NSW Police Traffic Highway Patrol Command were interviewed by local radio stations in key areas to discuss the risks associated with level crossings.

Campaign tracking research carried out during 2022-23 activity by an independent research agency showed the campaign continues to perform strongly for light vehicle drivers over time. Results for key measures and advertising diagnostics are well above norms and results are either stable or continue to increase over time. The summary of the results is set out in Table 3 below:

Table 3: Advertising diagnostics summary table for "Pearly Gates" level crossing safety campaign.

	Results achieved overtime	Baseline	Norms (TfNSW Safety Video average
Recognition	17/18 – 58% 18/19 – 60% 19/20 – 59% 20/21 – 67% 21/22 – 67% **22/23 – 68%**	42%	
Main message takeout: **"Always look and obey the road signs and signals when approaching a level crossing"**	14/15 – 72% 15/16 – 78% 16/17 – 87% 17/18 – 75% 18/19 – 80% 19/20 – 80% 20/21 – 81% 21/22 – 71% **22/23 – 74%**	77%	66%
Believability: **(Found the message of the ad to be believable)**	14/15 – 81% 15/16 – 69% 16/17 – 75% 17/18 – 73% 18/19 – 80% 19/20 – 74% 20/21 – 75% 21/22 – 72% **22/23 – 69%**	71%	68%
Personal Relevance: **'Ad's message is appropriate and has meaning to me personally'** **NOTE: *Statement changed from 'The ads message is appropriate and has meaning to me personally' to 'The ad is for people like me' in Jan' 22**	17/18 – 38% 18/19 – 41% 19/20 – 49% 20/21 – 47% 21/22 – 37% **22/23 – 37%**	48%	48%
Social Relevance 2014-19: **'After seeing this ad, I would tell my family and friends to be careful and always obey the signs and signals at level crossings.** **Social Advocacy 2020-22:** **Social Advocacy is measured by "After seeing this ad I would tell my family and friends to be careful and always obey the signs and signals at level crossings".**	14/15 – 46% 15/16 – 43% 16/17 – 48% 17/18 – 43% 18/19 – 54% 20/21 – 49% 21/22 – 42% **22/23 – 33%**	45%	55%

Throughout the lifetime of the campaign there has been an ongoing positive effect demonstrated on both past behaviour and future intentions on the actions needed when approaching a level crossing. 87 per cent of regional drivers say they will never ignore the signs or signals at a level crossing in the next 12 months, maintaining a positive trend over the last six years of the campaign.

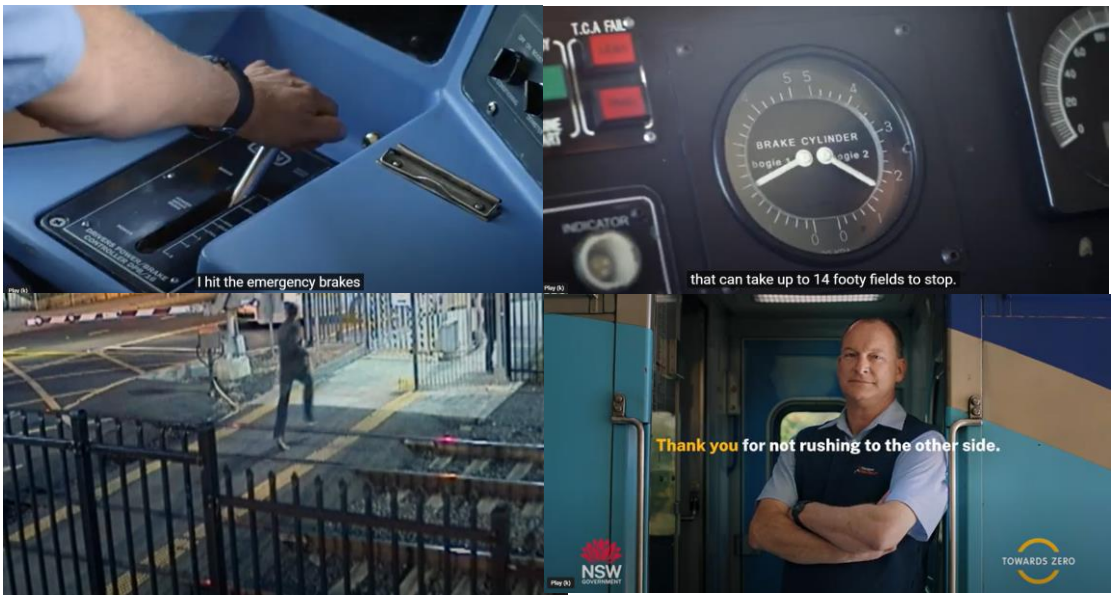


Figure 7: Excerpt from the "Train Driver" video.

The Level Crossing Safety education campaign will continue to be done in partnership with other level crossing safety programs in NSW.

Level Crossings Awareness and Enforcement Campaigns

The level crossing awareness and enforcement campaign includes public awareness (print, electronic and social media, letterbox drops and the use of Variable Message Signs) supported by the tasking and deployment of additional Police resources to enforce level crossing road rules. Police presence around level crossings throughout the campaign is highly visible, using well marked police vehicles.

NSW Police enforces the *Road Rules 2014 (NSW)* including level crossing offences. The impact of level crossing awareness and enforcement campaigns in delivering increased road policing around level crossings is reflected in the increase in legal actions for level crossing offences (driving) since the first campaign in February 2011.

Figure 8: NSW Police Force on patrol during the 2022-23 Awareness and Enforcement Campaigns.

Each year, the LCIP works closely with NSW Police, funding four level crossing awareness and enforcement campaigns. In 2022-23 the number of campaigns was reduced to three, due to flooding in the Manildra LGA requiring the redeployment of NSW Police resources to assist with this emergency situation. Throughout these campaigns, NSW Police enforced compliance with level crossing controls in a targeted approach with a significant amount of level crossing breaches being detected.

TfNSW ran localised radio campaigns and letterbox drops to inform residents of upcoming local police enforcement operations at level crossings, and to remind them of the penalties for disobeying the road rules. To complement this, the NSW Police Traffic Highway Patrol Command were interviewed by local radio stations in key areas to discuss the risks associated with level crossings. TfNSW provide this media support for each campaign which coincides with NSW Police media release and social media messaging.

Table 4: 2022-23 Awareness and Enforcement campaigns' infringement summary

Campaign	Locations	Electorate	Enforcement Period	Total Infringements
C1 Northern Rivers	Nammoona, Kyogle, Wiangaree	Lismore & Clarence	September 2022	12
C2 Central West	Manildra	Orange	March 2023	17
C3 Mid North Coast	Moorland, Coopernook, Johns River	Port Macquarie	June 2023	27

Remote Pilot Aircraft System (RPAS) Trial

On 19th and 20th June 2023 during the C3 campaign, NSW Police also utilised RPAS (Remote Pilot Aircraft System - Drone) technology at the Lansdowne Road, Melinga level crossing (LX ID

Figure 9: RPAS footage of infringements during the C3 Awareness and Enforcement campaign.

813). The use of RPAS technology assisted in identifying other road safety issues at the level crossing.

Of concern was the prevalence of vehicles crossing to the incorrect side of the road over solid double lines on blind bends. This technology has advantages where there are no accessible access or observation points for police to directly observe the level crossing.

Regional Field Days

Following two years of COVID-19-related event cancellations, the TfNSW Level Crossing team coordinated the first-ever "one-stop shop" transport safety exhibitions in 2022–2023 at the AgQuip Field Days, Henty Machinery Field Days, and Australian National Field Days.

Figure 10: Level Crossing Safety display at Henty Machinery Field Days, Henty (left) and Australian National Field Days, Borenore (right).

The more customer-focused 'one-stop-shop' offered a fantastic opportunity to interact with our regional customers and raise awareness of the significance of safety on NSW roads, waterways and level crossings. These events were well attended.

Heavy vehicle level crossing research

In December 2022, the LCSC endorsed the allocation of $90k towards funding research into heavy vehicles and level crossings. The research aims to identify the key issues, attitudes and behaviours for heavy vehicle drivers in relation to level crossings in order to develop a heavy vehicle safety campaign. TfNSW engaged IPSOS to carry out the research which involved both qualitative and quantitative interviews. The research was concluded in June 2023, and a full report is expected to be provided in 2023-24.

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 (NAC), which comprises representatives from the various jurisdictions to ensure its consistency of development and application. ALCAM is managed and supported by the Rail Industry Safety Standards Board (RISSB). TfNSW represents NSW on the NAC as well as its Technical Sub-Committee.

National ALCAM Committee Projects

The NAC has taken a risk-based approach to ensure the viability and longevity of ALCAM and has carried out the following works in 2022-23:

LXM System Rebuild

The purpose of the project is to redevelop the ALCAM Level Crossing Management (LXM) system to incorporate contemporary human factors and cyber security principles and improve the accessibility and useability of the web-based interface with a view to future proofing the LXM system.

RISSB has developed a LXM System Rebuild Project Charter, which outlines the project scope, deliverables, assumptions, risks, communication, budget, timeline & milestones, stakeholders and success criteria.

The project consists of two phases - Requirements Discovery and Development, Testing, Maintenance & Support. The Phase 1 of the project has been completed in 2022-23. The NAC has endorsed a Software Requirements Specification Report prepared by RGB Assurance and approved the project to proceed to the next phase. Planning is underway for the Phase 2 of the project, which will commence in 2023-24. Anticipated completion of the project is September 2024.

ALCAM Data Collection Training

The NAC has engaged the Level Crossing Safety Management Services Pty Ltd to deliver ALCAM data collection training courses in the following jurisdictions in 2022 and 2023.

- Western Australia – December 2022 (Completed)
- Queensland – February 2023 (Completed)
- South Australia – April 2023 (Postponed)
- Victoria – June 2023 (Completed)
- New South Wales – August 2023

Each course will run over four full days and include a mix of both in-classroom and on-site learning. There will be up to 8 participants per course from level crossing stakeholder organisations such as RIMs. Upon completion of the course, participants will be issued a Certificate of Attendance by the training provider.

NSW ALCAM Data Collection

ALCAM plays a critical role in planning and developing the LCIP and is used as the principal means of ranking public road level crossings for major upgrades funded under the LCIP. It is therefore important that the level crossing data in ALCAM is the most accurate and up-to-date information available.

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

In 2022-23, the LCIP funded ALCAM field assessments at 180 public level crossings (including 167 road crossings and 13 pedestrian crossings) on the following line sections of the CRN:

- Cootamundra to Griffith
- Griffith to Hillston
- Temora to Lake Cargelligo

New Technology and Research

Cooperative Intelligent Transport Initiative (TfNSW)

The Cooperative Intelligent Transport Initiative (CITI) infrastructure test bed was established in 2014 by the Centre for Road Safety in TfNSW. 'Connected' vehicles use Cooperative Intelligent Transport Systems (C-ITS), to talk to each other and roadside infrastructure, such as signalised intersections.

Figure 11: The DSRC Roadside Unit being installed at Unanderra Level Crossing.

The Road Safety Technology Team within the NSW Centre for Road Safety has successfully installed a connected level crossing at Unanderra south of Wollongong. The connected level crossing provides alerts to drivers through a dedicated short-range communications (DSRC) application as well as cloud-based communications. Currently two TfNSW test vehicles have been setup to receive the alerts which are activated when the crossing's boom gates are lowered.

A proof of concept to develop an internet of things (IOT) application using open data on passenger train locations to warn drivers has been completed and was successful. Unfortunately, the lack of available public data on the location of non-scheduled train and freight services has stopped the progression of the idea from concept to a full pilot of the technology.

Self-Contained Cost-Effective Level Crossing Solution Project (ARTC)

This project involved research into a lower cost level crossing activation solution. The concept trialled Grade Crossing Predictor (GCP) technology, utilising mostly equipment that had already been type approved. The trial is being concluded and has indicated potential incremental cost savings through specific design changes, some which have already been adopted and some which will be investigated further from this trial. To move beyond incremental savings, alternative approaches using new and innovative technologies and methodologies will be required.

Innovative Level Crossing Safety Trial (ARTC)

ARTC undertook a pilot program in regional NSW in 2021-22 with road camera technology developer Acusensus to monitor how motorists respond to stop signs at level crossings. The results revealed that at some level crossings more than half of motorists ignored the stop sign.

Following the successful completion of the trial at stop sign protected level crossings ARTC has extended the solutions capabilities to actively protected level crossings where data collected is

also finding poor motorist behaviours showing vehicles racing the flashing lights before the train arrives and damaging the boom gates.

Whilst this innovative use of a technology solution to address the challenge of gathering accurate data, the next challenge is for stakeholders to continue to collaborate and use the data effectively to improve safety outcomes for road and rail users across Australia.

Schweizer – Vamos Level Crossing System (TfNSW)

TfNSW is preparing to trial the Schweizer Vamos active train detection system at a private level crossing location. The system provides an active red or green signal (Stop or Go) and audible alarm to warn road users of an approaching train. The system is tailored to suit private level crossings providing a cost-effective solution by minimising site construction time and trackside equipment to that of conventional active level crossing upgrades.

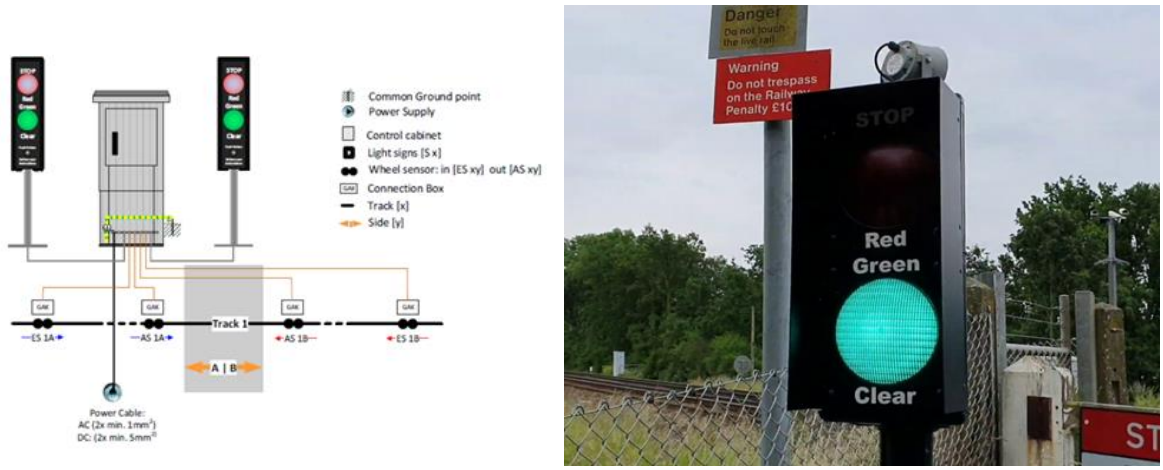


Figure 12: Typical Vamos level crossing signalling components for a private level crossing.

The project working group consisting of key stakeholders from TfNSW, Sydney Trains and UGLRL have achieved the following this financial year:

- Completed the Client Requirements Document (CRD) to clearly articulate and translate the problem, business needs and outcome improvement opportunities.
- Progressing the procurement and purchase of Vamos.
- Commenced the Type Approval process for Vamos to be trialled on the CRN.

Rail Active Crossing System (TfNSW)

Figure 13: The RAXS System operating in Queensland.

The Rail Active Crossing System (RAXS) is a cost-effective solution to rapidly upgrade a level crossing from passive to active controls. It utilises traditional red flashing lights to warn road users to stop when there is an approaching train, and in the event of a power failure the system will revert to a traditional stop sign.

Given the high costs of upgrading from passive to active controls, RAXS is a solar-powered wireless system provides a cost-effective option to conventional level crossing upgrades by eliminating the need of costly trenching and cabling, reduces the amount of trackside equipment and maintenance costs. This system is tailored to suit level crossings in remote regional locations where there is a requirement to upgrade a passive controlled site to active controls.

The project working group has been established with key stakeholders from TfNSW, Sydney Trains and ARTC and have achieved the following this financial year:

- Commenced the Client Requirements Document (CRD) to clearly articulate and translate the problem, business needs and outcome improvement opportunities.
- Commenced the procurement and purchase of RAXS.
- Planning the Type Approval process for RAXS to be trialled on the ARTC Network.

Augmented Stop Signs and Advance Warning Signs Trial (TfNSW)

TfNSW will commence the Augmented Stop Signs and Advance Warning Signs Trial in Bribbaree and Narromine in mid-2023. The trial will evaluate the effectiveness of stop signs and advanced warning signs with LED lighting installed on them. The trial will complement existing level crossing safety treatments and programs. The technology is designed to improve driver awareness of the level crossing and the need to stop at crossings controlled by stop signs.

Figure 14: Onsite Installation of the Augmented Stop Sign trial.

The TfNSW Emerging Technologies branch have managed the trial planning, design, manufacturing, and testing in collaboration with internal and external experts.

TfNSW acknowledges the collaboration and support from ARTC, Narromine Shire Council, Weddin Shire Council, Sage Automation, ONRSR, RISSB and other stakeholders.

Agency Safer Level Crossings Initiatives

ARTC Initiatives

Civil and Signal Maintenance and Upgrade Works

In 2022-23, ARTC undertook civil and signal upgrade works on the ARTC network in the Hunter Valley. A summary of the works is provided in the table below.

Table 5: ARTC Civil and Signal Works 2022-23.

Type of Works	Number of Sites	Cost
Civil Maintenance	151	$261,659
Civil Upgrades	11	$2,666,657
Signal Upgrades	6	$355,555
Totals	**168**	**$3,283,871**

ARTC Community Participation

ARTC's commitment to raising community awareness of level crossing safety continued in 2022-23. The company developed a new presentation kit for employees to use when visiting schools to educate students about rail safety, including a four-minute animation and an activity pack.

Figure 15: Excerpts from ARTC's school education video.

ARTC also attended numerous community events during the year where employee representatives discussed level crossing safety with members of the public, including at the AgQuip Field Days, Henty Machinery Field Days and Hunter Valley Steamfest. Key industry-wide events were also supported by ARTC, including Rail Safety Week, R U OK? Day and Rail R U OK? Day.

Social media played a key role in the company's activities to deliver vital safety messages to local communities to help prevent road/rail accidents. In addition to organic posts on LinkedIn and Facebook promoting safety, ARTC delivered an 'always on' safety awareness campaign via Facebook in level crossing hot spots where collisions and near misses have previously occurred.

The campaign, which is ongoing, targets drivers who take risks around level crossings, including stopping on tracks, rushing through crossings and ignoring signs – key issues identified by the Rail Crossing Safety Awareness Group and ARTC.

ARTC's goal is for the 'always on' campaign to reach more than 380,000 individuals in NSW – and 700,000 nationally – over its 12-month duration from 28 April 2023 to 1 May 2024. In NSW, the campaign has already reached 205,506 people (as of 4 September 2023) who have viewed the various ads 569,334 times and engaged with important level crossing safety messaging 63,915 times. This has led to an average engagement rate of 11.23%.

To date, three ads have been promoted as part of the campaign, including TfNSW's 'Obey the signs and signals at level crossings' animation from 28 April to 31 July, which achieved an engagement rate of 16.55%.

Sydney Trains Initiatives

Sydney Trains has a program of level crossing improvements across the network. During 2022-23 key infrastructure improvement initiatives and projects were prioritised using input from ALCAM. Last year Harley Hill Road Berry passive level crossing upgrade project was added to the program. This crossing is the highest risk passive crossing on the Sydney Trains network and will be upgraded with active crossing controls.

Table 6: Sydney Trains level crossing improvements in 2022-23.

Location	Project Scope	Cost
LX ID 359 Harley Hill Road Berry	Scope includes installation of active level crossing controls type F. Significant enabling scope has been delivered including extension of cable route and removals of decommissioned Fern St level crossing signalling infrastructure. Consultation with council is ongoing. The works is continuing in 2023-24 with a scheduled commissioning in June 2024.	$2,979,000
LX ID 437 St James Road Adamstown	Construction of Stage 1A – removal of redundant relays. Design progressing and construction timeline has required close working with council and staging plan. Project to continue, with Stage 1B - Traffic lights integration scheduled for June 2024 and Stage 2 - signals optimisation June 2025 scheduled commissioning.	$188,000
LX ID 434 Rawson Road Woy Woy	Collaboration with TfNSW and council have achieved a revised concept design that would be staged to allow installation of traffic lights later without significant re-work required. Project to continue in 2023-24 a further 2 years for detailed design and construction activities required.	$88,000
	Total	**$3,255,000**

NSW TrainLink Initiatives

NSW TrainLink (NSWTL) is a member of the Level Crossing Strategy Council and its working groups and provides a unique perspective as a Rolling Stock Operator (RSO). NSWTL works constructively with RIMs to address risks and improve safety at level crossings in NSW. In 2022-23 NSWTL participated in a range of initiatives to support safer level crossings including:

- **Regional Events:** Partnering with the TfNSW Level Crossing team to man an expo stand at significant regional events to promote level crossing safety including: AgQuip Field Days at Gunnedah; Henty Machinery Field Days at Henty; Australian National Field Day at Borenore; and the Royal Easter Show.

Figure 16: NSW TrainLink Display at the Royal Easter Show.

- **Warnervale Level Crossing:** Local community campaign letter drop in January 2023 with the Police Transport Command (PTC) for 4-6 weeks to promote level crossing safety. The PTC monitored Warnervale Thursday, Friday and Saturday nights based on reports of regular trespass between the hours of 1800 and 2100. As a result, there has been a reduction of reports of person on tracks in this area.
- **Hamilton Level Crossing:** Hamilton Station is a long-term hotspot for security incidents. Since 2019, NSWTL has implemented several strategies to manage anti-social behaviour and criminal activity at this location. In April 2023, The Hamilton Station Hotel (located directly opposite Hamilton Station) applied for changes to their liquor license conditions which would relax the responsibilities of the venue and inevitably impact the anti-social behaviour and risks at Hamilton Station and pedestrian level crossing access. NSWTL raised concerns by providing comments to the NSW Police submission of the public consultation process of this application.
- **Rail Corridor Vegetation Management:** On the ARTC network there is a high focus on reducing vegetation to improve sighting distances on level crossings. NSWTL meets with ARTC and others regularly to discuss reports of vegetation in the corridor and management of same.

Figure 17: Rail Safety Week at Bellambi railway station.

- **Rail Safety Week at Bellambi Station:** This is a problematic platform/level crossing and has a high number of school students boarding/disembarking services here. The team did a great job setting up a stall and engaging with the local school students to raise awareness around platform and level crossing safety.
- **Clifton Level Crossing:** Uplift of walkways and access across Clifton Level Crossing. The NSWTL team worked in conjunction with local council to have this area improved.
- **Vegetation at Dapto:** There are a high number of near misses being recorded in this area and increased vegetation may obscure pedestrians from seeing oncoming trains. NSWTL cleared vegetation at Avondale Road, Dapto level crossing to give better visibility of signals.

- **Facilitation of Transport Safety Program in local schools:** NSWTL attend schools up and down the South Coast including (but not limited to) – Holy Spirit College (Bellambi), Woonona HS, Corrimal HS, and Albion Park HS. These schools are targeted as the stations near them are our 'high incident' stations. We also reach out to a host of other schools and attend based on availability. The age group targeted is Year 7, 8 & 9 students and on some occasions, we have delivered the program to the whole school.

Level Crossing Speed Zone Reduction Program

The Level Crossing Speed Zone Reduction Program was a joint initiative between LCIP and TfNSW Regional and Outer Metropolitan (ROM) in response to the Speed Limit on Approach to Active Level Crossing Policy and was completed in 2022-23. The Program was implemented to reduce speed limits at active level crossings, as well as the approaches to them, setting the speed limit to a maximum of 80 km/h.

This policy helps to reduce the risk of crashes at level crossings between road vehicles and trains by reducing road speeds on high-speed approaches to actively controlled level crossings. Reducing the road speeds to a maximum of 80km/h allows motorists more time to react and decreases the likelihood of vehicles not being able to stop at level crossings.

ROM commenced the speed change implementation in November 2020 as part of a three-year program. The program was completed in time in June 2023. The new speed zones have been signposted in accordance with speed zoning guidelines and with supplementary railway crossing signage where possible.

Although 2021-22 proved to be a very challenging year, in terms of being able to deliver the program as planned due to COVID impacts, together with the impact of natural disasters, ROM staff were able to accelerate works in 2022-23 completing all sites within the program parameters.

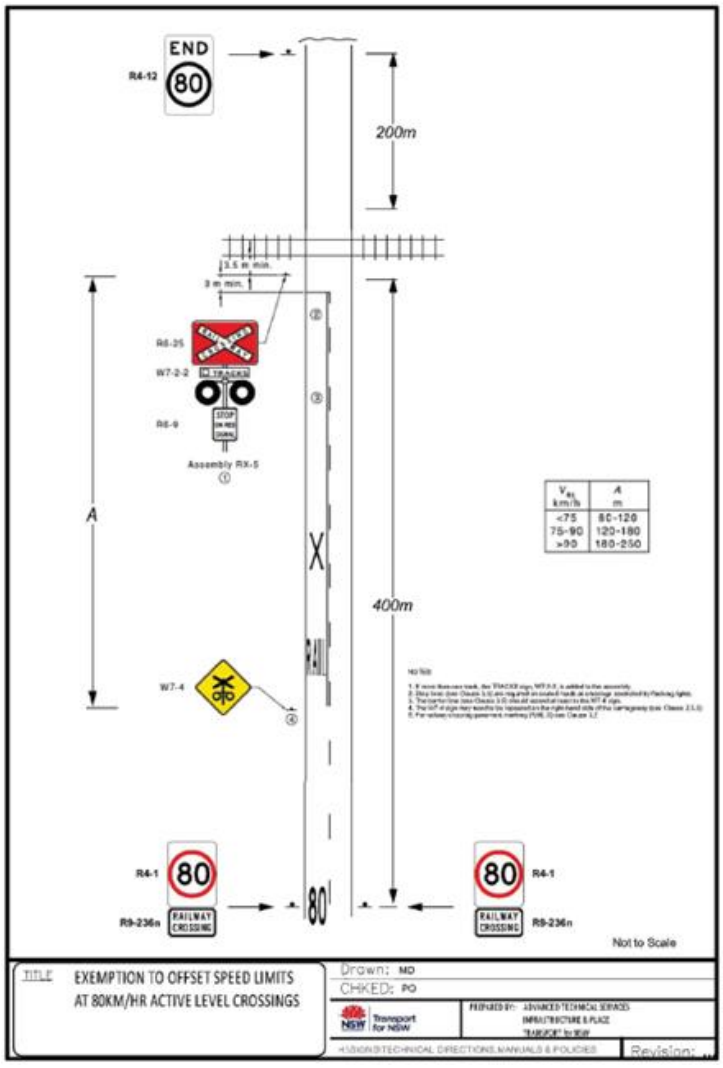


Figure 18: Speed signage layout for active level crossings.

The budget allocated to this program was $1.09M over three years 2020-21 – 2022-23. Costs were to be split equally between LCIP and the ROM Speed Management program, however additional funding became available under LCIP in 2021-22 which resulted in LCIP covering $1,043,469 of costs. The Speed Management Program funded by Community Road Safety Fund contributed an additional $588,220 with the total cost of the program being $1,631,689.

Table 7: Speed reduction at rail level crossing program financial overview.

Region	202021	2021-22	FY 2022-23	Cost
North	$201,805	$115,056	$128,825	$445,686
South	$347,205	$106,986	$226	$454,417
West	$235,083	$264,959	$231,544	$731,586
Totals	**$784,093**	**$487,001**	**$360,595**	**$1,631,689**

At the end of 2022-23 all 103 sites confirmed as meeting the program criteria have had their speed limits reduced including:

- 28 sites completed in the ROM North region.
- 28 sites completed in the ROM South region.
- 47 sites completed in the ROM West region.

While the program is now complete the policy remains in place and will be implemented at individual sites as required as part of business as usual when level crossings are upgraded from passive to active controls. In addition, clear guidance to practitioners has now been provided in the recently released Speed Zoning Standard to provide requirements for the setting of speed zones at level crossings and to ensure the policy continues to be implemented.

Inland Rail Update

The Inland Rail (IR) project is being delivered by the Australian Government through ARTC to provide an enhanced link between Queensland and Victoria to enable freight travelling to Brisbane to bypass the Sydney network. Connecting Melbourne and Brisbane via regional Victoria, New South Wales and Queensland, this 1,700km fast freight network will better link producers to markets and create new opportunities for businesses, industries and regional communities. Approximately 1,000km of the route is in NSW.

Current IR planning includes 54 new public road level crossings across the greenfield sections of Inland Rail in NSW. While Inland Rail will be introducing level crossings along greenfield sections of the project, the overarching objective across the project is to minimise the number of new level crossings through a combination of design or property solutions.

On the brownfield upgrade sections, the project is proactively and successfully pursuing the closure of existing public and private crossings with no proposals to introduce new level crossings. On the first brownfield upgrade project which has been commissioned, Parkes to Narromine (P2N), agreement was reached with landowners to close 14 private level crossings which represents over 40% of all the private level crossings on the P2N project and 1 public road level crossing.

Works commenced on the second brownfield upgrade project, Narrabri to North Star (N2NS) which is 188km long in 2021, with Stage 3 of the project between North Camurra and North Star due to be commissioned in Q4, 2023. Following consultation ARTC will be closing 14 private and 1 public level crossing. Ministerial approval was also received this year to close LX ID 602 Forest Lodge Bethungra, an existing public level crossing near Illabo as part of the Illabo to Stockinbingal project. This is a significant safety outcome for the project, the road and rail networks, and local communities.

Figure 19: A double-stacked freight train at on the upgraded Inland Rail line at Parkes. Picture: ARTC

Environmental approvals are progressing for all IR sections across NSW. The significant milestones achieved this year was that ARTC received environmental approval from the NSW Minister for Planning to progress the North Star to the Qld Border (30km) and the Narromine to Narrabri (300km) greenfield projects.

Interface Agreements

Context

Rail infrastructure managers (RIMs) and Road Managers are obliged to enter into interface agreements for level crossings on public and private roads under Part 3, Division 6 of the Rail Safety National Law (RSNL).

The purpose of the interface coordination provisions of the RSNL is to ensure that all RIMs and Road Managers identify risks to safety arising from level crossings, determine measures to manage those risks so far as is reasonably practicable, and seek to enter into interface agreements to manage the risks. The provisions are intended to ensure that risks arising from level crossings are identified and that accountabilities for risk control measures are clearly articulated.

Interface agreements have been a long-standing requirement since the introduction of the Model Law in 2006 and continued through the RNSL. The Office of the National Rail Safety Regulator (ONRSR) maintains a register of required interface agreements that it is aware of, and routinely follows up with accredited RIMs to monitor the status of such agreements.

Progress

ONRSR regularly engages with RIMs to monitor progress on outstanding interface agreements and also engages with councils as required. As of 30 June 2023, 136 interface agreements have been signed and 37 remain outstanding.

Note that these figures cover the three major RIMs only – ARTC, UGLRL (CRN) and Sydney Trains. Outstanding interface agreements for the CRN, which were excluded from last year's count are now included.

Table 8: Outstanding interface agreements in NSW as of 30 June 2023.

Summary of interface agreement implementation	
Agreements required in NSW	173
Agreements outstanding in NSW	37

Funding for Level Crossings in NSW

Table 9 provides a summary of the total expenditure on level crossing safety improvements in NSW since 2003-04 through to 2022-23.

Table 9: Funding for level crossing safety improvements in NSW from 2003-04 to 2021-22.

Year	Program Agency	Expenditure $ million	Total $ million	Year	Program Agency	Expenditure $ million	Total $ million
2003-04	CRIA	2.00	5.00	2004-05	LCIP	5.00	5.00
	LCIP	3.00					
2005-06	RailCorp	1.30	7.30	2006-07	RailCorp	2.40	11.33
	LCIP	6.0			ARTC	1.65	
					CRIA	0.28	
					LCIP	7.00	
2007-08	RailCorp	2.65	18.49	2008-09	RailCorp	2.81	18.03
	ARTC	6.90			ARTC[1]	2.47	
	CRIA	1.94			CRIA	4.53	
	LCIP	7.00			RTA	2.94	
					LCIP	5.28	
2009-10	RailCorp	3.27	59.77	2010-11	RailCorp	3.60	15.94
	ARTC[1]	42.77			ARTC	1.65	
	CRIA	3.87			CRIA	3.37	
	RTA	3.30			LCIP[2]	7.33	
	LCIP	6.57					
2011-12	RailCorp	3.20	42.69	2012-13	RailCorp	1.90	24.65
	ARTC	29.21			ARTC	12.90	
	CRIA	2.88			CRN	1.04	
	LCIP[3]	7.40			RMS	1.30	
					LCIP[4]	7.51	
2013-14	Sydney Trains	1.80	20.85	2014-15	Sydney Trains	2.78	19.62
	ARTC	8.17			ARTC	5.36	
	CRN	2.82			CRN	1.16	
	RMS	0.46			RMS	3.05	
	LCIP[3]	7.60			LCIP[3]	7.27	
2015-16	Sydney Trains	1.96	16.70	2016-17	Sydney Trains	2.94	29.21
	ARTC	3.88			ARTC	3.03	
	CRN	3.79			CRN	12.70	
	LCIP	7.07			RMS	3.26	
					LCIP	7.28	
2017-18	Sydney Trains	0.11	13.16	2018-19	Sydney Trains	1.55	21.57
	ARTC	2.00			ARTC	3.87	
	CRN	4.71			CRN	8.10	
	LCIP	6.34			RMS	0.48	
					LCIP	7.57	
2019-20	Sydney Trains	1.62	30.31	2020-21	Sydney Trains	3.67	21.58
	ARTC	5.52			ARTC	3.33	
	CRN	15.59			CRN	7.10	
	LCIP	7.58			LCIP	7.48	
2021-22	Sydney Trains	0.81	13.43	2022-23	Sydney Trains	3.26	8.46
	ARTC	4.99			ARTC	3.28	
	CRN	4.42			CRN	0	
	LCIP	3.21			LCIP	1.92	

[1] One-off funding for the Boom Gates for Rail Crossings Program was provided as part of the Commonwealth Government's Nation Building Program.
[2] Includes $2 million funding provided from the former RTA.
[3] Includes $2.5 million provided by RailCorp and $4.8 million provided by RMS
[4] Includes $2.5 million provided by RailCorp and $5.0 million provided by RMS

Appendix A: Total LCIP 2022-23 Work Completed

Table 10: Total LCIP 2022-23 work completed.

Construction Projects		
Location	Electorate	Cost
LX ID 370 Goldfields Way Old Junee	Cootamundra	$65,401
LX ID 686 Overshot Road Euchareena	Dubbo	$180,999
LX ID 705 Beni Street Wongarbon	Dubbo	$84,535
LX ID 980 Akuna Road Parkes	Orange	$27,878
LX ID 951 Convent Lane Borenore	Orange	$193,650
LX ID 1807 Turanville Road Togar	Upper Hunter	$25,200
	Sub Total	**$577,663**
Other safer level crossings initiatives		
Location		Cost
Level Crossing Education and Enforcement Campaigns		$874,307
Error! Reference source not found. Data Collection		$404,515
NSW's contribution to the NLCSC work program		$61,100
	Sub Total	**$1,339,922**
	Total	**$1,917,585**

Appendix B: Expenditure on level crossing safety initiatives in NSW funded through the LCIP and by RIMs and Road Manager 2016-17 to 2022-23

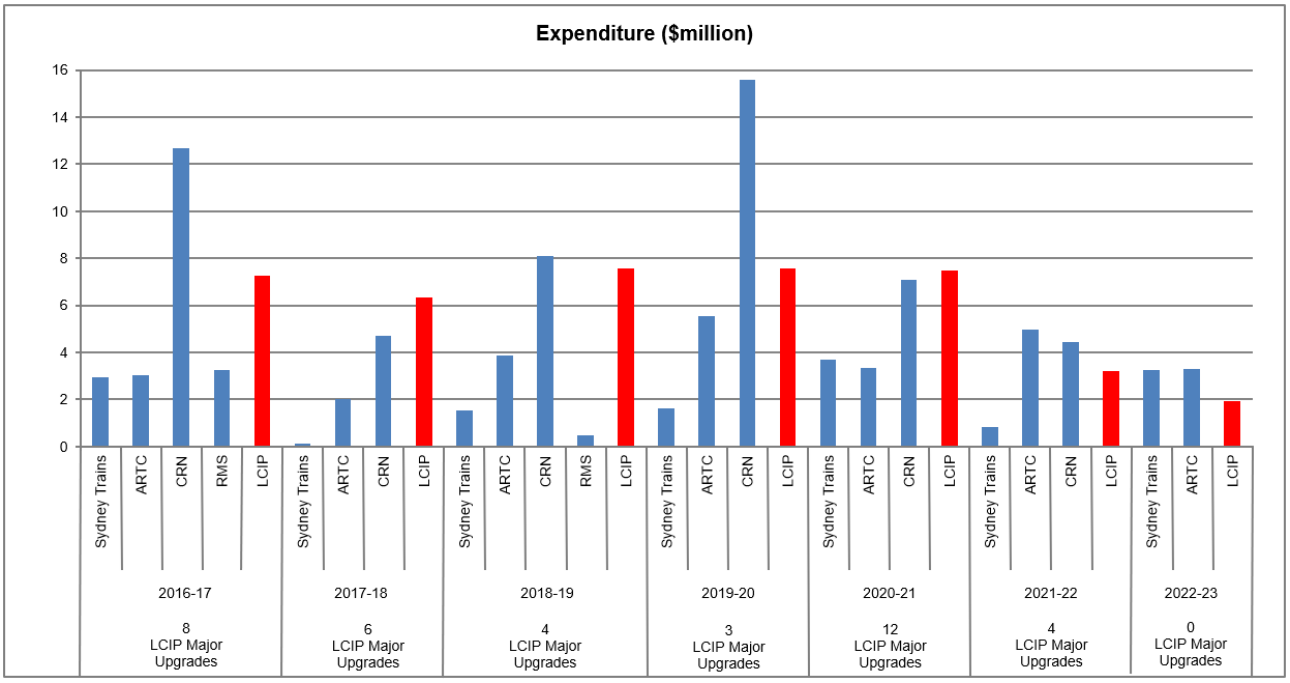
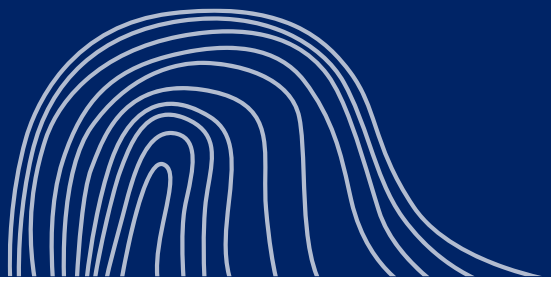


Figure 20: Expenditure on level crossing safety initiatives in NSW funded through the LCIP and by RIMs and Road Manager 2016-17 to 2022-23.



NSW GOVERNMENT