



OFFICE OF THE POLICE & CRIME COMMISSIONER FOR THAMES VALLEY

Report of the Police and Crime Commissioner for Thames Valley to the Thames Valley Police and Crime Panel meeting on 10 September 2021

Average Speed Cameras vs Fixed Spot Speed Enforcement Cameras

Introduction

This paper sets out the differences between different speed enforcement camera types, with advantages and dis-advantages of each, as well as providing further understanding of the capital/revenue expenditure of each system.

AVERAGE SPEED CAMERAS

Effectiveness & Deployment Characteristics

- These fixed camera sites have the effect of calming the speed over longer distance and can be used at sites where significant number of collisions are scattered along a length of road and for major roadworks enforcement
- Achieve high levels of driver compliance and over longer distances
- The ability to capture offending is tailored by the camera/site configuration. Cameras can capture the front of a vehicle or the rear, with advantages and disadvantages for each option. For example, front captures often provide identification of the driver and other offences (e.g. mobile use, non-wearing of seatbelt). Rear captures do not provide this, but do compensate for the absence of front number plates on vehicles such as speeding motorcycles.
- Installation requires mobile network coverage/ADSL and mains power.
- Sites are static and difficult to modify after installation.
- Equipment must be type approved and certified by the Home Office for use
- A minimum of 2 enforcement cameras must be used to measure the average speed between known distance of the entry/exit cameras
- Depending on the camera supplier chosen, cameras will have a minimum distance that a 2 camera system can operate 75 – 250 metres
- There is no theoretical maximum distance as a scheme of cameras can be added for the length of road which enforcement is required
- Typical systems will enforce between 20mph and 140mph

Cost

- The up-front investment cost can be high. For example, a two-camera system currently falls into the £120k-£150k range.
- There are additional running costs for service, calibration and administration for both the operator and the criminal justice system.
- Typical installation times can be several months, depending on the road layout and camera sites.
- As offending rates are low, there is a reduction in demand associated with dealing with collisions, e.g. police, ambulance, fire, health, family and community cost.
- There is a significant increase in time to cost recovery due to the high level of compliance.
- Annual calibration is unknown as each installation is site/number of cameras specific but would estimate them to be in line with the fixed cameras (£1,300) each camera

- Annual 3G/4G sim charges circa £700 per camera but will depend on volume of offences captured so cost could be more or less than this
- Back office servers - £4,500 per different speed limit to be enforced

The following items have not been included in the pricing: • Traffic Management • Civil Engineering Works • Signing (speed limit signs, repeater signs)

Pros and Cons Average Speed

Pros

Higher level of compliance

Less likely to be targeted by arson/vandalised

Can enforce over longer distances and multiple lanes

Maintains free flowing traffic improving travel times and traffic pollution within city environments

Greater return to reducing KSI

Cons

Expensive solution

More compliance means longer timeframe to cost recover capital investment

Limited mobility – Once installed system cameras can only be moved by supplier

FIXED SPOT SPEED ENFORCEMENT CAMERAS

Effectiveness & Deployment Characteristics

- Fixed speed cameras used at sites where collisions are clustered around a particular point or location
- Achieve high levels of driver compliance mainly confined to the vicinity or local area of camera location
- The ability to capture offending is determined by camera supplier, by the camera/site configuration. Cameras can capture the front of a vehicle or the rear, with advantages and disadvantages for each option. For example, front captures often provide identification of the driver and other offences (e.g. mobile use, non-wearing of seatbelt). Rear captures do not do this, but do compensate for the absence of front number plates on vehicles such as speeding motorcycles.
- Installation requires mobile network coverage/ADSL and mains power.
- Sites are static. However areas where there are multiple poles allow for rotational enforcement thus achieving wider compliance as road users will be unable to determine which camera is live vs another camera location.
- Equipment must be type approved and certified by the Home Office for use
- Cameras can be bi-directional reducing the need for additional cameras in the opposite direction at the same location
- Cameras can also enforce multiple lanes thus reducing the need for further cameras and investment
- Typical cameras will enforce from 20mph to 170+mph

Cost

- The up-front investment cost can be quite high. For example, on average a single fixed camera install would be in the region of £40 to £45k. There are additional running costs for service, calibration and administration for both the operator and the criminal justice system.
- Typical installation times can be several months, depending on the road layout and camera sites.

- Offending rates will depend on the site location and level of speed offending, but anecdotally higher offending rates are observed over an Average speed solution.
- Depending on the camera solution chosen there could be further on costs to replace piezo sensors or secondary white line road markings, as these wear out over time due to their placement within or on the road surface
- Annual calibration is circa £1,300 per camera
- Annual 3G/4G sim charges circa £700 per camera but will depend on volume of offences captured so cost could be more or less than this
- Back office servers £4,500

The following items have not been included in the pricing: • Traffic Management • Civil Engineering Works • Signing (speed limit signs, repeater signs)

Fixed Spot Speed

Pros

Cheaper option

Cameras can be moved to different locations where other poles have been installed

Some suppliers offer a camera, which is also a fixed spot speed, as well as a mobile enforcement camera, offering greater efficiencies with increased utilisation of the equipment

Cons

Radar enforcement can give inaccurate speed-readings, for example, roller shutter doors on vans or curtain sided Lorries.

More prone to vandalism

White line secondary check marks wear out and require re-painting

Piezo electric sensors/loops installed within the road surface; these wear out over time and need replacing. If Utility companies dig up the road and damage the Piezo/loops, again replacement will be required.

Strict guidelines apply to installation of fixed cameras concerning KSI over a 3-year period and radius of incidents

Can encourage late braking or disruption to free flowing traffic, can encourage vehicles to slow down rapidly then speed up once passed the camera site thus increasing emissions/poor air quality, noise levels to local community, and heightened risk of road incident

TYPICAL QUESTIONS ASKED PERTAINING TO AVERAGE SPEED CAMERAS

Does the mobile network coverage usually incur a cost for the operating organisation?

Yes, the 3G/4G network costs will be part of the annual running fees as well as annual calibration, service and maintenance.

Are there any schemes operational within Hampshire and Thames Valley?

At the current time Hampshire Constabulary are looking at the viability to install an average speed scheme within the Meon Valley. The scheme is looking to reduce KSI, improve speed compliance and reduce the number of complaints received from local residents due to the number of noisy vehicles. If fixed spot speed cameras were utilised, it could exacerbate the noise situation where by vehicles would slow down at the camera and then speed off after the camera. By installing an average speed solution, this should minimise such activity, as the scheme is spread over a given distance and not localised.

Is the reason for Motorway systems primarily for the protection of workforce?

Yes – Due to known compliance of motorist, it is considered as the best solution to protect road workers and motorists whilst works are being undertaken. Once works are completed then the contractor removes the system.

Do we have an estimate of the service-life of a typical system or camera site?

This will be supplier/product specific but usual lifecycle expectancy is 5 to 10 years

Could we have a summary statement covering the types of site they are good for, e.g. they are effective for covering high volume traffic areas where speed is a contributing risk factor and the road layout supports measuring average speed?

Average speed cameras are used for a variety of reasons and differing road designs from motorways, dual carriageways to single A roads or where enforcement is required to be over longer distances. Average speed systems are used where speed compliance is necessary (protecting motorway workers and road users when road works are being undertaken). A KSI hot spot or road or section of road where non-compliance to speed is an issue and therefore a heightened risk of incident, then average speed cameras could be considered.

More than 50 permanent Jenoptik SPECS average speed cameras schemes are in operation around the UK delivering on average, reductions greater than 70% KSI . It is for this very reason that average speed cameras are seen as the best solution for speed compliance and casualty reduction.

Are there any legislation, guidelines or technical limitations? For example, must measure the speed over a specific distance/time?

This will differ from supplier to supplier; there will be a minimum distance that the cameras will have to cover to operate.

Only legislation requirement is for Home Office Type Approval, but DfT 1/2007 guidelines are still used in application - Awaiting updated version which should be released sometime this year.

Are there further cost implications that should be considered?

The cost for back office staff will also need to be factored in. Is there sufficient capacity to process scheme captures within normal BAU staffing, or will an increase in establishment need to be considered.

Agreement will need to be made regarding who will fund the increase in establishment, if the main scheme has been funded by LOCAL AUTHORITY for example.

Current Suppliers of Home Office Type Approved (HOTA) equipment

Average Speed

Siemens
Redspeed International
Jenoptik
Neology

Fixed Spot Speed

Cubic Gatso
Redspeed International
Jenoptik
Truvelo
Redflex

SPEED CAMERA NARRATIVE

What is the focus of the intervention?

Both fixed and mobile speed cameras are used to enforce traffic speed limits, detect speeding vehicles and reduce road traffic collisions and injuries that result from them.

Many countries have seen an increase in the use of automatic speed enforcement, using speed detection devices such as cameras, which may be monitored or unmonitored, mobile or fixed, overt or covert. Speed cameras mostly use speed sensors to trigger a camera to capture an image of any vehicle (and its number plate) travelling above a pre-set speed. Modern systems use digital and video cameras and are able to transmit information over data networks. Once the evidence has been reviewed and an offence verified, a notification is sent to the registered owner of the vehicle. Sanctions for committing an offence can include licence points, driving bans, fines and driver awareness courses.

The focus of this review is on the use of speed cameras to prevent speeding, road traffic collisions and injuries and fatalities resulting from road traffic collisions.

This narrative is based on one meta-analytic review covering 51 primary studies. Nine of the primary studies in the review were carried out in the UK, 11 from Australia, five from the USA. The remaining studies were carried out across a number of other countries (including Denmark, Finland, Germany, Spain, Hong Kong, Belgium, South Korea, Netherlands, New Zealand, Canada, Norway and Italy).

How effective is it?

Overall, the evidence suggests that the intervention has reduced crime. The meta-analysis found that speed cameras led to reductions in: average speed (7%), proportion of vehicles exceeding the speed limit (52%), collisions (19%), collisions resulting in injury (18%) and in severe or fatal collisions (21%), when compared to sites with no speed cameras.

How strong is the evidence?

The review was sufficiently systematic that most forms of bias that could influence the study conclusions can be ruled out.

The evidence is taken from a systematic review covering 51 studies, which demonstrated a high-quality design in terms of having a transparent, and well-designed search strategy, featuring a valid statistical analysis, sufficiently assessing the risk of bias in the analysis and giving due consideration to the way outcomes were measured and combined. The review did not explore the issue of publication bias.

How does it work?

Speed cameras are suggested to reduce crime through deterrence. This may operate in one of two ways:

1. General deterrence – The threat of being caught and punished as a result of speed cameras discouraging potential offenders in the general population from speeding.
2. Specific deterrence – The act of being caught and punished as a result of speed cameras discouraging active offenders from re-offending.

Two primary studies in the review reported 'diffusion of benefits' (i.e., positive spill over or halo effects) from sites where the cameras were operating to the wider area. One study reported a significant 21% reduction on a motorway without camera enforcement and the second reported significant crash reductions 1km upstream and downstream of camera locations. One further primary study found some evidence that the crime reduction effects were concentrated within a short distance of camera sites. Authors suggest that the diffusion of benefits might be indicative of general deterrence in operation.

One study speculated that covert cameras may increase the detection rate (due to drivers being unaware of their presence and driving at faster speeds) and therefore increase the specific deterrence effect. Increased fines were also postulated to increase specific deterrence. The review authors note that it would be possible in principle to explore these mechanisms further, but that the original studies did not provide the necessary information to empirically test.

In which contexts does it work best?

Suggested moderators included road type, speed limits, setting (urban or rural), time of day and weather. Primary studies only provided enough information to allow the review to empirically test one of these; whether an urban or rural setting influenced how effective speed cameras were. The review notes that there was no evidence that the effects of speed cameras differed between urban and rural areas. The review found some evidence of greater reductions in crashes when cameras were operating in rainy and wet conditions (one study). Two primary studies reported that speed cameras had greater reductions on crashes during the day than at night and on weekdays than at weekends.

What can be said about implementing this initiative?

The review noted that different methods of implementation might alter the way in which speeding behaviour is modified. For example, whether cameras are obviously visible (overt versus covert, and whether cameras are yellow or grey), whether they are fixed or mobile and the levels of enforcement (operational hours and penalties issued). Meta-analysis found no evidence that the effect of speed cameras on speeding behaviour or collisions differed by whether speed cameras were covert or overt. The review notes that there was some evidence to suggest that fixed cameras had a greater effect on all road traffic crashes (from the meta-analysis of 15 studies) and those resulting in fatalities or severe injuries (from meta-analysis of 5 studies) than mobile cameras. There was little information on further implementation factors in the primary studies.

ECONOMIC CONSIDERATIONS

How much might it cost?

All of the primary studies that reported economic analyses, conveyed positive outcomes, although their details were not comparable and could not therefore be synthesised in the review. One primary study estimated a cost benefit ratio alone, two estimated costs savings alone and three estimated both. Primary studies typically collected data on crash costs, overall capital costs of scheme implementation, annual operating and maintenance costs, fine costs and ticketing revenue. Detailed costs, such as costs per unit, personnel costs and administration of sanctions were not widely reported.

The cost of treatment saved (from casualties prevented) was reported in one primary study evaluating 56 mobile safety cameras in the UK Northumbria Police area. In this, an estimation of around £30,000 was saved in treatment costs alone over the two years of the study.

Cost-benefit ratios estimated that the benefits exceed the estimated costs of speed camera programmes by at least 3:1, and were larger when the time horizons were five years or more. Comparisons of costs between speed camera programmes are difficult to make, however, due to large variations in implementation.

GENERAL CONSIDERATIONS

The review notes that the primary studies differed widely in terms of quality, study periods, settings, length of follow up, types of cameras evaluated and importantly, unreported factors (such as other road safety interventions occurring concurrently). Due to this variability, the exact size of the effects of speed cameras on speeding and crash outcomes must be interpreted with a degree of caution, however there is good evidence that overall, the implementation of speed cameras is associated with reductions in speeding, collisions and associated injuries.

SUMMARY

Overall, the evidence suggests that speed cameras can reduce traffic speed and road traffic collisions. The meta-analysis found that speed cameras led to reductions in all measured outcomes: average speed, proportion of vehicles exceeding the speed limit, collisions, collisions resulting in injury, and in severe or fatal collisions, when compared to sites with no speed cameras. There was some evidence that effects differed by type of speed camera (fixed or mobile), and no evidence for difference of effect between overt or covert cameras or between cameras in urban and rural areas. There was some evidence that effects were greater within a short distance of camera sites compared to the wider areas. Comparisons of costs between speed camera programmes were difficult to make, however, all primary studies that reported economic analyses conveyed positive outcomes.

Resources

Jenoptik.co.uk

RAC Foundation – The Effectiveness of Average Speed Cameras in Great Britain Sept 2016

Steinbach, R., Perkins, C., Edwards, P., Beechers, D., Roberts, I. (2016) [Speed cameras to reduce speeding traffic and road traffic injuries](#)

This narrative was prepared by the Cochrane Injuries Group in the Faculty of Epidemiology and Population Health at the London School of Hygiene and Tropical Medicine and was co-funded by the College of Policing and the Economic and Social Research Council (ESRC). ESRC Grant title: 'University Consortium for Evidence-Based Crime Reduction'. Grant Ref: ES/L007223/1.

Uploaded 12/07/2017 College of Policing Toolkit.

Office of the PCC for Thames Valley

1 September 2021