



Transport
for NSW

Centre for Road Safety

Oxley Highway

Route Safety Review



July 2015



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Overview



The Oxley Highway, Highway 11, is 516 km long. It commences at Port Macquarie on the mid north coast and terminates at the junction of the Mitchell Highway at Nevertire in the central west of NSW.

In 2013 a route safety review was conducted on the section of the highway from the junction of the Pacific Highway west of Port Macquarie to the junction of the Mitchell Highway at Nevertire, a distance of approximately 506 km. The section of the Oxley Highway east of the Pacific Highway was not covered by the review. It has had recent major engineering improvements with dual carriageways now provided over its full length.

The Oxley Highway is a major east west transport route linking the mid north coastal regions to the central western regions of NSW. It also provides access to three major north-south transport routes, the Newell, New England and Pacific Highways. It is one of the highways between Sydney and the Queensland border that cross the eastern escarpment. The Oxley Highway is also the major link between the large rural cities of Tamworth and Armidale in the west to Port Macquarie and Taree in the east. Funding for the highway is generally a State Government responsibility.

The road is a two-way single carriageway highway. The eastern section of the highway is characterised by steep grades, winding and often narrow alignment. The central part of the highway traverses undulating country side while the far western section is typified by a much flatter terrain. The route safety review length of the Oxley Highway passes through the major rural centres of Wauchope, Walcha, Tamworth, Gunnedah, Gilgandra and Warren.

Over the past 13 years (2000 -2012p) 1044 casualties have been reported from 805 casualty crashes on the Oxley Highway. Of the 1044 casualties, 37 people were killed and 1007 persons were injured.

The Oxley Highway route safety review followed the model adopted for previous route reviews:

- Pacific Highway (2004).
- Princes Highway (2004).
- Newell Highway (2007).
- Great Western, Mid Western, Mitchell Highways (CENWEST review) (2010).
- New England Highway (2010).
- Kings Highway (2012).
- Appin Road (2013).

The model used for route safety reviews aims to recommend road safety treatments that are known to be effective and can be implemented without major engineering works.

The Oxley Highway route safety review was established to examine and report on the following road safety issues:

- The circumstances surrounding fatal crashes and other casualty crash cluster locations.
- General road conditions along the highway and particular road safety issues raised by the community and stakeholders at community consultation workshops.
- Facilities, such as intersection treatments, safety barriers, signage, line marking and the configuration of overtaking lanes along the highway.
- The appropriateness of current speed limits and speed zones.
- Issues associated with driver behaviour such as speeding and fatigue.
- Enforcement activities.
- Future priorities for rehabilitation and maintenance programs and the way in which road safety outcomes can be integrated into these programs, especially at high risk locations.

A range of analyses, community engagement and highway inspections were undertaken during the review. These included:

- Analysis of reports on fatal crashes.
- Analysis of crash trends such as severity, crash type and crash factors.
- A desk based review of the Oxley Highway which included the use of Roads and Maritime Services (RMS) GIPSI-CAM (Global/Inertial Positioning System and Image Capture for Asset Mapping) system to review areas of highway road environment that require closer scrutiny.
- Community consultation workshops held in Wauchope, Walcha, Tamworth Gunnedah and Warren to obtain details of specific road safety issues along the highway for further investigation.
- Physical inspections of the highway to examine the locations and circumstances of fatal crashes, casualty crash cluster locations, speed limits and speed zones and road safety issues identified by the community. The inspections also assessed the road from both a behavioural and road environment perspective.

The review adopted the Safe Systems approach. This approach aims to influence the behaviour of road users, but acknowledges that people will inevitably make mistakes. It requires the system to anticipate and 'forgive' driver error. Consequently, a safe road environment (road and roadside) is integral to managing and improving road safety outcomes.

Based on the above analysis, a road safety strategy for the Oxley Highway has been developed. The goal of this strategy is to achieve a substantial reduction in the incidence and severity of road crashes on the Oxley Highway.

The following components have been developed to support this goal:

- Safer operation of the highway through targeted road safety engineering improvements.
- Reviewing and upgrading signage, safety barriers and line marking.
- The identification of targeted improvements for higher risk locations, particularly with regard to improving clear zones.
- Reassessing speed limits and speed zones for consistency along the route and to ensure that the limits are appropriate to the road environment and in accordance with the RMS NSW Speed Zoning Guidelines.
- Managing inappropriate speed and speeding, driver fatigue, motorcycle safety and the enforcement of speed limits.
- Address driver fatigue.

The following programs underpin these components.

Road safety engineering program

The route safety engineering program is prioritised based on risk. It aims to address issues such as reducing the impact of head on and run off road crashes, inadequate clear zones, substandard road alignment, narrow road shoulders, inconsistent signage, inconsistent line marking arrangements and the lack of suitable facilities at some intersections.

Typical treatments include:

- Improvements to clear zones, especially on the coastal escarpment and on some sections west of Tamworth. This includes a safety barrier review and upgrade to ensure that adequate protection from roadside hazards is provided.
- Improvements to the road alignment at several locations to reduce the potential for serious crashes on curves by providing wider sealed road shoulders.
- Review and upgrade junction treatments at key locations to ensure that suitable and adequate facilities are provided, particularly in high speed zones.
- Review speed zones to ensure speed limits are suitable for the road environment. This will help to provide a consistent application of speed zones along the highway in accordance with RMS NSW Speed Zoning Guidelines.
- Identify and develop suitable roadside enforcement sites that meet technical and safety requirements. This will allow RMS and the NSW Police to undertake enforcement activities.
- Review and upgrade signposting and line marking to ensure that it is consistent along the highway.

Road user behaviour program

The road user behaviour program is designed to address issues such as speeding, driver fatigue and motorcycle safety with initiatives including:

- Maintaining and strengthening Oxley Highway road safety partnerships.
- Stronger emphasis on motorcycle awareness and safety.
- Investigating the potential for additional informal pull over bays.
- Continuing community education campaigns.

Enforcement program

The enforcement program is designed to address speeding, drink driving and general compliance to road transport regulations for both light and heavy vehicle drivers. The initiatives include:

- Increasing the profile of police speed enforcement.
- Undertaking police speed enforcement operations.
- Provision of safe enforcement infrastructure.



Photograph 1.2: Timbumburi Creek, Tamworth

Section 1

Introduction



1.1.1 Description of the highway

The Oxley Highway, Highway 11, is 516 km long. It commences at Port Macquarie on the mid north coast and terminates at the junction of the Mitchell Highway at Nevertire in the Central West of NSW.

The majority of the highway is a two-way single carriageway. The highway traverses heavily timbered coastal regions, with steep winding grades through the eastern escarpment west of Wauchope. The environment changes on the central slopes and tablelands with a more undulating countryside dominated by rural farming. The road characteristics also change with less severe grades and larger radius curves. The Central Western plains section of the highway is generally flat with large radius curves, wider shoulders and clear zones. The farming landscape is more generally characterised by cropping practices.

For the purposes of the route safety review, the highway was divided into 6 sections as shown in the table below.

The sections of the highway are generally of similar length, except for section 1, and have been identified for their distinctive topography, traffic characteristics and crash profile, including road alignment. For example the section of the highway west of Gunnedah has a straighter alignment and flatter grades in contrast to the steep winding grades on the eastern escarpment west of Wauchope.

Traffic volumes peak near the major town centres, especially Tamworth and Wauchope. The section of the highway east of Wauchope also experiences higher traffic volumes, influenced by the larger populations on the coastal regions. This section of the highway has also experienced the development of large rural subdivisions, driven by a demand from Port Macquarie and to a lesser extent Wauchope. Tourism also has a stronger impact on traffic volumes near the coastal regions of the highway.

TABLE 1.1: Sections of the highway

Section	From	To	KM	LGA
Wauchope	Pacific Highway(west of Port Macquarie)	Wauchope	12	Port Macquarie/ Hastings
Escarpment	Wauchope	Yarrowitch (60 km east of Walcha)	106	Port Macquarie/ Hastings & Walcha
Walcha	Yarrowitch (60 km east of Walcha)	New England Highway (near Bendemeer)	104	Walcha
Tamworth	New England Highway at Tamworth	Kamilaroi Highway at Gunnedah	77	Tamworth
Gunnedah	Kamilaroi Highway at Gunnedah	Newell Highway, north east of Coonabarabran	101	Gunnedah & Warrumbungle
Warren	Newell Highway at Gilgandra	Mitchell Highway at Nevertire	106	Gilgandra & Warren
		Total	506	

1.1.2 Background

Since the turn of the century (2000 to 2010) NSW has experienced a significant downward trend in crashes and casualties, particularly for fatalities. In 2000 there were over 600 persons killed on NSW roads and by 2010 the road toll had been cut by 33 per cent. The 2008 road toll of 374 fatalities was actually the lowest annual total recorded for NSW since 1944. The number of injuries and recorded crashes on NSW roads also showed improvements, decreasing by around 15 per cent and 20 per cent respectively between 2000 and 2010.

The Oxley Highway has not experienced a similar trend. The number of fatalities since 2000 peaked in 2005 (five killed) and 2006 (six killed) and again in 2012 (six killed). The number of casualty crashes did trend downward slightly from 2008.

Safer Roads are an important component of the Safe System approach to road safety, with the Safer Roads Program serving as a vital tool for meeting the targets set out in the NSW Road Safety Strategy 2012-2021.

Route Safety Reviews form part of the NSW Safer Roads Program, this program is funded through the Community Road Safety Fund to specifically mitigate known and potentially severe crash locations.



Photograph 1.3: The Oxley Highway near Walcha

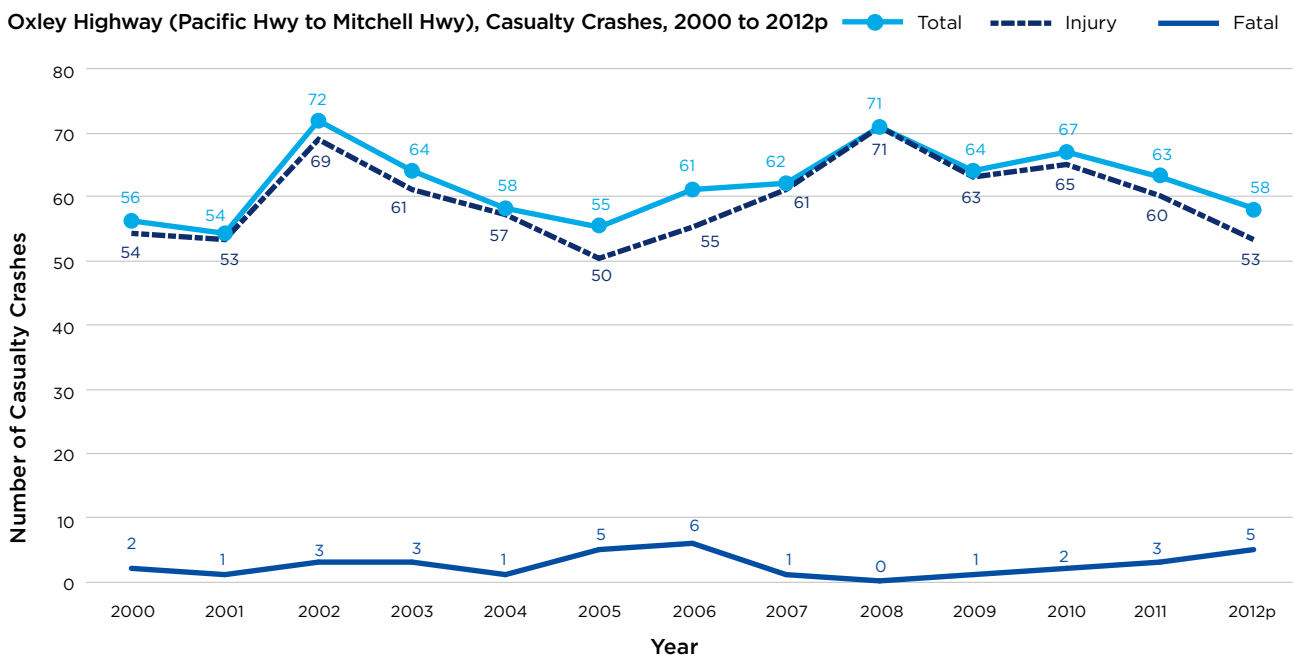


FIGURE 1.1: Oxley Highway casualty crashes 2000 to 2012p

Oxley Highway, fatalities and casualties 2000 to 2012p

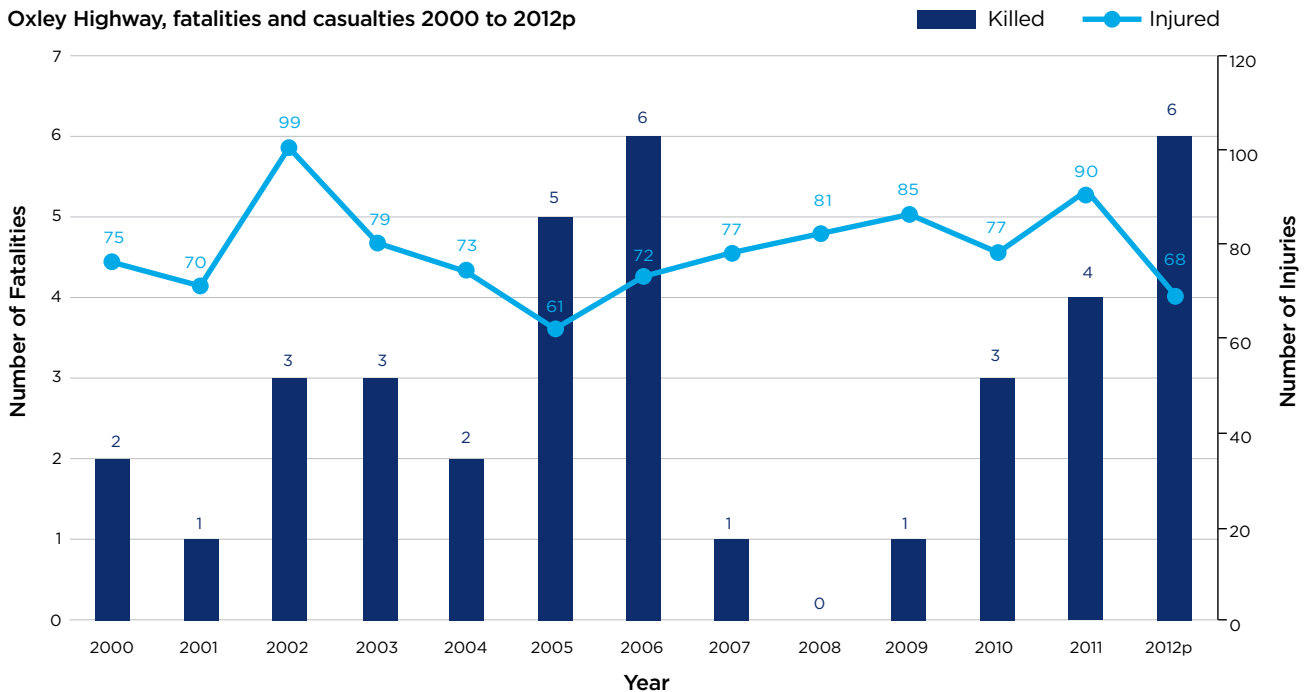


FIGURE 1.2: Oxley Highway fatalities and casualties 2000 to 2012p

1.1.3 Terms of reference

The Oxley Highway route safety review was established to review the length of the highway from the junction of the Pacific Highway, west of Port Macquarie, to the junction of the Mitchell Highway at Nevertire. The purpose of the review was to undertake a holistic assessment of road safety conditions along the highway and to investigate and report on the following:

- The circumstances surrounding fatal crashes.
- The circumstances surrounding crash cluster locations.
- Road safety issues advised by the community at community consultation workshops.
- The appropriateness and consistency of speed limits.
- The appropriateness and consistency of linemarking, signposting and delineation.
- Driver behaviour issues.
- Police enforcement issues.
- Future priorities for highway rehabilitation and maintenance programs.

1.1.4 The review process

Since 2004, highway reviews have been undertaken by RMS to improve road safety along key transport corridors. Previous reviews include the Pacific Highway (2004, 700 km), Princes Highway (2004, 430 km), Newell Highway (2007, 1060km), CENWEST review (Great Western, Mid Western, Mitchell Highways) (2010, 700 km) the New England Highway (2010, 600 km) and the Kings Highway (2012, 117 km).

The approach to this highway route safety review was multidisciplinary and engages people from the Centre for Road Safety (CRS) and RMS road safety, road user behaviour and asset management areas. It also involved representatives from NSW Police, NRMA and the community. A holistic approach is taken and the highway reviewed as a system following the methodology of the Safe Systems approach.

The objective of the Oxley Highway route safety review is to reduce the occurrence and severity of road crashes. Road safety issues have been identified and recommendations developed. Targeted road safety engineering, behavioural and enforcement programs should be implemented.

A safe road environment (road and roadside) is integral to managing and improving road safety outcomes. The Oxley Highway review examined:

- Fatal crash and other casualty crash cluster locations.
- Delineation and line marking, especially around curves.
- Clear zone issues.
- Low radius curves.
- Junction geometry and delineation.
- Narrow road shoulders.
- Speed zones.
- Regulatory, warning and advisory sign posting.
- Pedestrian and cyclist facilities.
- Heavy vehicle issues.
- School bus operations and the location of school bus stops.

Highway field inspections were undertaken in November 2013. The inspections were undertaken by a team of road safety engineering, road user behaviour and asset management practitioners from CRS and RMS. Representatives from the NSW Police, NRMA and four community representatives were also present on various sections of the highway.

The team inspected the locations of fatal crashes and crash clusters to determine the contribution of road environment factors to the crashes.

The team also reviewed and documented other road environment issues which were observed or raised during the consultation process.

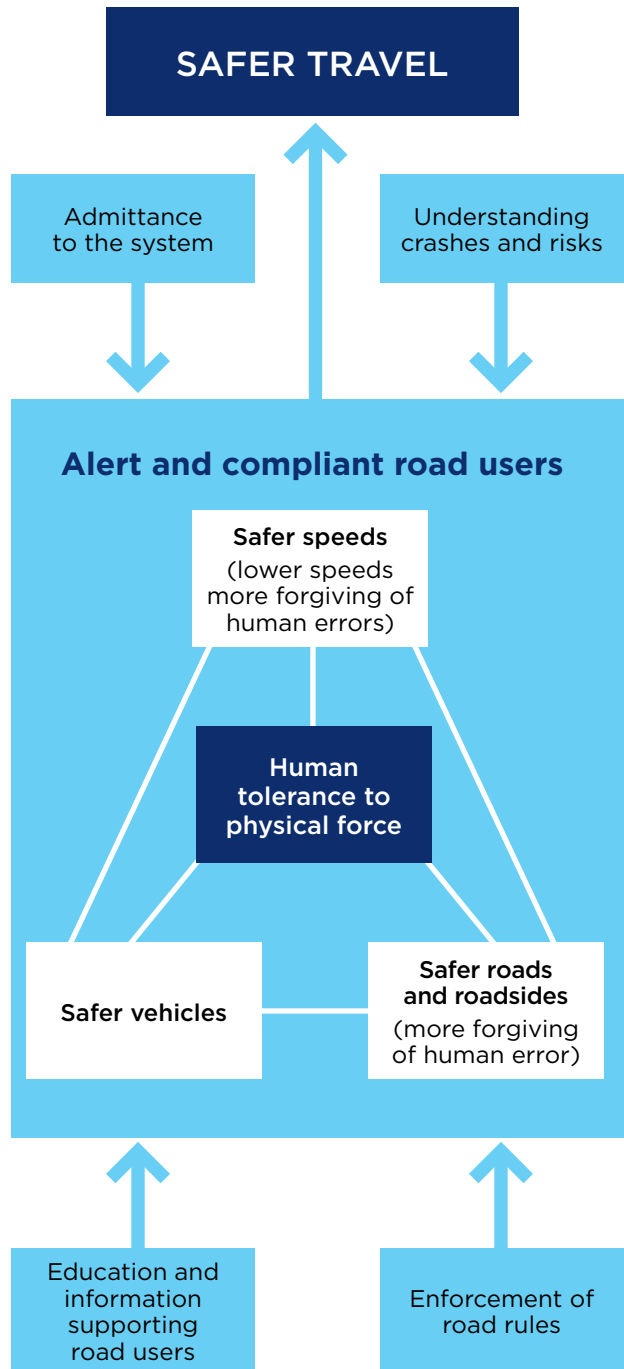
The analyses and highway inspections undertaken as part of the review included:

- Review of fatal crash reports and crash trends such as severity, crash type and crash factors.
- Review of information provided at the community consultation workshops.
- Physical inspection of the highway by the assessment team to examine the location and circumstances of fatal crash and casualty crash clusters and to assess any possible road environment contributing factors.

1.1.5 Safe System approach

The Safe Systems approach is adopted in highway route safety reviews. The approach recognises that a highway is a system with many inputs: the vehicle, the driver and the road environment. The Safe Systems approach aims to promote safe travel, yet recognises that drivers will make mistakes. However these mistakes should not result in serious injury or death. The system aims to provide a roadside environment that responds to driver error and reduces the occurrence and severity of road crashes. Figure 1.3 is a representation of the Safe Systems approach.

FIGURE 1.3: Safe System approach



1.2 Community and stakeholder engagement

Prior to the highway field inspections, community members and stakeholders were invited to submit comments for the Oxley Highway route safety review from 21 October to 13 December 2013.

As part of the review, CRS sought community comments on the:

- Locations on the Oxley Highway where there is a perceived road safety problem.
- Locations of near miss or unreported crashes.
- General road safety concerns on the Oxley Highway.

Community members and stakeholders could participate in the review by:

- Posting comments on the online community engagement website.
- Submitting written comments via mail or email.
- Telephoning.
- Attending community engagement workshops.
- Attending field inspections.
- Meeting with project team members.

1.2.1 Objectives

The objectives of the community and stakeholder engagement were to:

- Inform the community and other relevant stakeholders about the review and its scope.
- Present the road safety issues to be considered by the Oxley Highway route safety review.
- Gain an understanding of the local issues relating to road safety along the Oxley Highway.
- Manage community expectations.
- Use the information gathered from the workshops and the online community engagement website to further inform the review.

1.2.2 Community engagement workshops

The following community engagement workshops were held:

Warren Monday, 4 November 2013 (afternoon)

Gunnedah Tuesday, 5 November 2013 (midday)

Tamworth Tuesday 5 November 2013 (evening)

Walcha Wednesday 6 November 2013 (evening)

Wauchope Thursday 7 November 2013 (evening)

1.2.3 Community and stakeholders

- Local council staff and elected representatives.
- State and federal members of parliament.
- Road safety associations and committees.
- Emergency Services:
 - NSW Police Force.
 - NSW Fire Brigade.
 - NSW Ambulance Service.
 - NSW State Emergency Service.
 - NSW Rural Fire Service.
- NRMA.
- Local chambers of commerce.
- Local bus company operators.
- Local heavy vehicle freight operators.
- Members of the public, including residents of:
 - Warren
 - Gilgandra
 - Coonabarabran
 - Gunnedah
 - Tamworth
 - Walcha
 - Wauchope.
- Heritage associations.
- Local tourist associations.
- Transport for NSW (TfNSW) representatives from the CRS.
- RMS representatives from:
 - Community and Stakeholder Engagement
 - RMS Northern Region
 - RMS Western Region.

1.2.4 Contacting community members and stakeholders

For the purpose of the Oxley Highway route safety review, RMS and the CRS used a number of tools to inform and involve the community.

Figure 1.4 is an example of advertising for the Community engagement workshops.

NSW GOVERNMENT | **Transport for NSW**

Oxley Highway route safety review Community workshops

Transport for NSW is about to start a Route Safety Review of the Oxley Highway. Before we start we invite you to information workshops, run by Roads and Maritime Services and the Centre for Road Safety, to learn about the review and discuss any local road safety issues along the highway.

Come to the Wauchope workshop to learn about the review and to discuss any local road safety issues along the highway.

Where: Wauchope Country Club,
21 King Street Wauchope

When: Thursday 7 November 2013,
6:30pm to 8:30pm (doors open at 6pm).

For catering and room set-up purposes please register for the Wauchope workshop by contacting Prudence Burke on 131 782 or email oxleysafetyreview@rms.nsw.gov.au

We appreciate your feedback and look forward to seeing you there.

For more information about the workshops contact Prudence Burke on 131 782, email oxleysafetyreview@rms.nsw.gov.au or visit rms.nsw.gov.au

FIGURE 1.4: Community engagement workshop advertisement

The following tables provide details of the dates and types of communications used to disseminate information.

TABLE 1.2: Communications in October 2013

October 2013

Date	Communications/ consultation activity	Subject
22 October	Media release	Announcement of the Oxley Highway route safety review
22 October	Route safety review webpage established	
22 October	47 Letters to stakeholders	Detailing information and encouraging participation in the route safety review.
23 October to 7 November	170 Telephone calls to stakeholders	Detailing information and encouraging participation in the route safety review.
23 October to 7 November	87 Emails to stakeholders	Detailing information and encouraging participation in the route safety review.
23 October	Advertisement in the Port Macquarie News	Advertisement for community engagement workshop
23 October	Advertisement in the Tamworth Northern Daily Leader	Advertisement for community engagement workshop
24 October	Opening of community engagement website	Commencement of consultation period, interactive mapping tool
24 October	Advertisement in the Walcha News	Advertisement for community engagement workshop
24 October	Advertisement in the Namoi Valley Independent	Advertisement for community engagement workshop
31 October	Advertisement in the Coonabarabran Times	Advertisement for community engagement workshop

TABLE 1.3: Communications in November and December 2013

November and December 2013

Date	Communications/ consultation activity	Subject
4 November	Warren community engagement workshop (afternoon)	Invitation to participants to join the field inspection team
5 November	Gunnedah community engagement workshop (midday)	Invitation to participants to join the field inspection team
5 November	ABC local radio Tamworth.	Advertisement for community engagement workshop
5 November	Tamworth community engagement workshop (evening)	Invitation to participants to join the field inspection team
6 November	Walcha community engagement workshop (evening)	Invitation to participants to join the field inspection team
7 November	Wauchope community engagement workshop (evening)	Invitation to participants to join the field inspection team
7 November	Wauchope businesses 'Door Knock' (morning and afternoon)	Over 50 businesses door knocked to provide information and encourage attendance at workshop
18 November	Website update	Workshop powerpoint presentation made available
26-28 November	Field inspections	Conduct field inspection with community and stakeholder participants
13 December	Website update, closure of community engagement website	Confirm end of submissions and interactive mapping tool

Submissions

Community Engagement website

The community engagement website used a collaborative mapping tool – an online application used in a standard internet browser. It used Google maps to enable community members and stakeholders to pinpoint locations and identify issues on the Oxley Highway they thought should be considered by the route safety review.

The tool was used to allow people to engage with the review and provide information directly. It expanded the reach of the community engagement.

Figure 1.5 shows the online collaborative mapping tool on the community engagement website

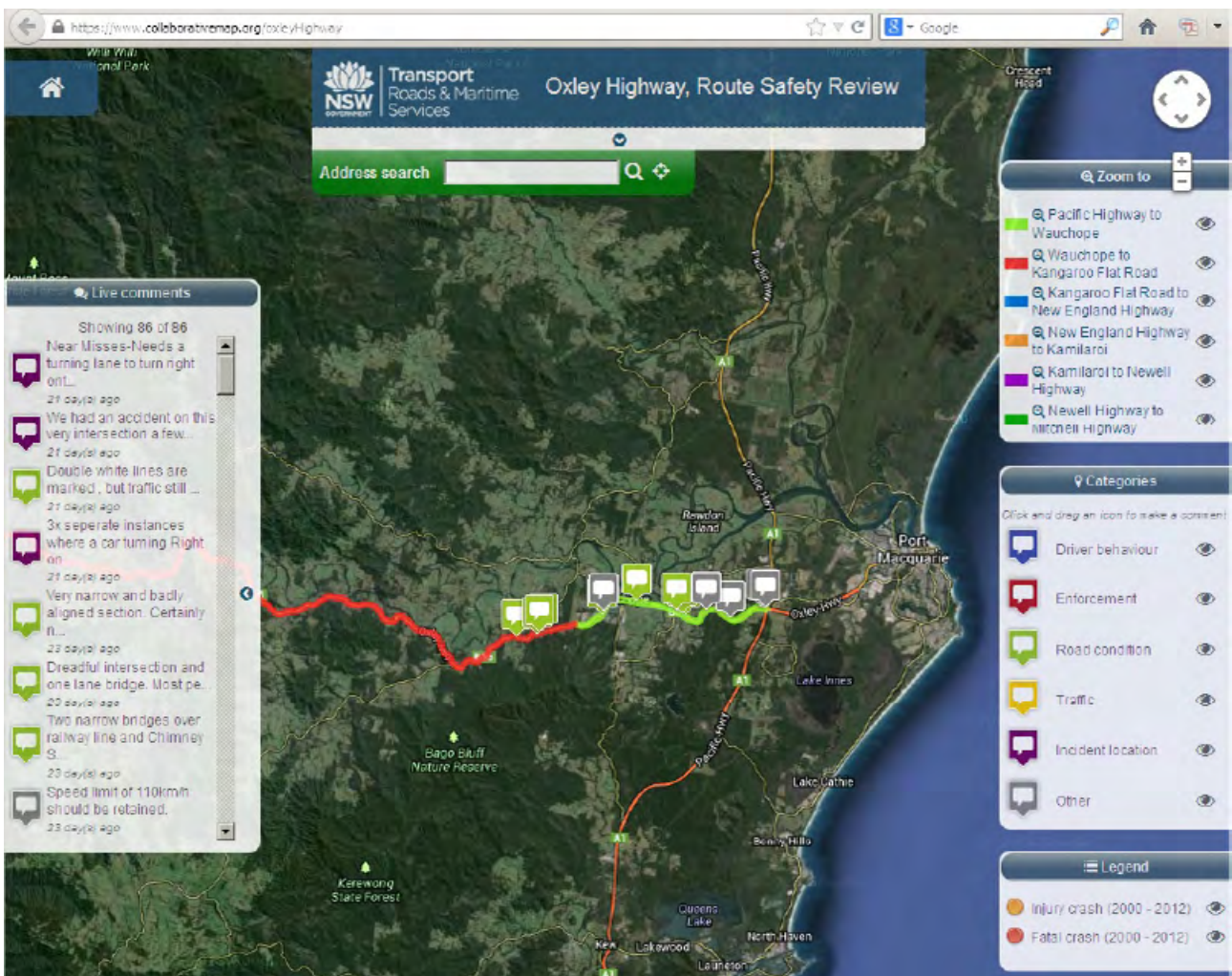


FIGURE 1.5: Online collaborative mapping tool on the community engagement website

All the community submissions and comments posted on the community engagement website, together with email, written and phone submissions, were compiled and documented in the Collaborative Community Mapping Report.

All participants in the field inspections were made aware of the community issues that had been raised. Locations of concern identified by the community using the community engagement website and included in the Collaborative Community Mapping Report were considered as part of the field inspections.

The Collaborative Community Mapping Report is available online and the contents will help to inform the recommendations of the Oxley Highway route safety review.

Telephone and written submissions

Telephone, email and postal submissions were accepted from community members and stakeholders who wished to provide more detailed submissions to the review.

Community engagement workshops

Workshops were held to provide community members with further information regarding road safety issues on the Oxley Highway and the objectives of the route safety review.

The workshops also provided feedback from local residents to CRS and RMS. This was used to inform the field inspection team and influence the direction of recommendations for the Oxley Highway route safety review.

Community engagement workshops were held in:

- Warren Sports Club – 4.00pm Monday 4 November 2013.
- Gunnedah Civic Theatre – 11.30am Tuesday 5 November 2013.
- Tamworth Quality Motel – 6.30pm Tuesday 5 November 2013.
- Walcha Aspley Hotel – 6.30pm Wednesday 6 November 2013.
- Wauchope Country Club – 6.30pm Thursday 7 November 2013.

At the workshops CRS and RMS gave presentations on the:

- Background and scope of the Oxley Highway route safety review.
- Overview of the crash data analysis.
- Significant issues from the analysis.

The workshops were conducted as a round table discussion, with representatives from CRS and RMS using the collaborative online mapping tool to record the community comments.

The presentation and meeting notes from the workshops are available online. Community issues recorded in the meeting notes were referred to in the field inspections and helped to inform the recommendations for the route safety review.



Photograph 1.4: Community feedback, Wauchope community engagement workshop



Photograph 1.5: Community feedback, Walcha community engagement workshop

Field inspections

One community participant, three local government representatives, a representative from NSW Police and the NRMA joined CRS and RMS staff for the Oxley Highway route safety review field inspections. The field inspections were held over a three day period from Tuesday 26 November to Thursday 28 November 2013.

The field inspections initiated the technical investigations to identify the road safety issues on the Oxley Highway. The field inspection investigations were determined by the:

- Locations of fatal crashes.
- Locations of casualty crash clusters.
- Oxley Highway and road safety knowledge from the field inspection team.
- Safety issues and locations identified by the community during the consultation period.

1.2.5 Key issues raised

Comments posted on the community engagement website and made at the community workshops focussed on road safety on the length of the Oxley Highway from the Pacific Highway to the Mitchell Highway. The key road safety issues raised by the community at the workshops are summarised below.

Engineering issues

Road design

- Access and limited vision to some properties was raised as a safety issue.
- Some submissions focussed on the need to provide adequate clear zones.
- Many submissions were concerned with intersection design and the need to provide turning lanes.
- Submissions concerning curves at the end of some straights on the eastern escarpment were raised as a road safety issue. It was suggested that these curves had higher crash rates.

- Other submissions suggested the installation of pull over bays on the eastern escarpment for slower vehicles to allow other vehicles to overtake. It was suggested that the bays should be supplemented with signposting encouraging slower drivers to pull over.
- The need to install overtaking lanes on the section of road between Tamworth and Gunnedah was raised as an issue.
- Some submissions raised the issue of poor sight distance at some intersections including, King Creek Road, Rawdon Island Road, Blackbutt and High Streets near Wauchope.
- Many submissions related to the roundabout on the Pacific Highway and the vegetation that obscured sight distance. Concerns were also expressed with directional signposting and the need to clearly mark lane turning movements at the roundabout.
- Submissions suggested that some curves west of Gunnedah had adverse crossfall that affected large heavy laden trucks.
- One submission suggested a realignment of the full length of the eastern escarpment.

Road alignment and width

- The road alignment and width were significant issues raised in relation to the section of highway between the Pacific Highway and the New England Highway.
- Some submissions related specifically to road alignment issues in the vicinity of Rawdon Island Road.

Safety barriers

- Some submissions raised the issue of unprotected steep drop-offs between Wauchope and Walcha.
- Specific issues were raised concerning the need for safety barriers on the series of curves east of Surveyors Creek at Walcha Road.

Bridges

- The majority of submissions relating to bridges mentioned the need for widening.
- Some submissions were concerned with bridges being located at or too close to curves.
- Some submissions mentioned the bridge over Surveyors Creek at Walcha Road and the need to reassess the existing treatment, including the nearby road junctions.



Photograph 1.6: Western approach to Chimney Swamp Creek west of Walcha

Road condition

- Many submissions discussed the need for stronger maintenance regimes to address pavement failures.
- There were many submissions concerned about the amount of loose material on the pavement, especially on the eastern escarpment. This was a particular concern for motorcyclists.

Linemarking

- Some submissions raised the issue of sections of centreline marking that allowed overtaking when forward sight distance was inadequate.



Photograph 1.7: Centreline marking permitting overtaking around curve

Illumination

- The issue of large vehicles accessing the highway at night, particularly during the cotton season, was raised as a road safety concern as the vehicles are difficult to see.

Railway level crossings

- Submissions suggested that sight distances to and along some railway level crossings was limited.

Behavioural issues

Fatigue

- Concerns were raised about fatigue related crashes and considered that shift workers in the Tamworth and Gunnedah areas were most at risk.
- Other submissions suggested that fatigued drivers were travelling between Tamworth and Gunnedah following a late night out.
- Submissions suggested the need for additional rest areas to encourage fatigued drivers to take rest breaks.

Alcohol

- There were a number of submissions raised concerning people drink driving between Tamworth and Gunnedah especially late at night.

Speed

- Submissions were received concerning drivers and riders disobeying speed limit signposting and travelling at high speeds in the rural areas.
- Inappropriate speed in built up areas, particularly Wauchope, was raised as a road safety issue.

General driver behaviour

- Many concerns were raised about drivers overtaking vehicles that were slowing to make right hand turns.
- Vehicles were often on the incorrect side of the road, mainly on curves through the eastern escarpment.
- Some submissions were critical of drivers overtaking over double unbroken centrelines.

Enforcement issues

Enforcement bays

- The installation of Police enforcement bays was suggested as a possible option to help reduce speed related crashes on the eastern escarpment.

Police presence

- Some submissions considered that there should be an increase in police presence on the Oxley Highway particularly between Tamworth and Gunnedah and on the eastern escarpment.

Traffic and pedestrian issues

Traffic volumes

- Submissions suggested that traffic volumes were increasing between Tamworth and Gunnedah, particularly commuter traffic, and the need to provide for these increases should be reflected in the design of the road.

Pedestrian safety

- Concerns were raised about the existing pedestrian facilities in Wauchope. They were considered to be unsafe and needed improvement.
- Submissions were received relating to vehicles illegally crossing unbroken lines, putting school children at risk in the vicinity of Westdale Public School.

General issues

- The lack of mobile phone coverage was raised as a significant issue on sections of the Oxley Highway.



Photograph 1.8: Loose material often falls onto the pavement through the eastern escarpment

Section 2

Route analysis



2.1 The highway in context

The Oxley Highway is a major east-west corridor link from the mid-north coast to the central west of NSW. It is the major link between Port Macquarie and Wauchope in the east to Walcha and Tamworth on the central tablelands and Gunnedah, Gilgandra, Warren and the Mitchell Highway in the central west.

The highway is broken by the New England Highway, west of Walcha through to Tamworth and by the Newell Highway, east of Coonabarabran through to Gilgandra. The road environment changes significantly over its full length from a steep winding alignment over the eastern escarpment to undulating country around Walcha and the plains west of Gunnedah.

The eastern escarpment from Long Flat to Yarrowitch has a very narrow and winding alignment often with little or no shoulders close to steep drop-offs. This section of the highway traverses very steep country which is frequently prone to land slippages. This is a constant maintenance concern often resulting in partial road closures on a number of short sections of the highway for long periods until the full road width can be reinstated. This area also experiences adverse weather conditions including heavy rain and fog.

Not surprisingly this section of the highway, through the escarpment, has a very poor casualty crash rate which is dominated by a high percentage of motorcycle crashes. The high involvement of motorcycles in casualty crashes is also evident on other roads in this region, with similar alignments, such as Waterfall Way and Thunderbolts Way. The challenging nature of these roads attracts motorcyclists not only from around NSW but from other states and overseas.

The section of highway between Tamworth and Gunnedah also has a very poor casualty crash rate. This short length of the highway, 77km, also has a high fatal crash rate with 9 people killed from 7 crashes over a 5 year period to end of December 2013.

2.1.1 Traffic types and volume

Traffic volumes on the open rural sections of the Oxley Highway vary significantly. Heavy peak weekday periods between Wauchope and Port Macquarie in excess of 10,000 vehicles a day contrast with very low traffic volumes west of Walcha to the New England Highway and between Gilgandra and Nevertire of around 500 vehicles a day. There is a marked increase in weekend traffic volumes especially between Wauchope and Walcha which is strongly influenced by tourist and motorcycle traffic.

Higher traffic volumes of around 4,000 vehicles a day are evident between Tamworth and Gunnedah. These two towns have an obvious commuter and goods and services transport link during weekdays.

Figure 2.1 below shows the Annual Average Daily Traffic (AADT) figures at various locations on the Oxley Highway from the Pacific Highway to the Mitchell Highway.

Average Daily Traffic

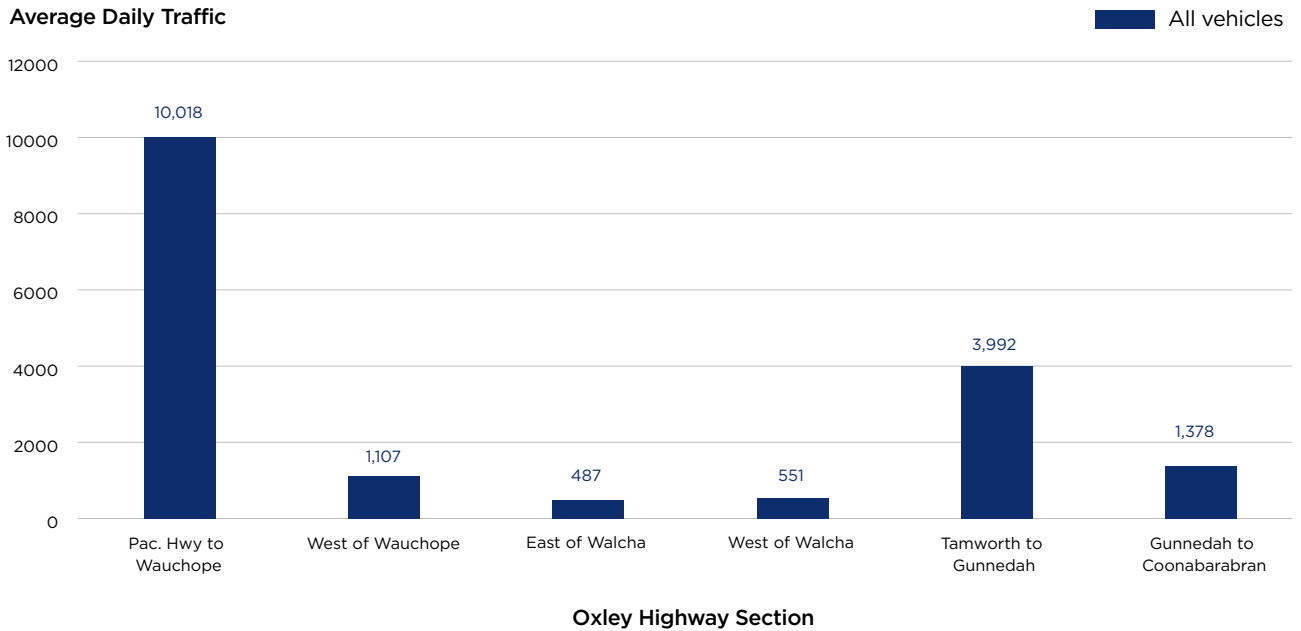


FIGURE 2.1: Average Annual Daily Traffic Volumes at selected points



Photograph 2.2: A series of culverts over a flood prone area west Tamworth

2.1.2 Existing speed zones

Speed zones are generally 100 km/h in the open rural sections except for three 110km/h zones. Two 110km/h speed zones are located in the far western sections of the Oxley Highway either side of Warren. The third section is a 50km length east of Walcha where a number of deficiencies such as unprotected steep drop offs, lack of shoulders and sub standard junction treatments are present. The speed limit over the eastern escarpment is currently 100kmh, due to the challenging road geometry this is not seen as a balance between safety and mobility. A speed zone review is recommended with consideration to reducing the speed limit at this location.

Table 2.1 shows the number of existing speed zones and their combined lengths along the Oxley Highway.

TABLE 2.1: Existing speed zones

Speed (km/h)	Count	Combined length (km)
40	5	2.3
50	7	11.4
60	6	7.9
70	3	5.9
80	5	15.8
90	1	3.4
100	11	309.7
110	3	149.6
Total	41	506

2.1.3 Local government populations

The Oxley Highway passes through seven local government areas: Port Macquarie/Hastings, Walcha, Tamworth, Gunnedah, Warrumbungle, Gilgandra and Warren. The populations of the local government areas surrounding the Oxley Highway are listed in Table 2.2.

TABLE 2.2: Oxley Highway Local Government populations

Local Government Area	Population
Port Macquarie/Hastings	75,700
Walcha	3,100
Tamworth	59,000
Gunnedah	12,000
Warrumbungle	9,800
Gilgandra	4,500
Warren	2,900

2.2 Casualty crash analysis

2.2.1 Definitions

Crash statistics recorded by RMS only include those crashes that conform to the national guidelines for reporting and classifying road vehicle crashes. The main criteria to meet for inclusion are that the crash:

- Was reported to the Police
- Occurred on a road open to the public
- Involved at least one moving road vehicle
- Involved at least one person being killed or injured or at least one vehicle being towed away.

Crash and casualty definitions

- **Fatal crash** – a crash in which at least one person was killed.
- **Injury crash** – a crash in which at least one person was injured but no person was killed.
- **Casualty crash** – a crash in which at least one person was injured or killed.
- **Tow away crash** – a crash which resulted in at least one vehicle being towed away but no fatality or injury.

- **Fatality** – a person who dies within 30 days of a road crash as a result of injuries received in that crash.
- **Casualty** – a person killed or injured as a result of a crash.

2.2.2 Crash trends since 2000

For the 13 years since 2000 to 31 December 2012, 805 casualty crashes were reported on the Oxley Highway. Of these 33 were fatal crashes and 772 were injury crashes.

There was a slight decrease in the number of casualty crashes from a peak in 2002 of 72 to 55 in 2005.

2.2.3 Casualty crashes 2000 to 2012

- Over the past 13 years there have been 805 reported casualty crashes, 33 of which were fatal crashes and 772 were injury crashes.
- Of the 805 casualty crashes 37 were killed and 1007 people were injured.

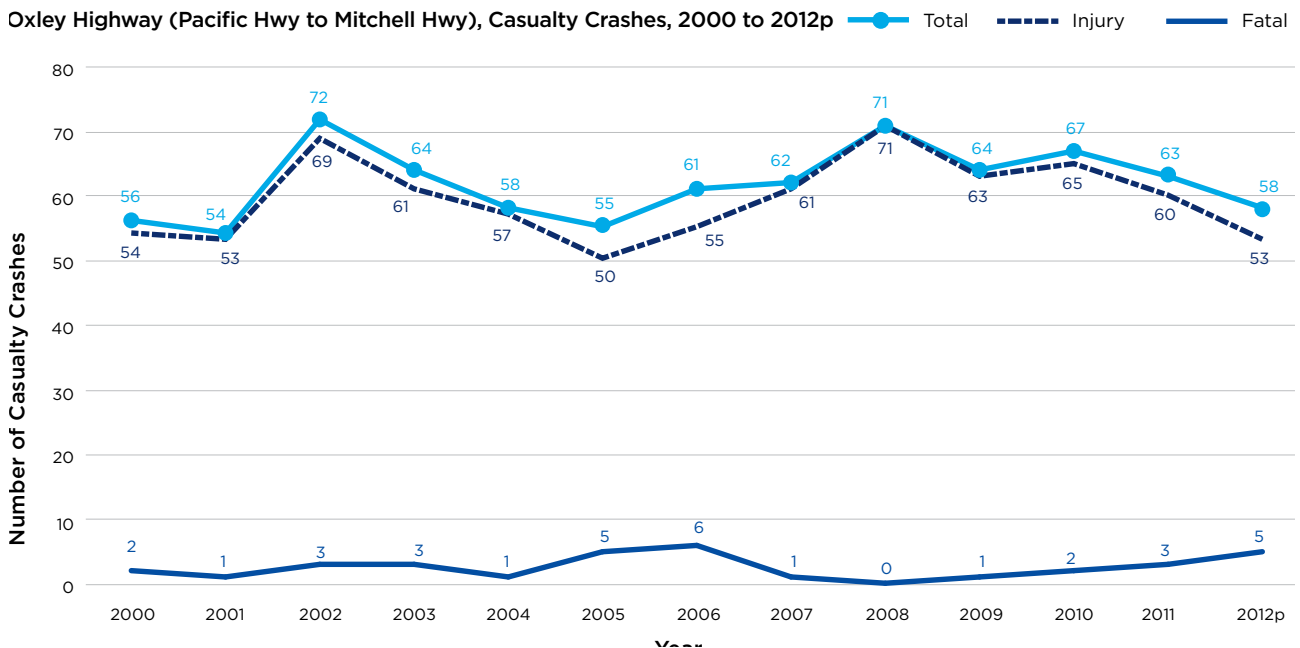


FIGURE 2.2: Casualty crashes 2000 to 2012p

2.2.4 Casualty Crashes 2008 to 2012 and fatal crashes 2013p

- There have been 327 reported casualty crashes, 15 of which were fatal crashes, resulting in 419 casualties.
- Of the 419 casualties 18 people were killed and 401 people injured.
- There were 4 fatal crashes in 2013 to 31 December.
- Thirty six per cent of the fatal crashes and 59 per cent of the injury crashes were single vehicle crashes.

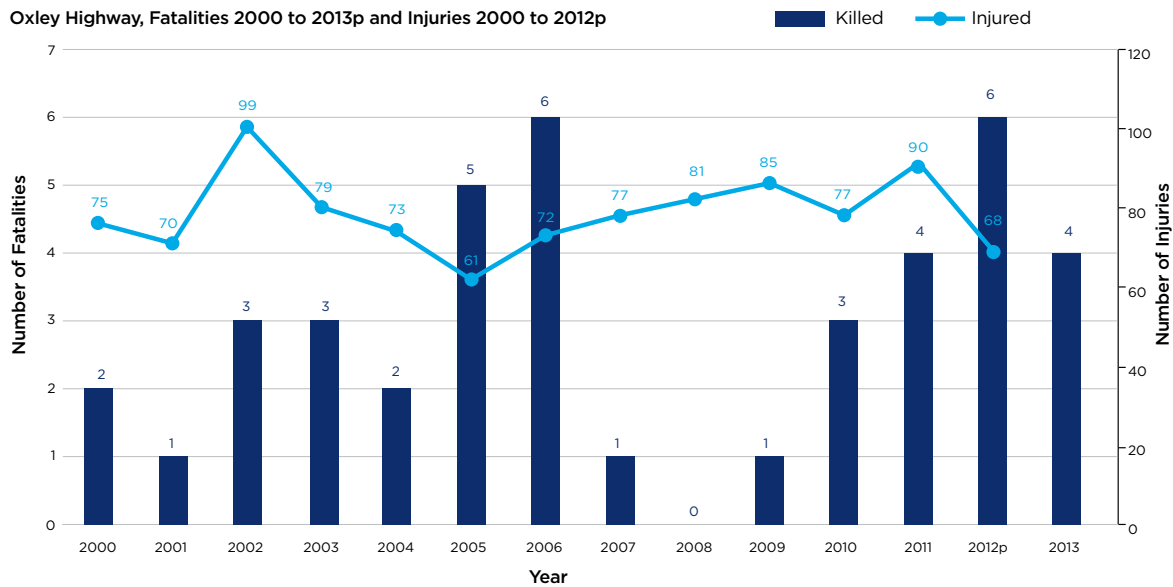


FIGURE 2.3: Fatalities 2000 to 2013p and injuries 2000 to 2012p

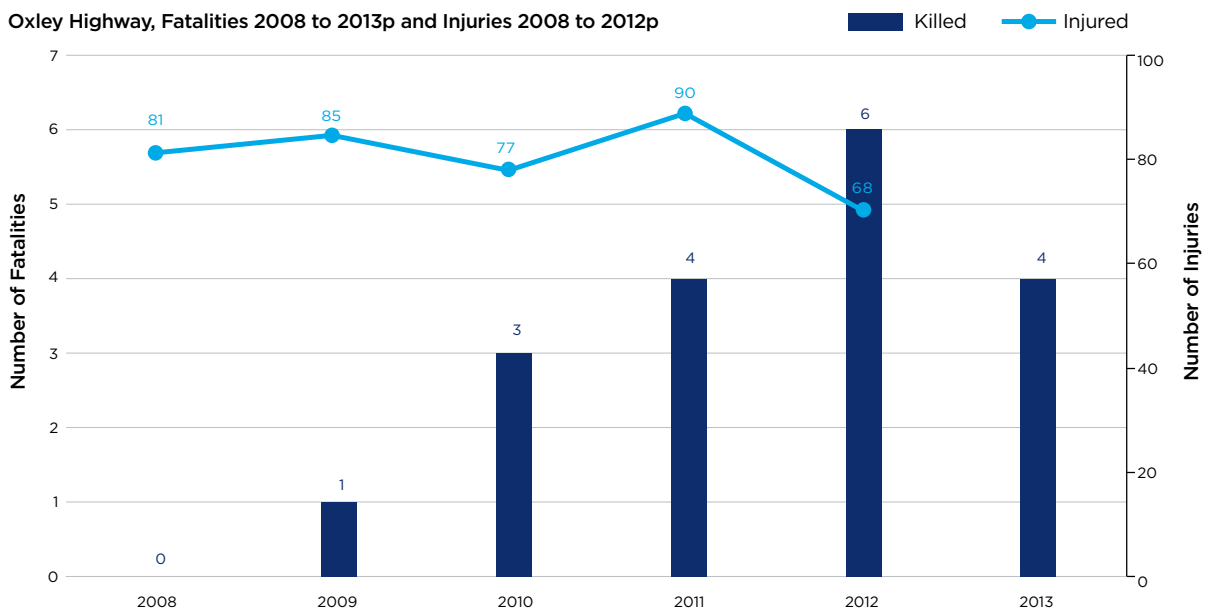


FIGURE 2.4: Fatalities 2008 to 2013p and injuries 2008 to 2012p

2.2.5 Features of recorded crashes

Who was involved: class of road user

- Of the 415 casualties from 2008 to 2012 the majority were drivers (49 per cent), motorcyclist (24 per cent) and motor vehicle passengers (21 per cent).
- Five per cent of all casualties including two fatalities, involved pedestrians.

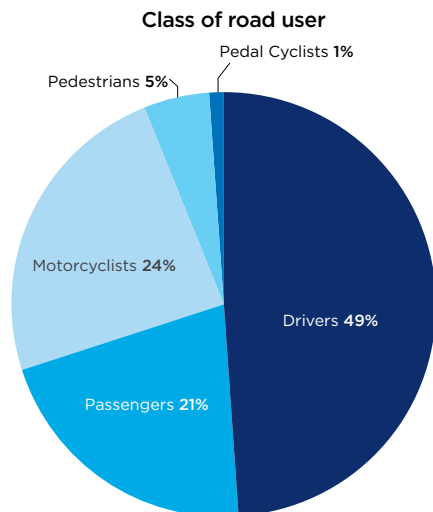


FIGURE 2.5: Class of road user 2008 to 2012p

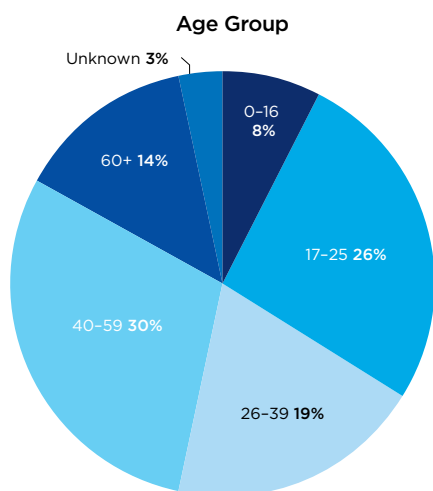


FIGURE 2.6: Age of road user

Who was involved: age of the road user

Road users are categorised by age group. These are broadly accepted categories which reflect the differing characteristics such as road access and usage, driver experience, risk taking behaviours, road trauma by road user class and rates of road trauma of each age group. For example, casualties in the under 17 age group are typically passengers and pedal cyclists as almost no one in this category has a drivers licence while the 17 to 26 year old age group is characterised by inexperienced drivers, risk taking behaviours and high casualty rates.

- The 17 to 26 year age group is involved in just over a quarter of all casualty crashes (26 per cent) yet only represents 15 per cent of all licence holders. This figure is fairly typical when compared to other similar roads.

Who was involved: residence of motor vehicle controller

- Almost three quarters (72 per cent) of drivers and riders involved in casualty crashes on the Oxley Highway resided in local governments areas along the Oxley Highway.
- Sixteen per cent were from other country areas within the state (shown as “Other Country”)
- Five per cent were interstate or overseas

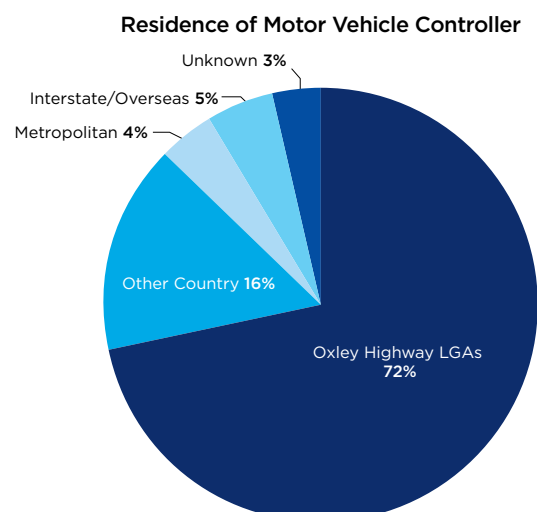


FIGURE 2.7: Residence of motor vehicle controllers

When the crashes occurred: day of the week

- Just over half of the casualty crashes occurred on Friday, Saturday and Sunday.
- The earlier days of the week had slightly lower casualty crash rates which generally correspond to lower traffic volumes.

When the crashes occurred: time of day

- Almost half of all casualty crashes (46 per cent), including 12 of the 15 fatal crashes occurred between 12 noon and 6.00pm.
- There was an even distribution of casualty crashes between the hours of 8.00pm and 2.00am.

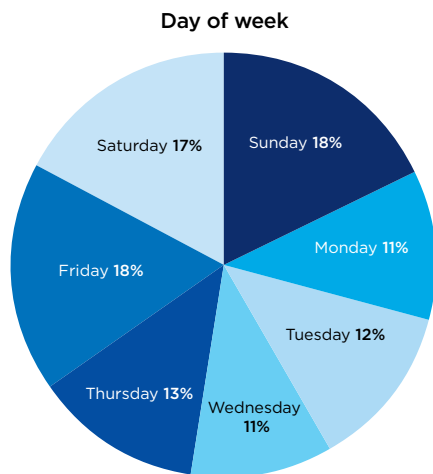


FIGURE 2.8: Day of week of casualty crashes

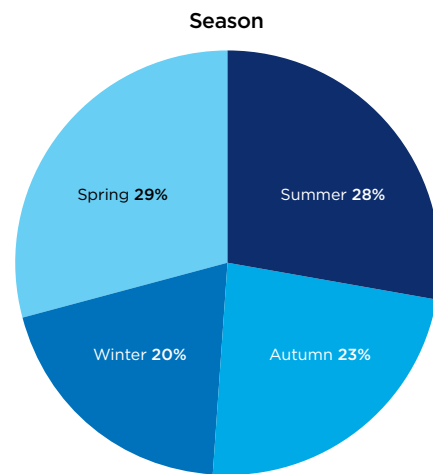


FIGURE 2.10: Season of casualty crashes

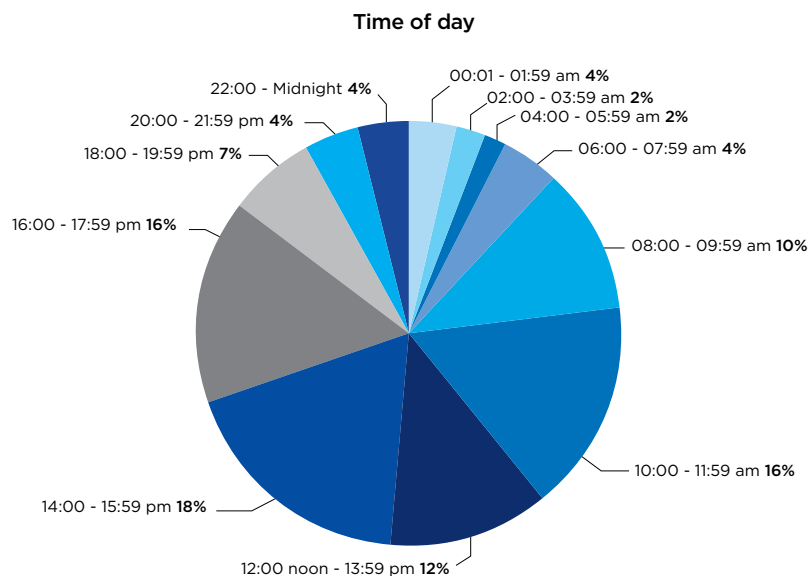


FIGURE 2.9: Time of day of casualty crashes

When the crashes occurred: season of the year

- Almost 60 per cent of the crashes occurred in the warmer months of spring and summer. These figures would strongly correlate with the lower traffic volumes experienced during the winter months.

Where the crashes occurred: location feature

- Just over a half of all casualty crashes (51 per cent) and all but one of the fatal crashes occurred in 90km/h or higher speed zones.
- Almost three quarters (74 per cent) occurred away from intersections
- Almost half of the casualty crashes occurred on curves.
- Twenty one per cent of casualty crashes occurred on a wet road surface

Casualty Crashes, Oxley Highway (btw Pacific Hwy and Newell Hwy), 2008 to 2012p, Location Features

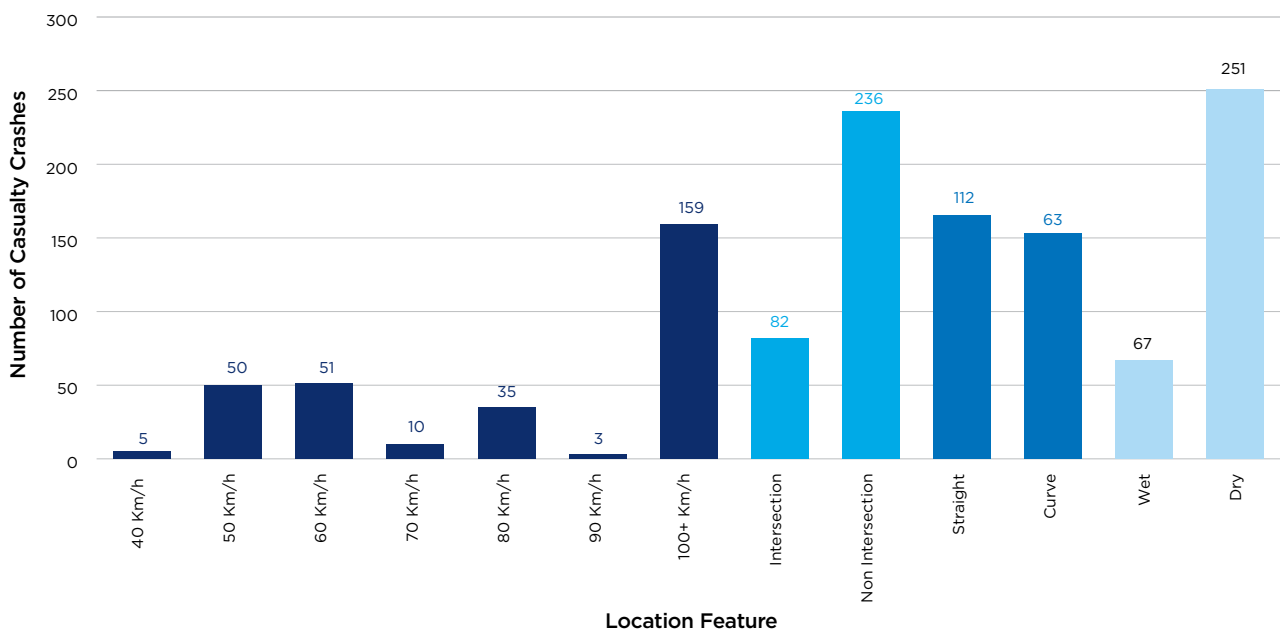


FIGURE 2.11: Casualty crashes by speed zone and location features

Where the crashes occurred: fatal crash locations

- Just over half of all the fatal crashes (8 out of 15) have occurred between Tamworth and Gunnedah. Yet this length of road represents only 16 per cent of the total length of the highway between the Pacific Highway and the Mitchell Highway.
- Four of the fatal crashes occurred over a very short length of the highway immediately east of the Kamilaroi Highway (due to the scale of the map these sites appear as a cluster of crashes).
- Two fatal crashes occurred at Tangaratta Creek Bridge east of Tamworth (due to the scale of the map this site appears as one crash).



FIGURE 2.12: Fatal crash locations on the Oxley Highway

What type of crash

- This section provides an analysis of crashes by speed zones, which are categorised as:
- Low speed - 60km/h or lower
- Rural - 70km/h to 80km/h
- High speed - 90km/h and higher

Low speed zones

In low speed zones - 60km/h or lower in urban areas:

- Almost a third of all casualty crashes (33 per cent) on the Oxley Highway occurred in speed zones with a speed limit of 60km/h or lower.
- Almost a third of these (28 per cent) were rear end crashes, which is typical of low speed environments in cities and towns.
- All casualty crashes involving pedestrians along the length of the Oxley Highway, apart from one fatal crash in a high speed environment, occurred in a low speed environment.

Oxley Highway, Casualty Crashes 2008 to 2012p and Fatal Crashes 2013p, Speed Limit 60 km/h and Below, Crash Type

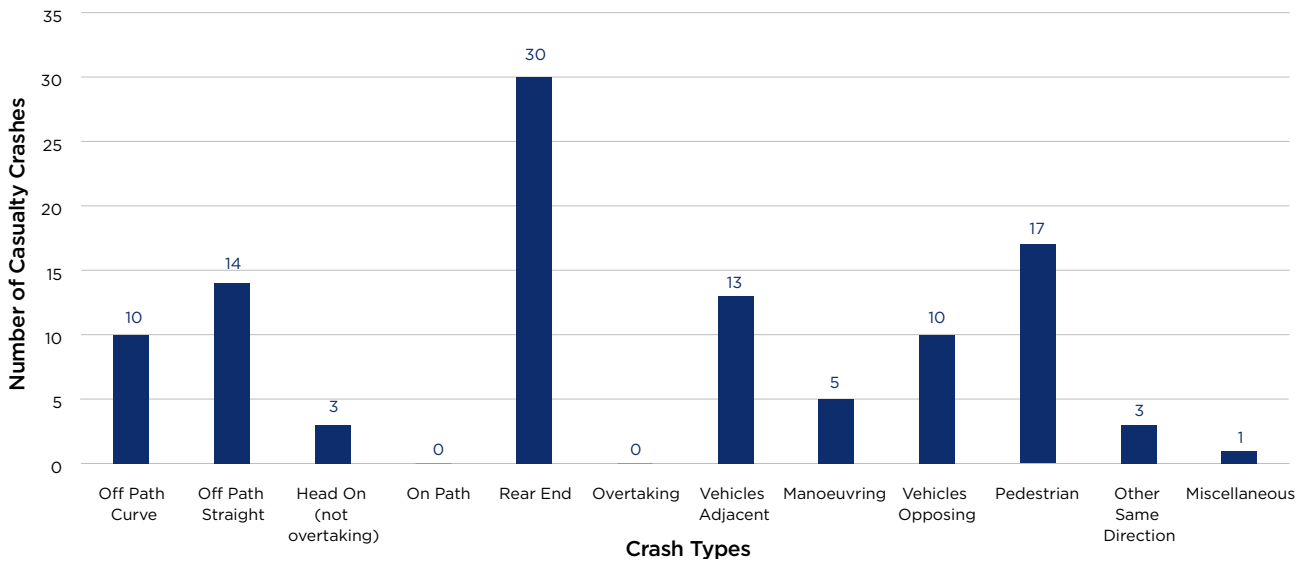


FIGURE 2.13: Casualty crash types in 60km/h or lower speed zones

Rural speed zones

In rural speed zones – 70km/h and 80km/h

- Almost two thirds (64 per cent) of all casualty crashes in rural zones were single vehicle of road crashes.

- The majority of run off road crashes (90 per cent) occurred on bends.

Oxley Highway, Casualty Crashes 2008 to 2012p and Fatal Crashes 2013p, Speed Limit 70-80 km/h, Crash Type

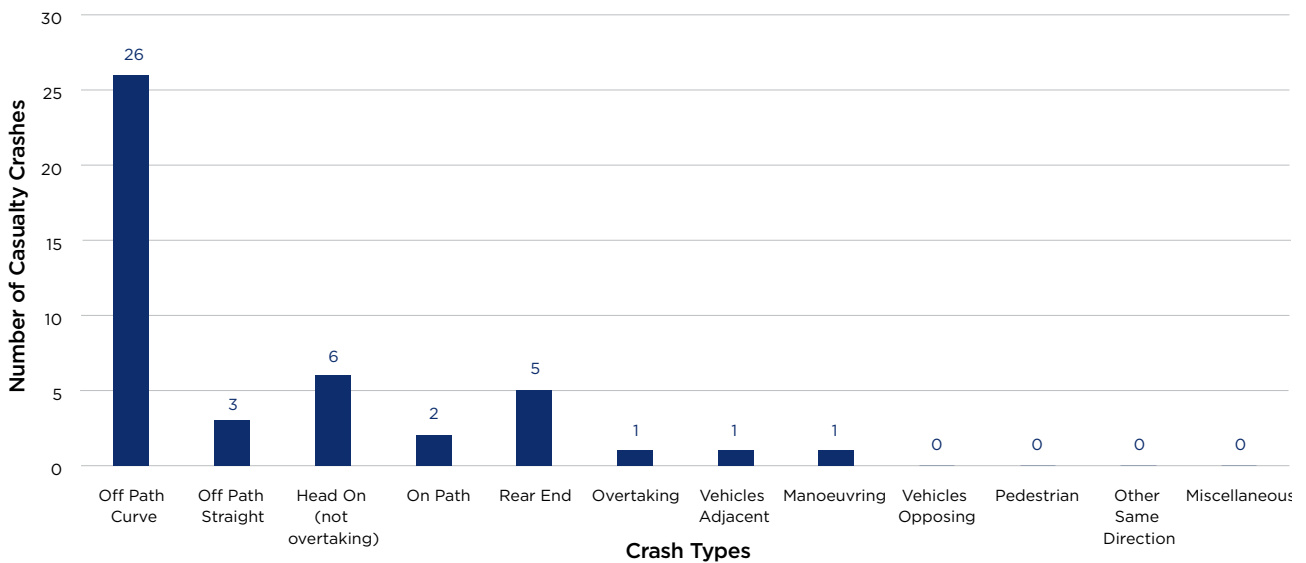


FIGURE 2.14: Casualty crashes in 70km/h and 80km/h speed zones

High speed zones

In high speed zones — 90 km/h or higher:

- Over half (52 per cent) of all casualty crashes on the Oxley Highway and 80 per cent of fatal crashes occurred in high speed zones
- Single vehicle off road on straights or bends accounted for 70 per cent of all casualty crashes, the majority impacting a fixed object, mainly trees, fences and embankments
- The majority of run off road crashes (74 per cent) occurred on bends.

Oxley Highway, Casualty Crashes 2008 to 2012p and Fatal Crashes 2013p, Speed Limit 90 km/h and Over, Crash Type

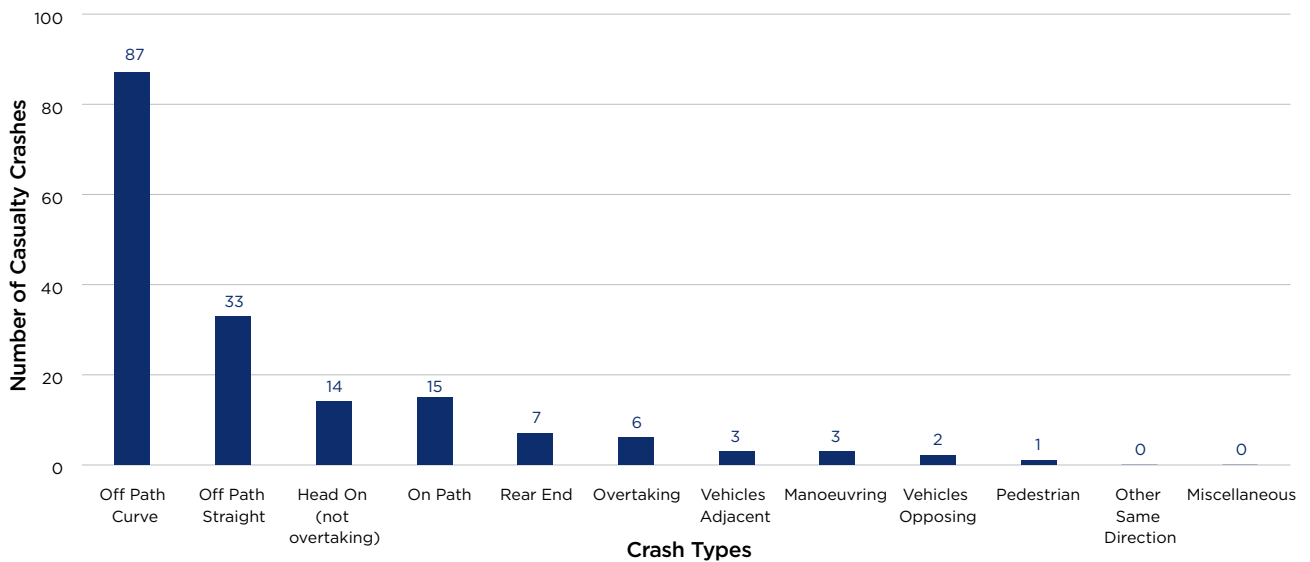


FIGURE 2.15: Casualty crashes in 90km/h or higher speed zones

Oxley Highway Fatal Crashes, 2008 to 2013p, Speed Limit 90 km/h or more, crash types

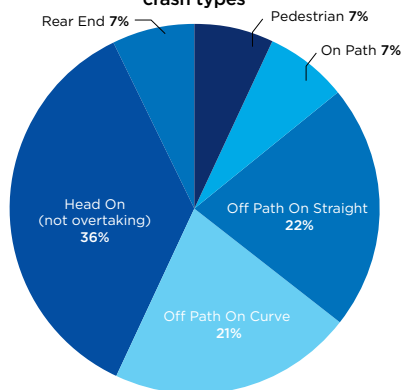


FIGURE 2.16: Fatal crash types in 90km/h or higher speed zones

Why (driver behaviour)

- Compared with casualty crashes throughout NSW from 2008 to 2012 the Oxley Highway had a higher incidence of speed related casualty crashes (38 per cent v 29 per cent)
- Fatigue related casualty crashes were similar (13 per cent v 13 per cent)
- There was a slightly lower rate of alcohol related casualty crashes (five per cent v eight per cent)
- While seat belt non usage only accounts for one per cent of all casualty crashes, 2 fatal crashes involved the non-use of seat belts.
- Of the drivers and riders involved in speed related casualty crashes 74 per cent resided in local government areas along the Oxley Highway.
- Of the fatigued drivers and riders involved in casualty crashes 79 per cent resided in local government areas along the Oxley Highway.

Casualty Crashes/Casualties, Oxley Highway 2008 to 2012p, Contributing Behaviour Factors

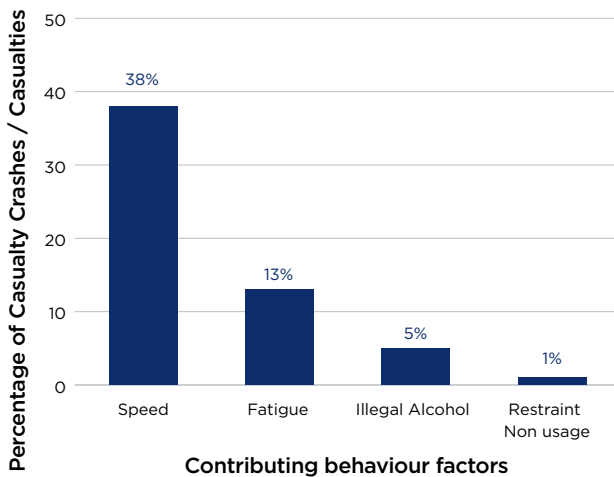


FIGURE 2.17: Behavioural factors contributing to casualty crashes

Heavy vehicle involvement in casualty crashes

- Heavy vehicles were involved in 22 casualty crashes on the Oxley Highway, of which 4 were fatal crashes.

- Compared with other country roads, the Oxley Highway has the same incidence of heavy truck casualty crashes (seven per cent v seven per cent).
- The majority (62 per cent) of heavy truck casualty crashes on Oxley Highway were single vehicle crashes.

Heavy Truck Casualty Crashes, Oxley Highway 2008 to 2012p, Percentage of Crashes

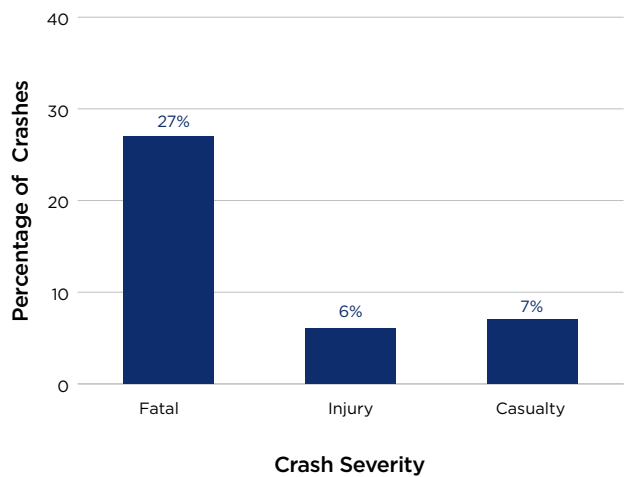


FIGURE 2.18: Heavy vehicle casualty crashes as a percentage of all casualty crashes

Heavy Truck Casualty Crashes, Oxley Highway 2008 to 2012p, Number of Vehicles Involved

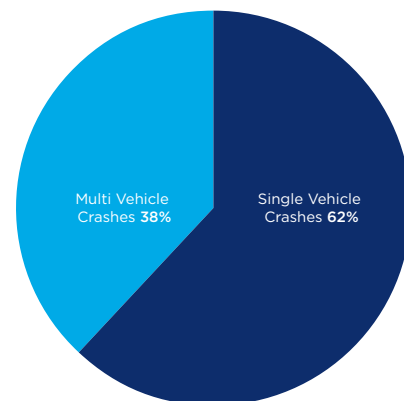


FIGURE 2.19: Heavy vehicle casualty crashes – single and multi vehicle

Motorcycle involvement in casualty crashes

- Motorcycles were involved in 96 casualty crashes on the Oxley Highway, 2008 to 2012p. Note there was one fatal motorcycle crash in 2013.
- Just over three quarters (78 per cent) of all motorcycle injury crashes on this route were single vehicle crashes.
- Compared with casualty crashes on other country roads, the Oxley Highway has just over twice as high a casualty crash rate (30 per cent v 14 per cent).
- Over half (56 per cent) of motorcycle riders involved in casualty crashes were locals who lived in the local government areas along the Oxley Highway.

Motorcycle Casualty Crashes, Oxley Highway 2008 to 2012p, Percentage of Crashes

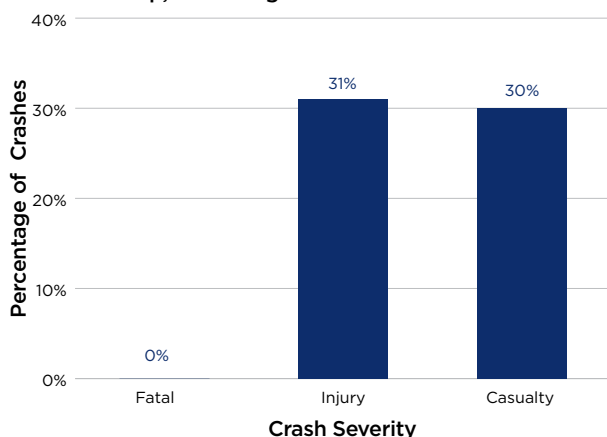


FIGURE 2.20: Motorcycle casualty crashes as a percentage of all casualty crashes

Motorcycle Casualty Crashes, Oxley Highway 2008 to 2012p, Number of Vehicles Involved

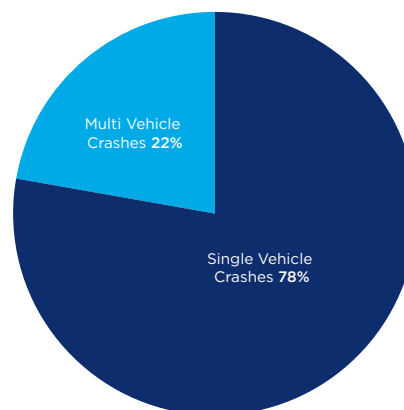


FIGURE 2.21: Motorcycle casualty crashes – single and multi vehicle

2.2.6 Crash analysis conclusions

- Over the five year period (casualty crashes 2008-2012 and fatal crashes 2013) there have been 327 casualty crashes resulting in 18 fatalities and 401 injuries.
- The majority of drivers and riders involved in casualty crashes are local residents (living in local government areas adjoining the Oxley Highway).
- Fifty three per cent of fatal crashes (2008-2013) occurred between Tamworth and Gunnedah (which is only 16 per cent of the full length of the Oxley Highway). This section also has an extremely high crash rate per kilometres travelled.
- All but one of the fatal crashes occurred in 90km or higher speed zones.
- Forty six per cent of all casualty crashes involved single vehicles running off road.
- The percentage of casualty crashes on the Oxley Highway involving motorcycles is double that of other country roads (30 per cent v 14 per cent) of which 56 per cent were locals.
- Over 60 per cent of casualty crashes between Wauchope and Yarrowitch involved motorcyclists.

2.3 Key road safety issues

2.3.1 Road safety engineering issues

As part of the route safety review process two field inspections were undertaken. The first was undertaken during September 2013 over a three day period as a preliminary investigation. These initial inspections allowed a reconnaissance of the highway and highlighted issues that would require more detailed scrutiny. These field inspections involved a small number of key personnel.

The principal field inspections were conducted over a three day period from Tuesday 26 November to Thursday 28 November 2013. These field inspections involved representatives from RMS, CRS, NSW Police Service, NRMA, Local Government and a community representative.

The key road safety engineering issues identified during the review are described under the following criteria:

Road alignment

According to the RMS study, *'Retro-fitting road safety to existing rural roads'* most fatal and serious injury crashes on high speed roads (90 km/h or higher) occur on curves within the 200–600 metre radii range.

This study identified curves within this radii range, within 90km/h speed zones or higher, as Priority 1 curves which should be effectively treated. These types of curves present particular issues for safety, which are not presented by tighter curves. Road users are generally travelling at lower speeds approaching tighter curves.

The Oxley Highway review found that the road alignment and degree of severity of curves at some locations requires review. A desktop review utilising the RMS GIPSI-CAM system showed that there are 129 Priority 1 curves along the route, as shown in the table below.

TABLE 2.3: Priority 1 curves along the highway

Radius (M)	200 to 600
Pacific Hway to Wauchope	5
Wauchope to Yarrowitch	52
Yarrowitch to New England Hway	49
Tamworth to Gunnedah	5
Gunnedah to Coonabarabran	17
Newell Hway to Nevertire	1
Total	129



Photograph 2.3: Tangaratta Creek Bridge west of Tamworth

Junction treatments

Treatments to road junctions aim to provide suitable and safe access in and out of side roads. Treatments include improved protection for vehicles turning right across opposing traffic, increased warning of an upcoming junction and improved sight distances at the junction.

Observations from the review include:

- Most junctions do not have the minimum treatment required to allow a through vehicle to pass a stationary vehicle waiting to turn right.
- Earth embankments and vegetation in or around some junctions restrict sight distance.
- The advance and intersection warning signage and road name signage is inconsistent and in many cases too small to be easily read.
- Many side roads were unsealed and in some cases gravel had been tracked by vehicles or washed by rains onto the Oxley Highway, some on curves.



Photograph 2.4: Surveyors Creek at Walcha Road

Safety barriers

Safety barriers come in various forms and aim to provide protection for road users from adjacent roadside hazards. They protect against run-off road into object crashes and can also provide a physical separation between opposing traffic lanes to protect against head on crashes.

Observations from the review include:

- The existing guardrail or wire rope safety barriers at some locations do not extend adequately to close off access to the hazard. There is still the possibility of an errant vehicle getting in behind the safety barrier and colliding with the hazard.
- Some guardrail end treatments were not considered appropriate especially in areas known to have a high incidence of motorcycle casualty crashes.
- Significant lengths of chain wire fencing are still in place as safety barriers, mainly between Wauchope and Walcha (including the 110km/h zone) and east of the New England Highway.
- While a few sections of guardrail had been treated with 'under-run barriers' there were further opportunities to expand this treatment, especially where motorcycle activity is prevalent.
- Some sections of safety barriers had unsealed or neglected shoulders to the edge lines.
- Sections of wire rope safety barriers with green upright supports tended to blend in with the background and therefore lacked adequate delineation.



Photograph 2.5: Chain wire barrier west of Walcha

Clear zones

Clear zones that are free of non-frangible hazards minimise the potential harm to drivers, riders and passengers of errant vehicles. When a hazard-free clear zone cannot be provided, the installation of safety barriers to protect road users from the adjacent hazard is an alternative measure.

Observations from the review include:

- Clear zones along the entire length of the highway need to be more closely examined. There were a number of significant unprotected culverts and trees very close to the edgeline.
- In a number of locations west of Tamworth and west of Gunnedah there were large dead trees well within the clear zone.
- There are many clear zone issues through the eastern escarpment between Long Flat and Yarrowitch. Many of these are exacerbated by narrow lane widths, little or no shoulders and steep embankments and drop-offs either side of the road.
- Long lengths of well established tree corridors are common within the road reserve generally in the western areas of the Oxley Highway. Many of these trees are large and growing within 3-4 metres of the edgeline.



Photograph 2.6: A dead tree well within the clear zone west of Tamworth



Photograph 2.7: Steep drop-offs and trees within the clear zone along the eastern escarpment

Road pavement and shoulders

The provision of wide sealed shoulders assists road users to regain control of their vehicle should it leave the travel lane. This is especially important on the outside of low radius curves or other locations where more space is needed to enable road users to regain control, such as sections of road with narrow lanes.

Observations from the review include:

- There are a number of lengths of the Oxley Highway that have limited or no shoulders. These are mainly confined to the sections east of Walcha, some within the 110km/h zone, but more especially the eastern escarpment where steep terrain severely constrains the ability to provide shoulders and appropriate lane widths.
- There are also long lengths of the highway west of Gunnedah that do not have sealed shoulders. However, the lack of sealed shoulders is often compensated for by wider clear zones and flatter terrain.

- The road pavement was generally in good condition. However, there were a few locations, mainly on the eastern escarpment where land slippages had affected the pavement condition.
- A short length of the highway between Walcha Road and the New England Highway has a very poor pavement with no sealed shoulders. This length of highway is to be rehabilitated during 2014.



Photograph 2.8: A partial road closure following a land slide on eastern escarpment

Bridges

Many bridges along the State road network were built some time ago and while they are still structurally sound, some of them do not meet today's design standards in terms of lane and shoulder widths. This can often present a 'squeeze point' for motorists on an otherwise standard width section of road.

Observations from the review include:

- A number of narrow bridges often had low radius curves on one or both approaches. One particular bridge, over Tangaratta Creek west of Tamworth, is the site of a number of casualty crashes including two fatal crashes.
- Many older bridges have little or no shoulders and reduced lane widths.
- There is a lack of consistent advance warning to motorists of the existence of narrow bridges.
- The older concrete abutments and bridge rails were difficult to distinguish, especially at night with little or no delineation.



Photograph 2.9: Bridge over railway line near Woolbrook west of Walcha

Signage

Warning signs provide road users with sufficient information to guide and give advance warning about the road environment ahead. Signs also provide advance information about road and weather conditions and directions to locations such as towns, side roads and features.

Observations from the review include:

- Advance, intersection, guide and directional road name signage is inconsistently applied and, in some cases, too small to be easily read.
- There are inconsistencies in the application of curve advisory speed signs. This was apparent in the nominated advisory speed, the use of 95km/h advisory plates and the location of the signs.
- At some locations too many single signs were used to convey messages. This was more apparent at locations associated with reduce speed signposting where quickly conveyed simple messages are needed.

Delineation

Delineation aims to provide road users with sufficient information to guide them and warn about the road environment ahead. It can also assist them in negotiating changes in the road alignment, terrain and conditions at night.

Observations from the review include:

- The use of chevron alignment markers to delineate curves needs to be addressed. Their use is often unpredictable and their size and position around the backs of curves inconsistent.
- In some instances small metal reflector blades are used as delineation on the top of guardrail. This is inappropriate especially in areas of high motorcycle activity.
- Significant lengths of road had little or no raised reflective pavement markers.
- In general guideposts along the highway are reasonably well located and maintained. However, the spacing around some curves was inconsistent.



Photograph 2.10: Enhanced curve delineation east of Coonabarabran

Line marking

Line marking provides road users with information about the layout of the road, the parts of the road that can and cannot be used and how the road should be used. It also provides delineation and indicates to road users the direction of the road, especially when visibility is limited, for instance in foggy conditions, at night or in wet weather.

Observations from the review include:

- Inconsistencies are obvious in the start and termination of barrier lines. Adequate forward sight distance is not available in some locations where linemarking suggests otherwise.
- There is an inconsistent and confusing use of C1 lines at some locations, particularly at some road junctions east of Gunnedah.
- Many locations, where overtaking is permitted, fall well short of the minimum safe length to complete a safe overtaking manoeuvre.
- Edge line marking through the towns and villages is inconsistent or non-existent.

2.3.2 Speed zones

Speed zoning is used to establish speed limits on particular lengths of road, helping speed management by providing consistency of speed limits.

Observations from the review include:

- The application of speed zoning along the highway appears to be inconsistent especially between Wauchope and Walcha and not in accordance with RMS Speed Zoning Guidelines.
- The apparent inconsistency is also evident through the towns and villages where different speed zones are signposted for similar town environments.
- In some locations a higher speed limit commences in an inappropriate location, for instance on the transition to curves or within curves.
- At other locations speed zone repeater signs are installed just prior to or immediately after, curve warning advisory speed signs displaying lower recommended speeds.

2.3.3 Vulnerable road user issues

Vulnerable road users are those people who do not travel within an enclosed vehicle and are therefore more likely to be injured in a crash. They include motorcyclists, pedestrians and cyclists.

Motorcyclists

There are a significant number of motorcyclists that tour the northern tablelands, especially over those roads with challenging road environments such as the Oxley Highway. High numbers of motorcyclists are evident on the section of the Oxley Highway between Wauchope and Walcha, particularly on weekends.

Observations from the review include:

- There is a very high number of motorcycle casualty crashes between Wauchope and Yarrowitch with over 60 per cent of casualty crashes involving motorcyclists. Almost 80 per cent of which were single vehicle crashes.
- Along the section of Oxley Highway between Yarrowitch and the New England Highway just over a quarter (26 per cent) of all casualty crashes involved motorcyclists.
- There was one fatal motorcycle crash in 2013 and six other motorcycle fatal crashes since 2000 along the full length of the Oxley Highway.
- Five of the seven motorcycle crashes since 2000 occurred between Wauchope and Yarrowitch.



Photograph 2.11: Motorcyclists on the Oxley Highway have a much higher casualty crash rate compared to other similar country roads

Pedestrians

Pedestrian safety issues are more evident in the towns of Tamworth and Wauchope. For residents, the highway serves as a local road. It incorporates sections with urban, industrial and commercial land uses on one or on both sides of the road. It also provides a connection for residents to access various goods and services such as shopping, medical, employment, education, sport and recreation.

Observations from the review include:

- There is a high number of casualty crashes involving pedestrians (almost 18 per cent) on the Oxley Highway between the Pacific Highway and Wauchope. Most of these have occurred in the township of Wauchope.
- Pedestrian safety at the mid block traffic signals on Marius Street Tamworth has been questioned following repeated incidents of motorists disobeying the traffic signals.
- Pedestrian safety has been raised in the vicinity of Westdale Primary School, Tamworth. Uncontrolled parking on both sides of the highway together with pedestrian movements immediately east of the school at nearby shops further exacerbates the issue.
- Marked pedestrian crossings in Wauchope are not up to standard.

Cyclists

Pedal cyclists are also classified as vulnerable road users. There were four reported pedal cyclist casualty crashes for the full length of the Oxley Highway over the 5 year period to December 20012. The number of cyclists using the Oxley Highway is very low which would account for the very low number of cyclists involved in casualty crashes. All but one of the casualty crashes involving cyclists occurred in low speed environments in towns.

2.3.4 Intelligent transport systems

Intelligent transport systems are systems that use technology and communication devices to improve transport safety, efficiency and overall performance.

While there were no such devices in place on the Oxley Highway there does appear to be some options for the deployment of better communication systems. This can be critical when emergency services are required to attend the scene of a casualty crash as the response time can be crucial in the outcome of the crash.

Observations from the review include:

- Many sections of the Oxley Highway had little or no mobile telephone coverage. This was especially evident along those sections of the highway with high numbers of casualty crashes such as the escarpment between Wauchope and Yarrowitch.
- Some isolated sites with particular or unusual road safety conditions could benefit from vehicle actuated signposting (VAS).



Photograph 2.12: Yaminbah Creek east of Coonabarabran

Section 3

Recommendations



3.1 An integrated approach to improving road safety along the highway

The multidisciplinary and consultative process employed for the Oxley Highway route safety review allowed for the adoption of an integrated approach to improving road safety.

Road safety improvements and outcomes are maximised when road safety engineering, road user behaviour and enforcement countermeasures are fully integrated. For example, to address inappropriate speed related crashes, the engineering program will focus on:

- Road design and reconstruction, especially at identified higher risk locations, to better guide drivers and riders through the road environment and at appropriate travel speeds.
- The consistent and effective use of regulatory and advisory signage.
- The provision of wider sealed shoulders, especially around curves.
- Enhanced protection of roadside hazards.

Speed zone reviews and behavioural and enforcement programs focusing on speeding, driver fatigue and drink driving will work in partnership with the various engineering countermeasures to provide integrated road safety outcomes.

3.1.1 Enhanced road safety engineering works program

The enhanced road safety engineering works program consists of the following:

- Access clear zones for hazards and identify options to remove or provide protection from these hazards.
- Implement speed zone reviews.
- Improve road alignment and road shoulders, particularly in higher risk locations.
- Improve safety barrier installations, particularly end treatments and enhancements for motorcyclists.
- Review and improve the facilities provided at road junctions.
- Improve the consistency and location of highway signage and delineation, especially those associated with curve warnings and advisory speeds.
- Improve linemarking, particularly in relation to those sections of road where overtaking opportunities have been provided.
- Review and improve the adequacy and consistency of treatments provided at narrow bridges.
- Review school bus operations, particularly at locations where school buses are required to enter or leave the highway and upgrade where appropriate.
- Review pedestrian facilities in cities and towns.

Review clear zones for hazards and identify options to remove or provide protection against these hazards

Objects within the clear zone are a potential hazard to the occupants and riders of errant vehicles. The Oxley Highway has a high proportion of casualty crashes involving hit object within the clear zone.

Undertake a safety barrier review of the highway with a focus on the following:

- Identification of locations, such as adjacent to trees, culverts, embankments and cuttings with narrow road shoulders, where a safety barrier is not currently provided.
- Where a hazard-free clear zone cannot be provided, the installation of safety barriers to protect road users from the adjacent hazard is an alternate measure.
- Where safety barriers cannot be installed it may be possible to widen and seal road shoulders to assist drivers and riders to regain control of their vehicles.
- Where these measures are not feasible due to the proximity of the hazard, consideration should be given to removing the hazard if possible.



Photograph 3.2: Unprotected series of trees on the eastern escarpment



Photograph 3.3: Unprotected series of large culverts west of Gunnedah

Review speed zones

Undertake a comprehensive speed zone review along the full length of the highway. The aim will be to ensure that the speed limits and the length of the speed zones are appropriate to the road environment, consistently applied along the full length of the highway and meet the requirements of the RMS NSW Speed Zoning Guidelines.

Initial findings included:

- A 100km/h speed limit on an extremely winding and narrow part of the highway over the entire length of the eastern escarpment. This length of highway also had a corresponding high casualty crash rate.
- The Safe System approach maintains that travel speeds as well as roads and roadsides should be designed and managed to reduce the risk of crashes and prevent serious injury or death to people in the event of a crash.
- An isolated 110km/h speed limit over a section of the highway east of Walcha with road safety deficiencies including lack of road shoulders, deep unprotected culverts and drop-offs and substandard junction treatments and substandard safety barriers.

- Inconsistent treatment of speed limits through villages and on some town outer limits.
- A lack of speed zone reminder signposting.



Photograph 3.4: Very winding alignment on the eastern escarpment with high speed limit

Improve road alignment and road shoulders, particularly in higher risk locations

Improve the road alignment and road shoulders, particularly at locations where the terrain and topography is unique and different from the rest of the highway. At these locations low radius curves can be improved by reconstructing the curve to increase the radius (where practical) and sealing the width of the shoulder around the outside of the curve. This should also include the provision of a smooth and consistent crossfall through the curves.

The locations identified, but not limited to, include:

- A series of curves on both approaches to Rawdon Island Road, west of the Pacific Highway.
- Specific 'isolated' curves through the eastern escarpment at the end of straight lengths of road.
- Road shoulders on the western approach to Tangaratta Creek Bridge, west of Tamworth.
- A series of curves east of Walcha with a high crash rate.
- Curves on both approaches to Surveyors Creek at Walcha Road.



Photograph 3.5: Safety barrier enhancements west of Wauchope

Improve safety barrier installations, particularly end treatments and enhancements for motorcyclists

Safety barriers are provided where a hazard-free clear zone cannot be installed adjacent to the travel lane. Safety barriers significantly reduce the severity of impacts with road side hazards and thus minimise the potential for injury to vehicle occupants and riders.

New technologies now allow the enhancement of existing systems to provide greater reduction of impact severity.

The situations identified for safety barrier enhancement include:

- Safety barrier installations that can be fitted with more forgiving end treatments.
- Increasing the number of motorcycle under-run safety barrier systems.
- Reassessment of safety barrier end treatment locations to ensure the point of need is adequately covered.
- Upgrading chain wire safety barriers with more efficient and forgiving systems.
- Improving wire rope safety barrier delineation.
- Replacing metal reflectors with more forgiving plastic delineators.

Review and improve the facilities provided at road junctions

Road junctions are an important part of the road network. They are locations at which a large percentage of traffic conflicts occur. The safe design of road junctions should therefore be a primary consideration, especially in high speed areas. As a minimum, through vehicles should be able to safely pass a stationary vehicle that is waiting to complete a right turn.

Some road junctions may have significant but varying use. This is especially the case in the far western sections of the Oxley Highway where a seasonal factor, such as the production of grain crops, is associated with increased numbers of heavy vehicles. These increases impact on road junctions particularly those accessing grain handling facilities.

Undertake a full review of road junctions along the highway to determine:

- The appropriateness of their design, especially those junctions with higher turning movements, signposted tourist attractions or restricted sight distances.
- The need to provide a short length of seal (for a distance of 5-10m back from the junction) on some gravel side roads.
- Adequate sight distance to and from the side road.
- The possibility of upgrading auxiliary right turn treatments to modified painted right turn bays.
- The possibility of providing vehicle actuated signposting, in advance of road junctions, where heavy vehicle usage increases significantly during certain seasons.
- The need for advance road name signposting, especially in high speed areas or where heavy vehicle or tourist traffic (particularly caravans) is common.



Photograph 3.6: Some road junctions require upgrades

Review and improve the adequacy, consistency and location of highway signage and delineation, especially those associated with curve warnings and advisory speeds

Signposting is generally broken into 4 systems directional, warning, guidance and regulatory. They all play a major role in providing a safer road environment. Directional, warning and guidance signposting inform drivers and riders of the road ahead and assist in critical decision making.

Undertake a full review of all directional, warning and guidance signposting along the highway with the objective of providing a more consistent and safer approach to:

- The application of and the size, location and height of advance curve warning, advisory speed and chevron alignment markers. Curves with the same advisory speed curve warning plates often had varying delineation systems around the back of the curve. There were also inconsistencies with the value on the advisory speed plate.
- The provision of easy to read advance and intersection side road junction signs.
- The signposting of significant changes in the road environment. There appears to be an inconsistent approach to the use and location of large red background signposting.

- Enhancing signposting on isolated curves and the 'second curve' both of which generally have a higher potential for casualty crashes.
- The provision of gateway signposting to towns and villages in association with and to better support speed reduction signposting.
- The location of speed reminder signs well away from other critical signposting, such as curve advisory speed warning signs. Speed zone reminder signs should not be located on curves.

Review and improve linemarking, particularly in relation to those sections of road where overtaking opportunities have been provided

Linemarking on rural roads provides, but is not limited to, guidance and direction to drivers and riders. It also supports traffic regulations, particularly those lengths of road where overtaking is not permitted.

Undertake a full review of linemarking to:

- Ensure that overtaking opportunities are only permitted where adequate forward sight distance can be provided, particularly on the eastern escarpment and east of Gunnedah.
- Remove the confusion between interchanging edge lines and continuity lines, mainly on the section of highway east of Gunnedah.
- Investigate the use of audio-tactile line marking, both centreline and edgeline, at locations where head-on or run-off road crashes have occurred.
- As an alternative to audio-tactile linemarking, investigate the possible use of an enhanced dividing barrier and separation centreline.

Review and improve the adequacy and consistency of treatments provided at narrow bridges

Lane widths on most bridges are generally consistent with those on the approaches. However, there is often a very noticeable reduction in shoulder width or the complete absence of shoulders. This is especially true of older bridges. Design standards have since changed and now provide a wider and safer passage for all vehicles.

Older narrower bridges create 'squeeze points' on highways and can be difficult and costly to replace. Appropriate and consistent treatment of these bridges should be applied along the full length of the highway.

Undertake a review of all narrow bridges with the objective of providing:

- A consistent and appropriate signposting and line marking system to all bridges. This could include the use of gateway signposting.
- Enhanced delineation of the bridges. The application of reflective white paint to bridge railings could be considered to increase delineation.
- Clear and unambiguous signposting and linemarking of one lane bridges.



Photograph 3.7: Thone River Bridge west of Wauchope

Review school bus operations, particularly at locations where school buses are required to enter or leave the highway and upgrade where appropriate

School bus services are operated along most of the length of the highway by a number of bus companies. School buses are generally adequately catered for in the urban areas. In the rural high speed areas pick up and set down points vary greatly and adequate areas for school buses to safely pull clear of the through carriageway are not always available. The provision of school bus facilities and associated parent parking in these areas is inconsistent.

Undertake a review of all school bus operations particularly in the high speed areas with the objective to:

- Providing safe turning areas for school buses at their termination points, including appropriate advance warning signposting.
- Providing safe turning movements into and out of side roads. This may involve pavement or shoulder widening, particularly at road junctions such as Chandlers Road in Walcha Shire.
- Providing a consistent approach to signposting school bus set down and pick up points.
- Consider the provision of safe and appropriate set down and pick up areas for buses to pull clear of the carriageway and for parents to park.
- Consider the relocation of set down and pick up points to safer locations. This may include relocation to a side road rather than on the highway.

Review pedestrian facilities in cities and towns

There were 18 pedestrian casualty crashes on the Oxley Highway for the 5 year period ending 31 December 2012. All of these crashes, except for one fatal crash, occurred in low speed environments in cities or towns.

A number of community concerns were raised regarding pedestrian safety, in particular the pedestrian mid-block traffic signals in Tamworth and pedestrian vehicle conflicts in Wauchope.

Undertake a review of pedestrian facilities in the cities and towns along the Oxley Highway with a specific focus on:

- The safety of existing pedestrian facilities in Wauchope, in particular the proximity of the pedestrian crossings and their position in relation to footways.
- The wide lane widths through Wauchope.
- The safe operation of the pedestrian midblock traffic signals on Marius Street Tamworth, in particular drivers disobeying the red signal. This may also include investigations into safer alternate pedestrian facilities.
- Pedestrian safety in the vicinity of Westdale Public School Tamworth.

3.1.2 Road user behaviour program

In accordance with the Safe System approach to road safety, road users should be kept informed and alerted to the road conditions. This approach also recognises that it is inevitable that road users will make mistakes and under these circumstances the system must be forgiving.

Speeding and fatigue are the key behavioural factors involved in fatal crashes along the Oxley Highway.

The road user behaviour program addresses:

- Speeding drivers
- Driver fatigue, distraction and inattention
- Drink drivers
- Road user information
- Police and RMS enforcement
- Response times
- Rest areas

Speeding drivers

Messages about speeding are well promoted but drivers, especially in rural communities, may not always be aware of their own driving speeds. These messages need to be reinforced and addressed through a combination of education and enforcement.

Recommendations are:

- Enhance communication mechanisms with rural communities and stress the consequences of speeding and the provision of the logic underpinning speed zoning guidelines.
- Promote the Safer Roads website and increasing community engagement on speed limits.
- Promote more involvement by councils and their local communities in defining local road safety issues.
- Maintain and strengthen existing road safety partnerships. This can be achieved through the promotion and adoption of the Safe System approach to road safety through suitable learning and development modules.



Photograph 3.8: Narrow pavement, no shoulders and tight curves east of the New England Highway

Driver fatigue, distraction and inattention

Compared with casualty crashes throughout NSW the Oxley Highway has a similar percentage of fatigue related casualty crashes (13 per cent vs 13 per cent). However, there is a significant issue with fatigue related crashes, especially in section of highway east of Gunnedah, with six fatal crashes in six years (2008-2013) which were fatigue related.

Although heavy vehicle driver fatigue related issues were not evident in the crash analysis there is strong evidence to suggest that heavy vehicle drivers, are taking breaks in non-urban areas on the Oxley Highway.

Recommendations are:

- Update signage, check for consistency and consider more specific messages.
- Identify safer informal sites for heavy vehicle drivers to rest. These sites can be promoted through the 'blue reflector' system.



Photograph 3.9: A recently upgraded section of the Oxley Highway east of the Newell Highway at Burra Bee Dee

Drink drivers

RMS continues to reinforce the idea of drink driving as an anti social behavior through the following:

- Promoting safer behaviour through the development of strategies following the RMS qualitative research (June 2010) into drink driving in rural and remote communities. These strategies will be targeted to local communities to ensure that the countermeasures are relevant and aim to address particular issues in each community.
- The provision of public breath testing machines in all local towns and ensuring that these resources and their location are well communicated to the community.

Road user information

Reliable road user information systems play a significant role in road safety especially the ability to display immediate and accurate advice. In most cases this advice is displayed through variable message signs, both permanent and mobile.

The road conditions on the eastern escarpment of the Oxley Highway are very winding often with narrow lane widths, no shoulders and steep drop-offs. These conditions are considerably more challenging than the remaining sections of the highway and are far more demanding on a driver or riders concentration. This section of the highway also attracts many tourists including motorcyclists that may not have travelled this area previously.

Recommendations are that RMS:

- Consider the safe and appropriate placement of variable message boards giving pre-warning of the significant change in road conditions and the need to adjust speeds and drive to the conditions. These may require engineering works to provide protected hard stand areas.
- Consider the introduction of adverse weather condition warning systems.
- Consider developing an improved communication strategy to inform drivers and riders of full or partial road closures due to landslip incidents.

- Investigate the possibility of providing permanent vehicle actuated signposting (VAS) at locations with a particular or unusual road safety condition. One example is the road junction that provides access to the cotton storage facility west of Warren, where seasonal factors influence heavy vehicle truck movements operating 24 hours a day.

Enforcement

Complement Police resources in rural areas through the following strategies:

- Promote mobile roadside enforcement through the identification and development of suitable roadside enforcement sites.
- Support and undertake co-ordinated education and enforcement campaigns.
- Police and RMS to deliver coordinated enforcement of heavy vehicles.

Response times

Reliable communication systems play a vital role in road safety. Response times are critical when dealing with emergency services that need to attend the scene of a casualty crash on the highway. Apart from the major town centres most of the telecommunication systems along the length of the highway are unreliable or non-existent.

This was particularly evident between Wauchope and the New England Highway which also has a very high casualty crash rate. This severely limits the community's ability to promptly notify emergency services in the event of an incident.

Recommendations are that RMS:

- Determine those areas most in need of reliable mobile coverage based on crash data.
- Liaise with the relevant telecommunications provider to deliver adequate coverage along those sections of the highway with poor crash histories.

Rest areas

Driver fatigue has been identified as one of the main contributing factors in road casualties on the Oxley Highway. Rest areas are part of a suite of strategies adopted to address driver fatigue. Rest areas can also assist heavy vehicle operators in complying with heavy vehicle driver fatigue laws.

For rest areas to be safe and effective they must be adequately designed to cater for either small vehicles, heavy vehicles or both. This should also include adequate provision for vehicles to safely enter and exit the site and appropriate advance and

intersection signposting of the site. Field inspections noted that some sites did not have adequate sight distance to or from the access point, were poorly signposted or did not have adequate provision for vehicles turning into the site.

Undertake a review with the objective to:

- Providing appropriate and consistent signposting to all rest areas.
- Improving forward sight distance for vehicles turning right into rest areas.
- Providing appropriate right and left turn facilities into rest areas.



Photograph 3.10: A major rest on the eastern escarpment near Gingers Creek

3.1.3 Enforcement program

To be effective an enforcement program needs to consist of several strategies. The suggested strategies involve:

- Speed enforcement.
- Speed camera enforcement.
- Driver fatigue and drink driving enforcement after driving.

Speed enforcement

The speed enforcement program includes the following initiatives:

- Review highway crash trends to identify appropriate locations for mobile speed enforcement sites.
- Safe, hard stand enforcement sites that meet work health and safety requirements will be identified and provided along the highway at appropriate locations so that enhanced roadside speed enforcement can be undertaken by the NSW Police or through the TfNSW mobile speed camera enforcement program.
- Review and, where possible, increase existing levels of speed enforcement to target higher risk locations (at suitable sites identified and developed to meet operational and Work Health and Safety requirements for stationary enforcement), higher risk times of day and more remote areas outside larger town centres.
- Continue to co-ordinate the TfNSW mobile speed camera enforcement program with police enforcement operations.
- Identify locations where complementary operations can be conducted to provide a greater level of enforcement.
- Support NSW Police to allow for increased and targeted enforcement activities.

Speed camera enforcement

Although supported by the community, further investigation needs to be undertaken to clarify whether it is feasible to provide speed camera enforcement on the Oxley Highway. The investigations will need to focus on site selection and ensuring it meets the necessary criteria. At present there are a number of sites along the Oxley Highway that have been identified as suitable for mobile speed camera enforcement.

The NSW Speed Camera Strategy outlines the selection criteria for sites for the four types of speed cameras used in NSW. Speed cameras should support existing Police enforcement on the Oxley Highway.

Speed camera enforcement strategies include:

- The promotion of compliance with speed limits through the use of speed cameras which support enforcement conducted by NSW Police.
- Monitoring the effectiveness of this enforcement through the annual review of speed cameras.

Driver fatigue and drink driving education

The following driver fatigue and drink driving education initiatives are in place:

- Ongoing media campaigns, targeting driver fatigue and drink driving along the Oxley Highway. These campaigns are run concurrently with targeted Police enforcement of drink driving.
- Regular advertising campaigns are run, particularly during school holiday periods focusing on driver fatigue.



Photograph 3.11: A heavily timbered section of the road corridor east of Coonabarabran

Section 4

Summary and conclusion

The success of other route safety reviews such as those conducted on the Pacific, Princes, Newell and Kings Highways provides reliable evidence that similar road safety outcomes will be best achieved by implementing an integrated series of engineering, behavioural and enforcement programs.

The recommendations made as a result of the Oxley Highway route safety review focus on an integrated approach to improving road safety along the length of the highway. The recommendations involve implementing an enhanced road safety program which includes:

- Providing greater protection from roadside hazards through the installation of appropriate safety barrier systems.
- Adjusting existing barrier systems to enhance safety for motorcyclists.
- Relocating or removing some roadside hazards.
- Improving linemarking practices.

- Providing upgraded and consistent warning, advisory and directional highway signposting.
- Improving and widening road shoulders.
- Upgrading road junction treatments.
- Improving road alignment.
- Reviewing speed zones and their lengths.
- Reviewing school bus operations and upgrading facilities where appropriate.
- Enhancing road user behavioural campaigns, especially those targeting motorcyclists, speeding and fatigue.
- Providing or upgrading the facilities required to strengthen enforcement strategies.
- Maintaining and strengthening existing road safety partnerships.
- Review mobile phone coverage to facilitate improved post crash response times.



Photograph 4.1: A major rest on the eastern escarpment near Gingers Creek



Photograph 4.2: A straight alignment and good clear zone west of Gunnedah

This information is intended as a guide only and is subject to change at any time without notice.

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