TOWARDS ZERO

NSW Mobile Speed Camera (MSC) Program:
Review of MSC Scheduling Performance

NSW GOVERNMENT

SENSITIVE

Review Objectives

1. Truly understand the inner workings of the MSC Scheduling System

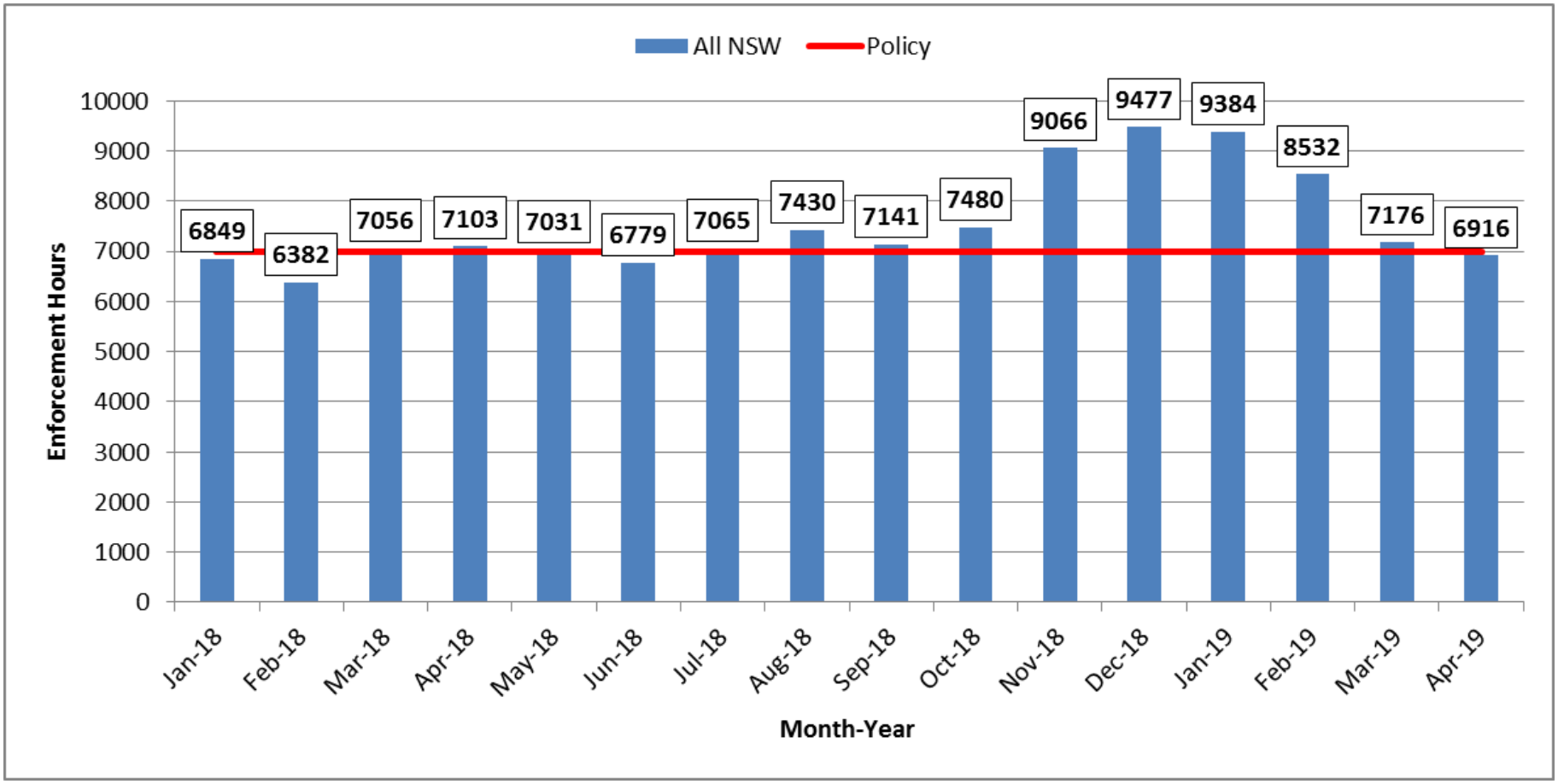
2. Quantify issues we are aware of and identify issues which have been overlooked

3. Address recommendations in NSW Auditor General's report

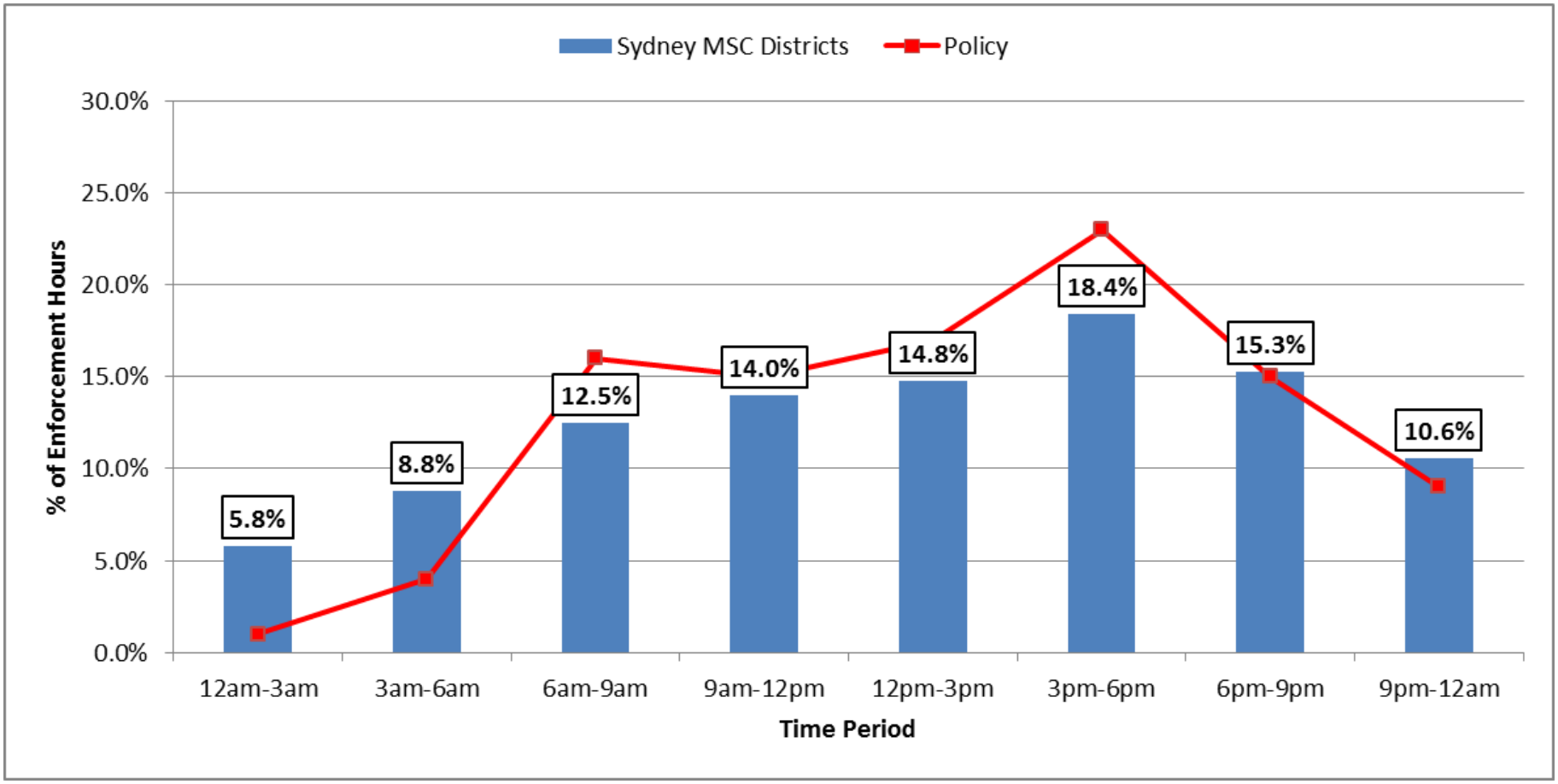
4. Identify parameters to track on a monthly basis to assess performance of MSC Scheduling System

5. Identify areas for improvement and whether the adherence with policy can be achieved through simple amendments to site weightings, business rules, etc. or if amendments to the MSC Scheduling algorithms are required.

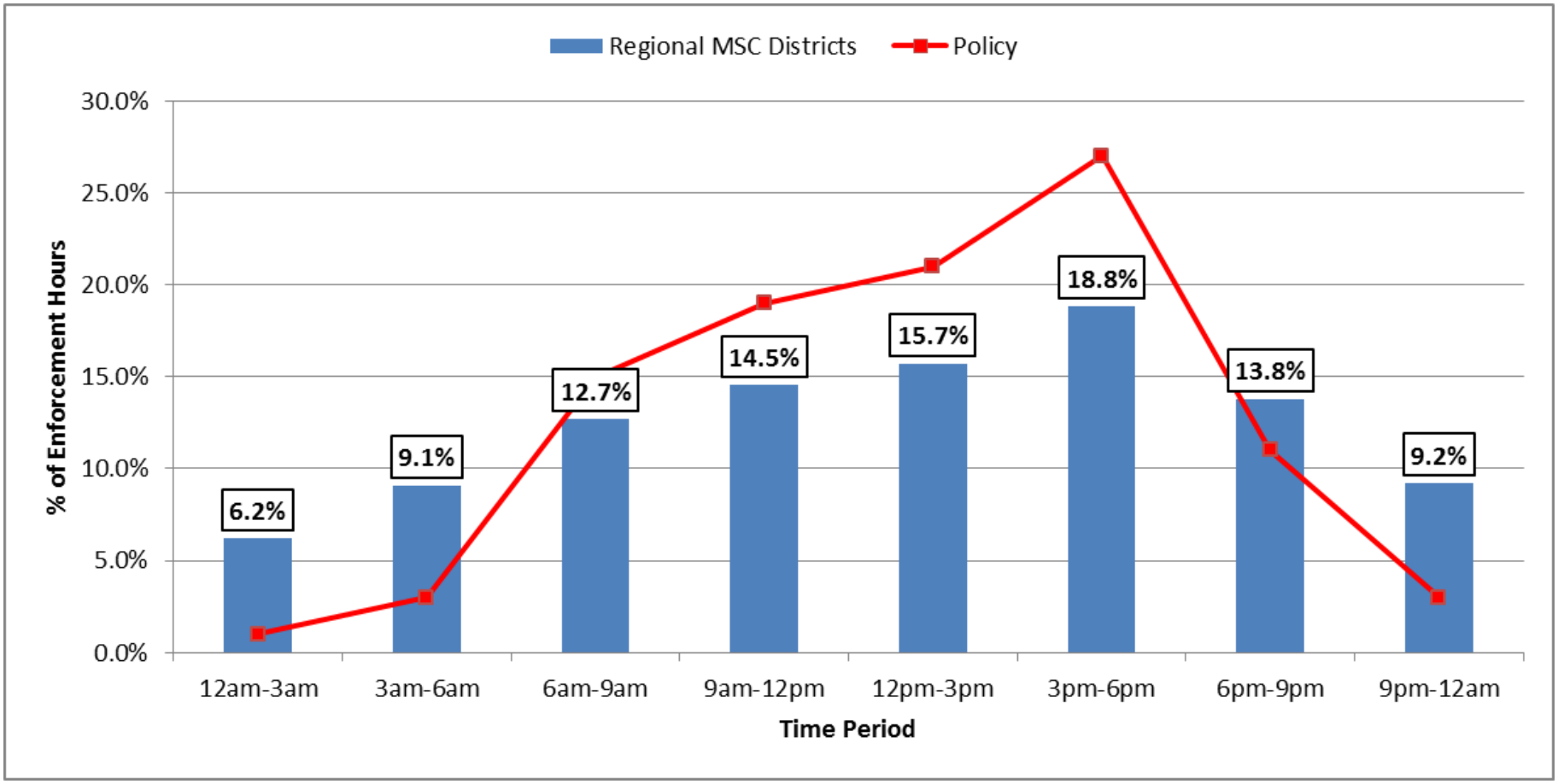
Enforcement Hours



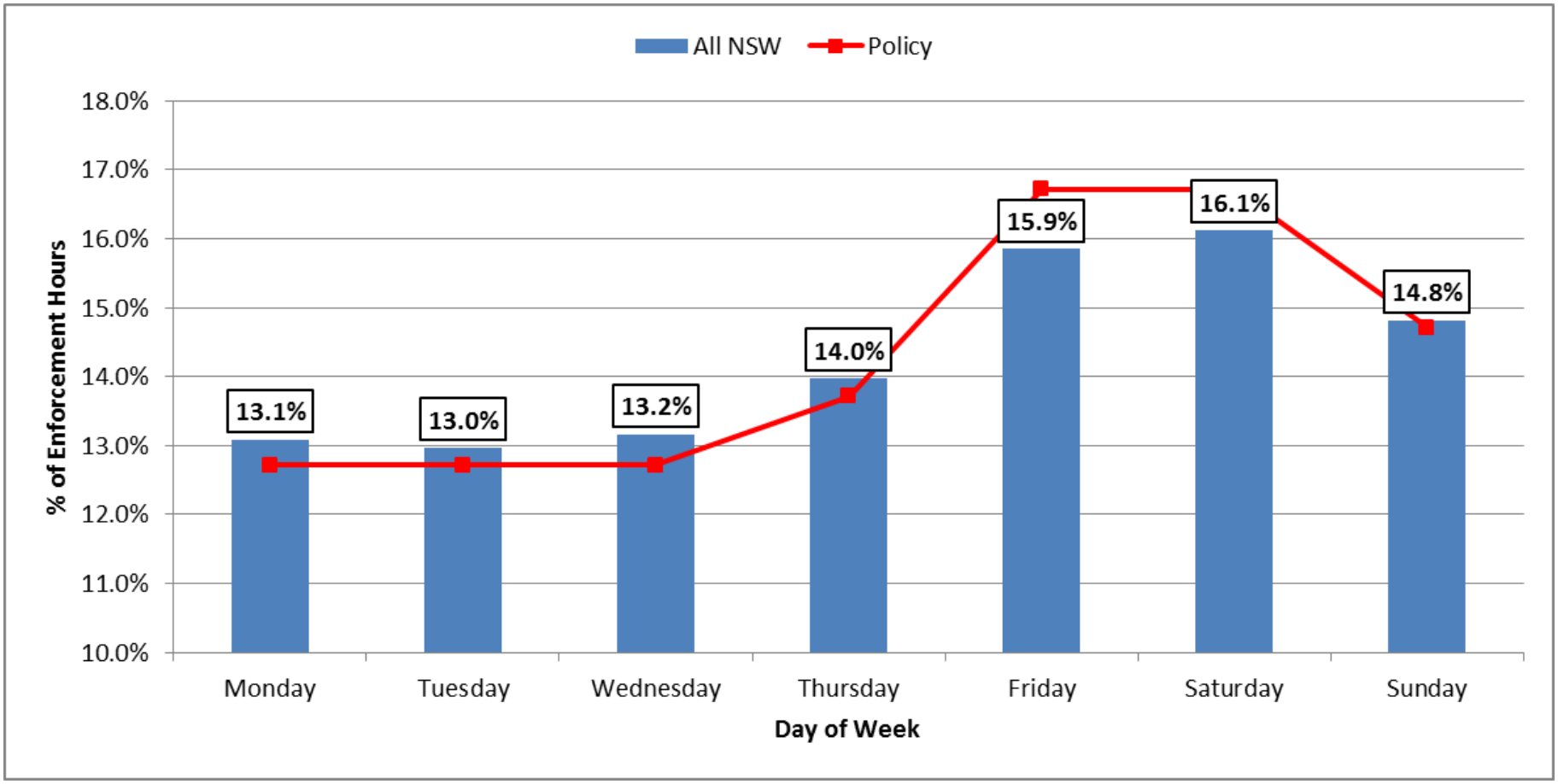
Time of Day – Sydney MSC Districts



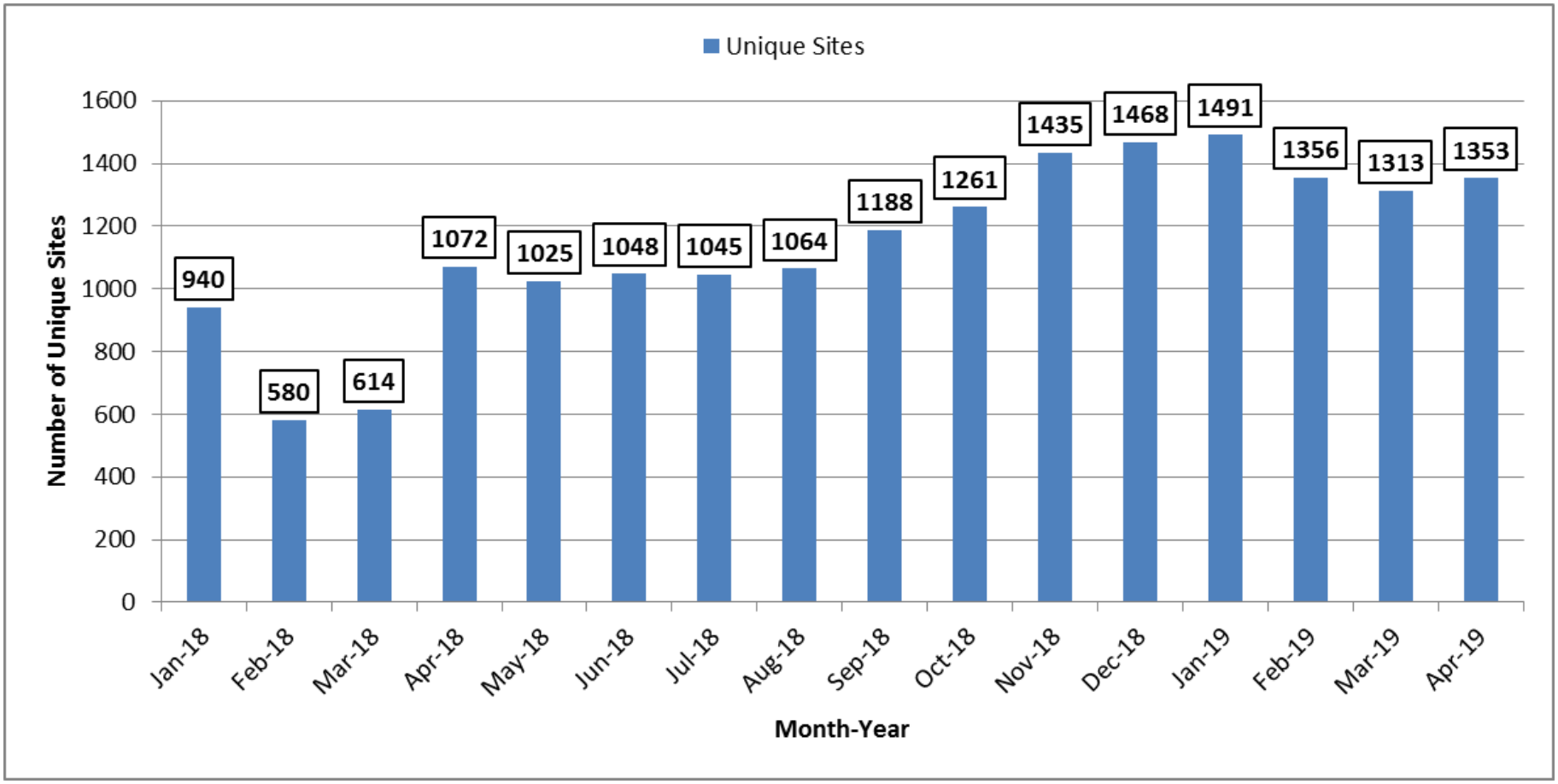
Time of Day – Regional MSC Districts



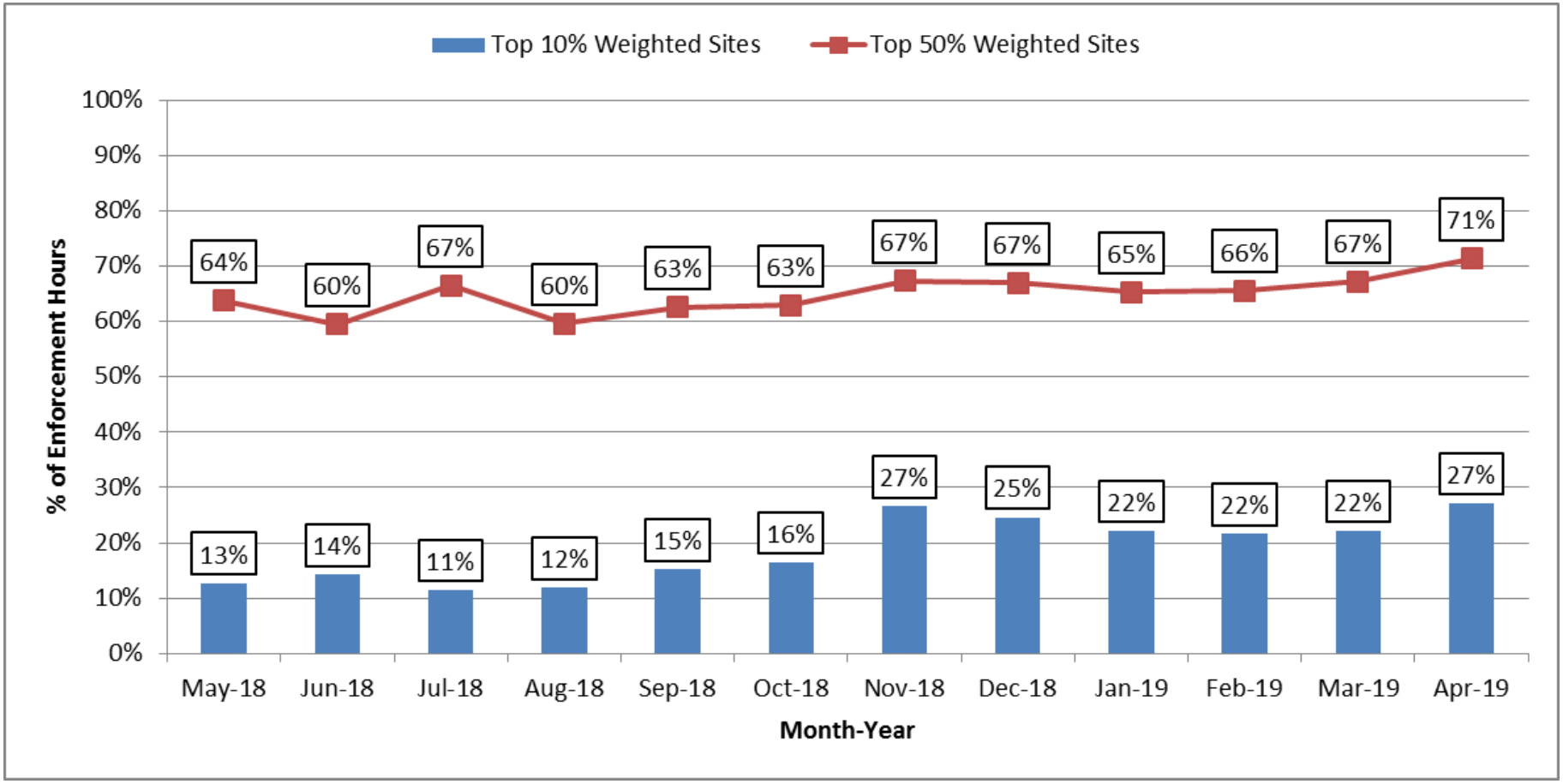
Day of Week


All NSW
Policy
18.0%
17.0%
16.0%
15.0%
14.0%
13.0%
12.0%
11.0%
10.0%
% of Enforcement Hours
13.1%
13.0%
13.2%
14.0%
15.9%
16.1%
14.8%
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Day of Week

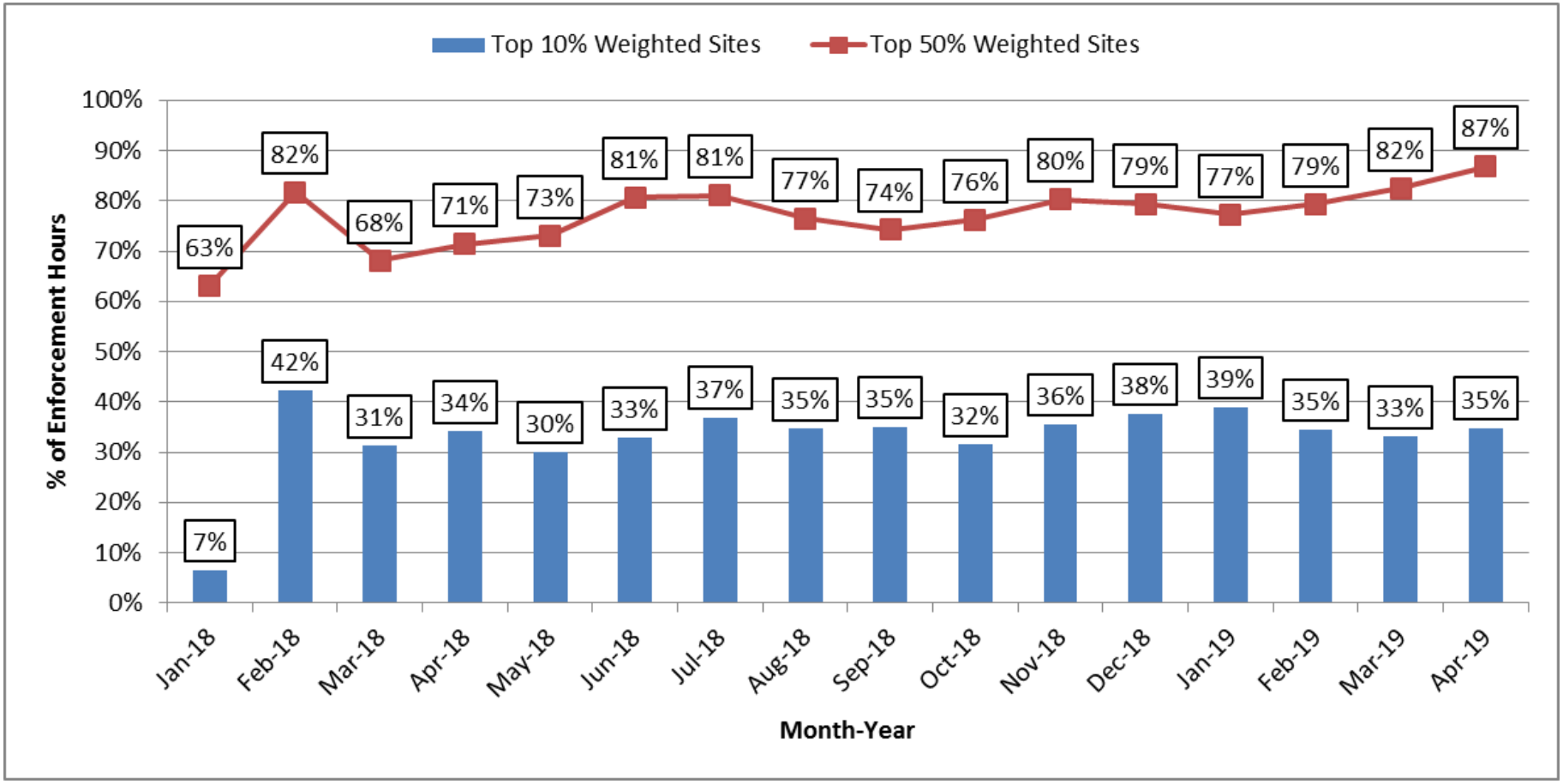
of Unique Sites Enforced per Month



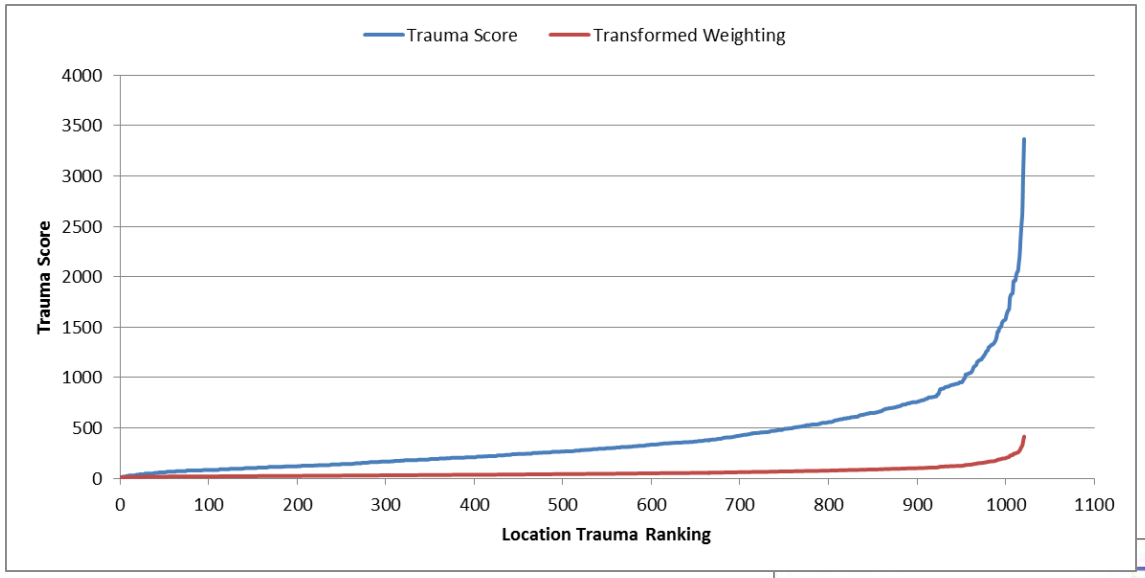
% of Enforcement Hours by Site Weighting – Sydney Southern MSC District



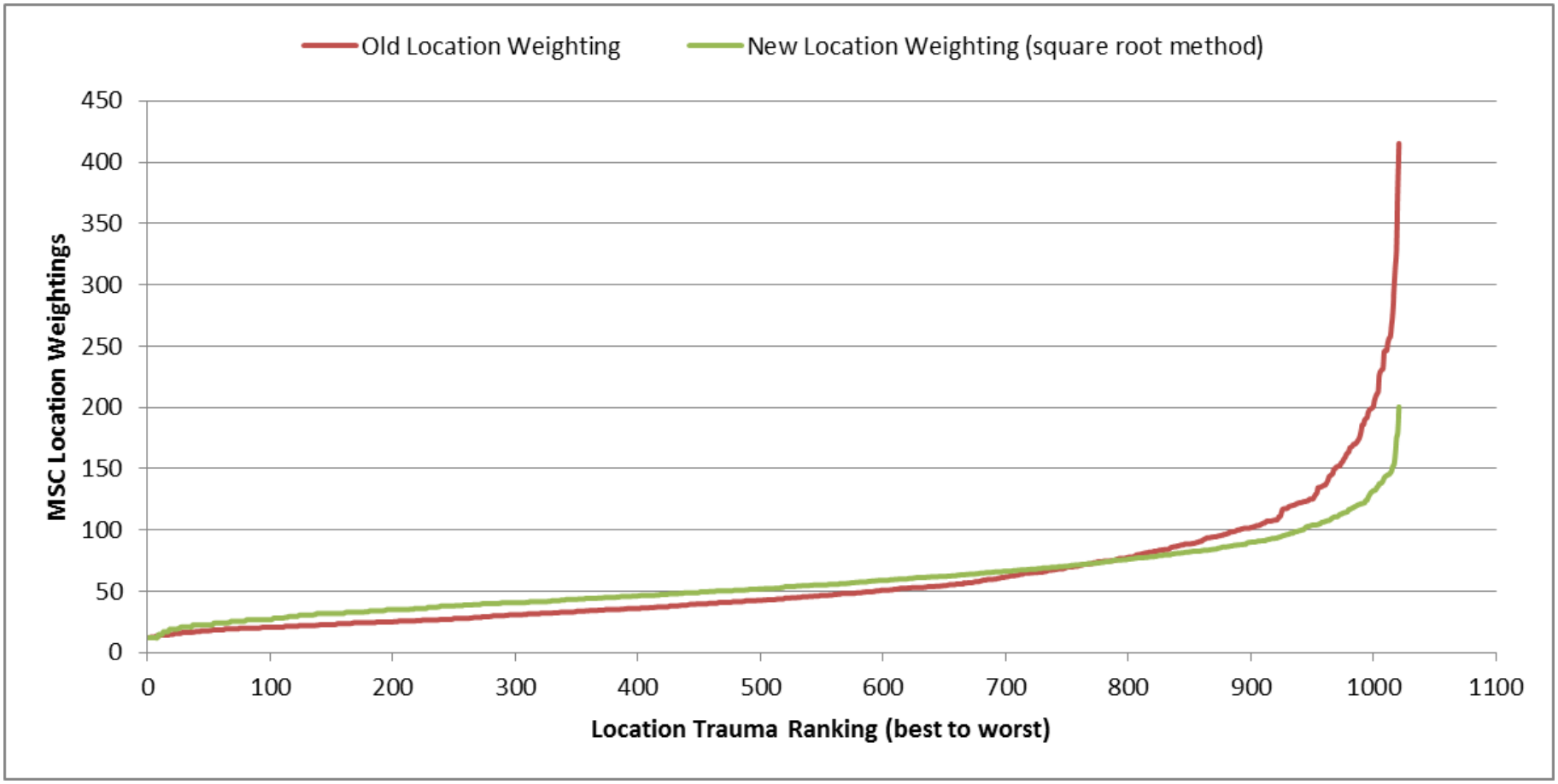
% of Enforcement Hours by Site Weighting – South West MSC District



Review of Location Weighting Procedure (1)

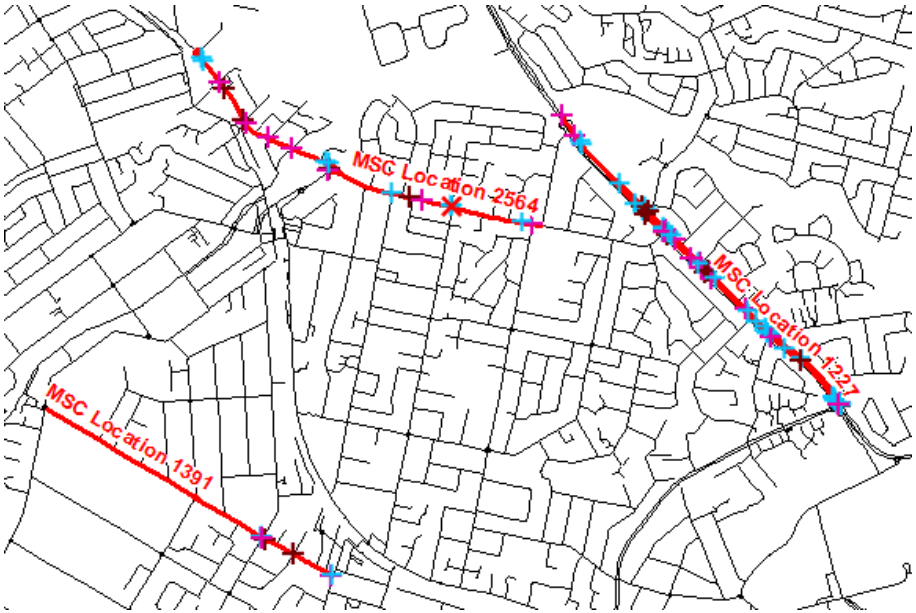


Review of Location Weighting Procedure (2)



Update Site/Location Weighting

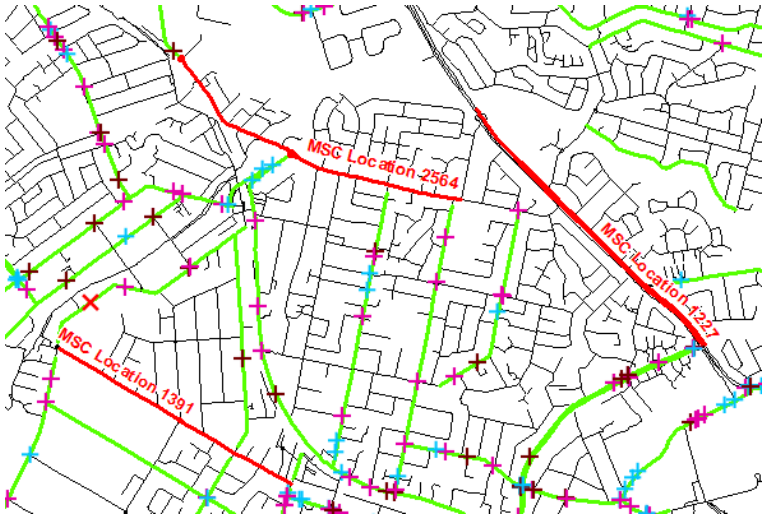
- Weightings will be updated to reflect the period July 2013 – June 2018
- Scheduling performance will not improve unless new weighting method and/or scheduling algorithm is amended



New locations

- Locations ranked by trauma score
- Camera requests from RMS and the public are given consideration, will act somewhat as ‘tie-breakers’
- Push for additional locations in LGAs with low number of existing MSC locations, compared with overall trauma in LGA
- Limited additional locations in LGAs with high number of existing MSC locations, compared with overall trauma in LGA
- Desktop review to identify possible sites will be undertaken before location is shortlisted

- How many new locations should be added?



NSW mobile speed camera operations considering practices in other Australian jurisdictions

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Prepared for The NSW Centre for Road Safety

March 2020

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OPIAD

Contents

Executive summary

In October 2018, the NSW Audit Office presented a report on mobile speed cameras (Audit Office of NSW, 2018). The audit assessed whether the mobile speed camera program is effectively managed to maximise road safety benefits across the NSW road network. One of its recommendations was for a review of better practice in other jurisdictions.

Based on decades of research worldwide, it is clear that

- Speed management is crucial for the prevention of death and serious injury on our roads.
- Speed cameras are an effective tool in managing speed.

It is not possible to have speed camera operations everywhere. One practice is to use many more sites than cameras, and move the cameras from site to site. This is the advantage of the mobility of mobile speed cameras. The location of cameras is varied so that it is very difficult for a driver to anticipate where a mobile speed camera will be or when. The intention is to generate in each driver the expectation that if he or she is speeding - anywhere or anytime - detection is likely.

Evaluations of the speed camera programs in Victoria, Queensland, Western Australia and the ACT have shown that these mobile speed camera programs have substantial benefits. Comparison with mobile speed camera practices in these jurisdictions indicates that the NSW mobile speed camera program could be made more effective.

The NSW mobile speed camera program uses signs to make the operations highly visible, with two warning signs before the camera vehicle and one sign after. The operation is made even more visible by using bright and distinctive markings on the camera vehicle.

Other jurisdictions do not use warning signs, although the ACT uses a sign on top of the otherwise unmarked camera van. Queensland is the only other jurisdiction to use markings on camera vehicles, but the Queensland markings are neither bright nor distinctive and up to 30% of the vehicles are unmarked.

The extent to which traffic policing should be highly visible or more covert can be considered based on whether the relevant offence is a fixed offence or a transient offence. A fixed offence is one, such as drink driving or unlicensed driving, where the offence results from the driver's physiological state or legal status, which the driver cannot change when an enforcement operation is seen. Highly visible policing is therefore suitable for fixed offences.

A transient offence is one where the driver can choose to comply when aware of an enforcement operation, and choose to offend elsewhere. Speeding is an example of a transient offence.

Even for transient offences, such as speeding, highly visible operations are suitable if the objective is to ensure compliance at a particular place (site, road section) and perhaps at a particular time, where it is a priority that safety be optimised at that place and time. For this purpose, fixed speed cameras should be highly visible.

To achieve larger scale general speed compliance across the network, mobile speed cameras should be covert. This means unmarked vehicles and no warning signs. Even if a driver cannot see a speed camera ahead, he or she should expect that there could be one.

As well as having the most visible mobile speed camera operations, the NSW mobile speed camera program is the least intense. Both Victoria and Queensland operate mobile speed cameras for more average monthly hours. When expressed as a rate per head of population or per registered vehicle, NSW has fewer monthly hours of operation than any of the other five Australian jurisdictions considered in this report.

Queensland has benefited substantially from a 50% increase in mobile speed camera operating hours from about 5,400 per month in 2008-09 to over 8,000 per month in 2014-15. For Victoria, the ACT and Western Australia, statistical modelling indicates that these other jurisdictions would achieve substantial benefits from an increase in hours, even though they already have greater intensity than NSW.

Research indicates that jurisdictions with lower intensity should benefit more from an increase. Because NSW has a smaller program, an increase in mobile speed camera hours would be expected to deliver larger reductions in death and serious injuries in NSW.

Other Australian jurisdictions use many more mobile speed camera sites than NSW. If cameras are used only at a small number of sites in limited areas, drivers will be able to learn where they can speed without fear of detection. More sites and a wider area of coverage means less predictability of enforcement and therefore a wider reduction in speeding across the network.

Based on the experience in other jurisdictions:

- There are clear indications that NSW would benefit from mobile speed camera operations that use unmarked vehicles without warning signs.
- NSW could consider increasing the number of sites and the location of sites to ensure an appropriate coverage of the State.
- The hours of mobile speed camera operation in NSW are less than optimal. Statistical modelling could be undertaken to determine the optimal number of hours.

1 Introduction

Mobile speed cameras are an important tool in preventing death and serious injury on NSW roads.

In October 2018, the NSW Audit Office presented a report on mobile speed cameras (Audit Office of NSW, 2018). The audit assessed whether the mobile speed camera program is effectively managed to maximise road safety benefits across the NSW road network. One of its recommendations was for a review of better practice in other jurisdictions.

This review considers mobile speed camera programs in other Australian jurisdictions, and identifies differences in practice compared with NSW. It assesses the likely road safety implications of these differences. On this basis, it makes suggestions for better practice in NSW.

2 Need for speed management

Research over the last three decades - in Australia the USA, Europe and elsewhere – has clearly demonstrated the importance of speed in causing death and serious injuries. Speeding increases both the likelihood and severity of crashes. Recent reviews have continued to confirm this fact (International Transport Forum 2018) and provided more detailed understanding of the relationships between speed and risk (Elvik *et al* 2019). As speed increases, other things being equal, risk of injury increases more than proportionally. The risk of more severe injury increases more rapidly. The risk of fatal injury increases the most rapidly.

Management of speed therefore is an essential part of work to improve road safety. Speed management also has broader benefits to the environment and to quality of life, because people live and work near streets and roads.

3 Value of speed limit compliance

A large part of speed management relies on speed limits. Guidelines for setting speed limits (for example, Austroads 2008) stress the balance between multiple objectives. The roads exist to provide efficient transport, and the roads need to cater for a variety of users and a variety of uses, depending on the nature of the road, in accordance with the NSW Government's Movement and Place framework.

Most drivers respond reasonably to speed limits, and transport agencies work to increase understanding of the need for these limits. Nevertheless, in its most recent Statistical Statement (page 25), the NSW Centre for Road Safety reported that, in 2018, crashes which involved speeding represented at least 39 per cent of fatal crashes and 16 per cent of all

casualty crashes; 2018 was not unusual in that regard. According to previous Statistical Statements, each year about 40% of fatal crashes and 16% of casualty crashes involved speeding as a factor. That is, speeding remains a major problem.

Achieving compliance with speed limits is essential for speed management, with crucial implications for prevention of deaths and serious injuries.

4 Value of speed cameras

Speed cameras help to improve compliance with speed limits.

The effectiveness of speed cameras has been established in many research studies. A Cochrane review (Wilson et al 2010) provided strong evidence for camera effectiveness (both fixed and mobile). Decreases in average speed, percentage of vehicles speeding, and crashes are consistently reported across studies from a range of countries. Cochrane reviews are highly respected summaries and analyses of the best available research in health-related fields (here injury prevention). Steinbach *et al* (2016) updated and extended the 2010 Cochrane review, reinforcing the results of the 2010 review.

5 Mobile speed cameras in Australian jurisdictions

Speed cameras are used in all Australian states and territories. The following pages describe the mobile speed camera programs in key Australian jurisdictions – specifically Victoria, Queensland, Western Australia, South Australia and ACT. While an outcome evaluation for the South Australian program could not be found, the other programs have been evaluated, and the evaluation reports provide a good basis for discussion of the programs and their benefits.

Clark *et al* (2019, page 15) point out that the largest jurisdictional variation in camera programs is in mobile speed camera programs. The common variations can be classified according to:

- the extent to which the mobile camera operation is overt, mainly using signage and markings on the camera vehicle
- the intensity of the operations, measured by hours of operation per month
- the number of sites
- the extent to which the focus is on improving compliance on a particular site or road section, or promoting compliance across the road network

Relative benefits of covert compared with visible operations are discussed in Section 15. Benefits of increased hours of operation are addressed in Section 16.

6 Victoria

Cameron and Delaney (2008) describe what a covert mobile speed camera operation means in Victoria. The camera is car-mounted. The car is one of a variety of popular makes and models and the car is unmarked. There are no warning signs. When there is enough natural light, the camera does not flash. The intention is that the driver should not notice the speed camera operation.

In Victoria, the mobile camera operating hours per month have continued to increase. D'Elia *et al* (2007) reported that the target per month had increased from 4,200 hours in August 2001 to 6,000 hours in February 2002. In 2019, mobile speed cameras operated approximately 9,300 hours per month (Department of Justice and Community Safety 2019).

The camera can detect speeding vehicles in one or both directions. And there are approximately 2,000 approved locations for mobile camera operation (Department of Justice and Community Safety 2019).

In Victoria, covert mobile speed camera operations began in 1989. Cameron *et al* (2003) briefly summarise evaluations of 1990s operations, which showed them to be very effective and included a 41% reduction in fatal crash outcome associated with very high camera activity.

From December 2000 to July 2002, Victoria introduced new speed management measures. These were:

- speed camera operations that were more covert
- a 50% increase in mobile speed camera operating hours per month
- a lower speed camera detection threshold
- a general urban speed limit of 50 km/h
- an increase in advertising targeting speeding behaviour.

D'Elia *et al* (2007) evaluated the package. Notice that this was an evaluation of the package as a whole, and was not able to analyse the effects of the separate elements. D'Elia *et al* (page 27) argued that the full force of the package was not felt until the second half of 2004. In that period, the package resulted in 27% fewer fatal crashes. There were 10% fewer casualty crashes (a casualty crash was one where a person was injured, including fatally injured).

7 Queensland

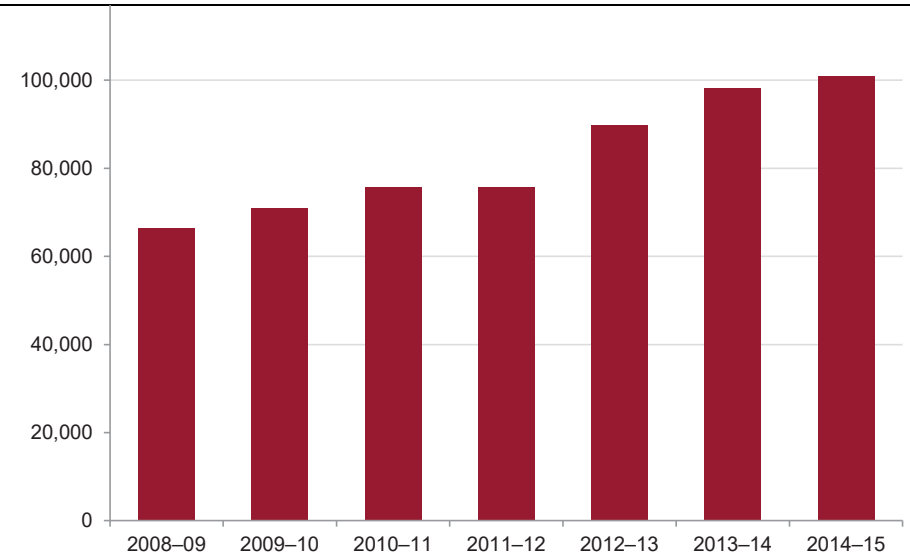
Queensland mobile speed camera operations started in May 1997. The mobile speed camera program originally operated only from marked vehicles. There had been signs after

the vehicle to inform drivers that they had passed the camera, but since July 2015 there have been no signs. Since April 2010 Queensland has deployed up to 30% of urban operations from a variety of unmarked vehicles, without signs (Newstead et al 2018, p 1). There are more than 3,500 mobile speed camera sites (Queensland Government Open Data Portal) and the cameras can detect speeding in either direction (Queensland Audit Office 2015).

Figure 1 shows mobile speed camera deployment hours as reported by the Queensland Audit Office (2015). As can be seen, by 2014-15, deployment hours were more than 100,000 per year, - more than 8,000 per month. Hours were about 50% more in 2014-15 compared to 2008-09 (about 65,000 hours per year).

The Queensland Department of Transport and Main Roads and Queensland Police Service (2017 page 16) reported that they had an approved plan to increase mobile speed camera hours.

Figure 1: Mobile speed camera deployment hours by financial year, Queensland



Source: Queensland Audit Office (2015 page 14)

The most recently reported evaluations of the Queensland speed camera program are those of Newstead *et al* (2017 and 2018). The 2017 evaluation relates to three years of operations: 2013, 2014 and 2015. The 2018 evaluation relates to operations in 2016. Some details were changed for the 2018 evaluation, but the evaluation framework continued to be that described by Newstead and Cameron (2013).

Using that evaluation framework, crash effects of the Queensland mobile camera program were assessed by comparing time series trends in the treatment areas with those in the

corresponding comparison areas. Treatment areas were those within a 1 km radius of the centre of the speed camera zone in speed limits up to 80 km/h. Where the speed limit was higher than 80 km/h, the radius was 4 km (for the 2017 evaluation) or 5 km (for the 2018 evaluation). Comparison areas were areas outside the defined radius of the speed camera zone centres. Treatment and comparison were matched for analysis using the same broad speed zone categories and by police region of operation (Newstead and Cameron 2013).

The evaluations included other types of speed camera, and also red-light cameras. Nevertheless, the evaluations found that 98% of the savings were associated with the mobile speed camera program. Newstead et al (2017, p 68; 2018, p 49) explained that this is because mobile speed cameras cover a much greater proportion of Queensland's crash population than other types of camera.

The 2017 evaluation found that overall, the Queensland Camera Detected Offence Program was associated with an overall reduction in serious casualty crashes of between 26%-30% across 2013-2015. This represents a reduction of between 1,660 to 2,000 serious casualty crash reductions (defined as those that result in death or hospitalisation). The number of serious casualty crashes saved because of the mobile speed camera program was 1,948 in 2013, 2,001 in 2014 and 1,643 in 2015.

The most recent 2018 evaluation of camera operations in 2016 reported consistent reductions in serious casualty crashes (1,650) of which 1,636 were attributable to the mobile speed camera program.

Notice that, in the evaluations, the method of assessing benefits relates to specific camera sites. However, the intention of covert mobile camera operations is to produce general effects over the network, and so the site-specific method could perhaps underestimate the mobile cameras' benefits. Newstead and Cameron (2013 page 10) point out that it would be difficult to assess the generalised effects of covert operations.

8 Western Australia (WA)

Western Australia had at least 4,000 mobile camera sites by 2013 (Newstead *et al*, 2015, page 6). Most mobile camera sessions were in metropolitan areas. In 2013, the average monthly hours were 2,640 hours in metropolitan areas and 540 hours in regional areas (Newstead *et al*, 2015, page 30). Newstead (2016 page 50) reported higher target operational hours of 3,500 per month.

There had been signs to draw drivers' attention to the camera operation. The use of signs was discontinued in 2011 (Newstead *et al*, 2015, page 30). The locations of operations are published on the WA Police Force website. Rearward facing operation commenced in 2010.

The most recently reported evaluation of the WA speed camera program is Newstead *et al* (2015). This included the years 1995 to 2013.

Newstead et al (2015, p 50) related monthly variation in observed crashes at camera sites, to the monthly number of camera sessions undertaken. The evaluation reported that the "vast majority" of camera sessions ran between 6 am and 8 pm, and so other times of the day were used as a control (page 44).

The effects were measured within 500 metres and within 1 km of the camera. The mobile speed camera program resulted in a large reduction in fatal crashes, with the average reductions over the years of between 20% and 25%.

Newstead et al (2015, p 85) pointed out that the benefits were less than they could have been if the cameras had been used more at night, because traffic is lighter at night and so speeding tends to be more prevalent.

9 South Australia (SA)

The SA mobile camera program uses unmarked vehicles and no signs; cameras can enforce in both directions (South Australian Police).

Maxwell (2015, page 10) indicates that mobile cameras operated for an average of 3,750 hours per month in 2014. There is no readily available information on the number of sites.

There is no apparent outcome evaluation of the South Australian mobile speed camera program.

10 Australian Capital Territory (ACT)

The ACT program does not use advance warning signs. The speed camera vehicle is an unmarked van with a sign on top. There are no other signs.

In 2017, mobile cameras were operated for an average of 1,200 hours per month (based on Clark *et al*, page 91).

Justice Safety and Emergency ACT list 1,184 sites where mobile cameras could be used.

The ACT mobile speed camera program was associated with an average 19.7% reduction in casualty crashes in areas within 500 m of a mobile speed camera site since program implementation (Clark et al 2019, p 61).

Clark et al (page 102) used the statistical model developed for the evaluation to estimate the likely effects of expanding different parts of the camera program. The specific expansion offering the greatest safety benefits was further increases in mobile camera deployment

hours. The other options considered were fixed speed cameras, red light/speed cameras, and a point-to-point camera.

11 New South Wales (NSW)

In NSW mobile speed cameras are operated from highly visible vehicles. NSW uses two warning signs before the camera and one after. The speed limit is displayed on one of the advance warning signs.

NSW mobile speed cameras operate in one direction only. The cameras could operate in both directions, but the requirement for warning signs would make bi-directional operation difficult.

NSW Centre for Road Safety (2019, page 27) reports that mobile speed cameras operate for 7,000 hours per month, at 1,024 locations.

The value of mobile speed camera operations in NSW has been assessed by observing the effects when the program was stopped and then re-started. NSW stopped using mobile speed cameras at the end of 2008 and introduced new mobile speed cameras in the middle of 2010. Maxwell (2015 Page 3) pointed to the large increase in the road toll following the cameras' removal, and the large decrease following the re-introduction. BITRE (2014 page 190) also pointed out the effects of the removal and re-introduction on their model of the NSW fatality rate. NSW provides a review of speed cameras each year (for example, NSW Centre for Road Safety 2019). The reviews assess the success of the mobile camera program against the result when the program stopped for 2009. In summary, the road toll went up when the mobile speed camera stopped, and decreased when it started again.

12 Comparison between jurisdictions

Table 1 briefly compares jurisdictions in relation to the features outlined in Section 5. The numbers in Table 1 are as reported in Sections 7 to 11, above. These numbers are not necessarily completely up to date. For example, Western Australian government budget papers indicate that camera programs have expanded and will expand further, but the details are not readily available. It was pointed out in Section 7, above, that a plan to increase Queensland mobile speed camera hours had been approved.

Table 1: Summary of features of mobile speed camera programs in Australian jurisdictions

	Signs	Vehicle markings	Hours /month	Directions measured	No. of sites
NSW	2 before, 1 after	Bright and distinctive	7,000	Single	1,024
VIC	None	None	9,300	Both	2,000
QLD	None	Yes, see below	>8,000	Both	>3,500
WA	None	None	3,500	Both	4,000
SA	None	None	3,750	Both	Not known
ACT	1 on van's roof	None (sign on van roof)	1,200	Not known	1,184

The jurisdictions vary in two significant ways. The first is the extent to which the program is overt, using signage and vehicle markings. The second is the intensity of the operations, measured by hours per month.

NSW is the only jurisdiction that uses warning signs.

NSW and Queensland camera vehicles have markings, although Queensland has up to 30% unmarked vehicles. NSW vehicles are brightly and distinctively marked. Queensland vehicle markings are not bright or particularly distinctive.

NSW	QLD
	

In Figure 2, the number of hours of mobile speed camera operations are expressed as hours per 10,000 registered vehicles and hours per 10,000 population, to relate the intensity to the size of the jurisdiction.

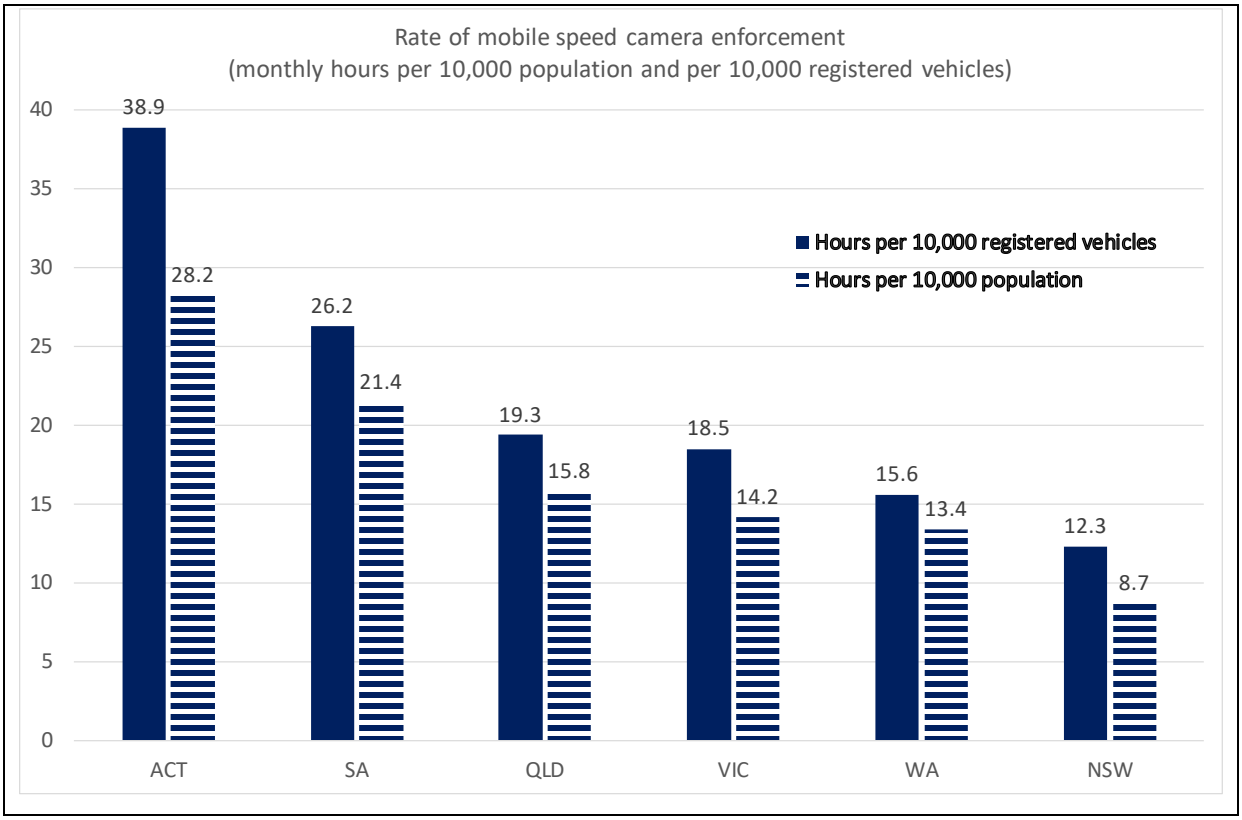


Figure 2 Comparison of monthly enforcement hours of mobile speed camera programs in Australia

Source: Hours: as per Table 1; Vehicle no. ABS Motor Vehicle Census 2019; Population: ABS Australian demographic statistics, March 2019

NSW has the fewest mobile speed camera hours per registered vehicle and the fewest per head of population. NSW has many more vehicles and people than other jurisdictions. Therefore, to have comparable rates to Victoria and Queensland, for example, NSW would have to increase its hours well above the current 7,000 hours per month. Based on the arithmetic alone, to match Victoria's and Queensland's rate per population, NSW would need 10,500 hours per month for Victoria or 11,000 hours per month for Queensland[1]. It is not suggested that either of these is necessarily the optimal mobile speed camera hours for NSW. The calculations have been made only to put the relative rates in perspective.

[1] NSW has fewer registered vehicles per person than other jurisdictions, and so to match the rates of hours per person would imply an even greater increase: 11,500 hours to match Victoria, and 12,700 hours to match Queensland.

NSW has the most visible operations. It has the least intense program, relative to its size. NSW's highly visible and low-intensity operations have a significant impact on the program's ability to achieve broad speed deterrence, as will be discussed in the following sections.

13 Deterrence and mobile speed cameras

Exceeding the speed limit relates to a driver's motivation. Drivers will be more likely to choose to comply with the speed limit, if they perceive that they would be likely to receive a penalty for non-compliance (Zaal 1994). The aim is therefore to influence the driver's choice to comply.

Even if the penalty is appropriate, potential offenders can only be influenced by it to the extent that they expect to receive the penalty if they offend. This is the basis of deterrence.

Ideally, the best road safety benefits would result if there is deterrence at all times and in all places. All times means throughout the day and throughout the year. All places means everywhere across the road network.

However, it is not possible to have speed camera operations everywhere. One practice used to enhance the perception of enforcement at more times and in more places is to use many more sites than cameras, and move the cameras from site to site. This is the advantage of the cameras being mobile. The location of cameras at particular sites is randomised[2], so that a driver cannot anticipate where a mobile speed camera will be or when.

The intention is to generate in each driver the expectation that if he or she is speeding - anywhere or anytime - detection is likely. There should be no times or places (or as few as possible) where a driver can feel confident that speeding would not be penalised.

The following three sections consider the requirements for covert and intense mobile speed camera operations to maximise this anywhere-anytime expectation.

14 Number and range of sites

As pointed out, the aim of a mobile camera program is to achieve an anywhere-anytime expectation of detection, so that drivers will choose to comply with speed limits at all times and broadly across the network.

If cameras are used only at a small number of sites in limited areas, drivers will be able to learn where they can speed without fear of detection. More sites and a wider area of coverage (coupled with randomised camera operations) means less predictability of

[2] This does not mean that each site has the same probability of a camera being there.

enforcement. Drivers are therefore more likely to reduce their speeds more generally, rather than at specific locations only.

There is no apparent basis for estimating the optimal number of sites. This number would be affected by the characteristics of the road network and road usage in each particular jurisdiction. Other Australian jurisdictions use many more sites than NSW, and it has been seen that the programs in these jurisdictions have been effective.

NSW could consider increasing the number of sites, especially if this accompanies an increase in mobile speed camera operational hours. NSW might also consider the location of sites to ensure an appropriate coverage of the State.

15 Signage and vehicle markings

The question is whether and in what circumstances mobile speed camera operations should be highly visible.

Rather than there being a clear distinction between overt and covert operations, visibility of operations varies along a continuum. NSW has highly visible mobile camera operations; Victoria's are intended not to be noticeable at all. Queensland has no signs and vehicles that have either no markings or inconspicuous markings. The visibility of Queensland operations is much less than that of NSW. On this basis, Queensland seems closer to Victoria in terms of visibility of mobile camera operations.

As Newstead and Cameron (2013 page 10) point out, it would be difficult to assess the generalised effects of covert operations. With a visible camera operation, the evaluator can measure effects at the camera site compared with elsewhere. But with a covert operation, designed so that the driver should be unaware that the camera is operating at the particular site, no site-specific effect can be expected.

Some commentators, who suggest that highly visible operations are effective, look to random breath testing as a guide. Homel (1986) is known as a champion of high visibility (and high intensity) policing to counter drink driving, as in random breath testing pioneered in NSW in the early 1980s. Therefore, it is significant that Homel (page 3) drew attention to the distinction between "fixed" offences and "transient" offences (per Cameron and Sanderson, 1982). Homel noted that

> *The differing requirements for effective police enforcement, depending on whether fixed or transient offences are the target, illustrate the dangers of treating traffic law enforcement as a unitary phenomenon.*

In the passage quoted, Homel is pointing out that the example of random breath testing is not necessarily the best approach for all types of offences and all purposes.

A fixed offence results from the physiological or legal status of the driver; it cannot be quickly changed if the driver becomes aware of an enforcement operation. A transient offence is one where the driver can choose to comply when aware of an enforcement operation, and choose to offend elsewhere.

Cameron (2015) returned to this distinction between fixed and transient offences. Among his examples are:

- fixed offences: drink-driving, drug-driving, unlicensed driving
- transient offences: speeding, mobile phone use, red-light running.

Cameron points out that research findings indicate that different enforcement practices are suitable, depending on whether the targeted offence is fixed or transient, and whether the objective is to achieve either

- an effect at a particular location or
- a general effect across the road network.

For fixed offences, highly visible operations can achieve a broad effect, across at least a substantial part of the network. The best example is random breath testing.

Even for transient offences, such as speeding, highly visible operations are suitable if the objective is to ensure compliance at a particular place (site, road section) and perhaps at a particular time.

When targeting transient offences and aiming for network-wide compliance, highly visible operations are not optimal. Speeding is a transient offence. Cameron (2015 page 3) states:

> *Traditional speed enforcement operated visibly, usually at identified high risk locations, has strong "local" effects on road trauma, but no effect outside a limited range. A "general" effect on speeding across the whole road system is best achieved if there is a perceived risk of being apprehended when speeding in any place at any time. This is best achieved by covert speed enforcement that can be moved to many locations."*

As summarised in the European Road Safety Observatory (2018 page 14):

> *Whereas nearly every driver keeps within the speed limit when a camera is clearly visible, a small percentage of drivers may still violate the limit when they drive on a road with hidden cameras. On the other hand, clearly visible speed cameras may tempt drivers to speed up again a few hundred metres after the camera, while they may be less tempted to violate the speed limit when they are aware of the possibility of a hidden camera check.*

To achieve better compliance with speed limits, using cameras, the implication is that:

- Highly visible cameras achieve compliance at specific places and times.
- Covert mobile speed cameras are necessary to achieve broad network compliance.

A covert camera program, however, cannot affect the behaviour of a driver who is unaware that covert cameras are operating. Transport agencies can raise driver awareness and expectation of mobile speed enforcement through public education and encourage drivers always to comply with speed limits.

To generate an anywhere-anytime expectation of detection, and maximise deterrence of speeding behaviour across the road network, mobile speed camera operations should not be highly visible. This means operating without warning signs, and without easily recognisable vehicles, in line with current practice in other Australian jurisdictions.

16 Intensity

To achieve a driver expectation of anywhere-anytime speed enforcement, a substantial enforcement intensity is necessary. What would be an optimal number of hours per month for mobile speed camera operations in NSW?

Consider the experience in Australian jurisdictions.

Elvik (2011) showed that there are diminishing marginal returns from increasing enforcement intensity. This means that the higher the existing intensity of enforcement, the less the benefit of increasing the intensity. Equally, it means that the lower the existing intensity, the greater the benefit of increasing intensity.

For Victoria, Cameron *et al* (2016) developed a model to estimate the crash reduction benefits of increases in several types of traffic enforcement. The model development was based on research literature from Australia and internationally. Following Elvik (2011) the model expects diminishing marginal returns. Even so, the largest benefits to be expected from an increase in enforcement in Victoria was an increase in mobile speed camera enforcement. A 50% increase in non-urban mobile speed camera hours was predicted to result in a 21.5% reduction in fatal crashes. A 50% increase in urban mobile speed camera hours was predicted to result in a reduction of 35.7% in fatal crashes. If the benefits of increasing mobile camera intensity are large for Victoria, the benefits should be much larger for NSW because the existing intensity is so much less than Victoria's. NSW's marginal return should be greater.

As part of the Queensland evaluation, Newstead *et al* (2017 page 46) pointed out that the crash reductions had grown over time as a result of steady increases in the number of sites

that were actively enforced along with increases in the hours of mobile speed camera enforcement each year.

Recall from Figure 1 (page 8), that Queensland mobile camera hours increased by about 50% from 2008-09 to 2014-15. Figure 2 (page 7) indicates that the hours per month in Queensland, per head of population, are more than 50% greater than those of NSW. Based on Queensland's benefits resulting from an increase of 50% in hours, NSW should benefit from a similar increase.

The ACT has a much higher per capita intensity than NSW's, but it could still benefit substantially from an increase in mobile speed camera hours. Based on the statistical model developed for the ACT evaluation, Clark *et al* (2019 page 102) estimated the effects of an increase in ACT mobile camera hours. Clark *et al* estimated a benefit-cost ratio of 4.1 if the operating hours were to be increased by 25%.

In relation to Western Australia's program, Cameron (2008) recommended an increase in their mobile speed camera monthly hours to 12,000 (9,000 hours in Perth and 3,000 hours in regional areas). This recommendation appears to be based on modelling adapted from data from other jurisdictions. This would be nearly four times the hours reported in the Newstead *et al* (2015) evaluation.

In summary, NSW has fewer mobile camera operating hours than other jurisdictions, related to population and the number of registered vehicles. Queensland benefited substantially from a 50% increase in mobile camera operating hours. For Victoria, the ACT and Western Australia, statistical modelling indicates that these other jurisdictions would achieve substantial benefits from an increase in hours. All these jurisdictions start from a higher intensity than NSW's and therefore could expect lesser marginal returns. Therefore, because it is starting from a smaller base, NSW should have larger reductions in death and serious injuries for an increase in mobile speed camera hours.

Based on the work in other jurisdictions, it seems that NSW may have less than the optimal intensity of mobile speed camera operations. Consideration should be given to undertaking statistical modelling to arrive at an estimate of the optimal operating hours for NSW.

17 Summary and conclusions

Based on decades of research, it has been clear for many years that management of speed is crucial for the prevention of serious road trauma – the prevention of death and serious injury. There is strong evidence for the effectiveness of speed cameras in managing speed to prevent serious trauma.

Like many other parts of the world, all Australian jurisdictions have speed camera programs that include mobile cameras. Evaluations of the programs in Victoria, Queensland, Western Australia and the ACT (see Sections 6, 7, 8 and 10, above) have shown that mobile speed camera programs have substantial benefits. Victoria had a reduction of 27% in fatal crashes from a package that included a 50% increase in covert mobile speed camera hours. Queensland, WA and ACT benefits were measured near mobile camera sites. Queensland reduced serious casualty crashes substantially, as discussed in Section 7, above. WA reduced fatal crashes by 20% to 25%. And ACT reduced casualty crashes by 20% to 25%.

The NSW mobile speed camera program uses signs to make the operations highly visible, with two warning signs before the camera vehicle and one sign after. The operation is made even more visible by using bright and distinctive markings on the camera vehicle.

Other jurisdictions do not use warning signs, although the ACT uses a sign on top of the otherwise unmarked camera van.

As well as NSW, Queensland is the other jurisdiction to use markings on camera vehicles. But the Queensland markings are neither bright nor distinctive and up to 30% of the vehicles are unmarked.

Highly visible policing is suitable for fixed offences, such as drink driving or unlicensed driving, where the offence results from a relatively unchanging physiological state or legal status.

Even for transient offences, such as speeding, highly visible operations are suitable if the objective is to ensure compliance at a particular place (site, road section) and perhaps at a particular time, where it is a priority that safety be optimised at that place and time. For this purpose, fixed speed cameras should be highly visible.

The NSW mobile speed camera program is highly visible, and so it functions much a like a highly visible fixed speed camera program rather than a randomised and unpredictable mobile speed camera program.

To achieve larger scale general speed compliance across the network, it is necessary to use covert mobile speed cameras. Following the approach taken in other jurisdictions, this means no warning signs and not easily recognisable vehicles for the NSW mobile speed camera program.

As well as having the most visible mobile speed camera operations, the NSW mobile speed camera program is the least intense. Both Victoria and Queensland operate mobile speed cameras for more average monthly hours. When expressed as a rate per head of population

or per registered vehicle, NSW has fewer monthly mobile camera hours than any of the other five Australian jurisdictions considered in this report.

Queensland achieved large safety benefits from a 50% increase in mobile camera hours. Statistical modelling, for Victoria, ACT and WA, predicts large benefits from increasing hours above those noted in this report. Research has found increased marginal returns for those starting from a lower enforcement level. Therefore, because it is starting from a smaller intensity than other jurisdictions, NSW should expect larger reductions in death and serious injuries for an increase in mobile speed camera hours.

Altogether, there are clear indications that NSW would benefit from less visible mobile speed camera operations, using unmarked vehicles without warning signs. The NSW hours of operation appear to be less than optimal, and statistical modelling could be undertaken to determine optimal hours for NSW

Changes to program visibility and intensity will align the NSW program with better practice mobile speed camera programs in other jurisdictions in achieving broader and more effective deterrence.

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AGENDA

Implementing the recommendations from the Auditor-General's performance review of mobile speed cameras

Date	16/11/2018		
Time	1:30 pm – 2:30pm		
Venue	Transport for NSW 18 Lee Street Chippendale		
Attendees	Melvin Eveleigh Antonietta Cavallo Hassan Raisianzadeh Julie Thompson Ruth Graham Arem Gavin Ben Mitchell Roger Weeks Arnold Jansen Lesa Saliba	ME AC HR JT RG AG BM RW AJ LS	TfNSW TfNSW TfNSW TfNSW TfNSW TfNSW TfNSW RMS RMS RMS

Agenda Items		**Responsibility**
1.	**Meeting topics**	
1.1	**Background** - Purpose of meeting - Governance	AG&RG
1.2	**Recommendations** - Review recommendations and action plan	All
2	**Other business**	**All**
3	**Next meeting**	**All**

AGENDA

Implementing the recommendations from the Auditor-General's performance review of mobile speed cameras

Date	16/05/2019		
Time	2:00pm – 3:00pm		
Venue	Level 4 Armidale Room, Transport for NSW 18 Lee Street Chippendale		
Attendees	Melvin Eveleigh Hassan Raisianzadeh Antonietta Cavallo Louise Higgins-Whitton Ruth Graham Arem Gavin Ben Mitchell Lauren Fong Roger Weeks Arnold Jansen Nico De Soleil	ME HR AC LHW RG AG BM LF RW AJ NDS	TfNSW TfNSW TfNSW TfNSW TfNSW TfNSW TfNSW TfNSW RMS RMS RMS
Apologies	Julie Thompson		

Agenda Items		**Responsibility**
1.	**Meeting topics**	
1.1	**Recommendations** - Report on progress to addressing recommendations	All
2	**Other Business**	**All**
3	**Next meeting**	**All**

AGENDA

Implementing the recommendations from the Auditor-General's performance review of mobile speed cameras

Date	25/02/2019		
Time	3:00 pm – 4:30pm		
Venue	Transport for NSW 18 Lee Street Chippendale		
Attendees	Melvin Eveleigh Julie Thompson Ruth Graham Arem Gavin Ben Mitchell Roger Weeks Arnold Jansen Lesa Saliba	ME JT RG AG BM RW AJ LS	TfNSW TfNSW TfNSW TfNSW TfNSW RMS RMS RMS
Apologies	Claire Murdoch, Hassan Raisianzadeh		

Agenda Items		**Responsibility**
1.	**Meeting topics**	
1.1	**Background**	AG&RG
1.2	**Recommendations** - Report on progress to addressing recommendations	All
2	**Other Business**	**All**
3	**Next meeting**	**All**

MINUTES

Implementing the recommendations from the Auditor-General's performance review of mobile speed cameras

Date	16/05/2019		
Time	2:00pm – 3:00pm		
Venue	Level 4 Armidale Room, Transport for NSW 18 Lee Street Chippendale		
Attendees	Melvin Eveleigh Hassan Raisianzadeh Louise Higgins-Whitton Ruth Graham Arem Gavin Ben Mitchell Lauren Fong Roger Weeks Arnold Jansen Nico De Soleil	ME HR LHW RG AG BM LF RW AJ NDS	TfNSW TfNSW TfNSW TfNSW TfNSW TfNSW TfNSW RMS RMS RMS
Apologies	Julie Thompson; Antonietta Cavallo		

Agenda Items		**Responsibility**
1.	**Meeting topics**	
1.1	**Recommendations** - Progress on actions has been updated in the attached table. - RMS actions to address recommendations 2C and 2D have been implemented and can be closed.	All
2	**Other Business** – None raised	**All**
3	**Next meeting** - All actions are underway or completed. - Next meeting will be scheduled for August to align with completion of the review of research on better practice for MSCs in other jurisdictions.	**All**

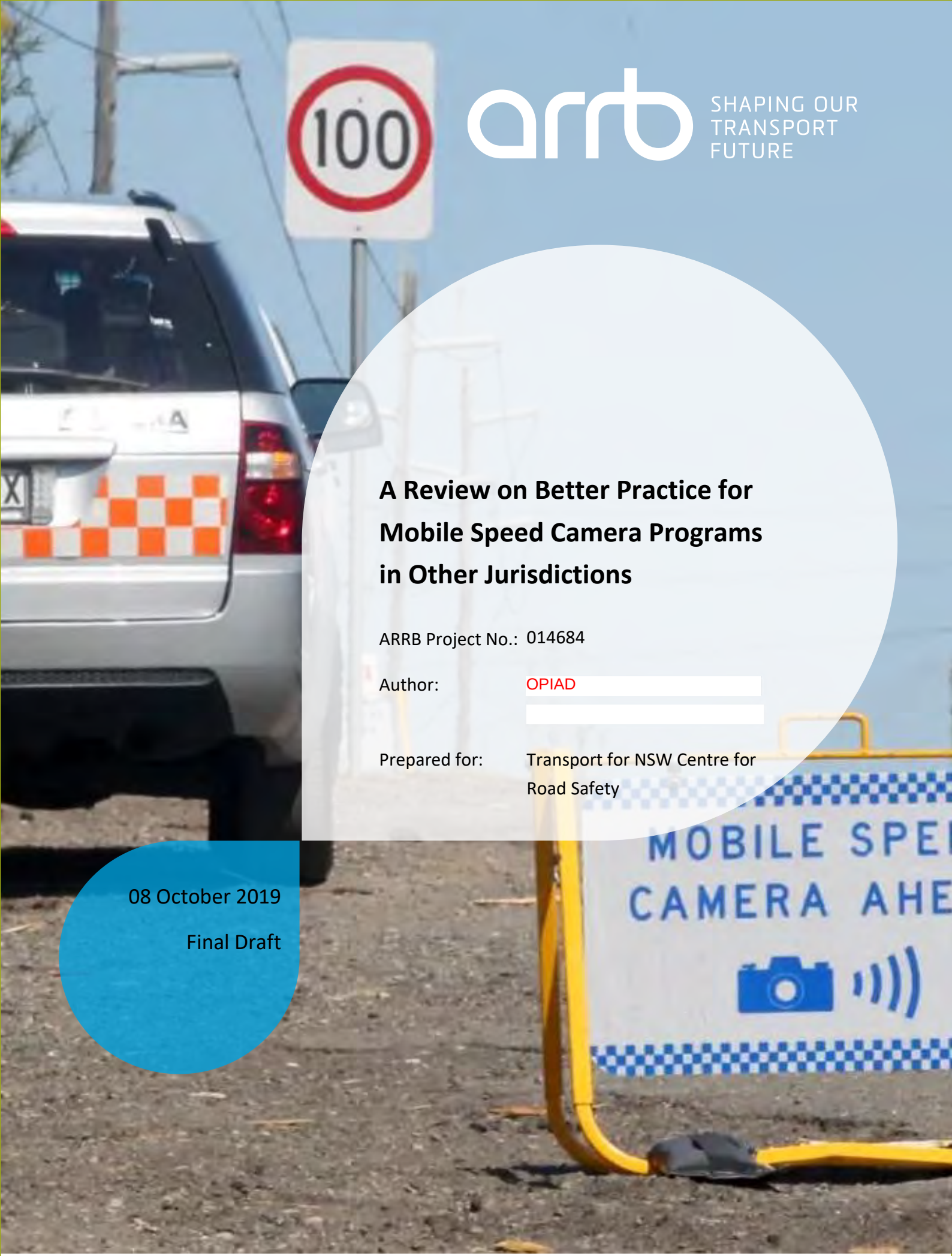
Performance Audit Recommendations: Mobile Speed Cameras

- Progress as at 16/5/19

Ref #	Recommendation	Actions to address	Timeframe to complete actions	Lead Agency	Status	Comments
1	**Review the Speed Camera Strategy to ensure MSCs provide an effective general deterrence and complement other speed enforcement activities, including by:**	Not accepted - reviewing the Speed Camera Strategy is outside the scope of current Government policy objectives	N/A			
A	• undertaking and publishing a review of research on better practice for MSCs in other jurisdictions	Conduct and publish a review of research on better practice for MSCs in other jurisdictions.	By October 2019	TfNSW	On Track	• CRS is in the final stages of developing of a services brief for a review on better practice for MSC programs in other jurisdictions. • Anticipated timeframe for completion is August 2019.
B	• reviewing the number of hours MSCs are deployed	Not accepted - the number of hours MSCs are deployed is a policy decision of the Government	N/A			
C	• revisiting the performance indicators for the success of the program, to ensure they provide information on whether it is providing a general network deterrence	Review the performance indicators used for the MSC program	By October 2019	TfNSW	On Track	• Identifying performance indicators that could be used to monitor the effectiveness of a MSC program is included in the scope of the better practice review (1A). • Following completion of this review CRS will update the performance indicators used for the MSC program in the annual review of speed cameras.

D	• continuing to develop public information campaigns to support the MSC program	Transport for NSW is currently developing a road safety advertising strategy. As part of this strategy the need for campaigns to address safer speeds across the road network will be considered to support the MSC program.	By October 2019	TfNSW	On Track	• There is not much new information to communicate about the current MSC program and CRS does not develop campaigns on individual camera programs. • As part of the Road Safety Advertising Strategy for 2019/20 CRS will develop a new campaign to address safer speeds across the road network. The campaign will support the MSC program, along with other initiatives that address speeding.
E	• reviewing signage requirements for MSCs to ensure they support the purpose of MSCs and align with better practice.	Not accepted - the signage requirement for the MSC program is a policy decision of the Government	N/A			
2	**Enhance management of MSCs by:**					
A	• assessing additional locations and sites for inclusion in the MSC program, using a broader range of selection criteria, and making sure these assessments are adequately documented	Review the criteria for the MSC program and assess additional locations and sites	By October 2019 and ongoing	TfNSW (creating a broader criteria and assessing new locations), RMS (assessing new sites)	On Track	• Following completion of the better practice review (1A) CRS will review and update the selection criteria, and conduct future assessments using the updated criteria. • Using the current criteria CRS has identified high priority locations for site selection. CRS is currently developing a scope of works to engage a company to conduct site selection for these locations. • CRS and RMS will ensure that documentation of these and any future assessments is maintained appropriately.

B	• ensuring the MSC scheduling system allocates location visits in accordance with their crash risk weighting and the deployment strategy	Regular monitoring of the MSC scheduling system has already been implemented, and enhancements will be made to ensure it allocates site visits in accordance with crash risk weighting and deployment strategy.	By October 2019	RMS and TfNSW	On Track	• CRS and RMS have commenced enhanced monitoring of the scheduling system. • CRS review has shown that the system is currently operating largely in line with the deployment strategy. CRS will continue to review and make enhancements to the scheduling system where appropriate. Any changes to the scheduling system/weightings and decisions behind changes will be documented. • CRS propose to have a workshop with iCAD and RMS to better understand the scheduling algorithm. • RMS has addressed issues at outlier sites and will continue to monitor scheduling. RMS is undertaking IT system enhancements to automate reviews of the scheduling system to enable identification of sites that may be over or under-scheduled for MSC enforcement.
C	• improving surveillance of contractor compliance with MSC operational procedures	RMS aims to enhance surveillance of contractor compliance to MSC operational procedures through: 1) A review of the allocation of internal staff resources; 2) Implementation of system monitoring upgrades to achieve more effective oversight of contractor performance	By October 2019	RMS	Completed	RMS has trained an additional three staff and increased the amount of surveillance conducted on the MSC vendor.
D	• reviewing oversight of the culling of infringement notices.	RMS will enhance the oversight of vendor culling of images to ensure all images culled meet the mobile speed camera business rules.	By October 2019	RMS	Completed	RMS has implemented a process to review the adjudication/culling process undertaken by the MSC vendor.



SHAPING OUR TRANSPORT FUTURE

A Review on Better Practice for Mobile Speed Camera Programs in Other Jurisdictions

ARRB Project No.: 014684

Author: OPIAD

Prepared for: Transport for NSW Centre for Road Safety

08 October 2019

Final Draft

VERSION CONTROL

REPORT VERSION NO.	DATE	RELEASED TO CLIENT BY	NATURE OF REVISION
1	08/08/2019	OPIAD	Preliminary Draft Submitted to CRS for comment
2	09/08/2019	OPIAD	Draft Submitted to CRS for comment
3	08/10/2019	OPIAD	Final Draft Submitted to CRS

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SUMMARY

The **Australian Road Research Board (ARRB)** was commissioned by the **Transport for NSW Centre for Road Safety (CRS)** to provide a report in response to the services brief for *A review on better practice for Mobile Speed Camera Programs in other jurisdictions*.

This review addressed specific recommendations from the 2018 NSW Auditor-General's Performance Audit on mobile speed cameras and sought to provide an evidence base for better practice Mobile Speed Camera (MSC) programs by:

- Identifying key components of a better practice MSC program consistent with key principles of an effective deterrence approach.
- Identifying the combination of components that contribute to optimal road safety outcomes.
- Identifying performance indicators to monitor the effectiveness of a MSC program and drive better practice performance.

To provide a comprehensive evidence base, a review of existing jurisdictional practices and published literature relating to MSC programs was undertaken, followed by direct engagement with stakeholders. The findings of the review identified common components of the MSC programs across all jurisdictions. These included both policy (accounting for broader policy settings which may impact on road safety outcomes) and operational components of the programs from the agreed jurisdictions. For the operation of a highly effective MSC program, the review suggests the program's various components should be considered in respect of general deterrence theory, Safe System principles and based on measured effectiveness (if such a measure is available).

The research identified that the components of the MSC program which influence general deterrence in the population include:

- whether deployment is overt or inconspicuous
  - signed or un-signed sites
  - marked or unmarked vehicles
- method of program deployment
  - program size (number of sites and hours of operation).
  - site selection criteria
  - randomness of site selection
- policy towards tolerance thresholds and penalty frameworks.

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For a highly effective MSC program, the following aspects should be considered in order to maximise ***general deterrence***:

CERTAINTY OF PUNISHMENT	Overt/Unmarked Operation	• Unmarked and unsigned deployments should encompass most sites in order to reinforce to road users that they can be caught and punished anywhere and anytime, ensuring certainty of punishment and, therefore, general deterrence. • Programs that rely upon highly overt deployments result in site-specific deterrence rather than general network-wide deterrence of speeding. This type of overt enforcement is associated with a limited halo effect at specific sites, having less outcome on general deterrence across the network. • Use of highly overt vehicles such as those used in NSW are used in the UK, Ireland and in 70–80% of Queensland's fleet, however these overt deployments are associated with far greater deployment hours, greater network coverage and true randomisation. Use of marked vehicles is only effective if the MSC deployment areas are wide enough to provide overlap of halo regions across the entire network. • Regardless of whether marked or unmarked vehicles are used, signage should not be placed in advance of MSC vehicles as such placement allows drivers to adjust speed in advance of the MSC location and decreases certainty of punishment.
	Program Deployment	• Deployment of a mobile speed cameras should be supported by an overarching road safety strategy, for example the NSW Road Safety Plan 2021 and the 2012 NSW Speed Camera Strategy. • Site selection should be based on an analysis of crash risk in accordance with Safe System principles. The site selection criteria in each jurisdiction followed similar methodology. • Once sites are selected, there should be a random deployment schedule to sites to ensure that camera locations are not predicable. The selection of sites should be completed by computer algorithm or statistical analysis to ensure selection is truly random. • In order to optimise safety outcomes, the research (particularly from NSW, Queensland and WA) suggests that the size of the NSW program should be increased. Evidence suggests that the 'dose' or intensity of the program (in the form of hours or rate of enforcement) has a relationship with a crash reduction response. • If the MSC program can cover a large geographical area representing the majority of high-risk crash locations, known halo effects can result in large crash reductions regardless of whether overt or unmarked vehicles used (provided advanced warning signs are not used). • Deployments should represent times when crashes occur (day and night).
	Tolerances	• Tolerance set as low as practicable factoring in machine capability and other considerations. • Community expectations are important but should not be the driving factor for selecting tolerance thresholds. • Tolerance levels should not be published.
SWIFTNESS & SEVERITY OF PUNISHMENT	Infringements	• Infringement schemes should be graduated based on severity of speeding. Consideration should be given toward loss of licence and vehicle impoundment for high-speed offenders or for repeat offenders. • Infringements should be issued as swiftly as possible and ideally within 7 days. With modern technology, it is projected that infringements could be issued quickly using means other than postal mail.

The primary objective of MSC deployment is to achieve general deterrence across the entire network; the performance measures for evaluating the success of the MSC program obtained in this review are limited. The main purpose of the MSC program is to reduce motorist speeding across the network and in turn reduce the number and severity of FSI crashes. In order to measure the success of the MSC program on achieving general deterrence network wide, the following performance indicators should be measured (on a frequent basis, preferably monthly):

The **number of deployed mobile camera sites** (as well as the total number of approved mobile camera sites)

The **randomness** of sites selected (the measurement of randomness can be defined by simplistic or highly technical statistical analysis but must be consistently defined)

The **geographical area** of sites (sites should span across the network and reflect the distribution of crashes in urban, fringe and rural areas)

The rate of **enforcement hours** per population and population of registered vehicles (the number of enforcement hours should also be recorded for completeness)

The **type of enforcement** at each site (whether the site is **signed/unsigned** and whether a **marked or unmarked vehicle** is used)

The mean speed, 85th percentile speed, and percentage of passing motorists exceeding the speed limit **at the camera site** (measured at the camera and defined perimeters surrounding the camera to measure the halo effect)

The mean speed, 85th percentile speed, and percentage of motorists exceeding the speed limit **across the network** (as measured by randomised speed surveys across the road network)

The **number of crashes and FSI crashes** across the network (including those where speed was a contributing factor).

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

The primary goal of the mobile speed camera (MSC) program is to provide general deterrence as a speed reduction and compliance strategy network-wide throughout the state. This can be achieved through overall integration, with other enforcement and educational awareness activities, to provide a clear message to all road users that 'anywhere, anytime and for anybody' exceeding the speed limit will result in certain and swift punishment of appropriate severity. An effective program should provide the major focus on making all roads safer throughout the state, not just at isolated locations. Through intensive program application and management, a dynamic reduction in fatal and serious injury (FSI) crashes can be realised.

This review addresses specific recommendations from the 2018 NSW Auditor-General's Performance Audit on mobile speed cameras and seeks to contribute to an evidence base for better practice MSC programs.

1.1 BACKGROUND

The NSW Government has committed to improving road safety in NSW through the release of their Road Safety Plan 2021 (the Plan) in February of 2018. The Plan supports the delivery of the State Priority target of a 30 per cent reduction in road fatalities by 2021 and works towards the long-term vision of zero trauma on the NSW transport network by 2056 set out in the Future Transport Strategy 2056. The Plan also features targeted and proven initiatives to address key trends, trauma risks and crash types on NSW roads.

NSW Government's 2012 NSW Speed Camera Strategy provides an integrated framework which guides how the four types of cameras – mobile, red-light, fixed speed and average speed – are used in NSW to target light[1] and heavy vehicles (NSW Government 2012).

The NSW MSC program consists of approximately 45 vehicles conducting 7000 enforcement hours per month across 1024 locations (Audit Office of New South Wales 2018). As a part of the Speed Camera Strategy, Transport for NSW (TfNSW) annually reviews all speed camera programs to ensure they are working to improve road safety, the most recent being the 2017 Annual Speed Camera Review. Overall, the trend in road fatalities and annual speed survey data demonstrates that the MSC program continues to deliver road safety benefits over the years since the program's re-introduction in 2010.

In October 2018 the NSW Auditor-General issued a performance audit report assessing the performance of the MSC program in NSW. The Audit concluded that effectiveness of the MSC program in NSW is limited by the approved number of camera locations and prescribed number of operational hours. This, combined with the use of advanced warning signs and marked vehicles, limits the ability of the MSC program to effectively deliver broader network-wide general deterrence from speeding. The Auditor-General's report concluded that the current deployment strategy for mobile speed camera sites could be improved in order to make enforcement less predictable and to therefore provide a greater general speeding deterrence across the network.

This report responds to the following specific recommendations made by the Auditor-General (2018):

- Undertake and publish a **review of research** on better practice for MSCs in other jurisdictions.

[1] Enforcement by average speed camera in NSW is not currently applied to light vehicles.

- Revisit the **performance indicators** for the success of the program, to ensure they provide information on whether it is providing a general network deterrence.

1.2 PROJECT AIM

The project brief identified the following two areas of focus for the review:

The primary focus area was outlined as follows:

1. **SUMMARISE RESEARCH** – considering published information on the following two areas:
    - **Deterrence theory**, outlining the key desired/optimal outcomes of an effective deterrence approach.
    - **MSC effectiveness**, including program evaluations examining the impacts of effective deterrence principles on outcome measures.
2. **REVIEW OF JURISDICTIONAL PRACTICE** – review the MSC practices of up to eight selected jurisdictions with the intention to identify the key components of a better practice MSC program to achieve intended network-wide speed compliance or reduction in speeding.

The secondary focus area of the project involved **IDENTIFYING PERFORMANCE INDICATORS** that should be used to monitor the effectiveness of a MSC program. This is to also consider performance management frameworks that may be associated with MSC programs that may assist better program performance.

1.3 PROJECT METHOD

The theory of deterrence was reviewed based upon published literature in general and in the context of the intent of a MSC program to deter speeding in the population.

Based upon a preliminary review of a broad range of jurisdictions, ARRB initially nominated a shortlist of Australian and overseas jurisdictions to evaluate existing better practice MSC policy and procedure. In consultation with CRS, the following seven jurisdictions were identified for inclusion in this review based on available research, size of MSC programs, and similarity to NSW:

- Victoria (Australia)
- Queensland (Australia)
- Western Australia (Australia)
- New Zealand
- United Kingdom
- Ireland
- France.

Where information relating to jurisdictions other than the above-nominated seven may have been identified, it was agreed with TfNSW that this would be included as general observations; however, the focus of the review remained on the agreed scope.

In preparation for the review, ARRB accessed published literature and research from road safety leaders, developers of good practice and/or innovators in the MSC space. Discussion with CRS and within the review team sought to identify direct contacts within the nominated jurisdictions who may be of assistance

in confirming practice or providing material outlining MSC practices. With authority from TfNSW, ARRB contacted the following agencies directly in order to obtain further information about MSC policy:

- The Office of the Road Safety Camera Commissioner (VIC)
- Department of Justice (VIC)
- New Zealand Transport Authority (NZ)
- Department of Transportation (USA)
- Surrey City Council (UK)
- Queensland Police (QLD)
- Queensland Department of Transport and Main Roads (QLD)
- Western Australia Police (WA)
- Main Roads Western Australia (WA)
- IFSTTAR Science and Technology Institute (France).
- The complete review of jurisdiction components of MSC programs is provided in Appendix A on page 51.

This review sought to identify common components of MSC programs through the review of research literature, stakeholder engagement and jurisdictional practice. Policy (accounting for broader policy settings which may impact on road safety outcomes) and operational components of the programs from the agreed jurisdictions were investigated. For a highly effective MSC program, it was theorised that the various aspects should align with general deterrence theory, Safe System principles (for MSC site selection) and measured effectiveness (if such a measure was available).

1.4 GLOSSARY OF KEY TERMS

Certainty of punishment	When a potential offender perceives the threat of detection and punishment to be certain.
Deterrence	Any process through which the offense is not committed because of the preventive effect of the sanction/consequences.
Displacement effects	Occur when speeding behaviour is controlled at specific locations, but negative effects are observed (such as increased speeds, traffic or crashes) in other locations.
Dose	Describes the level or quantity of speed enforcement; used to evaluate the relationship with crash reduction. *(Also see Intensity.)*
Elasticity	Relating to the Crash Modification Function (CMF) or dose–response curve for speed enforcement developed by Elvik (2001, 2011), the elasticity represents the strength of the relationship between crash reduction and enforcement activity.
Enforcement tolerance thresholds	The number of kilometres per hour over the speed limit a driver can exceed before an infringement is issued (this also accounts for machine tolerance).
General deterrence	Occurs when the general public is dissuaded from offending by threat of punishment and through observing others punished for offending.

Halo effect	Refers to speed reduction at a MSC site or in an area surrounding an MSC site. Time halo effect means that an effect can be found for a period after enforcement has ended. Distance halo effects means that effects on speed have been found at a certain distance from the location where the speed enforcement is carried out. (*Also see Site-specific effects.*)
Intensity (enforcement intensity)	This is the effective level of enforcement, in this instance measured as MSC enforcement hours as a function of population or kilometres travelled. (*Also see Dose.*)
Marked MSC vehicles	Vehicles displaying high-visibility markings which warn motorists that the MSC are operational.
Mobile Speed Camera (MSC)	A speed limit enforcement device deployed using cameras (most typically mounted to, within, or near a vehicle) that can be positioned at the roadside to monitor the speed of passing traffic at any location.
Network-wide effects	Occur when a general reduction in speed or reduction in infringements issued is observed over the whole road network.
Randomness	The lack of pattern or predictability in the selection or scheduling of MSC sites.
Severity of punishment	The perception that punishment for the offense is serious and severe.
Signed sites	Refers to the use of advanced warning signage or placards placed for the explicit purpose of warning motorists that mobile speed cameras are present.
Site-specific effects	Occur when a reduction in speed or reduction in infringements issued is seen at or surrounding a specific MSC site/location. *(also see Halo effect.)*
Specific deterrence	Occurs when offenders who have already experienced sanctions are dissuaded from offending again by the punishment experience.
Swiftness of punishment	The perception that punishment is administered immediately after the offense is committed.
Unmarked and unsigned MSC deployment	MSC operations that are not intentionally and overtly apparent/identifiable as speed camera operations.
Unmarked MSC vehicles	Normal passenger vehicles or vans used for MSC deployment which when parked on the roadside are less conspicuous to passing motorists.

2 DETERRENCE THEORY FOR MSC ENFORCEMENT

The strategy of ***deterrence*** is key to influencing driver behaviours and improving road safety. Through a review of deterrence theory and risk-taking by the New Zealand Land Transport Safety Authority (2002–2003), Elliott (2003) defined deterrence as involving the threat of punishment through forms of sanctions and as a way of achieving control through fear. Deterrence theory proposes that individuals will avoid offending if they fear the perceived consequences of the behaviour (Davey & Freeman 2011). Deterrence is underpinned by the idea that the offender will consider that the personal utility of not engaging in the offence (speeding) exceeds the personal utility of committing the offence (speeding), for fear of the consequences/sanctions (Elliott 2003). Therefore, deterrence refers to any process through which the offence is not committed because of the preventative effect of the sanction. As Elliott (2003) states, deterrence is a compliance-gaining mechanism.

Specific deterrence refers to the extent offenders that have already experienced sanctions are dissuaded from committing the same offence by the experience of punishment (Elliott 2003). For example, an individual who has been caught and fined for speeding in the past is likely to refrain from further speeding for fear of incurring additional fines/punishment.

General deterrence, conversely, assumes that the general motoring public who have not experienced sanctions before will be dissuaded from speeding by the threat of punishment, as a result of observing others being punished for offending, or through being warned of impending penalties for offending through media campaigns (Elliott 2003; Davey & Freeman 2011). Therefore, for general deterrence, the target is the general population of motorists. Specifically, this relates to the group of offenders or prospective offenders (motorists who speed or motorists who may speed in the future) who can be influenced through fear, i.e. those people that are likely to speed and likely to be deterred by the threat of punishment (Elliott 2003).

The main function of deterrence as a preventative measure is achieved through legal sanctions on drivers to encourage behaviour changes (modifying speeding behaviour through punishment) (Elliott 2003). Deterrence mechanisms include explicit mechanisms (e.g. speed cameras and traffic controls) that deter drivers from offending by threat of punishment (Elliott 2003). Deterrence is related to the driver's perception of severity and certainty of the sanction.

Elliott (2003) states that the deterrent effect of punishment is influenced by the following three components:

1. certainty of punishment
2. severity of punishment
3. swiftness of punishment.

Aligned with deterrence theory is the ***perception*** of being caught and punished for the commitment of offences. Enforcement agencies and road agencies are aiming to increase perceptions regarding certainty, severity and swiftness of sanctions for motorists who engage in illegal behaviours. Deterrence is most effective when potential offenders perceive a high likelihood of punishment and believe it will be swift and severe (Davey & Freeman 2011). Road safety operations that increase the perception of punishment certainty when engaging in offending behaviour are deemed likely to have a positive effect on deterring offenders (Davey & Freeman 2011). Additionally, Homel (1988) provided the foundation for deterrent

enforcement strategies with his highly effective general deterrence approach to drink driving that involved proactive detection and enforcement through random breath testing and high penalties.

2.1 DETERRENCE THEORY AND THE SAFE SYSTEM

The MSC program (and other speed-reducing measures) plays a critical role in deterring road users from exceeding the speed limit and forms part of the ***Safe System***. The Safe System[2] has been adopted by governments and agencies around the world as the best-practice method for advancing road safety. This approach recognises that road users are fallible, and that inevitably they will make errors while using the road network, and this may lead to a crash. The human body can only withstand a certain level of kinetic energy before a crash will result in death or serious injury. The broader road system, including road infrastructure, should therefore be forgiving and account for this vulnerability to avoid serious injury or death in the event of a crash.

A Safe System comprises four essential components (commonly referred to as 'pillars') which together reflect a holistic view of road safety:

- safe roads and roadsides
- safe speeds
- safe vehicles
- safe people.

In the Safe System, speed management is critical for reducing perception-reaction distance, stopping distance and impact energy of crashes. Speed management underpins almost every aspect of developing new and evaluating current safety initiatives. Small increases in vehicle speed can significantly impact on the risk of a driver having a crash. Drivers travelling at 65 km/h in a 60 km/h zone double the crash risk, with risk increasing even more at higher speeds (Victoria Police 2019). Even if the primary cause of a crash is not speed, a crash in a slower vehicle will be less severe.

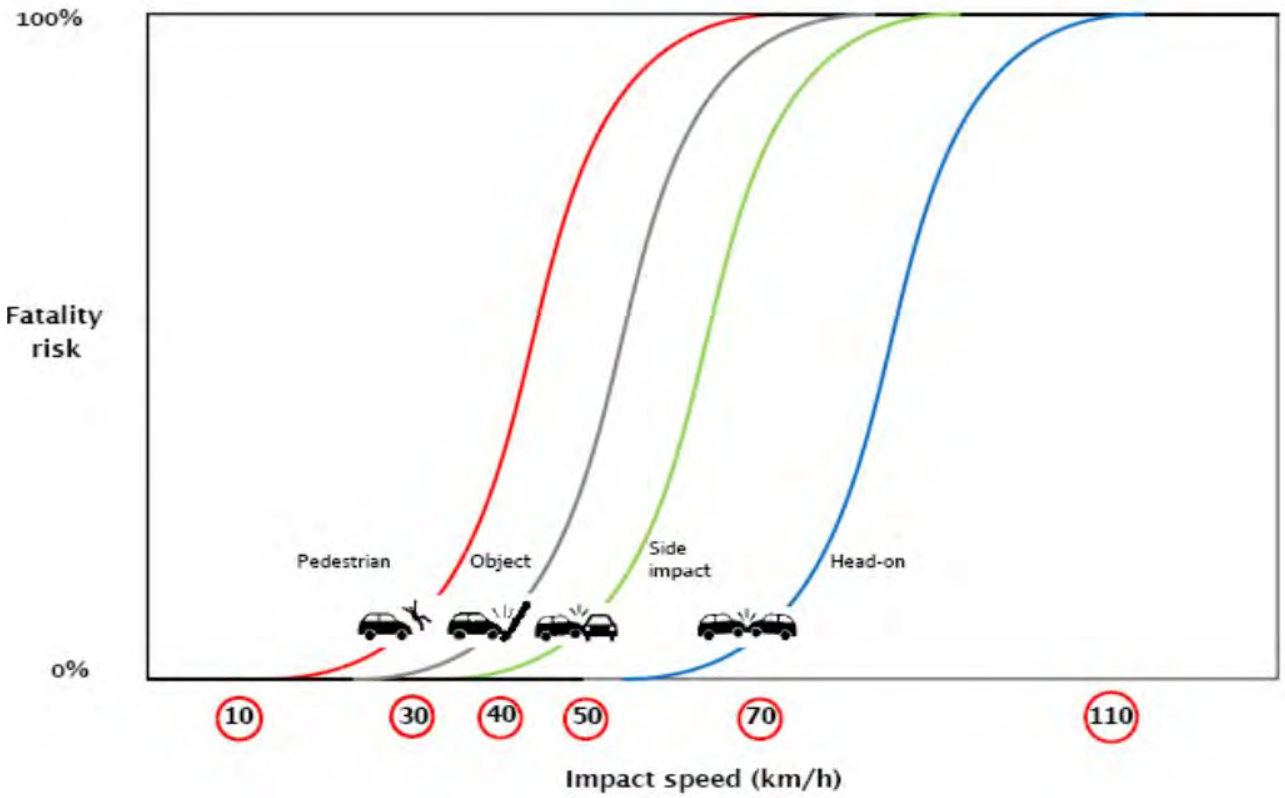
It is generally accepted that collision speeds of 30 km/h are the maximum any vulnerable or unprotected road user (particularly pedestrians) can withstand without sustaining death or serious injuries (refer to Figure 2.1). Although this speed limit is common on local roads in Europe, it is uncommon in Australia and New Zealand. Where higher speeds are desirable, additional and appropriate infrastructure is required to ensure casualty crashes are avoided (e.g. separation of road users). Speeds over 50 km/h dramatically increase the chance of death and serious injury in the event of a crash between two vehicles at an intersection. Casualties as a result of head-on crashes can be significantly reduced if speeds are 70 km/h or lower given current vehicle design and safety features. If higher speeds are required in either a rural or an urban environment, frontal and side-impact vehicle-to-vehicle conflicts, and vulnerable road user-to-vehicle conflicts need to be separated to prevent these potentially high severity crashes from occurring.

In the Safe System, travel speeds should be designed and managed to reduce the risk of crashes and prevent serious injury or death to people in the event of a crash. This includes setting speed limits and

[2] The Safe System approach is based primarily on 'Vision Zero' developed in Sweden and 'Sustainable Safety' from the Netherlands.

developing road rules according to the safety of the road and roadside and ensuring road user awareness and compliance through signage, driver education campaigns and enforcement (Roads and Traffic Authority (RTA) NSW 2011).

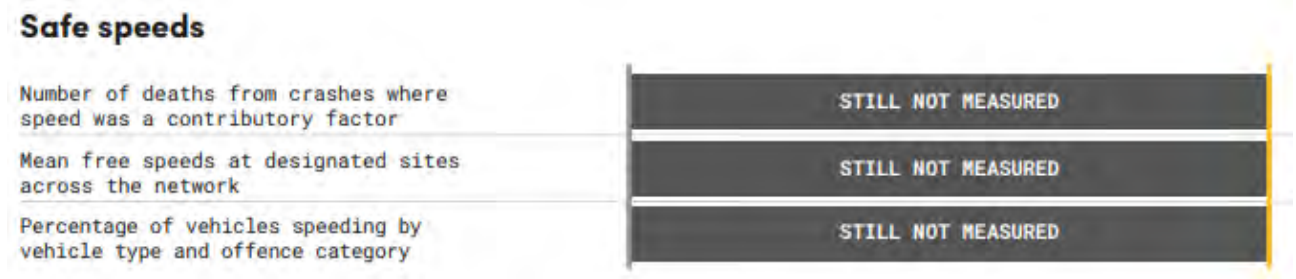
Figure 2.1 Maximum human tolerance to impact represented by impact speed



Source: RTA NSW (2011).

In Victoria, speed is reported to contribute to approximately one third of road trauma (Victoria Police 2019). For every one per cent reduction in average speed, there is on average a three per cent reduction in casualty crashes in Victoria. Currently, safe speed data is not a metric which is collected nationally, but the desired performance metrics for assessing safe speeds are illustrated in Figure 2.2 (AAA 2019).

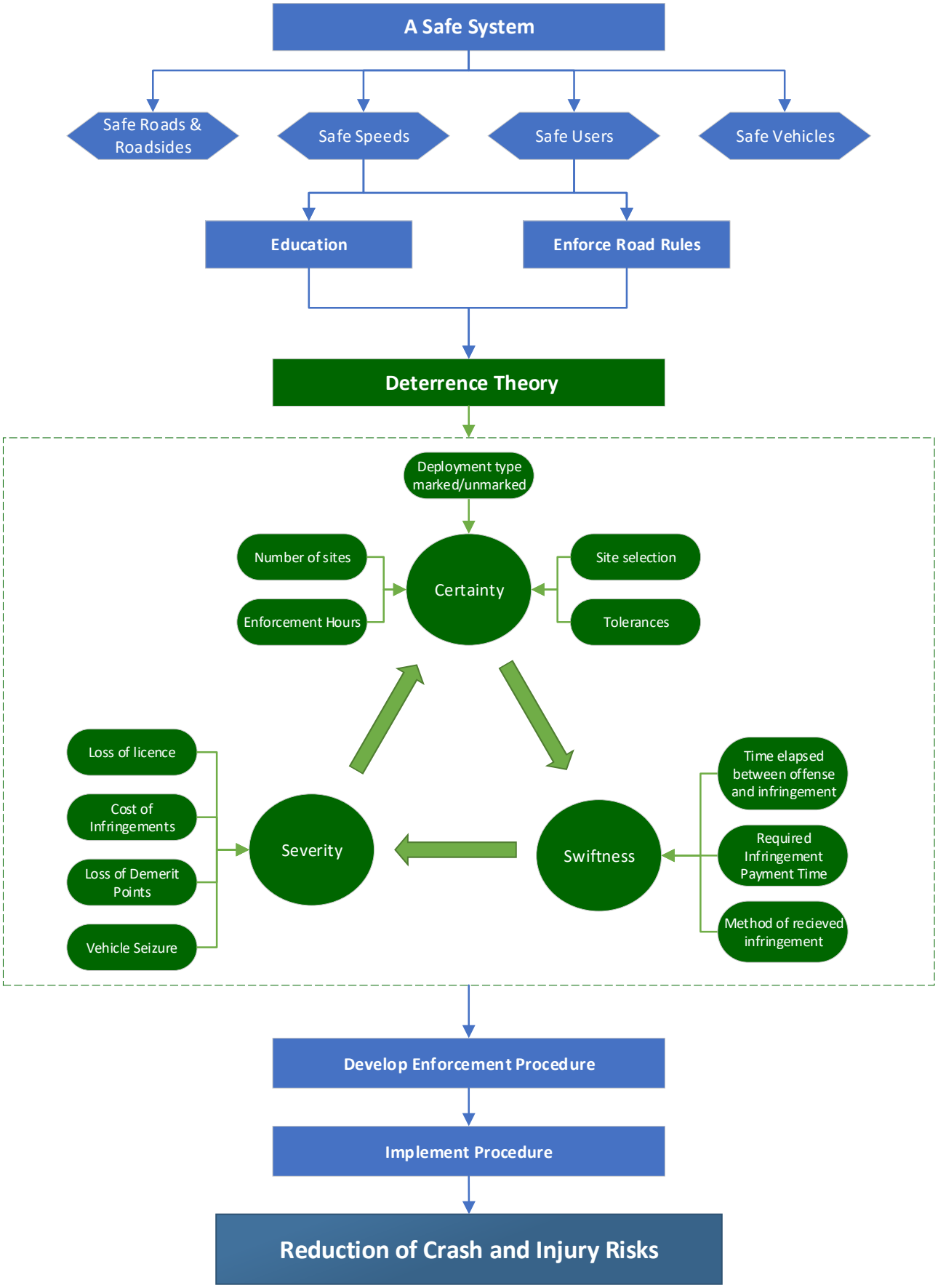
Figure 2.2 Dashboard from the AAA National Road Safety Strategy Progress Report (July 2019)



Source: Australian Automobile Association (AAA) (2019).

Figure 2.3 presents a model that demonstrates the relationship between the Safe System approach and deterrence theory in the context of MSC system components.

Figure 2.3 ARRB flowchart illustrating how deterrence theory forms part of the Safe System



2.2 CERTAINTY OF PUNISHMENT

Certainty of punishment determines the success of deterrence-based enforcement. If the potential offender perceives the threat of punishment to be certain, then they will be less likely to commit the offence (Von Hirsch et al. 1999). For example, if a driver is certain that there is a speed camera at the next intersection, then they will be less likely to speed through the intersection because the perceived certainty of detection and receipt of a fine is high.

Greater certainty of punishment is reported to be associated with lower offence rates, where more extensive use of the punishment is more effective than scarce or sporadic use (Elliott 2003). It follows that increased frequency of the punishment is related to increased levels of offence detection. Consistently across studies, the evidence suggests that, when there is a high likelihood of being caught (i.e. certainty), drivers are much less likely to offend (Fleiter & Watson 2006; Logan 1972; Mendes & McDonald 2001; Ritchey & Nicholson-Crotty 2011). Effectiveness of deterrence-based enforcement practice is based on general deterrence; increasing motorists' perceptions that there is a high risk of being punished for offending (speeding).

Davey and Freeman (2011) report that in terms of speeding enforcement, deterrence efficiency could be optimised by maintaining a high level of speed cameras and mobile operations; increasing the number of motorists detected. By having visible, sustained and widespread enforcement operations, a deferent effect would be created and maintained as motorists would perceive a constant high risk of apprehension, and thus modify their driving behaviour accordingly.

There is growing evidence in the literature that enforcement is more effective when drivers perceive the consequences of their traffic violations as severe and imminent (Al-Rukaibi, Ali & Aljassar 2006b; Elvik et al. 2012; Hössinger & Berger 2012; Özkan et al. 2006; Porter 2011; Retting 2011; Stanojevic, Jovanovic & Lajunen 2013; Taubman-Ben-Ari, Mikulincer & Iram 2004). As an example of general deterrence, Özkan et al. (2006) found that drivers in countries with strong enforcement commit fewer traffic violations than drivers in countries with relaxed enforcement because of their awareness of the consequences of these violations.

2.3 SEVERITY OF AND SWIFTNESS OF PUNISHMENT

The success of deterrence-based enforcement is also dependent upon the severity and swiftness of punishment. Individuals will be less likely to commit an offence if the perceived punishment for that offence is severe (Von Hirsch et al. 1999). As the perceived severity of the punishment increases, the likelihood of an individual committing that offence is expected to decrease. This effect is thought to be stronger in individuals who have never committed an offence compared to repeat offenders (Homel 1988).

In Queensland, Fleiter and Watson (2006) studied self-reported speeding behaviour among drivers and found that the certainty of getting caught decreased speeding, but the perceived severity of the fine did not. This result aligns with older research on deterrence theory, which determined that punishment certainty was more influential than severity (e.g. Chiricos & Waldo 1970; Logan 1972). Mendes and McDonald (2001) conducted an analysis on deterrence-driven data from 33 studies and found that the certainty of punishment moderated punishment severity. This means that, for the severity of the punishment to influence driver behaviour, deterrence is dependent on the driver's certainty of punishment. Ritchey and Nicholson-Crotty (2011) confirmed this finding, whereby the influence of fine

severity became negligible in areas where police patrols were low. In other words, the influence of punishment severity was dependent on punishment certainty (i.e. presence of police patrols).

Swiftness of punishment also affects the success of deterrence-based enforcement. If the punishment is administered immediately after the offence is committed, then the offender will be less likely to commit the offence in the future (Homel 1988). Elliot (2003) concurs, stating that the more proximate the punishment, the greater the deterrence effect. As the amount of time between offence and punishment increases, the less effective the punishment will be at deterring an offence in the future. For example, if a speeding driver is pulled over by the police and receives an on-the-spot fine, the fear evoked by this immediate punishment may be enough to prevent the driver from speeding again. However, if a speeding driver receives a fine in the mail for a speeding offence committed a month ago, the offence may not be salient enough in the driver's memory to prevent them from offending in the future.

While there is some limited empirical evidence to support swiftness of punishment as being a key success factor for deterrence-based enforcement (Shuey 2004, 2008), most of the evidence lacks robustness. This is not necessarily due to a lack of effect but, rather, because few jurisdictions world-wide process fines without a significant delay between offence and receipt (Babor et al. 2003). Delays in the issuing of a fine can often lead to denial of the offence, inaccuracy of memory recall and the potential to continue to offend. These effects have been exacerbated with the transition from traditional enforcement to automated enforcement such as speed cameras where there is no personal physical contact with the driver and delays occur in the issue of the fine. Elliot (2003) suggests that police enforcement (where an offender is immediately ticketed for an offense) has a greater deterrence effect than speed cameras (where there is remote detection and remote fine).

It is noted that other countries such as The Emirates, Iran and Saudi Arabia compensate for this delay in automated ticketing by issuing SMS notification immediately to the registered owner of the vehicle at the time the vehicle triggers the camera site and a further SMS at the time the infringement is processed.

3 REVIEW OF MSC PROGRAM COMPONENTS

In terms of MSC deployment, factors including advanced warning signage, vehicle markings, site selection processes and speed enforcement tolerance thresholds interact to alter drivers' perceived certainty of punishment to influence changes in speeding behaviour. This section will discuss the key components of MSC programs and their effectiveness as a general deterrent to speeding at specific sites and network-wide based on the findings from the literature review and stakeholder consultation.

In 2011, the Victorian Auditors-Generals Office (VAGO) evaluations of Victoria's mobile cameras demonstrated their effectiveness in reducing the frequency and severity of road trauma. The report contends there is a strong argument for using road safety cameras to change driver behaviour and reduce road trauma (VIC Auditor-General's Report 2011). Effectiveness of the mobile speed camera program was not specifically assessed in the 2011 VIC audit report.

It is inherently difficult to precisely quantify the direct effects of safety cameras on road safety across the road network because there are many different factors that influence road safety, and most evaluations will measure the total impact of the efforts. However, the research shows that while the precise contribution cannot yet be determined, cameras have resulted in significant improvements in road safety and their use as part of a broader road safety strategy is justified (VIC Auditor-General's Report 2011).

Generally, the literature provides a sound evidence base to support the safety effects of MSC programs globally, as follows:

- Erke (2009), referenced by the European Commission (2019), completed a total of 45 evaluation studies on speed enforcement published in 14 countries, which comprise a total of 129 results. MSC camera enforcement (which comprised both overt and inconspicuous enforcement) was found to result in a significant reduction in crashes of 17%, which was adjusted to account for publication bias in this sub-group. MSC enforcement was found to reduce fatal crashes by 32% and injury crashes by 14%.
- Jones et al. (2007) assessed the impact of crash and casualty numbers relating to the introduction of mobile speed cameras in the rural county of Norfolk, England. Crash data were collected for two years before/after the introduction of MSCs. After the introduction of cameras, overall crashes declined by 1%, and crashes involving fatalities or serious injuries declined by 9% on roads where MSCs were not placed. At MSC sites, crashes decreased by 19% and fatal and serious crashes by 44%. The introduction of MSCs was reported to result in real and measurable reductions in crash risk in this rural county.
- In Queensland (Newstead 2017), where the MSC program is approximately 70–80% overt and 20–30% unmarked, it is estimated that 98% of casualty crash savings associated with the Camera Detected Offence Program (CDOP) were derived from the mobile speed camera program. The mobile speed cameras were found to produce strong crash effects (localised in space) with 2013 to 2015 casualty crash reductions averaging around 30% state-wide in each year. This translated to around 3900 casualty crashes per year, saving society $720–790 million (HC) or $1.6–1.7 billion (WTP)
- Clark et al. (2019) found that post-implementation, the ACT mobile speed camera program was associated with a 19.7% reduction in crash risk. Estimated crash reductions have increased in the most recent year of evaluation in response to increased hours of mobile speed camera deployment, with a 22% crash reduction estimated for the most recent completed year considered in the analysis. This reduction translated to an estimated savings of over 3000 reported crashes, corresponded to savings in economic costs to the ACT community of over $60M.

- A four-year evaluation of mobile speed camera sites in London showed a 1.4 mph (2.3 km/h) reduction in average speed in urban areas and a 1 mph (1.6 km/h) reduction in average speed on rural roads. In the year ending in March 2004, it was estimated that MSC enforcement prevented between 150 and 400 FSI crashes on urban roads and between 90 and 120 FSI crashes on rural roads (De Pauw et al. 2014)

3.1 SIGNAGE AND VEHICLE MARKING

NSW is the only jurisdiction in Australia which utilises highly overt deployments, through the use of advanced warning signs (placed at intervals of 250 m and 50 m) and marked vehicles (see Figure 3.1). Victoria, Western Australia and France utilise primarily inconspicuous (unmarked and unsigned) deployment of MSCs to achieve general deterrence (See Figure 3.2). New Zealand and the UK reportedly utilise a combination of marked and unmarked deployment, although the percentage of each is not clearly publicised. The type of vehicle deployments in England and Ireland are closest in similarity to NSW, being largely overt in nature with the exception that advanced warning signage is not required.

Figure 3.1 Example of signed and marked vehicle, NSW, Australia

Source: In the Cove (2018).

Figure 3.2 Example of unsigned and unmarked vehicle, VIC, Australia

Source: Herald Sun (2013).

3.1.1 THE 'HALO' EFFECT

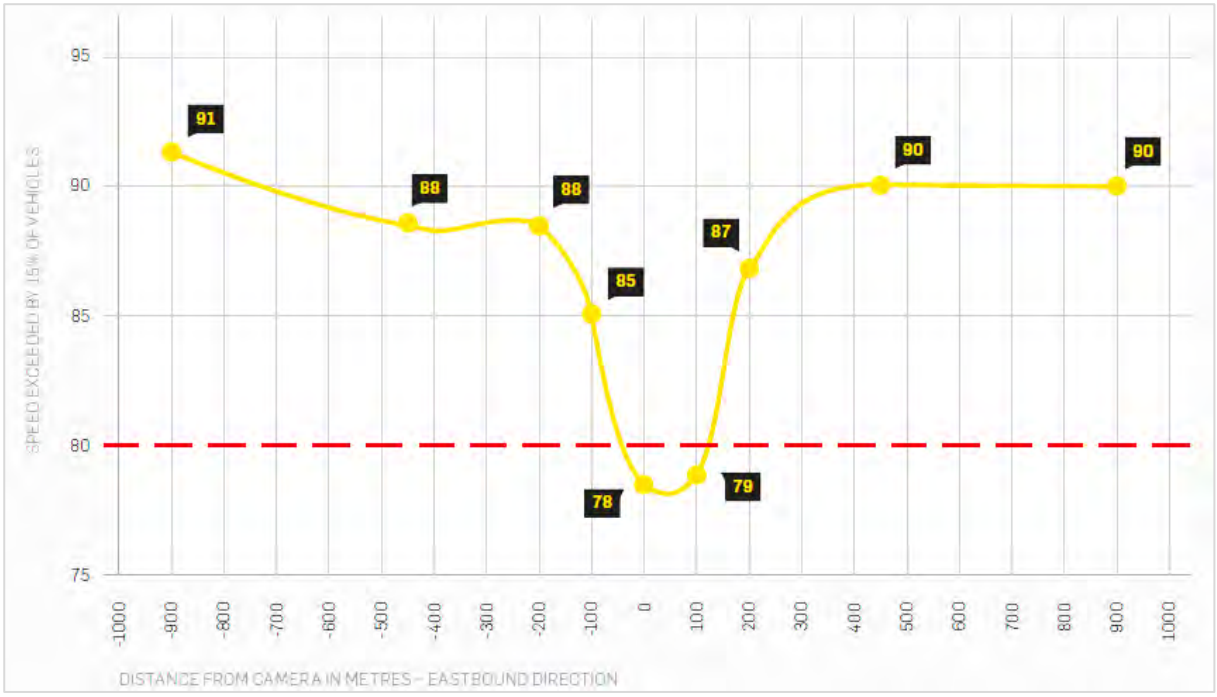
When MSCs in NSW were operated with signage placed 50 m in advance of the camera, enforcement operations were undertaken in both directions of travel (Saulwick 2013). Using this enforcement method, between July 2011 and January 2012 14 163 speeding infringements were issued (Saulwick 2013). In 2013, additional advanced warning signs were introduced at 250 m in advance of the MSC site, leading to only single direction enforcement being undertaken (Saulwick 2013). In the same period from July 2012 to January 2013, 6122 infringement notices were issued; less than half of the previous year (Saulwick 2013). A reduction in infringements issued (i.e. increased compliance) was cited in much of the global literature reviewed as a measure of MSC program effectiveness. However, in NSW, reduction in infringements (i.e. increased compliance) has likely occurred due to motorists being warned of the presence of MSCs with enough time and distance to reduce travel speed, reflecting a site-specific deterrence effect. Only recording motorists travelling on one side of the road would also contribute to less speeding motorists being detected and fined.

The NSW Auditor-General's (2018) report stated that multiple warning signs indicating the presence of speed cameras reduce the likelihood that MSCs would act as a deterrent to motorists. When advanced warning signs are present, some drivers have been found to develop deceptive behaviours towards

enforcement by slowing their speed in the vicinity of police or speed cameras to avoid being caught and fined (Aljassar, Ali & Al-Anzi 2004; Al-Rukaibi, Ali & Aljassar 2006a; Al-Rukaibi, Ali & Aljassar 2006b; Porter 2011; Stanojevic, Jovanovic & Lajunen 2013).

Comparisons can be drawn from NSW Transport Centre for Road Safety's (2011) analysis of the fixed speed camera program[3], which confirms that drivers do decrease speed at known camera locations, while still speeding prior to and subsequent to the camera location as shown in Figure 3.3. Advanced warning signage limits the opportunity for MSCs to moderate driver behaviour beyond the immediate specific site location through deterrence, as drivers are not concerned that they could be caught speeding anywhere, anytime.

Figure 3.3 Example of a speed profile around a fixed speed camera in an 80 km/h zone

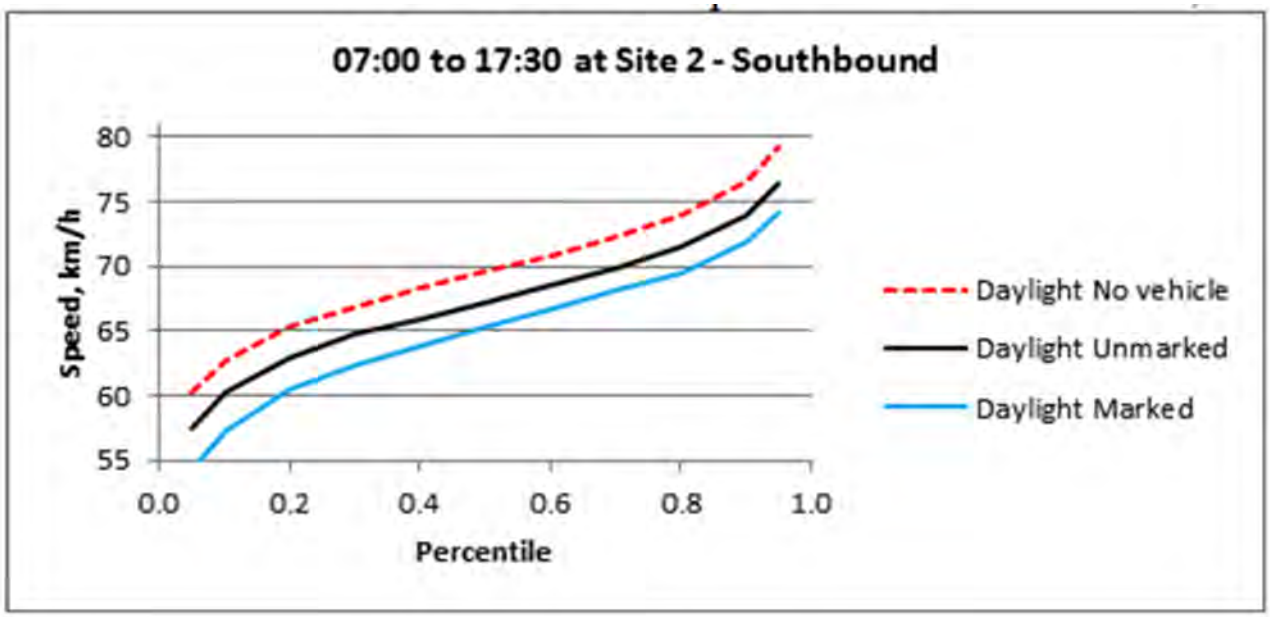


Source: Based on NSW Transport Centre for Road Safety (2011).

Frith and Lester (2013) also concluded that MSC deployments cause a 'halo' effect of speed reduction in an area around the site. At surveyed locations, the 'halo' effect was found to occur for both marked and unmarked MSC vehicles; a comparison in speed reduction is shown in Figure 3.4, showing that marked MSC vehicles result in the highest site-specific speed reduction (Frith & Lester 2013). It could be concluded that marked MSC vehicles result in greater site-specific deterrence and may be more beneficial in high-risk locations (e.g. blackspot or worksite deployments).

[3] The reference to fixed speed camera locations is relevant to MSC operations insofar that fixed and MSC locations apply advanced warning signs to inform drivers they are approaching a speed enforcement site.

Figure 3.4 Southbound speeds a the 70 km/hr camera site for periods of marked/unmarked/no camera-vehicle present at that camera site, in daylight (7:00 to 17:30)



Source: Frith and Lester (2013).

3.1.2 COMPARING EFFECTIVENESS OF OVERT VS UNMARKED MSC SITES

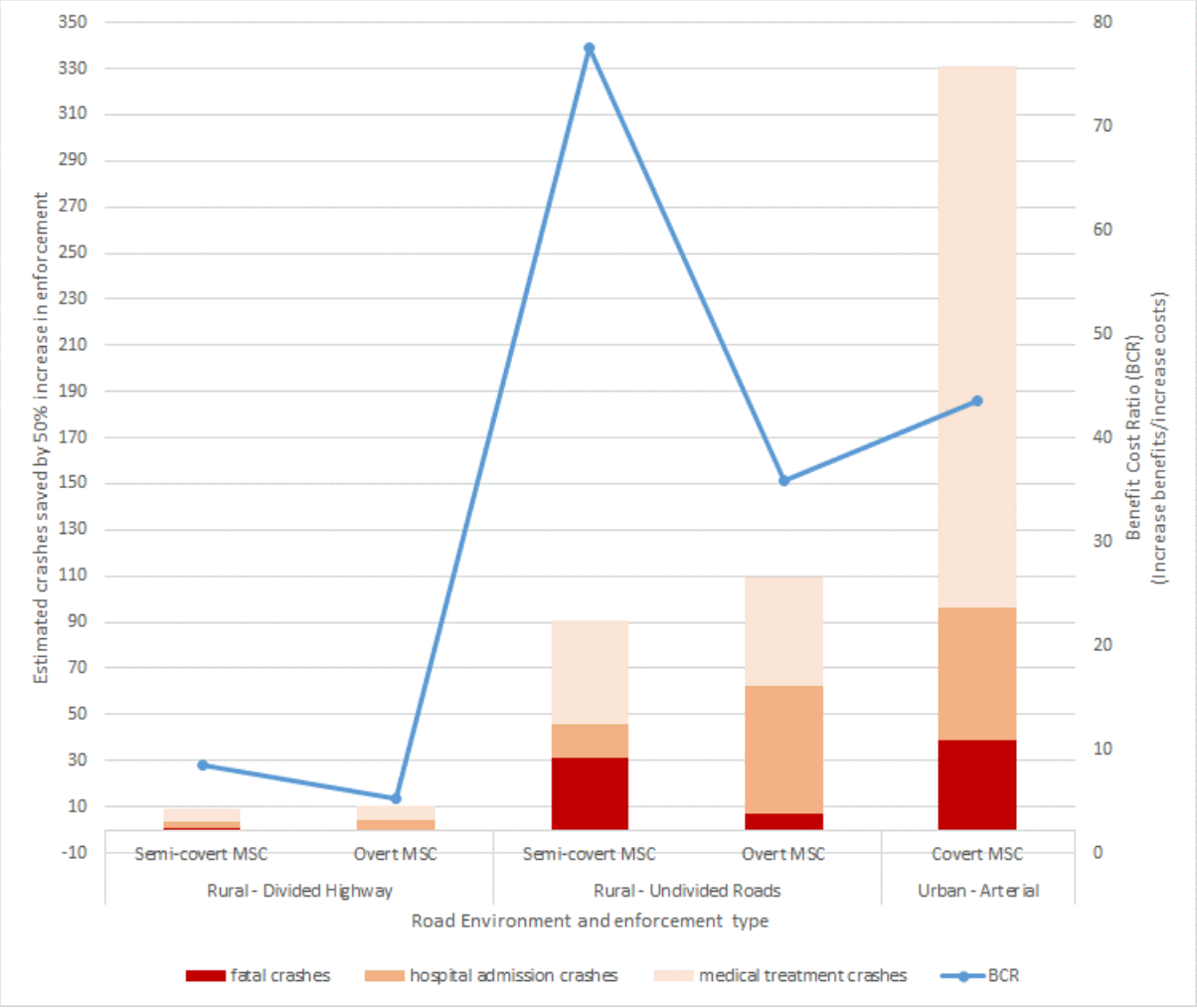
The Queensland Audit Office (2015 reports that a high percentage of unmarked vehicle MSC deployments prompts a network-wide general deterrence to speeding, with motorists modifying their speeding behaviour overall if they are unable to predict where and when they will be fined. In rural regions of Victoria, a combination of unmarked and marked MSC deployments was most effective (73.9% net reduction in crashes) (Diamantopoulou & Cameron 2002). Unmarked mobile operations at unsigned sites in Victoria (2000–2001) enforcing 4000 hours per month had a general effect of a 21% reduction in casualty crashes (Cameron 2009). Cameron (2009) also concluded that unmarked and unsigned MSC operations were found to have a stronger effect on fatal crashes, than was found by utilising a combination of marked and unmarked mobile camera operations or by operating marked and signed MSCs using randomised scheduling (both of which were found to have similar crash reduction benefits).

Cameron (2009) found that unmarked, unsigned operations achieve effects on the severity of casualty crashes, particularly crashes that are fatal or more serious. Unmarked mobile operations at unsigned sites in Victoria (2000–2001) enforcing 4000 hours per month had a general effect of a 21% reduction in casualty crashes. This demonstrates that unmarked MSCs are effective at reducing casualty crash risk through increasing the amount of speeding infringement notices issued to road users, hence deterring them from speeding.

New research by Cameron (2016) estimates the crash reduction benefits of increases in traffic enforcement in various types of road environments and associated Benefit Cost Ratio (BCR). The data relating to mobile speed camera enforcement reported by Cameron is plotted in Figure 3.5, which illustrates the benefits for a 50% increase in each type of enforcement (overt versus 'semi-covert'). This analysis suggests that overt MSC enforcement in rural areas results in slightly higher reductions in minor and serious injury crashes than 'semi-overt' (defined as unmarked and unsigned) MSC enforcement. However, 'semi-overt' enforcement in rural areas results in significantly greater reduction in fatal crashes as compared to overt enforcement. Cameron's (2016) analysis predicts that deployment of 'semi-covert' MSC enforcement

(defined as unmarked and unsigned) has significantly higher BCRs than overt enforcement, particularly due to the predicted reduction in fatal crashes.

Figure 3.5 Estimated crash reduction and benefit cost ratio (BCR) for various types of MSC enforcement in different road environments



Source: Cameron (2016).

3.1.3 LITERATURE RECOMMENDATIONS REGARDING MARKED/UNMARKED MSC SITES

According to the European Commission (2019), enforcement programs are more likely to deter drivers from committing an offense if they adhere to the following general guidelines:

- Adopt both overt and inconspicuous enforcement activities.
- Create publicity about specific enforcement activities.
- Provide public feedback on the results of enforcement activities.

The Queensland Audit Office (2015) states that the best way to maximise road safety outcomes is to increase the use of unmarked and unsigned camera deployments (in this period, unmarked MSC deployments represented only about 20% of MSC enforcement in Queensland). The use of unmarked vehicles is more effective than marked and visible vehicles in addressing speeding, as motorists do not see the camera and hence do not adjust their speed accordingly. Queensland Audit Office (2015) reports that a high percentage of unmarked vehicle MSC deployments prompts a network-wide general deterrence to

speeding, with motorists modifying their speeding behaviour overall if they are unable to predict where and when they will be fined.

Dated research relating to MSC deployments suggests that a combination of marked and unmarked MSC deployment is highly effective (Diamantopoulou & Cameron 2002). Recent research suggests, however, that unmarked and unsigned MSC deployments are most desirable with Monash University's Professor Maxwell Cameron commenting '*… if you're trying to affect speeding all the time then the best idea is to make sure the cameras aren't predictable or apparent and to operate them covertly,'* and '*the idea of being conspicuous is really in the wrong direction'* (Hinchliffe 2015 as quoted in Cameron 2009).

Effective unmarked/unsigned enforcement operations are not intended to be seen by road users; road users should be unaware of the location and timing of operations. If effective, this would create the perception that detection could occur at any location at any time (Cameron 2009). The research suggests that MSCs should operate at one site for a short period of time in order to affect general deterrence.

Cameron (2009) defined speed enforcement options suited to the Western Australian road environment. Analysis indicated that operating marked and signed MSCs using randomised scheduling and a combination of marked and unmarked mobile camera operations had similar crash reduction benefits (Cameron 2009). However, unmarked and unsigned MSC operations were found to have a stronger effect on fatal crashes (Cameron 2009).

3.2 PROGRAM DEPLOYMENT (SITE SELECTION, QUANTITY AND ENFORCEMENT HOURS)

The research corroborates that safety effects of the MSC Program are achieved through risk-based selection of sites and a high dose or intensity of enforcement (i.e. large quantity of sites and significant enforcement hours).

3.2.1 SITE SELECTION

Site selection for the MSC program refers to the method of determining the sites where MSC deployment should occur across the entire network. The selection of sites should be based on crash risk (which can be defined using historical crash or blackspot data or using predictive indicators in high-risk areas where crashes are yet to occur). From the review of jurisdictions, it was found that the site selection criteria are consistent across the board. Typically, the assessment criteria for site selection includes at a minimum:

- demonstrated crash history
- police nominated
- community nominated
- areas which traditional speed enforcement is not possible.

The NSW Auditor-General recommended that the range of criteria used for selection of MSC sites needs to be broader to ensure that the cameras better deter motorists from speeding (Auditor-General's Report 2018). Our research suggests that the site selection criteria for MSC sites is similar in each jurisdiction evaluated. Sites are generally selected based on crash history which are supplemented with sites that have been nominated by police or members of the community.

A network-wide Safe System assessment may define further sites which are 'high risk' due to speed, geometry or roadside hazards, but where crashes are yet to occur.

Provided the selection of sites is risk-based and utilises both lagging indicators (i.e. crash history and blackspot identification) as well as leading indicators (i.e. predictive risk measures used in accordance with Safe System principles), no specific evidence was found to support the need for broader site selection criteria in NSW.

3.2.2 RANDOMNESS OF SITE SELECTION

In terms of site scheduling and number of MSCs, the NSW Auditor-General (2018) recommends that the best way to optimise road safety outcomes is through maintaining an element of ***randomness*** in camera deployments. Having only a limited number of locations for MSCs restricts coverage of the road network and increases predictability of enforcement. This means that motorists are less likely to be deterred from speeding as they believe the chance of encountering a MSC is low. Increased predictability of MSCs reduces the program's ability to provide general deterrence of speeding across the road network. Additionally, as sites become well known to motorists, they will only change their behaviour in an area around the MSC site. This impacts directly on the required resources to achieve the same outcomes; i.e. a predictable schedule for a MSC will reduce in effectiveness, thus more enforcement hours would be required to achieve the original levels of effectiveness.

Queensland implements The Traffic Scheduling and Reporting System (TSRS), which is a site scheduling system that uses a weighted randomised selection process that builds in the unpredictability required to produce a general deterrence effect (Queensland Audit Office 2015). When the system was used to schedule 80% of all MSC deployments, a 7.7% reduction in casualty crashes was modelled (Queensland Audit Office 2015). Greater crash reductions were found to be associated with higher levels of randomness in the scheduling of speed camera sites. The TSRS relies on crash data to make MSC deployment decisions; however, it does not recommend the ideal day of the week or time of day for deployment (Queensland Audit Office 2015). As a general principle of enforcement operations in accordance with the Safe System, deployment of any enforcement activity should match road trauma. Therefore, deployment site decisions should consider data identifying the time and locations at which drivers are most commonly engaged in speeding.

The Queensland Audit Office (2015) states that when leaving deployment site decisions open to subjective judgements based on unverified data and police officers, there is a risk that the element of unpredictability (key to the general deterrence effect) is lost.

3.2.3 NUMBER OF SITES

As of 2018, NSW has 1024 approved locations available for the deployment of MSCs (Audit Office of New South Wales 2018). Each of these approved locations represents an area or length of road, where MSCs can be positioned at different specific sites within locations. As a result, there were 2585 specific MSC sites approved for use across all locations (Audit Office of New South Wales 2018).

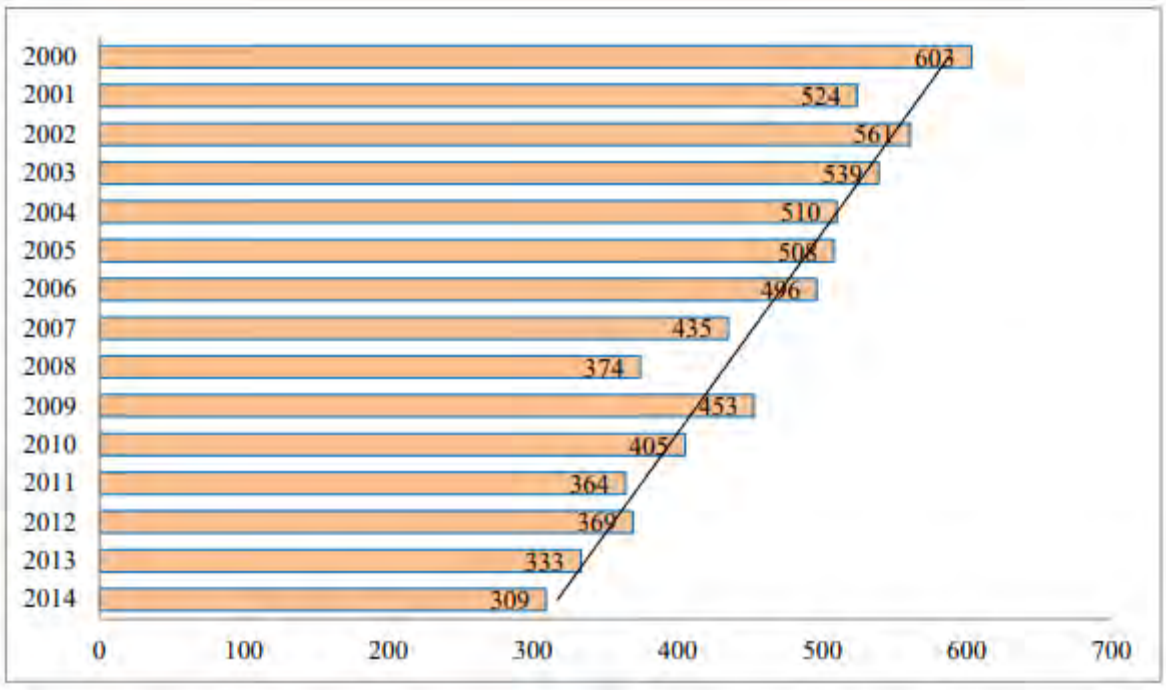
Based on the review of literature, there is limited research into MSC program effectiveness based on the number of MSC sites used, or whether the location of sites is published. The conclusion that increasing the number of sites may generate a reduction in crashes could potentially be drawn from Maxwell's (2015)

report which discusses the removal of MSCs in NSW and subsequent reintroduction. Maxwell (2015) reported:

> In 2008, road crash fatalities in NSW had declined for six consecutive years. In December 2008, NSW phased out the use of its ageing wet film mobile speed cameras and became the only state or territory in Australia to no longer use mobile speed cameras. Between 2008 and 2009, NSW's road toll jumped from 374 to 453 – an increase of 21%. As shown in [Figure 4 reproduced here as Figure 3.6], the 2008 road toll was well below the linear trend line. When mobile speed cameras ceased operation, the road toll did more than regress to the mean – it shot well above the mean. This indicates that the removal of mobile speed cameras from NSW's road safety initiatives directly contributed to an increase in crash fatalities.

As mentioned previously by the NSW Auditor-General (2018), having a limited number of MSC locations may restrict network coverage and increase predictability of enforcement.

Figure 3.6 NSW crash fatalities



Source: NSW Government Centre for Road Safety (produced in Maxwell 2015).

3.2.4 GEOGRAPHICAL CONSIDERATIONS

Newstead et al. (2013) evaluated the Queensland program, estimating crash effects from 1997 to 2011 (all casualty crashes) and to 2012 (serious casualty crashes). During 2010 to 2012, the percentage of mobile camera hours operated covertly rose from 7.2% to 23% and then fell to 20%. This increase in covert vehicle deployments did not have a statistical effect on crash risk, possibly due to the majority of deployments (approximately 80%) remaining overt. Although deployments were associated with halo effects, it was found that MSC sites accounted for approximately 78% of casualty crash locations in Queensland 2010–12. Therefore, overt MSC enforcement can be effective if halo effects for these operations span across the network.

Interrogation of data found that over 80% of crashes in the ACT occurred within 0.5 km of a site used at one or more times for mobile speed camera enforcement (Clark et al. 2019).

3.2.5 HOURS OF ENFORCEMENT

The number or rate of deployment hours and the timing attributed to those enforcement hours are considered important parameters governing overall effectiveness of the MSC program.

The Auditor-General (2018) provided a plot of data illustrating rates of enforcement in various Australian states and territories from 2012. Additional enforcement data from Ireland in 2014 was added along with fatality rates for this period. In general, areas with higher enforcement rates are associated with lower fatal crash rates.

NSW has recently increased the hours of deployment of mobile speed cameras; however, the rate of deployment is still comparatively low compared with other Australian jurisdictions. The NSW MSC program was expanded from 930 hours per month of enforcement (2012) to 7000 hours in 2014. In 2014, the proposed 7000 hours of enforcement was equivalent to 9.7 hours of enforcement per 10 000 population, which was smaller per capita than the scale of the MSC programs in both Victoria (16.8 hours of enforcement per 10 000 population) and Queensland (14.9 hours of enforcement per 10 000 population) (Audit Office of New South Wales 2018). While NSW has almost the same enforcement hours as Ireland's 7375 hours, the NSW population and registered vehicle population is significantly larger.

Recent literature suggests that the effect of MSCs is largely related to the ***dose*** (i.e. the quantity of enforcement) or ***intensity*** (i.e. the rate) of the program enforcement operation, which affects drivers' perceptions of the threat of detection of speeding and therefore the level of deterrence achieved network-wide (Cameron 2009). Cameron (2009) reported that the level of intensity relates primarily to program deployment, specifically:

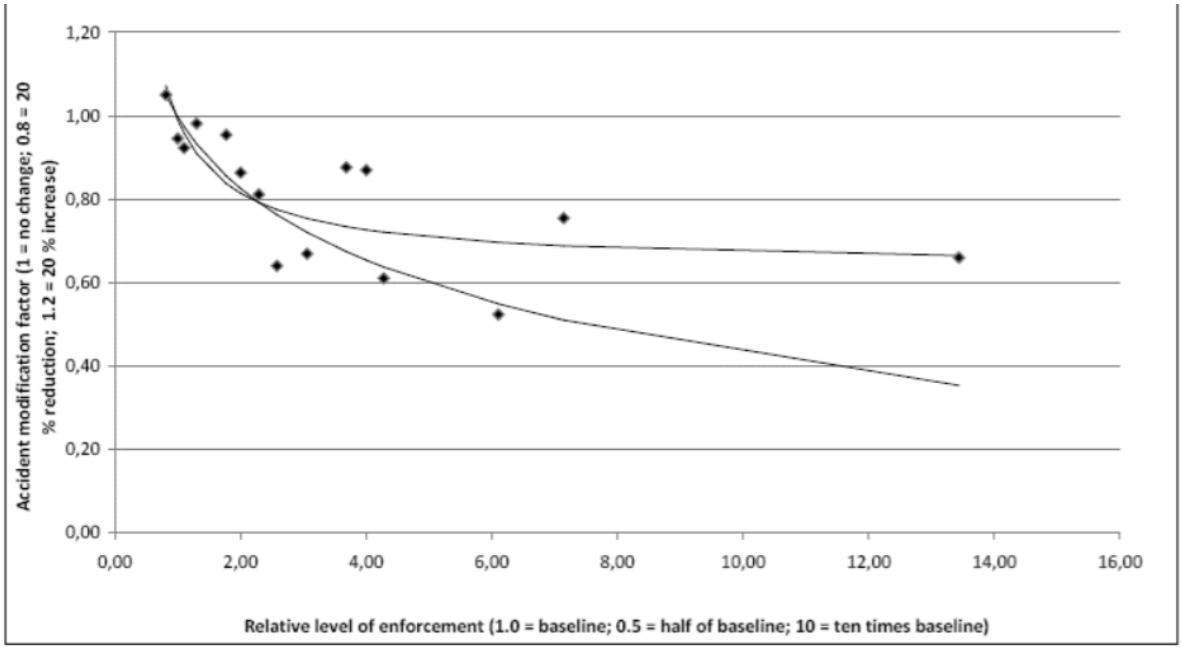
- number of fixed cameras
- monthly operating hours of mobile cameras
- number of speeding tickets issued following speeding offense detection.

Elvik (2001) developed a general framework for the cost-benefit analysis of police enforcement. A key part of this framework is the relationship between changes in the level of police enforcement and changes in crashes, measured by the percentage reduction in crashes or relative risk, relative to a base level.

One of the most widely referenced functional relationships developed by Elvik (2001, 2011) is the power function or Crash Modification Function (CMF) – defining a dose-response relationship between the level of enforcement (the dose) and crashes (the response) (Figure 3.7). The shape of the function or ***elasticity*** represents the strength of the relationship between crash reduction and enforcement activity. For the power function, for example, the ***elasticity*** represents the percentage reduction in crashes for every 1% increase in enforcement (Elvik 2001).

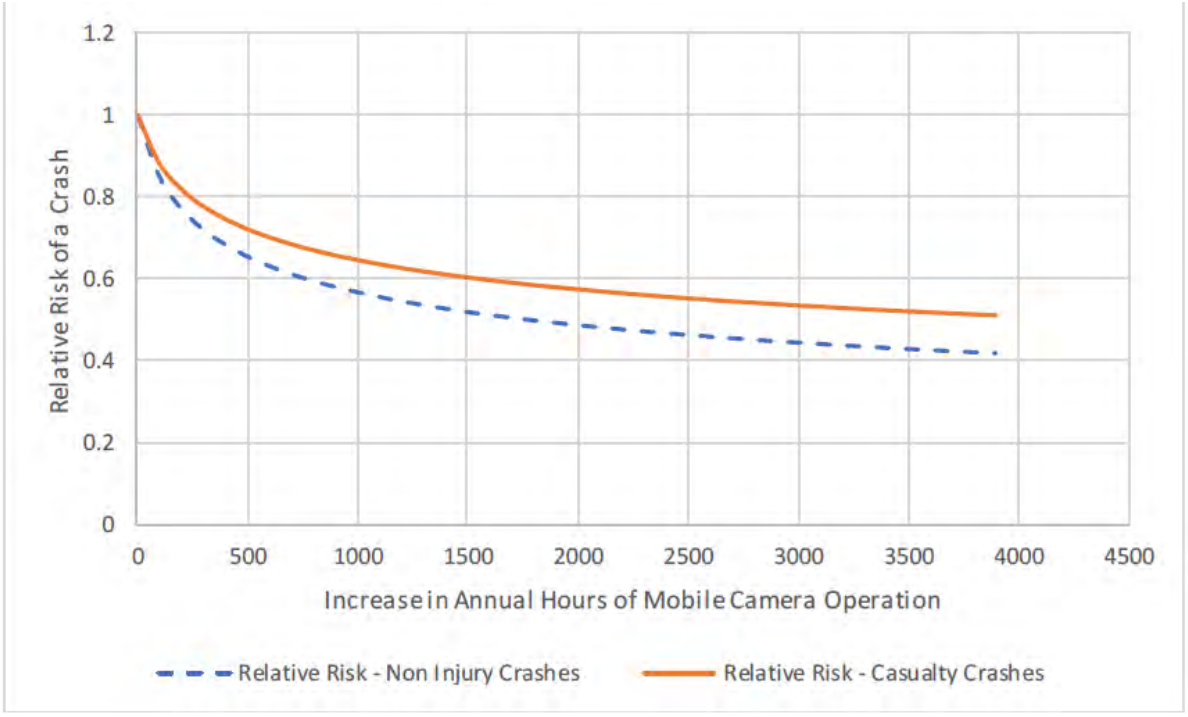
Analysis by Clark et al. (2019) of ACT MSCs demonstrates a similar relationship between increased annual enforcement hours and relative crash risk (Figure 3.8, Figure 3.9). Predicted crash reductions associated with increasing camera annual hours of camera operation per district can be taken straight from Figure 30. For example, an increase in camera hours of 1500 annually per district is estimated to result in a 40% reduction (relative risk of 0.6) in casualty crash frequency in areas within 500 m of a mobile speed camera site. This increase would represent an average doubling of the current speed camera hours delivered annually in the ACT (Clark et al. 2019).

Figure 3.7 Crash modification functions (CMF) based on 11 studies of speed enforcement (including MSC)



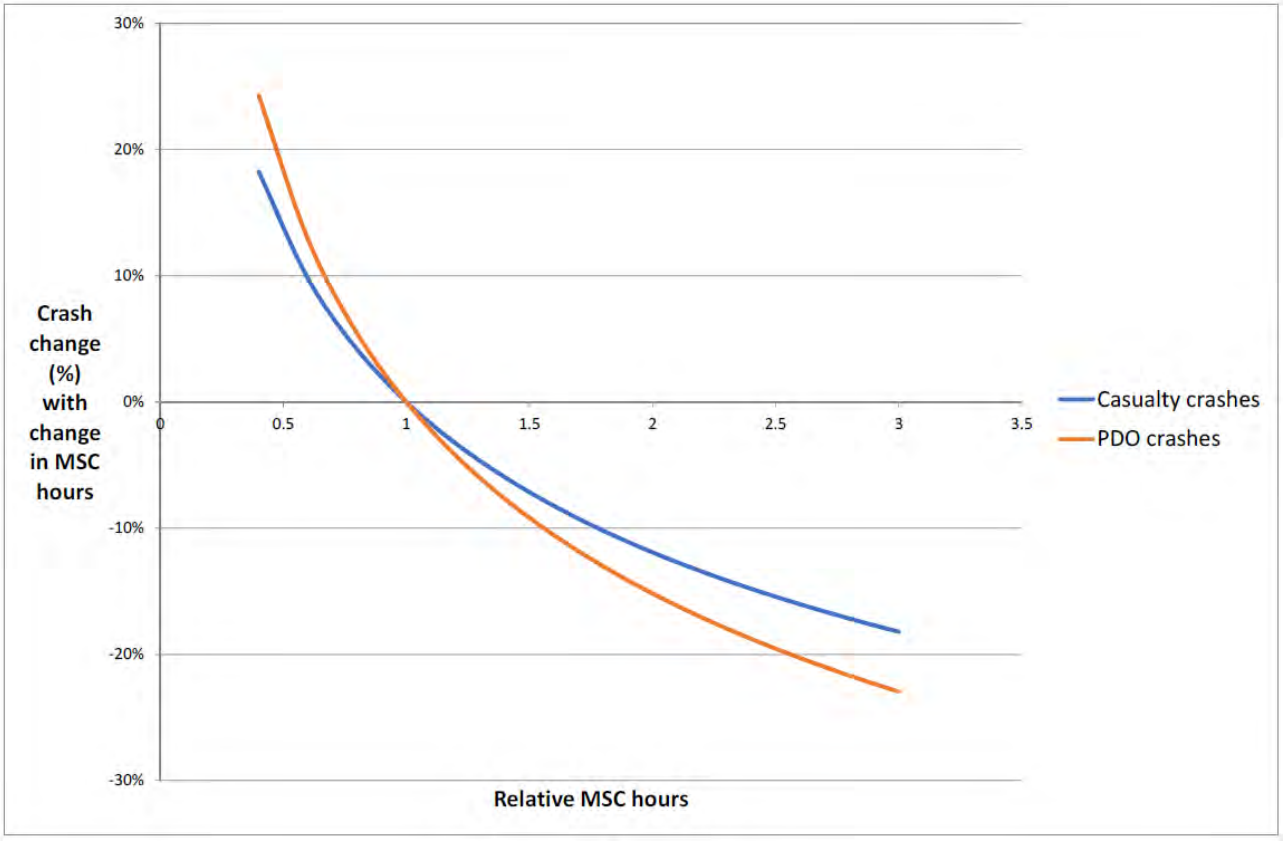
Source: Elvik (2011).

Figure 3.8: Relationship between increasing mobile speed camera annual hours of operation and change in relative crash risk associated with the ACT mobile speed camera program by crash severity



Source: Clark et al. (2019).

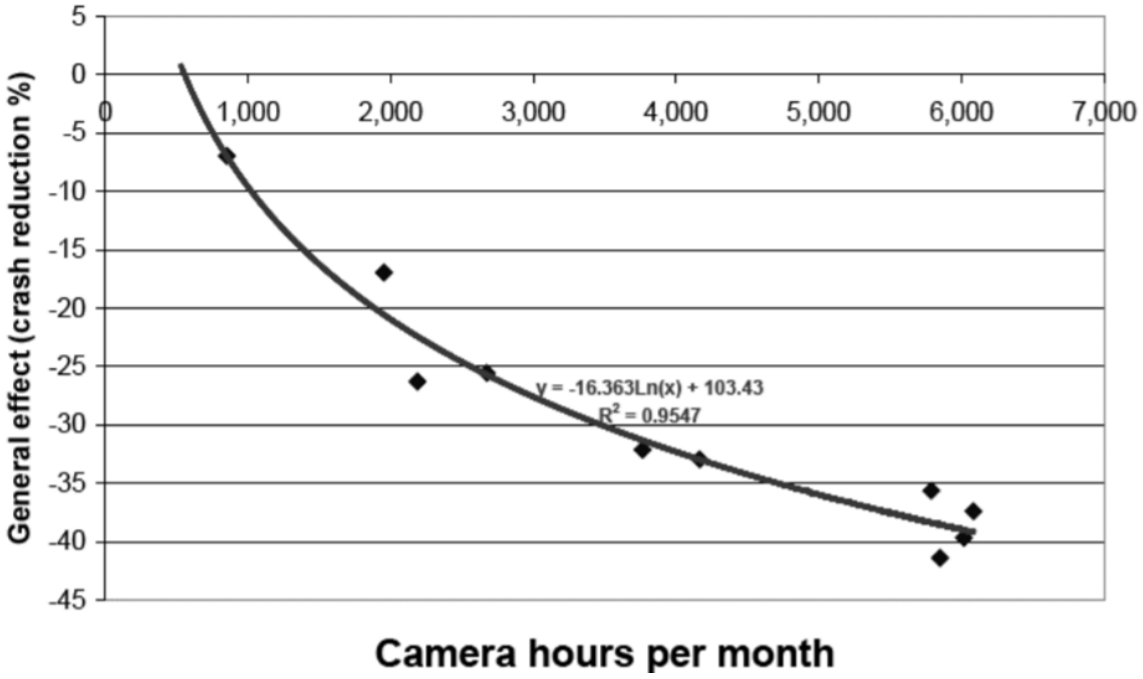
Figure 3.9 Percentage change in crashes associated with relative levels of MSC operating hours in the ACT



Source: Clark et al. (2019).

As discussed in Section 3.2.2, the Queensland MSC program is deployed using randomised scheduling of camera sessions to sites, thus contributing to their unpredictability across the broader road system (Cameron 2016). As the program grew from 852 hours per month in 1997 to about 6000 hours per month during 2003–06 (Newstead & Cameron 2003; Newstead 2004, 2006), a 2 km 'halo effect' area around camera sites covered a greater proportion of the total casualty crashes in Queensland, rising from about 50% to 83% over the evaluation period (Cameron 2016). The localised crash reductions around camera sites were observed to have a general effect on crashes, even assuming the program had no effect beyond the 2 km 'halo' areas. A power function as defined by Elvik (2001, 2011) explained this relationship well, with an estimated elasticity of –0.2202 (Figure 3.10) (Cameron 2009).

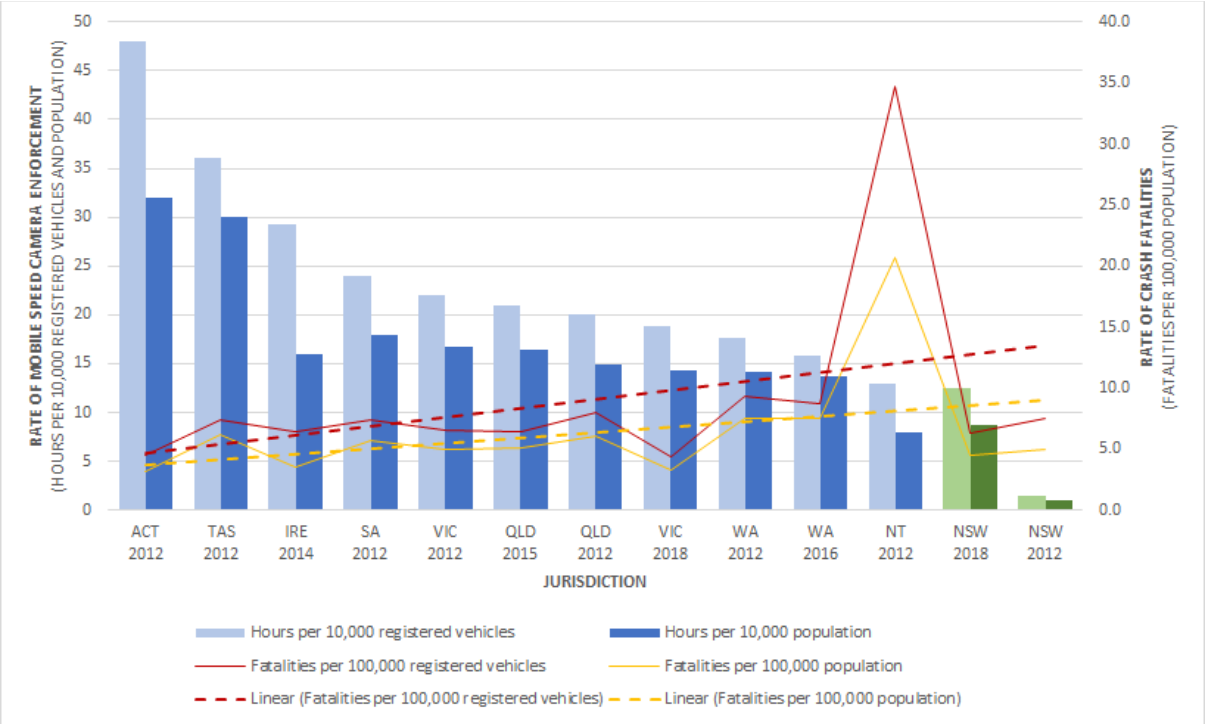
Figure 3.10 Relationship between casualty crashes in QLD and monthly hours of the overt MSC program with randomised scheduling, 1997–2006



Source: *Cameron (2009.*

The rates of enforcement for various jurisdictions and various years are shown in Figure 3.11 with an overlay of crash fatality rates. Although the relationship is not statistically significant, it can be seen that there is a general trend between increased rate of enforcement hours and decreased fatality rates. The enforcement rate in NSW in 2018 (which remains at approximately 7000 hours per month) is lower than any other jurisdiction based on the data that could be obtained during the literature review and through consultation.

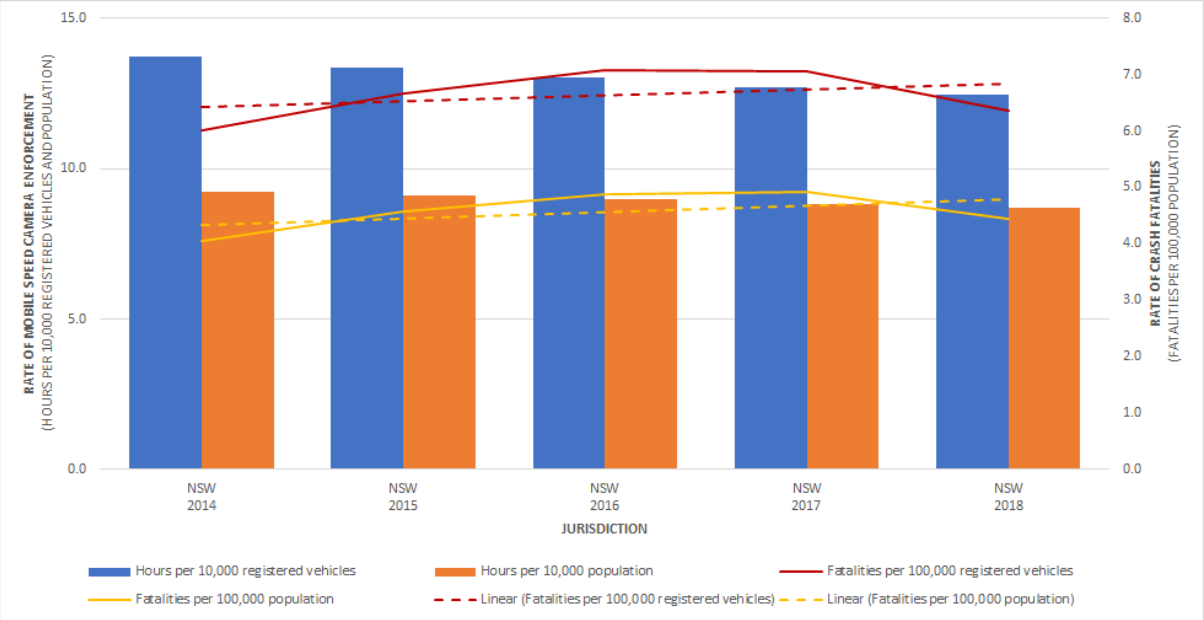
Figure 3.11 Rate of mobile speed camera enforcement, NSW versus other Australian jurisdictions (data plotted for 2012–14) with corresponding rate of crash fatalities



Source: Audit Office of New South Wales (2018) with additional jurisdictional information and fatal crash rates added by ARRB.

The literature review and consultation suggests that the MSC enforcement hours in NSW have remained constant at approximately 7000 hours per month from 2014 to 2018. With growth increases in population and registered vehicles, this has resulted in a reduced rate or dose of enforcement in the state (Figure 3.12). The fatal crash rate has also increased during this period (although the associated statistical significance has not been demonstrated in this review).

Figure 3.12 Estimated rate of MSC enforcement in NSW 2014 to 2018 with overlaid fatal crash rate.



Source: Auditor-General Report (2018) with additional years projected by ARRB

3.2.6 'MOBILE-MOBILE' MSC DEPLOYMENT

France has implemented new MSC technology starting in 2013 (Blais 2015); a small radar and camera mounted in the rear of unmarked vehicles that can detect speeding while the camera vehicle is moving (Figure 3.13).[4] Consultation with the IFSTTAR Science and Technology Institute in France refers to these devices as so-called 'mobile-mobile' (in-flow control)[5]. They were implemented in the absence of published scientific investigation (but in accordance with the principles of general deterrence). The program was re-launched in 2018 and is still in what would be referred to as a beta phase. The cameras will be fixed on the dashboard, with a radar hidden behind the number plate, to detect a car's speed (MacGuill 2013). These devices are designed to be able to take accurate photos from inside moving vehicles (MacGuill 2013).

This technology comes in response to devices and smartphone applications that can detect and cheat speed radar cameras currently in operation. However, any speed registered by the cameras will be reduced due to a 10% margin of error, meaning that for detection, a motorist would have to be travelling at 146 km/h on the motorway where the speed limit is 130 km/h (MacGuill 2013). This represents quite a large

[4] Wales has used similar arrangements with unmarked police vans for the past 15 years, however, involving the direct police interception of offending drivers using 7 mobile marked police vehicles intercepting errant drivers in consecutive interceptions. Although effective, this model from Wales is resource intensive.

5 Technological information about the devices can be found on the ONISR website.

enforcement threshold, limiting detection to motorists exceeding 10 km/h over the speed limit. As an extension of this program, unmarked vehicles owned by private companies became operational in Normandy in April 2018. These private unmarked speed cars operate six hours a day compared to the average of one hour, 15 minutes for the police-driven vehicles (Smart Highways 2019).

Figure 3.13 Unmarked mobile camera vehicle, France

Source: https://anglophone-direct.com/french-mobile-speed-cameras-go-private/

3.3 ENFORCEMENT TOLERANCE THRESHOLDS

Enforcement tolerance thresholds refer to the number of kilometres per hour over the speed limit a driver can exceed before an infringement is issued. NSW and all other reviewed jurisdictions have the policy of not publishing their tolerance thresholds for their MSC programs. Many of the reviewed jurisdictions do not publish their tolerances in order to not create a new 'default' speed limit.

Van Lamoen (2014) discusses that the tolerance threshold applied to speed enforcement should be set at the minimum practical level, as greater compliance with the speed limit is obtained by lowering the enforceable tolerance threshold. Enforcement of speed limits acts as a countermeasure to speeding and deters intentional speeding violations through threat of detection, apprehension and punishment when the driver exceeds the speed limit (Van Lamoen 2014). Lower tolerances contribute to an increase in network-wide general deterrence as drivers would have a higher certainty of punishment, resulting in reduced speeds.

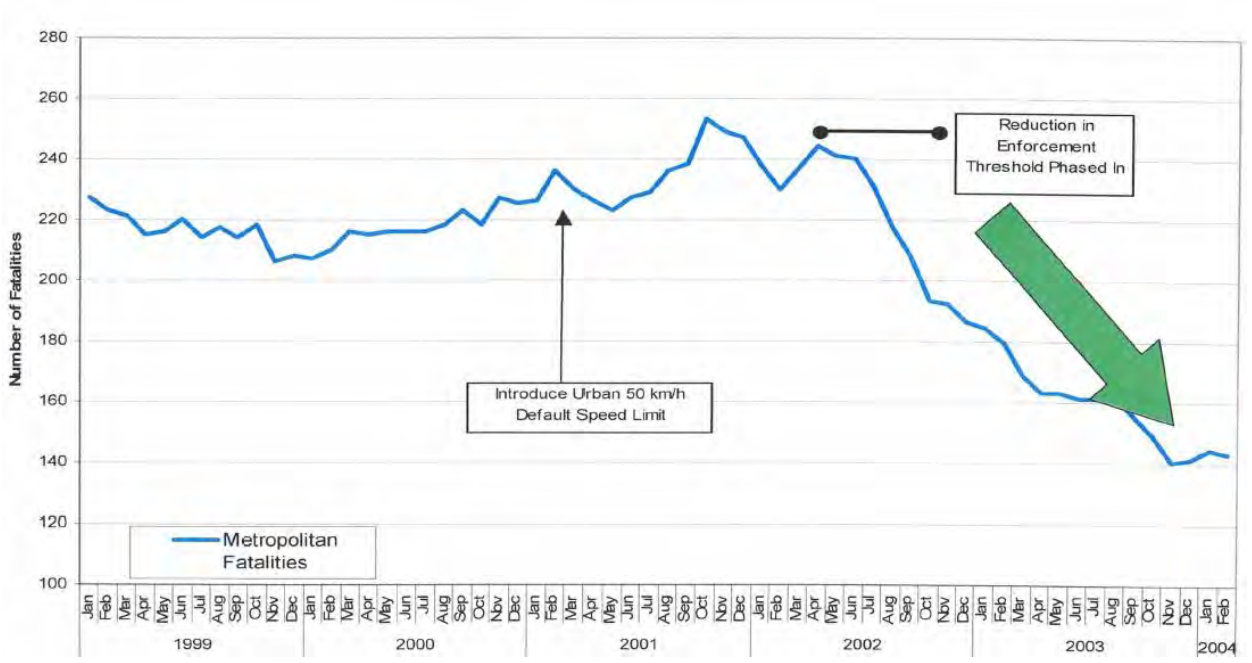
New Zealand enforced a flat 10 km/h enforcement threshold across all roads in July 2000 (Cameron et al. 2003). This resulted in a substantial decline in the number of vehicles exceeding the speed limit at speed camera sites. The proportion of drivers detected travelling over 110 km/h on rural roads fell from 24–26% during 1997–1999, to 20% in 2000, 15% in 2001 and 10% in 2002 (Land Transport Safety Authority 2003, cited in Cameron et al. 2003). Speed enforcement campaigns were later introduced in 2014 for 2 months to lower the speed enforcement threshold from 10 km/h to 4 km/h (Van Lamoen 2014). Significant reductions in speeding were seen, with 36% reduction in speeding of 10 km/h or less and a 45% reduction in speeding of over 10 km/h (Van Lamoen 2014). Increased intensity of speed enforcement and public awareness were considered as having enhanced the effects of implementing a reduced speed enforcement

threshold (Van Lamoen 2014). This indicates that the introduction of a lower speed enforcement tolerance threshold can reduce driver speeding and lead to greater general deterrence network-wide.

In Victoria as part of the Transport Accident Commission's 'Wipe off 5' campaign, the enforcement tolerance threshold was systematically reduced from February 2002 by 1 km/h increments each month for three months. This was accompanied by media reinforcement for road safety, which is an important aspect of reinforcing deterrence measures. A speed reduction effect was observed in addition to a reduction in crashes and considerable reduction in road fatalities by 9% each month (obtained in consultation with VicRoads). Road trauma was significantly reduced in Victoria between 2001 and 2003 as shown in Figure 3.14. This shows a reduction in road trauma of 17% in the first year and an 11% reduction in the second year. However, it is difficult to distinguish whether the reduction can be attributed to the tolerance reduction, the road safety campaign or a combination of both.

Newstead et al (2013) evaluated the Queensland program, estimating crash effects from 1997 to 2011 (all casualty crashes) and to 2012 (serious casualty crashes). The crash effects of Queensland's MSC enforcement were evaluated as the program grew over time. In 2008, the enforcement tolerance was reduced, which was separately evaluated to result in an 11% reduction in crashes (Cameron 2016).

Figure 3.14 Metropolitan fatalities, rolling 12 months – Jan 1999 to Feb 2004



Source: Obtained through consultation with VicRoads (Shuey 2004).

4 MSC PROGRAM KEY PERFORMANCE INDICATORS

To accurately measure the effectiveness or performance of the MSC program it is critical to identify Key Performance Indicators (KPIs) that are recorded at regular time intervals. This allows for the comparison of KPIs at regular intervals, such as annually, to gauge if performance has increased or decreased based on changes made to the MSC program. From the review of available literature, it is evident that jurisdictions either do not capture sufficient data to make comparisons, or do not publish this data externally. Subsections are provided to discuss KPIs that have been identified through the review of jurisdictions and other literature.

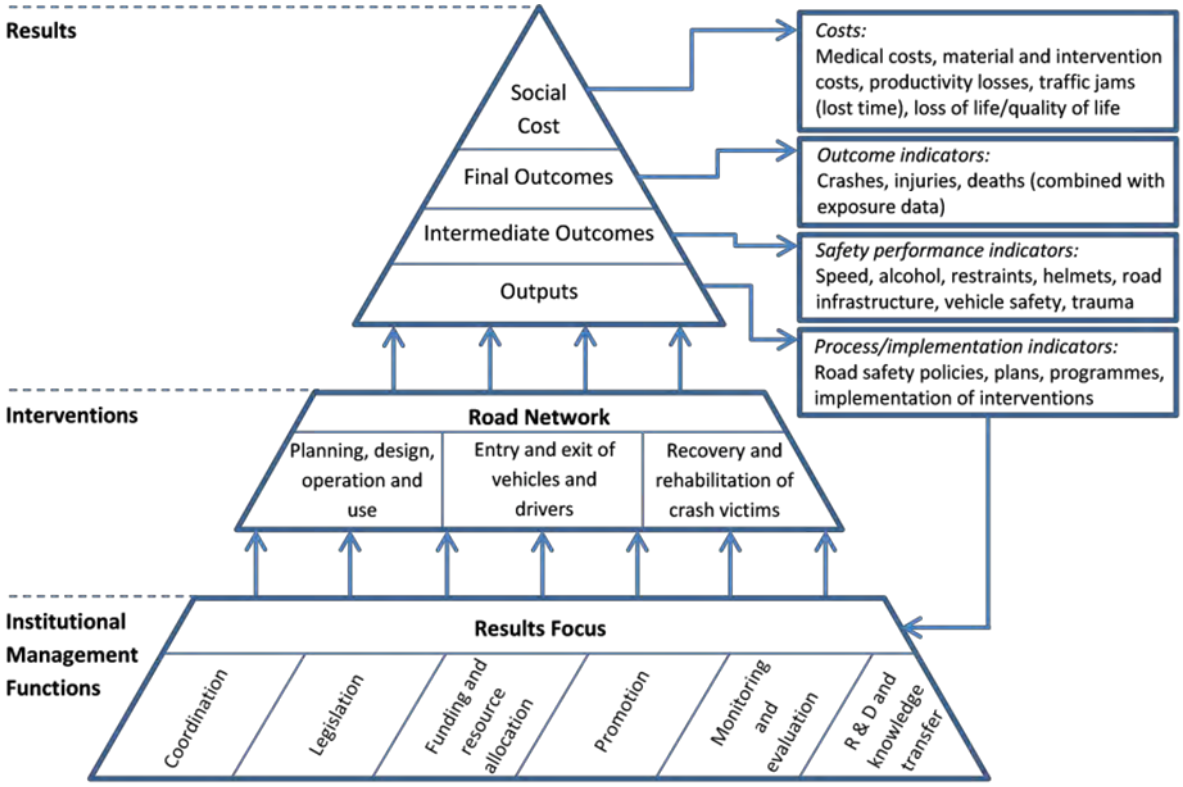
4.1 KPIS IN EACH JURISDICTION (AND GLOBALLY)

The development of performance indicators in road safety is historically based on crash data, including for speed enforcement. WHO (2008, 2010) provides guidance on the linkage between safety data and effective safety management providing a framework for the collection and use of this data. However, WHO (2010) identifies that crash data alone is not sufficient to manage safety, but rather it must be used in combination with other sources of information. This additional information is required to better interpret risks, thereby assisting in the monitoring of performance and achievement of results.

As identified in Figure 4.1 (and further discussed in WHO 2010) the desired results or outcomes of road safety management are expressed as goals and targets, and occur at a number of different but related levels. These include institutional outputs from the policies, programs and projects that have been implemented, which influence a range of intermediate outcomes (e.g. speed, alcohol, restraint use, helmet use and road and vehicle safety). These intermediate outcomes subsequently influence final outcomes (e.g. crashes, injuries, deaths and related exposure data). Acting on intermediate outcomes as proactive interventions reduces average and mean speed throughout the infrastructure and in turn reduces risk and crash potential.

The deterrence strategies consequently impact on the final outcomes, these being reduced crashes and reduced road trauma. Ultimately, these should reduce fatal and serious injury, in alignment with Safe System outcomes (safe roads, safe speeds, safe users, safe vehicles).

Figure 4.1 Data requirements for road safety management



Source: Adapted from WHO (2010); GRSF (2009).

Regarding mobile speed enforcement, the 'outputs', or process indicators, could include the hours spent on enforcement (preferably by area or sub-region). Intermediate outcomes could include the level of compliance with speed limits (including inside camera sites, but also outside these sites) as well as speed surveys and public attitude surveys. The final outcomes relate to the number of fatal and serious injury crashes occurring, including within the enforced areas, but more importantly across the entire network as a result of successful general deterrence.

In NSW, the performance of the MSC program is measured annually, with the most recent review having been completed for the 2017 year. The purpose of the Annual NSW Speed Camera Review is to monitor speed cameras in NSW to ensure they are having a positive road safety effect (TfNSW 2018). At least five years of crash and casualty data are required to assess a camera's safety benefit.

Since 2010, when the mobile speed program was re-introduced in NSW, it has been found that over 99 per cent of vehicles passing mobile cameras in NSW are not infringed for speeding (TfNSW 2018). In 2016, the compliance rate was 99.9% (compliance data compares the number of vehicles that pass a camera with the number of fines detected by the camera).

MSC compliance data (i.e. the proportion of vehicles that pass a MSC that are not fined) should not be the only measure of network-wide success of MSCs, as it is not demonstrative of general deterrence (and, rather, demonstrates improved compliance at a limited number of locations). The Auditor-General reported that compliance data is the only measure currently directly attributable to MSCs in NSW (Auditor-General's Report on Mobile Speed Cameras 2018). However, consultation with Transport for NSW indicates the network-wide success of the MSC program is measured using compliance data as well as data on the reduction in road trauma and speeding.

Despite the current performance measures of MSC effectiveness in NSW, the Auditor-General's Report suggests there is limited evidence that the current MSC program in NSW has led to a behavioural change in drivers by creating a general network deterrence. Given that MSCs are one component of a range of speed enforcement activities, including police patrols and fixed cameras, the results for speed surveys and crash data are only partially attributable to MSCs.

As the goal of MSC deployment is to achieve general network deterrence, the performance measures for evaluating the success of the MSC program obtained in this review are limited. The primary goal of the MSC program is to reduce speeding and FSI crashes across the network. In order to measure the success of the MSC program on achieving general network deterrence, the following performance indicators should be measured (preferably on a monthly or frequent basis):

- the **number** of deployed mobile camera sites
- the **randomness** of sites selected (the measurement of randomness can be defined by simplistic or highly technical statistical analysis but must be consistently defined)
- the **geographical area** of sites (sites should span across the network and reflect the distribution of crashes in urban, fringe and rural areas)
- the rate of **enforcement hours** per population and population of registered vehicles (the number of enforcement hours should also be recorded for completeness)
- The **type of enforcement** at each site (whether it was signed or unsigned and whether a marked or unmarked vehicle was used)
- the percentage of passing motorists exceeding the speed limit **at the camera site** (measured at the camera and defined perimeters surrounding the camera to measure the halo effect)
- the mean speed, 85th percentile speed, and percentage of motorists exceeding the speed limit **across the network** (as measured by randomised speed surveys across the road network)
- the **number of FSI crashes** across the network (including those where speed was a contributing factor).

4.2 ENVIRONMENTAL KPIS

Performance and outcome measures should all be recorded relative to the type of road environment in which the activity (enforcement, crash or speeding) is likely to vary. ARRB's (2005) review of fixed speed cameras recommends the categorisation of the road network into environmental types for defining the location of speed camera sites, the areas where network speeding is measured, and the location of FSI crashes. While this review was performed on fixed speed cameras, this categorisation is still relevant to MSCs in determining performance across different environments.

Environmental conditions should be recorded for both crash reduction and enforcement hours. This can be done by way of differentiating between the following area types:

- urban (defined as centres with populations > 10 000)
  - freeway
  - collector
  - arterial
  - local
- rural centre: (defined as centres with populations between 100 and 10 000)

  - through road
  - collector
  - local
- inter-rural: (defined as roads between centres and/or urban environments)
  - rural highway (> 2 lanes)
  - rural collector
  - rural minor sealed
  - rural minor unsealed.

This will allow for jurisdictions to measure the effectiveness of MSCs in different environments to determine the most optimal combination of enforcement techniques to achieve the greatest reduction in crashes/speeding.

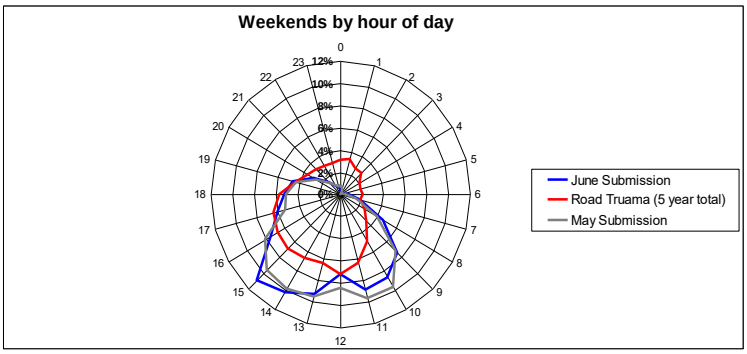
4.3 MSC ENFORCEMENT KPIS

The key performance measures for MSC enforcement are listed in Table 4.1. A key issue of best practice enforcement is to use the intelligence available to ensure that resources are not wasted and that enforcement matches trauma. This is particularly relevant where limited resources are being employed to ensure that the enforcement has impact where and when it has maximum benefit.

A critical analysis will determine effectiveness. This should be undertaken as routine self-assessment of any enforcement program.

Outputs do not need to be complex but must reflect user requirements. At the high end, a custom developed data collection and management system may be required, while at the lower end a simple application such as 'Microsoft Excel' can be used to record data, develop charts and produce reports.

There are simple, inexpensive basic analytical tools which are easy to produce and visually easy to understand. As an example, Excel has the capability of generating Radar Graphs also known as 'spider' graphs. These convert the input data and provide a graphic representation of outcomes.



As can be seen, from this example from the MSC deployment program in Victoria in 2002, the blue line indicates the road police enforcement by hours on the weekend (camera hours). The red line indicates the times of road trauma on the weekend.

Using this graphic representation to compare the peak enforcement actions between 10:00 and 15:00, to the actual road trauma data, between 22:00 and 03:00, it clearly shows the police resources (MSC camera deployment hours) are not being deployed efficiently and, as a result, their effectiveness is diminished. Understanding this mismatch of enforcement to road trauma enables commanders to strategically target scarce police resources to achieve positive outcomes.

To ensure a close match between enforcement and road trauma in time, effective deterrence also requires enforcement to be carried out close to where road trauma occurs.

For MSC enforcement, it may be appropriate to locate the cameras upstream of major trauma sites so that vehicles are travelling at safe speeds by the time they arrive at a high-risk location. Although effective enforcement requires a degree of targeting MSC resources at high-risk locations, if speed deterrence is to be effective across the road network, then it is essential to deploy the majority of MSC resources at locations other than high-risk locations. The balance between high-risk and other locations is a matter for judgement, which should be reviewed regularly in response to changing crash patterns and other intelligence relating to speed behaviours.

A simple process to measure the halo effect of speed reduction around ALL speed camera locations is to operate unmarked speed survey instruments 2–3 km before and after the identified sites. This will clearly validate the effectiveness or otherwise of the (a) enforcement strategy (b) the signage strategy and (c) whether MSCs are an effective tool in their current set-up. Unmarked speed survey information should be collected regularly and consistently throughout the state and throughout the year.

Table 4.1: MSC enforcement performance measures

ENFORCEMENT	PERFORMANCE MEASURE
Number of sites	Number of sites per population Number of sites per registered vehicle population Number of sites per Vehicle Distance Travelled (VDT)
Hours of enforcement	Hours of enforcement per month, per population Hours of enforcement per month, per registered vehicle population Hours of enforcement per month, per VDT
'Randomness' of sites	Measured as a percentage of the population to account for growth
Number of vehicles checked	Measured as a percentage of the population to account for growth
Percentage of vehicles exceeding the speed limit	Defined as both cited and non-cited users
Percentage of vehicles travelling greater than the enforcement limit	Standardisation of tolerance levels would enable comparison between jurisdictions
Cull rates	
The number of deployments at each site	Separate visits made includes multiple visits to the same site
The total number of deployments/sessions	Specific sites visited regardless of frequency
The percentage of sites at crash locations	
The percentage of sites at crash times of day	

4.4 COMPLIANCE RATE AND INFRINGEMENT KPIS

As the intent of the MSC program is to achieve general network deterrence, the annual review of the MSC program examines NSW crash and speed data for the entire state, rather than individual mobile speed camera locations. The 2017 mobile camera data collected reveals:

NSW speed survey data for the last eight years shows a reduced proportion of light vehicles exceeding the speed limit, across all speed zones. Comparing the 2016 speed survey results against those from 2015, there are a decreased proportion of light vehicles exceeding the speed limit in most NSW speed zones measured.

NSW and other jurisdictions cite compliance rates as a performance measure. The use of the MSC compliance data (i.e. the proportion of vehicles that pass a MSC that are not fined) is not an effective measure of the network-wide deterrence of MSCs as it only demonstrates improved compliance at a

limited number of locations. Transport for NSW advise that this measure is supplemented with data on reduction in road trauma, speed related crashes and speeding. However, compliance data is the only measure currently directly attributable to MSCs (Auditor-General's Report on Mobile Speed Cameras 2018.

Detailed information about infringement issuance, success rates and processing times should be collected as per Table 4.2.

Table 4.2: Performance data which should be collected about Infringements.

INFRINGEMENT DETAILS	PERFORMANCE MEASURE
Processing time	• Average time between photos being taken, and adjudication commencing. • Average time taken between adjudication and issuing of the TIN (traffic infringement notice). • Percentage prosecutability (and why). • Average time for the finalisation of the cases (from triggering the camera to final disposition). • Total number of queries answered, personal verifications requested, complaints, TINs reprocessed (e.g. corporate vehicles) and TINs cancelled.
Issued	• Number of infringements issued. • Time elapsed between date of infringement and date of issue.

4.5 SPEED SURVEY KPIS

Speed surveys provide a critical indicator of the general deterrence across the network on speeding as a result of MSC programs. This is supported by the Christie et al. (2003) study which shows that MSCs can reduce speed in a 500 m 'halo' around sites and have a corresponding reduction in injurious crashes. Therefore, speed surveys at (preferably before and after) MSC sites on a route can be used to measure speed compliance, and a reduction in speed will indicate whether a driver's certainty of punishment has resulted in a deterrence to speeding.

Ireland uses speed surveys as part of their MSC program to ensure that sites represent locations where speeding is common behaviour (An Garda Síochána 2017). Once a site's occurrence of speeding has lowered to an acceptable level, the site is removed from their list of approved locations (An Garda Síochána 2017). This helps to ensure that resources are targeted at areas where speeding is occurring and to measure the effectiveness and deterrence of MSCs at these sites.

NSW currently undertakes annual speed surveys across their network to determine compliance with speed limits. However, this only provides insight into the performance of the whole network and does not allow for the comparison between reduction in speeding and MSC enforcement. This limits the ability for the jurisdictions to determine the effectiveness of MSCs in precise locations and generally across the whole network. A data overlay is required to analyse the travel speeds at MSC sites over time, at sites where crashes have occurred, and across the network.

To provide a suitable comparison of year-on-year effectiveness it is recommended that performance measures similar to those used to gauge the effectiveness of fixed speed cameras be used. The performance measures for fixed speed cameras (as shown in Table 4.3 and as indicated previously by ARRB (2005)) should be captured at (preferably before and after) MSC sites and across the network at randomised locations, on a frequent basis (preferably on a monthly basis).

As previously mentioned, these annual speed surveys should be a mandatory part of the KPI's for MSCs.

Table 4.3: Speed survey performance measures

SPEED DETAILS
Speed distribution curve
Mean speed and 85th percentile speed
Percentage of vehicles traveling below the speed limit
Percentage of vehicles exceeding the speed limit by < 10 km/h
Percentage of vehicles exceeding the speed limit by < 20 km/h
Percentage of vehicles exceeding the speed limit by < 30 km/h
Percentage of vehicles exceeding the speed limit by > 30 km/h

4.6 DEMOGRAPHIC KPIS

MSC programs are intended to result in general network deterrence but they can also affect specific deterrence. In the event that continued reductions in speeding (i.e. 'towards zero') are not achieved through current performance measurements, it will become necessary to evaluate whether the same population of users, i.e. those who are unlicensed or form part of a commercial entity, are over-represented in infringements and/or FSI crashes. Assessment of the demographics of speeding drivers would identify the proportion of drivers that re-offend after receiving a speeding infringement. This analysis is being utilised by the Road Safety Camera Commissioner in Victoria to further evaluate trends in speed non-compliance.

Consideration should be given as to whether the less than 1% of drivers infringing in NSW since 2010 are first-time offenders, second-time offenders and so on. It is possible that the proportion of drivers who exceed the speed limit at a mobile camera site are high-risk drivers and repeat offenders with little consideration of punishment.

An important aspect of assessing the effectiveness of mobile speed cameras is understanding the demographics of speed drivers, some metrics which should be measured are listed in Table 4.4.

Table 4.4: Driver demographic measures

SPEED DETAILS
Percentage who were disqualified or unlicensed
Percentage of repeat offenders
Percentage of motorcycles
Percentage of 'fleet' or commercial vehicles
Percentage of male/female, young/elderly, etc

4.7 ROAD TRAUMA KPIS

The purpose of the MSC program is to achieve a reduction in driver speeds through general deterrence that in turn results in a reduction to overall road trauma occurring on the road network.

Over time, the monitoring and continued improvement of speed management practices will provide NSW with the means to maximise the reduction of road trauma from enforcement and education investments. With the broad level of data recorded in a consistent manner, the effect of variations in local practice (e.g. signing of camera sites, public education initiatives etc.) on outcome measures will be more easily isolated.

To accurately assess the effectiveness of MSCs in the reduction of road trauma, the measures shown in Table 4.5 should be captured.

Table 4.5: Road trauma performance measures

CRASH DETAILS	PERFORMANCE MEASURE
Crashes	Crashes per population Crashes per registered vehicle population Crashes per VDT
Fatal crashes	Fatal crashes per population Fatal crashes per registered vehicle population Fatal crashes per VDT
Hospitalisation/serious injury crashes	Hospitalisation crashes per population Hospitalisation crashes per registered vehicle population Hospitalisation crashes per VDT
Injury crashes	Injury crashes per population Injury crashes per registered vehicle population Injury crashes per VDT
Speed related crashes	Speed related crashes per population Speed related crashes per registered vehicle population Speed related crashes per VDT

5 KEY COMPONENTS OF AN EFFECTIVE MSC PROGRAM

While the jurisdictional review and consultative process revealed a limited evidence base quantifying the effectiveness of mobile speed cameras, and particularly of each individual program component. The consensus of research reviewed suggests mobile speed camera programs are an effective means to reduce road trauma and are an essential part of any road safety campaign. The true benefit of MSC programs lies in the observed reduction in speeding through general deterrence, which has a measurable effect on crash risk. The benefits of the MSC program are achieved along with other road safety measures, such as fixed cameras, drink-driving enforcement, other police enforcement and media campaigns.

The literature highlights aspects which lead to increased effectiveness of MSC programs and aspects which have less effectiveness.

A summary of the key components of the MSC program in each jurisdiction are shown below and are summarised in Appendix A, with respect to effectiveness in achieving general network deterrence.

The highest level of deterrence will result when drivers are certain they will be punished if they offend, where there is sufficient severity of punishment and when punishment is swift. Based on these principles and on the review of jurisdictional research, the highest level of deterrence (highest effectiveness) will result when the following is implemented:

1. A high proportion of **unmarked and unsigned** MSC sites should be used to achieve general network deterrence.
2. A high 'dose' or intensity of **MSC enforcement** is required to affect network speed compliance and crash reduction.
3. **Enforcement tolerance** should be as low as practicable.
4. **Infringements** should be swift and reflect the severity of non-compliance.

5.1 PROPORTION OF UNMARKED AND UNSIGNED MSC SITES

NSW is the only jurisdiction in Australia which utilises highly overt deployments, using advanced warning signs and marked vehicles. The use of signage (influenced by policy requiring signage), particularly 250 m in advance of the MSC has resulted in eliminating bi-directional enforcements. Advanced signage provides drivers with ample time and distance to adjust speeding behaviour before the site resulting in minimal certainty of punishment and therefore limits the general deterrence achieved.

Victoria, Western Australia and France utilise primarily inconspicuous (unmarked and unsigned) deployment of MSCs to achieve general deterrence. Where Queensland previously used few unmarked vehicles prior to 2010 (where only about 7.6% of the MSC fleet was unmarked), they increased the quantity of unmarked deployments until 2012 (reaching approximately 20% unmarked MSC fleet). New Zealand and the UK reportedly utilise a combination of marked and unmarked deployment, although the percentage of each is not clearly publicised. The deployments in England and Ireland are closest in similarity to NSW, being largely overt in nature with the exception that advanced warning signage is not required.

RECOMMENDATIONS:

- Unmarked and unsigned deployments should encompass most sites in order to reinforce to road users that they can be caught and punished anywhere and anytime, ensuring certainty of punishment and, therefore, general deterrence.
- Highly overt deployments result in site-specific deterrence rather than general network-wide deterrence of speeding. This type of overt enforcement is associated with a limited halo effect at specific sites, having less outcome on general deterrence across the network.
- Use of highly overt vehicles such as those used in NSW are used in the UK, Ireland and in 70–80% of Queensland's fleet; however, these overt deployments are associated with far greater deployment hours, greater network coverage and true randomisation. Use of marked vehicles is only acceptable if the MSC deployment areas are wide enough to provide overlap of halo regions across the entire network.
- Regardless of whether marked or unmarked vehicles are used, signage should not be placed in advance of MSC vehicles as such placement allows drivers to adjust speed in advance of the MSC location and decreases certainty of punishment.
- Media reinforcement (which in most jurisdictions evaluated occurs in the form of a proportion of highly visible MSC deployments) is important for educational awareness and to reinforce the possibility of 'anywhere, anytime' enforcement.

5.2 DOSE OR INTENSITY OF ENFORCEMENT

The research and consultation suggest that each jurisdiction has a common method of selecting sites for MSCs, namely consideration of crash and other risk factors in accordance with Safe System principles.

Apart from the UK, the majority of jurisdictions have documented site selection criteria.

Sites are selected based on risk with consideration of crash history, history of public complaints, police recommendation or public/Council recommendation.

As a general consideration, a jurisdiction may adopt a strategic approach in a network deterrence concept with thousands of speed cameras jurisdiction wide as evident in England and France, or a general deterrence approach with limited unsigned locations as in Victoria. The general deterrence approach is more resource-focused, cost-effective and achieves more measurable results on a cost-benefit basis.

The literature did not identify an evidence base for the number of sites on MSC program performance. Consistent with deterrence theory, it follows that the selection of more sites will enable more random selection of sites (and more uncertainty about which sites will be deployed) reinforcing the notion that offending drivers can be caught anytime, anywhere.

It can be concluded based on the Auditor-General's report that NSW has a lower hourly rate of operation per population than other Australian states.

RECOMMENDATIONS:

- Deployment of mobile speed cameras should be supported by an overarching road safety strategy, for example the NSW Road Safety Plan 2021 and the 2012 NSW Speed Camera Strategy.
- Site selection should be based on an analysis of crash risk in accordance with Safe System principles. The site selection criteria in each jurisdiction followed similar methodology.

- Once sites are selected, there should be a random deployment schedule to sites to ensure that camera locations are not predictable. The selection of sites should be completed by computer algorithm or statistical analysis to ensure selection is truly random.
- In order to optimise safety outcomes, the research (particularly from NSW, Queensland and WA) suggests that the size of the program should be increased in NSW. Evidence suggests that the 'dose' or intensity of the program (in the form of hours or rate of enforcement) has a relationship with a crash reduction response.
- If the MSC program can cover a large geographical area representing the majority of high-risk crash locations, known halo effects can result in large crash reductions regardless of whether overt or unmarked vehicles are used (provided advanced warning signs are not used).
- Deployments should represent times when crashes occur (day and night).

5.3 ENFORCEMENT TOLERANCE THRESHOLDS

There is minimal published or shared information relating to specific enforcement tolerance thresholds for MSCs. It is inferred that the tolerance value is comprised of the machine's inherent error tolerance combined with an additional factor applied by each jurisdiction.

Publication of tolerances is documented in the research to result in so-called 'default' speed limits higher than the posted limits. Historical information from Victoria from the Transport Accident Commission (TAC) 'Wipe off 5' campaign demonstrated significant safety benefits when enforcement tolerances were reduced in combination with a state-wide media campaign.

RECOMMENDATIONS:

- Tolerance set as low as practicable factoring in machine capability and other considerations.
- Community expectations are important but should not be the driving factor for selecting tolerance thresholds.
- Tolerance levels should not be published.

5.4 PENALTY FRAMEWORKS

Apart from Ireland, all jurisdictions use a graduated infringement scheme, with infringements increasing with increased speeding above the limit. In accordance with deterrence theory, the severity of punishment should be severe enough to promote general deterrence.

The general timeframe at which infringements are issued appeared to be 14 days or less. Deterrence theory suggests that punishment of offenses must be as swift as practicable. Automated systems in France have shown promising results in this aspect, with infringement notices typically delivered to motorists within 7 days.

RECOMMENDATIONS:

- Infringement schemes should be graduated based on severity of speeding. Consideration should be given toward loss of licence and vehicle impoundment for high-speed offenders or for repeat offenders.

- Infringements should be issued as swiftly as possible and ideally within 7 days. With modern technology, it is projected that infringements could be issued quickly using means other than postal mail.

6 CONCLUSIONS

The conclusions arising from the review of literature and the available published policy and research covering mobile speed camera operations are presented in this section.

KEY COMPONENTS

The highest level of deterrence will result when drivers are certain they will be punished if they offend, where there is sufficient severity of punishment and when punishment is swift. Based on these principles and on the review of jurisdictional research, the highest level of deterrence (highest effectiveness) will result when the following are implemented:

- A high proportion of **unmarked and unsigned** MSC sites should be used to achieve general network deterrence.
- A high 'dose' or intensity of **MSC enforcement** is required to affect network speed compliance and crash reduction.
- **Enforcement tolerance** should be as low as practicable.
- **Infringements** should be swift and reflect the severity of non-compliance.

KEY PERFORMANCE MEASURES

The primary goal of the MSC program is to reduce speeding and crashes (particularly FSI crashes) across the network. In order to measure the success of the MSC program on achieving general deterrence, the following performance indicators must be measured (preferably on a monthly or frequent basis):

- the **number** of deployed mobile camera sites
- the **randomness** of sites selected (the measurement of randomness can be defined by simplistic or highly technical statistical analysis but must be consistently defined)
- the **geographical area** of sites (sites should span across the network and reflect the distribution of crashes in urban, fringe and rural areas)
- the **rate of enforcement** hours per population and population of registered vehicles (the number of enforcement hours should also be recorded for completeness)
- the **type of enforcement** at each site (signed/unsigned and marked/unmarked vehicle)
- the percentage of passing motorists exceeding the speed limit **at the camera site** (measured at the camera and defined perimeters surrounding the camera to measure the halo effect)
- the mean speed, 85th percentile speed, and percentage of motorists exceeding the speed limit **across the network** (as measured by randomised speed surveys across the road network)
- the number of **crashes** and **FSI crashes** across the network (including those where speed was a contributing factor).

In order to accurately measure the performance of MSC programs, it is critical to collect additional performance data across a variety of areas. This allows for the comparison of a MSC program's performance between years to gauge the effectiveness of enforcement techniques.

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APPENDIX A JURISDICTIONAL FINDINGS

The findings from the review of research literature, internet searches, stakeholder consultation and review of jurisdictional practice identified several key components of a better practice MSC program. The eight jurisdictions that were included as part of the comprehensive review (including New South Wales) included:

- New South Wales (Australia)
- Victoria (Australia)
- Queensland (Australia)
- Western Australia (Australia)
- New Zealand
- United Kingdom
- Ireland
- France.

This Appendix provides the complete findings of the review for both effectiveness of MSCs and existing practices for each investigated jurisdiction.

Table A.1 below shows a summary of findings across all jurisdictions to allow for easy comparison of existing practices. All jurisdictions had similar methods of site selection based on risk. Apart from Ireland, all jurisdictions had similar penalty frameworks, with infringements operated on a graduated scheme based on severity. The complete jurisdictional findings can be found in the subsequent sections.

Table A.1: Summary of findings for selected jurisdictions

LOCATION	USE OF SIGNAGE AND MARKED VEHICLES	PROGRAM SIZE	PROGRAM MANAGEMENT AND LINKS
NSW	• Deployment largely overt • Advanced warning signs placed 250 m and 50 m before MSC vehicle • The placement of signage limits monitoring to a single direction • MSC vehicles are marked (highly overt)	• 1024 approved locations (road lengths/areas), with 650 being used • 2585 active sites (specific sites) • 45 MSC vehicles • 7000 operational hours per month • 'current' locations published online • MSC scheduling is not 'random' with some sites appearing frequently	Partnership between RMS (TfNSW) and NSW Police Force. Operation and maintenance of MSCs outsourced to 3rd-party roadsafety.transport.nsw.gov.au/speeding/speedcameras/current-locations roadsafety.transport.nsw.gov.au/speeding/speedcameras/mobile-speed-cameras audit.nsw.gov.au/our-work/reports/mobile-speed-cameras
VIC	• Advanced warning signs not typically used • MSC vehicles primarily unmarked • Generic roadside warning signs are used, particularly at border crossings	• 1600 approved locations (road lengths/areas) • 2000 active sites (specific sites) • Approx. 9300 operational hours per month • MSC locations published monthly online	Deployed through police force, accuracy monitored by road safety camera commission watchdog camerassavelives.vic.gov.au cameracommissioner.vic.gov.au
QLD	• Advanced warning signs not typically used • Marked MSC vehicles (~80%) • Unmarked MSC vehicles (~20% with maximum of 30% unmarked permitted) • Signs/marked vehicles still used in some instances to remind motorists that speed detection can occur 'anywhere, anytime'	• 2360 approved locations (road lengths/areas) • 3500 active sites (specific sites) • Deployment 80% overt and 20% unmarked (June 2015) • 18 unmarked MSC vehicles (at Jan 2018) • 100 total MSC vehicles (excluding trailers) as of 30 Jun 2015 • The number of overt MSC vehicles not published (est. approx. 80 vehicles in 2015) • 5 marked/overt autonomous MSC trailers (at 22 Dec 2016) deployed in high-risk zones/roadworks • 103 357 actual (95 000 budgeted) deployment hours in 2014–15 FY	Deployed through joint program between TMR and the Queensland Police Service (QPS), QPS is responsible for operation and maintenance qld.gov.au/transport/safety/fines/speed/cameras#mobile mypolice.qld.gov.au/news/2018/01/14/use-unmarked-mobile-speed-cameras-queensland data.qld.gov.au/dataset/active-mobile-speed-camera-sites parliament.qld.gov.au/documents/tableOffice/TabledPapers/2015/5515T1311.pdf

LOCATION	USE OF SIGNAGE AND MARKED VEHICLES	PROGRAM SIZE	PROGRAM MANAGEMENT AND LINKS
WA	• Advanced warning signs not typically used • MSC vehicles primarily unmarked • Signs/marked vehicles still used in some instances as per WA's Signs Index	For 2-week period Sept 2019, (approx.): • 4000 sites (2016) • KPI of 3500 enforcement hours per month (2016) • Actual hours 2200 max. (2016)	Deployment through police force (considered outsourcing in 2011 but did not occur) police.wa.gov.au/Traffic/Cameras/Camera-locations police.wa.gov.au/Traffic/Cameras/Camera-information/Mobile-cameras rsc.wa.gov.au
NZ	• Warning signs not typically used • MSC vehicles tend to be plain, unmarked vans parked on the roadside • Some overt MSC vehicles are used • MSC vehicles must not be intentionally disguised or hidden but can be inconspicuous	• Quantity of pre-approved locations not advertised • MSC vans 'could be anywhere,' police change locations 'frequently' to encourage drivers to slow down over the whole road network, not just at camera sites • Quantity of active sites not advertised • 44 MSC vehicles (2011, 2018 data) • Locations of fixed and red-light camera locations published online, but mobile 'safe speed' cameras are not listed and rather are 'deployed to risk, anywhere at any time'.	Deployed through District Commander, National Mgr (Road Policing), Police Infringement Bureau, Police Calibration Services, NZ Police police.govt.nz/faq/how-do-mobile-safe-speed-camera-vehicles-operate police.govt.nz/advice/driving-and-road-safety/speed-limits-cameras-and-enforcement/safe-speed-cameras/safe-speed fyi.org.nz/ (speed camera enforcement) drivingtests.co.nz/resources/where-are-speed-cameras/
UK	• Signage not typically used • Cameras are typically operated from vehicles marked with reflective stripes • Unmarked vehicles are used • New marked MSC van 'the Long Ranger' travels on-road and can detect speeding drivers from 1 km away (Gloucestershire Police) • On-road MSC vans can capture speeds in any direction	• Approved locations difficult to estimate due to 35+ police or local authorities providing individual results • Previously published weekly list, now the Staffordshire Safer Roads Partnership has released a list of potential routes, where the mobile vans could be at any time and on any day	35+ different local council and police authorities gov.uk/government/publications/fixed-speed-camera-collision-casualty-and-speed-data/speed-camera-data rac.co.uk/drive/advice/cameras/speed-cameras speedcamerasuk.com/speed-camera-database staffordshire-live.co.uk/news/local-news/latest-mobile-speed-camera-locations-2403579

LOCATION	USE OF SIGNAGE AND MARKED VEHICLES	PROGRAM SIZE	PROGRAM MANAGEMENT AND LINKS
IRE	• Ireland has signs stating 'police vehicles only' located where MSC vans park off-road, however these are not meant for advanced warning • MSC vans are highly overt and marked with high visibility reflective materials and display a safety camera symbol • Images are taken by a camera operator at the back of the van • Unmarked survey vehicles are used to accurately observe and record speeds (however only used for survey purposes)	• 1031 approved locations (May 2016) • 225 active sites (May 2016) • 45 new Garda MSC vans in 2010 • Minimum 7400 enforcement hours per month	Program is privatised and operation and maintenance is handled entirely by GoSafe with consultation with Garda Síochána (the Ireland Police) garda.ie/en/roads-policing/road-safety/garda-mobile-safety-cameras myvehicle.ie/car-news/how-do-speed-vans-work-
FRA	• Signage not typically used for MSCs • Autonomous mobile cameras use 'Radar check over whole length of worksite' panel • MSC vehicles primarily unmarked • Trialling vehicle mounted radar cameras to detect speeds from moving vehicle	• 501 MSC (2017) • 209 'autonomous cameras' (2017)	

PHOTOGRAPHIC COMPARISON OF MSC SITES ACROSS JURISDICTIONS

Figure A.1: **NSW:** Typical Approach to a MSC with highly overt signage and marked vehicle

Source: O'Sullivan (2018).

Figure A.2: **VIC:** Typical MSC site, unmarked vehicle and no warning signs

Source: Hearald Sun (2013).

Figure A.3: **QLD:** Typical MSC site, unmarked vehicle and no warning signs (representing ~20% of MSCs)

Source: The Queensland Times (2019).

Figure A.4: **WA:** MSC tripod set up in an unmarked vehicle without warning signs

Source: ABC News Jan 2018.

Figure A.5: **NZ:** MSC unmarked van parked without warning sign

Source: Driving Tests NZ (2019).

Figure A.6: **UK:** Inconspicuous MSC vehicle with warning decals

Source: Tang (2017).

Figure A.7: **Ireland:** Highly overt MSC vehicle with no signs (but with warning decals)

Source: Irish Mirror (July 2017).

Figure A.8: **France:** A camera tripod operated on the road without signage

Source: Tang (2017).

NEW SOUTH WALES (AUSTRALIA)

Typical Set-Up

Figure A.9: **NSW:** Typical approach to a MSC with highly overt signage and marked vehicle

Source: O'Sullivan (2018).

Signage

In New South Wales (NSW) signage for MSCs is currently required through their NSW Speed Camera Strategy 2012 . NSW requires that warnings signs must be placed at 250 m and 50 m before and after the MSC vehicle (Transport for New South Wales 2019).

In recent times, there has been increased consideration for the removal of signage requirements from MSC operations. A report released by NSW's Auditor-General (2018) has recommended removing the warning signs in an effort for greater deterrence of speeding across the entire network, rather than only at MSC locations (Audit Office of New South Wales 2018).

Marked/ Unmarked Vehicles

MSC vehicles are required to be highly overt through the use of high reflectivity markings on vehicles (Figure A.9) and requiring warning signage to be placed before and after the vehicle (Audit Office of New South Wales 2018). Vehicles are clearly visible and employ no covert method of disguising the vehicle or camera enforcement zone.

As of 2014, there were 45 MSC vehicles in NSW. This was a dramatic increase from the 6 MSC vehicles in use in 2010 (Audit Office of New South Wales 2018).

Program Deployment

The NSW MSC Program was first introduced in 1991. It ceased operation in December 2008 and was re-introduced in 2010.

NSW's MSC program is managed in a partnership between RMS and the NSW Police Force (Transport for New South Wales 2016). RMS has opted to outsource the operation and maintenance of all MSC to a third-party contractor. This allows Police more time for hands-on enforcement.

Number of Sites

The MSC vehicles operate across approximately 1024 approved locations, with approximately 650 of those locations active (Audit Office of New South Wales 2018). The MSC locations are available to the general public via the Transport for New South Wales (TfNSW) website (Transport for New South Wales 2018). Within these locations there are 2585 sites actively available for enforcement using MSCs (Audit Office of New South Wales 2018).

Hours of Operation

As of 2014, NSW MSC vehicles undertook 7000 operational enforcement hours per month (Audit Office of New South Wales 2018). This is a dramatic increase from the 2010 program with 900 operational enforcement hours (Audit Office of New South Wales 2018).

Site Selection Criteria

MSC site selection uses the following criteria to determine if a site is suitable:

- frequency and severity of crashes; and/or
- risk of road trauma or previous fatal crash; or
- police nominated; or
- community nominated; or
- location is difficult to enforce by Police using conventional methods (Transport for New South Wales 2012).

Transport for NSW reports this method of site selection is used to reduce speeding through the use of anywhere, anytime enforcement strategies (Transport for New South Wales 2012). However, this method, while in accordance with Safe System principles, is not specifically related to general deterrence.

Randomness of Site Selection

Transport for NSW and RMS have established a process to schedule MSCs which is intended to use crash data to prioritise camera locations and sites. Approved MSC locations and their crash risk weightings are entered into the MSC scheduling system by TfNSW. The scheduling system uses an algorithm designed to randomise the camera schedule to ensure that camera deployment is not predictable.

The MSC scheduling system is meant to randomise the schedule to ensure that deployment is not predictable. However, a relatively small number of locations have been visited many times making their deployment more predictable in these places (Auditor-General 2018) and reducing the effective general deterrence.

Infringments

NSW uses a graduated scheme based on the severity of speeding, meaning that speed infractions exceeding the posted speed limit by a small amount carry a lower fine and demerit penalty; compared to exceeding the posted speed limit by a large amount which carries a much higher fine and demerit penalty (Roads and Maritime Services 2019). Their scheme also incorporates different penalties for various vehicle classes and characteristics of their road rules. Examples of this include:

- different penalties for Class A, B, and C motor vehicles when exceeding the speed limit;
- specific penalty schemes for learner drivers special speed limit of 90 km/h; and
- passing a school bus at more than 40 km/h.

VICTORIA (AUSTRALIA)

Typical Set-Up

Figure A.10 **VIC:** Typical MSC site, unmarked vehicle and no warning signs.

Source: Herald Sun (2013).

Signage

In Victoria there is no requirement for signs to be placed before or after the MSC vehicle to warn approaching motorists, and signs are not used to warn motorists that MSCs are present. It is noted that permanent signs warning of speed enforcement are placed at a limited number of MSC sites in high-risk areas; however, these signs are predominately used at fixed camera sites (Email correspondence with Victoria Department of Justice).

Marked/ Unmarked Vehicles

MSC vehicles in Victoria are unmarked (Figure A.10). The Department of justice highlights that use of unmarked vehicles provides a 'visible deterrent' which encourages driver compliance and improved road safety outcomes (Email correspondence with the VIC Dept. of Justice).

In Victoria, the number of MSC vehicles and operational/enforcement hours are not published and this information was not discovered during consultation.

Program Deployment

The Department of Justice and Community Safety (DJCS), through Fines and Enforcement Services (FES), is responsible for the delivery of mobile camera operations on behalf of Victoria Police.

FES manages the delivery of services, the deployment of mobile speed cameras as a deterrent and the effectiveness of this deployment is driven by Victoria Police.

A third-party supplier, currently Serco Traffic Camera Services, maintains and operates the mobile speed cameras.

Victoria also has an independent watchdog, The Road Safety Camera Commissioner (RSCC), which is responsible for:

- monitoring and reviewing current camera operations
- reviewing information made available about the camera system
- investigating and reviewing any part of the system
- managing complaints from members of the public about technical or systemic issues relating to road safety cameras.

Number of Sites

As of July 2019, there are approximately 2000 approved MSC locations across Victoria, with approximately 1600 active sites.

The locations of active sites are currently available to the general public via the *cameras save lives* website. In 2011, the Auditor-General (VIC) found that publishing the weekly roster of mobile camera sites is also inconsistent with the program's aim to create general deterrence.

Hours of Operation

As of July 2019, there are approximately 9300 operational hours per month.

Site Selection Criteria

The Department of Justice indicates that one of the key philosophies of the program in Victoria is an 'anytime-anywhere' approach to mobile speed enforcement. Operations are generally driven by intel which includes crash and accident data as well as the input from the various Highway Patrol units that play a key role in determining the enforcement footprint and schedule in their respective regions.

Consideration of locations for road safety cameras is undertaken in accordance with the criteria stated in Victoria Police Traffic Camera Office's (2015) *Mobile Digital Road Safety Camera: Policy and Operations Manual.* As stated in the manual, 'selected sites should be able to withstand public scrutiny, clearly demonstrating fair and reasonable speed enforcement in the interests of improving road safety through the enforcement of the designated speed limits' (Victoria Police Traffic Camera Office 2015, p. 3).

This manual states (confirmed by the Dept. of Justice) that all roads considered for evaluation must meet one of the following categories:

- documented history of serious and major injuries resulting from a collision within the previous 3 years;
- subject of a validated complaint of excessive speeds, feedback from the general public;
- identified by police to be a speed-related problem site;
- alternate speed enforcement by non-camera devices within a specified site deemed not practicable/unsuitable (Victoria Police Traffic Camera Office 2015).

Randomness of Site Selection

A 2011 performance Audit of Victoria's MSC program suggested that increased randomness of deployment would strengthen the program (Victorian Auditor-General 2011). It was found that mobile cameras were not deployed often enough at night, were deployed in discernible patterns and were being used, in effect, as 'fixed cameras' by being regularly located at single locations. Consequently, there was an increased likelihood that the general deterrence effect of the mobile camera system would be diminished. A 2012 report from the Road Safety Camera Commissioner (RSCC 2012) also recommended that the site selection should be randomised and that additional deployments should occur at night.

Currently, the Department of Justice indicates the overarching strategy is to have sessions anytime-anywhere, which includes night operations. As is the case with most aspects of the enforcement strategy, the Victoria Police determine when and where cameras are deployed. The precise method or level of randomisation of sites in Victoria has not been quantified for this report.

Infringments

A third-party supplier verifies individual incidents captured across Victoria's mobile and fixed camera networks. Victoria Police then review these verified incidents and release incidents so infringements can be issued. The infringements are issued by a separate third-party supplier. Once released by Victoria Police, the issuing of the initial notice is a straightforward process.

Victoria's speeding infringements are based on a graduated scheme measured on the severity of the infraction and the type of motor vehicle (light vehicle and heavy vehicle) (VicRoads 2019a). They also incorporate an automatic licence suspension into their scheme for any infraction where the speed limit is exceeded by 25 km/h or more (VicRoads 2019a). The infringement schemes in monetary penalties, demerit point and automatic licence suspension penalties for different levels of exceeding the speed limit are published on the VicRoads (2019) website.

These infringements are issued via the mail (by the Fines and Enforcement Services unit within the Victorian Department of Justice) within 2 weeks (although this is advertised, it does not always occur in practice) of the infraction and provides the receiver 28 days to either pay the infringement or transfer the infringement to another person (VicRoads 2019a & Fines Victoria 2019).

Victoria does not publicise enforcement tolerance levels in order to avoid creating a de facto speed limit higher than the legal speed limit (Auditor-General VIC 2006). While the tolerance level is not known, it is noted that in 2002 the Victoria Police, in collaboration with the Transport Accident Commission, launched their 'Wipe off 5' campaign (Mulholland 2008). Part of this campaign included systematically reducing the enforcement threshold of MSCs by 1 km/h each month for three months (total reduction of 3 km/h) (Mulholland 2008).

The benefits of the threshold reduction could be seen through the reduction in road fatalities for 2002–03 (Mulholland 2008). It is inferred that the MSC tolerance currently remains the same as initiated in 2002.

QUEENSLAND (AUSTRALIA)

Typical Set-Up

Figure A.11 **QLD:** Typical MSC site, unmarked vehicle and no warning signs

Source: The Queensland Times (2019).

Figure A.12 **QLD:** Typical MSC trailer site, highly visible device

Source: Bavas, (2016).

Signage

QLD employed advance warning signs ahead of MSC sites until 1 July 2015 when the requirement for the signs was removed. The reasoning behind the removal of signage was that the signs themselves were problematic (taking up sidewalks, parking spaces, and distracting drivers) and too small (Chamberlin 2015). In exchange for the removal of signs, the placarding on overt vehicles was increased and additional logos added (Chamberlin 2015).

At present time in QLD, signs are not typically placed in advance of unmarked MSC vehicles (the use of 'speed camera in use' signs in proximity of MSCs is no longer a legislative requirement) (Queensland Police Service 2018). Warning signs are still used in some instances to remind motorists that speed detection can occur 'anywhere, anytime' (Queensland Police Service 2018).

Marked/ Unmarked Vehicles

QLD uses a combination of unmarked (Figure A.11) and marked MSC vehicles, and overtly marked trailers (Figure A.12) across the state (Queensland Police News 2019). Marked vehicles were exclusively used prior to 2010, and marked vehicles appear to still represent up to 70% of MSCs (Newstead 2017). QLD also uses highly overt MSC trailers for deployment in high-risk locations (Queensland Police Service 2018b), commonly at worksites where speed limits have been reduced.

- There are 18 unmarked MSC vehicles operating in QLD (at Jan 2018).
- There are 5 marked and highly overt trailers operating in QLD (at Dec 2016).
- 100 total MSC vehicles (excluding trailers) operating in QLD (at 30 Jun 2015).
- Enforcement hours are ~80% marked and ~20% unmarked which may indicate the proportion of marked/unmarked vehicles would be similar at 80%/20% (Audit Office 2015).

Program Deployment

Queensland's speed camera program is operated through the Camera Detected Offence Program (CDOP) which is a joint program between Queensland Department of Traffic and Main Roads (TMR) and Queensland Police Service (QPS) (Queensland Audit Office 2015). However, the QPS is responsible for managing and undertaking all MSC operations (Queensland Audit Office 2015).

Number of Sites

As of September 2019, there are approximately 2360 active MSC locations around QLD with approximately 3541 active sites ready for deployment of portable, marked, and unmarked MSCs (Queensland Police Service 2018. This does not include sites for overt MSC trailers, which are deployed to high-risk locations.

The QLD Audit Office (2015) found that the QPS does not visit approximately a third of approved sites in any one year, with approximately one in seven sites (14%) not visited over a three-year period. The Audit Office therefore questioned why such sites were continually approved.

Hours of Operation

While the total number of MSC vehicles and trailers is not readily available to the public, the following MSC counts have been published in the past:

- 18 unmarked MSC vehicles in use as of 14 Jan 2018 (Queensland Police News 2019); and
- 5 MSC trailers in use as of 22 Dec 2016 (Bavas 2016).
- 100 total MSC vehicles (excluding trailers) as of 30 Jun 2015 (Queensland Audit Office 2015);
- the number of overt MSC vehicles that are operating in QLD is not published but can be estimated as being approximately 80 vehicles in 2015.

The Camera Detection Offence Program's (CDOP) budget effectively determines the budgeted deployment hours for QLD's MSC vehicle deployment. The Queensland Audit Office's (2015) report shows a yearly increase in deployment hours between 2015 to 2018, with 95 000 budgeted (103 357 actual) deployment hours in the 2014–15 financial year. The Queensland Police Service (QPS) has approval for 30% of their deployment hours to be unmarked, however only 16.3 per cent were performed unmarked. This was due to both concerns from the public about 'revenue raising' from unmarked deployment and the belief that overt deployment provides an immediate effect (Queensland Audit Office 2015).

Site Selection Criteria

The site selection process in QLD is broken down into two stages: site nomination and site selection process. The nomination process is split into 'primary site nomination' and 'secondary site nomination resulting from public complaints and stakeholder concern' (Queensland Police Service 2019). Site nomination operates as follows:

Primary Site Nomination	• Road Safety Camera Office (RSCO) creates a Camera Scheduling and Reporting System zone record for each zone map issued by the Department of Transport and Main Roads (TMR); and • Site proposal is forwarded to the officer in charge for site selection, assessment and recommendation for approval (Queensland Police Service 2019).
Secondary Site Nomination	• Possible speeding problems identified by road safety stakeholders are referred to the officer in charge of the relevant district road policing unit; and • Complaints of allegedly speeding vehicle made by the public are referred to the officer in charge of the relevant district road policing unit (Queensland Police Service 2019).

Once a site has been nominated it then goes through the site selection process to determine if it will become an active camera site. This process is to be completed in compliance with the Camera Scheduling and Reporting System User Manual, unfortunately this manual is not available to the public (Queensland Police Service 2019). Justification for use of a speed detection device may include:

- a history of traffic incidents occurring in the locality;
- complaints of speeding vehicles being received from members of the public;
- officers having observed speeding offences in the area. Consultation with local authorities or the Department of Transport and Main Roads should be considered to establish that there are no other means of overcoming the situation, such as increased speed limits or traffic engineering solutions; or
- locations where there is a real threat to the safety of road users (including road construction workers) (Queensland Traffic Manual 2019).

Randomness of Site Selection

The QLD Audit Office (2015) noted the frequency and unpredictability underpinning the CDOP deployment system.

In deciding which sites to deploy to, the program intent was that police would rely primarily on the site scheduling system developed by the QPS and TMR – the Traffic Scheduling and Reporting System (TSRS) (QLD Audit Office 2015).

The TSRS has a weighted randomised selection process which builds in the unpredictability required to produce a general deterrence effect. Researchers modelled a 7.7 per cent reduction in serious casualty crashes where the scheduling system was used for 80 per cent of all camera deployments compared to where it was used for only 20 per cent, proving its efficacy (QLD Audit Office 2015).

The selection process appears to have shortcomings. In 2013–14, two per cent of the available sites accounted for 18.1 per cent of all deployments (QLD Audit Office 2015). These sites were attended more frequently than the site scheduling system recommended and had had high traffic volumes but not serious crash rates.

Infringments

QLD uses a graduated speeding infringement scheme, which is measured on the severity of the speeding infraction (Queensland Department of Transport and Main Roads 2019). Unlike other states, QLD does not make a distinction between motor vehicle classes for speeding infringements. However, it is noted that there are separate penalties for individuals and organisations. Infringements incurred by an organisation incur a penalty 5 times the amount for an individual as demerit points are not applied to organisations. The penalties for speed for individuals are published on the Department for Transport and Main Roads website.

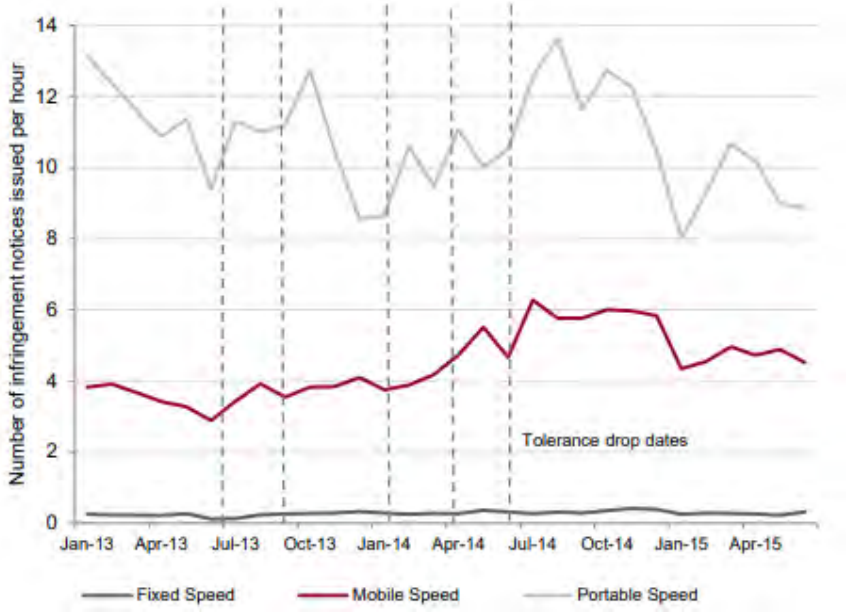
The infringement notice provides 28 days to pay the fine, elect to go to court, or nominate a different driver of the vehicle (Department of Transport and Main Roads 2019). The required timeframes for notification of an infringement occurring is not published.

In 2012–13, to improve driver behaviour and road safety outcomes, the Queensland Police Service (QPS) reduced the speed enforcement tolerance limit. When the tolerance levels dropped, an initial increase in the number of drivers fined within the lower speed bracket was observed (although speeding in higher brackets continued to decline). After this initial spike, driver behaviour improved and infringement

rates dropped. As of 2016, this was trending back down, indicating that driving behaviour is slowly changing and adapting to the new lower limits (Queensland Audit Office 2015).

The Audit Office (2015) analysis also indicates that many drivers still speed and drive to what they believe the speed camera tolerance levels

Figure A.13 Impact of tolerance drops on infringements



Source: Queensland Audit Office (2015) using extracted Integrated Traffic Camera System (ITCS) data.

are.

WESTERN AUSTRALIA (AUSTRALIA)

Typical Set-Up

Figure A.14 **WA**: MSC tripod set up in an unmarked vehicle without warning signs

Source: ABC News Jan 2018.

Figure A.15 **WA**: MSC tripod set up on the roadside

Source: ABC News Jan 2018.

Signage

The WA mobile speed camera program was historically an overt program with camera vehicles in operation at the roadside being clearly marked with a sign to identify them to passing traffic (Newstead 2016). WA Police report that since 2011 the sign has no longer been used.

In WA, warning signs are currently not placed in advance of MSCs (there is no requirement for warning signs) (Western Australia Police Force 2017). WA's Signs Index does have warning signs for speed cameras however, these are typically used in conjunction with fixed cameras (Main Roads Western Australia 2019).

Marked/ Unmarked Vehicles

WA utilises a camera tripod system which can be used within a vehicle (Figure A.14) or on the ground (Figure A.15) (Western Australia Police Force 2019). The tripod is typically mounted in the rear of an unmarked utility vehicle and in this setup, the laser-based speed camera system can monitor up to six (6) lanes of traffic simultaneously. All speeding vehicles traveling abreast or in tight formation can be tracked and caught. The speed camera captures each vehicle with laser tracking, returning extreme accuracy and clean images.

These cameras can photograph speeding vehicles from the front and/or rear, which also enables motorcycles (which are not required to have front number plates in WA) to be captured. (Until 2010 all mobile speed cameras in WA operated exclusively in front-facing mode with the rearward mode operation commencing in 2010 (Newstead 2016.)

Program Deployment

The deployment of MSCs in WA is handled by the Western Australia Police Force as of 2019 (Western Australia Police Force 2018c). There was consideration to outsource the operation of MSCs to a third-party company in 2011; however, this never came to fruition (Sonti 2011).

Mobile cameras are operated by civilian (non-sworn) employees of WA Police in 3 rostered shifts rotating 7 days a week with each staff member working 2 locations per shift (Newstead 2016).

The use of speed cameras is a part of the 'Towards Zero' road safety strategy in WA. The Road Safety Commission (RSC) is responsible for research and policy that develops and recommends changes to road safety strategies and speed limits.

Number of Sites

WA does not publicly display the number of MSCs that are in operation, nor the total number of active site locations that have been assessed as suitable for MSCs (Western Australia Police Force 2019). The Western Australia Police Force does provide weekly updates as to where MSCs will be located during the week and on what day (Western Australia Police Force 2019).

Newstead (2016) reported that there were 4 000 MSC locations in use as at 2016. Newstead (2015) reported a high number of mobile speed camera sites are used in Western Australia compared to other jurisdiction in Australia meaning the average number of hours of enforcement undertaken per site is necessarily lower than other jurisdictions.

Analysis of the operations data (Newstead 2016) provided identified nearly 10 000 MSC sites, more than 3 times the number of sites used under any other major mobile program in Australia. WA Police Force reports that up to 14 000 sites have been used over the program history with around 4 000 sites operational in 2016.

Hours of Operation

In 2006, Cameron (2006) of the Monash University Accident Research Centre (MUARC) recommended:

- 9 000 covert enforcement hours for MSCs on urban highways in Perth
- 3 000 overt, randomly scheduled MSCs on rural roads in the rest of WA
- 140 000 enforcement hours per annuum.

In 2016, the RAC cited the Cameron (2006) report stating that 140 000 hours of camera enforcement would bring WA in line with other jurisdictions such as Victoria, Queensland and New Zealand, and would cut the road toll by a quarter. The actual enforcement of MSCs in 2016 was reportedly 42 000 hours per year or approximately 3 500 per month (Newstead 2016). In 2016, Newstead reported that actual MSC hours ranged from 0600 to 2200 with additional hours worked outside for special ops.

Site Selection Criteria

The criteria for the selection of all mobile MSCs in WA includes:

- speed related fatal or serious crashes
- 'speed related complaints'
- school zones
- locations where more than 15% of the road users exceed the posted speed limit (Western Australia Police Force 2018c).

Camera site selection under the WA mobile program covers more than 90% of the crash population in metropolitan Perth (with less coverage in regional WA) (Newstead 2016).

Randomness of Site Selection

The WA program is also reported to employ randomised scheduling of operations.

The mobile speed camera program in WA appears to have been operated on the principles of random road watch, using many sites, with low site visitation frequency over most sites (Newstead 2015).

Speed camera deployments in WA are evenly distributed across the days of the week (Newstead 2015). There is a clear pattern in scheduling across the time of day with most deployments commencing between 7 am and 6 pm. Up to 2013 there has been essentially no camera-based enforcement in the hours between 8 pm and 7 am (a time of day where speed-related crash risk is often highest).

Infringments

WA uses a graduated speeding infringement scheme which is measured on the severity of the speeding infraction and is split between light vehicles (less than 22.5 tonnes) and heavy vehicles (greater than 22.5 tonnes) (Road Safety Commission 2019). The penalties for speed infractions for light vehicles and heavy vehicles are published on the WA Police Force website.

Infringements must be paid within 28 days of the issue date; however, it is unclear how long it takes for the infringement to first be issued (Western Australia Police Force 2018).

NEW ZEALAND

Typical Set-Up

Figure A.16 **NZ**: MSC unmarked van parked without warning sign.

Source: Driving Tests NZ (2019)

Figure A.17 **NZ**: marked MSC vehicle without warning sign.

Source: Driving Tests NZ (2019)

Signage

New Zealand (NZ) has not required warning signs for any MSCs since the regulation was changed in 2004 in order to further their policy of 'anytime, anywhere' enforcement (Cottingham, D n.d.). The country also announced that they were trialling warning signs for fixed speed cameras in 2019, there is a possibility for this to extend to MSCs but too early to tell (New Zealand Automobile Association 2019).

Marked/ Unmarked Vehicles

MSC operations in NZ are undertaken using a combination of both marked and unmarked vehicles (New Zealand Police n.d. & Cottingham, D n.d.). An example of NZ's marked MSC vehicle can be seen above in Figure A.16 and unmarked vehicle in Figure A.17. Unmarked cameras tend to be in plain vans parked on the roadside. The camera is typically operated from the rear of the Police vehicle (Povey 2003).

There are approximately 44 MSC vehicles operating in New Zealand (NZ Ministry of Transport 2011, 2018).

Program Deployment

As of May 2019, MSCs were deployed and administered by the NZ Police using the Police Infringement Processing System (PIPS). There have been ongoing proposals to move the speed camera program (including MSC) to the road safety partnership, which includes the police, the NZ Transport Agency and the Ministry of Transport.

To date the MSC program resides with the NZ Police.

Number of Sites

NZ does not publicly display the total number of active site locations for MSCs or which ones are being used at any times, this is to further their 'anytime, anywhere' policy (New Zealand Police n.d.b). The quantity of pre-approved locations not advertised nor is the quantity of active sites.

MSC vans 'could be anywhere,' police change locations 'frequently' to encourage drivers to slow down over the whole road network, not just at camera sites (NZ Police 2019)

The locations of fixed and red-light camera locations published online, but mobile 'safe speed' cameras are not listed and rather are "deployed to risk, anywhere at any time." (NZ Police 2019)

Hours of Operation

The number of operation / enforcement hours for MSCs is not publicly available and was not discovered during the consultation process.

Site Selection Criteria

The New Zealand Police (n.d.c) state that speed camera sites are placed in areas based on the following criteria:

- Where there is a problem with excessive speed;
- Where there is an identified crash risk;
- Where research shows a history of crashes causing death and/or serious injury; and
- Where schools and kindergartens are located.

(It is not strictly stated whether the above criteria is applicable for MSCs.)

Randomness of Site Selection

Mobile cameras in vans '**could be anywhere'** and police change the locations frequently to encourage drivers to slow down over the whole road network, not just at camera sites. (Radio New Zealand 2019)

The method of randomisation used to select sites is not published and was not determined through consultation.

Infringments

NZ uses a graduated speeding infringement scheme similar to those seen in Australia, where the penalty is measured on the severity of the speeding infraction. However, NZ does split the penalty for fines and demerit points into separate schemes. It is noted that NZ also uses a different demerit point system compared to Australia. Drivers start at 0 points, with points being added cumulatively based on infractions, if 100 active demerit points are reached within a 2-year period then the licence will be suspended for three months (New Zealand Transport Agency 2019a).

In May 2017, the review concluded in March 2017. Transport Agency and the New Zealand Police reviewed the infringement processing system managed by New Zealand Police and found it to be outdated and needing replacement. The Transport Agency and New Zealand Police collaborated on designing and procuring a modern fit-for-purpose infringement processing system that will be easier for the public to navigate, and that could be used to support any expansion of automated compliance systems.

In January, the police released a tender for developing a new Automated Compliance and Intervention Management (ACIM). The ACIM Program was initiated by the NZ Police in February 2019.

UNITED KINGDOM

Typical Set-Up

Figure A.18 **UK**: Highly overt MSC parked without warning sign.

Source: Bath Chronicle May 2017

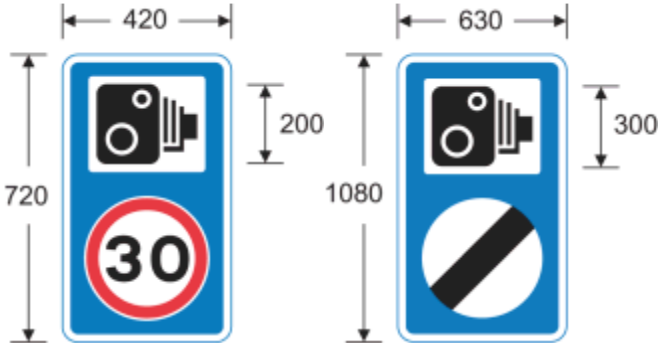
Figure A.19 **UK:** Inconspicuous MSC vehicle with warning decals.

Source: Tang 2017

Signage

In the United Kingdom (UK) best practice for police MSCs indicates that a warning sign should be used; however, there is no law formally requiring police to setup warning signs for advanced warning of MSCs (Butcher, L 2013 & Ask the Police n.d.). The *Traffic Signs Regulations and General Directions* 2016 contains signage that is recommended for use on roads where MSCs are deployed (Figure A.20); these are in the form of warning decals placed on the MSC vehicle.

Figure A.20 **UK:** MSC signage



Source: Traffic Signs Regulations and General Directions (2016)

Marked/ Unmarked Vehicles

The UK makes use of both marked (Figure A.18) and unmarked (Figure A.19) MSC vehicles to enforce speed limits (RAC 2018). Mobile cameras can be quickly moved from one site to another (Christie 2003).

There are also mobile speed cameras used as part of the safety camera partnership and targeted speed safety campaigns.

MSCs can take on a number of forms, working cameras from marked or unmarked cars, as well as being manually operated by police officers (RAC 2019).

Figure A.21 **UK:** View of the Camera operator position from within a new 'Long Ranger' MSC van.

Source: Grimsby Telegraph June 2018

Program Deployment

In the UK there are 36 regions, each operating their own individual MSC program. These are typically run by the regions Police Force or in some cases by a third-party provider. However, knowledge of each regions operating procedures is in some cases difficult or impossible to find.

One such example is in the Humberside area of the UK, where MSC enforcement is undertaken by Safer Roads Humber on behalf of their partners which includes police and local authorities (Safer Roads Humber 2019)

Number of Sites

The UK has varying degrees of program size depending on the locality as there are 36 different police or local authority localities (GOV.UK 2018). The sites in the UK are listed by an independent reviewer, which when queried re-directs the user to each individual region's website where camera locations are listed. Unfortunately, not all localities report active site locations and number of MSCs making it difficult to estimate the total number of MSC sites throughout the UK (GOV.UK 2018).

Mobile cameras tend to be rotated around a much larger number of sites than static cameras and in 2003 were almost exclusively used during daylight hours (Christie 2003).

Hours of Operation

MSC programs are operated by 36 different police or local authorities, due to this there is no information available the operational hours of their programs.

Site Selection Criteria

Through the review of research and the stakeholder consultation process, no relevant information was found for MSC tolerances in this jurisdiction.

The majority of MSCs reside on accident blackspots where there is a history of road traffic incidents over a three year or more period (RAC 2018).

Randomness of Site Selection

Where local authorities previously published a list of marked MSC van locations, instead, the Staffordshire Safer Roads Partnership has released a list of potential routes, where the mobile vans could be 'at any time and on any day.' Staffordshire currently lists approximately 240 'potential routes' where speed cameras could be operating (Staffordshire Live 2019).

Infringments

MCS capture the license plate of passing vehicles exceeding a speed above the legal limit and mail a fine and penalty points to the driver of the vehicle (Christie 2003).

While the UK uses a graduated speeding infringement scheme based on the severity of the speeding infraction, it is decidedly different to those used in Australia (Sentencing Council 2017). The recorded speed of the vehicle's infraction range changes based on the posted speed limit. This means that in a 20mph speed posted zone, driving up to 10mph over the limit would be the lowest infraction; while in a 70mph speed posted zone, driving up to 20mph over the limit would still be classified as the lowest infraction (Sentencing Council 2017). The infraction's penalty fine is also measured on a band scale which equates to a percentage of relevant weekly income with a minimum penalty being £100 and 3 penalty points (Sentencing Council 2017).

If caught by a speed camera, the vehicle owner will receive within 14 days of being caught, a Notice of intended prosecution (NIP), and Section 172 notice (GOV.UK n.d.). This displays the infraction that was committed and provides the recipient with 28 days to inform the police of who was driving the car by use of the Section 172 notice (GOV.UK n.d.). Once the Section 172 notice has been returned the driver will be sent either a Fixed Penalty Notice (FPN) or Letter telling them to go to court (GOV.UK n.d.).

The existence of a tolerance level for fixed speed cameras has been confirmed through research conducted by Auto Express which made Freedom of Information (FOI) requests to 45 police forces in the UK (Griffiths, H 2019). While the tolerance level has only be confirmed for fixed speed cameras and may not be a representation of the tolerance levels for MSC it is still worth discussion. Of the 45 police forces that FOIs were requested, 36 provided responses with most saying the tolerance is 10% + 2mph and some saying 10% + 3mph (Griffiths, H 2019).

IRELAND

Typical Set-Up

Figure A.22 **Ireland:** Highly overt MSC vehicle with no signs (but with warning decals).

Source: Irish Mirror July 2017

Figure A.23 **Ireland**: A camera tripod operated outside of a parked Garda vehicle.

Source: Tang 2017

Signage

Signage in the form of warning decals are required on the MSC vehicle (Figure A.22) however advanced warning signs are not used.

Marked/ Unmarked Vehicles

Ireland operates marked vehicles (Figure A.22) for speed enforcement which are have high visibility, reflective materials and display a large safety camera symbol decal to ensure visibility to motorists (An Garda Síochána 2017).

As of 2011, there were 45 mobile cameras in operation which will provide 6,000 hours of speed checks across 600 locations in Ireland. (JOE 2011)

The MSCs are operated from the back of a van by an Operator (GoSafe Operations Manager 2018). The MSCs have a long range with the general rule of thumb that if there is line of sight, a driver can be captured and fined.

Program Deployment

The safety camera programme (MSCs housed in mobile vans) was first introduced in 2010 and outsourced to a company called GoSafe. The primary purpose of the GoSafe initiative is to reduce speed related collisions and save lives. Initially as part of the Road Safety Strategy 2007 – 2012, followed by the Road Safety Strategy 2013-2020, the GoSafe consortium has been contracted to operate safety cameras on Ireland roads on behalf of the Garda organisation (the Ireland Police).

Minimum enforcement hours of 7,400 hours per month (GoSafe 2018)

Number of Sites

Roads around Ireland are divided into a number of zones and sites, which determine where the vans will park (GoSafe Operations Manager 2018). The GoSafe runs 24 hours a day, 7 days a week, 365 days a year.

Ireland currently has 1,031 active MSC site locations across their network which are ready for camera deployment (An Garda Síochána n.d., The Journal 2016).

Hours of Operation

GoSafe are set with key performance indicators to ensure enforcement is targeted at key days and times – with a particular emphasis on night-time and weekends (GoSafe 2018).

GoSafe itself is contracted to provide a minimum of 7,375 hours speed enforcement and 100 hours surveying per month as instructed by the gardaí.

Site Selection Criteria

The GoSafe Operations Manager (2018) states that the (enforcement) zones are based on live data that is generated from road traffic collisions, from fatalities, from injuries and also from speeding. GoSafe regularly monitors the data and determines where they need to deploy. They do not regularly attend areas where there is known high compliance. Road traffic collisions, and were they are occurring in real time, have a large bearing on the location of MSC deployment.

Randomness of Site Selection

No information was discovered to determine how sites are selected in Ireland.

Infringments

Ireland does not operate on a graduated infringement system for speeding, instead opting to use a single penalty for any speeding infraction (Road Safety Authority 2018). Ireland provides 28 days from the issue date of a fixed charge notice to be paid (An Garda Síochána n.d.b).

Guidance provided by the NPCC (National Police Chiefs Council, formally ACPO, Association of Chief Police Officers) suggests that officers do not seek prosecution of a driver until they have exceeded the speed limit by 10%, plus 2mph.

FRANCE

Typical Set-Up

Figure A.24 **France:** Mobile MSC vehicle operating in motion on a highway. The only distinguishing characteristic is a small camera symbol on the vehicle's number plate.

Source: https://anglophone-direct.com/french-mobile-speed-cameras-go-private/

Figure A.25 **France**: A camera tripod operated on the road without signage.

Source: Tang 2017

Signage

Mobile camera devices (Figure A.25) are not required to be signed to give advanced warning to drivers (Carnis 2015).

Autonomous mobile cameras (Figure A.26) are indicated by a "Radar check over whole length of worksite" panel combined with the worksite signage.

Marked/ Unmarked Vehicles

501 mobile speed cameras were in use as of 1st February 2017 (ANTAI 2019). They can be used to check speeds anywhere and to adapt to circumstances when required (roadworks, traffic conditions).

MSCs take the form of cameras installed in a vehicle stopped and positioned at the roadside, which detects and records speeding (National Agency for Automated Offense Processing (ANTAI) 2019). MSCs are deployed using unmarked, specially equipped cars used solely for this purpose (Carnis 2015).

France is trialling new MSC technology (first introduced in 2013); a small radar and camera mounted in the rear of unmarked vehicles that can detect speeding while the camera vehicle is moving. Consultation with the IFSTTAR Science and Technology Institute in France refers to these devices as so-called 'mobile-mobile' (in-flow control). They were implemented in the absence of published scientific investigation (but in accordance with the principles of general deterrence). A new program was launched in 2018 and is still in what would be referred to as a beta phase. The cameras will be fixed on the dashboard, with a radar hidden behind the number plate, to detect a car's speed (MacGuill 2013). These devices are designed to be able to take accurate photos from inside moving vehicles (MacGuill 2013). Technological information about the devices can be found on the ONISR website.

As an extension of this program, unmarked vehicles owned by private companies became operational in Normandy in April 2018. These private unmarked speed cars operate six hours a day compared to the average of one hour, 15 minutes for the police-driven vehicles (Smart Highways 2019).

209 new 'autonomous cameras' were in use as of 1st February 2017.

'Autonomous Cameras' (Figure A.26) are mobile and used to provide speed checking adapted to roadworks sites where the speed limits are rarely obeyed, after an experiment with semi-fixed cameras in 2012, these devices are in use across the national road network and the toll motorway network (CEGELEC Equipements Dynamiques Routiers 2019). They are moveable across different work and temporary danger areas and have a battery autonomy of one week. The cameras can operate in both directions and they are also able to discriminate between different types of vehicles.

Figure A.26 **France**: Autonomous temporary speed camera commonly used at worksites in France.

Source: CEGELEC Equipements Dynamiques Routiers 2019

Program Deployment

The national (automated) speed camera enforcement program started in France in 2003. By 2010, 2,756 speed cameras had been installed nationwide, of which 933 were mobile (Carnis & Blais 2013).

The official decision to establish an automated speed enforcement programme involved adopting a system both unpopular with drivers and intended to achieve significant results in the short term via deterrence and sanctions on a mass scale (Carnis 2008). The system has gained gradual acceptance by achieving a regular, substantial fall in the road toll, together with systematic media coverage. This specific policy configuration reinforces the government's choices relating to deterrence and has justified the ongoing installation of speed cameras throughout France.

Currently, French police have mobile speed cameras concealed in 383 unmarked cars, which are responsible for measuring around 1.5 million cars a year. (The Local 2019)

The French automated speed enforcement program (ASEP) can be considered as a combination of general and specific deterrence, since fixed photo radars should dissuade potential offenders from speeding whereas mobile devices should deter those who are caught and penalized. The expected effectiveness of the ASEP rests on three basic principles of deterrence theory (Carnis 2013).

Mobile speed cameras are installed on rural and urban roads and are managed by Police (Blais 2015) although current research suggests the infringement part of the operation is largely outsourced to a third party.

Number of Sites

Building a credible speed camera network means gridding the road network with enough speed cameras to yield a high probability of detection and punishment (Carnis 2013).

In France, MSCs are used in combination with other speed devices to creating "network-centric" deterrence. The French authorities opted for a progressive gridding of the road network, so as to ensure that whatever route a driver takes, he must at some point encounter a speed camera (Carnis 2015). The increasing number of enforcement points on the country's roads and freeways forms a wide net, covering the entire territory to send a message to drivers about certainty of punishment if they are caught speeding.

Hours of Operation

Research and consultation did not reveal specific operational hours for MSCs.

As they must be Police operated, a lack of resources means the police cars equipped with mobile cameras are only in use for an average of one hour a day (The Local 2019).

Site Selection Criteria

There is no official document specifying installation criteria for MSCs (Carnis 2008b, pp. 225-226; Canel & Nouvier 2004)

Fixed speed camera devices are generally installed close to “black spots”, or near areas experiencing high levels of speed limit violations whereas location of the mobile radars used in various speed enforcement contexts will depend on police officers’ knowledge and strategy. (Carnis 2013)

Carnis (2015) states that the choice of localities in France should in theory reflect perceived dangers, excess speed problems or the impossibility of using traditional detection methods, but in fact this choice also points up the existence of technical constraints and political trade-offs.

The choices of mobile camera checkpoints are decided by the Préfets of the département working with the police, according to the following criteria (ANTAI 2019):

- Areas where accident occur that are mainly caused by speeding
- At regular intervals over main roads to bring down the average speed over the whole route.

Randomness of Site Selection

The mobility of French MSCs allows for numerous random checkpoints on the road network and this generates a situation of widespread uncertainty (Carnis 2008c).

Official policy can aim at local deterrence, with a view to modifying behaviour in respect of a dangerous infrastructure (a tunnel, for example); route deterrence (over a road or highway as a whole); or global deterrence (not limited to the section under surveillance, but rather extending to other, non-checked sections of the network).

Infringments

Previously deterrence to speeding was characterised by considerable leeway and relatively random application of sanctions (with some cases having to be abandoned under the statute of limitations), and a low rate of payment of fines (Carnis 2008). Even though new offences were defined, and penalties increased in the late 1990s, the system of deterrence remained ineffective, as the relevant legal provisions were rarely put into effect. The 'hypothetical' application of speed limits undermined the credibility of measures taken by Police forces to improve road safety.

The French system uses a (nearly) fully automated form of digital technology for the mobile camera detection and penalty procedure. The infractions detected by mobile camera units communicated to the National Processing Centre (CNT) in Rennes, where they are computer processed. Given that the procedures are all automated, the centre has a high processing capacity and can cope with a very large number of infractions. In addition, it is reliable (there are very few challenges) and fast (most fines are communicated to the offender within a week of the offence). In 2008 alone the system sent out 17 million traffic infringement notices, with the total since 2003 running at over 57 million. (Carnis 2009).

In France a speeding offence leads to a fine and the deduction of driving licence points (of which the initial total is 12) (Carnis 2015). The penalties for speeding offences do not depend on the method of detection used. Automatic devices detect offending vehicles, with the owner presumed to be the driver; the owner is automatically considered responsible for the offence. He may appeal this responsibility by designating the person who was driving the vehicle at the time of the offence, but he must first pay the fine, which is held as a deposit and repaid depending on the final decision. In cases where the driver cannot be identified, the owner of the vehicle is obliged to pay the fine, even if the procedure does not entail a loss of licence points.

The fine is sent to the car owner in less than 8 days following detection of the offense and demerit points are then added to the driver's record. The third principle concerns the severity of punishment. Accordingly, the amount fined and the demerit points added are proportional to the speed excess (Carnis, 2008, 2011).

Any speed registered by the new mobile-mobile cameras will be reduced due to a 10% margin of error, meaning that for detection, a motorist would have to be travelling at 146km/h on the motorway where the speed limit is 130km/h (MacGuill 2013). This represents quite large enforcement threshold, limiting detection to motorists exceeding 10km/h over the speed limit.

For other speed cameras, a margin of 5 km/h (below 100 km/h) or 5% (above 100 km/h) is taken into account, always in favour of the driver (ANTAI 2019).

CONTACT US

OPIAD

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Transport Safety

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OPIAD

ARRB.COM.AU

Briefing: Secretary
FOR APPROVAL

Formal response – Performance audit on mobile speed cameras

Purpose: To seek the Secretary's approval of the attached letter (**Attachment A**) to the Legislative Assembly Public Accounts Committee (LAPAC) regarding the Auditor-General's performance audit on mobile speed cameras.

Analysis: The LAPAC is seeking a submission on Transport for NSW's (TfNSW) response to the recommendations made in the Auditor-General's report on Mobile Speed Cameras, tabled on 18 October 2018 (**Attachment B**). Under the *Public Finance and Audit Act 1983*, the Committee can examine any report of the Auditor-General laid before the Legislative Assembly. Recommendations by the Auditor General on Mobile Speed Cameras were to be completed by October 2019.

The Centre for Road Safety (CRS) and Compliance and Regulatory Services (CaRS) within the Safety, Environment and Regulation Division have been implementing the recommendations. The attached letter (**Attachment A**) to the Committee Chair provides the response with an enclosed progress table.

No matters in the Audit Report are contentious nor do they need to be brought to the Minister's attention.

Reason for deadline: Parliamentary Services has requested the formal response for Secretary approval by 22 October 2019.

Recommendations

1. **Approve** and **sign** the formal response to the LAPAC (**Attachment A**)

Key reasons

Formal response to the LPAC

The LAPAC has requested a submission from TfNSW outlining the status of the implementation of recommendations from the Mobile Speed Camera (MSC) Audit Report. A letter to the Chair of the Committee has been drafted with an accompanying table that outlines the status of each recommendation (**Attachment A**).

Some recommendations are outside the scope of current Government policy

Nine recommendations were made. Two recommendations relating to a review of the Speed Camera Strategy and the deployment hours and signage requirements, were considered to be outside the scope of the Audit as they relate to existing Government policy positions. These recommendations were not accepted, as outlined in the Secretary's response to the Audit-General on 14 October 2018 (**Attachment C**).

A number of recommendations require ongoing review

CRS and CaRS have commenced reviewing and enhancing a number of areas of the MSC program as recommended by the audit. This includes identifying and implementing improvements to: performance indicators used for program monitoring; the MSC scheduling system; and vendor management systems. While work to address these recommendations is underway, these require ongoing review and action as appropriate. Accordingly, not all of the

recommendations can be completed by the overall October 2019 date stated in the Audit Report stated.

Pending completion of the review on better practice MSC programs

A service provider has been engaged to conduct this review. It is anticipated that a report will be finalised end October 2019 and will be published on the CRS website once necessary approvals are sought.

Agency Approval

Stephen Jones **Deputy Secretary** **Safety, Environment and Regulation** Approved via email **Date:** 29 October 2019	**Rodd Staples** **Secretary**  **Approved** ~~**Not approved**~~ **Date:** 31/10/2019

Background

The 2018 Annual Speed Camera Review – MSC program key findings

The mobile speed camera program continues to deliver road safety benefits when compared to the most recent period without the program in operation, and there has been a 14 per cent increase in traffic volume across NSW since the mobile speed camera program was reintroduced in 2010.

Annual speed survey results show that there has been a decrease in the proportion of light vehicles exceeding the speed limit over the last nine years, for most speed zones. When comparing the 2017 results against the 2016 results there has been a decrease in the percentage of light vehicles exceeding the speed limit by up to 10 km/h in all speed zones except for 110-km/h speed zones. The percentage of vehicles exceeding the speed limit by 10km/h or more has decreased in all speed zones except in 90-km/h, 100-km/h and 110-km/h speed zones.

The speed survey results also indicate that there is a reduced proportion of heavy vehicles exceeding the speed limit over the last nine years. While this is true for most speed zones, it is not the case for exceeding the speed limit by 10 km/h or more in 100-km/h and 110-km/h zones.

In 2017 there were a total of 21,347 infringements issued from mobile speed camera enforcement resulting in $4.6 million in fines being issued. The total number of mobile speed camera infringements issued in 2017 decreased by 27 per cent compared to 2016. Over 99 per cent of vehicles passing mobile speed cameras are not infringed for speeding, and this high rate of compliance has remained consistent since 2010 when the program was reintroduced in NSW.

Attachments

Attachment	Title
A	Formal response to the LAPAC Chair with table enclosed
B	Auditor-General's report on Mobile Speed Cameras,
C	Agency response to the Audit Office on 14 October 2018

From:	serdmo
To:	PQ
Subject:	PI19/00011 - Submission Request - NSW - Public Accounts Committee - Auditor-General"s Performance Audit Report - Mobile Speed Cameras - Due to ED by 3pm, 17 Oct 2019
Date:	Tuesday, 29 October 2019 4:56:01 PM
Attachments:	Attachment B Part 1 - PI1900011 - Letter to Committee - Mobile Speed Cam....doc Attachment B Part 2 - PI1900011 - IMPLEMENTATION OF RECOMMENDATIONS - GKM 22 Oct.docx Attachment A.PDF PI1900011 - BN - Mobile Speed Cameras - CRS and CARS comments.docx PI1900011 - BN - Mobile Speed Cameras - CRS and CARS comments.pdf

Attached has been approved by the Dep Sec.

Will you progress to the Secretary? Or do you require the DMO to do this?

Regards
Meagan

Meagan Hunt
Business Coordinator - DMO
Safety, Environment & Regulation

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P
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A
D

SENSITIVE: NSW GOVERNMENT

From: PQ
Sent: Tuesday, 8 October 2019 2:31 PM
To: serdmo <serdmo@transport.nsw.gov.au>
Cc: Parliamentary Services <ParliamentaryServices@transport.nsw.gov.au>; Anthony Meere <Anthony.Meere@transport.nsw.gov.au>
Subject: PI19/00011 - Submission Request - NSW - Public Accounts Committee - Auditor-General's Performance Audit Report - Mobile Speed Cameras - Due by COB, 22 Oct 2019
Importance: High

Hi all,

The Legislative Assembly Public Accounts Committee is seeking a submission outlining Transport for NSW's response to the recommendations made in the attached Auditor General report, Mobile Speed Cameras, tabled on 18 October 2018.

Under section 57 of the *Public Finance and Audit Act 1983*, the functions of the Committee include the examination of any report of the Auditor-General laid before the Legislative Assembly.

Please provide the below (templates attached), approved by Deputy secretary, to PQ@transport.nsw.gov.au by **COB, 22 Oct 2019**:

- A covering briefing note for Secretary's sign off (please indicate if the responses to recommendations are contentious or need to be brought to the Minister's attention).
- A draft response letter from the Secretary to the Committee.
- Status of the implementation of recommendations.

Parliamentary Services is coordinating the Committee submission and will arrange Secretary approval.

Please let me know if you have any questions.

Thank you

SENSITIVE: NSW GOVERNMENT

Kind regards
Anju Sharma
Senior Parliamentary Officer
Parliamentary Services
Customer Technology and Services
Transport for NSW

T 02 8202 3149 | **F** 02 8202 3592
Level 5 18 Lee Street Chippendale NSW 2008

Attachment A

Transport for NSW

Your ref: FT19/08295
Our Ref: PI19/00011

Mr Greg Piper
Chair
Legislative Assembly Public Accounts Committee
pac@parliament.nsw.gov.au

Dear Mr Piper

Thank you for your correspondence seeking Transport for NSW's response to the recommendations made in the Auditor-General report on Mobile Speed Cameras, tabled on 18 October 2018.

The mobile speed camera program is a critical component of how speeding is managed in NSW and Transport for NSW has welcomed the opportunity provided by the Performance Audit to optimise the program and improve road safety.

Transport for NSW accepted the recommendations made when viewed in the context of existing policy settings. I note that two recommendations, to review the number of hours mobile speed cameras are deployed and review the signage requirements, are current Government policy and were not reviewed by Transport for NSW.

The status of each recommendation is outlined in the enclosed table. Transport for NSW has completed most of the recommended actions and will continue to monitor and implement improvements for a number of recommendations on an ongoing basis.

If you have any further questions, Mr Bernard Carlon, Executive Director Centres for Road Safety and Maritime Safety, would be pleased to take your call on (02) 8265 7510. I hope this has been of assistance.

Yours sincerely

Rodd Staples
Secretary
Encl
31/10/2019

IMPLEMENTATION OF RECOMMENDATIONS
Transport for NSW
Mobile Speed Camera

	RECOMMENDATION	ACCEPTED OR REJECTED	ACTIONS TO BE TAKEN	DUE DATE	**STATUS** (completed, on track, delayed) **and COMMENT**	**RESPONSIBILITY** (Section of agency responsible for implementation)
1	**By October 2019, Transport for NSW and Roads and Maritime Services should:** Review the Speed Camera Strategy to ensure MSCs provide an effective general deterrence and complement other speed enforcement activities, including by:	Rejected	Nil – A review of the Speed Camera Strategy is outside the scope of current Government policy.	N/A	N/A	N/A
	• undertaking and publishing a review of research on better practice for MSCs in other jurisdictions	Accepted	Conduct and publish a review of research on better practice for MSCs in other jurisdictions.	October 2019	On track. CRS has commissioned research on better practice for MSCs. It is anticipated that the report will be finalised end October and will be published following this.	Centre for Road Safety (CRS), Transport for NSW
	• reviewing the number of hours MSCs are deployed	Rejected	Nil – A review of MSC deployment hours is outside the scope of current Government policy.	N/A	N/A	N/A
	• revisiting the performance indicators for the success of the program, to ensure they provide information on whether it is providing a general network deterrence	Accepted	Review the performance indicators used for the MSC program.	October 2019	Completed. CRS has completed research on best practice performance indicators for a MSC program. Based on the research findings, CRS will review and update the current performance indicators used for the program in the next Annual Speed Camera Review where appropriate.	Centre for Road Safety (CRS), Transport for NSW

	• continuing to develop public information campaigns to support the MSC program	Accepted	Consider opportunities to support the MSC program in future communications campaigns to address Speeding.	October 2019	Ongoing. CRS will continue to consider opportunities to support the MSC program in future campaigns on Speeding. CRS does not develop campaigns on individual speed camera programs. Information on the MSC program is available on the CRS website.	Centre for Road Safety (CRS), Transport for NSW
	• reviewing signage requirements for MSCs to ensure they support the purpose of MSCs and align with better practice.	Rejected	Nil – A review of MSC signage requirements is outside the scope of current Government policy.	N/A	N/A	N/A
2	**By October 2019, Transport for NSW and Roads and Maritime Services should:** Enhance management of MSCs by: • assessing additional locations and sites for inclusion in the MSC program, using a broader range of selection criteria, and making sure these assessments are adequately documented	Accepted	Review the criteria for the MSC program and assess additional locations and sites as appropriate.	October 2019	Ongoing. CRS has identified opportunities to optimise the current program through better use of current approved enforcement sites. CRS will continue to review the site selection criteria and conduct additional site assessments as appropriate.	Centre for Road Safety (CRS), Transport for NSW

	• ensuring the MSC scheduling system allocates location visits in accordance with their crash risk weighting and the deployment strategy	Accepted	1. Regular monitoring of the MSC scheduling system. 2. Implement enhancements as appropriate.	October 2019	Completed. CRS has reviewed the scheduling system which is currently operating in line with the deployment strategy. CRS and Compliance and Regulatory Services (CaRS) are implementing a long term plan for IT system enhancements to improve the scheduling system and overall management of the program.	Centre for Road Safety (CRS), Transport for NSW
	• improving surveillance of contractor compliance with MSC operational procedures	Accepted	1. Review allocation of resourcing to monitor contractor compliance. 2. Implement system monitoring to enhance oversight of contractor performance.	October 2019	Completed. CaRS has allocated additional staff resources and training to increase field oversight of contractor compliance in delivery of the program. These will be monitored on a quarterly basis.	Compliance and Regulatory Services (CaRS), Transport for NSW
	• reviewing oversight of the culling of infringement notices.	Accepted	Enhance oversight of incident culling by the contractor.	October 2019	Completed. CaRS has implemented a system for oversight of incident culling by the contractor.	Compliance and Regulatory Services (CaRS), Transport for NSW

Appendix one – Response from agency

Transport for NSW

Ms Margaret Crawford
Auditor-General
Audit Office of NSW
GPO Box 12
SYDNEY NSW 2001

Margaret

Dear ~~Ms Crawford~~

Thank you for the opportunity to consider and respond to the Performance Audit Report on Mobile Speed Cameras.

Transport for NSW considers mobile speed cameras an important program that is reducing trauma on NSW roads by addressing speeding.

Transport for NSW and Roads and Maritime Services welcomes the opportunity the Performance Audit provides to optimise how mobile speed cameras are used in NSW to continue to improve road safety.

Transport for NSW and Roads and Maritime Services accept the recommendations when viewed in the context of the existing policy settings. Recommendations will be implemented within the context of the existing policy settings to improve the effectiveness and efficiency of the mobile speed camera program.

Transport for NSW will not review the number of hours mobile speed cameras are deployed or review the signage requirements for the mobile speed camera program, as these are existing Government policy settings.

Yours sincerely

Rodd Staples
Secretary

14/10/2018

Transport for NSW
18 Lee Street, Chippendale NSW 2008 | PO Box K659, Haymarket NSW 1240
T 02 8202 2200 | F 02 8202 2209 | W transport.nsw.gov.au | ABN 18 804 239 602

PUBLIC ACCOUNTS COMMITTEE

Auditor-General's performance audit report - Mobile Speed cameras

Further information requested by Committee

How many mobile speed cameras are now in use in New South Wales? Has there been any change since your response was submitted?

Answer: There has been no change to the number of mobile speed cameras there are 45 camera units in operation

2. When were the NSW Speed Camera Strategy and policies relating to the number of hours that mobile speed cameras are deployed last reviewed? Are there any plans to do this in the near future?

Answer: The NSW Speed Camera Strategy was published in 2012 following review by Government at which included the number of hours the cameras operate. Elements of the Speed Camera Strategy have been reviewed over time including the changes to signage and visibility of the mobile speed camera program introducing a speed zone identification and increased vehicle markings. There has also been a policy decision to expand the Average Speed Camera program in the metropolitan area announced as part of the 2018 Road Safety Plan. The policy relating to the current 7,000 hours of mobile speed camera enforcement hours per month was announced at the same time as the launch of the Strategy in 2012. The Government have not announced any plans to further review the Strategy or mobile speed camera enforcement hours.

3. Your response to Recommendation 1 notes that research was being conducted on better practice for mobile speed cameras in other jurisdictions and that it was anticipated that the report would be published at the end of October 2020. Has this occurred? If so is it available on the Centre for Road Safety (CRS) website?

Answer: The research on better practice for mobile speed cameras in other jurisdictions has been completed and is going through an approvals process..

4. Your response to Recommendation 1 also noted that the Centre for Road Safety has identified opportunities to optimise the MSC program through better use of current approved enforcement sites. What changes have been made to the criteria for site selection as a result of this?

Answer: Transport for NSW continues to conduct site assessments within existing mobile speed camera locations to ensure enforcement sites can be technically and safely enforced. Where a site is not feasible for enforcement e.g. due to changes in the road environment, the site is deactivated and a new site is identified. This is current and ongoing practice and no changes to the site selection criteria have been required to date.

5. According to the CRS website, annual reviews are undertaken to evaluate all speed cameras to ensure they continue to have a positive effect on driver behaviour and help reduce crashes. The last published review of mobile speed cameras is for 2018. Has the 2019 review been undertaken and if so, when will the results be published?

Answer: The 2019 Annual Review of Speed Camera Programs, which looks at data up until the end of the 2018 calendar year, is currently underway. It is anticipated that the review will be published end of 2020, subject to Government approval.

APPROVAL:

Name	Title	Division, Agency	Signature/ Date approved	Response requires Secretary's approval
Bernard Carlon	Executive Director, Centres for Road Safety & Maritime Safety	Safety, Environment and Regulation, Transport for NSW	7/7/20 	Yes

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Audit Report	Unique Identifier	Completed By	Report Date	Finding No.	Finding Title	Finding Details	Auditor's Suggestion	Management Action(s)	Rating	Business Manager	Division	Responsible Officer/ Organisation	Accountable Deputy Sec / Director	Original Due Date	Past Management Updates	Management Update this Quarter	Status	Revised due date	If the due date is changed, please provide the reasons for the change, below.	Equivalent rating (if relevant to align to current rating framework)	Equivalent division (if different based on organisational changes)
Mobile Speed Camera	AO201819/1/1	Audit Office of NSW	18-Oct-18	1.1			By October 2019, Transport for NSW and Roads and Maritime Services should: Review the Speed Camera Strategy to ensure MSCs provide an efficient general deterrence and complement other speed enforcement activities, including by: - undertaking and publishing a review of research on better practices for MSCs in other jurisdictions.	Accepted	No Rating identified.	Julie O'Connor	Safety & Regulation	Deputy Secretary,Safety & Regulation	Deputy Secretary,Safety & Regulation	1/10/2019	**July 2019** :CRS - Following a competitive RFP process, ARRB was engaged in late July to conduct this research project. Work is underway and a draft report is expected mid August. The final report is expected mid September. The Centre for Road Safety (CRS) is in the final stages of developing of a services brief for a review on better practice for mobile speed camera programs in other jurisdictions. The timeframe for completion of this project is August 2019. Following completion a summary of this review will be published on the CRS website.	CRS anticipates the research report will be finalised end October and will be published following this.	**In progress**	1/10/2019	Note, the audit did not specify a date in October (applies to all recommendations)	No rating identi	SER
Mobile Speed Camera	AO201819/1/3	Audit Office of NSW	18-Oct-18	1.3			By October 2019, Transport for NSW and Roads and Maritime Services should: Review the Speed Camera Strategy to ensure MSCs provide an efficient general deterrence and complement other speed enforcement activities, including by: - revisiting the performance indicators for the success of the program, to ensure they provide information on whether it is providing a general network deterrence.	Accepted	No Rating identified.	Julie O'Connor	Safety & Regulation	Deputy Secretary,Safety & Regulation	Deputy Secretary,Safety & Regulation	1/10/2019	**Aug 19** : The better practice review (1.1), including research on key performance indicators is underway. Identifying performance indicators that could be used to monitor the effectivenses of a MSC program is included in the scope of the better practice review review referred to at 1.1. Following completion this review CRS will update the performance indicators used for the MSC program in the annual review of speed cameras.	CRS has completed research on best practice performance indicators for a MSC program. Based on research findings, CRS will review and update the current performance indicators used for the program in the next Annual Speed Camera Review where	**Completed**	1/10/2019		No rating identi	SER
Mobile Speed Camera	AO201819/1/4	Audit Office of NSW	18-Oct-18	1.4			By October 2019, Transport for NSW and Roads and Maritime Services should: Review the Speed Camera Strategy to ensure MSCs provide an efficient general deterrence and complement other speed enforcement activities, including by: - continuing to develop public information campaigns to support the MSC program	Accepted	No Rating identified.	Julie O'Connor	Safety & Regulation	Deputy Secretary,Safety & Regulation	Deputy Secretary,Safety & Regulation	1/10/2019	**Aug 19** : Ongoing **Feb 19**: Speeding remains a priority area for TfNSW and development of a speed campaign will be considered in future advertising programs. Any future campaign will be used to support the MSC program along with other initiatives that address speeding	CRS will continue to consider opportunities to support the MSC program in future campaigns on Speeding. CRS does not develop campaigns on individual speed camera programs. Information on the MSC program is available on the CRS website.	**Ongoing**	1/10/2019		No rating identi	SER

Mobile Speed Camera	AO201819/1/6	Audit Office of NSW	18-Oct-18	2.1			By October 2019, Transport for NSW and Roads and Maritime Services should: Enhance management of MSCs by: - assessing additional locations and sites for inclusion in the MSC program, using a broader range of selection criteria, and making sure these assessments are adequately documented	Accepted	No Rating identified.	Julie O'Connor	Safety & Regulation	Deputy Secretary,Safety & Regulation	Deputy Secretary,Safety & Regulation	1/10/2019	**Jul 19** : Actions underway and ongoing. Feb 19 : Following completion of the better practice review (1.1) CRS will review and update the selection criteria where appropriate, and conduct future assessments using the updated criteria. CRS and RMS will ensure that documentation of any future assessments is maintained appropriately.	CRS has identified opportunities to optimise the current program through better use of current approved enforcement sites. CRS will continue to review the site selection criteria and conduct additional site assessments as appropriate.	**Ongoing**	1/10/2019		No rating ident	SER
Mobile Speed Camera	AO201819/1/7	Audit Office of NSW	18-Oct-18	2.2			By October 2019, Transport for NSW and Roads and Maritime Services should: Enhance management of MSCs by: - ensuring the MSC scheduling system allocates location visits in accordance with their crash risk weighting and the deployment strategy	Accepted	No Rating identified.	Julie O'Connor	Safety & Regulation	Deputy Secretary,Safety & Regulation	Deputy Secretary,Safety & Regulation	1/10/2019	**Jul 19** : Actions underway and ongoing. Feb 19: CRS and Roads and Maritime have commenced enhanced monitoring of the scheduling system. CRS review has shown that the system is currently operating largely in line with the deployment strategy. CRS will continue to review and make enhancements to the scheduling system where appropriate. Roads and Maritime is undertaking IT system enhancements to automate reviews of the scheduling system to enable identification of sites that may be over or under-scheduled for MSC enforcement. The system upgrades are expected to be implemented over the next 6 months.	CRS has reviewed the scheduling system which is currently operating in line with the deployment strategy. CRS and CaRS are working on a long term plan for IT system enhancements to improve the scheduling system and overall management of the program.	**Completed**	1/10/2019		No rating ident	SER

Transport for NSW Media Release

5 JULY 2021

MORE MOTORISTS GETTING THE MESSAGE THAT SPEEDING IS UNACCEPTABLE

Drivers are being reminded they can be caught anywhere anytime by a mobile speed camera, as new data reveals a drop in the number of people caught speeding per hour of enforcement.

Centre for Road Safety Executive Director Bernard Carlon said 3.5 drivers were caught per hour of mobile speed camera enforcement in June, compared with five drivers caught per hour immediately after the changes were implemented.

“I want to thank the majority of New South Wales drivers and riders for slowing down on our roads, with 98% of vehicles passing Mobile Speed Cameras not exceeding the speed limit until the end of May this year,” Mr Carlon said.

“That 2% of people who are doing the wrong thing are on notice – your behaviour is putting lives at risk and you will be caught. If 98% of people can do the right thing, then so can you.

“Early indications are that the changes to the mobile speed camera program, along with other initiatives, are contributing to a reduction in trauma with the number of deaths on our roads down by 56 in the 2020/21 financial year, compared to the average of the three previous financial years.

“Data has also revealed the number of fatalities linked to speeding has dropped from almost 50% last year to around 40% so far this year.”

Mr Carlon said in the five years between 2015 and 2019, 743 people were killed and 6,372 seriously injured in crashes where speed was a contributing factor on NSW roads.

“While most people associate speed related death or injuries with high speeds the truth is at least two thirds of speeding drivers or riders involved in those crashes were travelling less than 10km/h over the sign posted speed limit.”

“The complacency that some drivers have that ‘a little bit over’ the speed limit won’t hurt, has to stop. It is demonstrably untrue and the evidence proves this.”

Media contact: (02) 8265 6555

The Mobile Speed Camera Program has always had the ability to enforce in both directions and operated cameras this way until requirements for additional signage were introduced in 2012.

These signage requirements meant it wasn't safe from a WHS perspective to put signs out in both directions.

Now signs are no longer required, bidirectional enforcement by mobile speed cameras has resumed on some stretches of road where conditions permit.

As recommended by the Auditor General, this makes NSW's program consistent with every other state in Australia which already operate mobile speed cameras bi-directionally.

"There's been a lot of incorrect claims about where the fines go, however every dollar is placed straight into the Community Road Safety Fund and reinvested back into improving road safety," Mr Carlon said.

"This money is not going to government coffers, it is being used to fund life saving projects including the roll out of over 3,300 additional kilometers of audio tactile line markings as well as other safety infrastructure including flexible safety barriers, wide centre lines, curve treatments, and traffic calming measures such as speed humps and raised pedestrian crossings.

"Even more importantly, these changes to the mobile speed camera program are estimated to save up to 43 lives a year and 661 serious injuries when fully implemented reducing the cost to the community by up to $644 million a year.

"Speeding is never okay – whether it's a small amount or large, a life altering crash can occur at any speed. The focus of this debate should be on the lives saved not the number of people who break the law and are penalized because of their dangerous behavior.

More information about the Mobile Speed Camera Program: https://roadsafety.transport.nsw.gov.au/speeding/speedcameras/mobile-speed-cameras.html

Speeding statistics:

- If a car hits a pedestrian at 30km/h, there is a 10% risk the pedestrian will die. At 40km/h this risk increases to 40%. At 50km/h, there is a 90% chance the pedestrian will die.
- Studies have shown that going just 5km/h over the speed limit in a 60 km/h zone doubles your risk of being involved in a crash where at least one person is killed or injured.
- If you're travelling 10km/h over the speed limit in a 60km/h zone, you're four times as likely to be injured in a crash.
- At 40km/h the stopping distance of a car on a dry road is 27 metres. At 50km/h this increases to 37 metres and at 60km/h it will take 56 metres to stop.
- A typical stopping distance when travelling at 30 km/h on a reasonable road sur face is 19 metres, while at the slightly faster speed of 40 km/h, the stopping dista nce increases to 27 metres.

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COMMENT

SMH - 14 NOVEMBER 2016

Duncan Gay should be stripped of responsibility for road safety

Harold Scruby

Apart from the pain, grief and suffering, road trauma costs NSW about $8 billion per annum. According to Transport for NSW, speed-related fatalities comprise 42 per cent of the deaths on our roads.

The shocking news uncovered by the *Herald* last week that up to 16 people have been killed in underused point-to-point speed camera zones since the cameras were installed, demands road safety be stripped from Transport Minister Duncan Gay's portfolio.

The speed cameras NSW doesn't use

NSW has the biggest network of point-to-point speed cameras in the country but doesn't use them to target cars.

Road safety is the natural enemy of mobility. That the minister for mobility (roads) is one and the same minister for road safety is as absurd as the minister for mining being the minister for the environment.

The NSW government should let Gay do what he's good at: building roads. We should emulate the successful Victorian system by moving road safety to a separate ministry where there's an economic imperative to reduce road trauma.

More than 335 people have died on our roads this year and the NSW road toll is up more than 17 per cent on the three-year average. The irony of this tragedy is that people in the bush, Gay's constituency, are three times more likely to be killed in a crash than people in the city.

Gay's mismanagement of his road safety portfolio is not only costing many lives and limbs, it's costing NSW a fortune. His behaviour in selecting which speeding drivers should be booked and which should not is discriminatory.

In February 2011, the Pedestrian Council of Australia lodged a freedom-of-information request, which revealed that during six months in two point-to-point speed camera zones, 117 heavy vehicle drivers had been warned for speeding but more than 94,000 other motorists had also been detected speeding and weren't even warned.

In May 2011, Gay signed the National Road Safety Strategy along with all other roads ministers. The strategy sang the praises of point-to-point enforcement. Gay also agreed as part of the strategy to "improve compliance with speed limits across the road network ... install where appropriate point-to-point cameras to improve speed compliance among all vehicles".

The road toll is "going through the roof", says the Pedestrian Council's Harold Scruby. Photo: Kirk Gilmour

In NSW, point-to-point cameras are only placed in black spots. In the other jurisdictions they operate in – Victoria, Queensland, SA and ACT – they issue fines, not warnings, to all vehicles.

In January 2013, we commissioned a second FOI request when there were 25 zones in operation. Again, a handful of trucks had been warned. But not one other motorist was detected. Gay had switched off the data capture. A convenient case of wilful blindness.

During this time Gay was forging an alliance with the NRMA. Generally, the Nats have a strong libertarian culture and they despise modern speed camera technology. When booked, the robotic excuse of these Libertarian Luddites is to chant: "Nanny state ... revenue raising".

Gay capitalised on this feeling and developed a very clever distraction: "High-visibility policing." They have demonised speed cameras. Gay once claimed they were cash cows and he'd sent a dozen to the naughty corner.

On average, police officers can book one vehicle every half an hour. When they speed to catch lawbreaking motorists, they risk their lives and those of other road users. And it's very expensive, costing at least $200 per ticket.

Speed cameras catch every speeding driver for threepence and don't compromise safety.

For the past four years, at least nine fixed cameras have been in so-called "warning mode" where vehicles detected speeding at up to 30km/h over the limit are sent three warnings before being issued with a penalty. The farce is that these warnings go to the owners of the motor vehicles and there's no requirement to state who was driving. It's totally ineffective and a huge waste of public money.

The NSW road toll is up 17 per cent on the three-year average.

In spite of the misleading advertising campaign of "Anywhere Anytime", mobile speed cameras are only permitted to operate in published locations with three warning signs, giving motorists a chance to slow down. Although they are bi-directional, Gay will only permit mono-directional enforcement.

Gay's godsend has been Opposition Leader Luke Foley. While spending three months campaigning for greyhounds, he was struck dumb about the 90 people who died on NSW roads during the same period.

Current NRMA president Kyle Loades continues to procrastinate and obfuscate. "When it comes to road safety, our view is that changes to the system need to be based on evidence," he said.

However, practically every reputable road safety organisation has begged the government to turn on the point-to-point cameras for all vehicles, including STAYSAFE, the Australasian College of Surgeons, the Australasian College of Road Safety, the Australian Trucking Association and the Auditor-General. And international studies agree: they show point-to-point cameras reduce fatalities by 50-85 per cent.

Harold Scruby is chairman of the Pedestrian Council of Australia.

Push to turn off speed cameras

EXCLUSIVE

LINDA SILMALIS
CHIEF REPORTER

LABOR is calling for secret mobile speed cameras to be scrapped after the state government collected almost $4 million from an extra 25,000 fines in one month compared to the same time last year.

With the latest outbreak resulting in the majority of motorists being essential workers, Labor leader Chris Minns said it was time to stop what he described as "a blatant cash grab".

The latest government fine data showed a record $3.99 million was collected for speeding fines less than 10km/h over the limit in May this year.

Chris Minns.

This compares with $193,673 collected in May last year when 1547 fines were collected, although that was during the first Covid lockdown.

Monthly fines have soared since the government removed warning signs for the cameras last year.

Warning signs had been located 250m and 50m ahead of mobile speed cameras to encourage motorists to slow down.

State Opposition leader Chris Minns said it was time to put an end to secret cameras given the only people on the roads at the moment were essential workers.

It was also the case that people slowed down when they saw a proper warning signs – a behaviour that made roads safer, he said.

"In May alone the Government collected almost $4 million from over 25,000 extra fines compared to the same time last year," Mr Minns said.

"We all want our roads safer. But the lack of signage is only slugging people more at a time they can least afford it.

"How is this an essential service? Sydney is in lockdown and we have the government going out of its way to slug motorists on the road with low range speeding fines. The fact is people slow down when they see proper warning signs – and that makes our roads safer."

The Daily Telegraph

These speed cameras work, so why not use them?

Opinion - Harold Scruby - Daily Telegraph - Saturday 10 February 2018

POLITICIANS love making laws, but when it comes to enforcing them, particularly when they relate to road safety, they'll do everything possible to do nought.

They think they'll lose votes.

The NSW road toll is going through the roof. Apart from the pain, grief and suffering, road trauma costs NSW about $9 billion per annum. It's time to embrace all the systems and legislation we have, particularly technology, to reduce this horrific carnage.

Point-to-point speed camera (P2P) enforcement is relatively new. It targets sustained, intentional speeding behaviour over long distances and is more acceptable to the public than single-camera enforcement.

In May 2011, every Australian roads minister, including NSW's Duncan Gay, formally committed to the 2011 to 2020 National Road Safety Strategy.

The NRSS presented a 10-year plan to reduce the annual numbers of deaths and serious injuries on Australian roads by at least 30 per cent. It stated speeding was the main behavioural factor, causing 34 per cent of total deaths. It noted evaluations demonstrated that P2P enforcement reduced speeding, resulting in a low infringement rate and significant reductions in deaths and serious injuries.

Point-to-point speed cameras on Northern Expressway. Despite evidence they reduce the road toll, they're only being used to detect speeding trucks in NSW. (Pic: Roger Wyman)

The NRSS concluded: "First Steps — Actions for First Three Years — Install where appropriate point-to-point cameras to improve speed compliance among ALL vehicles."

When they were first introduced in NSW about 2010, the then Labor government ruled they could only be used for heavy vehicles. In February 2011, the Pedestrian Council of Australia (PCA) lodged a freedom-of-information request, which revealed that during six months in two point-to-point speed camera zones, 117 heavy vehicle drivers had been warned for speeding, but more than 94,000 other motorists had also been detected deliberately speeding — but not one driver was even sent a warning: irrefutable proof that non-enforcement of the law encourages its disobedience.

Despite this damning data, Gay refused to turn them on for all vehicles, claiming he had made “an election commitment”. Instead, he embarked upon a vociferous campaign to neuter the entire speed camera system, labelling them cash cows and boasting he had sent a dozen to the naughty corner. Two years later and Gay had rolled out a total of 25 P2P cameras — all in black spots. The PCA conducted another FOI. Again, a handful of truck drivers had been caught speeding — but not one other motorist had been detected. Gay had ensured there was no data capture. It was far better not to know.

People who live in rural areas are five times more likely to die in a car crash than city dwellers.

Gay was finally put out to grass and Melinda Pavey became Roads Minister in early 2017. She continues to prevaricate and obfuscate, while more people die, claiming only this week: “Extending the use of point-to-point cameras to cars in country areas could undermine road safety campaigns.” Go figure that. There were 34 fatal car crashes in P2P camera zones between 2010 and September 2016. Of those, 14 people were killed in crashes where speed was a factor. All P2Ps are in rural areas — and people who live in the bush are five times more likely to be killed in a crash than people in the city. These are Pavey’s constituents.

Since their inception, STAYSAFE, the Australasian College of Surgeons, the Australasian College of Road Safety, the PCA, the Australian Trucking Association and the Auditor-General, have asked the NSW Government to turn the cameras on for ALL vehicles.

Pavey’s luck is that the Opposition is struck dumb: Luke Foley has two DUIs under his belt and Michael Daley lost his licence for high-range speeding. Shadow roads minister Jodi McKay’s function is to remain invisible.

The people of NSW and Australia have the right to know why this government signed a contract to have P2Ps operating for all vehicles by May 2014, but have still failed to act on it, particularly as all other jurisdictions have now done so.

Fortunately, this week, Premier Berejiklian indicated that she’s “not ruling it out”.

Failure to do so is simply immoral.

Harold Scruby is chairman of the Pedestrian Council.