

# Road safety - traffic cameras

**Report 2: 2015–16**



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October 2015

The Honourable P Wellington MP  
Speaker of the Legislative Assembly  
Parliament House  
BRISBANE QLD 4000

Dear Mr Speaker

**Report to Parliament**

This report is prepared under Part 3 Division 3 of the *Auditor-General Act 2009*, and is titled  
**Road safety – traffic cameras.**

In accordance with s. 67 of the Act, would you please arrange for the report to be tabled in  
the Legislative Assembly.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Anthony Close', is written over a light grey signature line.

**Anthony Close**  
Acting Auditor-General



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## Summary

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Road safety experts recognise that disregard for speed and traffic signals is a significant cause of road crashes.

The latest data available shows that on Queensland roads speed contributed to:

- 437 fatalities (22 per cent of all road fatalities) over 2008 to 2014
- 2172 hospitalisations (five per cent of all road hospitalisations) over 2008 to 2013.

The Department of Transport and Main Roads (TMR) and the Queensland Police Service (QPS) work together to combat speeding and disobeying traffic signals through the Camera Detected Offence Program (CDOP).

This program, a key element in the state government's *Queensland Road Safety Action Plan 2013–2015* (which was in place during this audit) continues to play a major role in the newly released *Safer Roads, Safer Queensland: Queensland's Road Safety Strategy 2015–21* and the *Safer Roads, Safer Queensland: Queensland's Road Safety Action Plan 2015–17*.

The two primary aims of the program are to reduce speed related road trauma and the number of speeding drivers. It includes fixed and mobile speed cameras and red light cameras. In any one year, the program is responsible for detecting around 70 per cent of speeding and red light infringement notices issued.

Under the CDOP over the last seven years to 30 June 2015, the QPS have issued 3 760 962 camera infringement notices, and TMR has collected \$667.3 million in fines. The number of cameras on Queensland roads has grown from 50 mobile, three fixed and 36 red light cameras in 2008–09; to 100 mobile, 41 fixed, seven combined speed and red light and 74 red light cameras and one Point-to-Point camera system.

Understandably, there is a lot of public and media interest in the use of road safety cameras on Queensland roads. Most of this interest focuses on its efficacy in reducing the road toll and the perception that one of its aims is revenue raising. A key issue in this regard is getting the right balance between general and specific deterrence.

The results from road safety research demonstrates that one of the best methods to deter motorists from speeding is by deploying mobile cameras in an unpredictable way across approved mobile camera sites. This general deterrence effect is complemented by the specific deterrents from the fixed speed and red light camera network that target high risk locations or locations unsuited to mobile cameras.

From October 2014, the CDOP expanded to take primary responsibility for detecting and enforcing vehicle registration compliance using Automatic Number Plate Recognition (ANPR) cameras. The main aim of enforcing vehicle registration laws being that all vehicles on the road hold a current compulsory third party insurance policy—this covers the financial liability of a driver who causes road trauma or property damage.

In this audit, we examined the design and implementation of the CDOP (including ANPR), and assessed its operational integrity to determine how effectively it contributes to road safety outcomes.

## Conclusions

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The CDOP is well designed in its conception, drawing on a strong body of research on effective road safety enforcement.

The evidence shows that it is slowing motorists down, reducing hospitalisations and preventing severe crashes thus contributing to road safety. However, it is not working as well as it could. This means the frequency and severity of crashes caused by speeding are likely higher than necessary. The QPS and TMR have acted slowly on known system and process limitations that primarily affect the quality of available data. In turn, this has led to police losing confidence in the mobile camera site scheduling system, resulting in them adopting other approaches to select sites at which to deploy their mobile cameras.

This has led to a steady move away from siting mobile cameras to maximise general deterrence, toward achieving site specific deterrence. This practice risks heightening public perceptions that revenue raising is a feature of the program.

On the other hand, an apparent desire to avoid perceptions of revenue raising has unduly influenced decisions that have limited covert camera deployments (unmarked or not visible police vehicles) to well below their government approved levels.

Both practices run counter to research results which indicate the best way to maximise road safety outcomes is to maintain an element of randomness in camera deployments and to increase the use of covert deployment.

The checks and balances in place for issuing infringements are reliable and effective meaning the probability of infringements issued in error is very low. However the failure to address issues with the legibility of certain number plates and with the roll out of the ANPR systems is creating unacceptably high levels of manual effort and unnecessarily restricting the ability to fine offenders.

There is a need for stronger program governance to fix the known system and data issues to allow for more timely evaluations and monitoring of the program. This will guide the CDOP to be as effective as possible.

It is time to implement the program as designed by deploying cameras to the right locations at the right time and mode to redress the imbalance between too much specific and not enough general deterrence.

## Road safety outcomes—changing driver behaviour

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The results from TMR speed surveys show some improvements in driver behaviour. From May 2010 to May 2014, in four of the five speed limit categories, the average speed of drivers was less than the speed limit.

The exception is the 80 kilometres per hour category on rural roads. While average speeds for this category have fallen by 2.2 per cent, they remain above the 80 kilometre speed limit.

The TMR speed survey methodology is suitable, however, floods have limited the datasets, causing results to be less likely representative of driver behaviours across the state. Mobile cameras monitor all vehicle speeds. These datasets, particularly from covert police vehicles, could be used to strengthen the reliability of the findings of speed surveys.

Since 2012–13, the number of motorists in the high speeding brackets (more than 13 kilometres per hour over the limit) has started to reduce. In the same year, to improve driver behaviour and road safety outcomes, the QPS reduced the speed tolerance limit—the amount drivers are allowed to drive above the posted speed limit without being fined. There had been an increase in the rate of motorists being fined for speeding in the lowest speed category as a result. This is now trending back down, indicating that driving behaviour is slowly changing and adapting to the new lower limits.



For mobile cameras, research shows the use of covert vehicles is more effective than overt (marked and visible) vehicles in addressing network-wide speeding. Covert deployments detect more speeding drivers because motorists frequently do not see the camera and so do not adjust their speed. This is the primary reason that covert deployments detect 15.7 offenders per 1 000 vehicles monitored compared to eight offenders for overt deployments.

Accordingly, a high percentage of covert deployments prompts a general deterrence to speeding. However, the QPS are not using covert deployments to their full potential despite having government approval to increase the hours of usage. The QPS have approval for 30 per cent of mobile camera hours to be undertaken covertly. In 2014–15, they only performed 16.3 per cent of mobile deployment hours covertly. This is in part because the QPS wants to avoid perceptions of revenue raising.

The introduction of covert deployments arose from independent expert evaluations of the CDOP. Since 2009, further independent evaluations have recommended additional improvements to strengthen the CDOP, however only nine of the 17 recommendations have been implemented or progressed.

## Site selection and deployment practices

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If drivers know they can be fined for speeding anywhere and anytime, they are likely to modify their speeding behaviour overall—not just in specific localities. Frequency and unpredictability underpin the CDOP deployment system. Site selection, deployment and the types of cameras all play a part in this.

Speed Management Advisory Committees (SMAC) were established with representatives from TMR, the QPS, the Royal Automobile Club of Queensland and local government to approve nominated mobile speed camera sites. The QPS can only deploy to these sites. The SMACs decisions are based on crash history, crash potential and road safety outcomes. The SMACs have approved a large pool of sites across the road network.

The QPS does not visit approximately a third of these approved sites in any one year, with approximately one in seven sites (14 per cent) not visited over a three year period. This brings into question why these sites were chosen in the first place and why they continue to be approved sites.

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). The TSRS has a weighted randomised selection process which builds in the unpredictability required to produce a general deterrence effect. Researchers have 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.

However, in 2013–14, two per cent of the available sites accounted for 18.1 per cent of all deployments. They were attended more frequently than the site scheduling system recommended. These sites had high traffic volumes but not serious crash rates.

The higher traffic volumes at these sites result in more infringements being issued compared to other sites. The QPS justifies the frequent attendance at these sites because of their crash potential. However attending these sites more frequently than the TSRS recommends exposes the QPS to potential claims of revenue raising. And yet, the QPS make other deployment decisions about the use of covert cameras to avoid perceptions of revenue raising.

The TSRS has known shortcomings. It relies on crash data which takes many months for the QPS to verify before it can be included into the system. Also, it does not recommend the best day of the week, or best time of the day, to deploy speed cameras to sites.

The five-year trend for serious casualty crashes shows instances are rising on Fridays, Saturdays and Sundays, as well as in the evening and at night. However, the QPS mostly deploys cameras to sites during standard working hours on weekdays.

Instead of addressing the limitations of the TSRS, police increasingly use another system—the Integrated Tasking and Analysis System (I-TAS) to choose at which approved sites they will deploy their cameras. The routine use of I-TAS is not endorsed by TMR for frequent camera deployments.

While the I-TAS provides real-time information, it uses both verified and unverified data, and unlike the TSRS, it does not nominate sites. When police make the decisions about which sites to deploy there is a high risk that the element of unpredictability provided by the scheduling system—a key driver of the general deterrence effect—is lost.

Leaving deployment decisions open to subjective judgements based on unverified data and personal preferences, can erode public confidence in the system. Encouragingly, the QPS has now secured funding to develop an improved scheduling system.

## Enforcement

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The QPS issue infringement notices to encourage drivers to change their behaviour.

In 2014–15, the QPS issued 841 401 infringement notices under the CDOP with an estimated value of \$167 million. In the same year, \$135.8 million was collected. The surpluses from the CDOP are to be used to improve state controlled roads, in road safety education and awareness, and in supporting trauma services.

The process to issue infringements is reliable but labour-intensive. Only a low percentage are waived or successfully challenged in court. But over the last five years, a combination of poor film quality in analogue cameras and unclear number plates (certain personalised plates, obscured and unclear plate covers) have contributed to a growing number of detected offences (13.1 per cent) not being issued as infringements.

Beyond replacing analogue cameras with digital cameras progressively over three years, neither the QPS nor TMR is working effectively to identify the types of personalised plates causing problems or to resolve the issues that make personalised or covered plates hard to read.

Technology problems and the response to them are also issues for the Enforceable Network by Automatic Number Plate Recognition Camera Technology (ENACT) project. This is a key tool to detect unregistered vehicles, replacing the need for drivers of light vehicles to display registration stickers.

TMR were behind schedule in rolling out ENACT and the QPS portion of the project has been placed on hold. The TMR ANPR cameras which are in place can only correctly interpret infringements 19.1 per cent of the time. This leads to a great deal of manual checking.

Insufficient cameras have been installed in police cars. Despite the fact that the ENACT project plan included the integration of the QPS in-car cameras and TMR systems, this has not happened and is not scheduled to happen.

TMR is currently focusing on heavy vehicle compliance, rather than light vehicles. This means there is the potential for more unregistered (and uninsured) vehicles on the road. It also means a potential loss of revenue which could be used to improve road safety in Queensland.

## Recommendations

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We recommend that the Queensland Police Service and the Department of Transport and Main Roads:

1. address outstanding program improvement recommendations
2. reduce the length of time it takes to verify and analyse data so it can be used in a timely manner to inform program and deployment decisions
3. comprehensively review all approved mobile camera sites for their ongoing appropriateness
4. increase covert deployment of mobile cameras to cabinet approved levels
5. increase the rate of night time and weekend deployment of mobile cameras
6. identify and quantify the cause of unclear plates and address enforcement and design issues effecting the ability to issue infringements
7. put ANPR cameras that also store images in more QPS cars and enforce vehicle registration compliance in the urban and suburban setting
8. fix the software recognition limitations to improve the efficiency of ANPR enforcement processes.

## Reference to comments

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In accordance with s.64 of the *Auditor-General Act 2009*, a copy of this report was provided to the Department of Transport and Main Roads and the Queensland Police Service with a request for comments.

Their views have been considered in reaching our audit conclusions and are represented to the extent relevant and warranted in preparing this report.

The comments received are included in Appendix A of this report.



# 1. Context

Queensland is a signatory to the *National Road Safety Strategy 2011–2020*. This strategy set a national target to reduce the annual number of fatalities and hospitalisations by at least 30 per cent from 2011 by 2020.

In 2014, Queensland had a record low 223 fatalities from 199 fatal crashes. For the first six months of the 2013–14 financial year, there were 3018 crashes that resulted in one or more people being hospitalised. As at 13 September 2015, the road toll is 0.6 per cent higher than the same period last year.

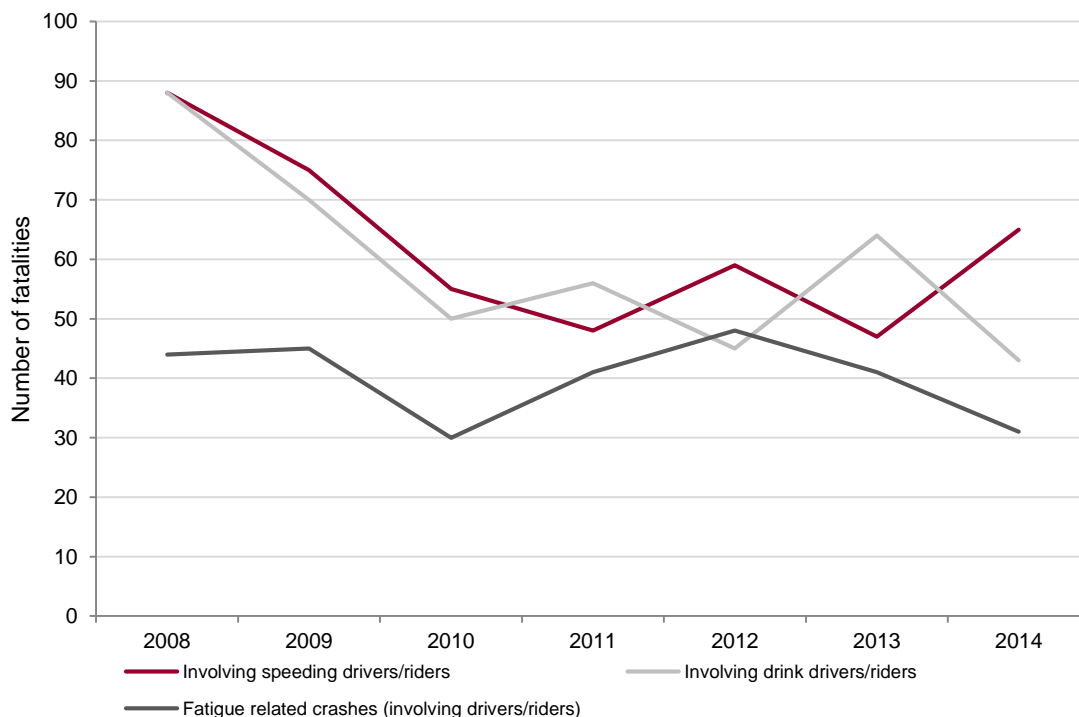
Many factors contribute to road crashes including alcohol, drugs, speed, disobeying traffic signals, and fatigue. Speeding—either exceeding the speed limit or driving too fast for the conditions, is a major factor in both the number and severity of traffic crashes.

Speeding affects road safety by increasing the:

- risk of accidents occurring, because of the reduced driver response time needed
- impact of collisions
- risk of fatalities and severity of injuries.

From 1 January 2008 to 31 December 2014, speeding contributed to 437 fatalities (22 per cent of all road fatalities) on Queensland roads. Figure 1A shows that fatigue and drink driving were the other two major factors.

**Figure 1A**  
**Top three factors contributing to road fatalities in Queensland**  
**1 January 2008 to 31 December 2014**



Source: Queensland Audit Office using Queensland Road Crash Weekly Report No. 915

## The Camera Detected Offence Program

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Queensland's red light camera program commenced in 1991, the speed camera program on 1 May 1997 and enforcement of vehicle registration on 1 October 2014. Collectively, they are known as the Camera Detected Offence Program (CDOP). This program is part of the *Safer Roads, Safer Queensland: Queensland's Road Safety Action Plan 2015–17*.

It is a joint program between the Department of Transport and Main Roads (TMR) and the Queensland Police Service (QPS) and aims to deter drivers from:

- exceeding the speed limit
- disobeying traffic signals
- driving unregistered and uninsured vehicles.

General deterrence is the primary philosophy that underpins the program—using cameras convinces the public that traffic laws are enforced and that they have a high risk of detection and punishment when they break the law.

Cameras are also used for 'specific deterrence'—focusing on particular sites for camera deployment. Examples of this are red light and fixed speed cameras, or frequently using a mobile speed camera at a site. Research indicates that specific deterrence has a positive, albeit geographically isolated, effect on driver behaviour.

On-the-spot speeding infringement notices are outside the CDOP, and accordingly outside the scope of this audit. These notices are issued by police officers based on the use of mobile or hand held radars or where they estimate a vehicle's speed to determine if an offence has occurred.

### Automatic number plate recognition cameras

Automatic number plate recognition (ANPR) camera technology matches photographed number plates to the vehicle registration database to detect unregistered and therefore uninsured vehicles.

These cameras became part of the CDOP from 1 October 2014, to coincide with the removal of the requirement for light motor vehicle owners (cars and motorbikes) to display vehicle registration labels.

TMR implemented its Enforceable Network by Automatic Number Plate Recognition Camera Technology (ENACT) project to ensure that the number of unregistered and uninsured vehicles does not increase as a result of this change.

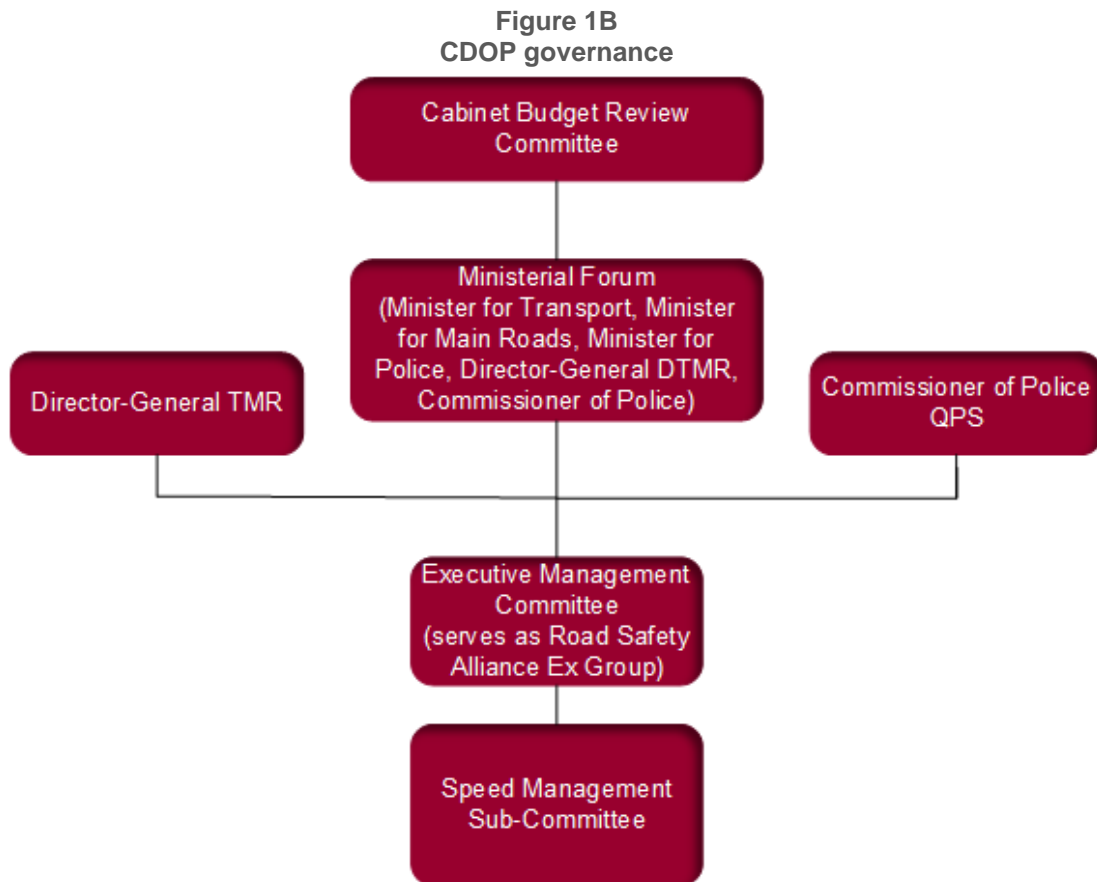
The TMR developed project plan for the ENACT project outlines its expected benefits as:

- A measureable decrease in the percentage of unregistered and uninsured vehicles in Queensland from the estimated 2014 level of 2.5 per cent.
- A way to ensure the revenue stream for government is not compromised through a reduction in registration revenue.
- A way to reduce the cost of the Nominal Defendant, which is a statutory body established under the *Motor Accident Insurance Act 1994*, in compensating people injured in motor vehicle accidents.

TMR uses fixed and mobile ANPR camera technology to check compliance and issue enforcement notices for unregistered, uninsured vehicles. In addition, TMR captures and retains information for heavy vehicle and general policing intelligence purposes.

## Program governance, roles and responsibilities

Figure 1B depicts the program's governance structure.



Source: Queensland Audit Office using Executive Management Committee Terms of Reference 2012

Figure 1C outlines the roles and responsibilities of each of these bodies and also of the QPS regional and district level Speed Management Advisory Committees (SMAC).

Both the Department of Justice and Attorney-General (DJAG) and State Penalties Enforcement Registry (SPER) are outside the scope of this audit:

- DJAG provides administrative support to Queensland's courts through courthouse registries. An infringement detected by a traffic camera, police officer or transport inspector can only be disputed in court. The Magistrates Court deals with traffic infringements.
- SPER is a division of the Office of State Revenue, which is part of Queensland Treasury. It is responsible for the collection and enforcement of unpaid infringement notices.

**Figure 1C**  
**Roles and responsibilities**

Entity	Roles and responsibilities
Cabinet Budget Review Committee (CBRC)	<p>The CBRC is a sub-committee of the government's cabinet. CBRC approves the:</p> <ul style="list-style-type: none"> <li>▪ expenditure of revenue collected under the CDOP</li> <li>▪ the CDOP's strategic policy direction</li> <li>▪ number of deployment hours</li> <li>▪ percentage of deployment hours that may be conducted covertly (a variety of unmarked vehicles).</li> </ul>
Ministerial Forum	<p>Includes the Minister for Transport, Minister for Main Roads, Minister for Police, the Director General of TMR and the Commissioner of Police. Provides road safety advice to CBRC and implements strategic policy decisions.</p>
Executive Management Committee (EMC)	<p>The EMC is a partnership between TMR and the QPS to improve road safety in Queensland. It facilitates development, planning and coordination of road safety policies with the aim of reducing road fatalities and serious injuries in Queensland.</p> <p>Its road safety mandate extends beyond the CDOP to ensuring TMR and the QPS's long term visions, targets and strategic direction are aligned. The EMC reviews performance indicators from the CDOP and other road safety programs to provide policy advice to government. It also approves fixed camera sites.</p>
Speed Management sub-committee	<p>The Speed Management sub-committee provides direct oversight over the CDOP by reviewing output metrics, providing strategic direction and implementing government policies. It includes representatives from TMR, the QPS and the Department of Justice and Attorney-General.</p>
Department of Transport and Main Roads (TMR)	<p>TMR is the lead agency with responsibility for policy development and evaluation, financial reporting and receipting payment for infringements. TMR approve fixed camera locations.</p>
The Queensland Police Service (QPS)	<p>The QPS are responsible for managing and undertaking camera operations, processing and issuing infringement notices, prosecuting court elections and ensuring performance criteria are met for back office processing. The Traffic Camera Office within the QPS manages the CDOP's operations.</p>
Speed Management Advisory Committees (SMAC)	<p>SMACs are responsible for approving mobile speed camera sites in their geographical areas and also provide input into the selection of fixed camera sites (approved by TMR).</p> <p>SMACs have been established either at a regional or district level, depending on the geographic size and population of the QPS region. They are chaired by the senior police traffic officer for the region. Each SMAC aims to include at least one representative from each of the following stakeholders:</p> <ul style="list-style-type: none"> <li>▪ Queensland Police Service (Chair)</li> <li>▪ Department of Transport and Main Roads</li> <li>▪ local government</li> <li>▪ Royal Automobile Club of Queensland (RACQ).</li> </ul>

Source: Queensland Audit Office using agency internal policies and guidelines



## The use of road safety cameras

### The types of cameras and their purpose

Figure 1D shows the different types of road safety cameras used in Queensland.

**Figure 1D**  
Types of road safety cameras

Type	Category	Main purpose	Description
Mobile	Speed	General deterrence	Uses laser or radar enabled and portable cameras to automatically photograph speeding vehicles travelling in either direction. Can be operated overtly (marked vehicles or visible cameras) or covertly.
Fixed	Speed	Location specific deterrence—to address high risk/black spot areas where mobile deployments are not safe or ineffective	Uses cameras permanently installed beside or above roads. Fixed speed cameras are used to make sure road users follow the signed speed limit at specific high crash black spots or on known high-risk roads.
	Red light	Location specific deterrence—to address high risk intersections	Uses cameras located at intersections with traffic lights to take photos of vehicles that run red lights. They are positioned several metres back from the solid white line that marks the start of the intersection.
	Combined speed and red light	Location specific deterrence—to address high risk intersections and black spot areas	Uses cameras located at intersections to detect red light running and speeding. Speeding can be detected on the red, yellow and green lights. The camera can detect running of red lights and speeding at the same time.
Mobile and fixed ANPR	Vehicle registration	Enforcement of registration compliance and third party insurance	Uses cameras to recognise number plates and check against registration databases. Known as automatic number plate recognition (ANPR).
Fixed point to point	Speed	Location specific deterrence—to address high risk/black spot areas	Uses a system of two or more cameras along a length of road. The cameras calculate how long it takes a driver to get between points and compares this to the minimum permissible time to travel the distance at the speed limit.

Note: The Traffic Camera Office checks the registration compliance for all vehicles detected committing a speeding or red light offence.

Source: Queensland Audit Office

## The format and number of cameras

Figure 1E shows the number of analogue and digital cameras in use as at 30 June 2015 and the number of active camera locations:

- analogue cameras are older and use film. They are more prone to malfunction and incorrect set up, relying on high quality film to ensure photographs are clear
- digital cameras provide higher quality pictures, are easier to set up, more reliable, do not rely on consumables and can work with infra-red flashes.

**Figure 1E**  
**Road safety cameras as at 30 June 2015**

		Mobile speed	Fixed speed	Combined speed/ red light	Red light	Point-to-point	Total
Number of cameras	Digital	63	41	7	74	1	<b>186</b>
	Analogue	37	-	-	-	-	<b>37</b>
	<b>Total</b>	<b>100</b>	<b>41</b>	<b>7</b>	<b>74</b>	<b>1</b>	223
Number of active camera locations*		3593	19	7	132	1	<b>3752</b>

\*Note: There can be more than one fixed camera at each location. Not all fixed camera sites have a camera available for placement due to maintenance, calibration testing and the total cameras available.

Source: Queensland Audit Office using Traffic Scheduling and Reporting System (TSRS) data

## How camera sites are selected

The CDOP policy makes the SMAC responsible for approving mobile speed camera sites in line with the CDOP site selection criteria. The SMAC also provides regional input into the selection of fixed camera sites and combined speed and red light camera sites.

Crash history is the primary criterion for selecting a potential speed camera zone. A zone is one kilometre in diameter in urban areas or five kilometres in diameter in rural areas. Within each approved speed camera zone, specific sites are defined where cameras can be operated.

Sites are also nominated through secondary criteria including crash potential, roadwork sites and sites nominated through documented and validated public complaints and stakeholder knowledge of problem locations.

## How mobile speed cameras are deployed to specific sites

Figure 1F outlines the purposes and inter-relationships of the information systems used in the CDOP.

**Figure 1F**  
**Systems used in the CDOP**

System	Owner	Purpose	Data
Traffic Scheduling and Reporting System (TSRS)	The QPS	Assists in randomising site selection and deployments.	Data relating to road safety cameras, camera sites, approved camera operators and camera deployment history. Imports crash data from RoadCrash.
RoadCrash	TMR	Stores Queensland crash information from 1992 onwards.	Crash data TMR has verified for completeness and accuracy from the QPRIME database.
Integrated Tasking and Analysis System (I-TAS)	The QPS	Visualises and maps traffic information from QPRIME.	Collates 'real time' crashes, public complaints and other incidents.
Queensland Police Records and Information Management Exchange (QPRIME)	The QPS	Operational policing system for the QPS	Records incidents and persons of interest such as crime reports and public complaints.
Image and Infringement Processing System	The QPS	Reviews and processes images and issue infringement notices	Images from cameras and associated infringement information

Note: Images from both mobile and fixed cameras include other information such as the location, time and alleged speed

Source: Queensland Audit Office

The two primary systems used for deploying speed cameras are the:

- Traffic Scheduling and Reporting System (TSRS), introduced in 2006
- Integrated Tasking and Analysis System (I-TAS), introduced in 2011.

The QPS uses two approaches, in conjunction with these two systems, to select the sites at which to deploy mobile speed cameras:

- system driven
- user driven.

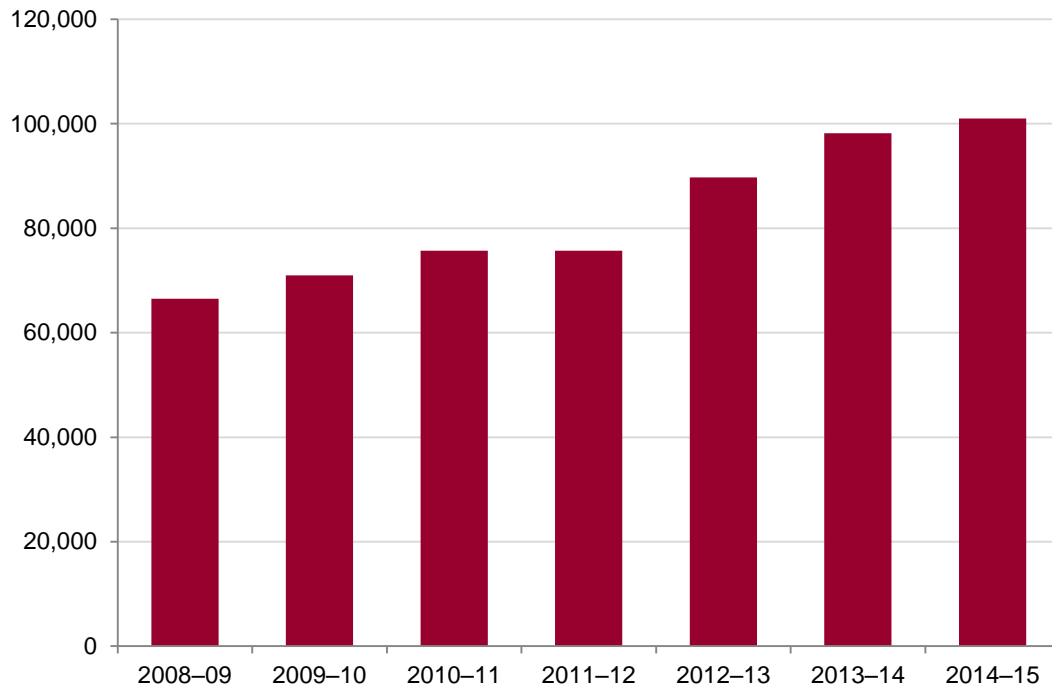
Police may select from sites nominated by TSRS. TSRS nominates sites based on a range of criteria, including crash and deployment history. It includes a degree of randomness across approved sites. The intent behind this is to promote a broader general deterrence approach by creating a level of unpredictability for the public about where and when police deploy cameras.

Alternatively, police may adopt a user driven approach—officers may be directed by their officer-in-charge to attend a particular site, or they may use the I-TAS to help select one. The I-TAS does not nominate sites; it overlays real time crash and public complaints data on maps to help police select sites for cameras deployment.

### Mobile camera operation hours

The government approves the operational budget for the CDOP which in turn determines the budgeted deployment hours. If the QPS are cost effective in their deployments additional deployment hours can be achieved. Figure 1G illustrates the increase in actual deployment hours over the last seven years.

**Figure 1G**  
**Actual mobile camera deployment hours**



Source: Queensland Audit Office using Integrated Traffic Camera System (ITCS)

## Infringement notices and fines revenue

### Fine categories

The QPS issue penalty infringement notices (fines) for verified infringements to deter drivers from unsafe driving behaviours. Fines are issued based on categories of speed, which also determine the level of penalty. Figure 1H shows infringement categories and penalties.

**Figure 1H**  
**Fine categories and penalties**

Speeding	Fine (\$)	Demerit points
Less than 13 km/h	157	1
13 km/h – 20 km/h	235	3
20 km/h – 30 km/h	392	4
30 km/h – 40 km/h	549	6
40 km/h or more	1 099	8
Registration	Fine (\$)	Demerit points
Failure to attach registration plate	91	0
Incorrect placement of registration plate or obscured registration plate	364	0
Incorrect attachment of accessory plates	91	0

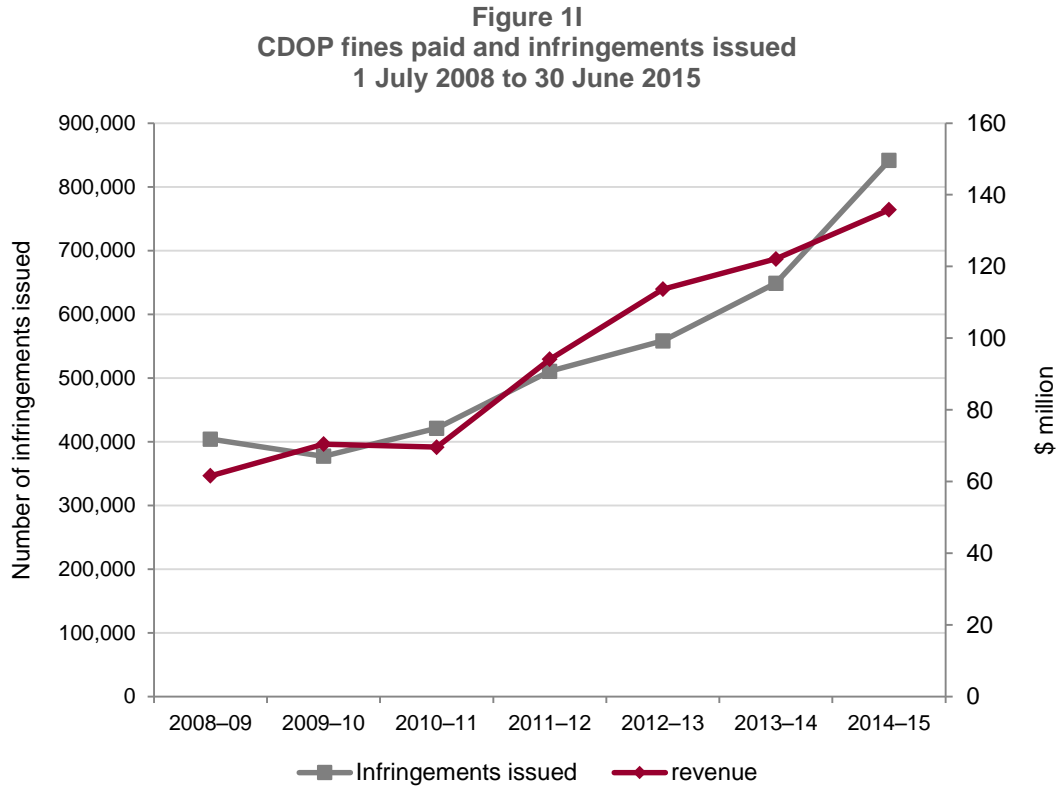
Source: Department of Transport and Main Roads as at 1 July 2015.

## Fines issued

As with any fines-based enforcement program, the CDOP raises revenue.

In 2014–15, the QPS issued 841 401 infringement notices under the CDOP with an estimated value of \$167 million. In that year, motorists paid \$135.8 million.

Figure 11 shows both the CDOP fines paid and the number of infringement notices issued have increased steadily since 2010–11 in absolute terms.



Note: Nominal revenue figures—infringements have not been adjusted to account for growth in registered vehicles or change in average kilometres driven per year.

Source: Queensland Audit Office using TMR Annual Reports and data extracted from Image and Infringement Processing System and Integrated Traffic Camera System (ITCS)

An increase in the number of infringements issued is not of itself an indicator of either success or failure of the program.

Increases are driven by a range of external and internal factors:

- increases in the number of registered vehicles
- increases in the number of cameras deployed
- increases in the hours that cameras are deployed
- increasing covert deployments
- improving the reliability of camera technology
- reducing speeding tolerances.

## CDOP expenditure

The revenue collected is required first to be spent on administrating the CDOP and remaining surpluses are required to be spent across three road safety themes in accordance with the *Transport Operations (Road Use Management) Act 1995*:

- road safety education and awareness
- road accident injury rehabilitation
- improving state controlled roads where accidents most frequently occur.

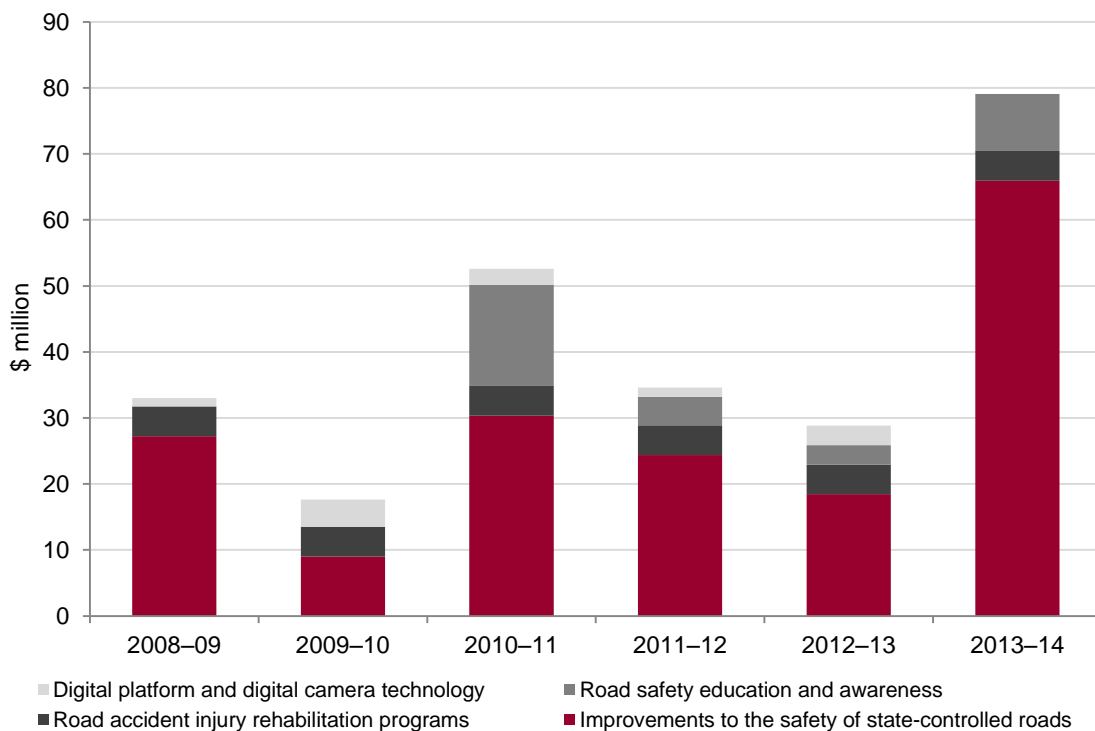
TMR allocates surpluses to road safety projects in accordance with the *Transport Operations (Road Use Management) Act 1995*. TMR assess each proposed project's net benefits and outcomes. The assessment criteria includes:

- value of the benefits to be returned for the cost invested
- degree to which the proposal meets the legislative criteria for allocation of excess revenue
- degree to which the proposal delivers on government priorities, specifically in relation to establishing safer communities and delivering a better quality of life for Queenslanders.

Figure 1J shows the surplus revenue spend from 2008–09 to 2013–14.

The largest share was reported to have been spent on safety improvements to state controlled roads: \$175.4 million (average of 71.4 per cent) between 2008–09 and 2013–14. The amount allocated to 2013–14 represents approximately 3.4 per cent of TMR's infrastructure spend.

**Figure 1J**  
**CDOP surplus expenditure**  
**1 July 2008 to 30 June 2014**



Source: Queensland Audit Office from Department of Transport and Main Roads Annual Reports

## Other evaluations of camera operations

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TMR has commissioned the Monash University Accident Research Centre (MUARC) to evaluate the CDOP's performance and its effect on crashes.

In 2012, MUARC developed a comprehensive evaluation framework through which the CDOP's performance can be measured annually in terms of its effect on crash frequency, severity and social costs to the community.

In August 2014, MUARC analysed data from 2009 to 2012 and estimated that the CDOP was associated with an overall reduction in all the QPS reported crashes of between 23 per cent and 26 per cent, with reductions being similar for different crash severity levels.

MUARC reported that this represents an estimated annual saving of around 6 000 crashes of all severities per year and subsequently reduced social cost.

## Audit objective and cost

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The objective of the audit was to establish whether and how well the CDOP is contributing to road safety outcomes.

The audit addressed the objective through the following sub-objectives:

- establish whether the design of the CDOP is consistent with its objectives
- establish whether road safety outcomes are achieved effectively
- determine the level of integrity of the CDOP.

The cost of the audit was \$349 000.

## Report structure

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We have structured the remainder of the report as follows:

Chapter	Description
Chapter 2	Analyses road safety outcomes
Chapter 3	Evaluates site selection and deployment
Chapter 4	Examines enforcement activities
Appendix A	Contains responses received on this report
Appendix B	Describes the audit methodology used
Appendix C	Outlines MUARC's CDOP evaluations



## 2. Road safety outcomes

### In brief

The Camera Detected Offence Program (CDOP) sits under the *Safer Roads, Safer Queensland: Queensland's Road Safety Action Plan 2015–17*. It is the primary mechanism for enforcing compliance with speed limits and traffic signals with the aim of improving driver behaviour and reducing speed related crashes.

The Queensland Police Service (QPS) fine motorists for running red lights and for speeding a set number of kilometres higher than the posted speed limit— this is known as the tolerance level. Fines revenue is used to fund the CDOP, improve safety on state controlled roads, provide blood products for road trauma victims and increase education and awareness on road safety issues.

### Conclusions

The CDOP has contributed to motorists slowing down but could more effectively achieve its principal aim of general deterrence across the road network.

Its enforcement activities have helped reduce speed-related crashes—but over the last 12 years has not further reduced speed-related fatal crashes.

The CDOP has contributed towards lowering the percentage of vehicles speeding in higher brackets (for example, more than 13 kilometres per hour). Increases in the number of vehicles detected speeding in lower speed brackets are largely attributable to lowering tolerance levels and increased deployment hours.

### Findings

- The number of crashes across all speed-related categories is decreasing except for speed-related fatal crashes, which have remained relatively steady over the past five years.
- More motorists are driving less than the speed limits. The average speed of drivers over the last five years in all categories is less than the speed limit, except for 80 kilometres per hour speed zones on rural roads.
- Prior to 2014–15 detected offences per vehicles monitored was trending down across the road network, however, the decrease was greatest at fixed camera locations.
- Mobile cameras on average detect up to nine offences more, per 1 000 vehicles monitored, than fixed cameras.
- The number of infringements issued per hour of operation has increased due to the lowering of tolerance levels and increased covert deployments (unmarked or not visible police vehicles).
- A delay in verifying crash data within the scheduling system is contributing to a move away from general deterrence to specific deterrence. This is hampering the CDOP in delivering further reductions in speed related crashes.
- TMR and the QPS have only implemented or progressed nine of the 17 CDOP improvement recommendations made by road safety experts since 2009.

### Recommendations

We recommend that the Queensland Police Service and the Department of Transport and Main Roads:

1. address outstanding CDOP improvement recommendations
2. reduce the length of time taken to verify and analyse data so it can be used in a timely manner to inform program and deployment decisions.

## Introduction

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The aims of the Camera Detected Offence Program (CDOP) are to:

- reduce road trauma caused by speeding
- reduce the number of speeding drivers.

Historical data on road trauma, speed and red light infringements provides insights into how driver behaviour has changed over time.

It is difficult to establish a direct causal relationship between the CDOP and the number of crashes. But studies have identified an indirect causal relationship—increased enforcement results in fewer accidents and lower violation rates—once drivers become aware of the increased enforcement.

The CDOP needs regular monitoring and evaluation to ensure the desired outcomes are achieved. Where outcomes are not achieved, actions need to be taken to continuously improve.

This chapter examines whether the outcomes of the CDOP are consistent with its stated objectives. Specifically, we assessed whether the CDOP's:

- operations are having a positive impact on road safety
- performance is being measured and actions are being taken to continually improve the effectiveness of the program in meeting its objectives.

## Conclusions

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The CDOP is reducing the incidence and severity of crashes by slowing motorists down, particularly around the site of camera deployments. Average speeds and falling rates of offending, particularly in the medium to high-speed brackets, indicate this.

Set against these positive outcomes three concerning aspects remain—the number of fatalities due to speeding remains at around 49 each year; the absolute number of drivers detected speeding is at a record high; and the average speeds in rural areas in 80 kilometre speed zones remain above that speed limit.

Taking action arising from program monitoring and evaluation is unacceptably slow for such an important public safety issue. Greater clarity is needed in both setting and measuring the indicators that speak to whether and how well the program is achieving its objectives.

This deficiency is one indicator that overall program governance requires strengthening. Two more indicators are the Department of Transport and Main Roads (TMR) and the QPS failing to act in a reasonable timeframe to address known data limitations and failing to address recommendations aimed at improving overall program performance.

## Road safety outcomes

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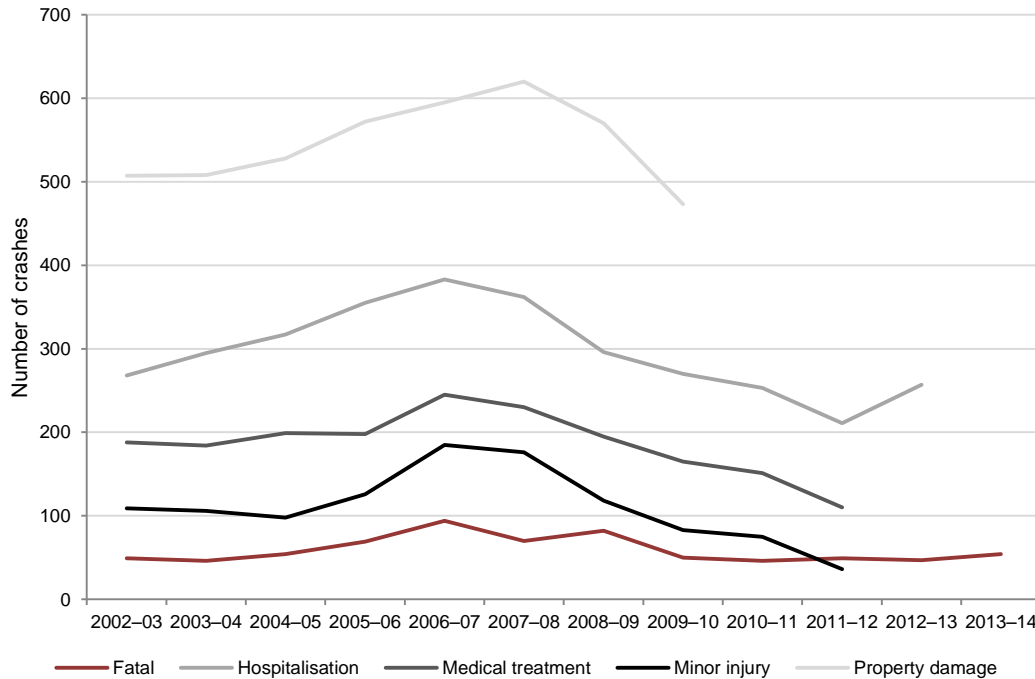
The aim of the *Safer Roads, Safer Queensland: Queensland's Road Safety Action Plan 2015–17* is to provide a safer road system in Queensland.

The enforcement activities of the CDOP contribute to the action plan by aiming to reduce the incidence and severity of crashes and by fostering slower speeds. The available data shows a positive downward trend in both sets of statistics, with the notable exceptions of speed-related fatal crashes and speeding in rural 80 kilometres per hour zones.

## The number and severity of speed-related crashes

Figure 2A shows the latest available data on crash severity. Except for speed-related fatal crashes, the chart shows downward trends since 2007–08 in the number of all other crash severity types where speeding was a factor.

**Figure 2A**  
**Queensland speed-related crash severity**  
**1 July 2002 to 30 June 2014**



Note: As at 10 August 2015, crash data for: fatal injury crashes was available up to December 2014 only; hospitalisation—up to December 2013; medical treatment and minor injury—up to June 2012; and property damage—up to December 2010.

Source: Queensland Audit Office using data extracted from RoadCrash

It is not yet clear if the 46 additional speed related crashes, (21.8 per cent increase) resulting in hospitalisation in 2012–13 is a statistically significant increase. This increase occurred across all regions, but more so in the Central and Brisbane regions, which increased by 38 per cent (23 crashes) and 36 per cent (14 crashes) respectively.

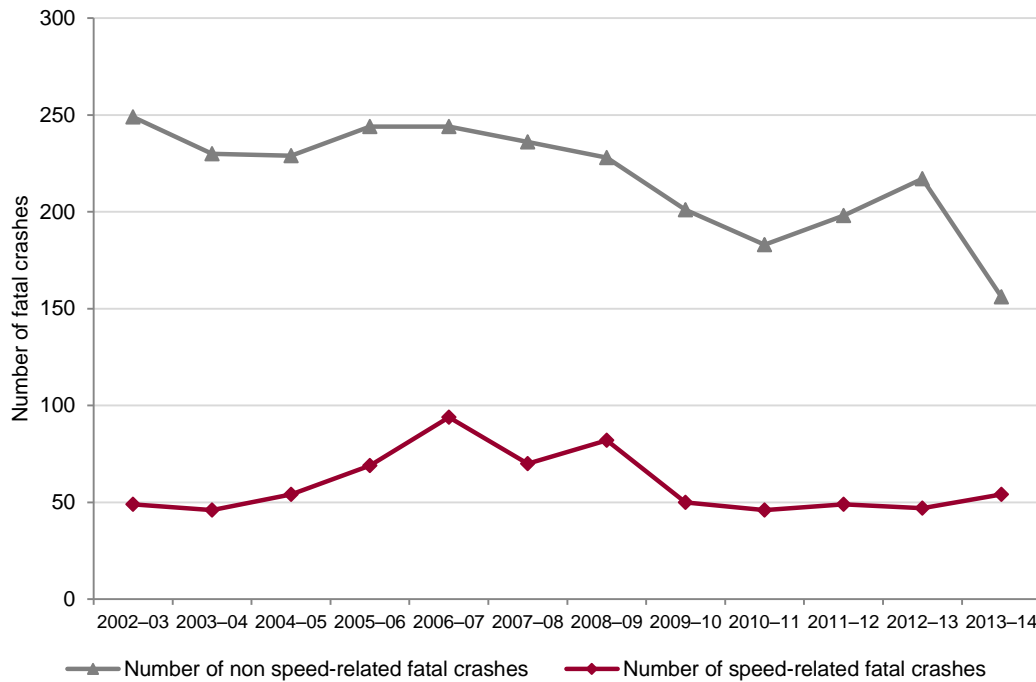
### Fatalities

The total number of fatal road crashes (from all causes) dropped in 2013–14 to its lowest level on record (210 fatal crashes), falling 20 per cent from the previous year’s figure.

Figure 2B shows there is a growing disparity between the more recent static trend in the number of fatal crashes due to speeding compared to the downwards trend from other causes.

Fatalities not attributed to speeding have fallen by 93 deaths (37 per cent) over the past decade from 249 in 2002–03 to 156 for 2013–14. However, speed-related fatal crashes have remained relatively steady since 2009 at about 49 fatal speed-related crashes per year.

**Figure 2B**  
**Fatal road crashes—all causes**  
**1 July 2002 to 30 June 2014**



Source: Queensland Audit Office using data from RoadCrash and the Australian Bureau of Statistics (3101.0—Australian Demographic Statistics)

## The incidence of speeding

The falling numbers of non-fatal road crashes correlates well with evidence that average vehicle speeds have also decreased over the same period.

Both the results of periodic speed surveys undertaken by TMR and our analysis of the number of infringement notices issued in each speed bracket indicate improved driver compliance over the last five years. However, our analysis also indicates that many drivers still speed and drive to what they believe the speed camera tolerance levels are.

### Results from speed surveys

Regular speed surveys establish benchmarks and track changes in the speed-related behaviour of motorists—particularly the level of compliance with speed limits across the road network. TMR conducts these speed surveys either six monthly or yearly across all speed zones to measure general vehicle speeds.

The survey results show that more motorists are adhering to the speed limit or decreasing the amount they speed. Between May 2009 and May 2014, except for 80 kilometres per hour zones in rural areas, the average surveyed speeds in all other speed zones is less than the speed limit and has been steadily decreasing. For example:

- average speeds in 50 kilometres per hour speed zones decreased by 0.97 kilometres per hour (2.1 per cent)
- in 80 kilometres per hour rural zones while the surveyed average speed is higher than the speed limit, it also has decreased by 1.84 kilometres per hour (2.2 per cent).

## Frequency and rate of offences detected

The total number of detected offences (speeding and red light) increased by 550 314 between 2008–09 and 2014–15, a rise of 113 per cent. This large increase in absolute numbers is influenced by many factors, including the number of deployment hours and methods of deployment.

To take account of these variables a better measure of driver behaviour modification is the number of detected offences per 1 000 vehicles monitored. Lower rates of detection over time signals more compliance with speed limits.

Figure 2C shows for 2013–14, as compared to 2008–09, the rates of detection fell for all camera types, except for the combined speed and red light cameras:

- The rate of offences detected by red light cameras decreased by 58 per cent and by fixed speed cameras by 53 per cent, indicating specific deterrence is effective at these sites.
- For mobile cameras from 2008–09 to 2012–13, the rate of detected offences per 1 000 vehicles monitored, while significantly higher compared to fixed speed and red light cameras, has also been trending down.

**Figure 2C**  
**Number of detected offences per 1000 vehicles**  
**1 July 2008 to 30 June 2015**

	Mobile speed	Fixed speed	Red light	Combined speed and red light	Point to point
2008–09	10.85	2.30	0.39	-	-
2009–10	8.95	1.43	0.40	-	-
<b>2010–11</b>	<b>9.46</b>	<b>1.33</b>	<b>0.26</b>	-	-
2011–12	9.16	2.02	0.19	0.19	0.58
2012–13	8.63	1.26	0.21	0.20	0.59
<b>2013–14</b>	<b>9.53</b>	<b>1.09</b>	<b>0.16</b>	<b>1.03</b>	<b>0.42</b>
2014–15	12.32	1.36	0.17	1.02	-

Source: Queensland Audit Office using extracted Integrated Traffic Camera System (ITCS) and Image and Infringement Processing System (IIPS) data

The rises in the rate of mobile speed camera detected offences in 2010–11 coincided with increased covert mobile speed camera operations (unmarked or not visible police vehicles).

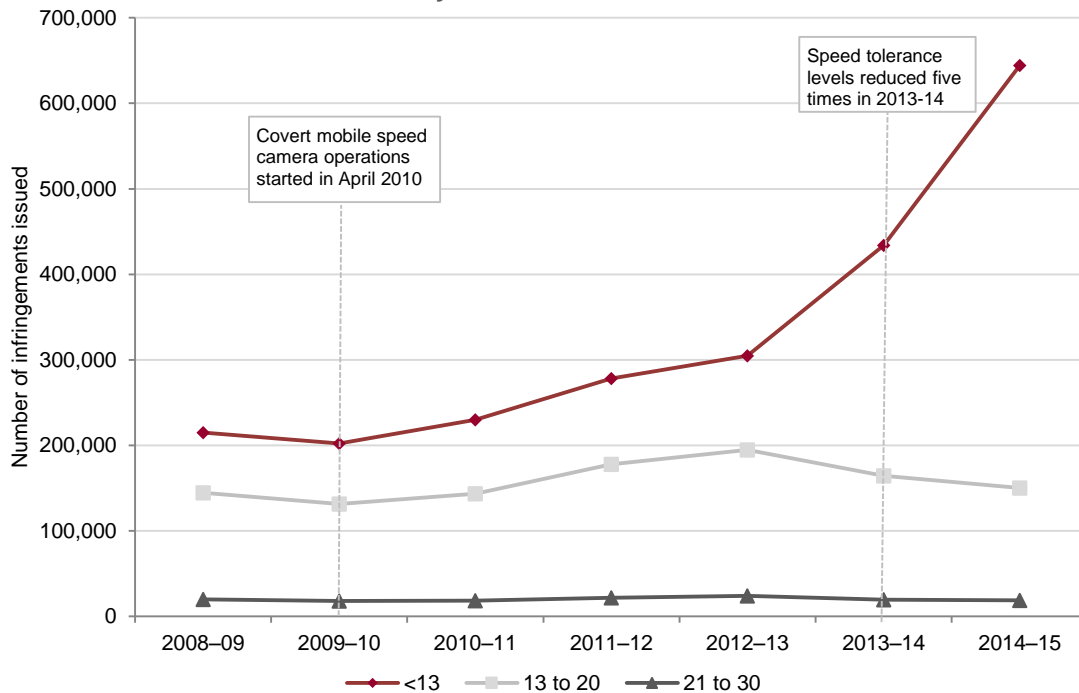
The rises since 2013–14 coincide with lowering the speed enforcement threshold (tolerance) levels. Under the *Queensland Road Safety Action Plan 2013–2015*, five high-risk red light camera sites were upgraded to speed and red light cameras in late 2013. The QPS have not yet verified crash data to determine how effective the combined cameras have been in reducing serious casualty crashes.

## Numbers of infringement notices issued by speed bracket

Figure 2D shows the number of infringements issued for each major speed bracket over the last seven years:

- The less than 13 kilometres per hour speed bracket had a threefold increase in infringement notices issued, from 214 881 in 2008–09 to 644 372 in 2014–15.
- For the 13 to 20 kilometres per hour speed bracket, infringements peaked in 2012–13 at 194 747, and since then have decreased by 44 424 to 150 323.
- For the 21 to 30 kilometres per hour speed bracket infringements also peaked in 2012–13 at 23 953, and have since decreased to 18 900.

**Figure 2D**  
**Number of infringements per speed bracket**  
**1 July 2008 to 30 June 2015**



Note: due to low numbers Figure 2D excludes 31–40 kilometres per hour (average of 2327 over 2008–09 and 2014–15) and >40 kilometres per hour (average 778 over 2008–09 and 2014–15); has not been adjusted for increase in hours of operation or other external variables such as increased traffic volumes.

Source: Queensland Audit Office using extracted ITCS and IIPS data

Between 2009–10 and 2012–13 more infringements were issued in all speed brackets, but this coincided with increases in the hours of camera operation and also with the introduction of covert mobile camera deployments. The increase in infringements issued from 2013–14 in the lowest range speeding bracket coincided with the reductions in speed tolerance levels.

Consequently, the increases in the number of infringements over this period do not necessarily mean that more people are speeding—it may just mean that more people are being caught speeding.

## Effect of the drops in speed tolerance margins

Figure 2E shows over the past two years that proportionately more drivers are being fined for speeding less than 13 kilometres per hour over the speed limit.

**Figure 2E**  
**Proportion of total infringement notices issued by speed bracket**  
**1 July 2008 to 30 June 2015**

Bracket km per hour	2008–09	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15
<13	56.2%	57.1%	58.2%	57.8%	57.8%	69.9%	78.9%
13 to 20	37.8%	37.1%	36.3%	37.0%	36.9%	26.5%	18.4%
21 to 30	5.2%	5.1%	4.7%	4.5%	4.5%	3.1%	2.3%
31 to 40	0.6%	0.6%	0.6%	0.5%	0.5%	0.4%	0.3%
>40	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%

Note: due to rounding not all columns add to 100 per cent.

Source: Queensland Audit Office using extracted ITCS and IIPS data

Speed enforcement is conducted within a tolerance margin, which is a fixed number of kilometres above the limit within which drivers are not issued with infringement notices. The tolerance margin provides a high degree of confidence that infringements issued are only where the driver exceeds the speed limit. This margin caters for both recognised manufacturer variations in vehicle speedometers and the measurement precision—the accuracy—of detection equipment.

In Monash University Accident Research Centre's (MUARC) 2009 evaluation of the CDOP, they recommended reducing the tolerance margin for new and existing cameras. The recommendation was based on expected improved road safety benefits and modelled on a reduction in serious crashes.

The QPS reduced tolerance levels for 80 kilometre per hour and lower speed zones in five stages over a year. For example, the tolerance level in the 60 kilometre per hour zone reduced three times over the year.

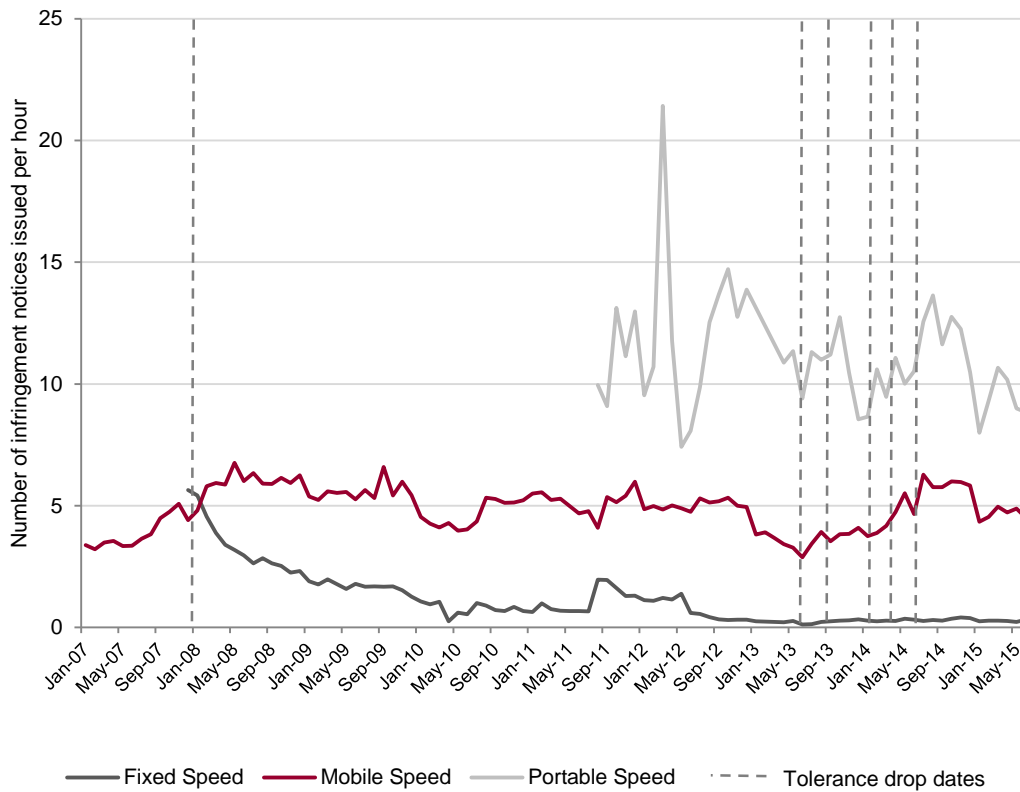
The tolerances were reduced on:

- 1 July 2013
- 20 September 2013
- 28 January 2014
- 4 April 2014
- 27 June 2014.

Prior to this the QPS last reduced tolerances across all speed zones was on 1 January 2008. While tolerance levels vary across Australia, Queensland is now one of the jurisdictions with lower tolerance levels.

The QPS also increased camera deployment hours by 18 per cent from 2012–13 to 2013–14 and had additional cameras available for use. To better isolate the effect of the adjustments to speed tolerances, Figure 2F analyses the rate at which infringements are issued—the number of infringement notices issued per hour of camera operation.

**Figure 2F**  
**Infringement notices issued per hour of operation following reductions in enforcement thresholds, 1 January 2007 to 30 June 2015**



Notes: Fixed speed camera site rates are provided mainly for reference—the majority of fixed camera are located at sites with higher speed zones for which tolerances remained unchanged. Portable cameras rely on the operator focusing on a vehicle and taking the photo. This contributes to the variability in the number of infringements issued per hour of operation.

Source: Queensland Audit Office using extracted Integrated Traffic Camera System (ITCS) and Image and Infringement Processing System (IIPS) data

For the six months prior to the universal tolerance drops in 2008, the number of infringements issued per hour of mobile camera operation had been steadily increasing and only stabilised six months after the tolerance drop. It took another 4.5 years before the rate started to decline to 2007 levels.

By contrast to 2008 the number of infringements issued per hour of mobile camera operation had been falling steadily prior to the tolerance levels being further reduced in 2013–14. Since then the rate of infringements per hour of operation increased steadily. After returning to previously elevated levels they have since stabilised.

This reinforces the experience of 2008 in that long lead times are needed for drivers to adjust their behaviour to take account of falls in tolerances.



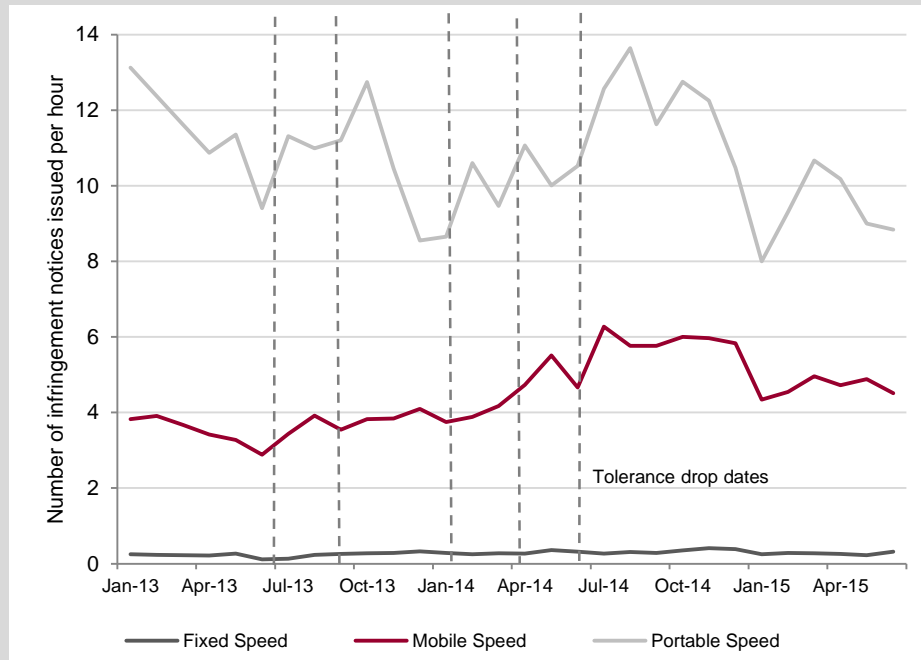
## Case study

### Evaluating the impact of tolerance drops

When tolerance levels drop an initial increase in the number of drivers fined within the lower speed bracket is expected. After this driver behaviour should improve and infringement rates drop.

It is difficult for the Speed Management Sub-Committee to assess the effectiveness of the tolerance drops on driver behaviour and road crashes because confounding variables—such as increased deployment hours, increasing use of covert cameras and improving camera technologies—are coupled with a series of drops over a short period.

While the QPS and the Speed Management Sub-Committee continued to monitor trends, neither had evaluated the effectiveness of the tolerances drops either during or at the end of the project.



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

## Program monitoring and evaluation

The QPS and TMR are finding it increasingly difficult to undertake timely measurement of the CDOP's overall performance due to three key deficiencies:

- Speed survey data is not likely to be representative of driver behaviour.
- Understanding outcomes relies heavily on the program collecting reliable and appropriate data, but the program is experiencing significant delays in verifying crash data.
- While external outcome evaluations of the CDOP are commissioned regularly, actions to address the recommendations have been slow or selective.

### Speed survey data

The reduction in average speeds reported from speed surveys conducted by TMR is ostensibly a positive road safety outcome—it indicates driver behaviour has improved, with more motorists complying with the speed limit.

However, the survey data does not fairly reflect driver behaviour across the state because flooding has affected data collection between 2011 and 2014 and funding restrictions have not allowed additional sites to be surveyed.

The QPS collects data on the actual speed of all vehicles monitored by its speed cameras (except for portable speed cameras which are target-specific). The opportunity exists therefore to enhance survey data at little extra cost by analysing the recorded detected speed of all vehicles monitored by the QPS mobile cameras, particularly those operating covertly. This would provide a more robust source of data for monitoring general vehicle speeds.

However, the QPS presently do not extract and manipulate this data to complement the results of speed surveys.

### Currency of crash data related to speeding

While one of the aims of the CDOP is to reduce road trauma the QPS analysis and verification of crash data, which captures road trauma, is slow.

It is acknowledged that raw crash data needs some period to settle, allowing police to finish their investigation into the cause of the crash and determine its ultimate consequences. For example, did a minor injury ultimately require hospitalisation?

Verified data is needed for two reasons:

- portions are reported to Commonwealth bodies for statutory purposes
- the Traffic Scheduling and Reporting System uses only crash data that is speed related.

Most of the crash data available to decision-makers is between three years (for minor injury crashes) and five years (for property damage crashes) old. The lack of more up-to-date information inhibits more timely consideration of how strategies, such as changing tolerances, have affected driver behaviour and contributed to road safety outcomes.

This makes it difficult to assess the effectiveness of any changes to the program over the short-term. It also makes it harder to separate out and analyse the impacts where many changes are made to different aspects of the program over short periods. Such is the case with the recent increases in deployment hours combined with reduction in speed tolerances.

TMR and the QPS are aware of the increasing length of time to validate crash data. A project aimed at improving the efficiency of validating data has commenced but is behind schedule.

### Acting on the results of evaluations

Since 2009, MUARC has evaluated the CDOP four times. The reviews and their aims are outlined in Appendix C.

These evaluations have provided TMR and the QPS with a degree of assurance as to the CDOP's effectiveness. They have also provided recommendations for how to improve the program and therefore road safety.

Their recommendations have been in the areas of:

- periodic use by TMR and the QPS of the evaluation framework developed by MUARC to monitor the effects of the CDOP on road crashes
- data enhancements to improve the accuracy of crash effect estimates
- speed and red light monitoring at pre- and post-installation of new fixed camera sites and suitable control sites
- comparisons of general speed monitoring measures with crash outcomes
- expanding the criteria for site selection to all casualty crashes, not just speed-related
- improved resourcing of the mobile speed camera program
- improvements to the scheduling and timing of camera deployments
- increased covert camera deployments.

TMR and the QPS have been slow to assess and respond to the recommendations made by MUARC. As a result, only nine of the 17 recommendations made since 2009 have been implemented or progressed. The remaining recommendations relate to use of covert mobile cameras and scheduling sites for deployment.

## Recommendations

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We recommend that the Queensland Police Service and the Department of Transport and Main Roads:

1. address outstanding program improvement recommendations
2. reduce the length of time taken to verify and analyse data so it can be used in a timely manner to inform program and deployment decisions.



## 3. Site selection and deployment practices

### In brief

The Queensland Police Service (QPS) deploy mobile cameras or install fixed cameras to approved sites. A stakeholder-based committee uses criteria, including the crash history and crash potential, to select mobile camera sites and recommend fixed camera sites.

The CDOP philosophy is one of general deterrence—motorists can reasonably expect that enforcement may occur anywhere, anytime and will therefore drive to the speed limit. The Department of Transport and Main Roads (TMR) and the QPS developed a scheduling system—The Traffic Scheduling and Reporting System (TSRS)—to assist in implementing the general deterrence strategy.

### Conclusions

The CDOP is primarily designed as a general deterrence enforcement strategy, yet the QPS's current deployment practices are more suited to achieving specific deterrence. This limits the program's effectiveness as specific deterrence has been proven less effective in reducing serious crashes across the road network.

A 15.2 per cent increase in the number of approved mobile speed camera sites between 2010–11 and 2014–15 allows the QPS to implement the general deterrence strategy. Despite this, the QPS mostly deploy mobile cameras in moderately high volume, high infringement areas, even when crash history does not support it. The QPS's frequent deployment of cameras to a relatively small number of sites based on their judgement of crash potential, weakens their ability to instil the general deterrence principle of the program and leaves the QPS open to perceptions of revenue raising.

Similarly, the failure to deploy covert (unmarked or not visible police vehicles) mobile cameras more frequently, despite the recognised advantages, reduces the effectiveness in encouraging motorists to drive to the speed limit.

### Findings

- The scheduling system uses dated data and does not recommend the most appropriate day or time to deploy to a particular site. This means that even when the QPS put cameras at the most appropriate sites, they do not know if they are there on the most appropriate days and times.
- The QPS use of TSRS has significantly decreased because of systems limitations. This results in a move away from the randomised elements of site selection and a more specific deterrence approach being employed. This is inconsistent with the general deterrence principle of the CDOP.
- The process for adding locations to the approved site list is robust. However, reviewing sites to ensure they remain suitable is ad-hoc. This has contributed to the QPS not visiting approximately one third, or 1000 sites, at all in any one year.
- The QPS is not meeting approved covert deployment hours, despite previous research proving its effectiveness in reducing speed across the road network.
- The QPS mostly roster officers to sites with high traffic flow and high infringement rates during a standard business day.

### Recommendations

We recommend that the Queensland Police Service:

3. and the Department of Transport and Main Roads comprehensively review all approved mobile camera sites for their ongoing appropriateness
4. increase covert deployment of mobile cameras to cabinet approved levels
5. increase the rate of night time and weekend deployment of its mobile cameras.

## Introduction

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The Camera Detected Offence Program (CDOP) operates to detect and penalise unlawful behaviours on the state's roads.

At its simplest level it has three elements:

- selecting and approving the sites at which cameras may be deployed
- acquiring and deploying cameras at the approved sites
- taking enforcement action when offences are detected.

This chapter examines the first two of these three elements and assesses whether the camera sites selected and the deployment of cameras to those sites is consistent with the program's rationale and operates in a way to maximise road safety benefits.

## Conclusions

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The QPS is unlikely to have its mobile speed cameras deployed in the right locations at the right time in the right mode of operation to maximise road safety outcomes.

The sites that have been approved for use had serious casualty crashes (fatalities or hospitalisations) or a high crash potential, but many are not being visited. Camera deployment practices are working against the principle of general deterrence, focusing instead on site-specific deterrence.

TMR and the QPS have robust systems to approve the most appropriate mobile camera sites. The principles embedded in its processes for site selection are consistent with the general deterrence philosophy—based on road safety principles and involving an appropriate mix of relevant government and non-government stakeholders in the decision-making.

But, the QPS does not deploy to all active approved sites. This is partly because sites are not systematically reviewed to ensure they remain appropriately valid.

Deployment strategies are internally inconsistent and contradictory in regard to ameliorating public concerns about revenue raising. On one hand the QPS have not deployed cameras covertly (in unmarked or not visible police vehicles) when expressly authorised to do so by Cabinet. While on the other hand, they increasingly ignore the system designed to randomly deploy cameras and are locating mobile cameras increasingly at sites with high traffic flows and high infringement rates, but not high crash rates. The first strategy is ostensibly to counter perceptions of revenue raising, but the latter serves to reinforce such perceptions.

It is not clear why the QPS would adjust its covert deployment strategy due to concerns about revenue raising when the research data indicates such covert operations are likely to contribute more to road safety outcomes than site-specific deterrence approaches achieved through greater visibility.

The QPS have chosen to remain highly visible, in part to avoid claims of revenue raising, and has moved away from randomised elements of deployment scheduling. Their aim is to address perceived high-risk potential crash sites by focusing on sites with moderate to high traffic flows and high infringements. But this detracts from the broader deterrent aims of the program and opens up the QPS to claims of revenue raising.

## Approving and reviewing camera sites

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Since the CDOP commenced in 1997, the Executive Management Committee has progressively expanded the criteria they use to determine where speed cameras can operate:

- crash history as the primary criterion and crash potential secondary
- documented and validated public complaints and stakeholders' local knowledge of problem locations
- road works site to ensure the safety of road workers.

Using these criteria TMR and the QPS jointly agree site selection guidelines for both mobile and fixed cameras which are then used to ensure the most strategic placement of cameras across the state. The guidelines provide the Speed Management Advisory Committees (SMACs) with principles, a framework and a process for matching high-risk sites with the appropriate camera type.

The SMACs then approve sites based on crash history (proven risk) and crash potential (assessed risk). They strengthen the credibility and integrity of their approval process by injecting local knowledge, subject matter expertise and public road safety concerns.

### Review of sites

Over time, changes in crash rate, crash risk, road infrastructure, and/or speeding behaviour can make an approved site redundant or less important.

TMR, in partnership with the QPS, has developed internal guidelines on reviewing sites for their appropriateness. The guidelines require annual checks of crash history for all existing speed camera sites. The intent being that those sites that no longer meet the crash history criteria or secondary criteria are either deactivated or their weighting in the scheduling system revised accordingly.

TMR has not undertaken a formal review of existing sites since the guidelines were implemented in 2007.

Instead, the QPS undertakes ad-hoc reviews of sites at a regional level for reasons such as changes in road infrastructure, policy changes and speed limit reviews. This has contributed to the QPS not deploying cameras to 30 per cent of their active sites (approximately 1017) in any year from 2010–11 to 2014–15, despite TSRS recommending police attend approximately 610 of them.

## Deploying mobile cameras

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Deploying speed cameras in a manner that is unpredictable to road users creates the perception in motorists' minds that speed cameras may be deployed anywhere, anytime. In 2014, Monash University Accident Research Centre (MUARC) found that randomness in the selection of sites was associated with greater crash reductions.

### Adherence to the camera site scheduling system

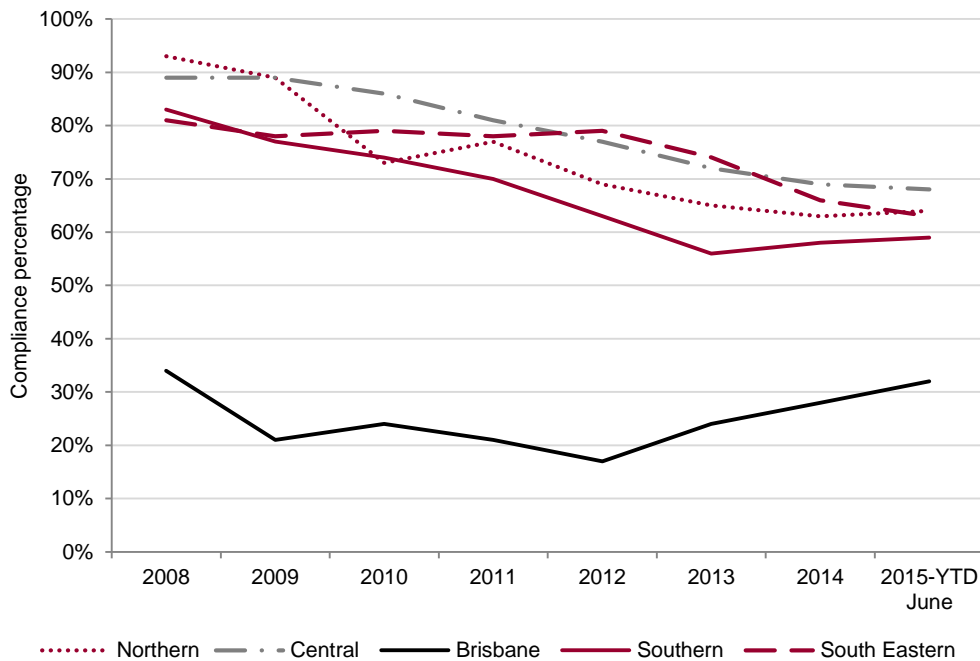
The QPS and TMR jointly developed the TSRS—the program's scheduling system—to select sites to deploy mobile cameras. To give effect to the program design principle of general deterrence the TSRS uses weighted randomisation algorithms when recommending sites.

While the TSRS has some known limitations, both TMR and the QPS endorse its use because its core strength is that it incorporates this element of randomness, while still factoring in crash history and crash potential.

However, Figure 3A shows that the use of the TSRS to select the sites to deploy cameras has declined over time in most regions. From a statewide average of 73 per cent at 1 January 2008, its use had fallen to around 55 per cent statewide at 30 June 2015.

While in the Brisbane region its use has always been relatively low, the Northern and Southern regions have experienced particularly large reductions in compliance rates: from 93 per cent to 64 per cent (31 percentage points decrease) and from 83 per cent to 59 per cent (29 percentage points decrease) respectively.

**Figure 3A**  
**Regional compliance with TSRS**  
**1 January 2008 to 30 June 2015**



Source: Queensland Audit Office using data extracted from the TSRS

The QPS provided us with two main reasons for police not using the site recommendations generated by the TSRS:

- the crash data in the systems is not current
- public complaints are not factored in.

From 2013, the QPS has been increasingly using data from their own Integrated Tasking and Analysis System (I-TAS) to make decisions about where to deploy cameras. The perceived advantage I-TAS has over TSRS is its ability to provide 'real-time' crash data and to factor in other intelligence, such as public complaints.

However, I-TAS relies on raw crash data from the Queensland Police Records and Information Management Exchange (QPRIME) database. This data has not been verified and includes other non-speed related crash factors, such as fatigue or alcohol. For these reasons alone TMR does not support the routine use of I-TAS's for siting speed cameras. TMR encourages the use of verified crash data which ensures that data only on speed-related crashes informs deployment decisions and which eliminates any confounding variables.

Unlike the TSRS, I-TAS also does not weight complaints, crashes or crash potential and does not recommend sites for selection. Because its primary function is a real-time analysis tool, if police officers use it routinely, they risk choosing sites in a way that creates a specific, rather than general, deterrence effect.



Other reasons proffered by the QPS on why TSRS recommendations are not chosen were their inability to access the recommended site on the day of deployment, current road conditions, and local knowledge of high-risk sites. However, TSRS addresses such site-specific issues by offering police multiple sites to deploy to.

### The effects of current site deployment practices

The fact that almost half of mobile cameras statewide are now deployed to sites that have been selected subjectively means that these sites may not:

- Reflect crash risk—ostensibly crash history is the primary criteria for site selection in the program's design.
- Be sufficiently randomised—a proven means to maximise the general deterrence effect.

### Crash risk

In relation to the crash risk, MUARC modelled the percentage change in serious casualty crashes (fatalities and hospitalisations) in the Brisbane police region compared to all other regions over 2009–12. Their modelling concluded that non-Brisbane regions which on average complied with TSRS 80 per cent of the time during that time had 7.7 per cent less serious casualty crashes than Brisbane regions (who complied with TSRS on average 20 per cent of the time).

This is clear evidence that using 'local knowledge' and applying greater judgement in site selection has adverse safety consequences from the perspective of crash statistics.

Our analysis shows that the increasing non-compliance with TSRS site recommendations has resulted in the focus shifting to sites where there is more traffic and where more offences are detected—that is, moderate to high vehicle frequency and high offence sites.

In these circumstances, the decision to deploy a speed camera at a selected site is usually not supported by its crash history. This opens the QPS up to perceptions that these mobile cameras are not being deployed primarily to improve road safety.

We used crash data over the past five years to compare the 74 sites the QPS visited the most (comprising 18.1 per cent of all deployments) with a random sample of 74 of the least visited sites (zero deployments) in 2013–14. We found at the most visited sites that:

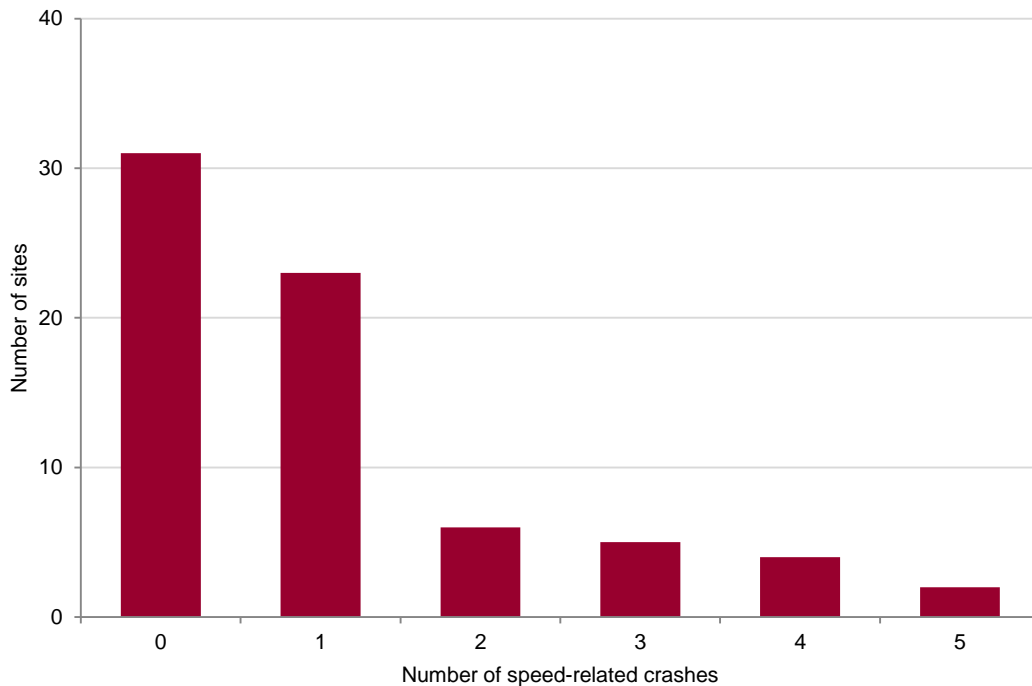
- at two-thirds the QPS set up their cameras more often than the TSRS recommended
- there were more vehicles per minute monitored compared to all sites—11.0 compared to 9.4
- the rate of infringement notices issued was higher—14.6 per 1000 vehicles compared to 11.1 per 1000 for all sites
- the frequently visited sites did not have a high number of crashes—crash history ostensibly being the primary criteria for site selection.

This data demonstrates a deliberate strategy to set up at sites where police are more likely to detect offences, rather than at sites where the crash history indicates there is a public safety problem.

Figure 3B demonstrates this. In relation to crash history, it shows over the last five years that 54 (73 per cent) of the 74 most visited sites had zero or one speed-related crash within close proximity. The remaining 20 (27 per cent) sites had two or more crashes.

Thirty-one of the most frequently visited sites had no speed-related crash history recorded within one kilometre. For these sites, the number of infringements issued per 1000 vehicles monitored averaged 12.5, which is also higher when compared to all other visited sites.

**Figure 3B**  
**74 most visited sites: speed-related crashes within one kilometre radius**  
**1 July 2009 to 30 June 2014**



Note: 2014–15 crash data has not been finalised and included.

Source: Queensland Audit Office using data extracted from I-TAS

Police assert they are attending these high frequency sites because of their crash potential or public complaints.

This is only partly supported by the data, which shows that over this period the 43 frequently visited sites with a crash history also had higher than average public complaints (87 complaints compared to only 34 for the remaining 31 sites).

The least visited sites either had no crash history or, if they did, police provided a level of coverage by deploying cameras to alternate sites within close proximity.

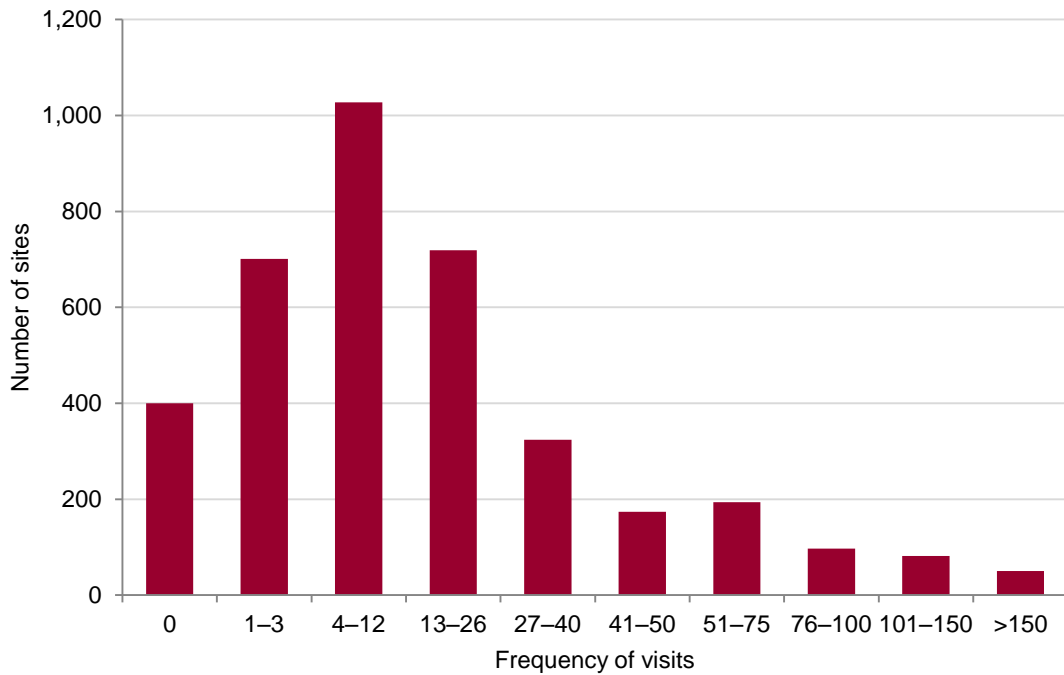
#### Perception of randomising deployments

The number of active approved mobile camera sites increased from 3119 in 2010–11 to 3593 in 2014–15 (15.2 per cent). Over the same period, the number of mobile speed cameras deployed has doubled from 50 to 100. This meant that the QPS had enough mobile cameras to service all 3593 active sites eight times a year on average, yet three out of 10 sites each year were not used.

The distribution of site visits over the period from 1 January 2012 to 30 June 2015 is shown in Figure 3C. Over the three-year period to 31 December 2014, the QPS did not deploy mobile speed cameras at 524 active sites, but deployed mobile speed cameras more than 150 times at 32 active sites.

Since we started our audit the QPS deployed cameras to 124 sites not previously visited over the past three years, reducing unvisited sites by almost a quarter. This is more consistent with the general deterrence approach advocated by road safety experts. The QPS also visited an additional 28 sites with enough frequency that they have now been visited more than 151 times.

**Figure 3C**  
**Number of site deployments**  
**1 January 2012 to 30 June 2015**



Note: Only active sites. Deployments include sites not nominated by TSRS.

Source: Queensland Audit Office from TSRS

Deploying to fewer sites on a more frequent basis aligns with the QPS high visibility approach to road policing throughout Queensland, but it is not clear it is significantly altering driver behaviour across the road network.

### Case study Highly visited sites

#### Top 10 visited sites in 2014–15

Deploying cameras in unpredictable patterns across the state's approved sites reinforces the message that speeding is an unacceptable safety risk and will not be tolerated, regardless of where the road is. Deploying to sites on this basis provides a general deterrence. Frequently visiting one site provides a specific deterrence at that location but is less effective in improving general driver behaviour.

Police visited the top 10 sites on average 106.2 times in a year (every 3.4 days) compared to the average of 9.99 times (once every 36.5 days) for all other visited sites. The top 10 sites visited in 2014–15 made up 3.9 per cent of all deployments.

The most visited site is used for convenience to test equipment and the operator. Regular deployments are made to this site as there is a history of crashes within one kilometre. Research on speed-related crashes has found a statistical effect within one kilometre of a site. However, the QPS cannot demonstrate that the additional deployments for convenience provide any further road safety benefits.

Over 2009–10 to 2013–14, four of the top 10 sites used had no crash history, five had one crash and one had five crashes. Except for one of these sites, all had a history of complaints, including one site where 254 complaints were made over the five-year period. The average for the top 10 sites is 63 complaints.

In 2014–15, the number of infringement notices issued per 1000 vehicles monitored for these top 10 sites averaged 12.3 compared to 11.1 for all sites (mobile camera deployments only). This result indicates that the frequent deployments at these sites have not significantly improved driver behaviour.

Source: Queensland Audit Office using data extracted from TSRS and I-TAS

## The effects of other system limitations on deployment practices

The QPS increased their camera deployment hours from 66 528 to 101 031 (51.9 per cent) between 2008–09 and 2014–15.

Outside specific campaigns, the QPS regions have the discretion to determine where and when cameras are deployed. They also have approval for 30 per cent of their deployment hours to be covert.

However, the site recommendations generated by the TSRS do not specify the:

- most appropriate day of the week or time of the day for deployments
- best mode of camera operation, for example overt (marked and visible vehicles) or covert.

This means that even when the QPS deploy cameras to appropriate sites, there is no guarantee they are at the site on the best days, at the right times and using the appropriate mode of operation to gain maximum road safety benefits. It also limits planning, rostering and allocation of resources.

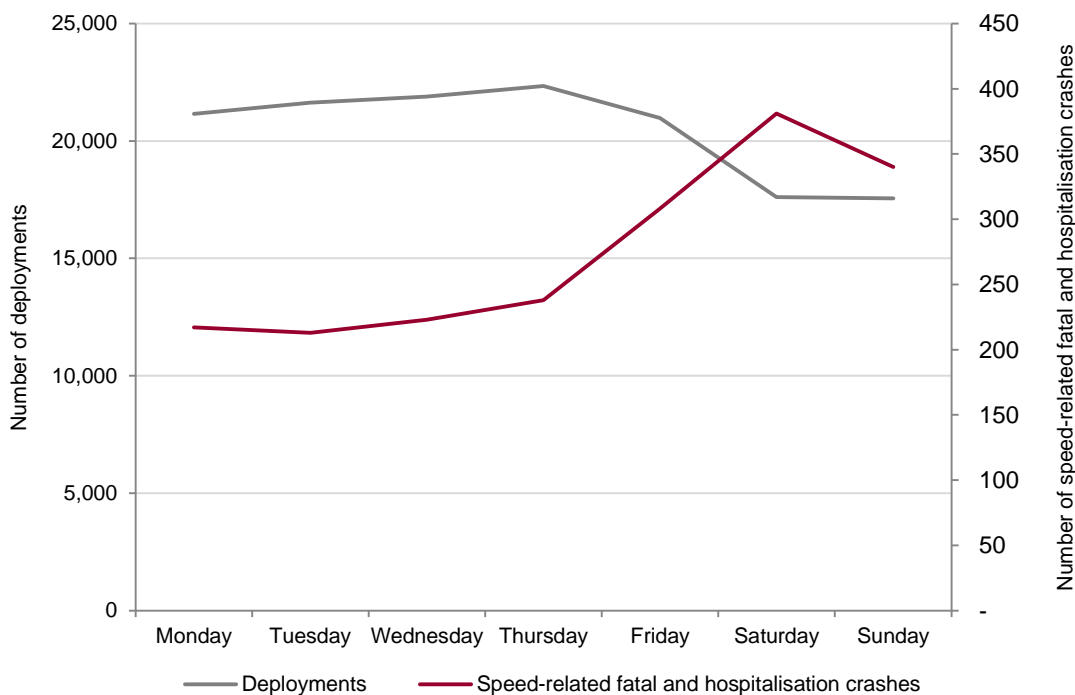
Both the QPS and TMR are aware of the limitations and decreased use of the TSRS. Led by the QPS, in June 2015 they completed a feasibility study that recommended developing a replacement for the TSRS. They are planning to commission a replacement system by 30 June 2016.

### Time of deployment

We examined whether the days of the week targeted by the QPS broadly line up with the distribution of speed-related crashes.

Figure 3D shows that more speed cameras are deployed on weekdays but more speed-related crashes occur on the weekends. This indicates that there is significant scope to reduce serious crashes by deploying more cameras on weekends.

**Figure 3D**  
**Deployment versus crashes by weekday**  
**1 July 2008 to 30 June 2015**



Note: Fatal and hospitalisation data is a five year period spanning 2008–13. TMR have not verified data for 2013–15

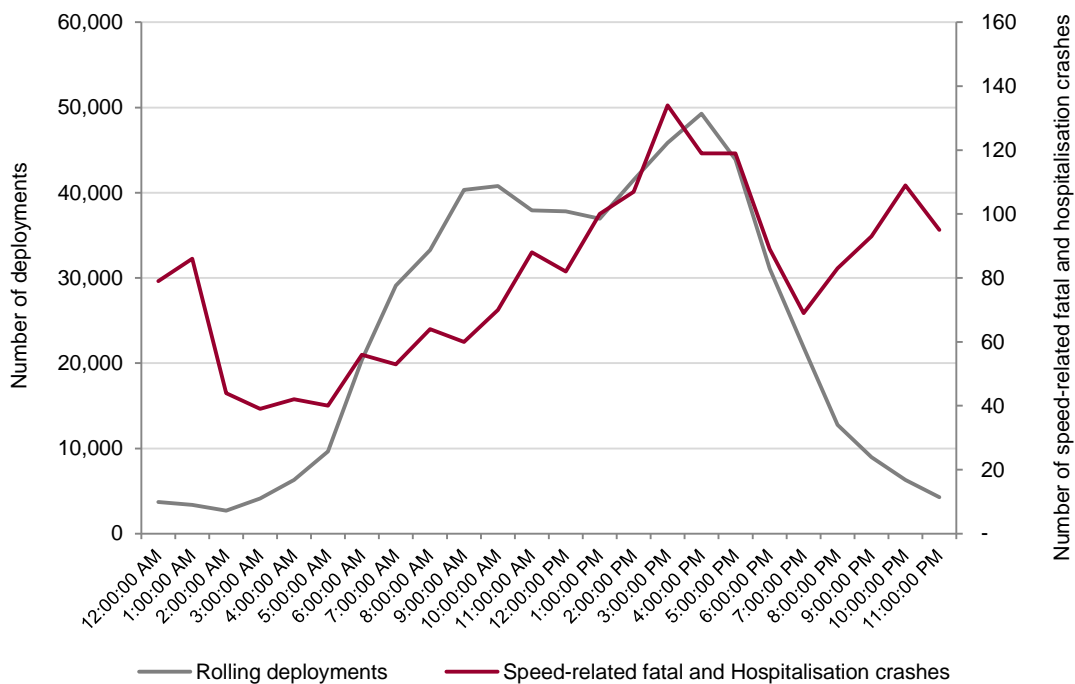
Source: Queensland Audit Office using data extracted from TSRS and RoadCrash

A similar scenario applies to the time of day that cameras are deployed—more night time deployment would likely reduce speed-related crash rates.

Figure 3E shows that of mobile camera deployments, 87 per cent are between 6.00 am and 6.00 pm (and 13 per cent between 6.00 pm and 6.00 am). It also shows that the number of speed-related crashes increases from early morning (around 5.00 am) and peaks in mid-afternoon (around 3.00–4.00 pm).

During the day, the number of deployments rises with the crash rate. However, between 7.00 pm and 1.00 am, while there is a high number of crashes—more so than the morning peak hour despite fewer vehicles being driven—the number of deployments falls away.

**Figure 3E**  
**Deployment versus crashes by time of the day**  
**1 July 2008 to 30 June 2015**



Note: Rolling deployments are based on four hour continuous deployments. Four hour duration has been selected as it is the average deployment duration for mobile cameras for the period 2008 to 2015.

Source: Queensland Audit Office using data extracted from TSRS and RoadCrash

We note operating conditions at night time can impinge on camera effectiveness. This is illustrated by the fact that the proportion of detected offences that result in an infringement notice being issued (the conversion rate) is higher during the day than it is at night. Deployments that occurred between 9.00 am and 12.00 pm had on average the highest ratios, while those between 9.00 pm and midnight had on average the lowest ratios.

The lower conversion rates at night are similar for digital and analogue cameras. This indicates that the cameras are less effective at night time—the level of light and/or the position of the camera resulting in lower conversion rates.

However, a visible presence with overt deployments provides a larger effect at the time of deployment than covert and at night still positively contributes to deterring speeding drivers.

### Incidence of covert deployments

Road safety experts find that the unpredictability of mobile speed camera locations and times contribute to a broader or general effect on reducing speeding and serious crashes across the full road system. Unpredictability can be increased by using a mix of overt and covert mobile cameras.

The government's Cabinet Budget Review Committee determines the percentage of covert deployments in any one year.

The QPS had approval to operate its mobile speed cameras for 95 000 hours during 2014–15 (103 367 actual hours performed). Of these approved hours, up to 28 500 hours (30 per cent) were approved to be operated covertly. However, in 2014–15, the QPS recorded performing 16 832 hours (16.3 per cent) covertly.

The data shows that more drivers adjust their speed on approach to overt than covert vehicles. Accordingly, covert deployments detect more speeding drivers than overt—15.7 offenders per 1000 vehicles monitored, compared to eight offenders per 1000 vehicles respectively. This 95 per cent difference demonstrates that covert cameras have greater potential to enforce speed limits over the medium to long term.

Had the QPS deployed 30 per cent of mobile speed cameras covertly in 2014–15, we estimate that approximately 33 879 additional infringement notices would have been issued, reinforcing the aim of the program to deter speeding drivers from re-offending.

In its 2014 review of the CDOP, MUARC estimated that between 2009 and 2012, the program contributed to a seven per cent reduction in serious casualty crashes (those resulting in death or hospitalisation) in some QPS regions. MUARC associated the estimated reduction in serious casualty crashes with an increase in covert operation of mobile camera hours rising from zero to 25 per cent in those regions. It estimated that a further 8.4 per cent reduction in serious casualty crashes would be achieved if covert operation hours increased from 20 per cent of all mobile camera hours (statewide) to 50 per cent.

The lower level of covert deployments than those determined by Cabinet reflects an operational QPS decision to remain highly visible. This is in part a response to public concerns that covert deployments are about 'revenue raising', and in part due to their belief that overt deployments have a more immediate effect around the mobile camera site.

It is not clear that self-limiting the approved use of covert operations to counter accusations of revenue raising is a matter for the QPS to be primarily concerned about. The focus on site-specific speed reductions is also at odds with the general deterrence principles underpinning the program.

## Recommendations

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We recommended that the Queensland Police Service:

3. and the Department of Transport and Main Roads comprehensively review all approved mobile camera sites for their ongoing appropriateness
4. increase covert deployment of mobile cameras to cabinet approved levels
5. increase the rate of night time and weekend deployment of its mobile cameras.

## 4. Enforcement

### In brief

The Camera Detected Offence Program (CDOP) operates statewide as a means of enforcing traffic rules. Under the CDOP, the Queensland Police Service (QPS) issue monetary and demerit penalties. From 1 October 2014, the CDOP was expanded to include use of automatic number plate recognition (ANPR) technology to enforce vehicle registration as well.

The CDOP accounts for approximately 70 per cent of all issued infringement notices for speeding and running red lights.

### Conclusions

The effectiveness of the CDOP in reducing speeding and running red lights has been weakened because more than 20 per cent of drivers detected offending were not issued with infringement notices over the last five years. The QPS and the Department of Transport and Main Roads (TMR) have not fixed problems with film quality and unclear personalised plates. As a result, in 2014–15 there were 135 533 instances where drivers were not informed of their offence and were therefore not prompted to alter their behaviour (an increase of 5.6 per cent from 2013–14).

The CDOP is further weakened by the poor planning for the rollout of the ANPR technology used to monitor vehicle registration compliance. The technology in place focuses on the heavy vehicle network, increasing the risk that the number of unregistered and uninsured (compulsory third party) vehicles will rise.

### Findings

- The process to issue infringements is robust and results in a low number being waived or successfully challenged in court.
- However, 13.1 per cent of detected offences were not issued in 2014–15 because the number plate was unclear (an improvement from 15.4 per cent in 2013–14). This resulted in approximately 135 532 drivers not being made aware they were detected speeding or running red lights. The cause of this is primarily due to poor quality film and certain personalised plates not being readable.
- The Enforceable Network by Automatic Number Plate Recognition Camera Technology (ENACT)—ANPR technology was poorly planned, resulting in integration issues. Consequently, it has not met its milestone dates to have a statewide network operational.
- Despite ENACT being labelled as an automated system, TMR manually validates all enforcement notices before they are issued due to software recognition limitations.

### Recommendations

We recommend that the Queensland Police Service and the Department of Transport and Main Roads:

6. identify and quantify the cause of unclear plates and address enforcement and design issues effecting the ability to issue infringements
7. put ANPR cameras that also store images in more QPS cars and enforce vehicle registration compliance in the urban and suburban setting
8. fix the software recognition limitations to improve the efficiency of ANPR enforcement processes.



## Introduction

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The integrity and effectiveness of the CDOP depends on accurate and reliable speed cameras to detect an offence, and on issuing only valid infringement notices.

To address concerns about their accuracy and reliability, speed and red light cameras must be calibrated annually in accordance with the *Transport Operations (Road Use Management) Act 1995* and the Traffic Regulation 1962. All detected offences are manually checked to ensure the photograph contains sufficient evidence of an offence being committed.

This chapter examines the integrity of the system in issuing infringement notices and whether the ENACT project has been rolled out effectively.

## Conclusions

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A significant number of speeding motorists are not fined because the QPS and TMR have not addressed known system limitations preventing them from issuing valid infringements.

Poor quality film in analogue cameras and difficulties reading certain styles of personalised number plates unduly preclude police issuing an infringement to the speeding motorist. This is a missed opportunity to change the behaviour of those drivers, and revenue is lost which otherwise would go to improving road safety.

TMR have not effectively managed the risks associated with removal of vehicle registration labels. They are behind their roll out schedule of Automatic Number Plate Recognition (ANPR) technology, and the QPS do not have sufficient in-car ANPR cameras to monitor widely across the road network.

The consequence of the delays are yet to be determined, however, it increases the risk of additional vehicles without compulsory third party insurance being driven on roads.

## The reliability of cameras

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The QPS has clear and appropriate policies and procedures for ensuring that cameras are maintained and calibrated as recommended by the manufacturer. This supports the QPS in adjudicating detected offences to ensure that infringement notices are issued where there is conclusive evidence of the offence being committed.

### Calibrating cameras

Calibrations of the CDOP cameras are conducted by approved testing entities in accordance with the camera manufacturer's specifications. Our review of calibration reports across three years from 2012–14 for 52 of the approximate 100 cameras, identified that all devices passed the calibration tests.

Fixed cameras undertake a self-testing process each night and the results are recorded in log files. If a fault is logged, incidents arising after that event are automatically voided. Police review the log to determine whether the camera needs to be removed and repaired or whether operator error caused the fault. However, as alert logs are only retained for approximately five days before being deleted from the system, we were unable to quantify the volume and frequency of faults.

### Upgrading to digital cameras

Analogue cameras have increasingly become unreliable and have contributed to a growing number of detected offences where the QPS are unable to issue an infringement notice.

The QPS advised that ongoing reviews since 2010, such as *the CDOP Review—Alternative Service Delivery Model* has delayed some of the key CDOP reforms including the transition to a digital platform.



All fixed analogue cameras have now been replaced with digital cameras and all mobile cameras are due to be replaced by digital cameras by 31 December 2016.

## The validity of infringement notices issued

The QPS has built conservatism into its processing of camera detections to maintain the integrity of the CDOP. Their rationale is that motorists will have a greater degree of confidence in the system and that it avoids perceptions of revenue raising.

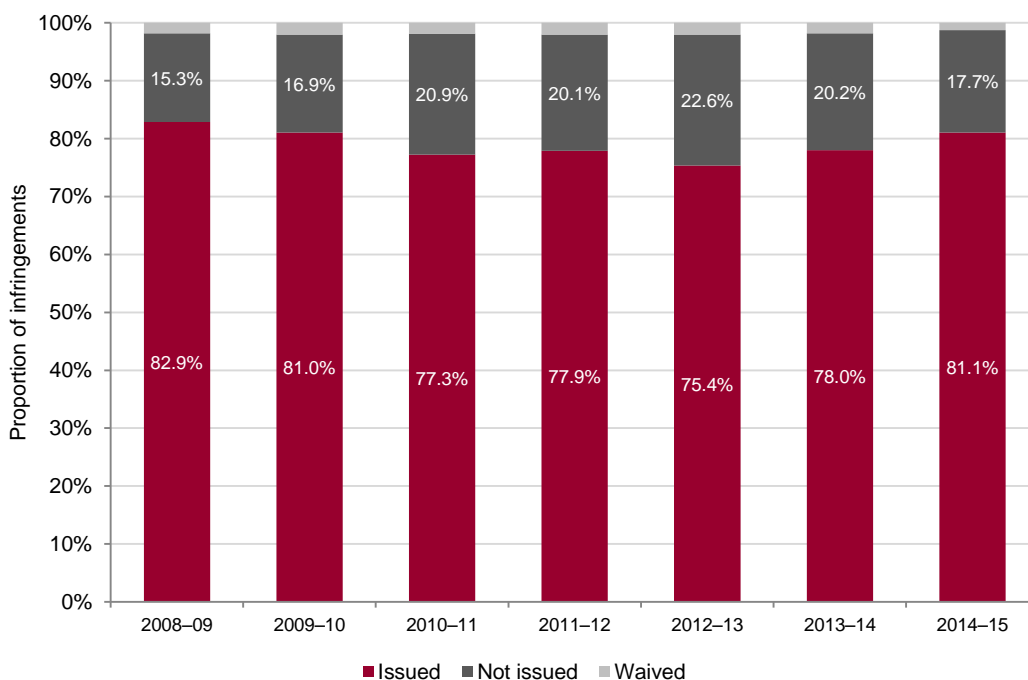
This conservatism means that not all motorists detected speeding are issued an infringement notice:

- A decision may be taken to not issue any infringements for a particular deployment because the camera was set up incorrectly or the equipment malfunctioned.
- The QPS also do not issue infringements for detected offences that have a low or poor level of proof, for example the number plate was unclear.
- The QPS may also waive an issued infringement notice at their discretion.

The proportion of detected offences that result in infringement notices (the conversion rate) indicates the effectiveness of the technology, maintenance and camera setup. The effectiveness of the CDOP is reduced as the conversion rate falls because infringement notices are the mechanism for the QPS to enforce these detected breaches of speed limits.

Figure 4A shows over the last seven years that around one in five motorists' detected speeding (20 per cent) were not issued an infringement notice.

**Figure 4A**  
**Percentage of issued, not issued and waived infringements**  
**1 July 2008 to 30 June 2015**



Note: Issued infringements excludes those subsequently waived.

Source: Queensland Audit Office using extracted IIPS and ITCS data

## Voided deployment sessions

The QPS does not process or issue infringements for detected offences from voided deployment sessions.

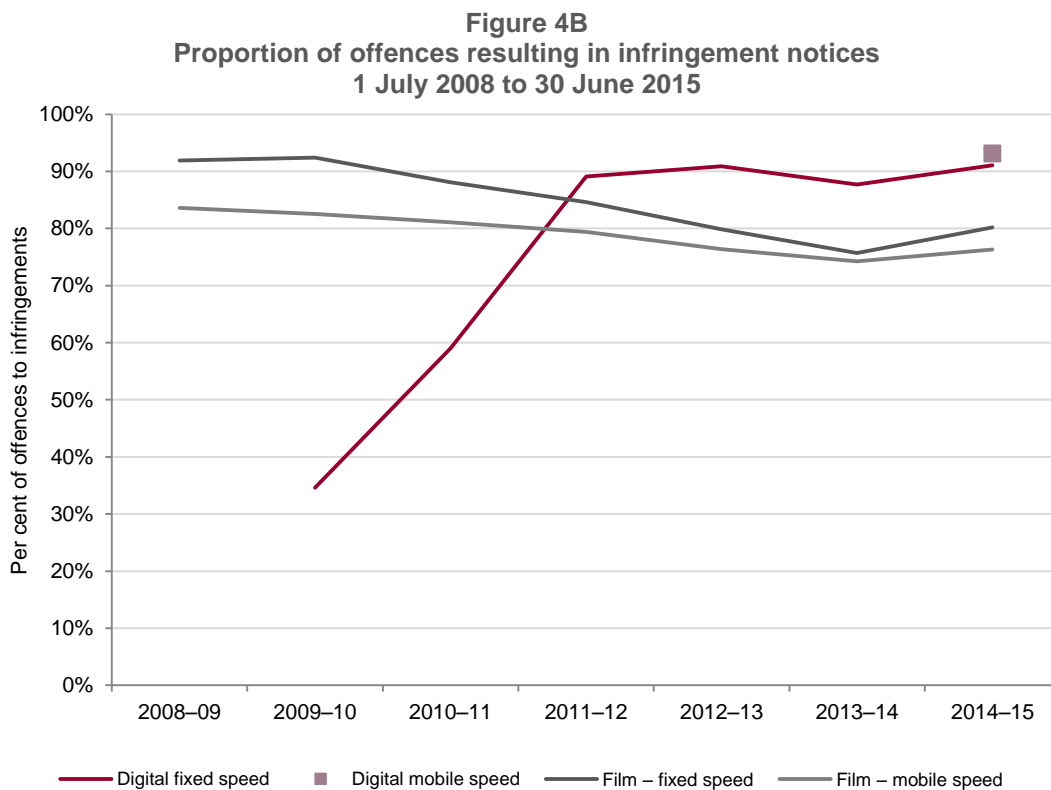
In 2014–15, 707 mobile deployments were voided (1.2 per cent of total deployments). Deployments are voided if they do not meet the relevant legal, policy or guideline requirements. Voided deployments are determined during an adjudication process after the session has been completed. In 2014–15, the two major causes for voided deployments were incorrect setup (71 per cent) and equipment malfunction (15 per cent).

Of the deployments voided due to incorrect setup, 52 per cent were for portable speed devices and 45 per cent for analogue (film-based) mobile speed devices. Of those voided due to equipment malfunction, 78 per cent of voids were for analogue mobile speed devices.

### Not issued infringement notices

The QPS and TMR do not have targets for the conversion rate of detected offences to issued infringements. However, the higher the ratio, the more effective the program is operationally.

The ratio of offences to infringement notices for mobile and fixed cameras from 2008–09 to 2014–15 is illustrated in Figure 4B.



Source: Queensland Audit Office using extracted IIPS and ITCS data

In 2014–15, the offences to infringement notices ratio was on average, 83.8 per cent for all camera types (including speed and red light, red light and portable cameras). The ratio is highest for the digital mobile speed cameras, 93.2 per cent and lowest for film-based analogue mobile speed cameras at 76.3 per cent.

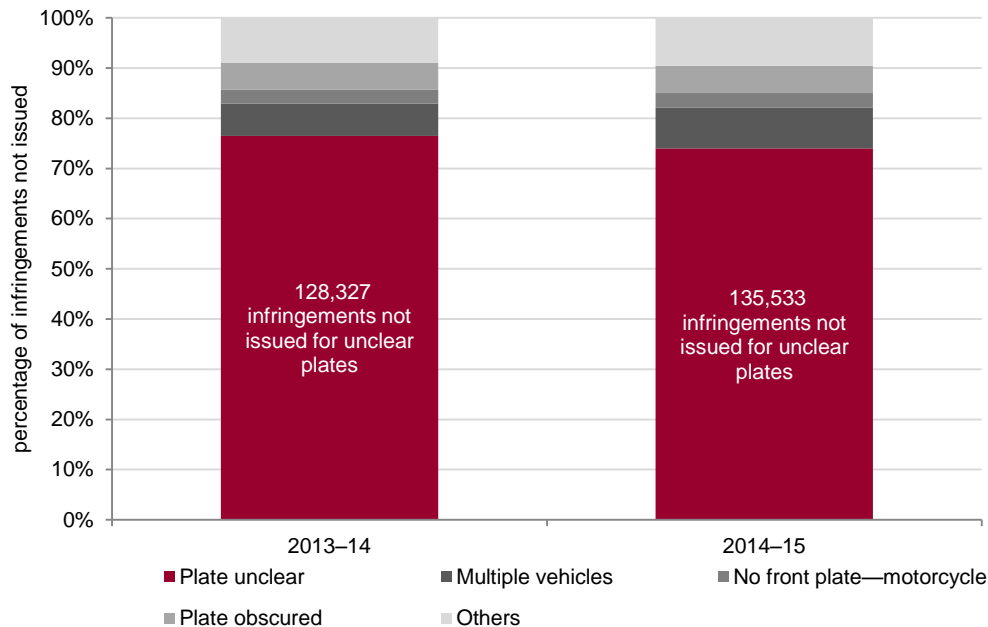
Over 2009–10 to 2011–12, the offences to infringement notices ratio for digital fixed speed cameras increased by 157 per cent. When fixed digital cameras were installed in April 2010, there were operational issues relating to variable speed limits (insufficient signage when speed limit was less than 80 kilometres per hour). This had a negative impact on the offences to infringements ratio.

### Why infringements are not being issued

Figure 4C outlines the reasons why infringements were not issued for detected offences, the most significant being an unclear number plate.

In 2014–15, 135 533 offences were not issued for this reason (74 per cent of not issued offences). Issues with analogue cameras such as poor quality film drove the large increase in the unclear number plate category. In 2014–15, analogue cameras accounted for 68 per cent (92 508 infringements) of 'not issued' infringements due to unclear plates, this is a small improvement of 2641 compared to the prior year.

**Figure 4C**  
**'Not issued' infringements**  
**1 July 2008 to 30 June 2015**



Source: Queensland Audit Office using extracted IIPS and ITCS data

Some personalised plates are unclear, mainly due to issues with the plate colours and font sizes. When recording the reason for not issuing infringement notices, police are not specifying when personalised plates are the cause. There is a designated field in their database for this purpose. As a result, the QPS does not know how many infringements were not issued because of unclear personalised plates.

Only new number plates (including personalised) are tested to ensure compliance with the QPS and TMR requirements. TMR performs the testing in collaboration with the QPS in a controlled environment set up to simulate 'on road' conditions. TMR approves the number plates based on the test results.

In 2014–15, 8.3 per cent of total offences detected through digital cameras were not issued due to unclear plates compared to 18.3 per cent for analogue cameras. Despite having their own category, obstructed plates (for example, by plate covers) or deteriorated plates can also be classified as 'unclear plates'. There are no demerit points and fines are less for registration plate offences. Lower level penalties mean lower incentive for drivers to ensure their registration plate is visible and legible which, in turn, effects the ability for the CDOP to enforce the road rules.

We estimate that over 2013–14 and 2014–15, potential fines revenue of approximately \$15.7 million has been lost due to issues with analogue cameras. This is a conservative estimate as we have used the lowest speeding fine (less than 13 kilometres per hour). More importantly, the QPS missed the opportunity to inform up to 104 338 motorists about their adverse driving behaviour.

## Waived infringements

Of the 854 513 infringements issued from 1 July 2008 to 30 June 2015, 1.5 per cent were waived.

Over 2008–09 to 2014–15, 5133 infringement notices were waived due to administrative, technical or clerical issues (0.1 per cent of issued infringements), indicating that quality assurance processes are detecting errors.

Failed court prosecutions are reviewed by the QPS and acted upon on a case-by-case basis. However, there is no consistent process for analysing and documenting these reviews. This limits their ability to identify and correct any systematic issues with the way offences are captured and infringement notices are issued.

## Enforceable Network by Automatic Number Plate Recognition

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The ENACT project uses a series of automatic number plate recognition cameras that detect unregistered and uninsured (compulsory third party insurance) light vehicles.

The ENACT project is behind schedule and presently focuses on the heavy vehicle network, leaving the suburban and urban road network largely unmonitored. Given the program has been in place for less than a year and is not fully operational, its medium and long-term effectiveness is yet to be determined.

A business case was not required for ENACT as the additional capital costs incurred were less than TMR's \$50 000 threshold for information and communications technology (ICT) projects. The automatic number plate recognition (ANPR) in-car camera technology required for ENACT was funded by the broader heavy vehicle road safety-focused ANPR program.

### ENACT project status

Planning and technical issues have hampered TMR's implementation of the ENACT project, which was intended to coincide with the removal of registration label laws from 1 October 2014.

Only one mobile TMR camera was operational on 1 October 2014 instead of the 15 planned. In late March 2015, almost six months late, TMR commissioned the remaining 14 mobile cameras. The delay in implementing the mobile cameras was due to:

- the inability to install the cameras safely in TMR vehicles
- a lack of wi-fi interoperability with systems to process the digital images.

The deployment of the TMR enabled vehicles is undertaken as part of the traffic inspectors' normal routine, which focuses on heavy vehicle compliance. As a result, the geographic areas covered are those that experience high volumes of heavy vehicle traffic and not urban corridors.

At 7 September 2015, 28 of the 30 planned fixed cameras were operating across 13 identified sites. The remaining two cameras will be located within the Brisbane urban corridor and were due to be integrated into the ENACT project by the end of June 2015. Twelve more fixed camera sites are due to be available to the ENACT project by 30 June 2016, however, these are being placed with the primary purpose of heavy vehicle enforcement.

The QPS's 12 in-car cameras were available from 1 October 2014. The in-car cameras access the Queensland Police Records and Information Management Exchange (QPRIME) database to inform the officer if the registered owner is wanted for other policing matters. The QPS are working on replacing existing ANPR systems and have not yet requested additional funding for more cameras.

## Integration

While TMR has made some improvements, the ANPR system cannot yet issue automatic infringements. Manual intervention is required to cleanse the list of detected offences before infringements are issued. The accuracy rate is determined after the photo for each potential infringement is manually checked against the Transport Registration and Integrated Licensing System (TRAILS) database.

An average of 19.1 per cent of potential infringements are correctly interpreted by the ENACT project. The high percentage of misreads is due to limitations in the optical character recognition technology, for example reading a 'Q' as an 'O'. The number of false positive reads—where an unregistered vehicle's plate is interpreted as a registered vehicle's plate—is not known.

The 12 QPS mobile cameras are not integrated with TMR's systems and the images of detected offences are not processed by Traffic Camera Office staff. This results in a manual intervention at the time of detection to issue infringements. It is at the officer's discretion to intervene. In making their decision, they consider the effect on their current duties and their ability to safely intercept the identified vehicle.

The project plan outlined the integration of the QPS cameras with TMR systems after the 1 October 2014 rollout but did not give an expected date. This aspect of the project has not been completed and does not have an implementation strategy or estimated time for completion. Until this integration occurs, the ability for police to intercept unregistered and uninsured vehicles is less than under the previous system, where a registration label was required to be displayed.

## Recommendations

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We recommend that the Queensland Police Service and the Department of Transport and Main Roads:

6. identify and quantify the cause of unclear plates and address enforcement and design issue effecting the ability to issue infringements
7. put ANPR cameras that also store images in more QPS cars and enforce vehicle registration compliance in the urban and suburban setting
8. fix the software recognition limitations to improve the efficiency of ANPR enforcement processes.

# Appendices

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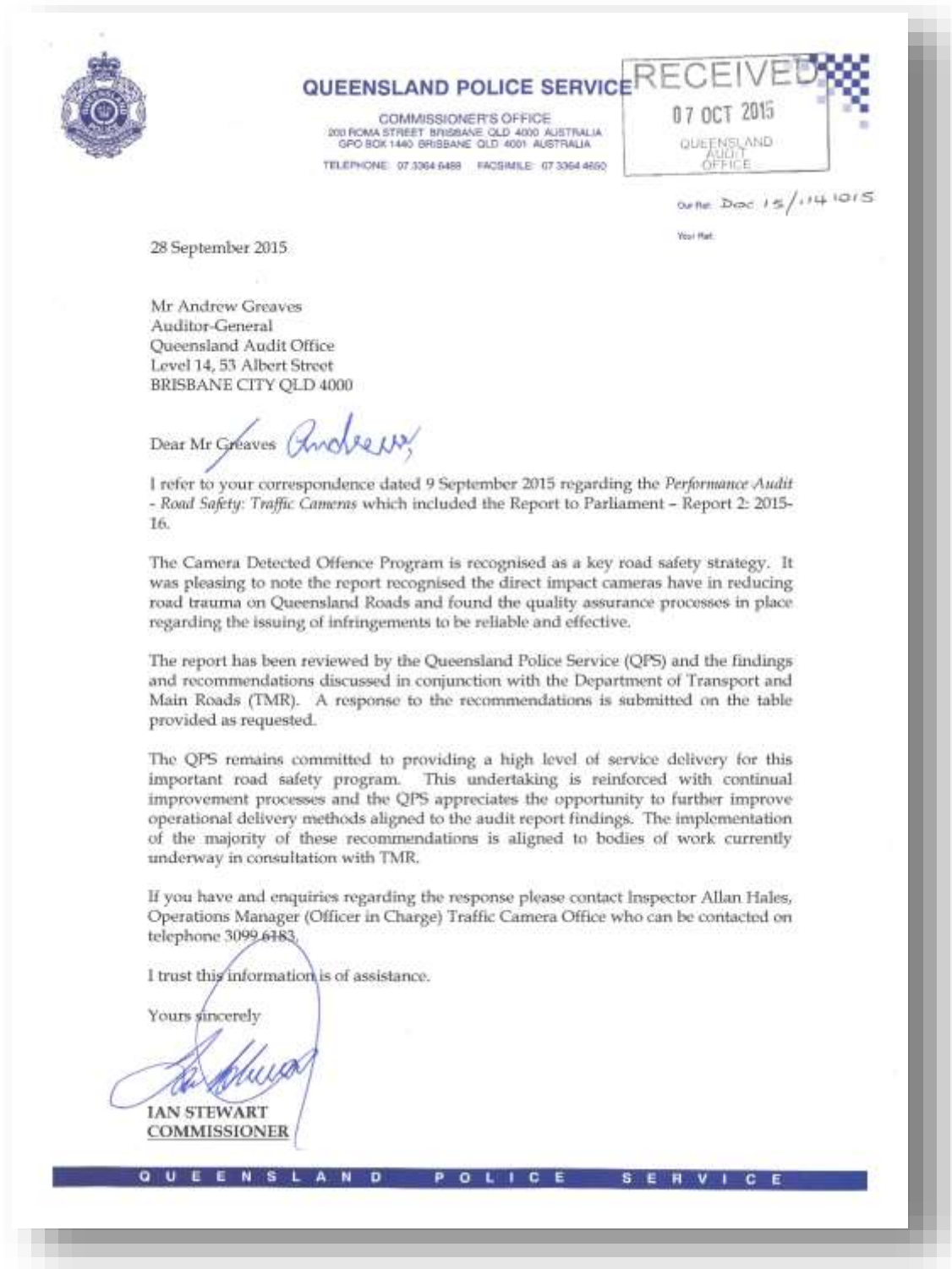
## Appendix A—Comments

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In accordance with s.64 of the *Auditor-General Act 2009*, a copy of this report was provided to The Queensland Police Service and the Department of Transport and Main Roads with a request for comment.

Responsibility for the accuracy, fairness and balance of the comments rests with the head of these agencies.

## Comments received from Commissioner of Police, Queensland Police Service





## Responses to recommendations

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Queensland Police Service, Road safety – Traffic Cameras (Report No. 2: 2015–16)  
Response to recommendations provided by the Commissioner of Police, Queensland Police Service  
on 28/09/2015.

## Response to recommendations



Queensland Audit Office

Recommendation	Initial response	Timeframe for Implementation	Current Status	Additional Comments
Address outstanding program improvement recommendations	Agree / Disagree	December 2016	P	<p>QPS in consultation with TMR will review outstanding recommendations that arose through formal external program evaluations. This review will assess the viability of recommendations, particularly those affected by system capability or Government approval processes.</p> <p>A QPS Renewal Project is progressing the enhancement and functionality of road safety camera scheduling processes aimed at improving deployments at the appropriate time and the day of week.</p> <p>This Renewal Project has been delayed for a number of years whilst an external review was undertaken to consider alternative service delivery models within the Camera Detected Offence Program.</p>
Reduce the length of time it takes to verify and analyse data so it can be used in a timely manner to inform program and deployment decisions	Agree	3 <sup>rd</sup> quarter 2016	P	<p>Additional temporary staff are currently reducing a backlog in cleansing road crash reports with a range of other data sets including hospital records.</p> <p>Reducing the data backlog in conjunction with system upgrades will enable that timely and informed Program and deployment decisions can be made.</p> <p>Both TMR and QPS have committed to reducing the lag time in provisioning timelier road crash data analysis i.e. within 4 months of the crash.</p> <p>The analytics from the road crash data is one data set that can be used to determine high risk road crash corridors where road safety cameras could be placed.</p>
Comprehensively review all approved mobile camera sites for their ongoing appropriateness	Agree	Initial review phase (manual process) will commence in November 2015 and be completed by June 2016;  Automated system analytics – commence Mid 2016 and ongoing.	P	<p>Determining the appropriateness of camera sites is a complex and involved process that includes a range of environmental and operational factors. QPS and TMR are committed to maintaining a best practice model to ensure the appropriateness of camera sites.</p> <p>The QPS is currently developing a new system based approach to improving the deployment of mobile speed cameras. The development of this system and the camera operational deployment rules are being reviewed by the QPS in consultation with TMR. The review will include mobile speed camera site management processes to ensure the integrity of the Camera Detected Offence Program is maintained through an evidence based approach.</p>

## Response to comments



Queensland Audit Office

Recommendation	Initial response	Timeframe for implementation	Current Status	Additional Comments
Increase covert deployment of mobile cameras to cabinet approved levels	Agree / Disagree	Mid 2016	P	<p>QPS has approved funding to increase the number of mobile speed camera vehicle fleet and this increase will provide for a greater distribution across approved camera sites of mobile speed camera operations. These operations will include covert road safety camera deployments.</p> <p>QPS maintains that a balance between covert and highly visible marked camera operations is necessary to maintain community support for the Program and to reduce offending of speeding on the road network.</p>
Increase the rate of night time and weekend deployment of mobile cameras	Agree	December 2016	P	<p>This recommendation will be undertaken in conjunction with the implementation of a new mobile speed camera scheduling system.</p> <p>The new mobile speed camera scheduling system will provide for additional analytical capability with expanded data sets. Expanded data sets will identify the most appropriate time to deploy the mobile speed cameras to an approved camera site including the road safety risk periods.</p> <p>Data analysis will be ongoing as the risk periods will shift with enforcement practices and other treatments including engineering solutions.</p> <p>QPS has established a Renewal Project team to implement the new camera scheduling system to commence operation from mid-2016 with refinement by December 2016.</p>
Identify and quantify the cause of unclear plates and address enforcement and design issues affecting the ability to issue infringements	Agree	1 <sup>st</sup> quarter 2016 for point 1 & 2; 2 <sup>nd</sup> quarter 2016 for point 3	P	<p>Significant achievements are currently being realised as the QPS replaces obsolete film based road safety cameras.</p> <ol style="list-style-type: none"> <li>QPS completed the replacement of all film based fixed camera systems in December 2014. QPS is currently replacing mobile speed cameras and will remove all film based cameras from camera operations by the first quarter 2016;</li> <li>QPS is committed to continuing to work in collaboration with TMR and key stakeholders in reviewing the design, characteristics and installation of registration plates to vehicles; and</li> <li>QPS will support TMR in the review of the current legislation and sanctions applied in respect to the fitting and display of registration plates to motor vehicles.</li> </ol>

## Response to comments



Recommendation	Initial response	Timeframe for implementation	Current Status	Additional Comments
Agree / Disagree				
Put ANPR cameras that also store images in more QPS cars and enforce vehicle registration compliance in the urban and suburban setting	Agree	Mid 2016 to complete the refresh of the QPS ANPR systems.	P	<p>The QPS ANPR Program is based on a road safety and broader law enforcement strategy. The road safety component includes the identification and detection of unlicensed drivers, unregistered and uninsured vehicles.</p> <p>The QPS ANPR Strategy is primarily a direct enforcement methodology where the vehicle is intercepted and the appropriate enforcement action is considered.</p> <p>The recommendation to expand the number of QPS ANPR cameras or to incorporate the images and metadata from the QPS ANPR cameras into the TMR automated processing system will require additional funding. This proposal would need to be considered by Government.</p> <p>QPS is currently refreshing their ANPR fleet of cameras through an evaluation and procurement process. This project is funded and scheduled for completion by Mid-2016.</p> <p>The QPS operational deployment of ANPR cameras includes metropolitan and regional areas.</p> <p>Unregistered/uninsured vehicles detected through the existing QPS Speed and Red Light Camera systems are provided to TMR for review and prosecution.</p>
Fix the software recognition limitations to improve the efficiency of ANPR enforcement processes.			AA	<p>Although this recommendation relates to the TMR's ANPR Strategy, the QPS has an ongoing continual improvement strategy for camera technology within CDOP. This commitment includes ANPR systems and software when used in the road safety camera program which includes point to point (average speed) camera systems.</p>

Current status:  
 I – Recommendation fully implemented  
 P – Recommendation partially implemented  
 AA – Alternate action undertaken  
 NA – No substantial action taken

## Comments received from Director-General, Department of Transport and Main Roads



Office of the  
Director-General  
Department of  
Transport and Main Roads

Our ref: DG30328  
Your ref: 2015-9125P

25 SEP 2015

Mr Andrew Greaves  
Auditor-General  
Queensland Audit Office  
PO Box 15396  
CITY EAST QLD 4002

Dear Mr Greaves

Thank you for your letter of 9 September 2015 about the performance audit on road safety – traffic cameras and for providing a copy of the final report to Parliament.

The Department of Transport and Main Roads (TMR) and the Queensland Police Service remain committed to reducing speed-related crashes and road trauma. The Camera Detected Offence Program (CDOP) is a key road safety program and an important component of the *Queensland Road Safety Action Plan (2015–17)*.

I note the Queensland Audit Office (QAO) has found CDOP is an effective program that deters speeding motorists and is successful in achieving its primary objective of reducing speed-related crashes. It is also pleasing to see that QAO has found that there is a high level of integrity around the infringement notices that are issued and that the expenditure of revenue is conducted in accordance with the legislation to fund road safety programs.

TMR acknowledges the report has identified a range of improvements to processes and systems associated with CDOP. The enclosed table details TMR's response to each of the audit recommendations.

If you require further information, please call Mr Dennis Walsh, General Manager (Land Transport Safety), on 3066 3017.

Yours sincerely

Neil Scales  
Director-General  
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## Response to comments

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Department of Transport and Main Roads, Road safety – traffic cameras  
(Report No. 2: 2015–16)

Response to recommendations provided by Director-General, Department of Transport and Main Roads.

## Response to comments



Queensland Audit Office

Recommendation	Initial response Agree / Disagree	Timeframe for Implementation	Current Status	Additional Comments
Address outstanding program improvement recommendations:	Agree	<p>QPS Implementation of recommendations relating to a new scheduling system to be completed by mid 2016.</p> <p>TMR Adoption of recommendations relating to program evaluation will be completed by Dec 2016.</p>	P	This will acquit all the recommendations from the MUARC reports.
Reduce the length of time it takes to verify and analyse data so it can be used in a timely manner to inform program and deployment decisions	Agree	<p>TMR &amp; QPS will work in collaboration to fix the road crash data lag by July 2016.</p> <p>TMR to implement a new road crash data loader between QPRIME and RoadCrash to enable these systems to transfer crash data more effectively by September 2016.</p> <p>A further project will then be considered to improve the data analysis available to agencies using this more up to date crash data.</p>	P	<p>There is currently a project underway to expedite both the currency and reliability of road crash data which includes:</p> <ul style="list-style-type: none"> <li>TMR funding 4 additional QPS temporary staff to code and cleanse the road crash data backlog in QPRIME.</li> <li>Development of a new data loader to transfer crash data more effectively between QPS and TMR.</li> </ul>

## Response to comments



Recommendation	Initial response Agree / Disagree	Timeframe for Implementation	Current Status	Additional Comments
Comprehensively review all approved mobile camera sites for their ongoing appropriateness	Agree	QPS to review all mobile camera sites as part of the new scheduling system by mid 2016.	P	TMR and QPS will continue to strive for best practice in site selection and deployment, including continuing to provide updated crash when available. The review of mobile camera sites will be considered as part of the development of the new scheduler system. TMR will also work with QPS to complete a review of existing sites once the data lag is reduced.
Increase covert deployment of mobile cameras to cabinet approved levels	Agree	QPS by Mid 2016	P	TMR supports the use of covert mobile speed cameras as part of the overall camera strategy. TMR will provide support to QPS in the implementation of this recommendation. The increase in covert hours will be aligned with the purchase of new covert vehicles by QPS.
Increase the rate of night time and weekend deployment of mobile cameras	Agree	QPS by December 2016.	P	TMR supports the increase in night and weekend enforcement as part of the overall camera strategy. TMR will support QPS by providing information on the time of day for crash data. The changes will require the development of the new scheduler, new deployment practices by QPS and the identification of risk periods using crash data.




Response to comments



Recommendation	Initial response Agree / Disagree	Timeframe for Implementation	Current Status	Additional Comments
Identify and quantify the cause of unclear plates and address enforcement and design issues effecting the ability to issue infringements	Agree	TMR by first quarter 2016	P	TMR acknowledges there a range of external factors such as rain, fog, dust and glare that can impact on the legibility of number plates. TMR in consultation with QPS and PPQ will review the design and manufacture standards for Queensland number plates. TMR will continue a camera testing regime with QPS to ensure plate designs pass CDOP detection standards.
Put ANPR cameras that also store images in more QPS cars and enforce vehicle registration compliance in the urban and suburban setting	Agree	QPS by Mid 2016	P	TMR supports this recommendation. It should be noted there are a range of additional methods employed to detect unregistered/ uninsured vehicles: <ul style="list-style-type: none"> <li>• QPS on-road officers and TMR Transport Inspectors are able to identify and intercept unregistered/uninsured vehicles.</li> <li>• Unregistered/uninsured vehicles caught speeding via the CDOP are also then referred to TMR Prosecutions Unit who issue a further infringement/s for driving an unregistered and/or uninsured vehicle.</li> </ul>

## Response to comments



Queensland Audit Office

Recommendation	Initial response Agree / Disagree	Timeframe for Implementation	Current Status	Additional Comments
Fix the software recognition limitations to improve the efficiency of ANPR enforcement processes.	Agree	TMR on-going implementation	P	Significant improvements have recently been achieved with the ANPR software. TMR is committed to an on-going program with suppliers and internal technical stakeholders to continually improve ANPR camera software and associated camera performance.

Current status:  
I – Recommendation fully implemented  
P – Recommendation partially implemented  
AA – Alternate action undertaken  
NA – No substantial action taken

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## Appendix B—Audit methodology

### Audit objective

The objective of the audit is to establish whether the Camera Detected Offence Program (CDOP) is contributing to road safety outcomes.

The audit addressed the objective through the sub-objectives and lines of inquiry set out in Figure B1.

Figure B1—Audit scope

Sub-objectives		Lines of inquiry	
1	Establish whether the design of the CDOP is consistent with its objectives	1.1	Are CDOP objectives clear and is performance measured?
		1.2	Are sites selected to maximise road safety benefits?
		1.3	Is fine revenue expended appropriately and according to legislation?
		1.4	Has the ENACT—Automatic Number Plate Recognition (ANPR) in-car technology been rolled-out effectively?
2	Establish whether road safety outcomes are achieved effectively	2.1	Do deployment procedures, equipment and operational practices maximise road safety benefits?
		2.2	Are findings and recommendations from evaluations of the CDOP considered and appropriate action taken?
3	Determine the level of integrity of the CDOP	3.1	Is the CDOP reliable and accurate?

Source: Queensland Audit Office

### Reason for the audit

Speeding increases the risk and severity of road trauma. From 1 January 2008 to 31 December 2014, speed-related crashes were a contributing factor in 437 fatalities (22 per cent of all road fatalities) on Queensland roads.

Speed-related crashes place a high cost on the community each year through hospital and health care costs, lost productivity in the workplace and the use of emergency services. Importantly, there are also personal costs for the individuals involved in road crashes and their families.

### Performance audit approach

The audit was conducted in accordance with the *Auditor-General of Queensland Auditing Standards—September 2012*, which incorporate the requirements of standards issued by the Australian Auditing and Assurance Standards Board.

The audit was conducted between August 2014 and May 2015. The Department of Transport and Main Roads (TMR) and the Queensland Police Service (QPS) were subject to this audit.

The audit included:

- interviews with the state office of TMR and the QPS—Traffic Camera Office
- interviews with road policing units
- analysis of statewide camera deployments and infringements data extracted from the following police systems:
  - Traffic Scheduling and Reporting System (TSRS)
  - Integrated Tasking and Analysis System (I-TAS)
  - Image and Infringement Processing System (IIPS)
  - Integrated Traffic Camera System (ITCS)
- analysis of statewide crash data extracted from TMR's system—RoadCrash
- analysis of key TMR and the QPS documents, including policies, guidelines, performance reports and industry reports
- sample testing of speed camera sites.

## Sampling methodology

### Purpose

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The purpose of the sample testing was to determine whether speed camera deployments to sites are based on speed-related crash history and public complaints.

### Site selection

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We tested the 74 most visited speed camera sites and a random sample of 74 of the least visited speed camera sites (zero deployments) using crash and public complaints data over the last five years (1 July 2009 to 30 June 2014).

### Sampling parameters

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Sampling parameters used are illustrated in Figures B2.

**Figure B2—Sampling parameters**

Parameters	
Period tested	1 July 2013 to 30 June 2014
Population size	3596 active sites
Confidence level	90 per cent
Tolerable deviation	5 per cent
Expected deviation	1.2 per cent
Sample size	74 most and 74 least visited sites

Source: Queensland Audit Office

## Appendix C—MUARC evaluations

Figure C1—The CDOP evaluations by MUARC

Review title	Date issued	Purpose	Outcome or conclusion
Development of strategies for speed camera enforcement in Queensland	June 2009	To use results and recommendations from research to improve the CDOP strategies, specifically for: <ul style="list-style-type: none"> <li>▪ deployment of speed camera technology</li> <li>▪ requirements of speed camera technology</li> <li>▪ a reduction in offence detection thresholds for existing cameras and new recommended technologies</li> </ul>	Outlined the options for the future of speed camera enforcement. Economic analysis of these options was conducted to generate cost benefit ratios. The recommendations have been partially implemented.
Development of an evaluation framework for the Queensland CDOP	June 2012	To develop a statistically valid evaluation framework for measuring the performance of the CDOP in terms of its effect on crash frequency, severity and social costs to the community in Queensland	Recommended that the evaluation framework be applied annually. First applied in MUARC's evaluation of the CDOP in 2014.
Review of the deployment and scheduling methods of the mobile camera program in Queensland	July 2014	To identify evidence-based best practice for effective operations of mobile speed cameras. Also to review current scheduling and deployment practices in Queensland with a view to providing recommendations for changes to maximise road safety outcomes	Found that the unpredictability of mobile camera locations and times contributed to a broader effect on speeding and serious crashes across the road system. TMR is currently working with the QPS to implement six of the 13 recommendations relating to scheduling sites and times. The remaining seven recommendations have not been progressed.
Evaluation of the Queensland CDOP 2009–12	August 2014	To measure the 2009–2012 performance of the CDOP in terms of its effect on crash frequency, severity and social costs to the community in Queensland	Found that the CDOP has resulted in reduced road trauma and social cost to the Queensland community. Made recommendations to strengthen monitoring and testing of the CDOP's effectiveness. TMR is considering its response.

Source: Queensland Audit Office—extracted from MUARC review reports



# Auditor-General Reports to Parliament

## Reports tabled in 2015–16

Number	Title	Date tabled in Legislative Assembly
1.	Results of audit: Internal control systems 2014–15	July 2015
2	Road safety – traffic cameras	October 2015

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