Economic Development Committee

Inquiry into the road safety benefits of fixed speed cameras

Submission 46

Queensland Government

QUEENSLAND GOVERNMENT SUBMISSION

Economic Development Committee
Inquiry into the road safety benefits of fixed speed cameras
Issues Paper No. 2, March 2010

Terms of reference
The Economic Development Committee will examine and report on the road safety benefits of fixed speed cameras in Queensland. As part of this inquiry the committee will consider:

- The effectiveness of fixed speed cameras in reducing speeding and road trauma;
- The criteria used to select sites for fixed speed cameras;
- The most efficient use of resources to maximise the road safety benefits of fixed speed cameras;
- The impact of new technologies on fixed speed cameras; and
- The appropriate role of fixed speed cameras in the overall speed enforcement regime.

Forward

The Department of Transport and Main Roads and the Queensland Police Service welcome this opportunity to provide the whole of government response to the Economic Development Committee about the road safety benefits of fixed speed cameras.

Queensland undertakes an evidence-based approach in our constant efforts to reduce the State's road toll. The Department of Transport and Main Roads is responsible for developing road safety policy, and monitors international best practice in developing new initiatives, and the Queensland Police Service enforces and implements these policies. This successful partnership has seen the road toll fall from a peak of 638 in 1973 to 331 in 2009. While this reduction is undeniably a good result, in recent years the road toll has remained unacceptable high, and new steps are needed to bring it down.

Fixed speed cameras have operated in this State since 2007-08, when the first 3 cameras were installed. The program was extended in 2009 and early 2010 with the roll-out of fixed speed cameras to a further 6 locations. In 2010 the first cameras were installed based on crash risk (rather than crash history) when cameras were installed at each end of the Clem7 tunnel's four traffic lanes.

Evidence suggests that cameras are effective in reducing average speed, but the problem we face in Queensland is significant. In 2009, state-wide speed surveys were undertaken to give us a picture of the extent of speeding on Queensland roads. The surveys monitored more than six million vehicles across a range of speed zones on rural and urban roads. The results indicate that between 20% and 50% of motorists state-wide are not complying with posted speed limits, dramatically increasing their crash risk.

And for too many Queenslanders, this risk is becoming a reality. In 2009, 75 fatalities were the result of crashes involving speeding drivers or riders. That's almost 23% of the State's road toll. While the emotional cost of this loss is enormous, there is also an economic cost. It is estimated that fatal speed crashes cost the community almost $200 million in 2009. If we can reduce speeding, we can save lives on our roads and save resources to invest in better infrastructure and services for everyone.

It is also important to dispel the myth that speed cameras are revenue raising exercises for government. In Queensland it is written in law that the revenue collected from camera detected offences is used for road safety education, building better roads and more forgiving roadsides and contributing to rehabilitation programs. For example, in 2008-09 revenue from speeding motorists provided $27 million for the Safer Roads Sooner program, $6 million for road safety education and awareness and $4.5 million for the Red Cross Blood Bank.

While this is good policy, the fact remains that if all drivers on Queensland roads obeyed the speed limits then not one cent of revenue would be raised - and the roads would be safer for all users.

However, with speeding continuing to take lives, new approaches are needed. That's why, in December 2009, the Queensland Government announced changes to road safety enforcement to be rolled out this year. These changes include the introduction of digital speed cameras, more fixed speed cameras, point-to-point speed cameras, combined speed and red light cameras and covert speed cameras.

While these initiatives are still rolling out and it is too early to say what impact they will have, it is notable that the road toll this year is well below the five year average. As at 17 May, the State road toll is 89, which is 49 below this time last year.

At the end of the day, there is only so much the government can do. It is up to each and every one of us to drive safely every day to really reduce the road toll.

David Stewart
Director-General
Transport and Main Roads

Bob Atkinson APM
Commissioner of Police
Queensland Police

Background

Queensland's approach to speed management, and road safety more broadly, is consistent with the national commitment to the Safe System framework. According to the *National Road Safety Action Plan 2009-2010*, the two fundamental objectives of the framework are:

- making the road transport system more forgiving of human error; and
- minimising the level of unsafe road user behaviour.

The Safe System framework seeks to prevent crashes in the first instance and minimise injury severity when crashes do occur. This broad approach to road safety improvement emphasises system-wide interventions to address human limitations. The four main aspects are:

1. Safe speeds;
2. Safe roads and roadsides;
3. Safe vehicles; and
4. Safe road users and safe behaviours.

This approach to road safety necessitates a cooperative effort from a number of government agencies and acceptance by the community that road trauma can be prevented.

Fixed speed cameras are a component of the Camera Detected Offence Program (CDOP), a key road safety program in Queensland. The CDOP is a joint partnership between the Queensland Police Service (QPS) and Department of Transport and Main Roads (TMR) and it is run in accordance with provisions in the *Transport Operations (Road Use Management) Act 1995* and associated regulations. The CDOP consists of the mobile speed camera program, the fixed speed camera program and the red light camera program.

Speed is a major contributing factor in crashes in Queensland. In 2009, there were 75 fatalities (or 22.7% of the road toll) as a result of crashes involving speeding drivers or riders on Queensland roads. Speed not only determines the likely risk of a crash but also the outcome of the crash or severity. Lower speeds result in fewer crashes as road users have more time for decision making, are less likely to lose control and can stop within a shorter distance.

The ongoing nature and complexity of the speeding problem in Queensland is evident using a variety of data sources.

Crash data

In Queensland, comprehensive crash data are collected and used to inform road safety applications, including speed management. Since 1994 the proportion of road fatalities which were the result of crashes involving speeding driver or riders has risen from below 15% to over 25% (dropping to 22.7% in 2009), as shown in Figure 1. The significance of speed as a factor in fatal crashes underscores the importance of pursuing speed management activities.

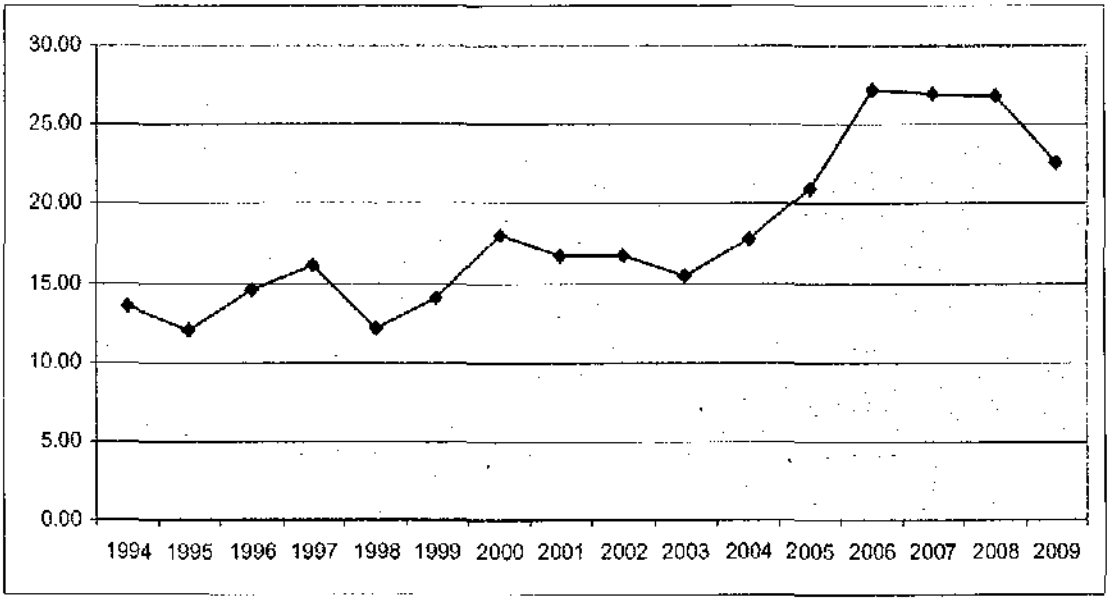

Figure 1: Speed-related fatalities as a percentage of all road fatalities, Queensland 1994-2009

Crash risk

Important Australian research (Kloeden et al., 1997) established the exponential relationship between speed over the limit and crash risk. As Table 1 indicates on an urban road with a speed limit of 60km/h, the risk of being involved in a casualty crash doubles with each 5km/h above the speed limit.

Speed	Relative risk
60 km/h	1.00
65 km/h	2.00
70 km/h	4.16
75 km/h	10.60
80 km/h	31.81
85 km/h	56.55

Table 1: Speed/risk relationship, 60km/h urban road (Kloeden, et al 1997)

Speed data

Preliminary findings of TMR's second state-wide speed survey (data collected in October/November 2009) have recently been released by the University of Adelaide's Centre for Automotive Safety Research (see figure 2, below). Together with the findings from the first survey (May 2009, see figure 3, below) these data contribute towards a comprehensive picture of the extent of speeding on Queensland roads and are used to inform further policy development, improve the effectiveness of marketing campaigns and will be used to monitor changes in speeding behaviour over time.

In both surveys more than six million vehicles were surveyed across a range of speed zones on rural and urban roads. (Independent analysis undertaken at Centre for Automotive Safety Research confirms that none of the differences between the May and November surveys are statistically significant). The surveys indicate that between one fifth and one half of motorists state-wide are not complying with posted speed limits, dramatically increasing their risk of being involved in a crash.

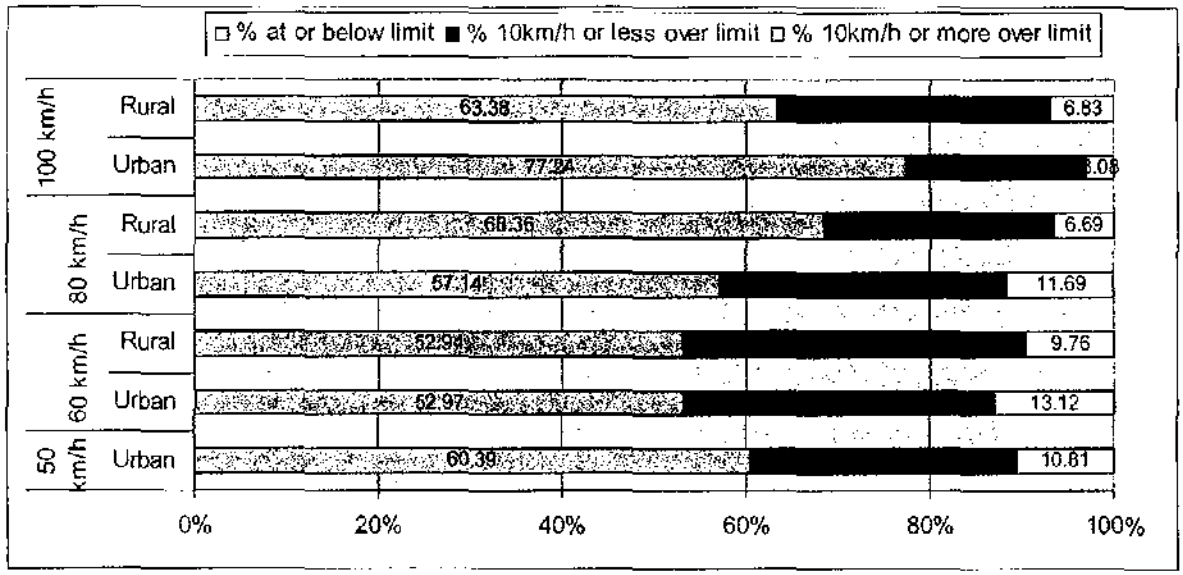

Figure 2: Summary of findings, Qld Speed Survey, November 2009.

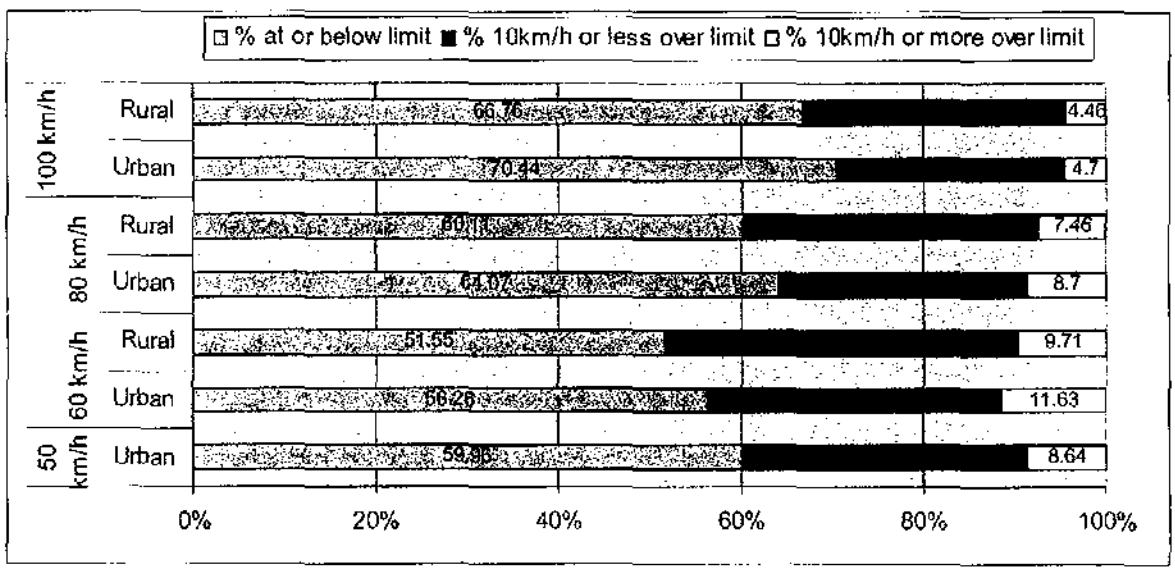

Figure 3: Summary of findings, Qld Speed Survey, May 2009.

The Queensland Speed Survey reveals that more than one third of motorists on 60km/h urban roads are up to four times more likely to crash because they are driving up to 10km/h above the speed limit. In addition, just over 10% of drivers on 60km/h urban roads are increasing their risk by much more than this as they drive more than 10km/h over the speed limit.

Attitudinal data

Each year TMR commissions a Road Safety Attitudes Tracking Study from an independent market research company. The most recent survey (May 2009) asked transport-related questions of a sample of 400 Queensland drivers. A number of the questions were specific to the Speed Camera Program revealed that:

- 85% of drivers agreed that speed is a major contributor to crashes;
- 80% of drivers agreed that 'it's time the community took a stand against speeding'; and
- 82% of motorists agreed that 'penalties for speeding are genuinely intended to deter people from speeding'.

However, responses also indicate that:

- Only 59% of motorists agreed that 'no matter what I always drive under or at the speed limit';

- Only 52% of motorists agreed that 'speeding is as dangerous as drink driving'; and
- Only 48% of motorists agreed that 'driving any speed over the speed limit constitutes speeding'.

Such inconsistencies are symptomatic of what has been labelled the 'speed paradox' by Fleiter and Watson (2005). Many motorists do not interpret driving over the posted speed limit as 'speeding' but rather exceeding a higher, personal threshold. As such, these motorists do not experience internal conflict between their knowledge of the negative impact of speeding and their speeding behaviour until they exceed this higher threshold. Public education is regularly aimed at countering this myth of 'safe speeding'.

Fixed cameras in Queensland

In February 2006 the Queensland Government hosted a Road Safety Summit. One of the outcomes of the Summit was a commitment to improve road safety through the implementation of fixed speed cameras on Queensland roads.

Fixed speed cameras have been introduced because of their proven ability to deter drivers from speeding and reduce crashes at specific sites. In addition to their benefits, fixed speed cameras can enforce speed limits in areas where it is difficult or unsafe to have other types of enforcement such as police officers performing speed enforcement. Fixed speed cameras also allow police more time to carry out other duties as the cameras do not require an operator.

In Queensland fixed cameras are deployed in order to maximise the effect of the CDOP and to complement the overall aim of the CDOP which is to create a general deterrent effect. TMR and QPS deploy fixed speed cameras in accordance with internal *Fixed Speed and Red Light Camera Site Selection Guidelines*. The Guidelines provide the principles, framework and process for matching high risk sites with appropriate fixed camera treatments in order to produce a safer road environment for Queensland road users.

The first fixed speed cameras were introduced into south east Queensland at:

- Bruce Highway at Burpengary, 14 December 2007;
- Main Street at Kangaroo Point (approach to Story Bridge), 14 December 2007; and
- Pacific Motorway at Tarragindi, 22 February 2008.

An additional six speed camera sites were established in the regions with the worst road toll at that time (North Coast, South Eastern and Southern regions), specifically at:

- Gold Coast Highway at Broadbeach, 31 August 2009;
- Warrego Highway at Redwood, 31 August 2009;
- Gold Coast Highway at Labrador, 28 September 2009;
- Warrego Highway at Muirlea (Ipswich), 24 December 2009;
- Nicklin Way at Warana, 24 February 2010; and
- Sunshine Motorway at Mooloolaba (Mountain Creek), 24 February 2010.

There are also two speed camera sites, in each direction of travel, in the Clem7 tunnel which opened March 2010.

With the introduction of digital technology into the CDOP in 2010, a wider range of fixed speed cameras including 'spot' speed, combined red light/speed and point-to-point camera systems can be utilised within the program. The QPS digital implementation project team is currently installing and testing a small number of fixed digital cameras at sites around Brisbane:

- two combined red light/speed camera locations: Waterworks Road and Jubilee Terrace, Ashgrove and Beaudesert Road and Compton Road, Calamvale;

- two 'spot' fixed speed camera locations: Pacific Motorway, Loganholme and Gateway Arterial Road, Nudgee; and
- one point-to-point speed camera system: Bruce Highway, Caloundra Road to Wild Horse Mountain, Beerburrum.

It is expected that these cameras will become operational in late 2010.

1. What is the appropriate role for fixed speed cameras in enforcing speed limits in Queensland?

Fixed speed cameras are used to address very specific road safety issues, with different camera types ascribed particular roles and priority due to their particular benefits.

In Queensland, on-road policing by QPS is the preferred method of enforcing speed (and other traffic offences) with speed cameras providing supplementary enforcement.

In terms of speed cameras, Queensland prioritises its resources according to research and best practice, with consideration of the Queensland road network, that is:

- the operation of mobile speed cameras due to their widespread, general deterrent effect;
- in the future it is expected that point-to-point (fixed) speed cameras will be used owing to their potential to reduce speeds and subsequent crash risk across a length of road;
- in the future it is expected that red light/speed cameras will be used to deter both offences at dangerous intersections; and
- in the future it is expected that fixed 'spot' speed cameras will continue to be used to reduce the risk at specific 'black spots' where engineering solutions are not feasible.

The Queensland government is committed to retaining its primary focus on the mobile speed camera program. A number of enhancements are currently being explored in order to produce additional crash and other social cost savings, for example, the deployment of covert mobile speed cameras for up to 30% of their operational hours. This initiative commenced with the QPS 2010 Easter Road Safety Campaign which included a limited number of covert vehicles deployed between Rockhampton and the New South Wales border.

When a location is identified as requiring enforcement to fix a speed-related problem, after consideration of other engineering and enforcement methods, the most appropriate fixed camera solution is selected. The type of camera to be deployed depends on the type of road safety problem identified:

- Red light running: where red light camera criteria crashes have occurred (or assessed risk identified) at the intersection, the intersection may be subjected to a red light camera (Crashes at signalised intersections are often the result of disobeying traffic lights or speeding. The implementation of a combined red light/speed camera should be used to deter both behaviours and improve overall road safety)
- Speed which is localised: where speed camera criteria crashes have occurred (or assessed risk identified) and are clustered at a specific location, the location may be subjected to fixed 'spot' speed camera.
- Speed on a section of road: where speed camera criteria crashes have occurred (or assessed risk identified) along a section of road the section may be subjected to a point-to-point speed camera system. These roads will generally be high volume roads such as freeways where there are limited entries and exits.
- Speed on bridges or in tunnels: where crash outcomes would be expected to be more severe the location may be subjected to proactive fixed speed camera placement.

The following principles guide the selection of sites for treatment by fixed cameras in the CDOP:

- Site selection will be evidence-based and targeted to maximise improvements in road safety.
- The selection of sites will contribute to the integrity and credibility of the CDOP.
- Sites will be identified by crash history (proven risk) or crash potential (assessed risk).
- When a location is identified as requiring camera enforcement, mobile speed cameras should first be considered due to their proven ability to deliver general deterrence.

- Fixed cameras will be deployed where it is unsuitable to enforce by either mobile cameras or effectively by other means (such as hand-held speed devices or police patrol due to issues which may have an effect on maintaining officer safety while undertaking this type of enforcement) or where there is sustained crash risk that is not able to be resolved by other means.
- Fixed camera enforcement will support general deterrent strategies such as mobile speed cameras, police enforcement, education and engineering.

Automated camera enforcement technology offers particular benefits which are different from those of on-road law enforcement and mobile speed camera enforcement. Fixed speed cameras can operate continually, every hour of every day. They are subject to fewer occupational health and safety considerations in relation to working on hazardous sections of road (Carseldine, 2003). Traditional on-road intercept and mobile speed camera methods rely on police officers being on the ground, and there is a low perceived risk of apprehension (Zaal, 1994). Automated camera enforcement technology will not replace these traditional speed enforcement methods, which will always form a key plank in the Government's speed management strategy, but will supplement and build on these methods.

2. Does prominent speed camera signage promote a safer road speed environment?

The impact of camera signage on road safety has not been the subject of significant academic research, most likely due to the presence of many confounding factors (such as the influence of the appearance of camera-housings and on-road markings). Different practices are evident across Australia (see Attachment 1: interstate comparison of signage).

In Queensland the signage policy for fixed speed cameras was established in 2007, in preparation for the installation of the first fixed speed cameras (see Attachment 2: Fixed camera signage policy). The policy provides for prominent advisory signs when fixed speed cameras are present on Queensland roads. The purpose of the signs is to:

- provide strong localised speed deterrence which will in turn deliver improved speed compliance and reduce crashes around fixed speed camera sites; and
- increase awareness of the use of fixed speed cameras and contribute to the perception among road users that if they speed they will be caught and penalised.

Fixed speed camera signs are not referred to under provisions of the *Transport Operations (Road Use Management) Act 1995* relating to enforcement using photographic detection devices. The signs are advisory in nature and do not affect the prosecuteability of detections captured by fixed speed cameras.

Currently motorists should pass two signs with a minimum of one sign alerting them to the presence of fixed speed cameras. The Traffic Control (TC) sign specifications have recently been changed to remind drivers that the cameras are 'for road safety' (see Attachment 3: Current Traffic Control [TC] signs for fixed cameras). Queensland also uses general signage, particularly at state borders, to alert motorists that speed and red light cameras operate in Queensland.

In light of new applications for fixed speed cameras, such as red light/speed and point-to-point cameras, the camera signage policy is currently under review. This review will consider research and best practice from Australia and overseas with a view to maximising the road safety effectiveness of fixed speed (and red light) cameras in Queensland. It will also take into account new technologies, such as in-vehicle navigation systems, which advise on the presence of fixed speed cameras.

Red light camera signage trial

Although red light cameras are a highly successful road safety initiative there are some motorists who continue to endanger themselves and other road users by refusing to stop at these intersections in compliance with traffic signals. In an effort to address this problem, and following a review of existing research (which is inconclusive regarding the impact of signs), TMR is currently trialling the use of advance warning signs at eight intersections where, despite the presence of a red light camera, crashes and infringements continue. These red light camera signs advise motorists that they are approaching an intersection with a red light camera, further encouraging them to obey the traffic signal and stop. The trial commenced in mid-2009 and infringement and crash data will be reviewed once 12 months of data is available in order to evaluate the effect of warning signs.

3. How effective are the existing fixed speed cameras in decreasing crash risks and changing driver behaviour in Queensland?

Fixed speed cameras are intended to reduce the incidence of speed-related crashes at the camera sites.

Details of the site selection for the existing Queensland fixed speed cameras, including the crash history of sites, are provided at Attachment 4.

As at 30 April 2010, the Queensland RoadCrash data available for statistical analysis only includes the details of crashes up to end of September 2008. As the first fixed speed cameras were only installed in December 2007 there are inadequate crash data to credibly analyse the effect of fixed speed cameras in Queensland. Any evaluation of the estimated crash reductions of fixed speed cameras should be calculated using at least three full years of post-implementation crash data.

While it is too early to measure the impact of fixed cameras in Queensland on crashes, speed limit compliance at each fixed speed camera location has improved (thus reducing speed-related crash risk) over time, as evidenced by a decline in the number of infringements. An operations summary for all Queensland fixed speed cameras has been provided by QPS's Traffic Camera Office (Attachment 5: Fixed speed cameras operations summary). Consideration of the number of detections at fixed camera sites since their installation suggests an increase in speed limit compliance at these locations over time.

The Queensland mobile speed camera program has been externally evaluated a number of times since its establishment in 1997 (see Attachment 6: List of evaluations of mobile program). As the crash data available for analysis begin to be influenced by the presence of fixed cameras as well as mobile speed cameras, a new evaluation framework is being developed. This research project is currently underway and it is expected that the framework will be tested using 2008 data later in 2010 (when data are expected to be available). The evaluation framework will also consider the impact of speed cameras on vehicle speeds, as detected by non-invasive devices, at and near the speed camera locations. Speed data will, however, be considered an intermediate measure of effectiveness. These data will allow the cause and effect relationship between activity (camera operation) and outcome (speed-related crashes) to be better established, strengthening the evidence in the evaluation. An example of such speed data, collected at the Redwood fixed speed camera, is presented as attachment 7.

TMR tracks community attitudes to fixed speed cameras, amongst other road safety matters, in their annual survey of Queensland motorists. In the latest survey (2009), relatively positive attitudes and experiences of fixed speed cameras were reported:

- 49% of respondents reported that they had driven past a fixed speed camera in Queensland in the last six months;
- 71% of respondents supported fixed cameras, with support higher among females (79%) than among males (64%);
- 39% of respondents reported that they slow down before driving past a fixed speed camera and then speed up again once they have passed the camera;
- 61% of respondents supported point-to-point speed cameras; and
- 82% of respondents supported red light/speed cameras, with support higher among females (86%) than among males (78%).

Fixed speed cameras are used across Australia (see Attachment 8: Interstate comparison of fixed speed cameras) and evaluations are available from other jurisdictions with a longer

history of fixed speed camera use which demonstrate the capacity of fixed speed cameras to promote speed limit compliance and reduce crashes.

New South Wales first introduced fixed speed cameras into the Sydney Harbour Tunnel in 1997 in order to address the risks associated with motorists' high speeds. Further roll out commenced in 1999 and approximately 141 fixed 'spot' speed cameras are currently operational in NSW. The NSW fixed speed cameras are well signed in order to maximise speed compliance through the 'blacklength' which the camera is designed to affect. The program aims to influence driver speeds across a greater road length and time period.

A representative sample of sites (28) was subject to a comprehensive analysis by ARRB Group Project Team (May 2005) which was completed in 2003. The effectiveness of the progress was assessed in terms of:

- Changes in driver speed behaviour, using speed data pre-installation and at specified time intervals post-installation;
- Changes in the incidence and severity of road crashes at fixed speed camera locations, during crash data three years pre-installation and two years post-installation;
- Economic value of the program, using estimated social cost savings which result from crash reductions and all costs involved in the installation, maintenance and operation of the fixed speed camera program but not considering the resultant fines; and
- Community attitudes, knowledge, beliefs and reported behaviours in relation to fixed speed cameras, using four waves of community surveys.

The (statistically significant) major findings included:

- Reduction in mean speeds of 6.3km/h 12 months after installation and 5.8km/h 24 months after installation on the camera lengths;
- Reduction in the percentage of vehicles exceeding the speed limit by at least 10km/h by 85.6% 12 months after installation and 87.9% 24 months after installation on the camera lengths;
- A 22.8% reduction in casualty crash frequency along the camera length (1-3.3km around camera location);
- An 89.8% reduction in fatal crash frequency along the camera length for the 24 months after installation;
- A cost-benefit ratio for the program of 3.4 for a project horizon of 6 years (for camera lengths and adjacent lengths); and
- The survey found high and growing community awareness of the fixed speed camera program and a majority perception that fixed speed cameras are a legitimate road safety countermeasure.

In their consideration of six evaluations of speed camera programs in the United Kingdom and NSW, Cameron and Delaney (2006: 42) found that the reported road trauma reductions varied substantially but there was more consistency in the speed reductions at camera sites, in particular:

- Reductions in proportion of motorists speeding of between 67% and 72%;
- Reductions in the proportion of motorists speeding excessively of between 80% and 96%.

Cameron and Delaney (2006) observed that reductions in mean speeds and, in particular, excessive speeds, at camera sites have reduced road trauma in the vicinity of the cameras. Further they found that 'the overall effects of overt fixed speed cameras is essentially the sum of their individual localised effects, and that the program benefit-cost ratio is essentially the same as individual fixed camera installations'. Fixed speed cameras have a strong deterrence

effect at their location. Such a treatment option is a useful option to be considered along with other enforcement, engineering and education solutions.

Point-to-point speed camera systems have a longer history overseas and impressive crash reductions are evident over the enforced road section. For example, in its first three years of operation a point-to-point system on a 46km section of highway in Strathclyde, Scotland, experienced a 29% reduction in serious casualty crashes and a 16% reduction in slight injury crashes (A77 Safety Group, 2008). In the Kaisermühlen tunnel in Austria the installation of a point-to-point system resulted in a one-third reduction in injury crashes (including fatal), half as many fatal and serious injuries, and a one third reduction in slight injuries in its first two years (compared to three years prior) (Stefan 2006).

4. What criteria should be used to select fixed speed camera sites?

The decision to install a fixed speed camera only occurs after a number of other speed management options have been considered. General deterrent strategies such as mobile speed cameras, police enforcement, education and engineering are preferred options.

The *Fixed Speed and Red Light Camera Site Selection Guidelines* emphasise that fixed cameras will (only) be deployed where it is unsuitable or ineffective to enforce by either mobile cameras or by other means (such as handheld speed devices or police patrol) or where there is sustained crash risk that is not able to be resolved by other means.

Fixed speed camera sites in Queensland are selected in order to maximise their road safety benefit, specifically to reduce motorists' speed and therefore reduce speed-related crashes.

The *Fixed Speed and Red Light Camera Site Selection Guidelines*, covering a broader range of camera types (including fixed speed cameras, red light cameras, combination red light/speed cameras, point-to-point speed cameras), provide the principles, framework and process for matching high risk sites with appropriate fixed cameras treatments to contribute to a safer road environment for Queensland road users.

These Guidelines will be reviewed to ensure that they adequately respond to changing circumstances, such as the adoption of new technologies and road improvements.

In accordance with the Guidelines potential fixed camera locations are identified on the basis of crash history (proven risk) or crash potential (assessed risk).

Crash history (proven risk)
Locations with a crash history are assessed to identify the most suitable means of treating the crash risk. This involves considering a range of alternative solutions, such as engineering solutions, to ensure that the most practical and effective crash reduction treatments are identified.

To identify sections of roads or intersections with proven crash risk, one or two sets of crash criteria are applied:

- 'speed camera criteria crashes'
- 'red light camera criteria crashes'.

Zones must have a history of at least five crashes (for speed or red light cameras, not relevant for point-to-point camera systems) in the preceding five years to be considered eligible for the installation of a camera. Locations experiencing more frequent and more serious crashes are first considered for progress to the operational assessment stage.

Crash potential (assessed risk)
Some locations may not have the crash history but may still exhibit significant risk factors that are likely to result in crashes. Site identification based on 'crash potential' ensures that new roads, in addition to existing roads, such as the Clem 7 tunnel may be addressed with camera enforcement to minimise the risk of crashes. The identification of zones for fixed camera enforcement on the basis of crash potential is exceptional.

Such zones may be characterised by:

- Excessive high risk driver behaviour;
- High risk of speed camera criteria crashes;
- Inability to effectively enforce by means other than fixed cameras; and

- Enclosed or elevated road environment or other factors that are likely to increase the likelihood or severity of crashes.

Roads in the planning or construction phases may be selected for fixed camera enforcement provided they meet the above criteria. This proactive approach ensures that fixed cameras are able to be used to minimise the assessed crash risk from the time when such roads begin to carry traffic.

Tunnels and bridges are examples that present a clear potential risk due to the inability of police to enforce using conventional methods, such as mobile speed cameras, which may result in poor driver behaviour compliance and increased crash risk. Incidents in such environments can prove extremely costly in terms of human life, increased congestion, pollution and repair costs. The most common hazard in a tunnel is vehicle breakdowns or crashes that may cause a fire or result in serious injury. In life-threatening crashes, medical assistance and transportation to hospital needs to happen quickly as trauma is a 'time-dependent disease', and basic life support may be needed soon after a crash (Brodsky, 1992).

Following identification of potential zones based on proven crash risk or assessed risk police evaluate the zones for site/s suitable for a fixed camera. This may be done in conjunction with TMR or local government, depending on the road ownership. The operational assessment also considers the site selection principles.

An operational assessment report is completed by QPS. This assessment includes:

- Assessment of additional site risk factors (e.g. inability to enforce speed, traffic volume, road environment);
- Technical feasibility (e.g. availability of electricity supply, site suitability for the photographic system, number of lanes, ability to enforce speed in both directions, road geometry);
- Australian Standards requirements (e.g. workplace health and safety requirements, suitability for camera infrastructure).

Upon identification of a candidate site for a fixed speed camera the QPS, through their Regional Traffic Coordinators, will advise the members of the relevant regional Speed Management Advisory Committee (SMAC) of the proposed site and treatment. A SMAC generally comprises representatives from QPS, TMR, RACQ and Local Government. Members are asked to provide the QPS Traffic Camera Office and TMR with any relevant local knowledge regarding the site. Sites are approved (or not) only after consideration of detailed information about the proposed site and camera treatment is received from the Regional SMACs.

5. Are fixed speed cameras more suited to specific road environments?

Yes, it is well established that different types of fixed cameras are more suited to particular road environments. Fixed cameras can be installed at dangerous locations where it is difficult and/or hazardous for police to enforce speed limits by using hand-held speed detection devices or mobile speed cameras.

Site assessment is about applying the correct enforcement technology (ranging from hand held operated devices to fixed unattended technology) to the road environment. Road design features including the provision of stopping areas, width of shoulders, posted speed limit, number of lanes, traffic volume, safety barriers, turn-around areas and lighting must be considered for enforcement purposes. In some instances the use of fixed camera technology is the only enforcement option available where an enforcement exclusion (by Police Officer) area exists from a health and safety assessment. The enforcement technology has to be applied to the actual environment and in compliance to the manufacturer's instructions to ensure the integrity and reliability of the CDOP.

When speed camera criteria crashes have occurred (or assessed risk identified) along a section of road the section may be subjected to point-to-point speed camera system. These roads will generally be high volume roads such as freeways where there are limited entries and exits.

Crashes at signalised intersections are often the result of disobeying traffic lights or speeding. Where red light camera criteria crashes have occurred (or assessed risk identified) at the intersection, the intersection may be subjected to a combined red light/speed camera which will deter both behaviours and improve overall road safety. Intersection crashes account for approximately one in three of all fatal and serious injury crashes in Queensland (Queensland Road Safety Strategy 2004-2011). Crashes that result from drivers running red-lights can be particularly severe because they often involve the front of a vehicle impacting with the side doors of another vehicle. Passengers and drivers are not as well protected from side impacts as frontal impacts. Speeding increases the risk of a crash and the severity of the crash outcome. These crashes place a heavy burden on the services of the Queensland Ambulance Service and the Queensland Fire and Rescue Service in terms of rescue and medical assistance.

When speed camera criteria crashes have occurred (or assessed risk identified) and are clustered at a specific location, the location may be subjected to a fixed 'spot' speed camera. The use of fixed speed cameras should be confined to major urban roads where there are no signalised intersections to install a combined red light/speed camera or where there is a significant crash problem at a mid-block location.

General principles for the placement of fixed speed cameras in particular road environments as expressed in the *Fixed Speed and Red Light Camera Site Selection Guidelines* include:

- When a location is identified as requiring camera enforcement, mobile speed cameras should first be considered due to their proven ability to deliver general deterrence.
- Fixed cameras will be deployed where it is unsuitable to enforce by either mobile cameras or effectively by other means (such as handheld speed devices or police patrol) or where there is sustained crash risk that is not able to be resolved by other means.
- Fixed camera enforcement will support general deterrent strategies such as mobile speed cameras, police enforcement, education and engineering.

6. Will the roll-out of new speed detection technology lead to excessive monitoring of Queensland drivers' speed?

No. Speed is an insidious problem in Queensland, as in other states and across the world. The TMR state-wide speed surveys show that between one-fifth and nearly one half of motorists, across a range of speed zones on rural and urban roads, are not complying with posted speed limits, dramatically increasing their risk of being involved in a crash.

According to the OECD (2008) 'enforcement of existing speed limits can provide immediate safety benefits, perhaps more quickly than any other single safety measure'. It is important that the Queensland government is able to access a broad range of speed management, including enforcement, approaches to address speeding and reduce crashes.

Public road safety campaigns, in Queensland, other states and overseas, are regularly aimed at dispelling the myth of 'safe speeding'. Unlike drink driving, speeding is not yet perceived by motorists as anti-social driving behaviour, as is clearly evidenced by the state-wide speed surveys. Tay, Watson and Hart (2002: 1141) underscore the casual effects of the social acceptance of speeding: 'Since many drivers do not consider speeding to be unacceptable, they are more likely to speed and thus resulting in higher incidences of speed related crashes'. Road safety research demonstrates the complex nature of speeding behaviour which is influenced by perceptions of enforcement and crash risks, personality and attitudes. Driver behaviour change through enforcement can be best achieved by police applying unpredictable tactics to reinforce the *anywhere anytime* philosophy of road safety.

Much speeding behaviour goes unpunished. If this behaviour is to change it is critical that the entire community understand the importance of safe driving and the consequences of speeding. Public education campaigns aim to provide information to modify behaviours and social norms by putting key road safety issues on the public agenda. These campaigns also provide information about why speed is enforced in the way that it is and the benefits that can be achieved by reducing speeds on Queensland roads. Public communication and education campaigns are developed on the basis of research and evaluation. As a result they are constantly changing, both in terms of their message and medium, as government attempts to optimise the delivery of this information.

Speed management policy will continue to be developed with reference to research and best practice and to take advantage of technological innovations which may help to address the problem of speed. Fixed speed cameras, in their current and future incarnations will be evaluated by the government in terms of their impact on crash rates, either at a specific location or across a section of road.

Other offences

In addition to enforcing speed and red light offences, CDOP cameras detect other prescribed offences, namely the use of unregistered and uninsured vehicles, which also has implications for road safety. Registration is a vital part of Queensland's transport system; it ensures that accurate and secure vehicle records are kept. This allows the TMR to identify registered operators and manage, and support the safety and security of Queensland's road transport.

The Travelsafe Committee Report (No. 51) identified that:

The driving of unregistered vehicles poses a number of road safety problems including:

- The possibility that such vehicles do not meet relevant safety standards;
- It may undermine the identification of vehicle owners as a means of managing driver behaviour;
- It reduces the revenue available to government to maintain the road system;
- Government agencies cannot retain current databases on the vehicle's ownership, registration status and vehicle type through the registered vehicles register; and

- The driving of unregistered vehicles is linked to other behaviours associated with high crash risk, including unlicensed driving.

The Travelsafe Committee Report (No. 51) also underscored the problems posed by unlicensed driving which can also be enforced using CDOP cameras:

> Unlicensed drivers are high-risk drivers who pose a significant safety risk on the road. During the ten years from 1995 to 2004, between six and 10 per cent of all drivers and riders involved in fatal crashes in Queensland were unlicensed. Unlicensed drivers were almost three times more likely to be involved in a crash than licensed drivers, and twice as likely to be killed or seriously injured in these crashes. Crashes with unlicensed drivers tend to be more severe due to links between unlicensed driving and other high-risk behaviours, including drink driving, speeding, failure to wear seat belts and motorcycle use.

7. Are there other technologies that would be more appropriate for reducing crash risk associated with excessive speed?

The Queensland Government is always considering additional or alternative methods for reducing driver speeds and resultant crash risk across the speed management components of education, engineering and enforcement.

There is a significant amount of quality research being conducted into speed management practice in Australia and overseas. The Queensland government continues to be informed about and considers this research within the context of the characteristics of Queensland roads and road users.

Queensland speed management policies and programs are regularly evaluated, usually by independent researchers. Detailed data collection about driver and rider behaviour, such as speeds on the network, attitudes to speed and speed infringement trends, are collected and analysed. It is vital for Queensland to continue to monitor its performance, and that of other jurisdictions, and to adopt new initiatives to improve its approach to speed management.

New camera types
The new fixed speed camera technology currently being tested for roll out in Queensland includes point-to-point speed camera systems and combined red light speed cameras.

Point-to-point speed cameras (or average speed cameras) are a speed camera system that uses at least two cameras over a length of road to measure a vehicle's average speed. The system uses the time it takes for a vehicle to travel between two points to calculate the average speed of the vehicle: Speed = Distance/Time. The *Transport Operations (Road Use Management) Act 1995* has recently been amended to include new evidentiary provisions to allow average speed to be used as evidence of the actual speed of a vehicle. These provisions will support the prosecution of offences detected by point-to-point speed cameras. These cameras may also be used independently as 'spot' speed cameras.

As strategic speed management seeks to influence speeds across the entire road network and, as point-to-point camera systems monitor driver speeds over a length of road, it offers considerable network coverage and potentially high crash savings. In addition, experience in the United Kingdom has shown that the community view point-to-point as a fairer enforcement camera system as it is more forgiving of 'unintentional' or 'momentary' speeding.

Combined red light/speed cameras are placed at a signalised intersection and are able to deter (and detect) both failure to obey the red traffic signal and speeding. The speed detection component of the camera can operate on the red, yellow and green signal. It is expected that new digital red light/speed cameras will be used to both replace existing wet film red light cameras and to enable new sites to be addressed by the program in the future. Promoting improved speed compliance at intersections will provide an opportunity for greater compliance to traffic signals at intersections and reduce the number and severity of potentially fatal angle crashes.

Speed activated signs
Speed Activated Signs typically use radar to detect an individual vehicle's speed and, if a motorist is exceeding the speed limit, a message such as 'slow down' is displayed to the motorist (the sign is blank for compliant motorists). Eighteen signs of various configurations have been installed on state-controlled roads as part of a Safer Roads Sooner-funded trial in Queensland. A similar number of additional signs have been scheduled for installation during 2010. Typically sign sites have been selected where there is a crash history and where there is believed to be scope for speed reduction.

Preliminary analysis of data being collected by the speed activated signs indicates consistent reductions in both the 85th percentile and mean speeds of vehicles approaching the signs. This suggests regular motorists familiar with the route have changed their behaviour so that they do not activate the signs. Moreover, preliminary analysis of data collected downstream of signs indicates that there is a further reduction in speeds beyond the sign as drivers who do activate the sign then decelerate.

Intelligent Speed Assist (or Adaptation) (ISA)

An emerging technology in the speed management arena which the Queensland Government is investigating is Intelligent Speed Assist (ISA). ISA describes systems where the vehicle 'knows' the speed limit and uses that information to give feedback to the driver (advisory systems) or limit the vehicle's speed (supportive and limiting systems). Research indicates that ISA is an effective means for reducing speed and therefore the risk of injury from speed related crashes. Its effectiveness, however, depends on the type of ISA technology being used, whether it is an advisory, supportive or limiting system. UK research by Carsten and Tate (2005) predicts that mandatory use of supportive ISA could result in a 50% reduction in serious crashes.

Any ISA system requires accurate speed zone mapping data that determines speed limit information at a precise location on the road network. At this stage, public roads have already been mapped in Western Australia and Victoria. New South Wales has mapped approximately one third of their network and other states are at the various stages of considering, researching or planning the mapping of their own networks. Queensland is investigating the best process to undertake the mapping of speed zones in Queensland.

TMR participates in two national groups aimed at advancing ISA technology: the Australasian Intelligent Speed Assist Initiative (AISAI) and the In-Vehicle and At-Roadside Technologies (IVART) Reference Group. Through these two groups, TMR is working to establish the effective and nationally consistent adoption of ISA systems.

8. Are there other issues regarding the use of fixed speed cameras to reduce road related risks in Queensland?

The QPS and TMR's CDOP uses mobile and fixed speed cameras to enforce speed limits which are particularly suited to some road environments. The program supplements speed enforcement by police officers. The mobile speed camera program has been independently evaluated since its introduction in 1997. The latest evaluation results indicate that for 2007, an estimated 2863 serious casualty crashes were prevented by the mobile speed camera program (within two kilometres of the centre of a speed camera zone), which translates into a total social cost savings of $1.691 billion.

Fewer crashes result in:

- reduced social costs in non-economic terms, including the quality of life a person would have enjoyed had they not died prematurely, and pain, grief and suffering of relatives and friends (BITRE. 2009);
- reduced social costs in terms of travel delays, vehicle repair costs, legal costs, disability-related costs, workplace and household losses, insurance administration, and medical costs (BITRE. 2009); and
- positive effects for the health, ambulance and fire services (Delaney et al., 2005).

In addition, managing and enforcing speed limits is internationally recognised as a strategy to improve traffic flows and minimise transport-related greenhouse gas (GHG) emissions, with some assessment indicating that motorway GHG emissions can be reduced by up to 15% using speed management and enforcement strategies which encourage consistent speeds. In 2007, road transport was responsible for almost 9% of Queensland's total GHG emissions.

Claims of revenue raising

The Queensland Government believes that there is no such thing as 'safe speeding'. Driving at any speed above the posted speed limit is potentially dangerous, and therefore illegal, and it is for this reason that enforcement is undertaken. The operation of speed cameras in Queensland is not about raising revenue for the government, but rather the implementation of a proven road safety initiative.

The distribution of revenue from Queensland camera detected offences is quarantined from consolidated revenue. Its use is restricted by the terms of the *Transport Operations (Road Use Management) Act 1995* which requires that all money collected for penalties imposed for camera detected offences in excess of the administrative costs of collection must be used for the following purposes:

- road safety education and awareness programs;
- road accident injury rehabilitation programs; or
- road funding to improve the safety of the sections of state-controlled roads where crashes most frequently happen.

Most other states in Australia do not have any policy or legislative requirements in place for the distribution of camera detected offence revenue or any other traffic fines. The use of revenue from Queensland camera detected offences is reported each year in the TMR annual report.

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Attachments

Attachment 1: Interstate comparison of speed and red light camera signage

Attachment 2: Fixed camera signage policy

Attachment 3: Current Traffic Control (TC) signs for fixed cameras

Attachment 4: Site selection for fixed speed cameras in Queensland, 2007-2010

Attachment 5: Fixed speed cameras operations summary and graph per site

Attachment 6: List of evaluations of mobile camera program

Attachment 7: Example of speed data from fixed camera site

Attachment 8: Interstate comparison of fixed speed cameras

Attachment 1: Interstate comparison of speed and red light camera signage

State	Site-specific signs	General signs
ACT	'RED LIGHT AND SPEED CAMERA AHEAD' signs at intersections with speed/red light cameras	'SPEED AND RED LIGHT CAMERAS USED IN THE ACT' used at major state border entry points
New South Wales	Each fixed speed camera has three signs 'SPEED CAMERA 24 HOURS', SPEED CAMERA AHEAD' and 'HEAVY FINES LOSS OF LICENCE'. Each red light/speed cameras location signed on approach 'SAFETY CAMERA AHEAD'	-
Queensland	Each fixed speed camera has two signs 'SPEED CAMERA 24 HOURS', SPEED CAMERA AHEAD'; trial of advisory signs at 8 red light camera intersections currently underway	'SPEED CAMERAS ARE USED IN THIS AREA' and 'SPEED AND RED LIGHT CAMERA SIGNS ARE USED IN QUEENSLAND'
South Australia	'SAFETY CAMERA AHEAD' signs erected at each approach to red light camera (some older signs read 'RED LIGHT AND SPEED CAMERA AHEAD')	-
Tasmania	'PERMANENT SPEED CAMERA AHEAD' signs on approach to fixed speed camera; 'RED LIGHT AND SPEED CAMERA AHEAD' signs at intersections with speed/red light cameras	'RED LIGHT AND SPEED CAMERAS OPERATE IN THIS STATE' signs on highways
Victoria	'ROAD SAFETY CAMERAS OPERATE IN THIS AREA' sign erected in areas where fixed speed, red light, speed/red light or point-to-point speed cameras are used	'SPEED AND RED LIGHT CAMERAS OPERATE THROUGHOUT VICTORIA' used at major state border entry points
Western Australia	-	'SPEED CAMERAS ARE USED IN WESTERN AUSTRALIA'

Background

In February 2006 the Queensland Government hosted a Road Safety Summit. One of the outcomes of the Summit was a commitment by the Government to improve road safety through the implementation of fixed speed cameras on Queensland Roads.
On 21 August 2007 the Camera Detected Offence Program Executive Management Board (EMB) considered a proposed signage policy for fixed speed cameras. On 15 October 2007 EMB members approved key signage policy options for fixed speed cameras – the options approved form the basis for this signage policy.

Scope

This policy is limited to advisory signs for wet film and digital fixed speed cameras on Queensland roads.

Purpose

The purpose of the signs is to:

- provide strong localised speed deterrence – this will in turn deliver improved speed compliance and reduce crashes around fixed speed camera sites; and
- increase awareness of the use of fixed speed cameras and contribute to the perception among road users that if they speed they will be caught and penalised.

Advisory signs

Fixed speed camera signs are not referred to under provisions of the *Transport Operations (Road use Management Act) 1995* relating to enforcement using photographic detection devices. As such the signs are advisory in nature and will not affect the prosecuteability of detections captured by fixed speed cameras.

Sign appearance

Two sign designs are approved for use with fixed speed cameras: Each has

- a white retroreflective background;
- blue retroreflective symbols and lettering;
- a retroreflective blue chequered border around the entire perimeter; and
- a symbol of a camera.

The approved wording for the two signs is as follows:

- 'SPEED CAMERA AHEAD'; and
- 'SPEED CAMERA 24 HOURS'.

Design approval

Each of the sign designs is approved by the Department of Main Roads as a 'non-standard sign' under Part 1, section 1.9 of the Manual of Uniform Traffic Control Devices. Each is assigned a traffic control number as indicated below and as such is an official traffic sign.

- SPEED CAMERA AHEAD (TC1674)
- SPEED CAMERA 24 HOURS (TC1675)

Site approval

Signs should only be installed at locations approved by the Queensland Police Service and Queensland Transport.

Sign placement

Each fixed speed camera site will have:

- two advisory signs positioned within one kilometre of the camera site in the direction being enforced;
- if suitable sign locations cannot be found within one kilometre, this distance may be increased;
- wherever possible, drivers who enter from on-ramps or side roads should encounter at least one sign on the approach to a camera site;
- the signs will be installed in the following order:
  - 'SPEED CAMERA AHEAD' (placed furthest from the camera site)
  - 'SPEED CAMERA 24 HOURS' (placed closest to the camera site); and
- where road width or other factors affect the visibility of fixed speed camera signs, additional signs should be installed – for example, signs installed on both sides of a three lane motorway.

Sign dimensions

There is a choice of two sizes for fixed speed signs as detailed in the approved designs to cater for variables such as vehicle approach speed.

	a	b	c	d	e	f	g	h	k	m	n	o	r
A	1500	1200	30	90	180	120DN	100	150	350	850	100DN	160	100
B	2500	2300	50	150	300	200DN	160	250	590	1430	180DN	260	150

Notes:

1. Install signs only at locations approved by the Queensland Police Service and Queensland Transport. Contact the Traffic Camera Office for approval process.
2. This sign is installed furthest from a fixed speed camera site - the distance from the camera site must be in accordance with signage policy requirements.
3. Refer to TC1675 for the sign to be installed closest to a fixed speed camera site.
4. Where physical space does not allow the proper installation of TC1674_1 refer to narrower sign shown in TC1674_4.
5. Edge strip comprises 30 mm x 30 mm or 50 mm x 50 mm blue and white checker.
6. For existing speed camera sign locations, the supplementary plate "FOR ROAD SAFETY" TC1674_3 may be used in conjunction with TC1674_2, to reinforce the road safety initiative. See pages 2 and 3 for details.
7. Signs require a clear film overlay fitted to protect the signs from graffiti.

Colour Legend

- Retroreflective blue
- Retroreflective white

Queensland Government

INFORMATION SIGN "SPEED CAMERA AHEAD FOR ROAD SAFETY"

Road Safety Systems Management Division
Road Safety Unit

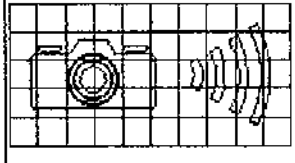
APPROVED AS OFFICIAL TRAFFIC SIGN

PRINCIPAL ENGINEER (Traffic Engineering) — 24/08/09 Date

TC1674_1
Page 1 of 4
A B C D

Designed	Checked	Scale
TV 08/09	DJ 08/09	Not to Scale

	a	b	c	d	e	f	g	h	k	m	n	o	r
A	1500	1200	30	90	180	120DN	100	150	350	850	100DN	160	100
B	2500	2300	50	150	300	200DN	160	250	590	1430	180DN	260	150



Notes:

1. Install signs only at locations approved by the Queensland Police Service and Queensland Transport. Contact the Traffic Camera Office for approval process.
2. This sign is installed closest from a fixed speed camera site - the distance from the camera site must be in accordance with signage policy requirements.
3. Refer to TC1674 for the sign to be installed furthest to a fixed speed camera site.
4. Where physical space does not allow the proper installation of TC1675_1 refer to narrower sign shown in TC1675_4.
5. Edge strip comprises 30 mm x 30 mm or 50 mm x 50 mm blue and white checker.
6. For existing speed camera sign locations, the supplementary plate "FOR ROAD SAFETY" TC1675_3 may be used in conjunction with TC1675_2, to reinforce the road safety initiative. See pages 2 and 3 for details.
7. Signs require a clear film overlay fitted to protect the signs from graffiti.

Colour Legend

- Retroreflective blue
- Retroreflective white

Queensland Government

INFORMATION SIGN
"SPEED CAMERA 24 HOURS FOR ROAD SAFETY"

Road Safety Systems Management Division
Road Safety Unit

APPROVED AS OFFICIAL TRAFFIC SIGN

PRINCIPAL ENGINEER
(Traffic Engineering)

24/08/09
Date

TC1675_1
Page 1/4

A | B | C | D

Designed	Checked	Scale
TV 08/09	DJ 08/09	Not to Scale

Initial fixed (wet film) fixed speed cameras, 2007-2008

The process of site selection for the first three fixed cameras was undertaken in 2007 in line with the following key principles:

1. site selection should be evidence based and targeted to provide improvements in road safety;
2. sites should be selected based on an assessment of proven risk via crash history as well as an assessment of other relevant risk factors;
3. site selection should, wherever possible, be consistent with the existing Camera Detected Offence Program (CDOP) and should maintain CDOP integrity and credibility; and
4. ideally, fixed speed camera locations should occur where it is difficult or unsafe to minimise risk by other means.

It was decided that the site selection process for fixed speed cameras should follow a similar process to that for mobile speed cameras, primarily targeting areas with a proven crash risk, to maximise reductions in serious casualty crashes. Accordingly, the site selection process used for the initial fixed speed cameras was as follows:

1. Site identification – sections of road for location of proposed sites are identified and ranked in terms of crash risk via analysis of crash history;
2. Site approval – specific proposed sites are approved based on consideration of the following:
   - an assessment of additional site risk factors (e.g., inability to enforce speed, traffic volume and road environment);
   - the feasibility of alternatives to minimise crash risk (e.g., education, engineering solutions or other forms of speed enforcement);
   - an assessment of health and safety risks for officers operating and maintaining the cameras; and
   - the technical feasibility of the proposed site in terms of fixed speed camera system requirements. For example:
     - availability of electricity supply;
     - site suitability for radar speed detection devices;
     - number of lanes;
     - ability to enforce speed in both directions; and
     - road geometry.

The three lengths of road selected for the first Queensland fixed speed cameras had a significant crash history, with a high number of crashes attributed to speeding (see table below), coupled with limitations for traditional speed enforcement such as handheld speed detection or mobile cameras. The number of speed-related crashes was high at these locations compared to other lengths of road in the same region and they were placed in the top 20 worst lengths of road for speed related crashes for the region.

Location	Total crashes	Fatal	Hosp.	Med. treat.	Minor injury	Prop. damage
Bruce Hwy Burpengary Nth Coast	**12**	1	9	0	0	2
Bradfield Hwy (Story Bridge) Metro South	**20**	0	16	1	0	3
Pacific Mwy, Tarragindi Metro South	**20**	1	15	2	0	2

Source: Queensland Transport Road Crash Database, Data Analysis Unit. Most recent five years of data used at time of site selection: 2001-2005.

Following detailed operational site assessments by QPS, the three fixed camera sites were selected and commissioned in late 2007 and early 2008.

Second fixed (wet film) fixed speed cameras, 2008-2010

In late 2008 the process commenced to establish a further six speed camera locations in the three police regions with the worst road tolls at that time (that is, two fixed speed camera locations in each of South East, Southern and North Coast police regions).

Using the latest five years of crash data available at the time, TMR identified the top-20 two kilometre lengths of road in terms of a significant crash history, with a high number of crashes attributed to speeding, coupled with limitations for traditional speed enforcement such as handheld speed devices or mobile cameras. These were ranked according to outcome of the Equivalent Property Damage Only (EDPO) method for weighting the number and severity of crashes. Under this method weighting for a crash increases with its severity.

Full data were supplied to QPS whose officers then commenced site assessment activities in order to precisely locate the cameras within the high crash zone. The number of speed-related crashes was high at these locations compared to other lengths of road in the same region and they were placed in the top-5 worst lengths of road for speed related crashes for the region. Crash data for selected sites are below.

Location	Total crashes	Fatal	Hosp.	Med. treat	Minor injury	Prop. damage
Nicklin Wy Warana Sunshine Coast North Coast	**20**	0	18	1	1	0
Sunshine Mwy Mooloolaba Sunshine Coast North Coast	**25**	2	12	2	3	6
Warrego Hwy Redwood Toowoomba Southern	**37**	3	17	1	2	14
Warrego Hwy Muirlea Ipswich Southern	**16**	1	9	1	1	4
Gold Coast Hwy Labrador Gold Coast South Eastern	**35**	0	30	0	2	3
Gold Coast Hwy Broadbeach Gold Coast South Eastern	**25**	1	19	1	1	3

Source: Queensland Transport Road Crash Database, Data Analysis Unit. Most recent five years of data used at time of site selection: 2002-2006.
Note: Equivalent Property Damage Only (EDPO) method is a points-based system whereby crashes with a greater severity are given a greater weighting factor; property damage crash allocated 1 point, minor injury 2 points; medical treatment 4 points; hospitalisation 8 points, fatal 16 points.

Higher ranked sites were rejected due to issues raised in the operational assessments. These comprehensive assessments included consideration of the following:

- the feasibility of alternatives to minimise crash risk (for example, education, engineering solutions or other forms of speed enforcement);
- ability to install and operate the camera meeting Australian Standards Requirements which include:
  - reflective issues (guard rails, signs, parked vehicles)
  - detection area (direction of aim into houses)
  - traffic density
  - extraneous moving objects (service roads, windmills)
  - electromagnetic interference (radar, microwaves, power stations)
- ability to install and operate the camera meeting speed detection device requirements which include:
  - number of lanes
  - drainage
  - straight section of road

  - road level (centre of road deployment)
  - suitability for foundations (secure ground, not over other infrastructure)
  - power (supply, proximity)
  - median strip width (suitability for installation of pole)
- ability to install and operate the camera meeting workplace health and safety requirements which include:
  - access to site
  - sufficient room to test and maintain
  - sufficient room to install guard rail
  - pending roadworks
- Other QPS considerations for camera installation and operations include:
  - topography of road (bend, downhill)
  - detection area (clear view of detection area)
  - reinforced concrete walls
  - overhead bridges
  - intersections, turning lanes, access roads, railway lines, aircraft
  - night flash requirements
  - location within speed zone
  - sun and lighting issues

Once QPS was satisfied a preliminary site met their requirements, a stakeholder review was undertaken. This process involves a representative of the camera vendor and the TMR (regional operations) or the relevant local government authority. Energex may also attend if required. This review process is designed to assess the technical feasibility of the proposed site in terms of fixed speed camera installation and system requirements, such as:

- pending roadworks
- availability of electricity supply
- speed limits and signs
- drainage
- road environment
- suitability for foundations
- ability to install signs within guidelines

Initial digital cameras, 2009-present

More detailed site selection guidelines, covering a broader range of camera types and the prospect of site selection on the grounds of assessed risk, were adopted leading up to the selection of sites for the 'proof of concept' digital cameras. These are two fixed 'spot' speed cameras, one point-to-point camera system and two combination red light/speed cameras. (These cameras are not currently issuing infringements.)

In order to locate the fixed speed cameras TMR determined that at least five 'speed camera criteria crashes' occurred in the zone in the preceding five years. The aggregate crash severity scores were calculated using the Equivalent Property Damage Only (EPDO) method to produce a ranked list of the candidate fixed camera zones. The data relating to the chosen sites are provided below. These zones were mapped to show their location, and those of existing fixed speed cameras which may be situated nearby. The list and maps were then presented to QPS for operational assessment of sites (as detailed above). Zones with the worst aggregate crash severity scores are preferred except where operational considerations exclude a zone.

In order to locate the red light cameras TMR determined that at least five 'red light camera criteria crashes' occurred in the zone in the preceding five years. The aggregate crash severity scores were calculated using the Equivalent Property Damage Only (EPDO) method and to produce a ranked list of the candidate red light camera zones. The data relating to the chosen

sites are provided below. These zones were mapped to show their location, and those of existing red light cameras which may be situated nearby. The list and maps were then presented to QPS for operational assessment of sites (as above). Zones with the worst aggregate crash severity scores are preferred except where operational considerations exclude a zone. In addition, consideration is given to ensure that there is an appropriate distribution of red light cameras across the state.

In order to locate the first point-to-point camera system, TMR identified road lengths (10-25km) with a significant history of 'speed camera criteria crashes' in the preceding five years. The aggregate crash severity scores were calculated using the Equivalent Property Damage Only (EPDO) method and to produce a ranked list of the candidate point-to-point road lengths. The data relating to the chosen sites are provided below. These zones were mapped to show their location, and those of existing fixed speed cameras which may be situated nearby. The list and maps were then presented to QPS for operational assessment of road lengths (as above). Zones with the worst aggregate crash severity scores are preferred except where operational considerations exclude a zone. Additional considerations for point-to-point camera systems included that:

- the continuous road length have limited entrances and exits;
- traffic volume to suit camera monitoring capacity;
- major road works or reconstruction are not planned in the near future.

The QPS digital implementation team restricted their consideration to locations in south east Queensland due to their preference for these 'test' cameras to be located in reasonable proximity to their Brisbane office. The final sites were highly ranked within the regions considered.

Camera type	Location	Total crashes	Fatal	Hosp.	Med. treat.	Minor injury	Prop. damage
Fixed 'spot' speed	Pacific Motorway, Loganholme	26	0	20	2	0	4
Fixed 'spot' speed	Gateway Arterial Road, Nudgee	37	2	20	4	2	9
Red light/speed	Waterworks Road and Jubilee Terrace, Ashgrove	16	0	6	3	1	6
Red light/speed	Beaudesert Road and Compton Road, Calamvale	15	0	3	4	3	5
Point-to-point speed	Bruce Highway, Caloundra Road to Wild Horse Mountain, Beerburrum	47	4	39	0	0	4

Source: Queensland Transport Road Crash Database, Data Analysis Unit. Most recent five years of data used at time of site selection: 2003-2007.
Note: Equivalent Property Damage Only (EDPO) method is a points-based system whereby crashes with a greater severity are given a greater weighting factor; property damage crash allocated 1 point, minor injury 2 points; medical treatment 4 points; hospitalisation 8 points, fatal 16 points.
Note: THESE CAMERAS ARE NOT YET ISSUING INFRINGEMENTS.

Once QPS had identified candidate sites they consulted with members of the relevant Regional Speed Management Advisory Committee, which generally comprises of representatives from Queensland Police Service, the Department of Transport and Main Roads, RACQ, and local governments. Members were asked to review the proposed site and treatment and provide feedback to QPS and TMR regarding any local issues which may affect the site. A small number of issues were raised by Committee members; these were investigated and resolved.

The scope of the QPS digital implementation project was extended to include the provision of speed cameras in the Clem 7 tunnel. QPS and TMR met with engineers to discuss speed-related risks along the 6.8km tunnels, including alternatives to speed camera enforcement. Consideration of driver behaviour and crashes in tunnels in other jurisdictions, both overseas and interstate, led TMR and QPS to install speed cameras in the Clem7 tunnel before it was

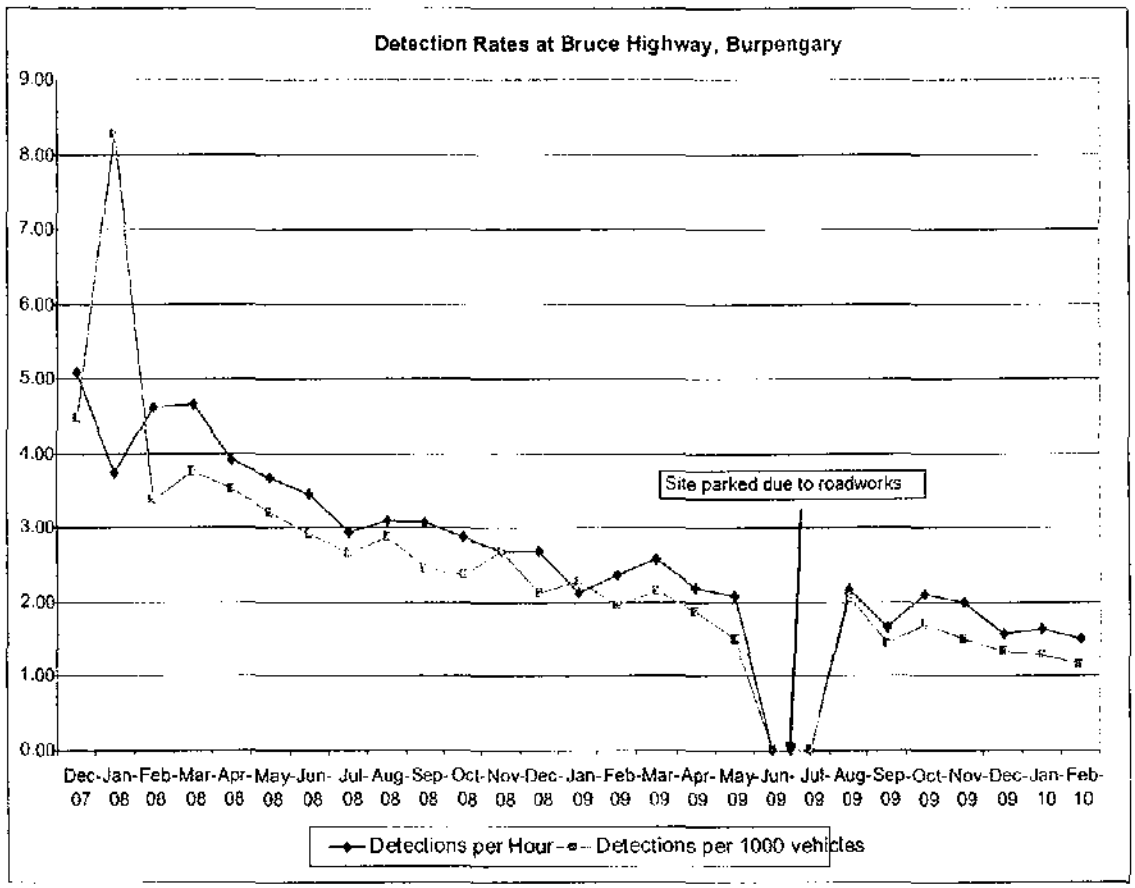
opened to traffic. Site assessments were undertaken in order to situate cameras over both lanes, at two locations, in the two parallel tunnels.

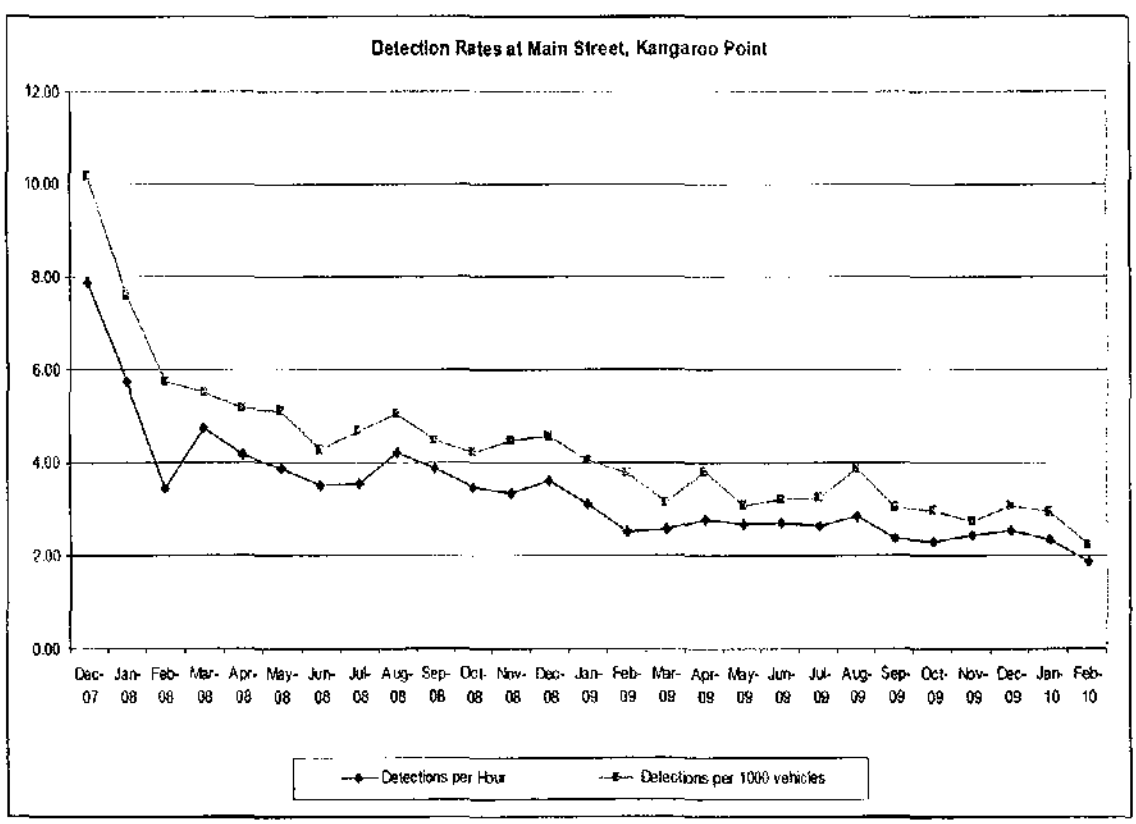
Attachment 5: Fixed speed cameras operations summary and graph per site

Time Period	Site	Vehicles	Detections	Notices	<13	13-20	21-30	31-40	>40	Hours	Prosecutability Rate	Detections per Hour	Detections per 1000 vehicles
Dec 07 to Feb10	Bruce Highway, Burpengary (580001)	18,937,537	44,286	39,951	23,655	13,951	1,937	286	122	16,069	90.21%	2.76	2.34
Dec 07 to Feb10	Main Street, Kangaroo Point (280001)	14,931,892	62,231	57,893	32,024	22,775	2,745	274	75	18,893	93.03%	3.29	4.17
Feb 08 to Feb-10	Pacific Motorway, Tarragindi (280002)	20,819,893	25,781	24,228	14,890	8,033	1,041	163	101	15,700	93.98%	1.64	1.24
Sep 09 to Feb10	Gold Coast Hwy, Broadbeach (380002)	1,925,678	4,815	4,266	2,190	1,687	317	48	24	3,979	88.60%	1.21	2.50
Sep 09 to Feb11	Gold Coast Hwy, Southport (380001)	1,679,816	7,574	7,185	3,996	2,695	420	58	16	3,630	94.86%	2.09	4.51
Dec 09 to Feb 10	Warrego Highway, Muirlea (480002)	908,488	577	555	326	182	36	9	2	1,588	96.19%	0.36	0.64
Sep 09 to Dec-09	Warrego Highway, Redwood (480001)	808,846	314	291	187	96	7	1	0	2,016	92.68%	0.16	0.39
Feb-10	Sunshine Mwy, Mooloolaba (580003)	29,868	33	28	18	9	1	0	0	109	84.85%	0.30	1.10
Total		**60,042,018**	**145,611**	**134,397**	**77,286**	**49,428**	**6,504**	**839**	**340**	**61,984**	**92.30%**	**2.35**	**2.43**

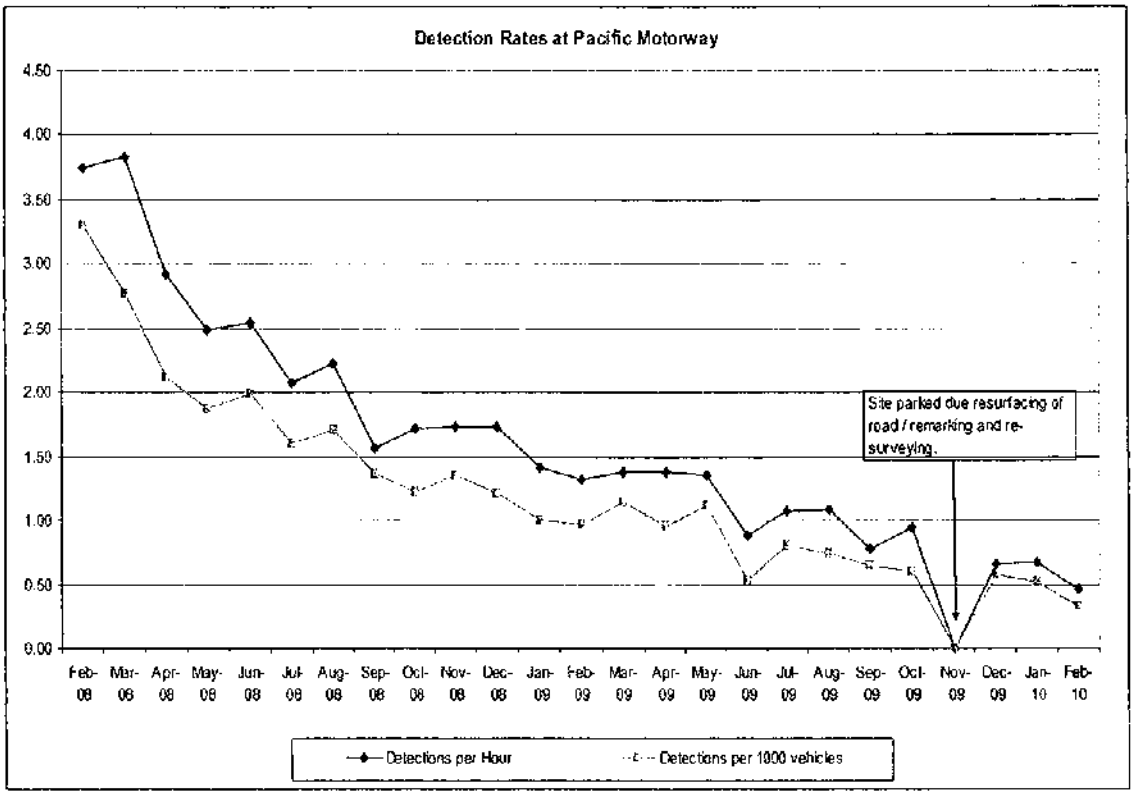
Data sourced from the Integrated Traffic Camera System (ITCS) and is accurate as at 7th April 2010. The figures have been verified as correct by the Officer in Charge, Traffic Camera Office.

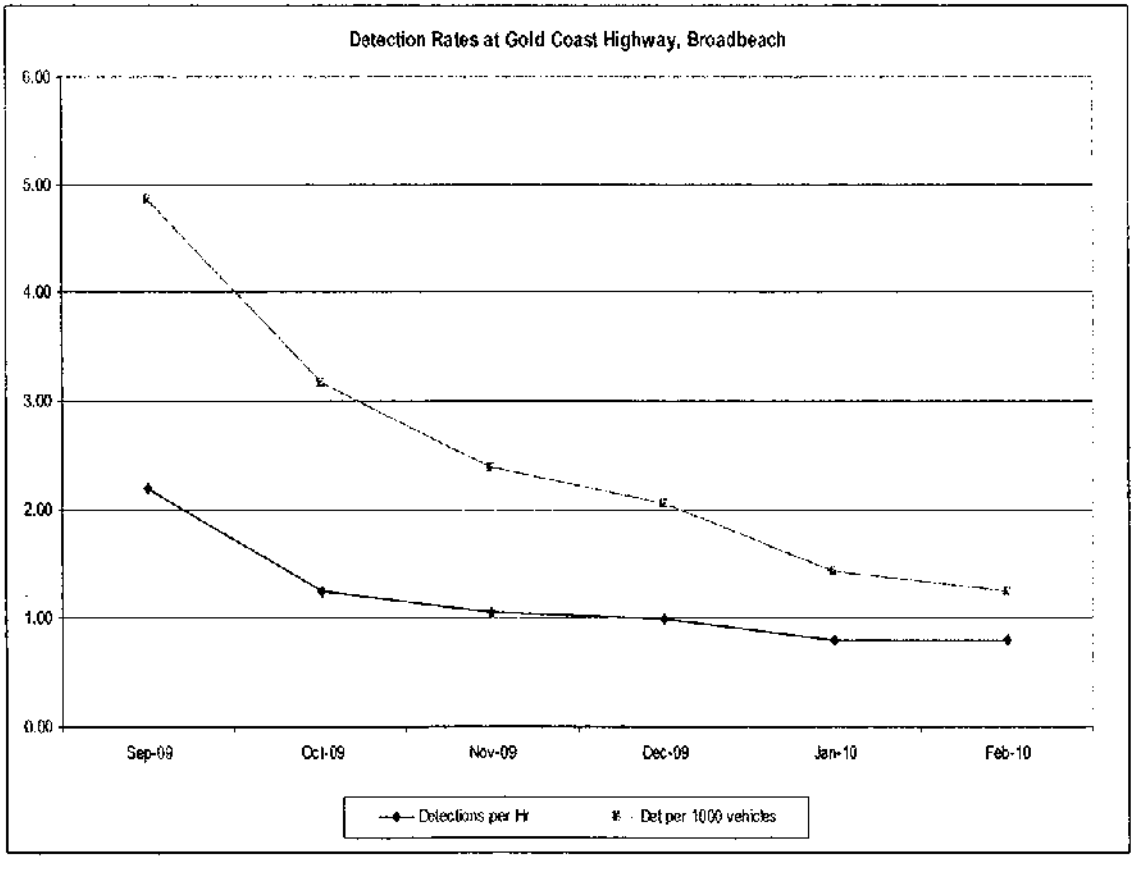
Attachment 5: Fixed speed cameras operations summary and graph per site (continued)



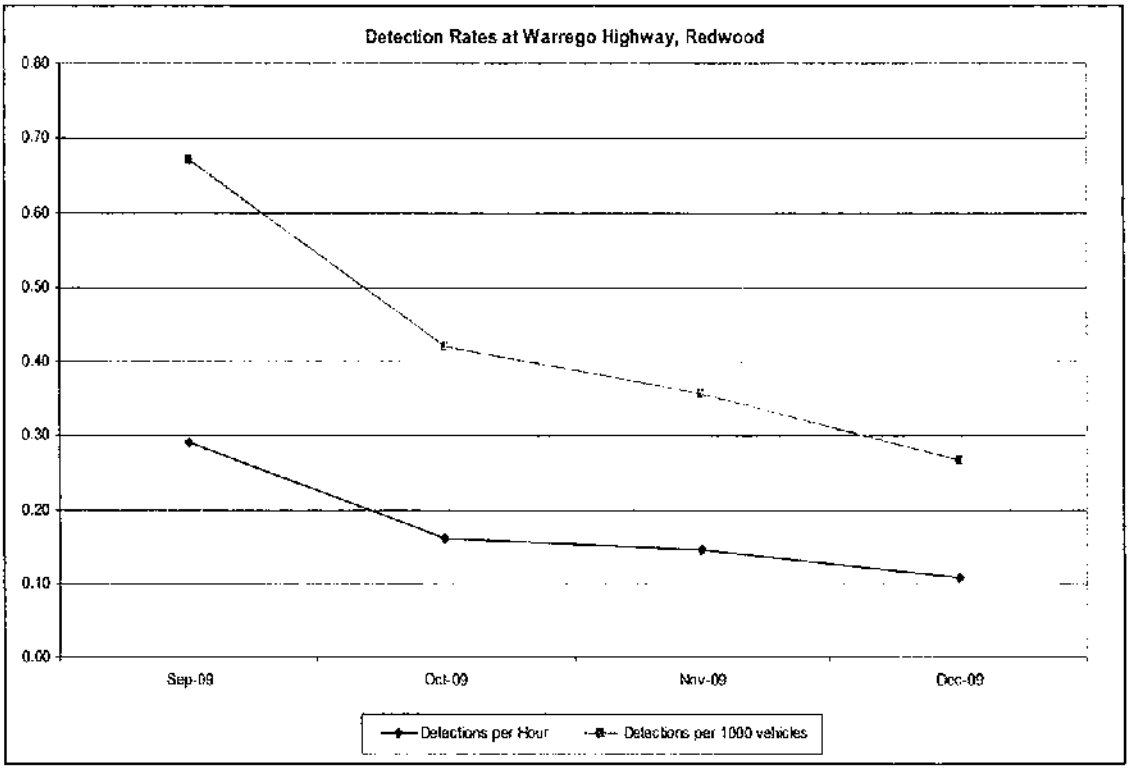


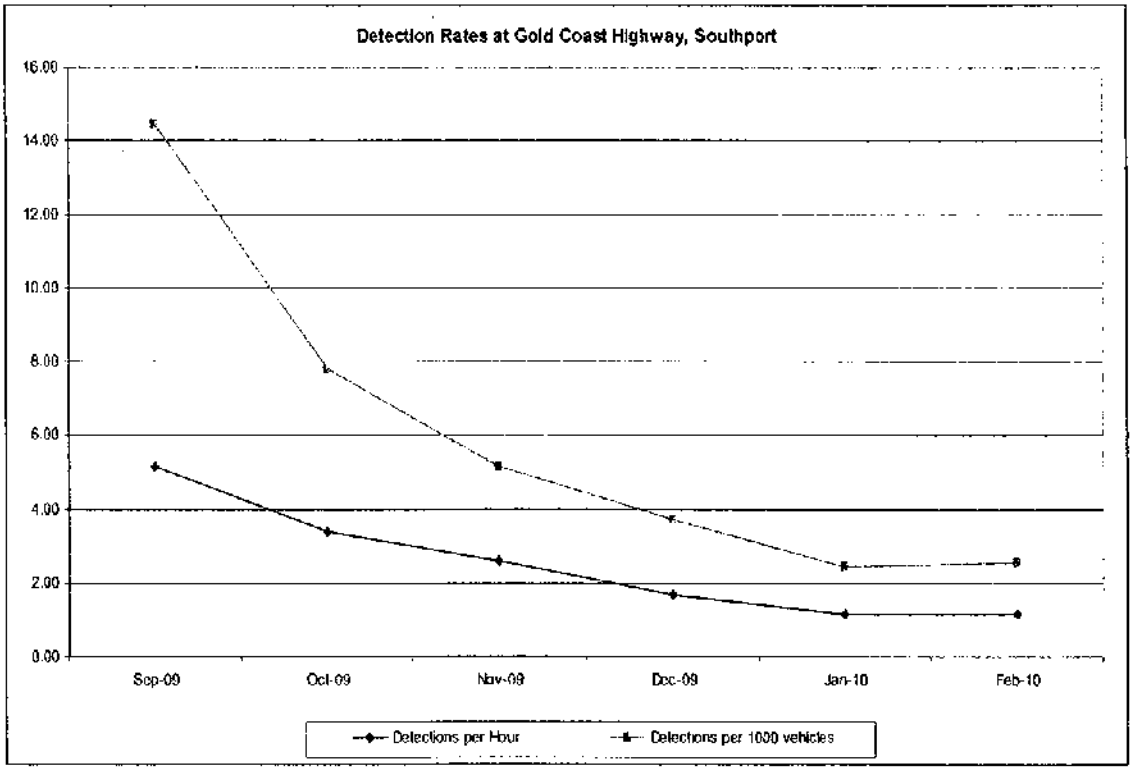
Attachment 5: Fixed speed cameras operations summary and graph per site (continued)



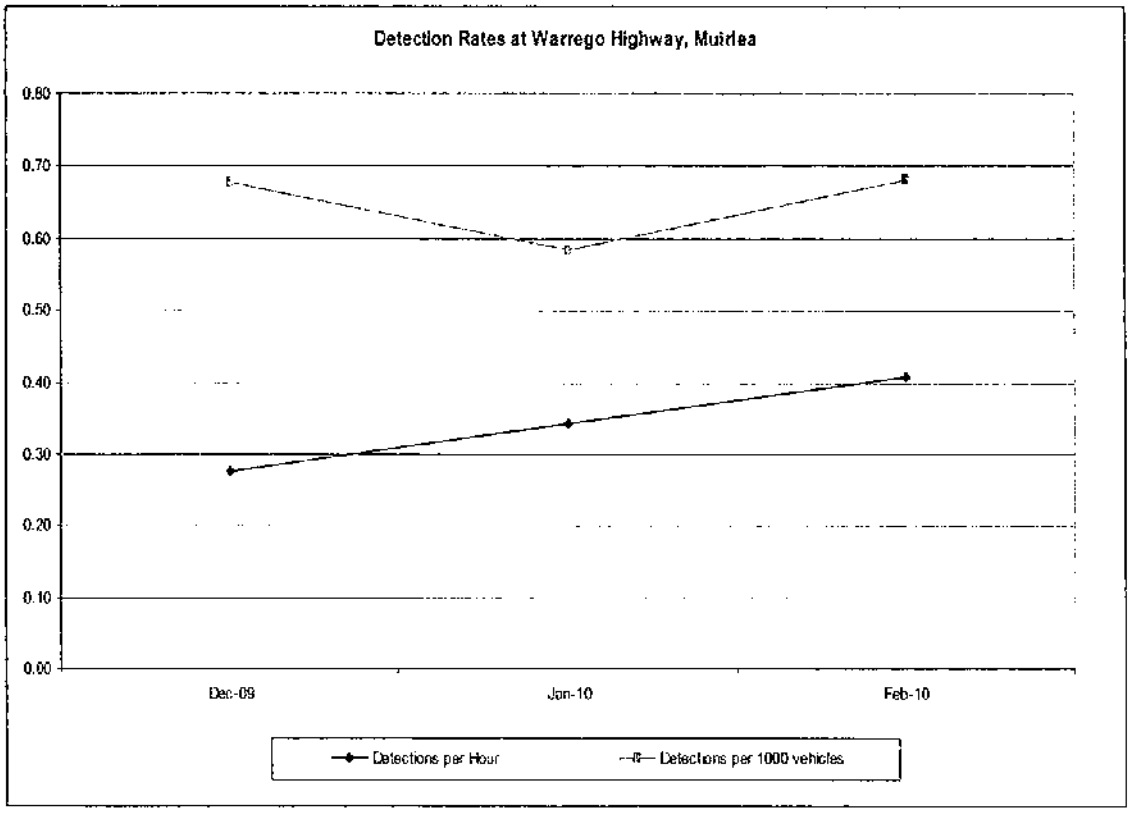


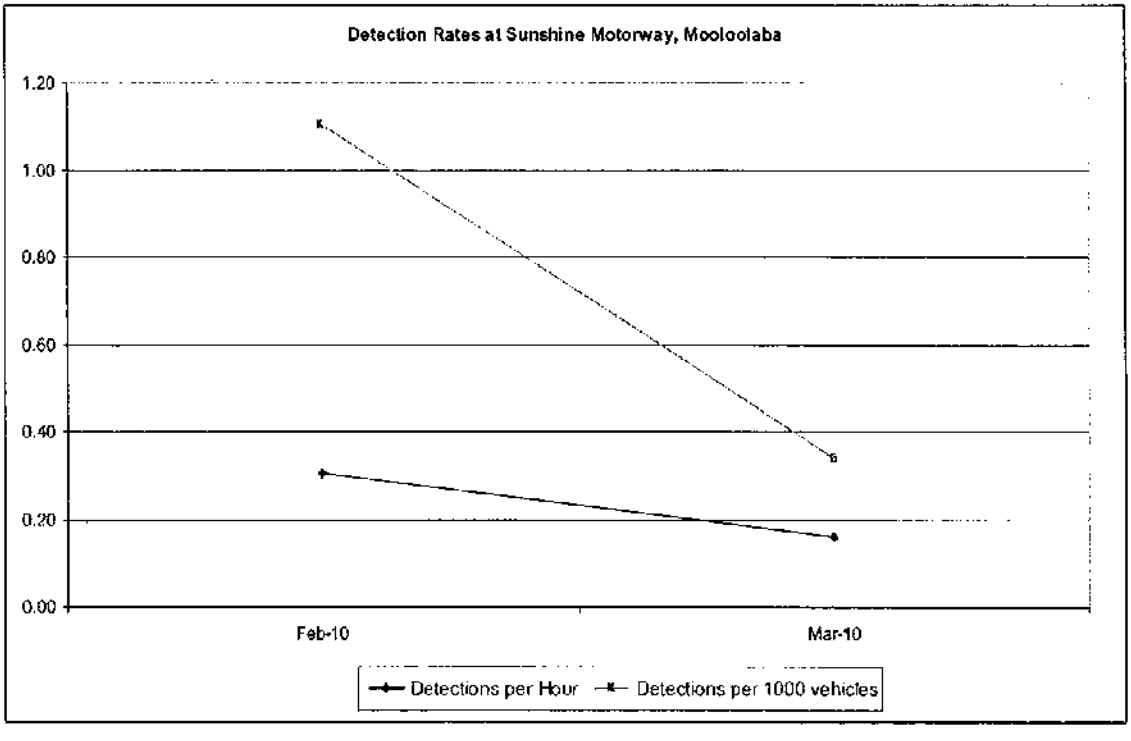
Attachment 5: Fixed speed cameras operations summary and graph per site (continued)





Attachment 5: Fixed speed cameras operations summary and graph per site (continued)





Attachment 6: List of evaluations of mobile camera program

Report Name	Affiliation	Author/s	Publication date
Evaluation of the Crash Effects of the Queensland Speed Camera Program: Interim Analysis Results	Monash University Accident Research Centre	Stuart Newstead & Max Cameron	August 2001
Evaluation of the Crash Effects of the Queensland Speed Camera Program (1997 - 2001)	Monash University Accident Research Centre	Stuart Newstead & Max Cameron	September 2003
Evaluation of the Crash Effects of the Queensland Speed Camera Program in the years 2001 - 2003	Monash University Accident Research Centre	Stuart Newstead	May 2004
Evaluation of the Crash Effects of the Queensland Speed Camera Program in the years 2003 - 2004	Monash University Accident Research Centre	Stuart Newstead	August 2005
Evaluation of the Crash Effects of the Queensland Speed Camera Program in the year 2005	Monash University Accident Research Centre	Stuart Newstead	August 2006
Evaluation of the Crash Effects of the Queensland Mobile Speed Camera Program in the year 2006	Monash University Accident Research Centre	Stuart Newstead	September 2007
Evaluation of the Crash Effects of the Queensland Speed Camera Program in the years 2006 – 2007	Monash University Accident Research Centre	Stuart Newstead	March 2009
Evaluation of the Crash Effects of the Queensland Mobile Speed Camera Program in the year 2007	Monash University Accident Research Centre	Stuart Newstead	May 2009

Attachment 7: Example of speed data from fixed camera site

A fixed speed camera was installed on the Warrego Highway at Redwood (Toowoomba Range) in a 90km speed limit section of road on 31 August 2009. Speed had been identified as contributing to 37 crashes in the immediate area, including three fatal crashes, in the years 2002 to 2006.

Before the camera was installed, speed data was collected for a two week period, in March/April 2009 at locations at 1km before (east, speed limit 100km/h) and 1km after (west, speed limit 70km/h) the intended camera location. This demonstrated that only 26.1% of drivers were complying with the speed limit on the approach to the intended camera site, and only 15.4% were complying at the location after the intended camera site, with more than half of drivers exceeding the speed limit by more than 10km/h at the data collection site after the camera location.

	Vehicle count	Mean speed	% vehicles at or below limit	% vehicles up to 10km/h over limit	% vehicle more than 10km/h over limit
1km before (100 zone)	41808	104.5	26.1	51.8	22.1
1 km after (70 zone)	53627	79.2	15.4	30.0	54.6

This collection was replicated nine months after the installation with speed data again collected at these locations, for one week in April 2010. The operation of the fixed speed camera between the two data collection sites had clearly impacted on the level of speed limit compliance and reduced the severity of speeding.

	Vehicle count	Mean speed	% vehicles at or below limit	% vehicles up to 10km/h over limit	% vehicle more than 10km/h over limit
1km before (100 zone)	26616	102.8	32.8	53.0	14.10
1 km after (70 zone)	32999	72.5	32.9	45.8	21.3

Since the installation of the camera approximately one-third of drivers are now compliant, at collection sites both before and after the camera. Of those still exceeding the speed limit, greater proportions are now found at fewer than 10km/h above the speed limit.

	Change in mean speed	Change in % vehicles at or below limit	Change in % vehicles up to 10km/h over limit	Change in % vehicles more than 10km/h over limit
1km before (100 zone)	1.7km/h reduction	6.7% increase	1.2% increase	8.0% reduction
1 km after (70 zone)	6.7km/h reduction	17.5% increase	15.8% increase	33.3% reduction

NOTE: THIS IS A VERY PRELIMINARY ANALYSIS BASED ON LIMITED DATA.

Attachment 8: Interstate comparison of fixed speed cameras

State	Fixed speed	Point-to-point	Red light/speed	Planned expansion
ACT	9	-	13	P2P proposed
NSW	141 locations, using 176 cameras	24 safe-t-cams (heavy vehicles)	50	Planning to upgrade to 200 red light/speed
NT	-	-	9	-
Qld	9 (plus Clem 7)	-	-	Intro digital tech in 2010: 1xP2P, 2xfixed speed, 2x red light/speed.
SA	-	-	71	P2P proposed
Tas	3	-	-	-
Vic	33	I system	116	
WA	-	-	1	P2P proposed to provide travel time information only