Submission No 30

INQUIRY INTO SPEED ZONING AND ITS IMPACT ON THE DEMERIT POINTS SCHEME

Organisation: New South Wales Government

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Submission by

NSW Government

in response to

The Parliamentary Joint Standing Committee on Road Safety (Staysafe)

Inquiry into speed zoning and its impact on the demerit points scheme.

February 2014

CONTENTS

1 Terms of Reference

On 30 October 2013, the Parliamentary Joint Standing Committee on Road Safety (Staysafe) issued its terms of reference in relation to speed zoning and its impact on the demerit points scheme.

The table below provides a reference point for each of the Staysafe Inquiry terms of reference within the NSW Government submission.

Terms of Reference	**Location/Reference in Submission**
a) the contribution of speed to crash rates on NSW roads;	Part 3
b) the rationale for and current operation of speed zones on NSW roads; c) key factors governing the establishment of speed limits;	Part 4
d) mechanisms for reviewing the appropriateness of maximum speed limits;	Part 5
e) the operation of speed limits in other jurisdictions;	Part 6
f) the appropriateness of current thresholds in the Demerit Points Scheme for speeding offences;	Part 7
g) the impact of demerit points in reducing speeding behaviour; and	Part 8
h) any other related matters.	Part 9

2 Introduction

The NSW Government welcomes this Staysafe inquiry into speed zoning and its impact on the demerit points scheme.

This submission will examine speed management in relation to speed zoning and the Demerit Points Scheme, covering crash data, speed zoning rationale, operation of speed zones in NSW and in other jurisdictions and will also cover the Demerit Points Scheme in relation to speeding.

The Safe System approach underpins the road safety framework adopted in the NSW Road Safety Strategy 2012-2021 and National Road Safety Strategy 2011-2020. The approach takes into account the interaction of key components of road safety: the road user (safer people), road and roadside engineering (safer roads), vehicle design and features (safer vehicles) and safer speeds. The Safe System approach has improved road safety in NSW by accepting that road users are fallible and will make errors that result in crashes, regardless of the level of compliance in obeying road rules. This makes it vital to design transport systems, including road speeds, which protect road users, despite the inevitability of human errors. To complement the design of the Safe Systems approach, it is important to implement policies to deal with non-compliant dangerous behaviour.

Speed limit setting is a scientific process involving consideration of a range of factors, such as the amount of kinetic energy that is expelled in a crash, and is essential for establishing a safe system for road users. Speed limits are important in reducing the likelihood of crashes occurring, and are a key determinant of injury severity in the event of a crash. Speed limits throughout NSW are set in line with the NSW Speed Zoning Guidelines.

While speed is a key aspect of the Safe System approach, it is never considered in isolation, but is instead viewed as one part of a whole safe road transport system. Using the Safe System approach, the setting of a speed limit can only be determined by considering the number and types of hazards within a road environment, including the presence and movement of different types of road users. Pedestrians and cyclists are particularly vulnerable road users, and speed limits are designed to increase the survivability of crashes involving these groups.

Speed remains the leading behavioural factor in fatal crashes on NSW roads. Excessive and inappropriate speed increases the risk of a crash and the severity of its outcome. However drivers continue to speed as evidenced in the crash data, and drivers are self-reporting that they regularly exceed the speed limit.

The NSW Road Safety Strategy 2012-2021 identifies a key challenge to overcome the challenge of changing the social acceptability of speeding through a comprehensive speed management strategy. To succeed in achieving a 30 per cent reduction in fatalities and serious injuries in the decade to 2021 will require substantial progress to improving the culture of speed compliance in NSW.

Demerit points schemes are used widely across Australia and internationally to encourage safe and responsible driving behaviour, including compliance with speed limits. Demerit points have been an important feature of the NSW driver licensing system since 1969. The current NSW Demerit Points Scheme is consistent with the National Driver Licensing Scheme.

Most NSW drivers have no accumulated demerit points. During the period between 2005 and 2013, consistently over 70 per cent of NSW drivers have no accumulated demerit points at any point in time. This is despite a number of significant changes to the Demerit Points Scheme and enforcement programs over that period.

Changes to the NSW Demerit Points Scheme in 2009 made it more lenient towards low level speeding but more strict towards higher level speeding. This change reduced the number of demerit

points accumulated by NSW drivers and riders. However, following this change the acceptability of low-level speeding amongst the community has also appeared to have increased.

To address the increased number of road fatalities in 2009, Transport for NSW (TfNSW) and the NSW Police Force subsequently increased high visibility speed enforcement, including the roll-out of mobile and red-light speed cameras. The NSW Speed Camera Strategy is based on a high visibility general deterrence approach. This approach is designed to deter drivers from speeding through increasing the expectation of being caught and penalised for speeding.

In combination, the changes to speed enforcement practices and the Demerit Point Scheme over recent years have helped create an effective and fair system to limit speeding on NSW roads and reduce the risk to the community.

Although the Inquiry's focus is on speed zoning and demerit points, issues arising from the Inquiry may be relevant to other speed management practices. This submission therefore discusses other issues concerning speed management policy and practices.

3 The contribution of speed to crash rates on NSW roads

3.1 Overview of the NSW road toll and recent crash trends

NSW has achieved significant reductions in road trauma since fatalities peaked in 1978 with 1,384 persons killed.

There were 339 fatalities on NSW roads in 2013p (provisional figure as at 2 January 2014), 30 fewer fatalities than the previous year and the lowest annual total since 1924. This is a remarkable achievement given the population has more than tripled over this period and the number of registered motor vehicles has increased from less than 150,000 in 1924 to nearly five million in 2013.

Table 1: Fatalities and fatality rates per population for Australian jurisdictions, 2012 and 2013p

	Number of Fatalities			Fatalities per 100,000 Population		
State / Territory	2012	2013p	Percentage Change	2012	2013p	Percentage Change
NSW	369	339	-8%	5.05	4.58	-9%
Victoria	282	243	-14%	5.01	4.24	-15%
Queensland	280	271	-3%	6.13	5.82	-5%
South Australia	94	98	4%	5.68	5.87	3%
Western Australia	185	161	-13%	7.59	6.40	-16%
Tasmania	32	37	16%	6.25	7.21	15%
Northern Territory	49	37	-24%	20.83	15.45	-26%
ACT	12	7	-42%	3.20	1.83	-43%
Australia	1303	1193	-8%	5.73	5.16	-10%
Australia excl NSW	934	854	-9%	6.06	5.43	-10%

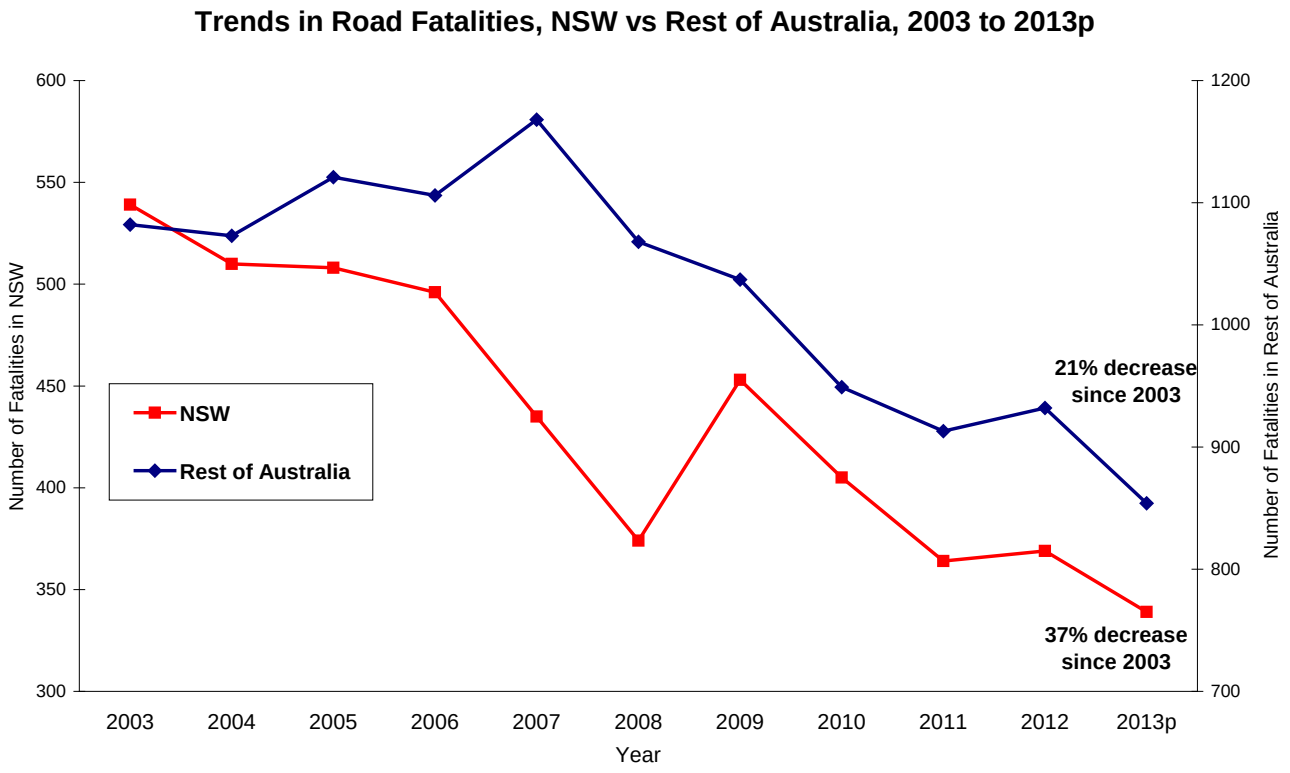
(Source: BITRE Road Deaths Australia, December 2013)

In 2013 NSW recorded a fatality rate of 4.58 per 100,000 population, the lowest NSW result since records began in 1908. NSW also achieved the second lowest fatality rate per population of all States in 2013 (4.58 fatalities per 100,000 population), surpassed only by Victoria (4.24). The fatality rate for the whole of Australia was 5.16.

There have also been improvements in non-fatal road trauma for NSW. Injury figures for 2013 are not yet available, but there were 22,932 persons injured on NSW roads in 2012, the lowest annual total since 1962.

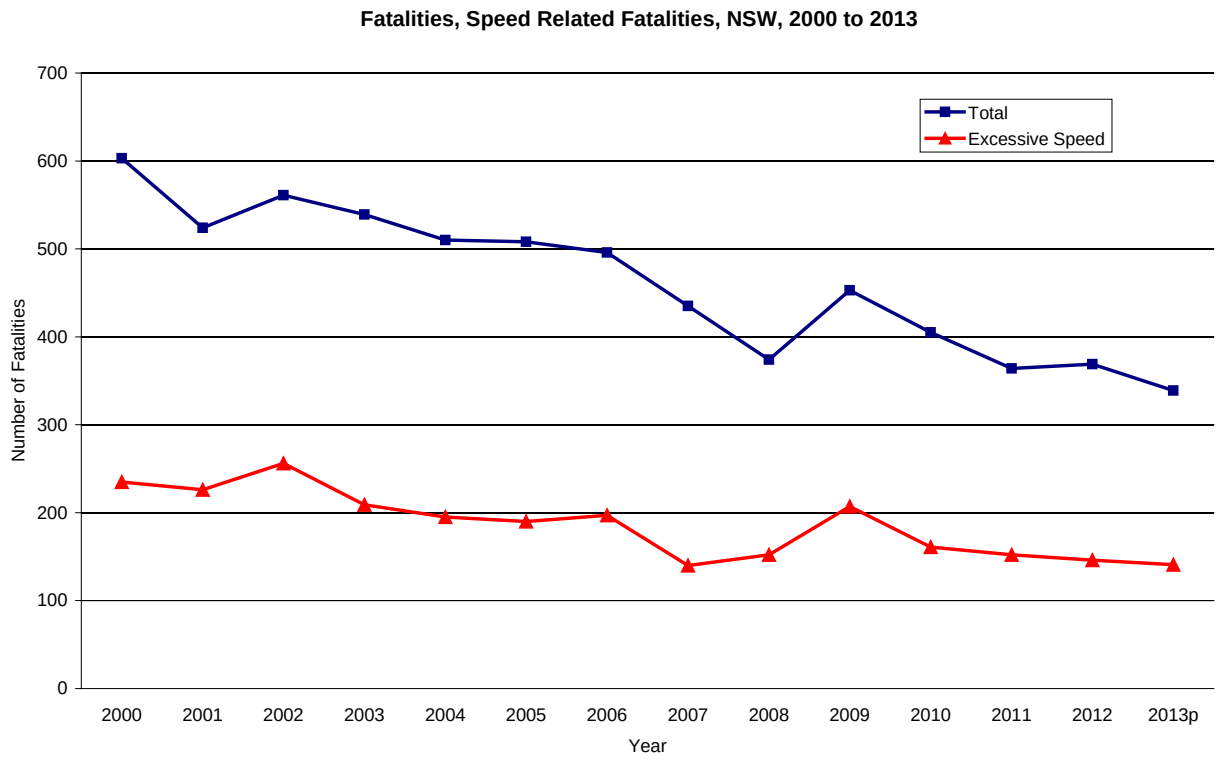
Over the past decade NSW has outperformed the rest of Australia in terms of fatality reductions. From 2003 to 2013p there has been 37 per cent reduction in fatalities on NSW roads, almost double the percentage reduction in fatalities across the rest of Australia (21 per cent).

Figure 1: Trends in Road Fatalities, NSW vs Rest of Australia, 2003 to 2013p



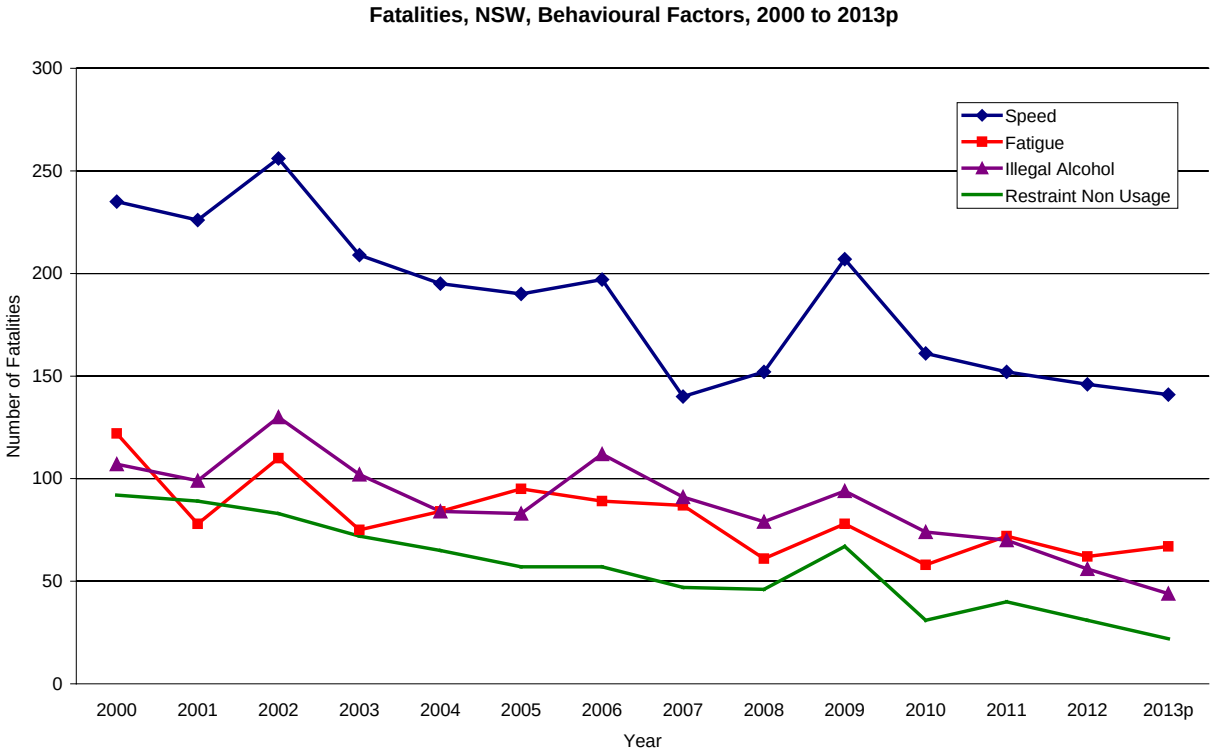
Since the turn of the century, speed related fatalities in NSW have decreased by around the same magnitude as total fatalities. Speed related fatalities have decreased by 40 per cent, from 235 in 2000 to 141 in 2013p. Over the same period, total fatalities have decreased by 44 per cent, from 603 in 2000 to 339 in 2013p.

Figure 2: Fatalities, Speed Related Fatalities, NSW, 2000 to 2013



However excessive or inappropriate speed remains the leading behavioural factor involved in road fatalities in NSW. Speed was implicated in 42 per cent of fatalities in 2013p, double the incidence for driver fatigue (20 per cent) and illegal alcohol (13 per cent although alcohol results are incomplete for 2013 at this stage and could be expected to increase slightly).

Figure 3: Fatalities, NSW, Behavioural Factors, 2000 to 2013p



3.2 Definition of speed related crashes in NSW, comparison with other jurisdictions

Excessive or inappropriate speed is the leading behavioural factor involved in crashes in NSW. In 2012, speed was involved in 39 per cent of fatal crashes, 40 per cent of fatalities, 16 per cent of injury crashes and 16 per cent of tow away crashes. Provisional road toll data as at 2 January 2014, indicates that in 2013, excessive or inappropriate speed accounted for about 42 per cent of fatalities (provisional figure).

The identification of speeding (excessive speed or inappropriate speed for the conditions) as a contributing factor in road crashes in NSW is determined directly from police reports of those crashes and from other factors suggesting the involvement of speeding. Therefore the criteria below are used in NSW to determine whether or not a crash is considered to have involved speeding as a contributing factor. The criteria for identifying speed involvement in crashes in NSW has been applied since 1986. The criteria defines speeding as travelling above the posted speed limit, or at a speed that is inappropriate for the conditions even though this speed may be below the posted speed limit. The latter includes situations where the circumstances of the crash suggest that inappropriate speed was likely to have been a contributing factor in that crash.

A speed-related crash is defined as a crash which involves at least one speeding motor vehicle. A motor vehicle is assessed as having been involved in a speed related crash if either:

- the vehicle controller (driver or rider) was charged with a speeding offence, the vehicle was described by the Police as travelling at excessive speed, or the stated speed of the vehicle was in excess of that permitted for the vehicle controller's licence class or the vehicle weight; or

- the vehicle was performing a manoeuvre characteristic of excessive speed such as the vehicle skidding, sliding, losing control, jack-knifing on a curve; or the vehicle ran off the road while negotiating a bend or turning a corner and the controller was not distracted by something or disadvantaged by drowsiness or sudden illness and was not swerving to avoid another vehicle, animal or object and the vehicle did not suffer equipment failure.

The identification of speed involvement as a contributing behavioural factor by other jurisdictions is highly dependent on the nature of the crash data collected and how strictly the definition complies with excessive (meaning in excess of the posted speed limit) or inappropriate speed.

The *National Road Safety Strategy 2011-2020* stated that speeding was a contributing factor in around 34 per cent of fatalities and 13 per cent of all serious injuries in Australia.

The latest figures from the International Road Traffic Accident database (IRTAD) report "Road Safety Annual Report 2011" showed that inappropriate speed was a factor in 26 per cent of fatal crashes and 14 per cent of injury crashes in Italy, 30 per cent of fatal crashes in the USA, 35 per cent of fatal crashes in Switzerland and 39 per cent of fatal crashes and 26 per cent of injury crashes in Germany. "Exceeding the speed limit" was identified in 14 per cent of fatalities in the United Kingdom. However, when "exceeding the speed limit" or "travelling too fast for the conditions" definitions were applied (more in line with definitions used in NSW and other jurisdictions) speed accounted for 24 per cent of all fatalities.

Whilst the figures above represent slightly different approaches to the identification of speed as a contributing factor in crashes, they do suggest that the NSW level of speed involvement in fatal crashes is comparable with the levels found in other jurisdictions.

3.3 Comparison of Crash Rates / Speed Limits for Motorways by Jurisdiction

Sometimes community discussion about speed zoning focuses on what should be the highest speed limit on the road network. These debates should be informed by safety information. This section and section 3.6 below examine fatality crash rates on high speed roads in international jurisdictions and casualty crash rates on selected NSW highways.

The most recent figures for international motorway safety are published by the IRTAD dated December 2012. The figures in *Table 2* show a wide variation in motorway fatality rates per billion vehicle kilometres across a number of jurisdictions.

Table 2: Motorway fatality rates per billion vehicle kms by jurisdiction

Jurisdiction	Fatalities per Billion Km	Year
Denmark	1.0	2010
Finland	1.6	2011
France	1.8	2010
Germany	2.0	2011
Great Britain	1.2	2010
Japan	1.7	2009
Switzerland	1.0	2010
USA	3.6	2010

These figures show 2.0 fatalities per billion vehicle kilometres travelled for German autobahns whilst the fatality rates for motorways in Denmark (1.0), Switzerland (1.0), Great Britain (1.2), Finland (1.6), Japan (1.7) and France (1.8). The USA has a relatively poor fatality rate with 3.6 fatalities per billion vehicle kilometres, but this is reflective of the relative performance across all roads when compared to other jurisdictions.

The above figures refute the argument that German autobahns with their unlimited speeds have supposedly low fatality rates. The other European jurisdictions with lower fatality rates all have speed limits applying across their motorway networks (rural motorway speed limits range from around 110 km/h to 130 km/h) with many enforcing speed limits with extensive speed camera monitoring programs.

Of course not all lengths of German autobahns are speed unlimited. In fact, speed limits apply in urban areas, around junctions and road works, as well as applying to heavy vehicles. Where speed limits do not apply for light passenger vehicles, the advisory speed is 130 km/h. In recent years, Germany has progressively increased the length of restricted speed limits on its autobahn to around 30 per cent of the network. The fatality rate for German autobahns has improved from 2.7 fatalities per billion vehicle km in mid-2000's to 2.0 in 2011. This improvement was in line with improvements for other roads.

The extent of the rural motorway network in Australia including NSW is much smaller compared to many overseas jurisdictions. Also, speed limits apply to NSW motorways, with a maximum speed limit of 110 km/h. Fatality rates of NSW motorways compare well against other international jurisdictions. For example, the M1 Pacific Motorway (formerly known as the F3 freeway) between Wahroonga and Hexham for the three year period 2010 to 2012 the fatality rate was estimated to be only 0.8 per billion vehicle km travelled.

3.4 Case study: Crashes on the Hume Highway (south of Campbelltown to Victoria)

Speed limits are set according to considerations of technical issues and the purpose and use of the roads. The maximum speed limit of 110km/h in NSW takes into consideration the standards of the roads and crash risks. Any increase to this limit would require roads to meet certain engineering standards and assessment that the speed limit increases will not compromise the safety of all users of the road.

In NSW, the Government has invested significantly to improve the standard of the state's highway network. For example, with the opening of the Holbrook bypass in August 2013, the NSW Government completed the duplication of the Hume Highway. The length of the Hume Highway from Campbelltown to the Victorian border forms the main road link between Sydney and Melbourne. It is a divided carriageway with relatively high speed limits.

The most recent AUSLINK casualty crash rates (2012) show that the Hume Highway corridor compares favourably with other AUSLINK corridors. Table 3 shows that casualty crash rates on the Hume Highway (south of the M5 junction) are between 51 and 75 casualty crashes per billion vehicle kilometres travelled. Table 3 also shows casualty crash rates on sections of a number of NSW highways and major Sydney routes in 2012.

Table 3: New South Wales National Network Data-Performance Indicators-Casualty Crashes per BVKT (17 September 2013) *(note this chart is not comparable with Table 2)*

DESCRIPTION	Casualty Crashes per BVKT in 2012
Federal Highway (HW3): ACT Border - Intersection Hume Highway (HW2) near Goulburn	89
Barton Highway (HW15): ACT Border - Intersection Hume Highway (HW2) near Yass	53
Newell Highway (HW17): Victoria Border - Marsden	68
Newell Highway (HW17): Marsden - Gilgandra / Coonabarabran LGA Bdy	70
Newell Highway (HW17): Gilgandra / Coonabarabran LGA Bdy - Queensland Border	49
New England Hwy (HW9): Hexham - Aberdeen	149
New England Hwy (HW9): Aberdeen - Armidale	88
New England Hwy (HW9): Armidale - Queensland Border	119
Pacific Highway (HW10): Hexham Brudge - Intersection Oxley Hwy (HW11) @ Port Macquarie	88
Pacific Highway (HW10): Intersection Oxley Hwy (HW11) @ Port Macquarie - Intersection Gwydir Hwy (HW12	67
Pacific Highway (HW10): Intersection Gwydir Hwy (HW12) @ Grafton - Intersection Bruxner Hwy (HW16)	74
Pacific Highway (HW10): Intersection Bruxner Hwy (HW16) @ Ballina - Queensland Border @ Tweed Heads	61
M5 East (M5) / General Holmes Drive (MR194) / Foreshore Drive (MR617): Beverly Hills - Port Botany	117
King Georges Road (MR200) / Roberts Road (MR200): Blakehurst - Chullora	292
Sturt Highway (HW14): Hume Hwy (HW2) - Victoria Border	104
Princes Highway (HW1): Blakehurst - Waterfall	146
Southern Freeway (F6): Waterfall - Bulli	20
Mt Ousley Rd (MR513) / Picton Rd (MR95) / Southern Freeway (F6): Bulli - Wollongong	145
Western Motorway (M4): Concord to Intersection Walgrove Road (MR515)	158
Western Motorway (M4): Intersection Walgrove Road (MR515) - Start Great Western Highway (HW5) @ Laps	120
Great Western Highway (HW5): End Western Motorway (M4) - Bathurst	191
Mitchell Highway (HW7): Bathurst - Intersection Newell Highway (HW17) @ Dubbo	76
Hume Hwy (HW2): The Crossroads - Marulan	70
Hume Hwy (HW2): Marulan - Intersection Sturt Highway (HW14)	51
Hume Hwy (HW2): Intersection Sturt Highway (HW14) - Victoria Border	76
Sydney - Newcastle Freeway (F3) / John Renshaw Drive (MR588) / Weakleys Drive (HW9): Wahroonga - Berr	45
Pennant Hills Road (HW13): Carlingford (M2 Interchange) - Wahroonga	319
TOTALS (RMS Managed)	91

From *Table 3* above casualty crash rates for the Hume Highway are comparable with the Pacific Highway (rates 61 to 88), better than the New England Highway (rates 88 to 149) but slightly worse than the M1 Pacific Motorway (F3) (rate 45).

Table 4 shows that over the ten year period 2003 to 2012, there were 98 fatal crashes and 1,520 injury crashes on the Hume Highway south of Campbelltown – an average of around 10 fatal crashes and 150 injury crashes per annum. There were on average 12 fatalities and 230 injuries per annum.

Table 4: Casualty crashes on the Hume Highway (south of Campbelltown to Victoria), 2003-2012

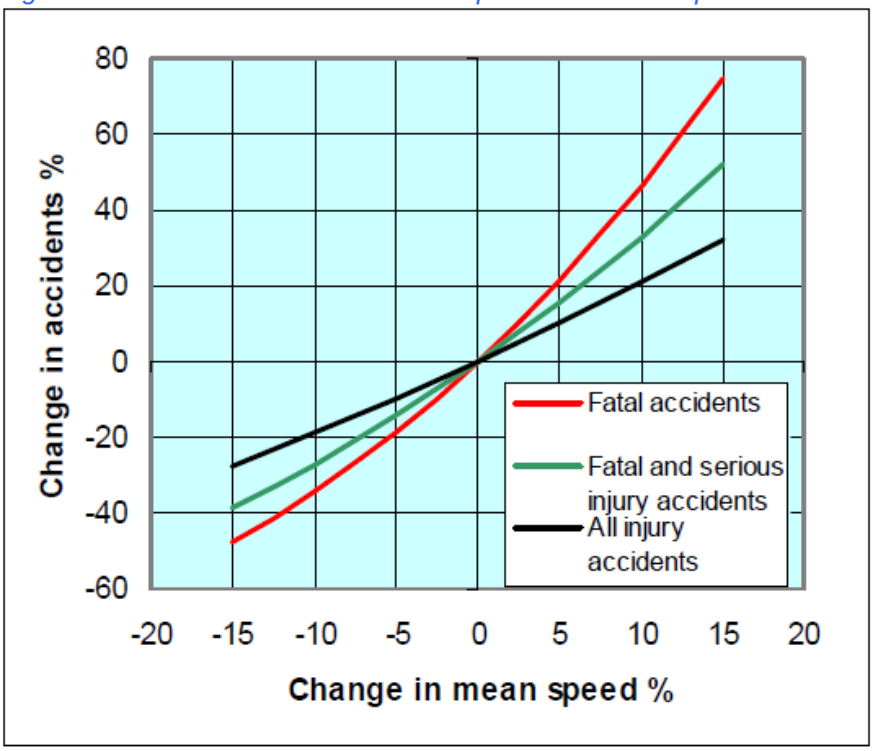
			Reporting year										
Degree of crash	Speeding involved in crash	Speed Limit	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2003-2012
Fatal	Yes	90 & under	0	0	0	0	0	1	0	1	0	0	2
		100	0	1	0	1	1	0	0	1	1	0	5
		110	2	0	1	2	0	4	3	4	1	3	20
		Sub-Total	***2***	***1***	***1***	***3***	***1***	***5***	***3***	***6***	***2***	***3***	***27***
	No or unknown	90 & under	1	0	0	0	1	1	1	0	0	0	4
		100	3	4	3	3	4	0	0	1	0	0	18
		110	3	11	4	8	6	3	4	1	5	4	49
		Sub-Total	***7***	***15***	***7***	***11***	***11***	***4***	***5***	***2***	***5***	***4***	***71***
	Sub-Total		**9**	**16**	**8**	**14**	**12**	**9**	**8**	**8**	**7**	**7**	**98**
Injury	Yes	90 & under	9	5	4	6	5	4	7	2	4	2	48
		100	17	6	8	6	9	3	1	2	1	2	55
		110	24	25	25	25	25	39	23	41	36	39	302
		Sub-Total	***50***	***36***	***37***	***37***	***39***	***46***	***31***	***45***	***41***	***43***	***405***
	No or unknown	90 & under	35	28	33	22	25	7	6	5	6	5	172
		100	17	12	8	10	14	13	9	6	4	6	99
		110	89	102	76	82	81	79	66	97	84	86	842
		Unknown	1	0	0	0	0	0	0	1	0	0	2
		Sub-Total	***142***	***142***	***117***	***114***	***120***	***99***	***81***	***109***	***94***	***97***	***1115***
	Sub-Total		**192**	**178**	**154**	**151**	**159**	**145**	**112**	**154**	**135**	**140**	**1520**

The majority of these casualty crashes occurred in speed zones of 100 km/h or more. Speed was identified as a contributing factor in 28 per cent of fatal crashes and 27 per cent of injury crashes.

The map (*Figure 5*) details the distribution of casualty crashes along the Hume Highway (south of Campbelltown) over the ten year period 2003 to 2012. Injury crashes are spread along the route whilst there is slightly greater concentration of fatal crashes towards the north and south of the route.

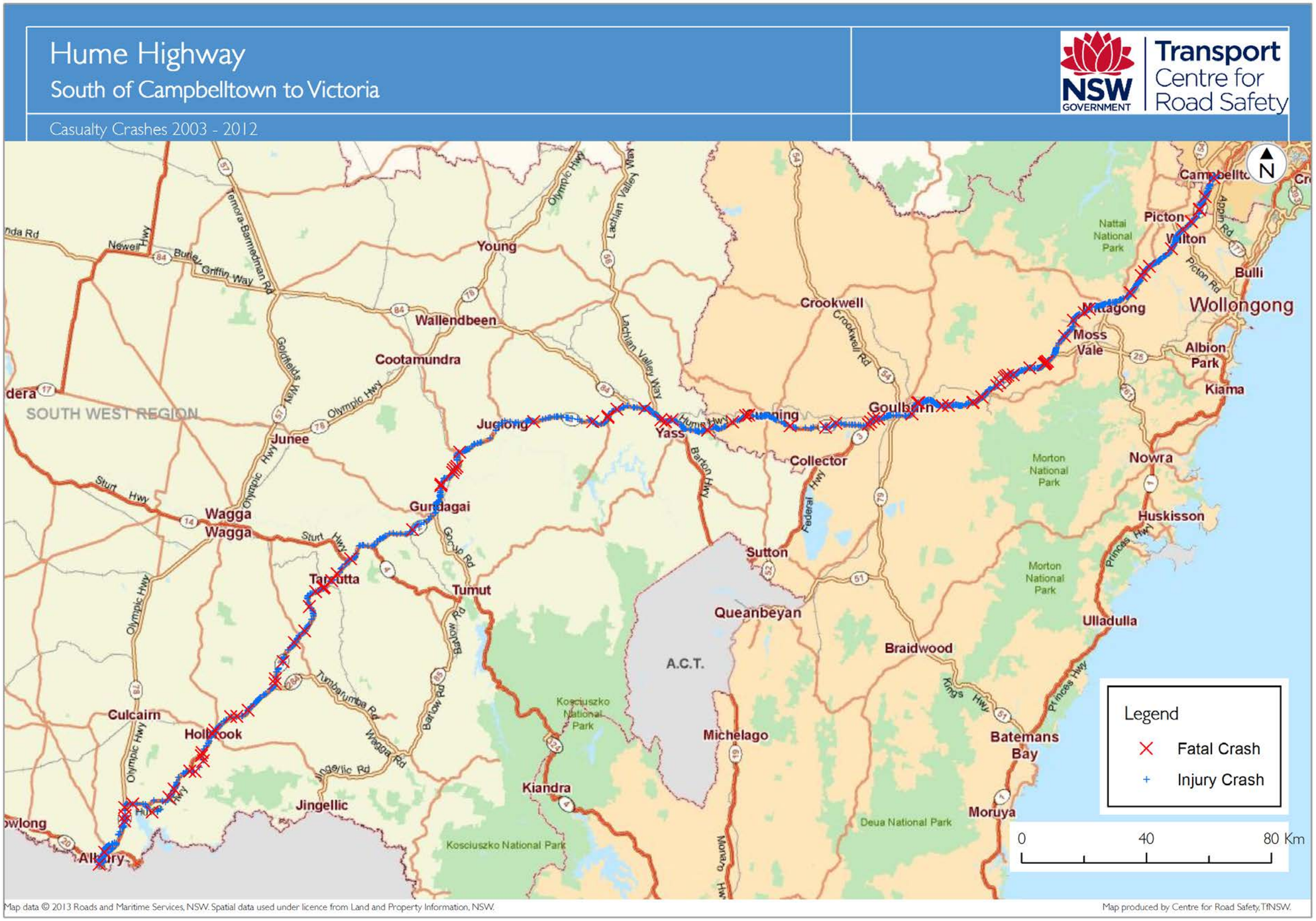
Internationally accepted research by Nilsson has established a clear relationship between changes in average traffic speed and crash outcomes. Nilsson conducted a meta-analysis of a number of published studies investigating speed changes and crash outcomes and developed the Nilsson power model. Based on the investigations of 50 separate speed limit changes on urban and rural roads in Sweden, Nilsson (1981) derived a series of mathematical functions that explain the relationship between changes in speed and traffic safety. Nilsson's findings clearly demonstrate the relationship between crash severities in cases of positive or negative program interventions – increased speeds (resulting in reduced road safety) and decreased speed (resulting in enhanced road safety) – and that the impact in both cases is greatest on the most serious crashes (see *Figure 4* below).

Figure 4: The Power model - Relationship between mean speeds and crashes (Nilsson, 2004)



When examining crashes on the Hume Highway using the Nilsson power model, a 10 km/h increase in speeds for existing 110 km/h speed zones, would result in an estimated 42 per cent increase in fatal crashes (to around 14 per annum) and an estimated 15 per cent increase in injury crashes (to around 175 per annum). This highlights the critical role of setting scientifically determined speed limits on NSW roads to reduce the risk and severity of crashes.

Figure 5: Hume Highway (south of Campbelltown to Victoria)-Fatal and Injury Crashes



Note that the crash map depicts the Hume Highway as it is currently configured (December 2013). There are crashes shown which do not appear to be on the highway, however these crashes have occurred on sections of the Hume Highway which were subsequently replaced by upgrades.

4 The rationale for and current operation of speed zones on NSW roads and key factors governing the establishment of speed limits

4.1 Speed zoning in NSW – General approach

In NSW, speed zoning consists of a system of default speed limits and speed zoning. The default urban speed limit is 50 km/h and the default rural speed limit is 100 km/h and they apply automatically unless an approved speed limit sign indicates otherwise.

Approved regulatory speed limit signs are white and contain a number (the speed limit) within a red circle (annulus).

Advisory speed limit signs are yellow in colour. They are used to inform motorists of changes in alignments (i.e. curves, bends, humps, dips) and of the appropriate speed to negotiate these road features.

All regulatory speed limits end in"0" (e.g. 50) and advisory speeds end in "5" (e.g. 45).

4.2 Rationale for current operation of speed zones on NSW roads

Speeding is a major behavioural factor contributing to road related deaths and injuries. Speed contributes to both the risk of being involved in a crash and also the severity of a crash.

The laws of physics and human performance mean that small increases in speed result in large rises in the number of collisions, injuries and deaths on NSW roads. As driving speed increases, the time that a driver has to identify and react to a dangerous situation decreases. Additionally, the distance needed for that vehicle to stop increases. High speeds are also associated with extremely high risks of losing control of the vehicle on corners, curves or if evasive action is needed.

Even when speeding is not the decisive cause of a crash, the severity of injury is highly correlated with the vehicle speed at the moment of impact. The effects follow the rules of physics regarding the change in kinetic energy that is released in a crash. The energy released and absorbed in a crash is linked to mass and impact speed, with speed the most significant contribution. Most of the kinetic energy is generally absorbed by the lighter crash "opponent" – often the vulnerable road user, such as pedestrians and cyclists. The likelihood of being seriously injured in a collision rises significantly even with minor changes in impact speed. The aim is to reduce the amount of energy generated in a crash to ensure the forces released are within the boundaries of human tolerance and are survivable.

Speed is the largest single contributing factor involved in fatal road crashes, contributing to around 40 per cent of road fatalities each year in NSW - about 150 lives lost every year. Speed limits are one of the oldest and most proven strategies for controlling traffic speeds. Lower speeds deliver significant road safety benefits, reducing both the number and severity of crashes. A major study (Tziotis 2001) that evaluated the introduction of the 50 km/h urban speed limit in NSW found that a 23 per cent reduction in road crashes was achieved on residential streets where the lower speed limit was introduced. The study also found that the proportion of motorists speeding fell dramatically on streets that were rezoned to 50 km/h.

As well as the benefits for safer speeds, appropriately set speed limits provide a more uniform speed environment in which drivers can more safely undertake difficult manoeuvres, such as stopping, overtaking and turning.

Speed limits throughout NSW are set in line with the NSW Speed Zoning Guidelines. A key objective is to ensure that speed limits are safe and applied consistently across the State without an excessive number of changes. The guidelines aim to ensure that speed limits and speed zones are set to balance road safety with mobility needs, taking into account numerous technical factors, such as road design, complexity of the road network and land use. Whilst setting speed limits involve the scientific application of technical considerations, the Government welcomes and invites the community to highlight issues with current speed zones through the Safer Roads Website. RMS also reviews roads and ensures speed zones are appropriate.

4.3 The Safe System approach to road safety

The Safe System approach underpins the road safety framework adopted in the *NSW Road Safety Strategy 2012-2021* and *National Road Safety Strategy 2011-2020*. The approach guides the development of countermeasures to reduce death and injury on NSW roads.

The Safe System approach takes into account the interaction of key components of road safety: the road user (safer people), road and roadside engineering (safer roads), vehicle design and features (safer vehicles) and safer speeds.

The Safe System aims to create an environment in which there is an acceptance that crashes will occur however steps are in place to ensure the consequences of the accident should not result in death or serious injury. When an unanticipated event or human error occur that results in a crash, the road environment, vehicle design and travel speeds need to account for this in order to reduce the risk of a crash and the severity of the outcome. The Safe System approach is consistent with policy approaches adopted by international road safety leaders and is a central theme of the 2008 OECD report, 'Towards Zero: Ambitious Road Safety Targets and the Safe System Approach', and the United Nations Decade of Action for Road Safety 2011-2020.

The Safe System approach requires that those who design, operate and manage the road transport system are accountable for the safety performance of the system as a whole, by delivering a safe road environment, safe vehicles, and safe travel speeds that considers the behaviour of different road users. It also requires safe and compliant road user behaviour.

A fundamental principle of the Safe System approach is that the key elements (roads, vehicles, people and speeds) cannot be viewed in isolation from one another. Instead, their interactions need to be considered for effective system solutions to be implemented. For example, the setting of a safe travel or operating speed can only be determined by considering the number and types of hazards within a road environment, including the presence and movement of different types of road users (e.g. cars, cyclists, pedestrians).

The Safe System approach recognises that road user behaviour is critical. Road user behaviour, including speeding, can be addressed through varied strategies, including education, engineering and enforcement. Sanctions, such as the accumulation of demerit points, operate in combination with education initiatives and police enforcement to help deter road users from speeding.

While the role of education and enforcement is critical, the Safe System approach accepts that road users are fallible and will make errors that result in crashes, regardless of the level of compliance in obeying road rules. This makes it vital to design transport systems, including road speeds, which protect road users, despite the inevitability of human errors.

4.4 The impact of speed on crash risk and outcomes

Speed increases both the likelihood and severity of crashes. As driving speed increases, the time that a driver has to identify and react to a dangerous situation decreases. High speeds are also associated with extremely high risks of losing control of the vehicle on corners, curves or if evasive action is needed. A critical factor in the relationships between speed and crash outcomes is stopping distance. Stopping distance is the combination of the distance travelled by the vehicle during the reaction time of the driver, and the distance travelled once the brakes are applied. The reaction time of the driver does not depend on speed, but the greater the speed, the greater the distance travelled during the period it takes for the driver to react and the longer the braking distance.

The relationship between vehicle speed and crash severity is unequivocal and based on the laws of physics. The higher the speed in a crash, the greater the amount of kinetic energy that must be absorbed by the impact. Since kinetic energy is determined by the square of the vehicle's speed, rather than by the speed alone, the probability of death or injury, and the severity of injuries that occur in a crash, increase exponentially with vehicle speed. For example, a 30 per cent increase in speed (e.g. from 80 to 105 km/h) results in a 69 per cent increase in the kinetic energy of a vehicle.

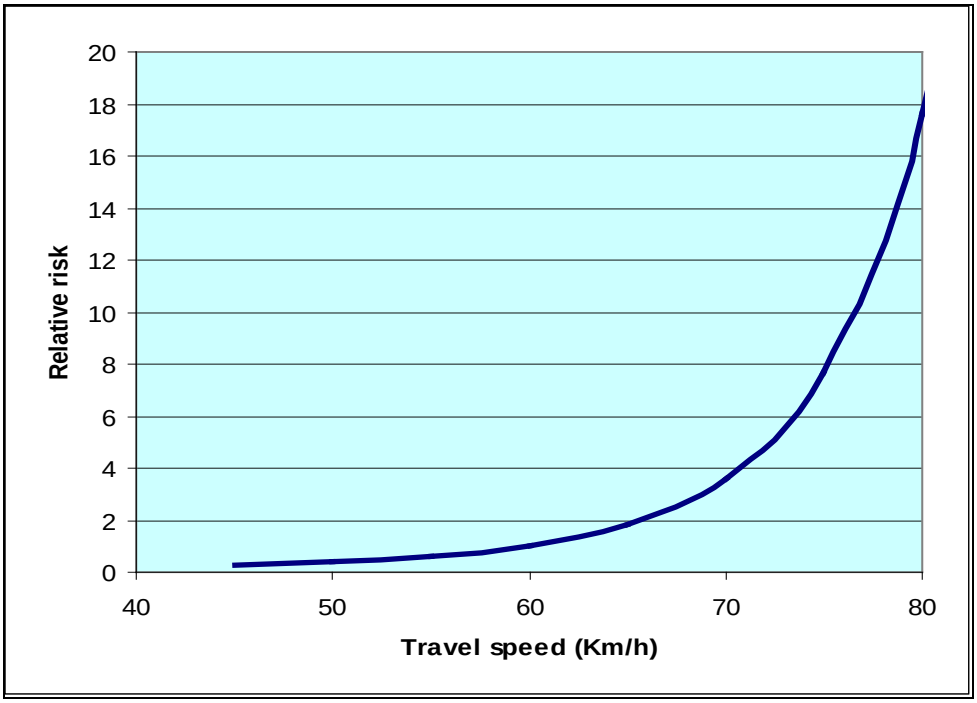
Results from research on speed risk are consistent with the laws of physics and well-established knowledge in the field of biomechanics (Elvik et al., 2004). Lower speeds:

- allow road users more time to assess hazards and avoid potential crashes;
- reduce the distance travelled while reacting to the hazards;
- reduce the vehicle stopping distance after application of the brakes;
- provide a greater opportunity for road users to avoid a collision;
- make it less likely that a driver will lose control; and
- reduce the impact forces in the event of a crash, reducing the severity of the outcomes.

In addition to increased risk of crash involvement, travelling faster increases the severity of the impact when a crash occurs. When a vehicle crashes, it undergoes rapid deceleration. The occupants meanwhile continue to move at the pre-crash speed until restrained by seat belts or airbags, or until hitting the vehicle interior or an external object. All other factors being equal, the higher the pre-crash speed, the greater the energy that must be absorbed by the occupant in the crash and the greater the severity of injury. Even small increases in speed can have a considerable effect on the forces experienced by vehicle occupants and subsequent injury outcomes. The effect of speed on severity of crash outcomes is also true for pedestrians and cyclists, which is discussed further below.

Australian research (Kloeden et al, 1997, 2001 and 2002) has shown that the risk of a serious casualty crash doubles with just a 5 km/h speed increase on 60 km/h urban roads or with a 10 km/h increase on rural highways. These findings are consistent with numerous international studies showing that speed limit reductions generally result in reduced casualty crashes.

Figure 6: Travel speed and the risk of involvement in a casualty crash relative to risk of travelling at 60 km/h in a 60 km/h speed limit zone



The line in Figure 6 represents the relative risk at various speeds compared with the casualty crash risk experienced at 60 km/h. So at travel speeds of 60 km/h it is a relative crash risk of 1.0, at 55 km/h it is less than that, at 50 km/h it is even less than that. There were insufficient examples of free speeds of less than 45 km/h to estimate a statistically confident estimate of the relative risk – hence these points were not plotted. Similarly there were too few examples of free speeds of more than 80 km/h to derive statistically confident estimates of the relative risk for these speeds. The absence of the line does not suggest zero risk – just the absence of a reliable estimate of the risk at those speeds.

Findings in NSW are also strongly consistent with these studies (Bhatnagar, Saffron, de Roos & Graham, 2010; Gavin et al., 2010). Research conducted by the Centre for Road Safety (Bhatnagar, Saffron, de Roos & Graham, 2010) demonstrated a reduction in casualties after a speed limit reduction on the Great Western Highway in 2000 from 110 km/h to 100 km/h. There were 45 casualty crashes on the Great Western Highway in the four years before the speed limit reduction, and 33 casualty crashes on the highway in the four years after the speed limit change, representing a 27 per cent casualty crash reduction. Speed survey data showed a mean speed reduction on the highway from 102.4 km/h (in 1999 when the speed limit was 110 km/h) to 97.5 km/h (in 2001 after the speed limit dropped to 100 km/h). Applying Nilsson's power model to this change in mean speed produces an estimated 16 per cent reduction in casualty crashes, demonstrating that Nilsson's model provided a comparable and more conservative estimate of savings than the actual safety outcomes observed on the Great Western Highway.

All things being equal, crash severity and survivability is highly dependent on the level of speed involved in the crash.

Australian research has demonstrated that the chances of surviving a crash decrease rapidly above certain impact speeds, depending on the nature of the collision. For a car impact with a pedestrian, the pedestrian is likely to survive if the impact speed is not greater than 40 km/h. For a car in a side impact crash the survivable crash impact speed is 50 km/h whilst for a head on crash it is 70 km/h..

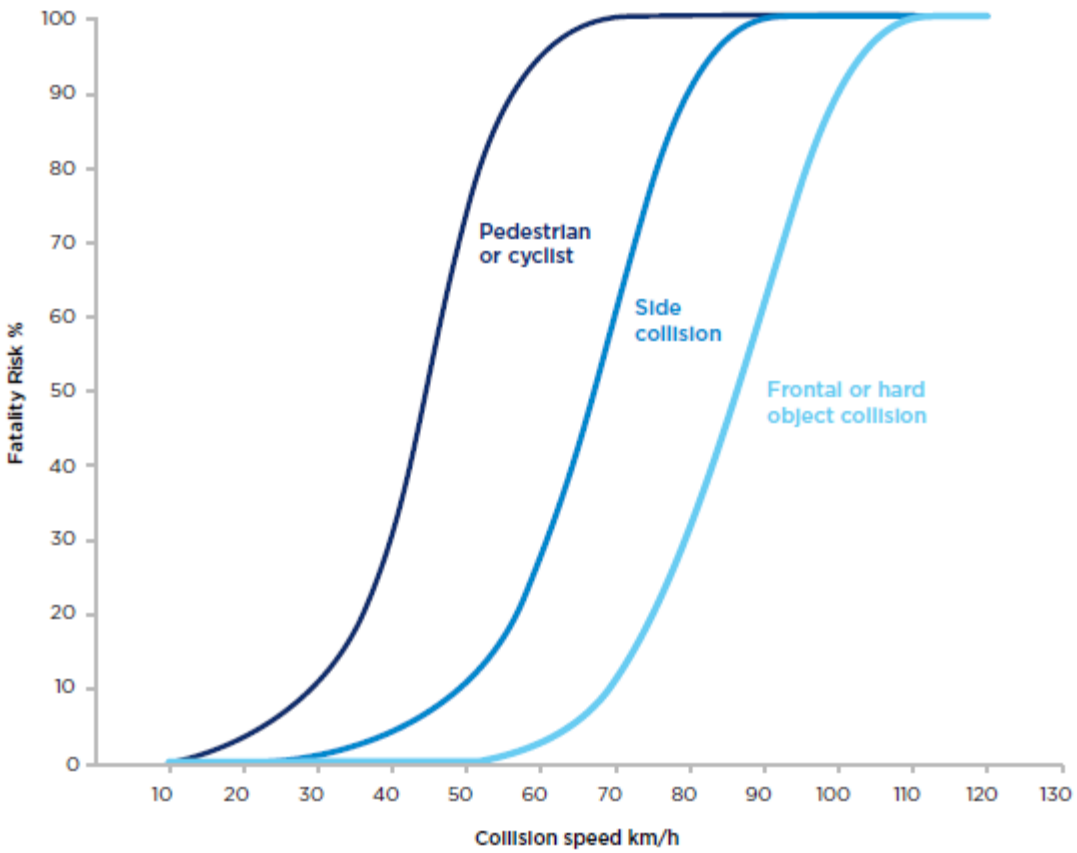
The data shows that road transport systems need to be designed to account for these levels of survivability, with speed limits aligned with the survivability of likely crash types in specific environments.

In addition to car occupants, our roads are used by vulnerable road users such as pedestrians, cyclists and motorcyclists. Studies of survival and impact speed show that small increases in travel speed can result in large increases in braking distances and impact speed, thus substantially increasing the risk of a pedestrian or bicycle rider being killed or seriously injured (see Figure 7)

Consistent with this, slight reductions in vehicle speed significantly reduce the severity of outcomes for pedestrians in the event of a crash. In NSW, most pedestrian and bicycle rider fatalities occur on roads with a posted speed limit of 60km/h or higher, whilst over 60 per cent of injuries occur on roads with a speed limit of 50km/h or less.

For example, research estimates that at an impact speed of 60 km/h a pedestrian has a 10 per cent chance of surviving whilst at an impact speed of 40 km/h a pedestrian has a 70 per cent chance of surviving (Rosen and Sander, 2009).

Figure 7: The relationship between impact speed and fatality risk for various crash types



Source: Wramborg P. (2005)

4.5 Community views of speeding and speed enforcement strategies

The previous section demonstrated that there is a known relationship between travel speed and crash outcomes. There is also a strong understanding from drivers that speeding increases your risk of a crash. Yet this contrasts with the high degree of speeding behaviour generally reported by drivers. In most countries, a large percentage of motorists drive faster than the speed limit (see Wegman and Goldenbeld, 2006). For example, in Great Britain almost 60 per cent of drivers exceeded the urban area speed limit, and in Sweden a similar proportion exceeded the rural speed limits (Lynam, et al., 2005).

Findings observed in NSW and across Australia are similar to those reported internationally. There have been a number of investigations of attitudes to speeding and speeding enforcement in NSW over the past five years (Walker et al., 2009; Fernandes et al., 2013), including two reports published in 2013 (Woolcott Research, 2013; Austroads, 2013). The latter of these reports examined community attitudes across Australia and New Zealand.

Collectively, these studies show that acceptance of low-level speeding is increasing, while acceptance of high-level speeding is decreasing. While the latter is a positive trend, the increasing acceptance of low-level speeding in NSW is a significant problem that needs to be addressed (Gavin et al., 2010). The community attitudes research also shows that people are generally supportive of the punishments used for medium and high-level speeding, including loss of demerit points and licence suspensions. Key findings from recent community attitudes reports are summarised below.

The results of these studies highlight the importance of fostering a road safety culture in NSW where the community appreciates the importance of complying with speed limits that are safe and appropriate for the road environment. The NSW Speed Camera Strategy is being implemented in collaboration with NSW Police to raise the visibility and amount of speed enforcement. TfNSW also continues to undertake communications, education and awareness campaigns to change the social acceptability of speeding.

4.5.1 Report 1: Changes in attitudes towards speeding in NSW

In 2009 a quantitative study examined driver attitudes toward a range of speeding issues including the social acceptability of speeding, and the acceptability of different enforcement methods (Walker et al., 2009). In 2011 a quantitative telephone survey of 1,500 NSW drivers measured changes since the 2009 study, and explored other speeding issues of emerging interest. The 2009 study showed that speeding was not yet socially unacceptable, except in extreme cases. Findings from the 2011 study suggested that the situation may be gradually improving, with small reductions in the perceived acceptability of speeding, albeit only in lower speed zones (Fernandes et al., 2013).

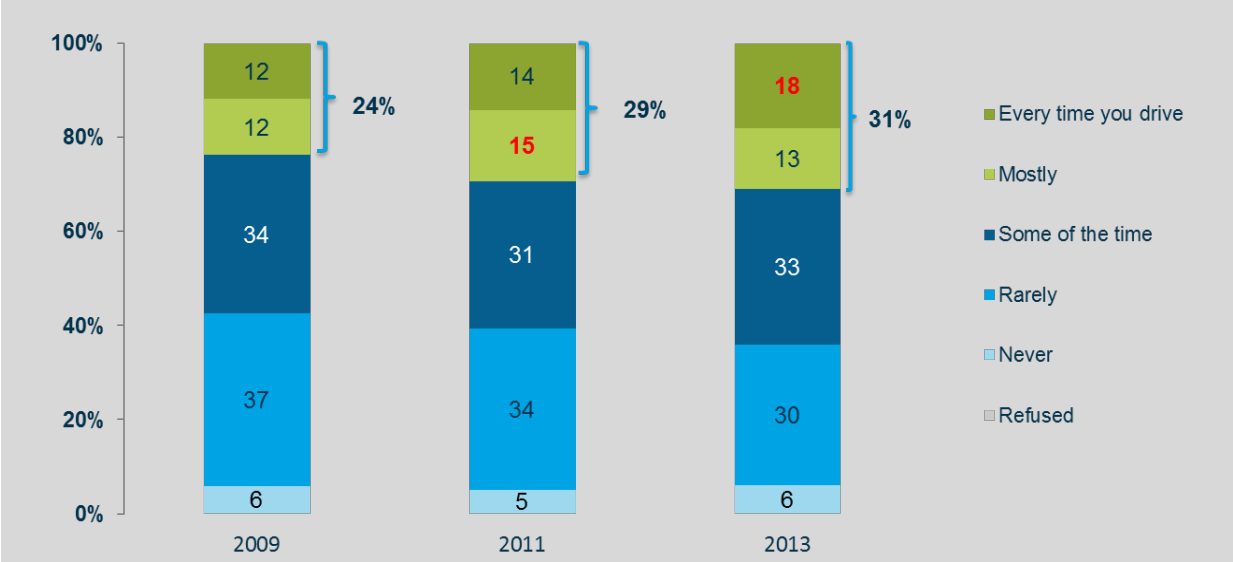
Consistent with 2009 findings, the 2011 study identified that there was a high level of support for existing speed enforcement practices in NSW, including mobile speed cameras. Findings showed that there was more community support for marked mobile speed cameras than for fixed speed cameras not in school zones.

4.5.2 Report 2: Attitudes Towards Speeding in NSW

This report found that the incidence of self-reported speeding in NSW increased in 2013, to a point where just under one third of all drivers (31%) claimed to speed ‘mostly’ or ‘every time’ they drive (see Figure 8). As outlined in Figure 9 below, most people who admitted to speeding seemed to justify their behaviour as it tended to be ‘lower level’ speeding (less than 10 kilometres an hour over the speed limit). The proportion of drivers speeding less than 10 kilometres an hour over the limit has increased since 2009. However, the proportion of drivers speeding more than 10 kilometres an hour over the limit has progressively decreased since 2009.

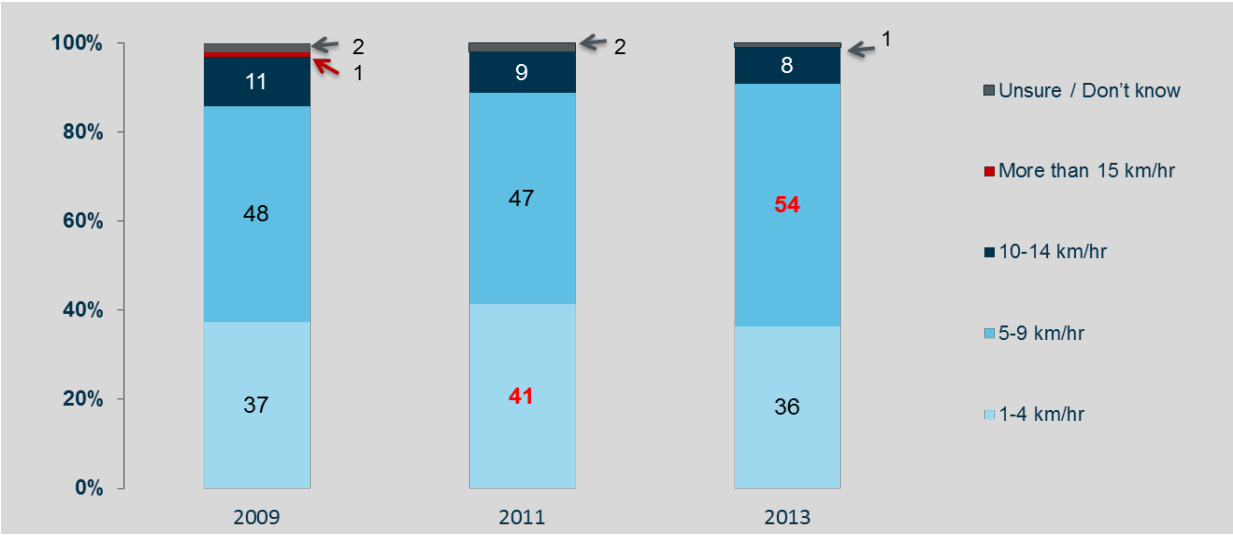
The number of self-reported speeding offences declined since 2011, with 16 per cent of drivers reporting that they received a fine in 2013 (compared to 21% in 2011 and 24% in 2009). The perceived likelihood of being caught for speeding also decreased, particularly by fixed speed cameras and police with radars (both down 5% in terms of ‘likelihood of being caught’). As is summarised later, these results reflect changes in the level of enforcement in NSW using fixed speed cameras over recent years, and the actual number of infringements that were issued over this time.

Figure 8: How commonly speed limits are being exceeded



Base: All respondents: 2009 (n=1500), 2011 (n=1508), 2013 (n=1004) Q2.9 How often would you say you exceed the speed limit, even if only by a few kilometres per hour? Would that be…

Figure 9: Amount speed limits are being exceeded



Base: All respondents 2013 (n=1004) Q2.10 When you are speeding, by how many kilometres per hour do you usually exceed the speed limit?

Detection methods were genuinely seen to discourage speeding. Police with radar guns (52% strongly discourage) and red-light speed cameras (55%) were viewed as the most likely to achieve this outcome. Increasing visibility and awareness of the use of these enforcement measures may therefore be beneficial. The findings identify that by 2013, around half of the respondents claimed they would like to see police presence increased. This demonstrates the importance of police enforcement. The Government has increased high visibility police enforcement in recent years.

Interestingly, while the self-reported incidence level of speeding has increased (along with the perceived acceptability of lower level speeding), speeding was still regarded as the number one factor that leads to crashes in NSW (31% thought speed most often leads to crashes).

4.5.3 Report 3: Austroads report - Driver Attitudes to Speed Enforcement (2013)

Similarly to the above NSW report, this report of Australian and New Zealand drivers found that low level speeding was generally considered acceptable, common and a 'safe enough' behaviour. Adherence to the speed limit was more readily considered a compliance rather than safety issue. There was a clear relationship between attitudes towards speeding, and the self-reported speeding behaviour of study participants.

As outlined in *Table 5* below, the majority of respondents reported they did not speed in school zones, but in the other zones the majority reported exceeding the speed limits by 1-9km/h.

Table 5: Proportion of respondents who reported exceeding speed limit by particular bands, by zone

Km/h above the speed limit	None	1-4 km/h	5-9 km/h	10-14 km/h	15-19 km/h	20-24 km/h	25-29 km/h	30 km/h+
School zone	69.9%	20.9%	7.0%	1.8%	0.1%	0.4%	0.0%	0.0%
60km/h zone	20.6%	28.8%	35.9%	12.0%	0.8%	1.7%	0.0%	0.2%
100km/h zone	20.1%	24.8%	37.5%	14.3%	1.0%	1.9%	0.0%	0.4%

Q2.10 When you are exceeding the speed limit in a school zone, by how many kilometres per hour do you usually exceed the speed limit? Base: All respondents, weighted by age, gender and location n=3051

Q2.11 When you are exceeding the speed limit in a 60km/h zone, by how many kilometres per hour do you usually exceed the speed limit? Base: All respondents, weighted by age, gender and location n=3051

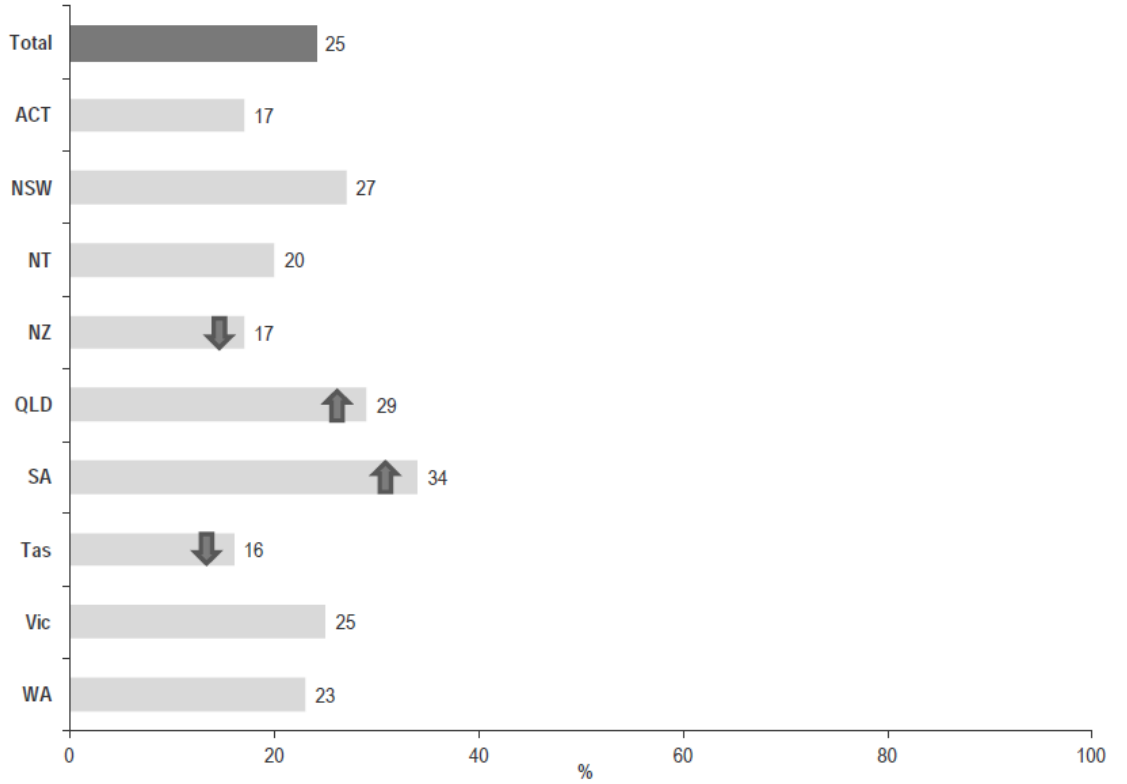
Q2.12 When you are exceeding the speed limit in a 100km/h zone, by how many kilometres per hour do you usually exceed the speed limit? Base: Base: All respondents, weighted by age, gender and location n=3051

Safety concerns were found to influence drivers' choice of speed, but these are only considered in certain circumstances; in particular, areas with high pedestrian activity, poor driving conditions, and when driving at high speeds. Participants generally demonstrated a lack of understanding of the safety implications of 'low level' speeding. Due to a limited understanding of the risks inherent in driving at different speeds, the rationales for different speed limits were not well understood by participants. Insofar as the limits were below what drivers saw as safe, adherence was more readily considered compliance rather than a safety issue.

More respondents reported they were deterred by the threat of immediate licence suspension (76%) than by a fine (32%) or demerit points (25%). Over a quarter (27%) of respondents from NSW indicated that a build-up of demerit points would deter them from speeding (see Figure 10 below). This was not significantly different from the average across respondents from all jurisdictions. The arrows in Figure 10 highlight that when compared to the results from all respondents, the build-up of demerit points was viewed as an effective deterrent from speeding most commonly by respondents from Queensland and South Australia, and least commonly by respondents from New Zealand and Tasmania, Respondents in group discussions were particularly aware of double demerit periods and reported that these had an impact on driving behaviour. Loss of demerit points was considered a good penalty system as it removed recidivist speeders from the roads.

Over half (54%) of all the Australian and New Zealand survey participants thought penalties for exceeding the speed limit by up to 10 km/h were 'about right', slightly less than a quarter (21%) of respondents indicated that they thought penalties were 'too harsh' and 11% thought that they were 'not harsh enough'. Almost half (45%) of survey respondents reported that they thought the penalties for exceeding the speed limit by more than 20 km/h were 'about right', while 30% of respondents indicated that they thought the penalties were 'not harsh enough'. Only 7% of respondents reported that they thought the penalties for exceeding the speed limit by more than 20 km/h were 'too harsh'.

Figure 10: Build up of demerit points as a deterrent



[1]

Note: Arrows indicate two states with the highest and lowest accumulations of demerit points

4.6 Comparison of self-reported and actual speeding behaviours in NSW

Data on actual speeding behaviour is consistent with attitudes towards and self-reports of low level speeding identified in the above reports. Vehicle speeds are assessed across NSW through annual speed surveys undertaken by the Centre for Road Safety at the same locations every year. These speed surveys are conducted on a range of roads with a range of speed limits to gather current information about speeding behaviour of both light vehicles and heavy vehicles.

The results in Table 6 and Table 7, provide a summary of annual speed survey results from 2008-2012. Results are presented separately for light and heavy vehicles and show:

- Mean speed
- 85th percentile speed (i.e. the speed at or below which 85% of vehicles are observed to travel under free-flowing conditions past a nominated point)
- Percentage exceeding the speed limit by up to 10km/h
- Percentage exceeding the speed limit by more than 10km/h.

In 2012 annual speed surveys were conducted at 164 locations across NSW. They were not undertaken at specific speed camera enforcement locations. The annual speed surveys measure free travel speeds, with a headway of four seconds. That is, only the speeds of vehicles that are unimpeded by other traffic are measured. Therefore the survey provides a measure of the speed that drivers choose to travel rather than a measure of traffic congestion.

[1] Note the chart arrows indicate the top and bottom two states.

In 2012, light vehicle speed survey results indicate:

- 50km/h speed zones
  - 43 per cent of drivers were speeding up to 10km/h above the posted speed limit, and a further 13 per cent were exceeding the speed limit by 10km/h or more.
  - The 85th percentile speed was 59km/h and the mean speed was 51km/h.
- 100km/h speed zones
  - 31 per cent of drivers were speeding up to 10km/h above the posted speed limit, and a further nine per cent were exceeding the speed limit by 10km/h or more.
  - The 85th percentile speed was 106km/h and the mean speed was 98km/h.

Table 6: Mean speed and 85th percentile speed survey results, 2008-2012

Posted Speed Limit	Light Vehicles Mean Speeds (km/h)					Light Vehicles 85th Percentile Speeds (km/h)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
40 km/h School Zone	45.7 km/h	45.1 km/h	43.6 km/h	44.2 km/h	43.3 km/h	53.5 km/h	52.7 km/h	50.9 km/h	51.4 km/h	50.2 km/h
40 km/h	38.7 km/h	38.9 km/h	38.4 km/h	38.3 km/h	39.3 km/h	44.2 km/h	44.6 km/h	44.0 km/h	43.8 km/h	44.7 km/h
50 km/h	53.6 km/h	53.6 km/h	52.1 km/h	52.3 km/h	51.4 km/h	60.8 km/h	61.1 km/h	59.1 km/h	59.4 km/h	58.5 km/h
60 km/h	58.6 km/h	58.7 km/h	57.7 km/h	57.4 km/h	58.1 km/h	65.4 km/h	65.6 km/h	64.2 km/h	64.3 km/h	65.0 km/h
70 km/h	69.8 km/h	69.6 km/h	67.9 km/h	67.8 km/h	67.6 km/h	77.7 km/h	77.8 km/h	75.8 km/h	75.6 km/h	75.3 km/h
80 km/h	77.4 km/h	77.8 km/h	76.1 km/h	76.4 km/h	77.2 km/h	85.6 km/h	85.9 km/h	84.5 km/h	86.4 km/h	85.0 km/h
90 km/h - small sample	89.0 km/h	88.1 km/h	91.1 km/h	90.9 km/h	86.5 km/h	97.7 km/h	96.7 km/h	99.0 km/h	99.2 km/h	95.2 km/h
100 km/h	97.9 km/h	98.8 km/h	98.6 km/h	99.1 km/h	98.4 km/h	105.7 km/h	106.5 km/h	106.2 km/h	106.7 km/h	106.0 km/h
110 km/h*	109.6 km/h	109.9 km/h	108.8 km/h	109.2 km/h	109.8 km/h	117.7 km/h	118.0 km/h	116.6 km/h	116.7 km/h	117.2 km/h

Posted Speed Limit	Heavy Vehicles Mean Speeds (km/h)					Heavy Vehicles 85th Percentile Speeds (km/h)				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
40 km/h School Zone	42.3 km/h	41.9 km/h	41.2 km/h	42.4 km/h	40.8 km/h	48.9 km/h	48.3 km/h	47.1 km/h	49.2 km/h	46.4 km/h
40 km/h	37.5 km/h	38.6 km/h	37.7 km/h	37.3 km/h	39.1 km/h	42.7 km/h	44.2 km/h	42.7 km/h	42.4 km/h	44.9 km/h
50 km/h	51.9 km/h	53.2 km/h	51.8 km/h	51.2 km/h	50.3 km/h	59.3 km/h	60.3 km/h	58.6 km/h	58.1 km/h	57.2 km/h
60 km/h	56.9 km/h	56.4 km/h	56.2 km/h	55.8 km/h	57.2 km/h	64.3 km/h	63.8 km/h	63.2 km/h	63.0 km/h	65.0 km/h
70 km/h	66.4 km/h	66.1 km/h	65.4 km/h	64.9 km/h	64.2 km/h	75.2 km/h	75.5 km/h	74.4 km/h	73.4 km/h	72.9 km/h
80 km/h	72.7 km/h	76.3 km/h	72.0 km/h	72.9 km/h	75.5 km/h	82.4 km/h	89.6 km/h	81.6 km/h	81.9 km/h	83.9 km/h
90 km/h - small sample	85.9 km/h	85.0 km/h	91.1 km/h	90.0 km/h	85.6 km/h	95.6 km/h	94.5 km/h	99.4 km/h	98.9 km/h	95.5 km/h
100 km/h	96.3 km/h	97.4 km/h	98.0 km/h	98.0 km/h	97.6 km/h	102.7 km/h	103.5 km/h	104.4 km/h	104.4 km/h	104.0 km/h
110 km/h*	101.4 km/h	100.7 km/h	101.8 km/h	100.6 km/h	101.8 km/h	106.7 km/h	106.4 km/h	109.0 km/h	106.8 km/h	107.4 km/h

* Note HV Speed Limit is 100 km/h and results presented indicate the percentage of HV's exceeding 100km/h in this section

(Source: NSW Centre for Road Safety, 2013)

In 2012, heavy vehicle speed survey results indicate:

- 50km/h speed zones
  - 40 per cent of drivers were speeding up to 10km/h above the posted speed limit, and a further 10 per cent were exceeding the speed limit by 10km/h or more.
  - The 85th percentile speed was 57km/h and the mean speed was 50km/h.
- 100km/h speed zones
  - 33 per cent of drivers were speeding up to 10km/h above the posted speed limit, and a further six per cent were exceeding the speed limit by 10km/h or more.
  - The 85th percentile speed was 104km/h and the mean speed was 98km/h.

The results show that over the last five years the general trend has been a decrease in the proportion of light vehicles exceeding the speed limit across most speed zones. This includes a significant decrease in the proportion of vehicles exceeding the speed limit in 2010, coinciding with the introduction of mobile speed cameras and installation of red-light speed cameras. However, the range of road safety communications campaigns and changing patterns of of police enforcement that occurred over the same time period means that the observed decrease in the proportion of light vehicles exceeding the speed limit cannot be solely attributed to the introduction of mobile speed cameras and installation of red-light speed cameras. There were also some reductions between the proportion of light vehicles exceeding the speed limit between 2008 and 2009. The results in 2011 showed a continued suppression of speeding, when compared to results from 2008 to 2009. However, there were some increases in speeding when compared to 2010.

Table 7: Percentage of vehicles exceeding the speed limit, 2008-2012

Posted Speed Limit	Light Vehicles Exceeding the Speed Limit - by up to 10km/h					Light Vehicles Exceeding the Speed Limit +10km/h				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
40 km/h School Zone	46.2 %	46.4 %	44.0 %	45.1 %	42.0 %	25.7 %	23.0 %	17.5 %	19.7 %	18.4 %
40 km/h	29.4 %	30.2 %	27.8 %	27.2 %	32.0 %	4.0 %	4.5 %	3.4 %	3.7 %	6.0 %
50 km/h	49.5 %	48.8 %	46.4 %	46.6 %	42.8 %	17.0 %	16.8 %	12.6 %	13.2 %	13.0 %
60 km/h	31.8 %	32.3 %	28.8 %	28.2 %	29.9 %	7.2 %	7.3 %	5.4 %	5.8 %	7.8 %
70 km/h	36.4 %	35.9 %	31.3 %	30.2 %	28.2 %	10.1 %	10.4 %	6.6 %	6.3 %	7.3 %
80 km/h	28.4 %	29.8 %	26.3 %	26.1 %	24.8 %	7.8 %	8.8 %	6.3 %	6.6 %	7.1 %
90 km/h - small sample	32.5 %	29.6 %	38.0 %	38.5 %	22.9 %	10.3 %	9.0 %	11.8 %	13.4 %	10.0 %
100 km/h	33.6 %	34.5 %	32.2 %	34.4 %	31.0 %	7.6 %	8.2 %	9.0 %	8.9 %	9.4 %
110 km/h*	38.7 %	40.8 %	37.5 %	38.9 %	41.2 %	9.9 %	9.3 %	6.4 %	7.0 %	11.4 %

Posted Speed Limit	Heavy Vehicles Exceeding the Speed Limit - by up to 10km/h					Heavy Vehicles Exceeding the Speed Limit +10km/h				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
40 km/h School Zone	41.1 %	42.2 %	36.2 %	43.3 %	39.5 %	13.1 %	10.1 %	10.2 %	12.6 %	8.1 %
40 km/h	21.4 %	26.6 %	22.8 %	21.0 %	29.9 %	2.9 %	5.4 %	3.6 %	3.0 %	6.2 %
50 km/h	43.0 %	45.6 %	44.7 %	42.5 %	40.4 %	14.0 %	16.7 %	12.5 %	10.7 %	10.0 %
60 km/h	27.0 %	26.7 %	25.8 %	25.4 %	25.4 %	6.4 %	5.0 %	3.9 %	4.5 %	9.6 %
70 km/h	28.7 %	28.6 %	27.3 %	23.7 %	21.4 %	5.4 %	5.7 %	4.2 %	3.5 %	3.6 %
80 km/h	22.4 %	23.6 %	21.2 %	23.2 %	19.4 %	5.5 %	9.8 %	5.1 %	5.9 %	6.2 %
90 km/h - small sample	28.3 %	27.2 %	41.3 %	34.8 %	22.6 %	6.6 %	6.3 %	14.0 %	13.6 %	11.2 %
100 km/h	34.3 %	34.5 %	34.1 %	34.0 %	33.4 %	3.0 %	3.2 %	4.8 %	4.8 %	5.8 %
110 km/h*	45.8 %	48.1 %	39.8 %	44.9 %	8.8 %	8.7 %	8.1 %	12.9 %	8.8 %	3.2 %

* Note HV Speed Limit is 100 km/h and results presented indicate the percentage of HV's exceeding 100km/h in this section

(Source: NSW Centre for Road Safety, 2013)

When looking at the percentage of light vehicles exceeding the speed limit by up to 10km/h, there has been a decrease in speeding in all speed zones in 2012 compared to the previous year with the exception of 40km/h, 60km/h and 110 km/h speed zones. However when looking at the percentage of light vehicles exceeding the speed limit by more than 10km/h, there has been an increase in speeding in a number of speed zones. While there is continued suppression of speeding in the 50km/h and 100km/h speed zones there was a slight increase in speeding in the remaining speed zones for light vehicles compared to 2010 and 2011. Of particular concern is the larger increase in speeding in the 60km/h as well as the 110km/h speed zones.

The results for heavy vehicles follow a similar trend to that of light vehicles, in that there has been an overall decrease in the percentage of heavy vehicles exceeding the speed limit by up to 10km/h in most speed zones compared to the previous year. When looking at the percentage of heavy vehicles exceeding the speed limit by more than 10km/h, there has been an increase in speeding in the 40km/h, 60km/h, 80km/h and 100km/h. Generally however, a lower proportion of heavy vehicles exceed the speed limit than light vehicles.

5 Mechanisms for reviewing the appropriateness of maximum speed limits

5.1 Overview of NSW speed zones

Speed limits are set to balance safety and mobility needs to reduce the risk of a crash occurring, and so that any collisions are likely to be survivable. In setting speed limits based on Safe System principles, it is vital to take a number of parameters into account, such as the threshold of physical resistance of the human body to the energy released during crashes, the road's function and its type of users, and as much as possible make sure that the layout of the road and its surroundings match that function. This approach ensures that all speed limits are safe and appropriate, allowing time for drivers to detect a hazard and react quickly enough to brake or take evasive action.

Speed limits are set so that vehicles travelling at the speed limit are able to safely respond to potential risks in the road environment. Lower speed limits for example, are used where there are a greater number of potential conflict points such as pedestrian crossings and intersections, with these types of crashes having a high fatality risk at lower speeds. Higher speed limits are used on lengths of road where there are few or no conflict points and the road environment has been engineered to reduce the likelihood of a crash and the severity of a crash should one occur.

The community has a role in identifying concerns about speed zones and signage for investigation by Transport for NSW and Roads and Maritime Services. However, it is important that the assessment of those concerns will have regards to the technical matters, because the safety risks that lead to the establishment of a speed zone may not always be obvious to a driver.

5.2 NSW Speed Zoning Guidelines

The *NSW Speed Zoning Guidelines* have been developed to provide a state-wide point of reference to ensure consistent application of speed limits throughout NSW and make the roads and the roadside environment safer for all road users. The purpose of the document is to guide the review and installation of speed limits to:

- ensure that speed limits and speed zones are set to balance road safety with mobility needs;
- ensure an appropriate balance of speed zones which are sensitive to changes in conditions along the length of a road without an excessive number of changes;
- ensure that community views are considered in speed zone management; and
- identify and investigate aspects of speed zone policy to ensure that they are practical and balance mobility, road safety and community concerns.

The current *NSW Speed Zoning Guidelines* follow the fundamental principle that the appropriate speed limit for a specific length of road should reflect the safety risk to the road user. High crash rates or crash concentrations are indicators of road safety problems and potential conflict points relating to land-use that contribute to road safety risk. Inappropriate speed limits can exacerbate crash problems. Speed is a predictor of the severity of the outcome of all crashes regardless of the identified contributing circumstances. Speed limits and speed zones are set to balance road safety with the mobility needs for the community in NSW.

The *NSW Speed Zoning Guidelines* were originally prepared in April 1995, revised versions were released in 2004 and 2011. Before the development of the speed zoning guideline, urban speed limits were as follows:

- Pre 1964 30mph (48km/h)

- 1964 increased from 30 mph to 35 mph (56 km/h)
- 1974 increased from 56 km/h to 60 km/h
- 2003 reduced from 60 km/h to 50 km/h.

5.3 Aspects of road design governing the establishment of Safe Speed limits

The evidence suggests that road geometry contributes to the choice of travel speed. For example, drivers have a tendency to select lower speeds when they are travelling on roads that have rough surfaces, are narrow, winding, hilly, and where the direction of the road and boundaries are not well delineated (Edquist, et al., 2009). By reducing their speed, drivers in these situations are more able to navigate through the road environment safely.

The physical road infrastructure, such as roadside crash barriers, is designed to operate within certain safe limits in terms of speed and mass, beyond which they are less effective and may fail. Increasing speed limits beyond what has been identified as 'safe' for a particular length of road may result in safety critical infrastructure not providing (minimal, if any) safety benefits due to the impact forces going beyond their physical tolerances. The laws of physics dictate the fact that all other things being equal, an increase in vehicle speed will result in higher impact forces to the occupants, the vehicle and the road infrastructure.

Many aspects of road design are safety critical and affected or influenced by speed in one way or another, the following examples are not all inclusive and do not cover the detailed design calculations with speed as an influencing factor but they give an indication to the depth that speed factors in many areas of road design.

The application of these engineering and design principles are done within the Safe System framework, having regards to the road users, including presence of vulnerable road users such as pedestrians and bicycle riders, and the vehicles.

5.3.1 Sight Distances

A principal aim in road design is to ensure that a driver has sufficient sight distance to be able to perceive any road hazards in sufficient time to take action to avoid mishap. The 'Sight Distance' is the distance measured along the road over which visibility occurs between a driver and an object or between two drivers at a specific height above the carriageway in their lane of travel. The higher the speed limit, the more sight distance is required for a driver to be able to detect a hazard and react. A driver's sight distance should be as long as practicable, but it is often restricted by crest vertical curves, horizontal curves, roadside vegetation and other objects that can obscure a driver's vision at intersections. Like almost all design elements, the safe sight distance required is dictated by speed. The higher the speed the greater the sight distance required. Various aspects of sight distance are listed below.

- Vertical stopping sight distance - to an object
- Vertical stopping sight distance - to tail lights
- Horizontal stopping sight distance - to an object
- Horizontal stopping sight distance - to tail lights
- Headlight sight distance
- Safe intersection sight distance
- Approach sight distance
- Entering sight distance
- Manoeuvring sight distance
- Minimum gap sight distance

- Intermediate sight distance
- Overtaking sight distance.

Two types of sight distances are briefly discussed below.

Stopping Sight Distance

Stopping sight distance is the distance required by an average driver (of a car or truck depending on design requirements), travelling at a given speed, to react and stop before striking an object on the road.

The reaction time is calculated based on the time required: for a driver to perceive a signal or object and decide upon a response; perform the required muscle movement (e.g. push the brake pedal); and for mechanical devices to engage after the driver has acted.

At all times a driver must be provided with sufficient visibility to see an object in the lane of travel and stop before striking it. This is known as the "stopping" sight distance. Stopping sight distance has two components, the distance travelled during total reaction time and the distance travelled during braking time, both of which are related to speed. Basically the higher the speed, the longer the stopping distance. The braking distance is primarily affected by the speed of the vehicle and the coefficient of friction between the tires and the road surface, this can theoretically be found using the following;

Braking distance = V^2 / (f x 2g)

Where V = velocity (km/h)

f = coefficient of friction (usually varies between 0.20 - 0.36)

g = force of gravity

The actual stopping distance will vary from this theoretical baseline depending on road and tire condition and the addition of individual driver reaction times.

Overtaking Sight Distance

Overtaking sight distance is the distance required for the driver of a vehicle to safely overtake a slower moving vehicle without interfering with the speed of an oncoming vehicle. It is measured between the driver's eye (1.1 m) of the overtaking vehicle and the oncoming vehicle (1.25 m).

At reasonable intervals a driver should have sufficient visibility to detect oncoming vehicles in sufficient time to allow safe and uninterrupted overtaking of a vehicle with minimal risk of collision with oncoming traffic.

Calculations to obtain the distance needed to stop or to overtake are highly related to the speed being travelled at any given point.

5.3.2 Geometric Elements

It is accepted that drivers will change their desired speed to suit a road alignment. What must be delivered by the geometric design is an alignment that leads a driver to reduce speed in a comfortable manner.

- Horizontal radius - The radius of horizontal curves has the greatest geometric influence on driver speed. Curves of 1000 metres radius or less make up only 21% of the NSW State road network, however the majority of fatal and serious injury crashes occur on these types of curves. Further information about curve radii is detailed below.

- Superelevation (including adverse crossfall)
- Superelevation transition
- Plan transition
- Lane widening
- Merge lengths
- Diverge lengths.

Curve radii

In engineering terms, road alignments have to service traffic in terms of providing a route that meets the constraints imposed by vehicle dynamics, occupant comfort, and topography. A safe curve radii is very dependent on a number of factors, vehicle mass, transverse friction demand, the superelevation of which has a direct relationship to speed.

The speed adopted on an open road is affected more by the driver's perception of the horizontal alignment of the road than by any other single design feature. For this reason, whenever curves are used to change the direction of travel or to suit the topography, the radii must be large enough to permit travel speeds commensurate with those expected on adjoining straights or along the whole of the section being designed.

The value of the transverse friction factor is a function of the type and condition of the road surface, the behaviour of the vehicle and the type and condition of the tyres. It is therefore variable and the least determinable of the elements adopted to determine the "safe speed" of a horizontal curve.

5.3.3 Cross Sectional Elements

There are various cross sectional elements of the road environment from a driver's perspective which are considered in setting speed limits. These include

- Shy line distances

The shy line is taken as the distance from the edge of travelled lane to the outer edge of the shoulder, provided that there is a significant length of constant width shoulder in advance, or as the distance as shown in *Table 8* below, whichever is the greater.

Table 8: Shy Line Distances

85th Percentile Speed (km/h)	Shy Line Distance (m)	
	Nearside (Left)	Offside (Right)
≤70	1.5	1.0
80	2.0	1.0
90	2.5	1.5
≥100	3.0	2.0

- Shoulder widths
- Working width
- Clear zones (impacting on verge width and median width) - The "Clear Zone" is the width of roadside, beginning at the edge of the travelled way, which is made available for the driver/rider

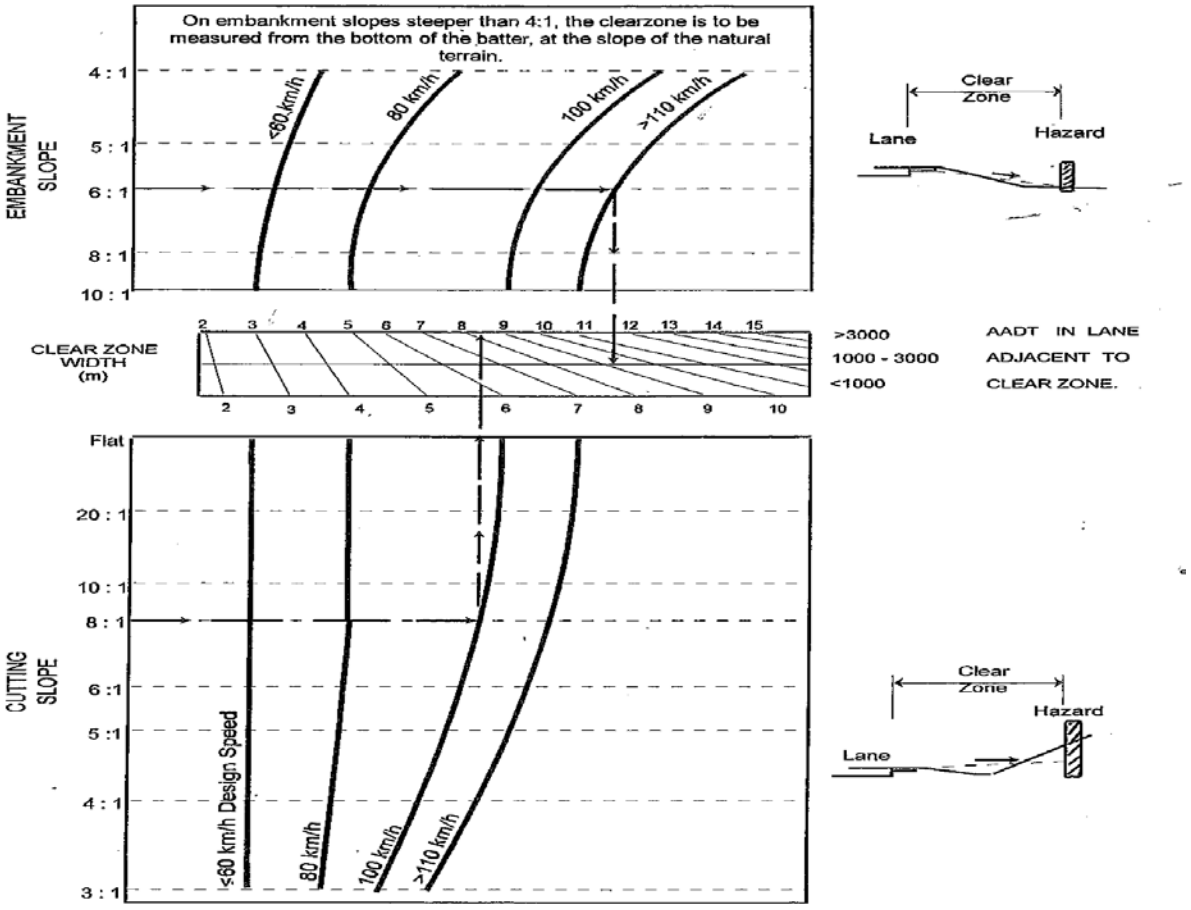
of an errant vehicle to take corrective action in an emergency[2]. The Speed Zoning Guidelines define the 'Clear Zone' as 'the roadside area adjacent to the road which is required to be clear of any non-frangible roadside hazards (i.e. trees, poles, drains, culverts, steep embankments)'.

The factors affecting the clear zone width are the:

- design speed because errant vehicles travel further with increasing speed;
- traffic volume because increased exposure of road users to a hazard means that more vehicles are likely to leave the road;
- roadside slope because of the effect of slope on a driver's ability to recover from an incident;
- road curvature because it can affect the lateral distance travelled by an errant vehicle.

Calculating the required clear zone widths takes into account the traffic volume, design speed and slope of run-off area adjacent to the carriageway, as shown in Figure 11 below.

Figure 11: Clear Zone Nomograph



5.3.4 Roadside Environment

In setting speed limits, it is important to identify the presence of road and roadside furniture and other treatments, including consideration of:

[2] *Road Design Guide* (Section 3 Cross Section (3.7- Clear Zone)) February 2000

- Safety barrier type
- Safety barrier deflection
- Terminal treatments
- Verge widths to allow for barrier deflection.

5.3.5 Design Speed

The maximum speed, appropriate to the terrain and road environment, at which a motor vehicle can consistently travel a section of road with comfort and safety, is the measure of the design speed and the consistency at which it is applied to each of the road's geometric elements. To maintain a consistent alignment and travel speed, it is most important that the same design speed should be adopted for the design of successive geometric elements. This highlights the importance of designing road environments and setting speed limits from a holistic road systems perspective.

Design consistency is also provided and maintained by adopting the concepts of Road Hierarchy, Traffic Flow and Speed Parameters referred to in the sub-sections and the design recommendations contained in the *Road Design Guide*.

Design Speed is the speed adopted for the design of the individual geometric elements of an existing or selected speed environment. Design speed is the constant which is used to co-ordinate geometric elements so that a driver negotiating each element at its design speed will not be exposed to unexpected hazards.

Additionally, desired speed is the maximum operating speed a driver will adopt on the less constrained elements of a road environment, i.e. straights and large radius horizontal curves of a more or less uniform section of road when not constrained by other vehicles. Speed Environment is the 85th percentile of the range of desired speeds adopted by drivers for a particular section of roadway. The 85th percentile limit is accepted as the optimum speed at which safe and comfortable travel is provided for 85 per cent of drivers travelling at low traffic flows in good weather.

Section 2 of the *Road Design Guide* recommends the limits to be adopted in the design of the geometric elements which combine to form a road's horizontal and vertical alignments. The limits are recommended for design speeds ranging from 50 to 130km/h, which signify that geometric elements may be combined to create a low or mid speed environment as well as a high speed environment. A principal aim in road design is to ensure that a driver has sufficient sight distance to be able to perceive any road hazards in sufficient time to take action to avoid mishap. A driver's sight distance should be as long as practicable, but it is often restricted by crest vertical curves, horizontal curves in cutting, roadside vegetation and buildings at intersections.

5.4 Speed limit setting roles

Transport for NSW is responsible for the development and maintenance of the *NSW Speed Zoning Guidelines* and other speed zoning policies. Roads and Maritime Services (RMS) is responsible for reviewing and setting speed limits in accordance with those policies.

Although RMS is the only agency authorised to set speed zones, there is scope for stakeholders (e.g. local council, members of the public and road safety experts) to make requests to RMS for changes in speed zones. The speed limit changes are to be appropriately authorised. Speed limit changes on State-managed roads are to be approved by the RMS Chief Executive and by the relevant regional manager for all other roads.

RMS regularly reviews speed limits on the NSW road network in accordance with the *NSW Speed Zoning Guidelines* and assesses a number of factors including road environment and traffic characteristics, crash profile and community concerns. While considering the reduction in the number of speed zones for a particular length of road, the fundamental principle is that the established speed limit should reflect the road safety risk to the road users while maintaining mobility and amenity.

The NSW road network spans a wide range of road types with different transport functions and mixtures of traffic. Roads also have widely differing crash patterns, geometric features, adjacent land use (i.e. potential conflict points), and speed behaviour. This means that different roads or even a particular stretch of the same road may have different speed zones. The adoption of a particular speed limit aims to provide improved safety and mobility for all road users, sharing the road. However, it is important that speed zone changes are minimised.

To help reduce the road toll, the NSW Government has developed strategies to set safe speed limits, including speed zone reviews for the top 100 roads and the trial of the M1 Pacific Motorway (F3) wet weather zone Since March 2011, the Government has completed speed zone reviews on the Top 100 roads named by the community. These reviews resulted in 37 fewer speed zones (427 reduced to 390) across the State and included a review of 131 sites leading to:

- 18 speed zones being increased
- 18 speed zone being decreased
- 12 speed zones had a mix of increase and decrease.

In addition to the Top 100 routes, over 400 speed zone reviews were conducted in 2012 and 2013, leading to 262 speed zone changes.

Transport for NSW and RMS has a program to ensure the consistent application of the Speed Zoning Guidelines, including the 2011 changes to rationalise speed zones across the NSW road network.

It is noted that while minimising speed zone changes is desired, in the interest of balancing safety and mobility, at some high risk locations it will still be appropriate to implement a lower speed limit for a short length, rather than reducing the speed limit across the whole length.

In clause 2.3.6 of the NSW Speed Zoning Guidelines it indicates that speed limits should not be reduced for isolated road hazards except for 'at risk' locations. At risk speed zones must minimise the impact of the reduced speed limit on motorists without compromising safety.

5.5 Community involvement

The NSW Government welcomes and has actively invited community involvement in identifying concerns people may have about existing speed zones.

In July 2011, the Government launched the Safer Roads NSW website (www.saferroadsnsw.com.au) to ensure that community views are considered in the review of speed limits, including enabling the public to submit concerns with existing speed limits and signs. Community members can also nominate to receive emails notifying them of changes to permanent speed limits within nominated areas.

Since its launch in July 2011, up to November 2013, over 3,600 public enquiries about speed zones were received through the Safer Roads NSW website. This included 1,407 comments resulting from the public invitation to identify the 'Top 100' sites which consisted of:

- 108 who considered that the speed limit was too high
- 924 who considered that the speed limit was too low
- 271 who commented there were too many changes to speed limits

- 91 who commented on School Zones
- 84 who commented on other issues such as signage
- Some members of the public made multiple comments.

Between June 2012 and November 2013 there were also 579 enquiries through the Safer Roads NSW website relating to speed cameras.

In addition to enquiries from the Safer Roads NSW website, Roads and Maritime Services (RMS) receives a large number of correspondence each year relating to speeding and speed zone issues.

An RMS search of its correspondence system found that the numbers of speed zone related enquiries found on the RMS Correspondence Workflow were:

- 875 enquiries from January 2012 to December 2012
- 558 enquiries from January 2013 to November 2013.

6 Operation of speed limits in other jurisdictions

6.1 Review the operation of speed limits in other jurisdictions

Part 4 ("Speed Controls") of Australian Standard *AS1742 – 2008 Manual of Traffic Control Devices* outlines the standards for regulatory speed control as used in Australia. In addition, the *Austroads Guide to Traffic Management* Part 5: Road Management (Austroads 2008a) and the *Austroads Guide to Road Safety* Part 3: Speed Limits and Speed Management (Austroads 2008b) provide guidelines on the different types of speed limits and the application of them to the road environment.

Across Australia and New Zealand generally, default unsigned 50 km/h speed limits operate within urban built-up areas, and 100 km/h in rural open-road environments. To reflect differences that may prevail along roads across the road network varying sign posted speed limits are also applied for values ranging from 10 km/h for shared pedestrian vehicle road spaces (e.g. car parks and pedestrian malls) to 110 km/h for high standard highways and freeways.

Speed zoning in NSW is based on a system of default speed limits and speed zoning. The default urban speed limit is 50 km/h and the default rural speed limit is 100 km/h. These two speed limits are implemented as a matter of course unless an approved speed limit sign indicates otherwise. The current *NSW Speed Zoning Guidelines* outline the different types of speed limits that are used in NSW. The application of them to varying road environments is summarised in Table 9 below.

Table 9: Typical Speed Limits application in NSW

Speed (km/h)	Key features
10	▪ Shared zones
40	▪ High pedestrian activity areas ▪ Local traffic areas ▪ School zones (prescribed times) ▪ School bus blackspot zones
50	▪ Default urban speed limit
60	▪ Significant urban undivided arterial access (with direct driveway access)
70	▪ Significant urban divided arterial roads (with limited driveway access) ▪ Urban fringe undivided road
80	▪ Urban high standard divided roads (without driveway access) ▪ Undivided arterial and sub arterial roads on the fringes of urban areas ▪ Lower quality rural roads ▪ Undivided rural roads with less than 5.6m wide sealed pavement or no marked dividing line
90	▪ High volume urban motorways ▪ Lower quality rural roads
100	▪ Default rural speed limit ▪ Urban motorways ▪ Rural undivided road with sealed pavement greater than 5.6m ▪ Rural divided roads
110	▪ Maximum allowable speed limit in NSW ▪ Motorways (freeways/tollways) in non built-up areas ▪ High quality rural divided roads ▪ Undivided rural roads with low traffic volume in western part of NSW

6.1.1 School zones speed limits

School zones are implemented outside schools to reduce vehicle speeds where there is an increased potential for conflict between vehicles and school children. The application of 40km/h speed limited school zones at all school access points across NSW is designed to protect child pedestrians by slowing down motorists and reducing the risk and severity of a crash. Most school zones across the State operate from 8:00 am to 9.30 am and 2.30 pm to 4:00 pm on gazetted school days.

6.1.2 High pedestrian activity areas

Vehicle speed is a key factor in pedestrian injuries and fatalities, 40 km/h high pedestrian activity speed limits are installed where there are relatively large numbers of pedestrians and/or other vulnerable road users. These areas should be established in conjunction with a suitable local area traffic management scheme. The area needs to contain physical devices or treatments to create a self-enforcing 40 km/h speed environment.

6.1.3 International approaches to speed zoning

A brief review of OECD countries shows that this approach of setting speed limits based on road type and use is a common approach, even if the actual set speeds do vary.

Table 10: General speed limits (km/h) on urban arterial and urban local and collector roads in OECD countries (2008)

Country	Urban arterial roads	Urban local and collector roads
Australia	60 - 70 - 80	50
Austria	50	50 40 (streets in residential areas) 30 (zones)
Canada	50 - 60	40 - 50
Czech Republic	50 - 60	50
Denmark	50	50
Finland	50	30 – 40 - 50
France	50	30 - 50
Germany	50	50
Greece	50 - 70 - 90	40 – 50 (collector streets) 30 (local streets)
Iceland	50 - 60	50 (collector streets) 30 (local streets)
Ireland	50 - 80	50
Korea	60 (1 lane) 80 (2 plus lanes)	60 (1 lane) 80 (2 plus lanes)
Mexico	80	20 - 60
Netherlands	50 – 70	50
New Zealand	50 - 80	50
Norway	50	30 - 50
Poland	50	50
Portugal	50 – 90	50
Russia	60	60
Sweden	50 – 70	30 – 50
Switzerland	50	50
United Kingdom	48 – 64 (30 – 40 mph)	32 – 48 (20 – 30 mph)
United States [1]	48 – 88 (30 – 55 mph)	40 – 56 (25 – 35 mph)

Table 11: General speed limits (km/h) on motorways, highways and rural roads in OECD countries (2008)

Country	Motorways	Main Highways	Rural Roads
Australia	100 - 110	100 - 110	80 – 90 – 100
Austria	130	80 - 90 - 100	70 – 80 – 90
Canada	100 - 110	80 – 100	70 - 100
Czech Republic	130	90	90
Denmark	130	80 - 100	80
Finland	120	100 (main) 80 (rural)	120
France	130	90	90
Germany	130 None (autobahns)	100	100
Greece	120	110	70 – 100 50 (through small towns)
Iceland	90	90	80 (gravel roads) 90 (paved roads)
Ireland	120	100	80
Korea	90 – 100 - 110	60 (2x1 lane) 80 (2x2 or more lanes)	60 (2x1 lane) 80 (2x2 or more lanes)
Mexico	130	110	100
Netherlands	100 - 120	100	60 (settlements /recreational areas)
New Zealand	100	100	80 - 100
Norway	90 - 100	80	80
Poland	130	100	80
Portugal	120	90 - 100	90
Russia	110	90	90
Sweden	110	90	70
Switzerland	120	80	80
United Kingdom	113 (70 mph)	97 (60 mph)	97 (60 mph)
United States[2] rural urban	 88 – 113 (55 – 70 mph) 104 – 120 (65 – 75 mph)	88 – 113 (55 – 70 mph)	88 – 113 (55 – 70 mph)

Australian jurisdictions generally rely on the Austroads Guides and Australian Standards (2008) in speed limit setting. Nevertheless, each jurisdiction tend to have minor differences within their respective speed zoning guidelines to cater for local practices and specific requirements. As an example, guidelines of each jurisdiction have slight differences in recommended minimal zone length.

6.1.4 Comparison of Zone Length

The length of a proposed speed zone is an important consideration when assessing a road for a speed limit change. The minimum length of a speed zone is important since it can affect a range of issues, including traffic flow, compliance, enforceability and community acceptance. The minimum length for the range of speed limits used in Australia by jurisdiction is summarised in Table 12 below.

Table 12: Desirable minimum lengths (km) of speed zones specified in Australia and New Zealand

Speed limit (km/h)	**AS1742.4**	**NSW**	**Vic**	**Qld**	**WA**	**TAS**	**NZ**
40	0.4	0.2	0.4	0.4	0.4		0.5
40 (school zone)	0.2	0.2	0.2	0.2	0.2		0.3
50	Default	Not applicable	0.5	0.5	0.5		0.5
60	0.6	0.5	0.6	0.6	0.6	0.6	1.0
60 (school zone)	-	-	0.3	-	0.3		-
70	0.7	2.0	0.7	0.7	0.7	0.7	1.0
80	0.8	2.0	0.8	0.8	0.8	0.80	1.0
90	0.9	2.0	0.9	0.9	0.9	0.9	As approved
100	2.0	3.0	2.0	2.0	2.0	2.0	2.0
110	10.0	10.0	10.0	20.0	4.0	4.0	-

It can be deduced from the above table that for speed limits greater than 60 km/h, NSW has minimum speed zone lengths significantly longer than all other Australian and New Zealand jurisdictions to help maintain speed zone consistency. The Australian Standards state that it is favourable to maintain consistent speed zone lengths to avoid confusion among drivers.

In Tasmania, the minimum length of speed zones is equivalent to 0.6 minutes of travel time and is used to avoid constantly changing speed limits along a section of road (Tasmanian Department of Roads and Transport 1993).

In the UK Circular 1/93 *Setting local speed limits*, the UK Department of Transport has recommended a minimum length of 600m for speed zones. The minimum length can be reduced to 300m – 400m on roads with local access functions. These lengths are reduced from the minimum length of 800 m specified in a guide published in 1993 by the UK Department of Transport.

The NSW Speed Zoning Guidelines allow for shorter speed zones for isolated deficiencies than those specified in table 1.1 where the risk to the road user is considered to be too high, These can often be a short term measure whilst work is undertaken to rectify the issue. They should only be implemented when no other options are available.

6.2 International approaches to setting speed limits:

6.2.1 New Zealand Guidelines

In New Zealand, Road Controlling Authorities (RCAs) are responsible for setting speed limits on their roads, under the *Setting of Speed Limits Rule* (New Zealand Transport Agency 2004). RCAs consist of a group of the local city councils, district councils and regional councils. Speed limits are set in multiples of 10 km/h between 10 and 90 km/h, as well as holiday (seasonal), temporary, and variable speed limits.

Rural speed zoning involves speed limits being set according to the physical characteristics of the road and its operating conditions. For example a narrow, winding, mountainous section of road may justify a lower speed limit. Typically speed limits of 70, 80 or 90 km/h are used, instead of the 100 km/h suggested by the Speed Limits NZ process (New Zealand Transport Agency 2004).

Risk-based guidelines were developed following the trialling of lower speed zones on rural roads. Potential area-based rural speed zones were to be identified using a risk-based approach using KiwiRAP's star rating, road infrastructure safety assessment (RISA) and crash rates-based risk assessment (New Zealand Transport Agency 2011a).

6.2.2 United Kingdom

In the UK, any single-carriageway road where there is no street lighting has a default speed limit of 60 mph (97 km/h), this is often referred to as the 'National Speed Limit'; this applies in the absence of signs indicating any other speed limit.

A speed limit policy '*Setting Local Speed Limits*' was released by the UK Department for Transport in 2006. The UK speed limit assessment framework is designed to help determine the appropriate speed limit on the basis of casualty reduction as well as economic, social, and environmental effects. The policy states that speed limits in rural areas should be set based on the following factors:

- the mean speed (a change from the previous policy, where the 85th percentile speed was used)
- road function, characteristics and environment
- local conditions and constraints
- crash rates
- minimum costs in terms of safety, mobility and the environment.

Under the policy, higher-risk locations are identified and lower speed limits set on these roads:

- for local access roads, that have a high number of junctions and accesses, a lower speed limit should be applied
- for roads with substandard road alignment i.e. where there is a high density of bends, or the road is hilly, lower limits should be applied
- higher speeds should be used for higher-quality roads.

Speed limits on upper tier roads, which cater primarily for through traffic, and on lower tier roads, which have a local or access function, are determined based on crash rates as follows:

- upper tier roads with a crash rate less than 35 injury crashes per 100 million vehicle kilometres travelled (VKT) have a 60 mph (97 km/h) limit
- upper tier roads with a higher crash rate will have a lower speed limit, typically 50 mph (80 km/h)
- lower tier roads with a crash rate of below 60 injury accidents per 100 million VKT, have a 50 mph (80 km/h) limit

- lower tier roads with a higher crash rate have a 40 mph (64 km/h) limit.

6.2.3 Sweden

The speed limit system in Sweden had not changed considerably since the early 1970s until a recent review. In 2008–2009 the Sweden Road Authority (SRA) introduced new speed limits that were aligned with how safe the road is and with the physical tolerances of the human body in a crash (i.e. the Safe Systems approach). The SRA aimed to strike a balance between road safety, environment, mobility, accessibility and regional development (Svensson 2010).

The general speed limit outside of urban areas was 70 km/h. The typical speed limits applicable on various road types were as follows:

- motorways – in rural areas, speed limit was mostly 110 km/h, although some roads were 120 km/h
- divided (median-separated) roads had a speed limit of 100 km/h; except low-volume roads which may have 110 km/h speed limit
- two-lane undivided roads had a speed limit of 80 km/h, except on low volume roads (< 2000 vehicles per day) which were deemed 'important', which have a 100 km/h speed limit
- in cities and villages the top speed limit was 40–50 km/h
- around schools and day-care centres, and in CBD areas, the speed limit was 30 km/h
- 2+1 roads – between 110 km/h and 70 km/h.

The 2+1 roads consist of two lanes in one direction, and one lane in the other, alternating every few kilometres with a steel cable barrier separating the traffic flows. These roads were first successfully trialled in 1998 and became widely used throughout Sweden since. Swedish guidelines recommend speed limits of 110 km/h for new 2+1 roads on semi-motorways, and speed limits of either 90 km/h or 110 km/h for new conventional 2+1 roads. A lower speed limit of 80 km/h applied to trucks on 2+1 roads (National Cooperative Highway Programme 2003). A lower speed limit is also applied on the approach to intersections on 2+1 roads, usually from 100 km/h to 70 km/h.

6.2.4 Netherlands

The speed limit policy in the Netherlands is aimed at safety and credibility (personal communication, Hilke Harms, 9 September 2011). The key concepts were:

- the speed limits need to be safe, given the circumstances and traffic composition, i.e. that it is almost impossible that a crash will result in severe injury
- the speed limits were credible, i.e. the speed limit and transitions fit how the road looks
- the driver has sufficient information about the local speed limit.

The speed limits for various road types were defined in the Dutch Road Traffic Law (Wegenverkeerswet) as follows (Schagen et al. 2004):

- freeways – 120 km/h
- highways – 100 km/h
- most rural roads – 80 km/h
- rural access roads – 60 km/h (along with traffic calming measures, gateway signage, road width restrictions applied)
- built-up areas – 50 km/h.

However, at many higher-risk locations the speed limits differed from those stated in the Dutch Road Traffic Law, to improve the safety (personal communication, Hilke Harms, 9 September 2011):

- Higher-risk locations on freeways:
  - the speed limit can drop from 120 km/h to 100 or 80 km/h; about 40% of the freeway network has a speed limit of 100 km/h
  - at curves on freeways the speed limit can drop to 90 km/h
  - the speed limit is reduced to 80 km/h close to cities
  - at connections between two freeways i.e. freeway off-ramps, the speed limit can be reduced to 50 km/h on a curve (speed limit drop is applied in steps from 100 to 90 to 70 to 50 km/h)
  - where traffic volumes were high, the speed limit can be lowered from 120 km/h to 100 km/h (by road authorities).
- Higher-risk locations on highways:
  - speed limit of 80 km/h at high-risk road sections
  - speed limit of 70 km/h at specific higher-risk locations.
- Rural roads:
  - at traffic lights the speed limit drops to 70 km/h
  - at higher-risk road sections the speed limit can drop to 60 km/h
  - at higher-risk locations on rural roads the speed limit drops to 60 or 50 km/h
  - at schools or other locations with a lot of pedestrians or cyclists, or a location with a sharp curve, the speed limit is 30 km/h.
- In built-up areas the speed limit is 30 km/h or 20 km/h for shared space, neighbourhood roads, and shopping centres.

6.2.5 United States

The speed limit guidelines in the United States vary between states. The Manual of Uniform Traffic Control Devices (Federal Highway Administration 2011) was the national standard for signing on highways, including regulatory speed limits, advisory speed signs, school zone speed limit signs and work zone speed limits (Federal Highway Administration 2011).

Speed limits varied according to road hierarchy as follows:

- highway speed limits – mostly 70 mph (112 km/h), with some at 75 mph (120 km/h)
- collector roads – usually 55 mph (88 km/h) or lower
- local roads – speed limits 35 mph (56 km/h) or lower.

The web-based expert speed zoning system USLIMITS2 was available to assist practitioners to analyse segments of roads and set speed limits which are appropriate and consistent. The system recommends a speed limit for a section of road based on road function, roadside development, operating speeds, road characteristics and other factors required to determine appropriate speed limits in speed zones (Federal Highway Administration 2011). It was applicable for rural roads, local roads and urban freeways. Application of the tool would lead to recommendation of lower speed limits at higher-risk road lengths, e.g. where there is high frequency of intersection or access points. The system also considered crash rates and compares them with typical values found on the local network.

Section 3.5 above has details comparing crash rates and speed limits for motorways across various international jurisdictions.

7 The appropriateness of current thresholds in the demerit point scheme for speeding offences

7.1 Rationale for a Demerit Point Scheme

The first known demerit points scheme was implemented in Connecticut in 1947. Schemes have been implemented in most states of the USA, most Canadian provinces, most countries of the European Union (EU) and many other countries including Japan, Korea and Israel. The first Australian schemes were implemented by Queensland (1967), NSW (1969) and Victoria (1970). The last two Australian jurisdictions to adopt a demerit points scheme were the ACT (1993) and NT (2007).

A demerit points scheme is designed to encourage safe and responsible driving behaviour by providing a strong incentive, alongside financial penalties, to drive within the road rules. A demerit points scheme assigns a penalty, in the form of licence demerit points, to drivers who have committed an offence against the road rules. Once a certain number of demerit points have been accumulated within a designated timeframe, drivers are penalised with licence suspension or withdrawal (Nolén and Östlin, 2008). A demerit points scheme usually includes all major offences that increase the risk of casualty crashes occurring, including speeding offences. The penalisation is generally adjusted for each offence depending on its level of risk, or whether it is a repetition of a prior offence.

Worldwide, demerit points schemes have broad community support. This is because a demerit points scheme punishes recidivist drivers more severely than drivers who occasionally commit an offence. They also don't overly punish lower-income individuals who, compared to more wealthy people, are disproportionately impacted by financial penalties.

There are three main methods through which a demerit points scheme aims to modify the behaviours of drivers. First, by making offenders associate repeat traffic violations with more severe sanctions to the extent that they lose their licences, providing deterrence from unsafe driving behaviour. Second, by reducing the likelihood of traffic accidents by removing drivers from the road transport system who repeatedly violate road rules. Third, by providing an incentive for drivers to rectify their inappropriate behaviour at the wheel.

For an effective demerit points scheme, it is essential that the level of enforcement is at a sufficient level so that drivers who have been caught once feel that there is a real risk of being caught again if they commit further offences. In this sense, 'specific deterrence' is the principle that supports the use of a demerit points scheme for specific driving offences, such as speeding. Specific deterrence occurs when a motorist who has been apprehended and punished for a speeding or other offence refrains from further unsafe behaviour for fear of incurring additional punishment. Thus, in order for the 'fear of punishment' in regards to a demerit points scheme to be effective, drivers must believe that the likelihood of being caught for speeding and other driving offences is relatively high (Davey & Freeman, 2011).

While demerit points schemes are widely implemented throughout Australia and internationally, each particular demerit points scheme is designed and implemented in different ways. This makes it challenging to reach general conclusions about the effectiveness of demerit points schemes. There are additional challenges posed for evaluating demerit points schemes because new or modified schemes are generally accompanied by substantial increases in both enforcement and publicity. It is generally not possible to quantify the separate contributions of these components to the benefits observed (Goldenbeld et al., 2012).

The impact of a demerit points scheme on road safety is intended to be a two-stage process: the threat of demerit points is designed to reduce the frequency of illegal driving behaviour, which in turn is expected to lead to reduced frequency and severity of crashes. Evaluation studies can focus either

on the first stage alone, examining the impact of a scheme on traffic offences, or on the whole process, examining the impact of demerit points on crashes and casualties. The long-term effects of a demerit points scheme cannot be measured by issued sanctions, because if a scheme is effective, then drivers improve their behaviour and commit violations less frequently. The reduction in the number of licence withdrawals can therefore depend on reduced enforcement or improved driver behaviour or both.

A recent large-scale review of European demerit points schemes showed they commonly produce 15-20% reductions in crashes, fatalities and injuries (Castillo-Manzano and Castro-Nunõ, 2012). However, these positive impacts generally disappeared within 18 months following the introduction of a demerit points scheme (Castillo-Manzano and Castro-Nunõ, 2012). The effectiveness of a demerit points scheme can be increased and prolonged by sustainably increasing the actual and perceived likelihood of detection for offences, by having a high level of enforcement, and ongoing publicity regarding enforcement levels (SWOV 2012; Goldenbeld et al., 2012). NSW has adopted these methods of reinforcing the demerit point scheme, based on a general deterrence approach.

There have been few investigations into the effectiveness of Australian demerit points scheme models, highlighting an important gap in the Australian road safety research literature. However, recent research conducted by the Centre for Road Safety, which is outlined in this section and Section 8 of this submission, has identified some promising findings. The use of different forms of sanctions within a demerit points scheme has also been investigated.

7.2 National Demerit Points Scheme

The Demerit Points Scheme that operates in NSW generally mirrors the policy principles of the nationally agreed driver licensing scheme. The scheme is a national initiative in place in all Australian States and Territories and provides for the general application of demerit points and a licence suspension period across jurisdictions.

The option to elect to obtain a good behaviour licence for a period of 12 months is also part of the nationally agreed scheme. Electing to be subject to a good behaviour period affords a driver the opportunity to address their driving habits whilst remaining within the licensing system. See section 7.5 below for more information about good behaviour periods.

One of the other key elements of the national scheme is a schedule of nationally agreed demerit point offences which are transferred to a driver's home jurisdiction when the driver commits the offence when visiting in another Australian State or Territory. The table of agreed offences currently contains 36 'core' offence groups which represent approximately 160 actual traffic offences and includes speeding offences.

Under the current national agreement, jurisdictions apply the number of demerit points to an offence as though it was committed in the driver's home jurisdiction (the 'home' rule). This process could be compromised if any scheme was introduced to allow drivers to 'trade-off' demerit points for low-level speeding offences by attending some form of driver education course.

Research studies have found that many driver education courses are not effective in improving or changing road safety behaviour. However, targeted courses that focus on identifying risk and developing strategies to manage such risks have been shown to be effective. The cost-effectiveness of the delivery of such courses is an important consideration. If these courses were delivered on the same scale as demerit points, even for low level offences, they would need to accommodate approximately 200,000 participants, at significantly higher cost than the current demerit points scheme.

7.3 Comparison of Australian jurisdictional demerit points scheme speeding bands and punishments

Australian jurisdictional demerit points schemes are based on a national scheme specifying which offences attract demerit points, how many points apply to each offence, the threshold number of points at which the driver's licence is suspended, the length of the suspension period and the details of the good behaviour alternative to licence suspension. However, individual jurisdictions have made adjustments to their own schemes, so that there is only partial uniformity across Australia. For example, offences committed on public holidays attract double points in New South Wales and Western Australia but not in Victoria.

Table 13 below provides an overview of the speeding thresholds and punishments within demerit points models operating in each Australian jurisdiction. It shows that the demerit point speed bands and demerit point penalties in NSW are generally similar to other jurisdictions. As outlined later in this Section, the use of large fines, automatic licence disqualification and confiscation of number plates or vehicles in NSW provides a significant deterrence and high level of punishment for excessive speeding.

Table 13: Demerit points scheme speed bands and demerit point punishments in Australian jurisdictions

State	Speed Bands (km/h	Number of Demerit Points
NSW	<11	1
	11-20	3
	21-30	4
	31-45	5
	>45	6
QLD	<13	1
	13-20	3
	21-30	4
	31-40	6
	>41	8
VIC	<10	1
	10-24	3
	25-34	4
	35-44	6
	>45	8
SA	<10	2
	10-19	3
	20-29	5
	30-44	7
	>45	9
WA	9-19	2
	20-29	3
	30-40	5
	>40	7
TAS	0-14	2
	15-29	3
	30-37	5
	>38	6
NT	<15	1
	15-30	3
	31-45	4
	>45	6
ACT	<15	1
	15-29	3
	30-44	4
	>45	6

7.4 Recent changes to the NSW Demerit Points Scheme

In 2007, the Demerit Points Scheme was modified so that P1 provisional licence holders caught speeding during their first 12 months of driving lost their licence for at least three months (i.e. 'zero tolerance for speeding'). Learner Demerit Points and a zero tolerance approach to speeding was introduced in 2009.

In the last decade there has been an increase in automated speed enforcement in NSW, primarily through the installation of fixed speed cameras in school zones and the re-introduction of red-light speed cameras. As a result, both the perceived likelihood of speeding drivers being caught and the number of drivers actually being caught speeding has increased. While increasing enforcement has had a positive outcome for road safety in NSW, it is also recognised that unintentional human errors can be a factor in road crashes. For this reason, a range of policies have been introduced over recent years to increase the leniency of the licensing system, particularly for professional drivers and provide a safeguard for motorists from losing their licence.

On 1 July 2009, the NSW Government introduced additional changes to the way demerit points were applied to speeding offences. The aim was to introduce a system of smaller increments for speeding offences. This gave drivers who commit offences at the lower end of the scale some leniency, while getting tougher on those who commit more serious speeding offences.

Under the new scheme the brackets rose in increments of 10 km/h for the lower range speeding offences (previously they were 15 km/h increments). The changes saw 1 demerit point incurred for the lowest level speeding offence in NSW (0-10 km/h), down from 3 demerit points. This change meant that in normal driving conditions a driver must be caught at the lower level of speeding 13 times before the threat of licence loss occurs, rather than four times before the change. Changes to fines and demerit points for higher level offences (over 10 km/h) were also introduced and in most cases increased. Additional changes were made to address speeding by P2 drivers so that any two speeding offences resulted in licence suspension.

Table 14: Demerit Points Scheme changes for exceeding speed limit offences introduced 1 July 2009 (excluding Provisional licence holders, non-school zones and standard demerit points period).

Pre 1 July 2009		Post 1 July 2009	
Speed Range	**Demerit Points**	**Speed Range**	**Demerit Points**
0 to 15	3	1 to 10	1
16 to 30	3	11 to 20	3
-		21 to 30	4
31 to 45	4	31 to 45	5
More than 45	6	More than 45	6

In late 2010, the NSW Government established a Working Group on Demerit Points, comprising of relevant agencies, representatives of the NRMA Motoring and Services, the Law Society of NSW, the Pedestrian Council of Australia and driver safety experts to examine a range of issues including penalties for drink driving offences, driver education courses as an alternative to demerit points, and a special 'Hardship Licence' for suspended drivers who require their licence to drive for employment or family hardship.

Based on advice from the Working Group on Demerit Points, additional reforms to the NSW Demerit Point Scheme were introduced in 2011.

On 31 January 2011, the demerit points threshold for unrestricted licence holders in NSW was increased from 12 to 13 demerit points within any three-year period. This was a slight departure from the national agreement that suspension should occur when a driver accumulates 12 or more demerit points within a three-year period.

The concept of a professional driver was also introduced into NSW road laws and these drivers have a 14 demerit point threshold (one extra demerit point) to recognise the additional time these drivers spend on the roads. Professional drivers are defined as those who drive for a living, such as taxi and heavy vehicle drivers. Demerit points were removed for 20 offences that were unrelated to road safety.

On 1 July 2012 the NSW Government introduced the 'Fair Go for Safe Drivers' initiative that recognises and responds to community concerns and calls for NSW motorists to be rewarded for safe driving. The initiative provides a 50 per cent discount on licence renewal fees for drivers who hold a NSW unrestricted licence, and have maintained a driving record with no relevant offences for the five year period before their renewal date. The current penalty regime, which includes the application of fines, demerit points and licence sanctions, has proven to be a strong incentive for drivers to obey the road laws. While penalties do play an important role in influencing driver behaviour, the 'Fair Go for Safe Drivers' initiative complements the penalty regime by providing a balance to reward drivers who display safe driving practices by remaining offence free.

In 2013, the Government announced a package of measures aimed at reducing re-offending. These measures include unrestricted licence holders who exceed their demerit points limit on a second occasion within a five-year period being required to complete a Driver Knowledge Test and attend a driver education course, and provisional licence holders who exceed their demerit points limit on a second occasion within a five-year period being required to complete a Driver Knowledge Test. The new measures are scheduled to commence no earlier than February 2015.

7.5 Overview of the current NSW Demerit Point Scheme and how it addresses speeding

In the current NSW Demerit Points Scheme, a driver who has not committed any offences has zero points. Over 70 per cent of NSW drivers have no accrued demerit points.

If a driver commits an offence that carries demerit points, the points are added to their driving record. If they incur the threshold number of demerit points within a three-year period, a licence suspension or refusal is applied. The three-year period is calculated between the dates the offences were committed. It ends on the day the most recent offence was committed.

The current thresholds are:

- Unrestricted licence – 13 points
- Professional drivers – 14 points
- Provisional P2 licence – 7 points
- Provisional P1 licence – 4 points
- Learner licence – 4 points
- Unrestricted licence with a good behaviour period – 2 points within the term of the good behaviour period.

Roads and Maritime Services (RMS) send drivers a Notice of Suspension or Refusal if they reach or exceed the number of points available for the type of licence, or if they commit an excessive speed offence. A Notice of Suspension or Refusal specifies the date the licence suspension or refusal begins. The imposition of a licence suspension or refusal period relies on RMS serving a Notice.

For unrestricted licence holders, the period of suspension depends on the number of points accumulated:

- 13 to 15 points - three months
- 16 to 19 points - four months
- 20 or more points - five months
- For provisional and learner licence holders, the suspension period is three months.

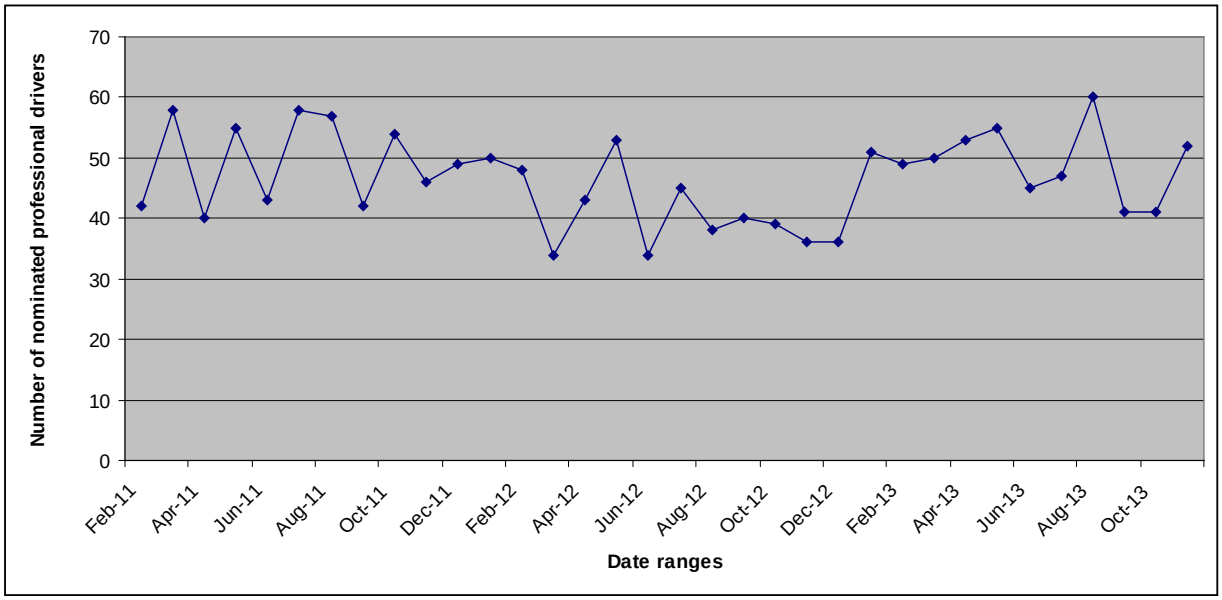
RMS may refuse to renew a person’s licence if they have exceeded their demerit points threshold, or have committed a serious speeding offence. The periods that a licence may be refused are the same as those that apply for suspensions. RMS issues a Notice of Refusal in this situation. Formal refusal is only applied and a refusal notice given when you attend a registry and apply for a licence or licence renewal.

Unrestricted licence holders who receive a Notice of Suspension due to the accumulation of demerit points can apply for a 12 month good behaviour period instead of serving the suspension. This option is not available to provisional or learner licence holders or those already serving a good behaviour period. If a driver chooses a good behaviour election, they must make it before the suspension begins. If the election is not made before the required date, then the suspension will be enforced. The legislation does not give RMS discretion to reissue the suspension notice with a new date or to

change a suspension to good behaviour after the suspension period has begun. If a driver accumulates two or more demerit points while serving a good behaviour period, their licence is suspended for double the original suspension time.

Due to the critical role of driving for specific groups of professionals, if a person can demonstrate that they meet the professional driver criteria, any suspension (or refusal) that was applied based on 13 demerit points exactly will be withdrawn. If they subsequently reach or exceed 14 demerit points however, they will be subject to suspension or refusal as per other unrestricted licence holders. Data provided by RMS indicates that approximately 50 drivers each month have nominated as professional drivers and met the required criteria (See Figure 12 below).

Figure 12: Number of drivers that nominated as professional drivers, February 2011 – November 2013



Double demerit points apply for speeding, seatbelt and motorcycle helmet offences during all public holiday periods such as long weekends, Christmas, New Year and Easter. Certain driving and parking offences, including speeding offences, attract an additional demerit point if committed in an operating school zone. Double demerit points can also apply when school zones are in operation during holiday periods. If a driver commits a speed, seatbelt or helmet offence during this combined period, the demerit point value applying for the school zone will be doubled.

A driver may be disqualified or have their licence suspended for serious speeding offences:

- Driving more than 45 km/h above the speed limit – six months
- Driving more than 30 km/h but not more than 45 km/h above the speed limit – three months.

In addition to the suspension and disqualification periods, these offences also carry demerit points which are added to a driver's record. If these demerit points cause them to reach or exceed their demerit points threshold, then an additional suspension or refusal period may apply under the Demerit Points Scheme.

Holders of a learner or a provisional licence receive a minimum of four demerit points for any speeding offence. This means that both learners and provisional P1 licence holders have their licence suspended or refused for at least three months for any speeding offence.

If the court rules that a person is not guilty of a demerit point offence, it is the end of the matter. If a court finds a person guilty of the offence and convicts the person, the court usually orders a fine. In this case the offence will be recorded on the offender's traffic record and RMS must apply the relevant number of demerit points. If a court finds a person guilty of the offence and dismisses the

offence under Section 10(1) of the *Crimes (Sentencing Procedure) Act 1999*, the demerit points related to the offence will not be recorded.

Any demerit points incurred are not deleted. They remain on a person's driving record along with the offences they relate to. Over time, demerit points age and there is a point in time after which they are not counted even though they, along with other offences a person has committed, have resulted in them reaching the demerit point threshold in a three-year period. Any demerit points that are more than 40 months old are not counted for demerit point suspension. For example, this means that a licence suspension will be applied if a driver incurs 13 or more demerit points (14 for professional drivers) in a three-year period and all the offences are not more than 40 months old.

An additional element of speed enforcement strategy in NSW, complementing the Demerit Points Scheme, concerns tough measures that combat anti-social 'car hoon' behaviour. From 1 July 2012, changes were made to the Vehicle Sanctions Scheme that Police apply at the roadside for 'hoon' type behaviour. The changes were as follows:

- The existing offences of street racing and aggravated burnout continued to apply, however the offences of 'engaging in a Police pursuit' and 'speeding by more than 45km/h' were included.

- Where a driver commits one of the offences above and is the registered operator of the offending vehicle, Police may confiscate the number plates at the roadside as an alternative to the long-standing practice of impounding the vehicle. Vehicle impoundment or plate confiscation is for a fixed three-month period. A person may apply to the local court for an order for the early release of confiscated plates or an impounded vehicle.

The changes also saw the introduction of tough new penalties for those who use a vehicle that has had its number plates confiscated. This includes driving a vehicle with no plates or false plates. Heavy penalties also now apply to altering, tampering with or replicating a production notice sticker which police attach to a vehicle when number plates are removed.

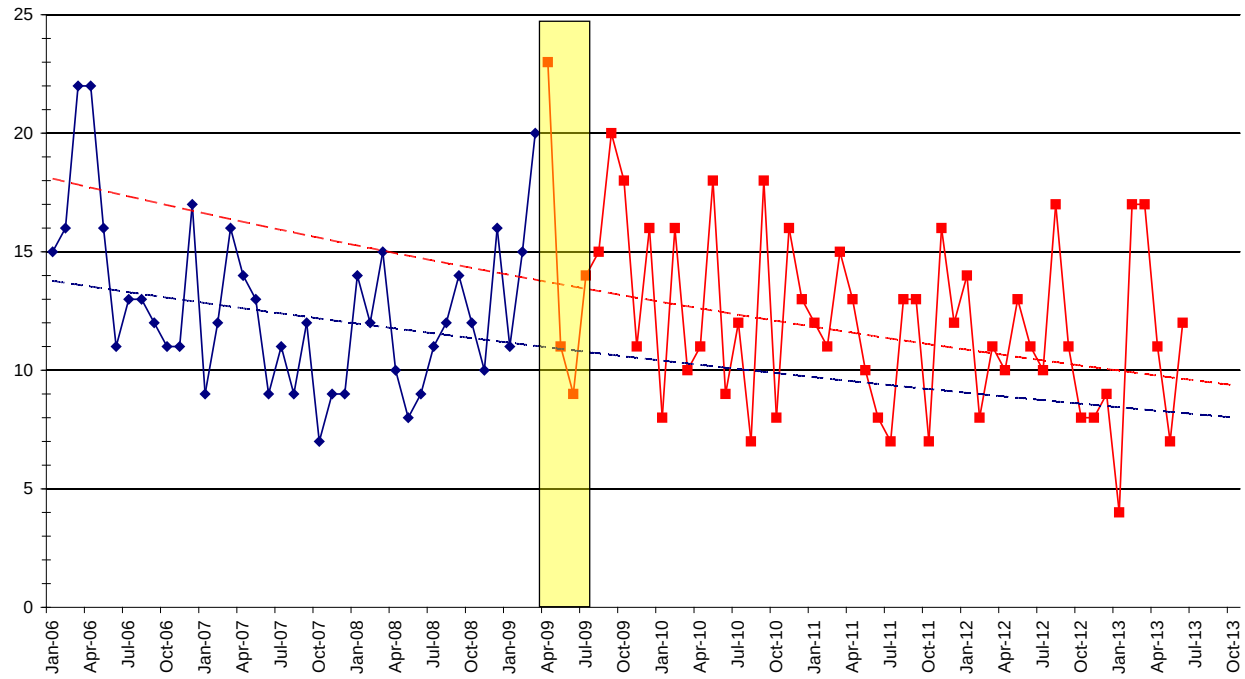
7.6 Casualty crashes trends associated with changes in Demerit Points Scheme

There have been four major changes to the NSW Demerit Points Scheme over the last decade. In 2007, zero tolerance for speeding offences for novice drivers was introduced. Also in 2007, there was an increase in fines and demerit points that apply to certain traffic (including speeding) and parking offences committed within operating school zones. In 2009, changes were introduced that reduced demerit points for low level speeding and increased for higher level speeding. In 2011, there was an increase in the number of demerit points to 14 for professional drivers and 13 for all other drivers. An analysis has been conducted of casualty trends of two of these major changes.

From 1 July 2009 low level speed offences up to 10 km/h attracted one demerit point, reduced from three demerit points. The change was announced in April 2009. Prior to the announcement of the change there was a downward trend for speed related fatal crashes and speed related casualty crashes. However, after April 2009 there was an increase in monthly speed related fatal crashes and monthly speed related casualty crashes.

Figure 13 below shows the trends experienced for speed related fatal crashes since 2006.

Figure 13: Speed Related Fatal Crashes Since 2006



Prior to April 2006 there had been a downward trend for speed related fatal crashes. However, post April 2009 there was a discontinuity in the trend – the trend line post April 2009 was initially around three fatal crashes per month higher than the trend line pre 2009. This premium has decreased over time to just fewer than two by June 2013, which may be due to significantly more high visibility enforcement that has been put into effect over recent years. *Figure 14* below shows the trends experienced for speed related casualty crashes since 2006.

Figure 14: Speed Related Casualty Crashes Since 2006

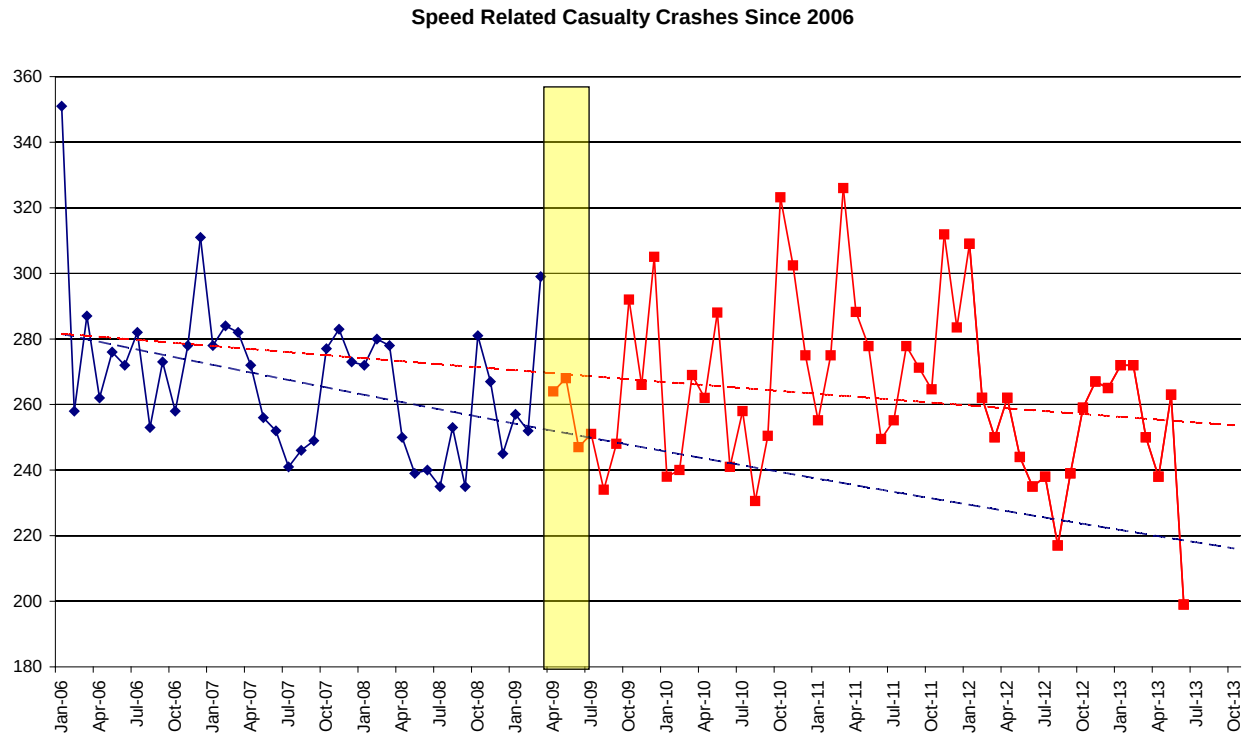


Figure 14 shows that prior to April 2009, there was also a decreasing trend in speed related casualty crashes (blue dash line). Between April 2009 and April 2011, there was a stepped rise in the underlying level of speed related casualty crashes. However since then, speed related casualty crashes have decreased, with the trend line (red dash line) decreasing but these levels are not as low as if the trend prior to April 2009 had continued.

Caution is needed when interpreting these results. Whilst the data shows an association between speed related crashes and the demerit points change in July 2009, there were many other enforcement, demerit point policy (number of points, length of period) and public education campaigns that could have influenced the trends (e.g. mobile speed cameras ceasing operation in December 2008).

7.7 Impact of the Double Demerit Points Measure

In 1997, the NSW Government introduced double demerit points for all speed offences (and an extra demerit point for all other offences). It was initially applied to the 1997 Easter school holiday period and then extended as a trial for the subsequent public holiday long weekends up to and including the 1998 June holiday weekend.

The 1998 evaluation of the full double demerit points trial period covered issues such as community awareness and attitudes, driver compliance and road trauma reductions.

The evaluation report found that the NSW public had a very high level of awareness and support for double demerit points and this had been sustained over the entire trial period. A significant proportion of drivers reported that they slowed down during the double demerit points trial periods, particularly those belonging to high risk speeding groups (in particular young males and those people who self-reported that they tended to drive above the speed limit). The reductions in the numbers of infringements issued by the NSW Police Force (up to one third for non-camera speed offences) also support this improved driver compliance. There was a 22% reduction in fatalities and an 8% reduction in serious injuries associated with the double demerit points trial. As a result of the evaluation, the double demerit points policy measure was applied for speed offences across all public holiday weekends and the extended Christmas New Year holiday period.

In 2001, double demerit points were extended to cover all restraint and helmet offences. Community surveys from the early 2000's showed continuing support for the measure and self-reported behaviours change.

It is rather more difficult to isolate the direct impact of the double demerit points measure on the current holiday trauma levels given changes to traffic, enforcement and public education campaigns over the intervening years.

However, since double demerit points began (from Easter 1997 up to and including the 2013 Easter Holiday period) over the 86 holiday periods (491 days), in which double demerit points have applied, there have been 632 fatalities, 304 (32%) fewer fatalities on the number of fatalities for the same holiday periods immediately prior to the introduction of double demerit points. Similarly fatal crashes were down by 250 (31%) for the same comparison.

As double demerit points usually apply over extended weekend periods the comparison should be with weekends outside public / school holiday periods. Over the most recent three years of finalised data (2010 to 2012) there has been an average of 1.06 fatalities per day during public holidays (days when double demerit points are usually applied). For weekends outside the holiday periods the daily fatality rate was 1.20, a daily rate 13 per cent higher than for the public holidays.

7.8 Community attitudes to the current NSW Demerit Points Scheme

The Roads and Maritime Services' (RMS) Regulatory Services Customer Insights Panel was established in October 2009 to obtain customer opinions, feedback and input on a wide range of RMS products, services, policies, communications and challenges to assist with current and future RMS direction and policy decisions.

A representative sample of 1500 RMS customers was recruited both online and through motor registries. The same 1500 customers were asked to complete 12 monthly online surveys throughout 2009-2010. The questions asked of the panel were generally about licensing, registration, customer services and other RMS policy issues, including views of enforcement practices.

The fifth online survey was conducted in April 2010, focusing on the NSW Demerit Points Scheme. 1,025 completed surveys were collected, equating to a 68.3% response rate from the 1,500 panellists. Key findings from this survey are summarised below. While this provides a general indication of community views of the scheme, the data was collected prior to the most recent changes to the NSW Demerit Point Scheme in 2011.

7.8.1 Penalty system

The value of offences for the NSW Demerit Points Scheme were seen to be fair by about half of all participants (52%), with the current system seen to improve road safety (54%). Double demerit points were also felt to be effective, being seen by participants to reduce crashes during periods of heavy road use (60%).

Three-quarters of participants (75%) reported however having no points recorded against their licence, with no participants admitting to being currently suspended or disqualified from driving or riding. Around 1 in 6 participants (14%) admitted having some accrued demerit points.

7.8.2 Speeding – awareness and perceptions of penalties

Participants generally had a limited understanding of the penalties relating to different speeding offences.

Only 23% of respondents knew the correct penalty for speeding by less than 10km/h over the limit (see Figure 15 *below*). 21% knew the correct penalty for speeding between 20km/h and 30km/h over the limit (see Figure 16 below). Over one-third (35%) admitted not knowing the correct penalty for speeding by less than 10km/h, and over one-quarter (26%) admitted not knowing the correct penalty for speeding by between 20km/h and 30km/h. This finding may reflect the changes to speeding penalties that occurred not long before the survey was conducted, and the fact that most survey participants reported that they had not committed any speeding offences.

Considering the penalties for different speeding offences the $197 fine was seen as the strongest deterrent to speeding between 10km/h and 20km/h over the limit, and court attendance and the immediate six month suspension were seen as the strongest deterrents to speeding more than 45km/h over the limit (see Figure 17 and Figure 18 below).

Overall, these findings reinforce the community attitudes results outlined earlier, showing that drivers generally support the NSW Demerit Points Scheme, but have limited awareness of existing speed thresholds and punishments.

Figure 15: Awareness of penalties – speeding by not more than 10km/h

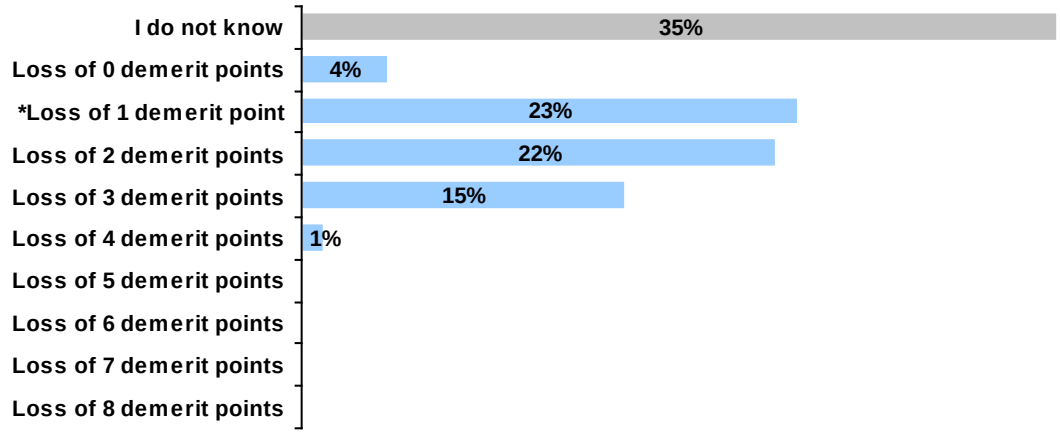


Figure 16: Awareness of penalties – speeding by not more than 20-30km/h

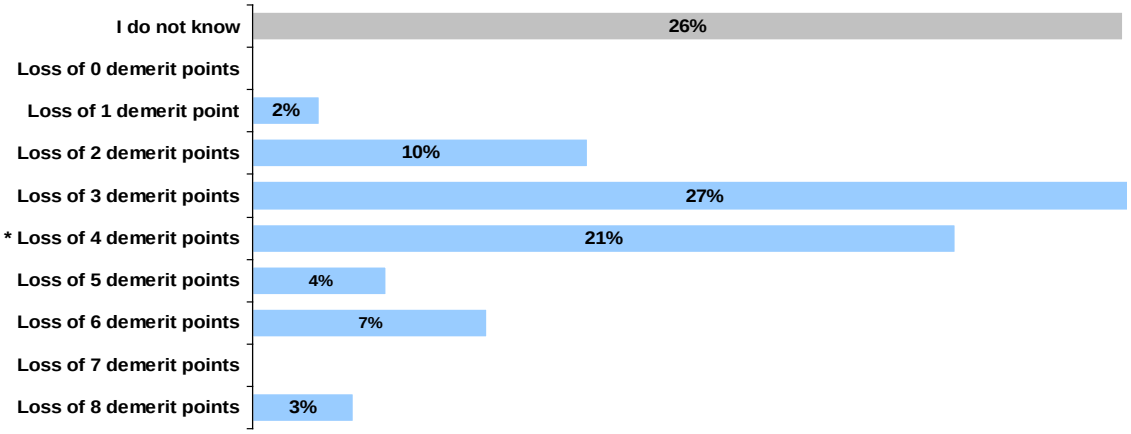


Figure 17: Perceptions of penalties – speeding between 10 and 20km/h

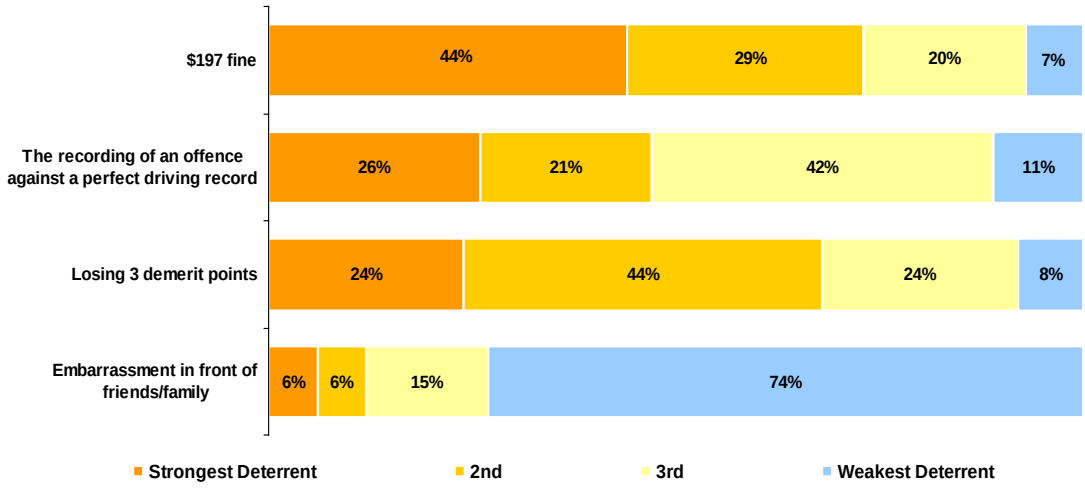
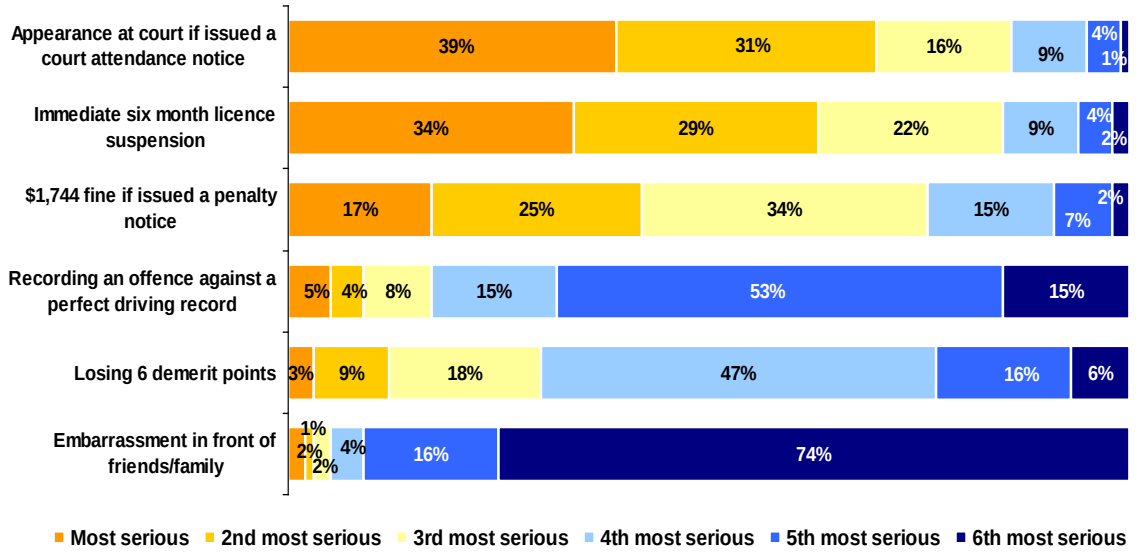


Figure 18: Perceptions of penalties – speeding more than 45km/h



7.9 Driver licence disqualification reform

Since demerit points are a form of penalty, consideration must be given to ensuring that they are only imposed in appropriate cases and reflect the criminality of the offence committed.

Unlike some other criminal sanctions which go to rehabilitation, demerit points are largely punitive in nature and are intended to have a deterrent effect. This needs to be considered in determining what offences they apply to and what amount they should be set at.

The impact of demerit points must also be considered notably their potential to result in loss of licence and the consequential impacts.

The report by the Legislative Assembly Committee on Law and Safety, *Driver Licence Disqualification Reform November 2013*, made a number of recommendations to reform the laws relating to unauthorised driving offences to ensure that:

- courts have more discretion to impose appropriate driver licence disqualification periods that take into account the circumstances of the offender's case
- penalties and disqualification periods for these offences are proportionate to the crimes
- unauthorised driving offences will no longer be part of the Habitual Traffic Offenders scheme
- vehicle sanctions are available as a possible penalty for those who repeatedly drive while disqualified, and
- offenders who have served a minimum offence-free period will have the opportunity to apply to the court for it to consider whether it is appropriate to remove their outstanding disqualification.

The Committee found that the majority of licence suspensions are for the non-payment of fines with fifty two per cent of licences suspended in 2012 were as a result of fine default/non-payment of fines (147,592) compared to 16 per cent for accumulation of demerit points (45,328).

The Government is currently considering the recommendations of the Committee on Law and Safety.

8 The impact of demerit points in reducing speeding behaviour

8.1 Proportion of demerit points that are for different levels of speeding offences

Office of State Revenue data was analysed to identify information regarding speeding and the NSW Demerit Points Scheme. Key findings are presented below.

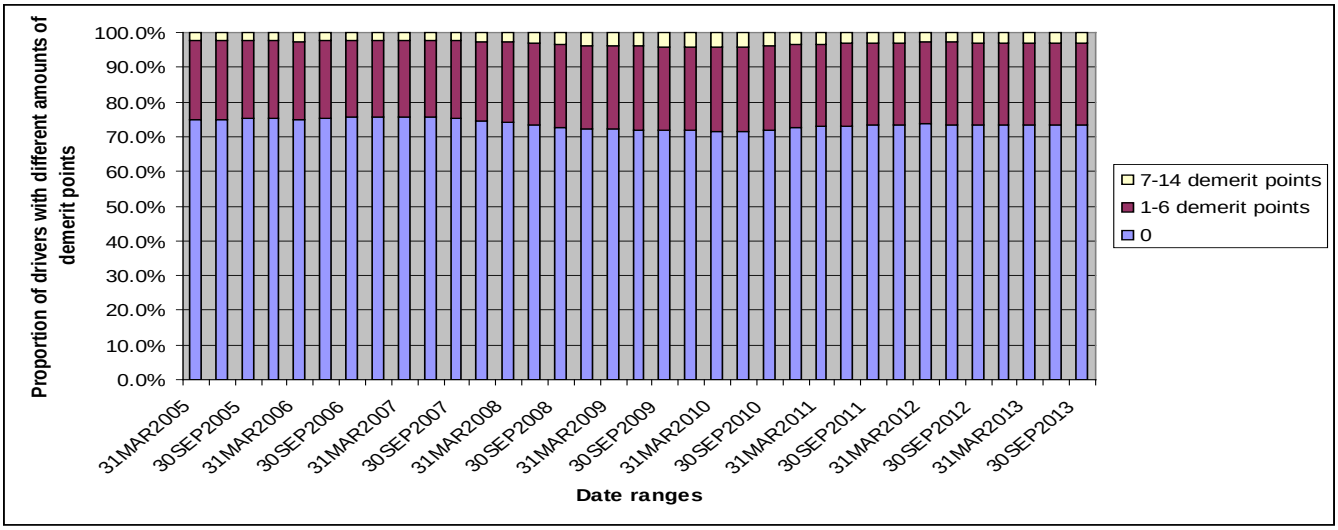
In the year ending on 30 June 2013, drivers and riders on NSW roads received a total of 956,957 demerit points. Almost two thirds of all demerit points were for speeding offences (n=596,732). As is outlined below in Section 8.3, this is substantially lower than the amount of demerit points prior to changes to the NSW Demerit Point Scheme in 2009. Most of demerit points received by NSW drivers and riders in 2013 were for low level speeding (i.e. 0-10km/h over the speed limit) (see Figure 19 below).

Figure 19: Proportion of demerit points for different levels of speeding offences, July 2012-June 2013

8.2 Proportion of drivers with different amounts of demerit points

Between 2005 and 2013 there was a stable trend of more than 70% of NSW drivers at any one time that have not accumulated any demerit points. Less than 5% of drivers had 7-14 demerit points at any time (see Figure 20 below). The proportion of drivers with 0, 1-6, and 7 or more demerit points has also remained consistent between 2005 and 2013, despite changes to the Demerit Points Scheme and speed enforcement practices over this time.

Figure 20: Proportion of NSW drivers with different amounts of demerit points 31 March 2005-30 September 2013



** More than 12 demerit points were only calculated after March 2011*

8.3 Impact of the change to speeding demerit points on 1 July 2009

As previously outlined, speed thresholds within the NSW Demerit Points Scheme were changed in 2009. Comparing the speeding data from prior to and following this change provides an opportunity to examine the impacts of the Demerit Points Scheme more broadly.

Between July 2008 and June 2009 (i.e. 2008/09) there were 641,540 speeding offences, compared with 623,011 in 2009/10. The total amount of demerit points accumulated for speeding offences decreased considerably from 2,249,882 in 2008/09 to 1,692,645 in 2009/10. This further reduced to less than 600,000 demerit points for speeding offences in the year ending in June 2013.

These findings indicate that changes to the Demerit Points Scheme in July 2009 reduced the total number of demerit points for speeding offences, lessening the burden of the scheme on NSW drivers for low-level speeding offences.

Following the change in 2009 community acceptance of low-level speeding appeared to increase, as identified by surveys examining community attitudes to speeding (Walker et al., 2009), and speeding-related casualties increased in the following year. However, subsequent increases in high visibility speed camera enforcement, to be outlined in Section 9, have appeared to help address this trend in speeding-related casualties.

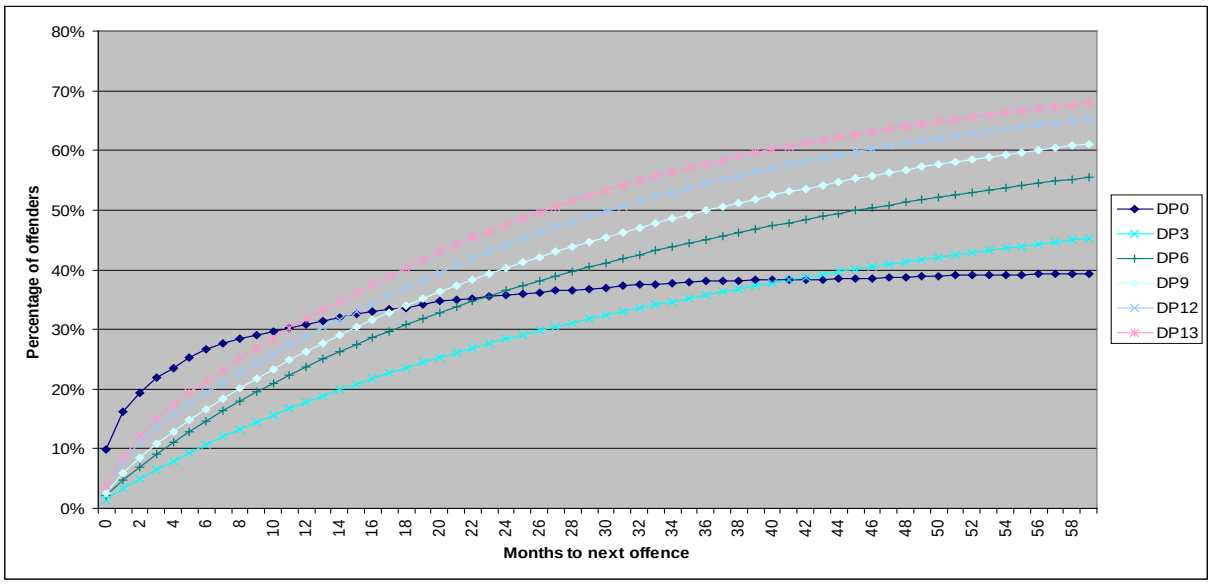
The change to the speed camera program has increased the certainty of punishment for speeding behaviour. This has been achieved by increasing the amount of overt speed enforcement activities, such as marked mobile speed cameras and red-light speed cameras. The purpose of these is to increase the general deterrence of speeding through high visibility enforcement. In this way, the Speed Camera Strategy operates in combination with the Demerit Points Scheme to create a fair enforcement system that is capable of reducing the incidence of speeding on NSW roads.

8.4 Survival analysis for demerit points for different driver groups based on their number of accumulated demerit points

The survival analysis in Figure 21 below illustrates how commonly drivers with different amounts of demerit points for speeding offences commit another speeding offence within a five year period, and

how long they take to reoffend. Key findings and implications emerging from the survival analysis are presented below.

Figure 21: Raw percentage of offenders who re-offend by demerit point count and months until next speeding offence



The survival analysis shows that generally, drivers with more demerit points have an increased likelihood of reoffending over the next five years. The survival analysis also shows that drivers with three demerit points have the lowest likelihood of reoffending up to 42 months, and the second lowest likelihood after five years. This may indicate that the initial accumulation of demerit points is an effective deterrent for engaging in speeding behaviour in the future.

8.5 Descriptive analysis of the number of demerit points suspensions, and also the number who opt for the good behaviour period.

Figure 22 below shows annual trends between 2000 and 2013 in five categories:

- *Demerit point (DP) suspensions;* that is, licence suspensions due to the accumulation of the maximum number of demerit points within the designated timeframe.
- *Excess speed (ES) suspensions;* that is, licence suspensions for exceeding the speed limit beyond a specific threshold, but not resulting in the accumulation of the maximum number of demerit points within the designated timeframe.
- *Combined excess speed and demerit point suspensions;* that is, an excess speed suspensions that also resulted in a driver accumulating the maximum number of demerit points within the designated timeframe.
- *Demerit point good behaviour periods;* that is, drivers who have accumulated the maximum number of demerit points within the designated timeframe, but who opt to take the good behaviour period rather than have their licence suspended.
- *Combined demerit point and excess speed good behaviour periods;* that is, drivers who have committed an excess speeding offence that resulted in the accumulation of the maximum number of demerit points within the designated timeframe, but who opt to take the good behaviour period rather than have their licence suspended.

Figure 22: Trends in particular licence suspensions, and the number that opted for good behaviour periods, January 2000-September 2013

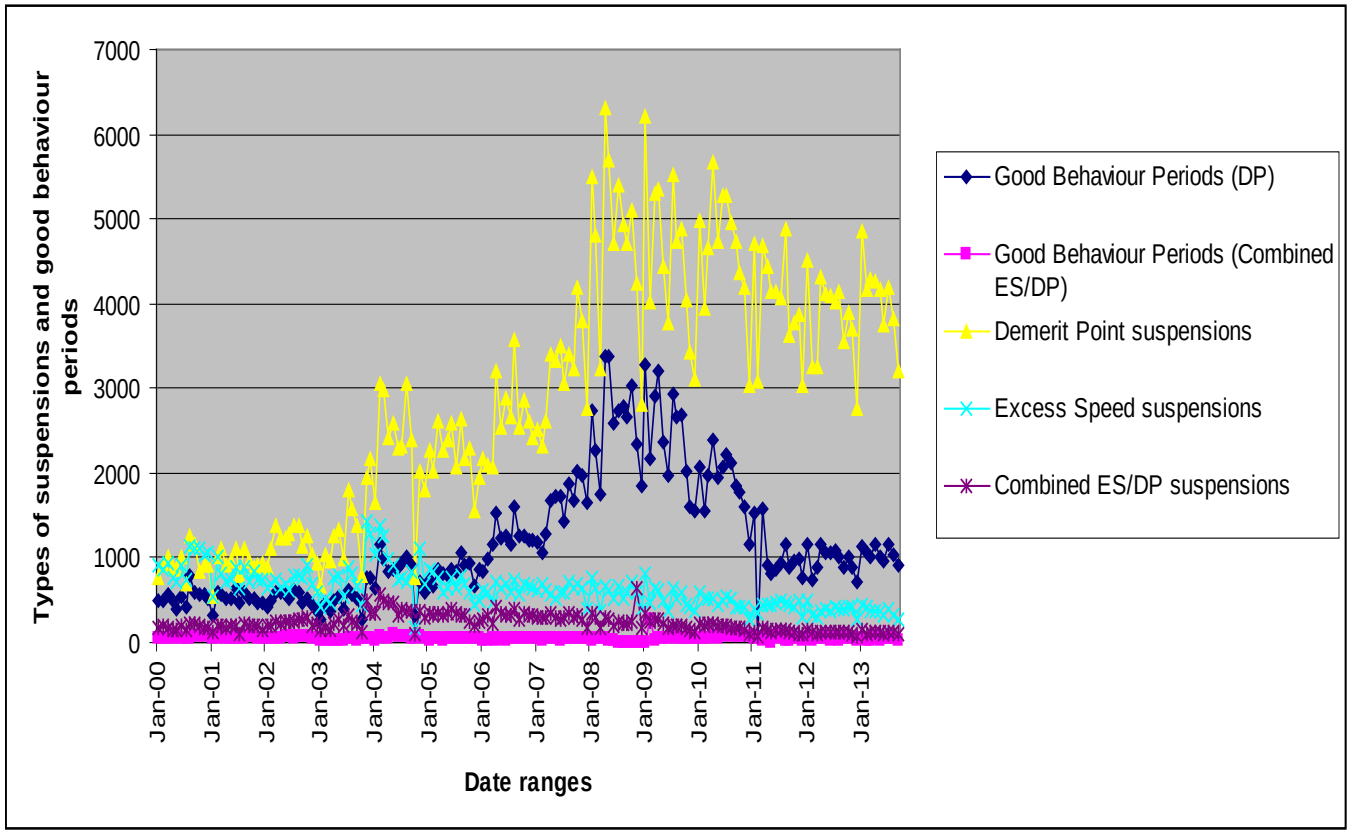
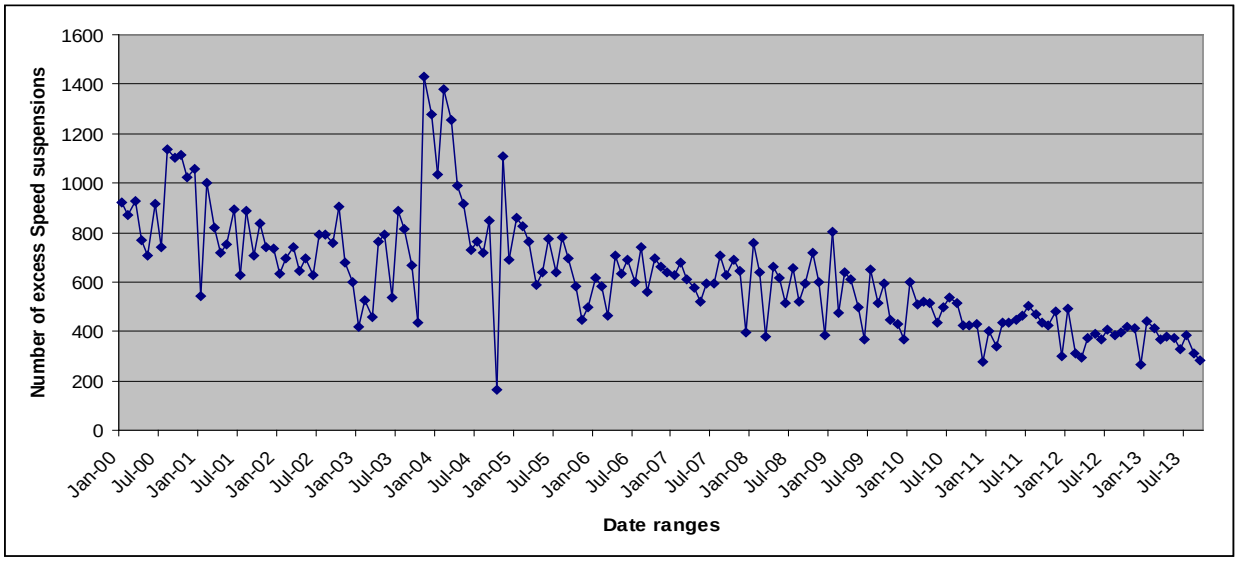


Figure 22 illustrates trends in different types of license suspensions, and the number of drivers that opted for good behaviour periods, between January 2000 and September 2013. Key results are summarised below:

- The total number of excess speed suspensions, and combined excess speed and demerit point suspensions, is far less than the number of licence suspensions from demerit points alone.
- The number of demerit point suspensions substantially increased in 2008, but has been trending downwards since that time. This is likely to be a result of both an increase in speed camera enforcement in school zones between 2007 and 2009, as well as modifications to the NSW Demerit Points Scheme in recent years that have made the system more lenient towards low level speeding. Further reductions are expected as new speed cameras are installed and rolled-out in 2014.
- The number of excess speed suspensions has gone from a maximum of 1,430 in November 2003, to a low of 283 in September 2013. This trend is highlighted in Figure 23 below. The substantial reduction indicates that NSW drivers are decreasingly engaging in high range speeding. This may be partly attributable to low acceptability of this behaviour, as well as the stricter vehicle restrictions and other anti-social 'hoon' laws introduced in 2012. Due to the considerable risk posed by high range speed, this reduction represents a significant road safety achievement.
- The number of drivers who reach the maximum number of demerit points who opt for a good behaviour period has decreased since 2008. A larger proportion of drivers with licence suspension for demerit points opt for the good behaviour period (29%), than drivers with licence suspension for combined excessive speed and demerit points (21%).

Figure 23: Number of excess speed licence suspensions, January 2000-July 2013



8.6 State Debt Recovery Office Cautioning System

The State Debt Recovery Office (SDRO) provides a processing service for agencies who issue penalty notices. The SDRO issues notices directly for camera detected offences such as speeding red light and bus lane cameras. The SDRO also investigate, issue notices and prosecute anyone lodging false nominations or failing to nominate drivers for demerit point offences. In accordance with the *Fines Act 1996*, a person can apply for a review of a penalty notice up until the due date of the penalty reminder notice. The SDRO Review Guidelines, October 2013 provide for the making of consistent decisions and to assist people to understand what evidence may be required to support their claim for a review.

The Guidelines indicate that the SDRO will only consider a 10 year clear driving record for review of demerit point offences. After the SDRO reviews a request one of three outcomes is possible:

- Penalty to stand - the offence was proven and the circumstances or issues raised did not warrant granting a caution, that person must pay the fine elect to have the matter decided in court.

- Caution - the penalty notice was issued correctly and the offence occurred due to the circumstances and evidence provided, however a person is issued a caution. A payment is not required and demerit points to not apply. However, for demerit point offences the caution will be recorded on a persons driving history.

- Cancellation - the penalty notice does not sufficiently disclose the offence or has been issued in error. The person does not have to pay the fine and that demerit points (if applicable) will not be recorded.

The SDRO will generally not consider leniency for some serious offences where safety is an issue. For example, speeding offences of more than 30 km/h over the speed limit, these offences incur an automatic licence suspension period. P1 drivers/riders caught speeding will have their licence suspended for at least three months and leniency will not be considered.

8.7 Owner onus and reduced impact of demerit points

Fail to nominate penalty notices are issued to companies and individuals who fail to nominate the driver or person responsible for the vehicle at the time of the demerit points offence. These offences are considered serious due to attempts to avoid the application of demerit points. Any requests for

review must explain why a person was hindered from lodging a nomination within required timeframes. Leniency may be considered on the first occasion, however multiple offences may lead to prosecution and fines up to $11,000. The strength of this penalty is necessary to maintain the high level of punishment for demerit point offences, including speeding. Additionally, there is scope to deregister a vehicle for repeated failure to nominate offenders.

There are issues around expansion of "owner onus" offences which result in the nomination process and the expectation that the appropriate person is nominated and penalty applied. The SDRO processes around 300,000 nominations per annum. Dealing with nomination issues take up a significant amount of time, cost and resources through exploitation of avoidance opportunities, such as false nominations, fail to nominate, car dealer vehicle transfers, company vehicles and the difficulties with enforcing fines for interstate drivers.

Much of current legislation was developed around the traditional method of face-to-face issue of penalty notices and has not kept pace with the increase in camera detected offences which incur demerit points and as a result avoidance opportunities exist. Whilst the SDRO have had successful prosecutions against companies and individuals for failing to nominate and false nominations, unfortunately in many cases, demerit points do not get awarded against the offending driver for the original offence of speeding.

9 Any other related matters

9.1 Overview of NSW speed enforcement

9.1.1 Enforcement approach

High visibility policing is critical to address speeding. In 2012, almost 40% of legal actions (176,841 out of 449,479) commenced by the NSW Police Force's Traffic and Highway Patrol Command was for speeding offences.

Speed cameras support police enforcement by broadening the benefits of speed enforcement across the network. They can also operate at locations that are difficult for police to enforce. Speed camera enforcement in NSW also uses a high visibility approach, so that drivers and riders are aware of enforcement. This is based on a general deterrence approach where the aim is to deter drivers and riders from speeding, rather than covertly catching and penalising illegal behaviours.

General deterrence aims to increase the certainty that speeding can be enforced anywhere at any time, thereby reducing speeding not only at identified enforcement locations but also across the road network, thus creating a general deterrence effect (Cameron & Delaney, 2006). This is because drivers are less able to predict where the enforcement will occur. The less predictable the enforcement, the more speed limit compliance can be achieved.

9.1.2 Development of the NSW Speed Camera Strategy

Speed enforcement helps reduce the proportion of drivers who exceed the speed limit on NSW roads, reducing the risk of being involved in a fatal or injury crash and the severity of outcomes in the event of a crash.

Speed cameras are speed enforcement tools that supplement enforcement conducted by NSW Police. They have been proven to make roads safer by reducing speeding and in turn the number and severity of crashes. Evaluation studies consistently report positive effects of speed camera enforcement on speeding behaviour and the number of crashes (Elvik et al., 2009).

The NSW Government is a signatory to the *National Road Safety Strategy 2011-2020* (National Strategy) which sets out targets to adopt best practice enforcement and reduce the national annual number of deaths and serious injuries by 30 per cent by 2020. Recommendation 8 of the National Strategy, to be completed by 2014, is to improve compliance and speed enforcement across the whole road network through the adoption of best practice enforcement using a combination of on-road policing and speed camera technologies. This action is based on recommendations by the OECD, the World Health Organisation and Austroads about best practice strategies to reduce speeding and the related crashes, injuries and fatalities.

In April 2011, the Premier asked the NSW Auditor-General to conduct a performance audit of fixed, mobile and red-light speed cameras in NSW to determine whether speed cameras in NSW were being used for road safety (Audit Office of NSW, 2011). The audit assessed whether speed cameras are located in places with significant road safety risk and whether they reduce speeding and the number and severity of road crashes.

The results of the audit were released in July 2011 and found that in general, speed cameras change driver behaviour and have a positive road safety impact in NSW, the number of speeding offences and the total number of crashes, injuries and fatalities reduced after the introduction of fixed speed cameras.

A key recommendation from the 2011 audit was the need to develop an overarching strategy for all speed camera types: fixed, mobile, red-light speed and point-to-point. The Speed Camera Strategy was finalised in 2012. The Strategy helps to ensure that different types of speed cameras are being used to reduce speeding at various high risk locations across the road network and are complementary to ensure their effectiveness is maximised. This integrated approach delivers a stronger, more comprehensive framework of speed management and enables the NSW Government to meet its commitments to reducing fatalities and increasing compliance with speed limits.

The Speed Camera Strategy also aims to improve the transparency and understanding of the use of speed cameras in NSW through increased community engagement and education. The Strategy was developed in collaboration with key road safety leaders and stakeholders including Transport for NSW, Roads and Maritime Services, the NSW Police Force, NRMA Motoring and Services, Pedestrian Council of Australia, Transport and Road Safety Research Centre (University of NSW) and Monash University Accident Research Centre. Together these partners recognise that speed enforcement should complement other engineering and education strategies.

Community support and awareness are fundamental components of road safety programs. They assist in creating a general deterrence of speeding and ultimately influence drivers to improve their behaviour. A key component of the new strategy involves promoting the effectiveness of cameras in achieving even greater compliance across the road network and in turn reducing speed-related crashes, fatalities and injuries.

9.1.3 Overview of the types of speed cameras used in NSW

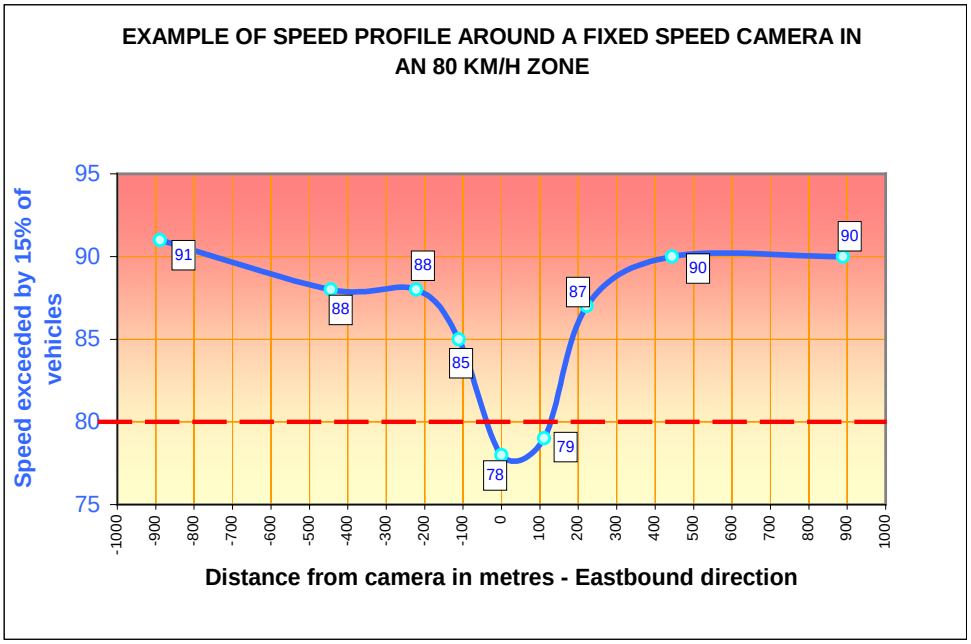
There are four types of speed cameras used in NSW to encourage drivers to comply with the speed limit (see Table 15 below). The suite of speed cameras used in NSW have different roles in reducing speed-related crashes. An effective speed management strategy should incorporate each type of camera enforcement to address the speeding problem.

Table 15: Types and levels of speed camera enforcement in NSW (program by 2015)

Speed cameras used in NSW			
Type	Main purpose	Introduced	NSW program
Mobile	General network deterrence	First introduced in 1991. Ceased operation in December 2008 and re-introduced in 2010	45 vehicles operating at about 2,500 locations for 7,000 hours per month
Red-light Speed	Location specific (To address high risk intersections)	2009	Planned for 200 cameras at 45 intersections by end of 2014
Fixed	Location specific (To address black spot/high risk)	1997	133 cameras at 108 locations
Point-to-Point	Route enforcement (For heavy vehicles only)	2010	25 lengths

Fixed speed cameras (including red-light speed cameras) are implemented to reduce speeding and improve safety at specific locations due to the high number of crashes at these locations. However, as illustrated by Figure 24 below, the safety benefits of fixed speed cameras are limited to a total length of approximately 1,000 metres around each camera.

Figure 24: Example of a speed profile around a fixed speed camera



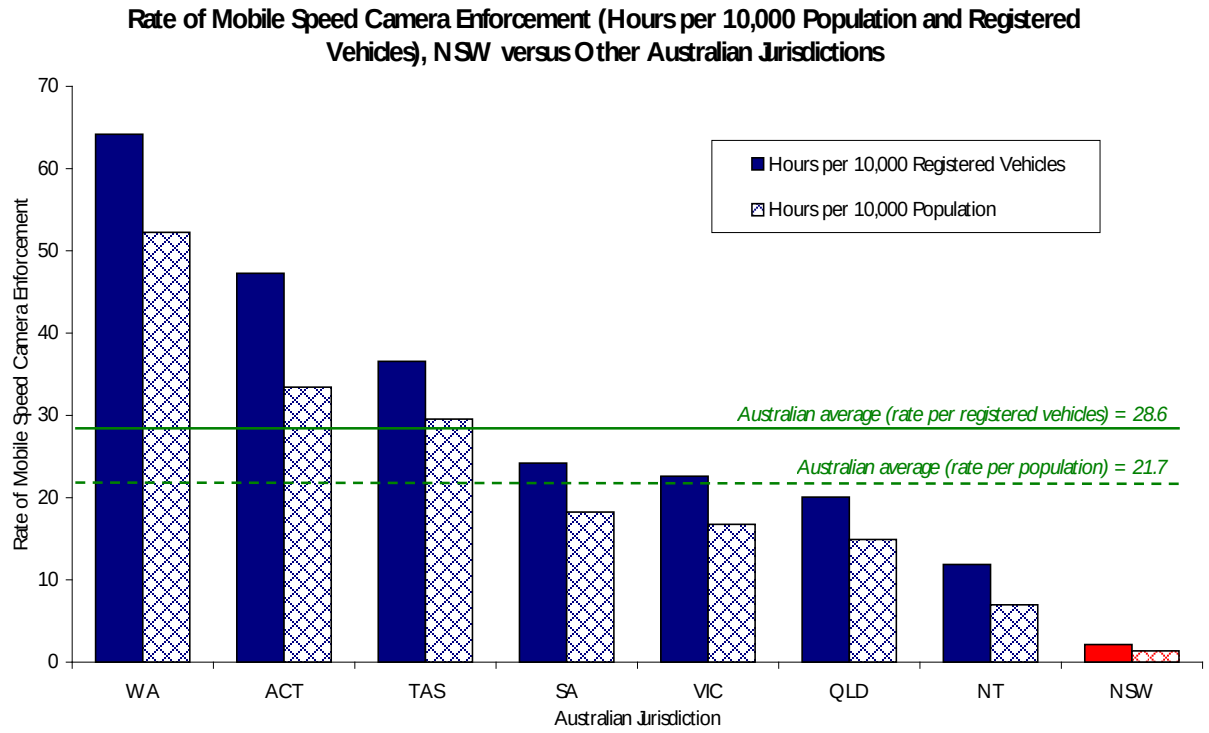
An overwhelming number of rigorous evaluation studies clearly demonstrate that mobile speed cameras produce significant reductions in mean travel speed, crashes, and casualties. For example, a US study found that mean speeds decreased by 1.32 km/h directly after the introduction of an overt mobile speed camera program, and remained 1.08 km/h lower than baseline levels twelve months after implementation (Cunningham et al. 2008). In terms of crash reduction, an evaluation of mobile speed cameras in the UK found a 19% decrease in overall crashes, and a 44% decrease in crashes involving fatalities or serious injuries (Jones et al. 2008).

Similarly, the trend in road fatalities and annual speed surveys in NSW demonstrates that the small-scale interim mobile speed camera program continues to deliver positive road safety benefits, compared with results prior to the re-introduction of the mobile speed camera program in 2010 (NSW Centre for Road Safety, 2013).

Mobile speed cameras used in NSW are in marked vehicles with signage placed both before and after the vehicle. A further initiative of the NSW Speed Camera Strategy is enhancing warning signage for mobile speed camera vehicles to ensure motorists see and recognise the enforcement activity. For mobile speed cameras, the number of warning signs has doubled and motorists get up to 250 metres of advance warning. Unlike the past, mobile speed camera vehicles now display high visibility markings.

In NSW, the program size of 7,000 hours of enforcement per month, up from the current 900 hours, is equivalent to 9.7 hours of enforcement per 10,000 population, which is smaller than the mobile speed programs in Victoria (16.8 hours per 10,000 population) and Queensland (14.9 hours per 10,000 population) (See Figure 25 below). The program is managed by the Roads and Maritime Services on behalf of Transport for NSW, in consultation with the NSW Police Force, with operations outsourced to a private contractor. This model is also used in Victoria and cameras are operated by technicians, freeing up police for hands on enforcement.

Figure 25: Comparison of rates of mobile speed camera enforcement by Australian jurisdictions, January 2012.



Note, this data was current as of January 2012, based on the proposed program size for WA

While we know that fixed cameras and red-light speed cameras reduce speeding at specific locations, more can be done to reduce speeding across the road network. As already outlined, the NSW Auditor-General recognised this in the 2011 review of speed camera enforcement in NSW. Of the initial 57 locations where red-light speed (safety) cameras were installed in NSW, crashes reduced by 26% and injuries by 34%. A key initiative of the NSW Speed Camera Strategy was that warning signs for red-light speed camera signs were more than doubled in size, making it clearer to motorists that they will be infringed if they speed or run a red light.

Point-to-point enforcement addresses speeding along travel routes with a demonstrated history of crashes. Point-to-point enforcement in NSW has targeted heavy vehicles as they are over-represented in crashes on known heavy vehicle routes. Based on the crash benefits experienced in other jurisdictions and evaluations from international programs it is expected there should be significant reductions in heavy vehicle crashes on the point-to-point lengths used in NSW.

The ultimate indicator of performance for all speed cameras in NSW is a reduction in people killed and injured in crashes. Speed enforcement in conjunction with other initiatives such as engineering treatments, education and safer vehicles should lead to a continued reduction in the road toll. In order to assure the community that speed enforcement is being monitored and evaluated for performance, a range of evaluation criteria have been developed for each camera type.

As each type of speed camera addresses a particular crash problem on the road network, site selection criteria have been developed for each camera type to ensure they are placed on roads according to their intended purpose. The effectiveness of all speed cameras are measured through

the analysis measures that are directly attributed to driver actions which include vehicle speeds and compliance rates, and crash outcomes including the frequency and severity of crashes. This information is obtained from systematic reviews of crash data, monitoring of infringement rates and other speed data.

9.1.4 Reviews of speed camera effectiveness

Annual NSW Speed Camera Performance Reviews are undertaken by the Centre for Road Safety. Where it is determined a camera has not been effective, alternative road safety countermeasures are considered. The purpose of the reviews is to provide a systematic process for monitoring the effectiveness of speed cameras in NSW to ensure they are having a positive road safety effect.

The evaluation criteria for each camera type outlined in the Strategy has been determined by the Centre for Road Safety based on the road safety benefit that is expected to be achieved from the program. Broadly speaking camera effectiveness is measured by two key criteria, the impact on:

- slowing drivers down and therefore reducing crashes and casualties, and
- achieving greater speed compliance through a reduction in infringement rates.

As recommended by the NSW Auditor-General's Performance Audit Report *Improving Road Safety: Speed Cameras* (2011), Transport for NSW typically examines at least five years of crash and casualty data post implementation to make a statistically significant assessment of a camera's effectiveness. The red-light speed camera and point-to-point enforcement programs are in their early stages, with locations only operational for three years or less. Given the infancy of these programs, the data analysed in the most recent annual review are not sufficient to reliably assess the effectiveness of individual camera locations. Due to the mobility of mobile speed cameras and their purpose of creating a general deterrence effect across the road network, the analysis examined crash data for the entire state, not individual mobile speed camera locations.

Key findings from the 2013 speed camera review are summarised in Table 16 below. It found that across the four programs, speed cameras are continuing to improve road safety in NSW. Early results in new programs show that drivers are changing their behaviour, which overall is resulting in a reduction in crashes and casualties at camera locations and across the road network. However three of the four programs are still in their infancy and a better understanding of the longer term effectiveness of these programs will require ongoing monitoring of their performance by the Centre for Road Safety into the future.

Table 16: Key findings from the 2013 speed camera review

Camera type	Size of NSW program as at 31 December 2012	Program effectiveness
Mobile	642 locations Approximately 930 hours of enforcement per month	Overall, the trend in road fatalities and annual speed surveys demonstrates that the small-scale interim mobile speed camera program continues to deliver positive road safety benefits, compared with results prior to the re-introduction of the mobile speed camera program in 2010. • The provisional 2012 road toll of 370 persons killed on NSW roads is the second lowest annual figure since 1932 (with 366 fatalities). • The results of the 2012 annual speed survey were mixed with a decrease in the percentage of light vehicles exceeding the speed limit by up to 10km/h in most speed zones. However when looking at the percentage of light vehicles exceeding the speed limit by more than 10km/h, while there was continued suppression of speeding in 40km/h school zones, 50km/h and 100km/h speed zones, there was a slight increase in speeding in the remaining speed zones compared to 2010 and 2011. The increase in speeding observed in 2012, compared with 2010 and 2011 results can be expected given the size of the program and provides evidence that the general deterrence effect provided by mobile speed cameras can be enhanced by a larger program.
Red-light speed	106 cameras at 91 intersections	Overall, when comparing the five years before the red-light speed cameras were installed to the post installation period there has been a 30 per cent reduction in casualties at these locations
Fixed	133 cameras at 108 locations*	Overall, when comparing the five years before the fixed speed cameras were installed to the most recent five years there has been a 41 per cent reduction in injuries at camera locations
Point-to-point	19 lengths**	Preliminary analysis of point-to-point enforcement lengths shows that there has been a low number of heavy vehicle crashes since camera operation. Infringement data for average speed offences in point-to-point enforcement lengths show a high level of compliance and a low number of infringements.

*** Of the 108 fixed speed camera locations, seven locations operate in warning mode and six locations are 'high risk' locations (typically located in tunnels). These locations were not included in the fixed speed camera analysis.**

**** The total proposed point-to-point program is 25 enforcement lengths to be installed by the end of June 2014. As at 31 January 2014, 24 lengths had been installed.**

9.2 Communications campaigns that complement the NSW Demerit Points Scheme

Best practice guidelines for speed enforcement recognise that public education conducted in combination with speed enforcement achieves maximum road safety results. Education, without enforcement however does not have as great an effect because some drivers do not believe that their speeding behaviour will lead to a crash. This supports the high visibility, general deterrence-based approach to speeding enforcement used in NSW.

The NSW Government will continue to develop and deliver public education campaigns to support speed enforcement in NSW. By combining enforcement with public education, drivers will be aware of the types of enforcement being used in NSW and will also be informed about the rationale for enforcement.

Campaigns that use powerful emotive messages will be employed in combination with other messages, to ensure that drivers recognise that road crashes (and especially speed related crashes) place a large burden on the community, and that speed cameras are there to reduce this burden.

To complement the enforcement of speeding, several large-scale communications campaigns have been undertaken by Transport for NSW since 2007, including:

- Speeding: No one thinks big of you.
- Campaigns supporting rollout of point-to-point enforcement of heavy vehicle speeding, red-light speed camera and mobile speed camera programs.
- Don’t rush.
- Don’t rush speed camera campaign.
- You’re in our sights – supporting enhanced enforcement program.
- Double demerits campaigns and ongoing media.

These campaigns have operated in tandem with changes to the NSW Demerit Points Scheme and speeding enforcement strategies to highlight: the risks of speeding; the threat of being caught for speeding offences; and the sanctions used to punish speeding offences, such as license suspension.

10 Summary

- The number of fatalities and injuries on NSW roads are decreasing. However, speeding continues to be the main contributor to both the number of crashes, and the severity of crash outcomes.
- The *NSW Road Safety Strategy 2012-2021* aims to reduce fatalities and serious injuries by 30 per cent, in the decade up to 2021. To deliver these reductions in road trauma will require substantial reductions in speed-related casualty crashes.
- Setting safe speed limits is a key pillar of the Safe Systems approach to road safety that underlies the NSW Road Safety Strategy. Speed zones are holistically considered from a Safe Systems perspective and determined based on sound physics and technical principles, as well as by considering the number and types of hazards within a road environment.
- NSW speed zones are broadly comparable to those implemented in other Australian jurisdictions. The NSW Government has encouraged the community to identify concerns with existing speed zones and speed signs for investigation by RMS and Transport for NSW.
- The NSW community widely accepts the risk posed by speeding, however the majority of drivers continue to speed. This is mostly low level (0-10km/h), and commonly viewed as acceptable behaviour. Due to the overall risk posed by widespread low level speeding, changing community views towards speeding is an important objective of *NSW Road Safety Strategy 2012-2021*.
- A demerit points scheme is a widely used road safety mechanism that is designed to encourage safe and responsible driving behaviour by providing a strong incentive, alongside financial penalties, to drive within the road rules. International research has found that demerit points schemes significantly reduce crashes, fatalities and injuries.
- The NSW Demerit Points Scheme is comparable to other Australian jurisdictions, incorporating the same nationally-agreed principles. However, the NSW scheme has been modified over the past decade to ensure that it is capable of deterring drivers from engaging in speeding and other high risk behaviour, yet remains widely supported by the community.
- The majority of NSW drivers do not accumulate any demerit points, and demerit points are mainly given for low range speeding offences. Offence data shows that the Demerit Points Scheme is potentially an effective deterrent against speeding for drivers who accumulate few demerit points, but is less effective in modifying the behaviour of the small number of recidivist speeding offenders in NSW. Changes to the NSW Demerit Points Scheme in 2009 made it more lenient towards low level speeding but more strict towards higher level speeding. This change reduced the number of demerit points accumulated by NSW drivers and riders. At the same time, research indicates an increased acceptability of low-level speeding amongst the community.
- To address the increased road toll in 2009, Transport for NSW and NSW Police subsequently increased high visibility speed enforcement, including through the roll-out of mobile speed cameras. The Speed Camera Strategy forms a key part of the general deterrence approach to enforcement in NSW, which has increased the certainty of drivers being punished for speeding.
- In combination, the changes to speed enforcement practices and the Demerit Point Scheme over recent years have helped create an effective and fair system to limit the amount of speeding on NSW roads and reduce the risk to the community posed by speeding.

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