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Cumbria Road Casualty
Reduction Partnership

11 The Green
Carlton Avenue
Penrith, CA10 2BA

Phone +44(0)1768 217477
Fax +44(0)1768 217470
email
enquiries@cumbriasafetycameras.org

Cumbria Safety Cameras

Operational Case 2007 to 2011

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Contact Details		
Partner	Name	Email
Cumbria County Council	Ian Stewart	ian.stewart@cumbriacc.gov.uk
Cumbria County Council	Rob Terwey	rob.terwey@cumbriacc.gov.uk
Cumbria County Council	Jan Sjorup	Jan.sjorup@cumbria.police.uk
Cumbria County Council	Jonathan McKeown	Jonathan.mckeown@cumbriacc.gov.uk
Cumbria Constabulary	ACC Graeme Sunderland	Graeme.sunderland@cumbria.police.uk
Cumbria Magistrates Court Service	Simon Evans	simon.evans@cumbria.mcs.gov.uk
Cumbria Magistrates Court Service	Heather Shaw	heather.shaw@cumbria.mcs.gov.uk
Cumbria Fire Service	Bernard Dolan	cfo@cumbria.fire-uk.org
Cumbria Safety Cameras	Steve Callaghan	steve.callaghan@cumbria.police.uk
Cumbria Safety Cameras	Kevin Tea	kevin.tea@cumbria.police.uk
Highways Agency	Martyn Cox	Martyn.cox@highways.gov.uk

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Foreword

The Government has indicated their aspiration to reduce speed related accidents.

This fits with the Local County agenda and as such the Cumbria Road Casualty Reduction Partnership also known as 'Safer Roads for Cumbria' has been formed to promote accident reduction across Cumbria, Cumbria Safety Cameras is a member of this partnership.

This document is the joint policy of all the key partners in the county to continue the casualty reduction through education, enforcement to engender a cultural change in driver attitude towards speed limit compliance and conformity.

Cumbria Safety Cameras operate speed enforcement cameras on behalf of the Cumbria Road Casualty Reduction Partnership and as such are the speed enforcement section of the partnership.

We wholeheartedly commend this policy document to the partner organisations and the County Council to enable the continuation of the speed enforcement activities of Cumbria Safety Cameras from 01 April 2007 to 31 March 2011.

- Chief Constable, Cumbria Constabulary
- Chief Executive, Cumbria Magistrates Court Committee
- Area Manager, Highways Agency
- Chief Executive, Cumbria County Council
- Cumbria Chief Fire Officer

Executive Summary

This is a joint submission between Cumbria Constabulary, the Magistrates Courts Service, the Highway Authorities (Cumbria County Council and The Highways Agency) and the Fire Service to be considered for the continuation of the speed camera activity between April 2007 and March 2010. The partners believe this initiative has been of benefit to the community in 2003 to 2007 and continues to afford the opportunity to make a step change in casualty reduction across the county for the benefit of the public, businesses, Health Authorities, the Government and the Partners and to meet the Local Transport Plan (LTP2) targets.

In making this application the partners propose to operate mobile and fixed speed cameras in a way which maximises their deterrent effect utilising the available resource for their operation and maintenance using the practice demonstrated by LMW Leggett and published in 1990. A copy of the full report accompanies this report at Appendix D.

Summary of Proposals

It is proposed to: -

- 1) To operate mobile speed camera enforcement county wide in accordance with the enforcement strategy herein.
- 2) Deploy fixed cameras at sites justified by fatal and serious injury collisions and prevailing speeds, after assessment and approval by the Steering Group of Cumbria Safety Cameras
- 3) Continue with mobile deployment routines to allow enforcement to take place with 3 Mobile Vehicles/Day on weekdays, 1 or 2 Mobile Vehicles /Day at weekends
- 4) Continue Dark Hours Mobile Enforcement Capability at mobile sites where required and where justified by the speed complaints protocol operated by Cumbria Constabulary
- 5) Carry out a public relations program to:
 - (a) Ensure public acceptance of speed enforcement operations as defined by the strategy
 - (b) Encourage the public to participate as stakeholders in casualty reduction initiatives
 - (c) Promote the use of statistics to increase casualty reduction by predictive techniques and increase awareness of speed related accidents.

The aim of the project continues to be to ensure improved compliance with speed limits to reduce casualties both in the vicinity of camera sites and throughout Cumbria as a whole, by encouraging a culture of speed limit conformity. Evidence shows direct links between speed, the severity and frequency of road accidents. Overall speed reduction is shown to have a direct affect of reducing the severity and frequency of collisions.

This application will seek to maximise safety benefits derived from the continuation of operations upon existing mobile safety camera sites coupled with the introduction of better spatial deployment of resources as well as fixed speed camera sites and new mobile sites where necessary; this will be supported by a planned communications campaign.

Background

Description of the Project Area

This policy for speed enforcement covers the whole of the County of Cumbria, the boundaries of which are coterminous with the Constabulary and Magistrates Courts Committee areas.

Speed and Road Traffic Accident Frequency

Interest in driver speeds and the effect this has on accident likelihood and frequency has been the subject of interest to many scientists' and engineers as evidenced by their reports dating back to the 1930's. The correlation between the average speed of traffic and the number of crashes was demonstrated in a June 1931 issue of "The American City" in a report entitled "Are traffic accidents caused by speed?", the monthly average speed of traffic was established and plotted against the number of crashes with a positive relationship being

shown between speed and the number of accidents. While the averaging of the speed of traffic weakens the ability to identify the cause of individual accidents further studies since this early report has identified and strengthened the relationship suggested by the American City report of 1931.

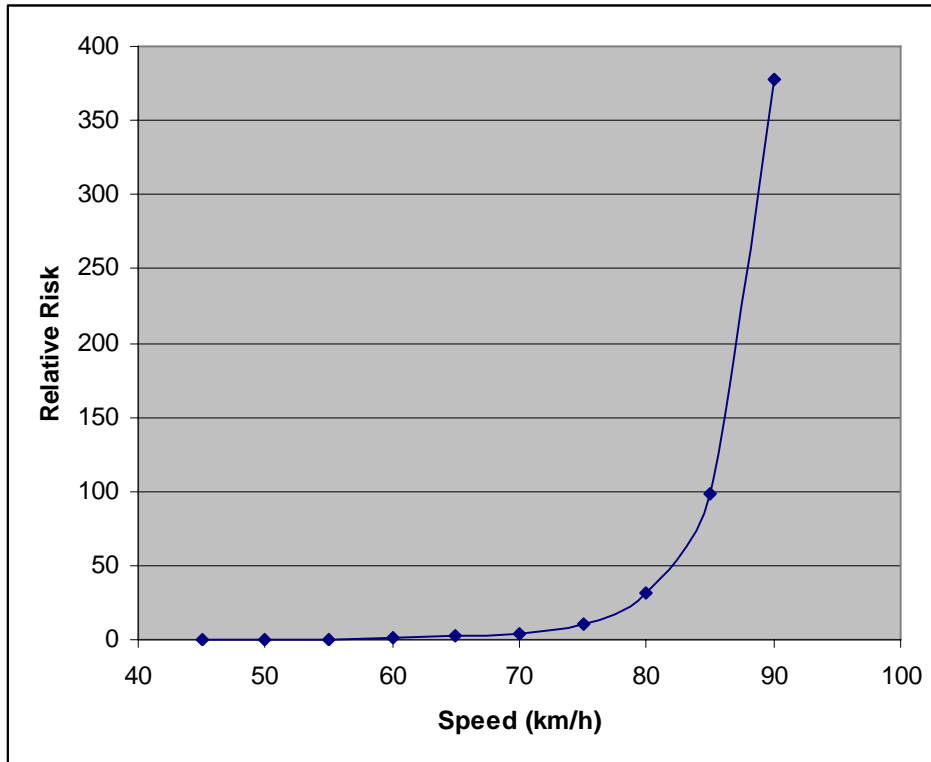
The further studies by Tilden, 1936; DeSilva, 1940; Lefevre, 1956; Cleveland, 1959; have shown that the faster driver had a greater incidence of crash involvement.

The manner of driving, including the speed, was considered in studies by Greenshields, 1963 and Johns and Bundy, 1974 but speed was found to feature in accident involvement across differences in driver behaviours.

Research by Wilson and Greensmith, 1983 showed that drivers with lower mean preferred speeds on clear stretches of roads had a lower incidence of accident involvement than those with higher speeds. Of particular note is that accident free males appeared to adjust their speed to changing conditions more than accident involved males.

Fildes, Rumbold and Leening, 1991; found that a linear relationship existed between characteristic speed and crash involvement and that drivers with speeds above the 85th percentile were more likely to have been involved in a crash than drivers who chose speeds in the middle of the speed range. Fast drivers are also more likely to have experienced multiple accidents. The results were common to roads in rural and urban environments.

The relationship between speed and the incidence of crashes has been defined by Kloeden, McLean, Moore and Ponte, 1997; and further refined by Kloeden, McLean and Glonek, 2002 in their Analysis and Reanalysis of Travelling Speed and the Risk of Crash Involvement. Relative risk of travelling at various speeds within a 60km/h speed limit was compared to travelling at the speed of 60km/h in that limit, travelling at 60km/h was defined as presenting a relative risk of 1. This is shown in Figure 1.



• Figure 1 - Relative Risk of Injury Accident in 60 km/h Speed Limit

For clarity the data used to produce the chart at figure 1 is shown in Table 1

• Table 1 - Relative Risk of Injury Accident in a 60km/h Speed Limit

<i>Speed (km/h)</i>	<i>Speed Relative Risk</i>	<i>Speed (mph)</i>
45	0.34	28
50	0.43	31
55	0.61	34
60	1	37
65	2	40
70¹	4.2	43
75	10.6	47
80	31.8	50
85	98.9	53
90	378.22	56

Note 1 – Approximate ACPO Speed Enforcement Threshold for a 60km/h speed limit

To put the relative risk in perspective the equivalent ACPO speed enforcement threshold for the 60km/h speed limit is just less than 70km/h representing an increased risk of injury accident incidence just over 4 times higher than that presented by travelling at or around the speed limit of 60km/h. Similar results can be predicted for a range of speed limits with the risks rising more rapidly as the speed limit is increased. The 60km/h speed limit represents a speed of 37mph so it is approximately equivalent to a 40mph speed limit if comparison is required.

In the 1997 report it was reported that 68% of cars involved in casualty crashes were exceeding the 60km/h speed limit. The slope of the graph in figure 1 clearly shows the rapid rise in relative risk of crash involvement with an increase in speed above the speed limit.

In 2000 the Department of the Environment, Transport and the Regions (DETR) produced a report “*New directions in speed management – a review of policy*”, citing several Transport Research Laboratory reports that supported the link between vehicle speed and the incidence of casualty causing collisions. TRL 511, *The relationship between speed and accidents on rural single carriageway roads*, quantified the percentage reduction in accident frequency per 1mph reduction in the mean speed of traffic as 9% for a mean speed of 27mph and 4% for a mean speed of 60mph. The Safety Camera System was founded on the DETR (2000) report and its references being supported further by the TRL 511 report.

There have been many disbelievers in the value of speed management methods and the relevance of increase in speed as a factor in the frequency of injury accidents despite the evidence presented in the conclusions of the reports mentioned above, by way of confirmation and review, Aarts L and vanSchagen I, 2005; *Driving speed and the risk of road crashes: A review*, sought to evaluate the most recent empirical studies into speed and crash rate where they identified many similarities in the results presented by the reports reviewed, all reports showed that there was a positive correlation between speed and the frequency of injury accidents, there was no evidence of detracting reports. One of the reports, Baruya (1998), stood out by identifying that there were significant other factors in injury accidents such as traffic flow, speed limit, increase in speed limit offenders, junction density, road section length, road width and low average speeds; this reports suggests to the practitioner that speed enforcement activity may benefit from deployments governed by intelligence from this report.

With the relationship between speed and accident frequency seemingly established and supported by noted academics for approaching 80 years it is surprising that the attitudes to speeding and perceptions of speed enforcement in the United Kingdom means that driving faster than the speed limit is considered by many to be acceptable behaviour. Most drivers consider themselves to be more skilful than average, Svenson (1981) and as such speed limits only apply to less skilful drivers rather than themselves, Walton and Bathurst (1998). A more surprising conclusion was presented by McLean and Kloeden (2002) when they compared the relative risk of excess speed above the speed limit to Blood-Alcohol Content (BAC) showing that excess speed presented comparable risks to BAC especially when enforcement levels and penalties were compared. Table 2 shows the relative risks of excess speed and BAC with the enforcement thresholds for both being compared directly. The equivalent Association of Chief Police Officers speed enforcement threshold in a 60km/h speed limit, the enforcement of which is sometimes considered draconian, is shown in the red band directly mapped to the BAC enforcement threshold in the UK. Should a driver be apprehended by Police with a BAC of 0.08g/100ml the offender would be arrested and upon conviction would receive a driving ban. When the drink-driver at the enforcement threshold presents a relative risk compared to a sober driver of 3.2 the seldom punished speeding motorist at the ACPO speed enforcement threshold presents a greater risk of 4.2 times than the driver who is driving at or below the speed limit.

• Table 2 - Speed and Blood Alcohol Concentration Relative Risk

<i>Speed (km/h)</i>	<i>Speed Relative Risk</i>	<i>Blood Alcohol Content (g/100ml)</i>	<i>Alcohol Content Relative Risk</i>
60	1	0	1
65	2	0.05	1.8
70 ¹	4.2	0.08 ²	3.2
75	10.6	0.12	7.1
80	31.8	0.21	30.4

Note 1 – Equivalent ACPO Speed Enforcement Threshold

Note 2 – UK Drink Driving Prosecution Threshold

McLean and Kloeden conclude that speeding is not listed as often as drink-driving in accident causations because it is relatively easy to detect the presence of alcohol in accident involved drivers and that it is a matter of routine for them to be tested for alcohol impairment. Alternatively speed estimation of crash involved vehicles is not a straightforward matter. There results a massive disparity between the penalties that are regarded as acceptable by the public for the 2 risky behaviours and it would seem that on this evidence that the attitude is not reasonable when this is taken into account.

The reduction of travelling speeds can be expected to reduce the frequency of accidents including those accidents involving an alcohol impaired driver, the enforcement of speed therefore can be considered just as if not more important that the enforcement of alcohol or drug impaired drivers.

Speed and Road Safety

The discussion above clearly defines speed as being a key risk factor and contributor to the risk of a road traffic accident. There are further definitions of speed and speeding that relate to the management of speed and road safety:

- Excess speed – exceeding the speed limit by between 10% to 40%
- Excessive speed – exceeding the speed limit in excess of a speed considered as excess speed
- Inappropriate speed – driving at a speed that is inappropriate for the conditions which is not in excess of the speed limit

Excess and inappropriate speeds contribute to approximately 30% of deaths on the roads in high income countries, the control of speeds can reduce the frequency of accidents and most certainly the severity of the impact of these accidents, the resulting reduction in the energy to be dissipated in the vehicle passenger protection zones has the obvious potential to reduce the severity of injury and thus the mortality rate of collisions.

Speed and its effect on injury is especially relevant for vulnerable road users such as cyclists, pedestrians and older drivers, pedestrian survival is particularly sensitive to increases in speed above that of the speed limit of 30mph for built up areas in the UK.

The World Health Organisation (2004), *World report on road traffic injury prevention*, lists the **setting and enforcing of speed limits** as the 2 most effective measures in reducing road traffic injuries. With this as a guide the same report suggests a systems approach is used to identify the nature of the problem to be addressed and to suggest how the problem so identified can be reduced and the efforts in doing so can be targeted and monitored. What follows is the application of the systems approach suggested by Rothe JP, (2002), *Driving lessons: exploring systems that make traffic safer*.

Identifying the Road Traffic Accident Problem in Cumbria

Systems Approach

The application of systems approach to core safety camera site casualty reduction between 2003 and 2007

The World report on road traffic injury prevention advocates a systems approach to:

- Identify problems
- Formulate strategy

- Set targets
- Monitor performance

In applying the approach to develop a road casualty reduction strategy for the deployment of speed enforcement systems the 4 steps of the systems approach has been retrospectively applied to the methodologies and problems associated with the casualty reduction task and operations carried out between the years 2003 and 2007. The accident distribution presented to the Safety Camera Partnership in 2002 where accidents between 1998 and 2000, later 1999 to 2001 and 2001 to 2003 were used to decide the strategy for speed enforcement has changed significantly as a result in part of that enforcement. The problem presented to the partnership in 2002 was one of road casualty accident clusters that were associated with a high degree of excess speed being present at those locations, the problem can therefore be stated as being "Cluster Collision Sites".

The strategy that was formulated to reduce the incidence of accidents at those sites was to concentrate enforcement at the Cluster Collision Sites with supporting measures that allowed the Safety Camera Unit to react to sites of public concern on other parts of the road network.

Targets for casualty reduction were set that met an expected county wide casualty reduction target of 5% per year, wider stretched targets were acknowledged and monitored as part of an umbrella Casualty Reduction Partnership.

Regular monitoring was undertaken with key organisations being advised of progress to targets. Table 3 shows the on-site casualty reduction performance for each calendar year since the inception of the Safety Camera Partnership.

• Table 3 - On-Site casualty reduction, 2003 to 2006

Year	Core site KSI reduction from Base line
2003 ¹	42%
2004	71%
2005	60%
2006	68%

Note 1: Safety Camera operations between April and December only

The reductions in on-site accidents between 2003 and 2006 show that there has been a large degree of success at the safety camera sites with a reduction well above 50% for each year, the results exceeding the national average for mobile casualty reduction of 19%. The off-site accident reduction rate is between 11% - 12% per year.

The application of the systems approach therefore has been very successful in forming the strategy for the reduction of KSI casualties at clustered sites that featured evidence of a high level of speeding vehicles coincident with those sites.

Performance monitoring, a key feature of the systems approach adopted, has indicated that the intervention method of speed enforcement at high speed cluster sites will not maximise the benefits that can be realised with more efficient and widespread mobile speed enforcement methodology. A further application of the systems approach is required to identify the problem to be addressed in order to realise casualty reduction targets. What follows is the application of the systems approach to Cumbria after it has been subjected to successful cluster site enforcement for a period of 4 years.

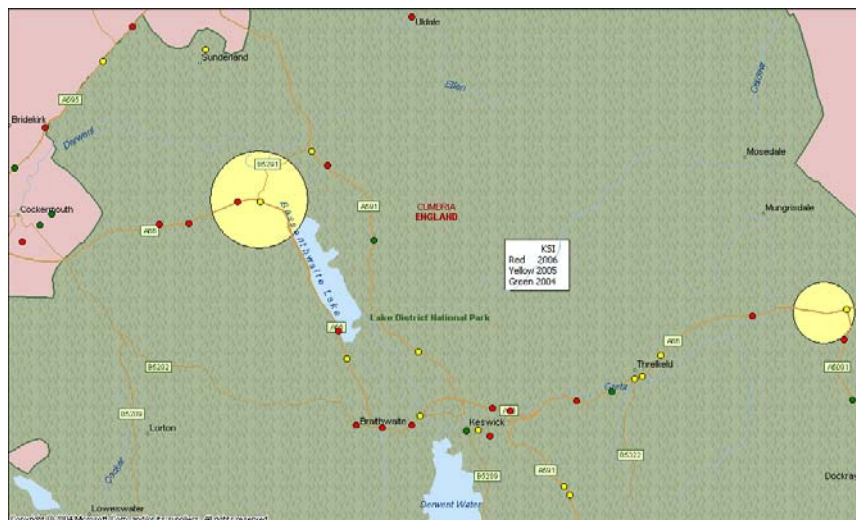
The application of systems approach to core safety camera site casualty reduction between 2007 and 2011

Consider that if the reduction percentages observed at cluster collision sites continued to be applied a diminishing return is inevitable.

The reductions are shown in table 3; if these were applied year-on-year to a site with 10 accidents in 2002 there would be a maximum of 1.22 accidents per site at the end of 2006, further reductions of 70% per year would result in 0.5 accidents after 3 years, a negligible improvement.

It can be seen that the success of the reduction of on-site accidents has led to a significant shift in the nature of the problem requiring the application of the Systems Approach to future operations, the strategy governing operations needs to be adjusted to address the resultant problem now it has been identified. The safety camera system therefore requires the re-application of the systems approach to optimise its casualty reduction effect.

Figure 2 shows the physical effects of cluster site enforcement and the nature of the newly identified problem to be addressed between 2007 and 2011 to allow casualty reduction targets to be met through effective deployment of speed enforcement assets.



• Figure 2 - Casualty distribution post Safety Camera enforcement

The yellow circular areas show the location of core Safety Camera sites established in 2003 and regularly enforced between 2003 and 2007; the incidence of casualty collisions, indicated by the small coloured dots show that the accident locations are distributed along the road network between core sites with very few accidents now occurring in the confines of the sites.

The problem therefore is now identified as being one of route based collisions. As the collisions are route based a further problem arises, that of how to distribute the speed enforcement assets to cover the network and maintain an affordable system? A strategy is required that will extend the influence of speed enforcement in a way that will increase deterrence and hence reduce traffic speed on a large part of the road network.

As distribution of collisions was identified further analysis and consideration indicated that the public may now be familiar or complacent in their regard of the Safety Camera system. Familiarity means that manipulative and some compliant drivers will be aware of the locations that speed enforcement is carried out and that the likelihood of encountering more than one speed enforcement vehicle on a single road is low. A complacent driver would be a motorist who would regard the likelihood of seeing any speed enforcement activity as low,

perhaps being guided by the published Safety Camera schedule. This is an unfortunate product of core Safety Camera activity in a narrow range of sites over a 3-year period.

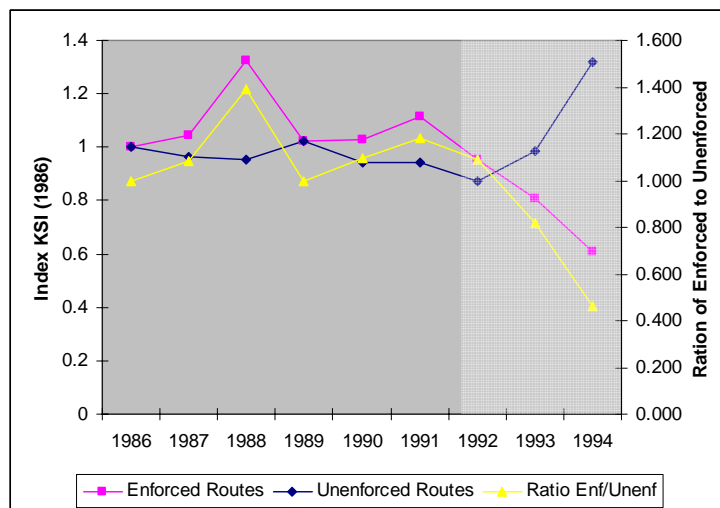
The strategy required to satisfy the solving of the problems identified needs to maximise the effectiveness of the mobile unit deployment by increasing visibility and at the same time deterrent effect through the use of unannounced or unexpected van presence, a better spatial deployment of resources is required. This can be achieved through the use of a randomised selective enforcement strategy which has been proven to be effective when used in Australia; its use produces a short term and slight reduction in public acceptance of speed enforcement activity which returns to pre-system levels shortly after the introduction of wider enforcement suggesting that the benefits of the potential for this method outweighs the early detractors.

Selective enforcement strategies are designed to create a high level of deterrence, this has been utilised between 2003 and 2007 and has produced a high degree of localised compliance with resulting benefits of collision and casualty reduction. Leggett (1994) demonstrated the use of a randomised selective enforcement strategy designed to create a wide area deterrent effect; the system employed a long term, low intensity Police enforcement strategy in Tasmania, Australia.

“This strategy involved the visible deployment of single stationary police vehicles on each of three contiguous stretches (between 16 km and 20 km) of rural highway, selected on the basis of high accident rates. Each stretch of highway was divided up into smaller, one kilometre sections with the nominated police vehicle (one vehicle for each stretch of highway) being randomly allocated to one of these smaller sections for a two hour period during high accident times of the day (between 3 pm and 11 pm). The actual program deployment schedule involved three site visits per week over a two year period, on each of the three stretches of rural highway.

*The selective enforcement strategy was reported as having resulted in a significant reduction in the level of speeding behaviour and a significant 3.6 km/h reduction in overall mean travel speeds. **However, the most impressive finding was a large, significant reduction of 58% in serious casualty accidents (fatal and hospital admission accidents).***

Based upon reported accident reduction benefits and the costs associated with program administrative and vehicle deployment, it was estimated that the two year selective enforcement program had resulted in a benefit-cost ratio of four to one.”



• Figure 3 - Casualty Collision Reduction pre and post 1992

Where Police vehicles are referred to in the quoted passage, in Cumbria this will mean Safety Camera and Police vehicles, with the majority of the enforcement being provided by the Safety Camera vehicles as it is their primary task, Police vehicles have the effect of deterrence by their mere presence while engaged on other tasks, this is a supplementary benefit of the Police vehicle when applied to the system of deterrence.

Results from the demonstration in figure 3 clearly show the massive benefits of the strategy implemented by Leggett after their introduction in 1992. The enforced routes show a post implementation reduction of over 39% over the pre-implementation period after the strategy had been in operation for 3 years.

Compliance zones over a wide area can be achieved through the efficient spatial deployment of assets with an accompanying high degree of casualty reduction.

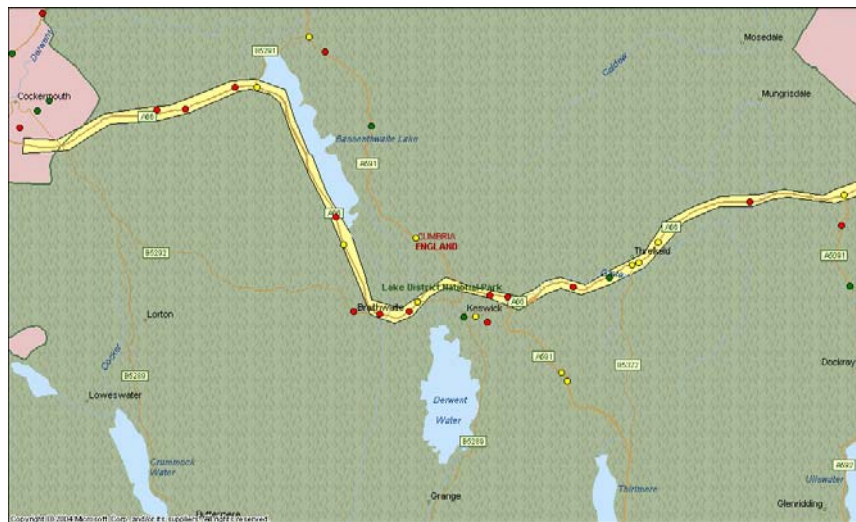
All Safety Camera vans will maintain a high degree of visibility with the Police Speed Enforcement traffic sign being applied to all four surfaces of the van thus enabling them to have a sign on the road at every enforcement location.

A System of speed enforcement routes will be established that will be subject to publicity to engender a deterrent effect along their length, the routes will be subjected to multi-van operations.

Core sites will be integrated into the random route enforcement strategy ensuring maintenance of the casualty reduction achieved during 2003 – 2007. Visits will also be made to sites of public concern; these will have the effect of increasing the coverage, visibility and random nature of the enforcement as required by the strategy increasing the deterrence of the Safety Camera van deployment.

The use of unannounced enforcement and enforcement at unsigned sites in between signed sites will have the effect of increasing uncertainty, unpredictability and hence deterrence of the speed enforcement system.

The establishment of routes in between or encompassing core safety camera sites will enable publication of the required envelope of influence and facilitate the monitoring function so effectiveness of the system can be supported. Figure 4 shows how a route will be established for deployment, monitoring and performance purposes.



• Figure 4 - Illustration of safety camera route

Targets for casualty reduction will be aligned with those of the wider Road Safety Partnership because the objective to address a wider distribution of accidents is directly comparable with the targets of that partnership. The migration towards the targets will be used in a similar fashion to the way in which they have been used thus far, to provide a means of monitoring of the performance of the system.

To illustrate the shift in emphasis of the strategy to change from addressing a cluster collision problem to a route collision problem the systems approach is summarised in table

System Approach Summary

A summary of the systems approach to 2003/7 and 2007/11 is shown in the table.

• Table 4 - Summary of systems approach to casualty reduction

	2003 to 2007	2007 to 2011
Identify Problems	Cluster Collision Sites	Routes Expand the influence of casualty reduction effect of speed enforcement Tackle familiarity and complacency Maintain or reduce costs of enforcement
Form Strategy	Enforce Cluster Sites Enforce Complaint and Exceptional Sites Enforce Around Sites	Continue Cluster Enforcement Publish/Name/Enforce Routes Multiple Van on Route Enforcement Deploy in Accordance With Intelligence Tie In with National Intelligence Model Enforce Exceptional Sites
Targets	Dft LPSA stretched Targets Police Fiscal Year Targets	Agree Targets with All Agencies Agree Specific Targets (M/C, Rural, Urban, Young Driver etc) Agree Migration and Target Vectors on Annual Basis
Monitor & Evaluate	CCC Report to Steering Group	Monthly to CCC for CRSP Monthly to Steering Group Police Internal Reporting

Safety Camera Casualty Reduction Strategy

Strategic Aim

The strategic aim of the Partnership continues to be to improve road safety and to reduce the number of people killed or injured in collisions on the roads of Cumbria, by working in partnership to operate an intelligence led speed reduction strategy which focuses on engineering, education, enforcement and evaluation. The Safety Camera Casualty Reduction strategy is a key element of the wider road safety strategy in Cumbria

Key Objectives

The strategic aim is supported by the following key objectives:

1. To demonstrate a minimum of 5% per year reduction in collisions and casualties by utilisation of speed camera enforcement. This to be coupled with an education campaign designed to positively influence the cultural attitude of drivers towards dangerous driving, especially speeding
2. To reassure the public that the motivation behind the process is driven by a wish to improve road safety, and to help educate road users about road safety

3. To ensure that this initiative accords with the principles of Best Value and encompasses Best Practice

Overview of the Current Speed Camera Enforcement in Cumbria

Existing Camera Deployment

There are 50 mobile and 6 fixed Safety Camera sites in Cumbria with a varying number of mobile and fixed sites within their boundaries. Enforcement within exceptional sites is used to carry out targeted enforcement and enforcement in support of the Cumbria Constabulary Speed Complaints Protocol and to allow immediate action to address speed related casualty reduction matters.

Cumbria Road Casualty Reduction Partnership prefers to use digital technology for fixed camera speed enforcement as this reduces the costs and increases the efficiency of camera operation.

Enforcement Strategy

Aim

To maximise the deterrent effect of mobile speed enforcement to induce a widespread reduction in average vehicle speeds on the Cumbrian road network to realise a reduction in the severity and frequency of injury collisions.

Asset Deployment

To allow the maximum perceived risk of detection a highly efficient method of spatial deployment of resources is a requirement of the enforcement strategy. This will follow the general principles of Leggett (1994), *Using Police enforcement to prevent road crashes: The randomised scheduled management system*, described in the Background section of this document. Enhancements to the random nature of deployment will be achieved by co-working with Police assets engaged on road based operations to increase the perception of spatial coverage and hence deterrence.

Fixed Camera Operation

Fixed cameras have been installed at 6 locations covering both directions of travel on the roads upon which they are installed. The Redspeed cameras are able to operate on a permanent or scheduled basis and will be operated to maximise their deterrent effect and tackle the greatest incidence of speeding and accidents at their locations.

Proposed Application

Introduction

The following sections of this document will discuss how the Cumbria Safety Camera Partnership will deliver accident reductions, implement the project and justify the case being promoted. This submission draws on the lessons learned from operations during 2003 – 2007.

The financial case supporting this submission is set out in **Appendix C**.

Project Management

A "Partnership Steering Group" is well established to manage the Safety Camera System, this comprises of one senior member for each Partner plus the Safety Camera Manager, Treasurer and PR manager.

A Project Manager runs the project on a day-to-day basis, ensuring the terms of the Partnership are complied with and the operational case is being met. This post is employed through Cumbria Constabulary, enabling closer working on a daily basis with the enforcement practitioners.

The Safety Camera System is led by the Safety Camera Manager and consists of the Safety Camera Manager, the Public Relations Manager, the Data Manager and the Administration Manager. 6 Safety Camera Technicians carry out the safety camera and support functions supported by one Police Enforcement and Enquiry Officer.

In addition to the Safety Camera Unit the Police provide a Central Ticket Office and staff; Her Majesty's Courts Service provides a Fixed Penalty Office and staff.

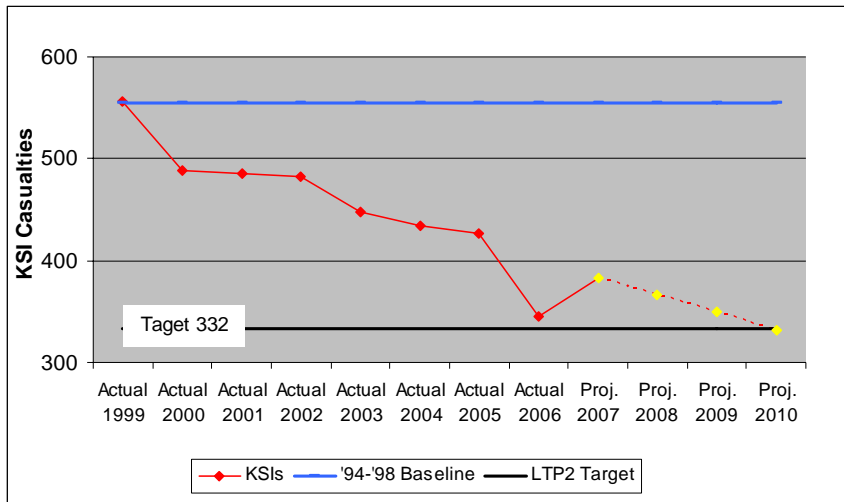
Cumbria County Council will undertake the roles of Treasurer and internal audit, external audit will be undertaken under direction of the County Council audit procedure. This will require one eighth of one fulltime post for treasurer and audit. Efficiency savings are achieved by having this role within a Local Authority, given the established financial systems in place.

Further details of these working relationships are set out in the Memorandum of Understanding attached at Appendix A.

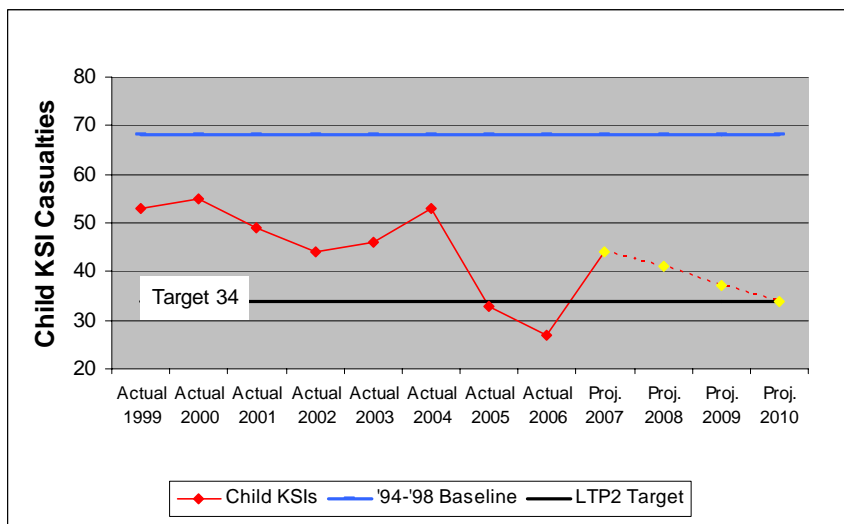
The Cumbria Casualty Reduction Partnership works closely with all partners. Cumbria Safety Cameras, the operational arm of the Cumbria Casualty Reduction Partnership is a member of the Cumbria Road Safety Partnership, the group responsible for achieving the governments 2010 targets for reduction in road casualties. All partners in the Cumbria Casualty Reduction Partnership are members of the Cumbria Road Safety Partnership. This allows coordination and clarity of objective for operations and targets between all partners and groups involved in the reduction of road casualties in Cumbria.

Progress towards 2010 Government and LTP2 KSI Casualty Reduction Targets

Figure 5 shows the progress toward the KSI Casualty reduction targets for the County of Cumbria. The graph shows the progress in a comparison to the reference years of 1994 to 1998 and the expected progress towards achieving stretched LTP2 targets, figures between 2007 and 2010 are projections with actual figures for 1994 to 2006.



• Figure 5 - Progress to LTP2 Casualty Target



• Figure 6 - Progress to LTP2 KSI Casualty Target

Figure 6 shows the progress toward the LTP2 targets for Child KSI casualties.

- Figure 7 - Progress to LTP2 Child KSI Casualty Target

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Camera Equipment

The use of fixed and mobile safety cameras will help the county achieve: -

- A reduction in road casualties
- An Improvement in driver behaviour
- A reduced impact of accidents on victims, their families, industry, and on hospitals and the emergency services.
- Reduced delays to business, public transport and other road users as a consequence of reduced numbers of accidents.

Fixed Cameras

The fixed sites are normally treated with Redspeed fixed speed cameras. These are the only spot digital fixed camera system approved for use in the UK by the Home Office at the time of writing, 28 November 2006. The digital camera system is recommended for use because it:

- Removes the requirement for a large number of films to be processed or stored
- Reduces the personnel required to operate the camera systems
- Increases the flexibility of the camera system by allowing remote configuration
- Reduces the running costs of the camera system
- Reduces the processing time required during data acquisition and verification

Cumbria County Council has completed a purchase tender in respect of the fixed camera system supply. Redspeed who returned a bid that was compliant with the tender requirements has won this and are the preferred supplier to the partnership for digital fixed enforcement camera systems.

Road Works Cameras

The use of road works cameras is considered essential to ensure the safety of both road user and staff working on the site during the works serviced by the Constabulary and is covered by Highways Agency and Contractor Health and Safety Risk Assessment control measures. Road works speed enforcement will be undertaken with mobile speed cameras deployed in the safety camera vans from overhead bridges within the road works area or, where no overhead bridges are situated in the road works, from specially constructed areas on the carriageway furnished with adequate protection. The contractor must produce a safety certificate before safety camera operations take place on the carriageway within motorway road works that confirms all signing and lighting regulations are satisfied for work on the carriageway.

Road works enforcement may also be carried out by the use of time distance cameras supplied by Speed Check Services or fixed digital cameras supplied by Redspeed International.

Deployment of Cameras

Camera related enforcement is to be guided by the following principles:

- Proportionality in applying the law and securing compliance.

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- Intelligence led targeting of enforcement activity.
- Consistency of approach.
- Openness and honesty about what enforcement action is being undertaken, why it is being taken and where enforcement activity will be focused.
- Recognition that effective partnership working is essential.

Method

In achieving these aims, objectives and principles the Partnership has identified those areas within the County's highway network where a benefit may be gained by the deployment of speed enforcement cameras. Sites will be targeted by intelligence led speed reduction activity.

Civilian Speed Enforcement Officers are responsible for operation of all portable cameras, process of evidence, (offence adjudication as necessary) and security of evidence before passing the information to the Central Ticket Office (CTO). The use of roadside produced photographs and data down loads to appropriate software systems will provide the offence corroboration needed for the officer's opinion of a speeding offence being committed.

To operate cameras to the level required to achieve both, casualty reduction targets the partnership: -

- Employs one police support staff member in an enforcement and technical management role to maintain, supervise and control the camera units/vehicles/enforcement officers together with their duty deployment and service motorway cameras. The title of this post is Safety Camera Administration Manager and Enforcement Officer
- Employs 6 police support staff as civilian enforcement officers who work in a staggered hours or shift system that allows the operation of 3 safety camera vans during weekdays and 1 to 2 safety camera vans at the weekend. This maximises the visibility and hence effectiveness of the deterrent effect of the safety camera system.

Speed data has been established through the use of Applied Traffic AT-SR3 Radar Counter Classifiers. Policy and guidance for the analysis and gathering of traffic speed data is contained in the Safety Camera Project Office procedures and Appendices.

To ensure maximum benefit is achieved at sites and routes, annual monitoring of speed/traffic flow data will be integrated with regular monitoring of collision information, for both existing and new sites and routes. The Project Manager will manage this aspect of the work reporting to the Partnership Steering Group.

Cumbria Constabulary Traffic Management Officers have identified popular motorcycle routes within the county that also present a significant incidence of injury accidents. Speed Enforcement, joint operations with Cumbria Constabulary and Public Relations activity targeted on these routes have proved effective in reducing the expected rate of incidence of KSI collisions during the motorcycle seasons of 2003 to 2006. The enforcement on these routes is carried out on a random route basis as well as at core sites within the route lengths. Motorcycle Routes exist on the A686, the A6 and on the A683.

Review of Safety Camera Sites

All safety camera sites approved for operation by the Cumbria Casualty Reduction Partnership will be reviewed annually for consideration of their continued use after they have been in operation for a minimum period of 3 years.

Camera Resources Required to Implement the Strategy

To allow the projected speed enforcement to take place Cumbria Safety Cameras require to use the following inventory of Speed Enforcement Camera Equipment:

- 3x Tele Traffic Lastec Local systems
- 3 x Tele Traffic Concept systems
- 1x Speedflex LasercamNT
- 12x Redspeed Fixed Digital speed camera systems

Public Concern Site Enforcement

The percentage of enforcement time at sites of public concern is automatically calculated by the site schedule system. The site schedule system is an Excel spreadsheet that records all site enforcement activity; logging the number of times a site is visited, summing the time for enforcement on each site. The total enforcement time per year is also stored and reported by the system. All public concern sites are identified to allow the total time for public concern sites to be compared to core sites. The total enforcement time is then used to calculate and display the percentage time that is dedicated to public concern site enforcement.

Communications Activity – Operational Case 2007

A Broader Perspective

With the changes in the way that the safety camera operations are being funded, we also see a slight change in the way that marketing communications is being carried out. Since November, the communications manager has been working part time with the transport team at the county council on the Safer Roads for Cumbria initiative.

This inclusive approach will benefit both organisations. It means that the safety camera PR can act on areas of concern other than pure speed related matters, something that was “banned” previously by the Dept for Transport. One area that will gain from this is tackling the problems with young drivers. SRFC will find an advantage in that the positive relationship built up between CSC and the media will open doors.

Aims:

The primary aim of the Cumbria Safety Cameras communications strategy is to further drive down the number of killed and serious injuries on the county's roads and to continue to help achieve this by a dynamic PR, marketing and education campaign. Despite the rise in the number of fatalities over 2005, the total number of KSIs dropped substantially and the county was just nine KSIs short of the 2010 target.

During 2006 we saw a continuation in the number of people not only supporting the use of safety cameras but a high percentage of residents admitting that camera operations had not only altered attitudes to speed but changed the way that they drove (Source: CN Research). We will continue to maintain and build on this.

Statistics demonstrate that a campaign with a strong local focus is essential with national campaigns underpinning the regional work. The trend where the majority of fatalities were local has continued in 2006 so the focus on local campaigns must be sustained.

As one of the premier “biking” counties we will continue to work with regional partners and the county's police in maintaining an enviably low number of motorcycle deaths. In 2006 we saw a rise in motorcycle fatalities from 2 in 2005 to 13 so a dual campaign of education and enforcement will be carried out. The 2007 Don't

Crunch After Lunch leaflet will include a tactical guide to group riding to stop "tail end Charlies" with lesser riding skills attempting to keep up with more advanced riders and having collisions.

Measure of success:

There are a number of ways which we measure our ongoing success.

First, we will strive to continue a three year run of very positive news stories in the local media. Apart from the occasional - and inevitable - Letter to the Editor appearing in the local press opposing the safety camera scheme, we have experienced no serious criticism or negative media coverage since the project started in Cumbria in 2003.

Our relationship with the media is successful because we are open and honest with them and can react immediately to requests for information or online, TV and radio interviews. The key to the media campaign is having someone who is accessible, knowledgeable and quotable. We are fortunate that in Cumbria in the absence of the Communications Manager both the project manager and data analyst are capable of fronting media questions.

Second, we will continue to monitor the attitudes of the local population on a quarterly basis. Our research covers not just attitudinal perceptions but awareness of campaigns run in the county on local radio, in the local newspapers and TV. This feedback provides us with timely information as to which campaigns and media is effective in reaching our target audiences.

Market research is carried out by an independent third party organisation that polls 400 members of the public totally at random via telephone interviews. The results are then subjected to statistical weighting to ensure that the results are representative of the Cumbrian population

We acknowledge that it might be difficult to substantially increase the support as it is already exceptionally high. When polled in June 2005, 73 per cent of respondents agreed that the primary aim of safety cameras was to save lives. By December this had risen to 80 per cent. When asked if the use of safety cameras should be supported as a method of reducing casualties, in June 77 per cent supported the statement whereas in December this had risen to 86 per cent (Source: CN Research).

Message to be communicated:

One of the key messages is that excessive or inappropriate speed is a significant contributor to both the cause and end result in road traffic accidents.

A successful introduction into the communications mix in Cumbria in 2005 was the message in newspaper advertising that while the various road safety organisations are doing as much as they can to reduce the number of KSIs on Cumbria's roads, it is ultimately down to each individual driver to ensure that they drive in an appropriate and safe manner.

We will continue to drive this home by extending the advertising campaign in all local newspapers.

A further successful approach which we will expand upon is the fact that passengers in cars – and this particularly applies to younger drivers – have a right to tell drivers to slow down or drive in a safer manner. The success of the radio campaigns – Mates and Drop Dead Gorgeous – which used the sign off line of don't drive like a prat (potential road accident threat) provides an excellent platform for the next 12 months.

Bikers have responded well to the continuing Don't Crunch After Lunch message and this will be continued. We are in the early stages of planning one or two biker related events with one in the north of the county being held in conjunction with neighbouring police forces.

A new sector to be targeted this year will be professional drivers and to remind them of their responsibilities. As high mileage drivers they are statistically more likely to have an accident and they are among the high risk offenders for speeding fines. Joint campaign with Chamber of Commerce and Cumbria Business Gazette.

A regional campaign aimed at Mr and Mrs Average in the 30-55 year age grouping will take place in spring/early summer.

Target Audience:

As well as a generic message about excessive and inappropriate for all drivers within the county, we have identified clear driver types that need to be targeted.

The first is young drivers who accounted for a high percentage of fatalities in Cumbria in 2005. One of the problems we need to tackle is that where young drivers are involved, this is usually a multiple fatality as they have friends in the vehicle. We will continue to work with the Fire and Rescue Service's RAT scheme.

Second, we need to counter research findings that show that there is a problem with 30-55 year olds, particularly professional drivers and others that rely on cars for their livelihood. We will be working with the local business oriented media and Chamber of Commerce to tackle this.

Third, while we have an enviable motorcycle fatality level – just two dead in 2005 - we need to continue the pressure on this group and will work within the county and regional partners to maintain awareness of the dangers of irresponsible riding.

Method and justification of activity

Key activities will include:

Depending on allocated budget, we hope to continue the monthly advertisements in all weekly newspapers within the county that provide a running KSI total and relevant safety message. The running total provides a certain morbid fascination that guarantees an immediate involvement, the safety message highlights specific problems, ie winter driving conditions, while the It's You That Makes The Difference drives home the readers' responsibility. Awareness of CSC through newspaper advertising rose from 16 to 23 per cent in one quarter (Source CN Research).

An increase in radio advertising – research shows this is a highly effective medium for increasing awareness of drivers within Cumbria. Furthermore, an ongoing commitment to radio advertising has secured spin off benefits from the two key stations in the county by way of free promotions to underpin the paid for activity. A relatively small series of radio advertising generated a 26 per cent awareness of the safety camera campaign (Source: CN Research) so it follows that an increase in advertising should generate an increase in awareness. It is intended to ramp up radio advertising to 36 weeks – not including the regional radio advertising campaign.

Leaflets – we will reprint the generic leaflet for distribution through NIPS, GP's surgeries, etc and the Got A Car 2 Die 4 young drivers leaflet which is part of the Fire and Rescue Service's road safety visit to secondary schools. The Don't Crunch After Lunch motorcycling leaflet will be reprinted with 2005 stats.

National Communications and PR activity

Linking with Safer Roads for Cumbria we shall monitor national events and, where relevant to local activities, ensure that complementary promotional activities mesh with planned national activities. Particular areas include motorcycling, young drivers and generic speed campaigns.

Regional Communications and PR activity

Following on from last year's highly successful Strictly Come Speeding campaign, the partnerships from Lancashire, Merseyside and Greater Manchester will work together on areas of mutual concern.

Local Communications and PR activity:

- Newspaper advertising - Once a month
- Radio advertising - 36 weeks planned for CFM and Lakeland Shows
- Attendance at major regional farm shows
- Young drivers - Joint with Fire and Rescue Service
- Motorcyclists - Joint with neighbouring forces and local initiatives
- PR releases - Publicising ad hoc events, survey results, campaigns etc
- TV and radio – Features and news stories
- Public talks - Continuation of talks to organisations such as Rotary Clubs, Lions et

Monitoring and evaluation:

Cumbria safety Cameras commissions quarterly surveys which are carried out by a neutral third party company. As well as the core seven questions requested by DfT we add on questions that monitor not only people's awareness of the safety camera operation but attitudes to road safety messages, knowledge of road safety organisations, etc. This enables us to judge the public's support for the safety camera operation, the media hears our messages, awareness of the core messages, listen to attitudes, etc. If we identify any weaknesses in the medium or the message, we can take action to rectify any shortcomings.

Additional questions are also added to form the basis of ongoing PR.

Methodologies

Media Relations

Our approach to being contactable, knowledgeable and quotable has proved to be a major plus point in establishing a friendly and effective relationship with the newspaper and broadcast journalists in the county. We have never refused to give information or an interview and the reputation as being honest and open with journalists has resulted in virtually no negative coverage since the project started this will continue to 2010 with the use of proactive release of casualty performance in conjunction with radio, television and printed media advertising.

Collision Mapping

The police collisions recording system has been updated and replaced by a new collision mapping system in August 2004. This is capable of producing statistical information in a format that is easily analysed for use by the safety camera project office in determining intelligence led deployment methods for the speed enforcement cameras. The system has greatly enhanced the ability to display and analyse the accident patterns across the county and will streamline the process of site selection.

Speed Enforcement Thresholds

Cumbria Safety Cameras and Cumbria Constabulary operate a speed enforcement threshold in line with ACPO speed enforcement recommendations.

Motorway Enforcement

The M6 Motorway accounted for 8% of all KSI collisions occurring in the County in the first application for inclusion in the Safety Camera System, it is therefore recommended that enforcement be continued on the 4 sites approved for speed enforcement. The motorway will also be monitored for speed and accident performance in non-enforced areas to assess the requirement to extend the enforcement coverage of required.

Conspicuity of Camera's

- The Partnership will publicise the locations of their mobile and fixed camera sites using both national and local information sources.
- The Partnership will continue to operate an Internet presence in the form of a web site for this purpose of disseminating information and publishing safety camera operations
- This supply of information is seen as a key part of communications strategy to demonstrate to the public that the enforcement of speed is not a covert activity, but one carried out fairly and openly.
- All static camera housings will be coloured yellow
- Enforcement vehicles will be suitably marked to show their purpose. I.e. contain a logo in the livery of the Partnership making use of rear and side reflective safety materials.

Insurance

The Highways Authority that owns that equipment should seek insurance for fixed speed enforcement devices.

Processing of Penalty Notices

Current Arrangements

To accommodate the increase in Conditional Offer of Fixed Penalties the Police and the Courts carried out an increase in staffing and equipment in 2003.

The Central Ticket Office and Fixed Penalty Office are staffed to accommodate the administration of approximately 36,000 fixed penalty offers per year maximum. The staff in the Central Ticket Office is also providing call centre services for public enquiries.

Traffic Management Department

- In partnership with the Data Analyst, will identify collision sites and speed patterns and advise the Project Manager and the Highways Authorities of areas of local concern where safety camera operations could benefit the community
- Will have representation on the Steering Group of the Safety Camera Partnership to ensure that the operations of the Safety Cameras contribute to the development of a cohesive speed management strategy for the County of Cumbria

- Will provide data analysis in conjunction with the Safety Camera Data Analyst to provide collision intelligence to the CRASH groups on a monthly basis
- Will provide quality assurance for the recording of collision records recorded on the Cumbria Constabulary Collision and Recording System (CARS)
- Will coordinate through the CRASH Group the deployment and effectiveness of Vehicle Activated Signs and Speed Indicator Devices throughout the county

Criminal Justice Unit

The Criminal Justice Unit at Cumbria Constabulary will provide court file administration services to the partnership in addition to the Central Ticket Office function.

Financial Efficiency

The Cumbria Casualty Reduction Partnership strives to ensure that all costs incurred in the operation of the safety camera system are kept to a minimum. The staff of the Safety Camera unit is used to carry out traffic data surveys and site surveys as well as speed enforcement, where these functions are contracted out by other partnerships. All Safety Camera related staff in the Safety Camera unit, the Central Ticket Office and the Fixed Penalty Office is housed in buildings owned by the members of the partnership at minimum cost removing the requirement for rentals. It is believed therefore that the efficiency of the safety camera unit and related operations are currently carried out in the most efficient manner possible.

Maintenance

The agency who operate and accommodate equipment for use in the partnership will be responsible for the administration of maintenance contracts to ensure that the equipment and systems are readily available for use in the casualty reduction operations of the partnership. The costs of the maintenance contracts are eligible for cost recovery from the annual LTP grant allocated to Safety Camera Operations.

References

- Aarts L and vanSchagen I (2005).** *Driving speed and the risk of road crashes: A review.* Accident Analysis and Prevention 38 (2006) 215-224. Leidschendam: Institute for Road Safety Research SWOV
- Baruya B (1998).** MASTER: *Speed-accident relationship on European roads.* Working Paper R 1.1.3, Deliverable D7, Technical Research Centre of Finland VTT, Espoo.
- Cleveland DE (1959).** *Driver characteristics and speed performance related to the facility.* Highway Research Board Bulletin; 212: 1-10.
- DeSilva HR (1940).** *A study of motor-vehicle drivers and speed in Connecticut.* Public Roads 1940; 21: 89-101.
- Fildes BN, Rumbold G and Leening A, (1991).** *Speed behaviours and drivers' attitudes to speeding.* Melbourne: VicRoads. Report No.: 16.
- Greenshields BD (1963).** *Driving behaviour and related problems.* Highway Research Record; 25: 14-32.
- Johns TR and Bundy HL (1974).** *Driver performance in young males as measured by the Highways Systems Research Car.* Chapel Hill, North Carolina: University of North Carolina.
- Kloeden CN, McLean AJ and Glonek G (2002).** *Reanalysis of travelling speed and the risk of crash involvement in Adelaide South Australia.* CR 207. Adelaide: NHMRC Road Accident Research Unit The University of Adelaide.
- Kloeden CN, McLean AJ, Moore VM and Ponte G (1997).** *Travelling speed and the risk of crash involvement in Adelaide South Australia.* CR 172. Adelaide: NHMRC Road Accident Research Unit The University of Adelaide.
- Lefevre C (1956).** *Relation of accidents to speed habits and other driver characteristics.* Highways Research Board Bulletin; 120: 6-30.
- Leggett LMW (1994).** *Using police enforcement to prevent road crashes: The randomised scheduled management system.* Land Transport & Safety Division, Queensland Transport. Queensland, Australia.
- McLean J and Kloeden C (2002).** *Alcohol, Travelling Speed and the Risk of Crash Involvement.* In: Mayhew DR, Dussault C, eds. Proceedings of the 16th International Conference on Alcohol, Drugs and Traffic Safety, Montreal, 4-9 August 2002. Montreal, Society de l'assurance automobile du Quebec, 2002:73-79
- Peden et al (2004).** *World report on road traffic injury prevention.* World Health Organisation. Geneva: World Health Organisation.
- Rothe JP (2002).** *Driving lessons: exploring systems that make traffic safer.* Edmonton, University of Alberta press.
- Taylor MC, Baruya A and Kennedy JV (2002).** *The relationship between speed and accidents on rural single-carriageway roads.* TRL Report TRL511. Crowthorne: TRL Limited
- Tilden CJ (1936).** *Motor vehicle speeds on Connecticut highways.* New Haven: Yale University.
- Wilson T and Greensmith J (1983).** *Multivariate analysis of the relationship between drivometer variables and drivers' accident, sex and exposure status.* Human Factors; 25(3): 303-12.
- Zaal D (1994).** *Traffic Law Enforcement: A review of the literature.* Monash University Accident Research Centre, Victoria, Australia. Available at: www.monash.edu.au/muarc/reports/muarc053.pdf accessed 28 Feb 2007.

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