Published Project Report
PPR379

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Evaluation of Operation Radar

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Transport Research Laboratory

PUBLISHED PROJECT REPORT PPR 379

Evaluation of Operation Radar

by L K Walter (TRL)

Prepared for: Project Record: **Study to establish how methods and levels of police enforcement in London affect road casualty rates**

Client: **Transport for London, London Road Safety Unit (Chris Lines)**

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Executive summary

In 2005, TRL carried out a literature review 'How methods and levels of policing affect road casualty rates' (Elliott and Broughton, 2005). This report reviewed all available literature from the UK and overseas on the effect on the number of road casualties of varying the level of Police enforcement of traffic laws. The conclusions of most reports were similar: that increasing the level of Police enforcement improved driver compliance and reduced the number of casualties. The results of the reports could not be combined together in a meta-analysis as levels of policing were either defined in different ways or not at all. The report recommended that a practical trial was needed to investigate the relationship between Police enforcement and road casualty rates. This report describes the evaluation of the resulting Police operation, code-named Operation Radar - an evaluation which aimed to establish how methods and levels of policing in London affect road casualty rates.

Operation Radar was planned and implemented by the Metropolitan Police Service Traffic Operational Command Unit and ran during May 2008. It was designed to increase the visible presence of Police on a stretch of the A23 in Surrey. Two tasking teams were deployed in two shifts per day to the six mile route, with each team comprising six Officers and one sergeant. They concentrated on mobile phone, seat belt and speed offences. The operation ran for four weeks on weekdays from 7am to 7pm, excluding two Bank Holidays. The aims of the operation were that each section of road should be subject to increased enforcement each day and that each Police Officer should write a minimum of 10 Fixed Penalty notices (FPNs) each shift. A mixture of Police enforcement methods were employed, including static speed checks and mobile patrolling on motorcycles. As previous research has suggested that a media campaign is essential to support the increased enforcement, on-route advertising and press coverage were used to warn motorists of the increased presence of Police Officers.

During the operation, 17 arrests were made and 939 endorsable FPNs, 1039 non-endorsable FPNs and 96 Process Offences were handed out. Seat belt offences made up half of these tickets, speed and mobile phone offences each made up about a quarter and there was also a small number of offences driving without insurance. As the operation progressed, it became clear on the ground and from the decrease in weekly numbers of endorsable FPNs that it was becoming more difficult to identify drivers who were breaking the law. This suggested that drivers became increasingly cautious of being stopped for endorsable offences (speeding and mobile phone use) during the operation.

TRL carried out a programme of observations to objectively assess the effectiveness of Operation Radar in reducing speeding and use of hand-held mobile phones, and raising the level of seat belt wearing. Observations were made at a series of sites on the A23, with complementary observations at other sites off the A23.

The speeds of vehicles at seven sites on and around the route were recorded continuously from before the operation started, until two weeks after completion. Mean and 85th percentile speeds reduced significantly during the period, as did the proportion of drivers exceeding the speed limit, exceeding the ACPO recommended enforced speed level (speed limit + 10% + 2mph) and exceeding an excessive speed level (speed limit + 15mph).

The seven sites (split into two directions) where speeds were recorded, were split into four groups – sites on the A23 near the targeted speed enforcement (Targeted A23 sites), sites off the route but near the targeted speed enforcement (Close off-route sites), the other sites on the study route but not near the targeted speed enforcement (Other A23 sites) and other sites off the A23 (Other off-route sites).

85th percentile speeds were observed to drop by an average of 1.9mph at the Targeted A23 sites, by 1.1mph at the Close off-route sites and by 0.6mph at the Other A23 sites by the end of the operation. These reductions appear to be the result of the increased enforcement of Operation Radar as no significant change in speed difference was

observed at the Other off-route sites. At sites where a speed reduction was observed during the study, a smaller reduction in speed remained for the two weeks after the operation had finished. Mean speeds also dropped by a similar amount.

As would be expected a greater speed reduction was seen at sites where the mean speed before the operation commenced was considerably higher than the speed limit. At two sites in the Targeted A23 group reductions in 85th percentile speed of 3.4mph and 2.2mph were observed in the final week of the operation compared to before the operation commenced. In addition, at these two sites the proportion of drivers exceeding the speed limit dropped from 69% before the operation to 59% in the final week of the operation. The proportion travelling above the ACPO recommended enforced speed level dropped from 35% to 24% and the proportion travelling at excessive speed dropped from 6.4% to 2.7%. This provides additional evidence that seriously high speeders were affected by the increased Police presence.

Mobile phone and seat belt use by drivers were also measured at six sites on and near the A23 route. These observations were taken once a week from before the operation started to two weeks after completion.

Mobile phone usage on the A23 remained steady at 1.8%. A small drop in the proportion of women using hand-held mobile phones was observed on the route during the operation. Usage off the route was approximately twice that on the route and showed a small drop off the route during the operation.

Seat belt use remained at an average of 87% on the route before and during the operation. Those who were not using their seat belts do not appear to have been affected by the increased Police presence, possibly as this offence is only punishable with a small fine. This apparent lack of effect was also found for non-endorsable FPNs. The profile for these FPNs was flat throughout the operation , which suggests that drivers are not as aware of or concerned about the safety risks when their licence is not at risk.

There were additional benefits from this operation, including a number of offenders that would not have been caught by technology alone. 28% of drivers charged were not the registered keeper and mobile phone and seat belt offences (around 75% of the caught offences) are not currently enforced by cameras. Several offenders were arrested for other outstanding offences once stopped for traffic offences.

So many drivers commit traffic offences (for example, on average, 13% of drivers were observed not wearing a seat belt during the operation) that, even with this unsustainable increase in policing, it is estimated that only 3% of mobile phone and seat belt offenders, and a much smaller proportion of speeders, on the route were caught during the operation.

The findings support the theory that increased enforcement does influence driver behaviour in a way that research has shown would lead to fewer casualties and consequently to reduced public and private cost. The findings also suggest that behaviour is affected by the severity and probability of likely punishment, as indicated by the different responses to seat belt wearing, mobile phone use and speeding that were observed.

1 Introduction

In 2005, TRL carried out a literature review to assess the relationship between an increase in the level of policing and a reduction in accidents or casualties. It concluded that this relationship is difficult to establish from previous research, in part because different studies do not measure enforcement levels consistently. A large number of studies outside the UK were reviewed, along with a few small-scale UK studies. It was not possible to generalise results to busy urban areas such as London.

In order to assess this relationship in London, a Police enforcement operation and an associated programme of observations were carried out in 2008. Included in this report are the details of the operation and the evaluation of its effectiveness in relation to three key road safety issues: hand-held mobile phone use by drivers, seat belt use and speeding.

In 2007, there were 23,265 road traffic collisions in Greater London, and speed was listed as a contributory factor in 27% of these. Speed management is a key theme in London's Road Safety Plan 2001 for its importance in reducing road traffic casualties in London.

The use of mobile phones whilst driving is another contributory factor to road collisions, impairing drivers' concentration. A simulator study (Burns et al, 2002) showed that holding a conversation on a hand-held mobile phone is more distracting to a driver than driving under the influence of alcohol. The use of a hands free kit is also distracting but to a lesser extent than using a hand-held phone.

While speeding and mobile phone use contribute to road collisions, the third road safety issue measured in this study was seat belt use. Once a vehicle is involved in a collision, the severity of that accident will be affected by whether the occupants were wearing a seat belt. Broughton & Walter (2007) estimated that the risk of being killed, should a collision occur, is reduced by 72% on average if a seat belt is worn.

2 Background

2.1 Enforcement research overview

In 2005, TRL produced a report under contract to TfL: 'How methods and levels of policing affect road casualty rates', by Elliott et al (2005). This extensively reviewed available literature produced in the UK and overseas and its conclusions are summarised below.

The majority of studies in the literature found that increased levels of traffic policing reduced road accidents and traffic violations. However, it is difficult in practice to establish the relationship between levels of policing and violation, accident or casualty rates. Unfortunately, it is not possible to establish the relationship by generalising across the studies in the literature because appropriate information about enforcement levels is not given consistently across the different studies. Some studies do provide limited information about the levels of enforcement required to have an effect on safety. For example, it seems that stopping one in every six offenders, for example, has a noticeable effect.

Although it is not easy to demonstrate, the relationship between policing levels and violations is likely to be S-shaped as shown in Figure 2.1 and discussed in Elliott et al (2005), similarly the relationship between policing levels and casualty rates. The number of violations is likely to be at its highest when Police enforcement is negligible. Increasing enforcement will not have a significant effect on violations until a threshold level of enforcement has been reached where drivers start to become aware of the Police presence. After this point violations are likely to reduce as enforcement increases, until a saturation point is reached. Increasing enforcement beyond the saturation point is not likely to have an effect on the number of violations. There will still be some drivers violating traffic regulations, so the number of violations will never reduce to zero. Reducing the number of drivers violating traffic regulations leads to a reduction in accident and casualty rates.

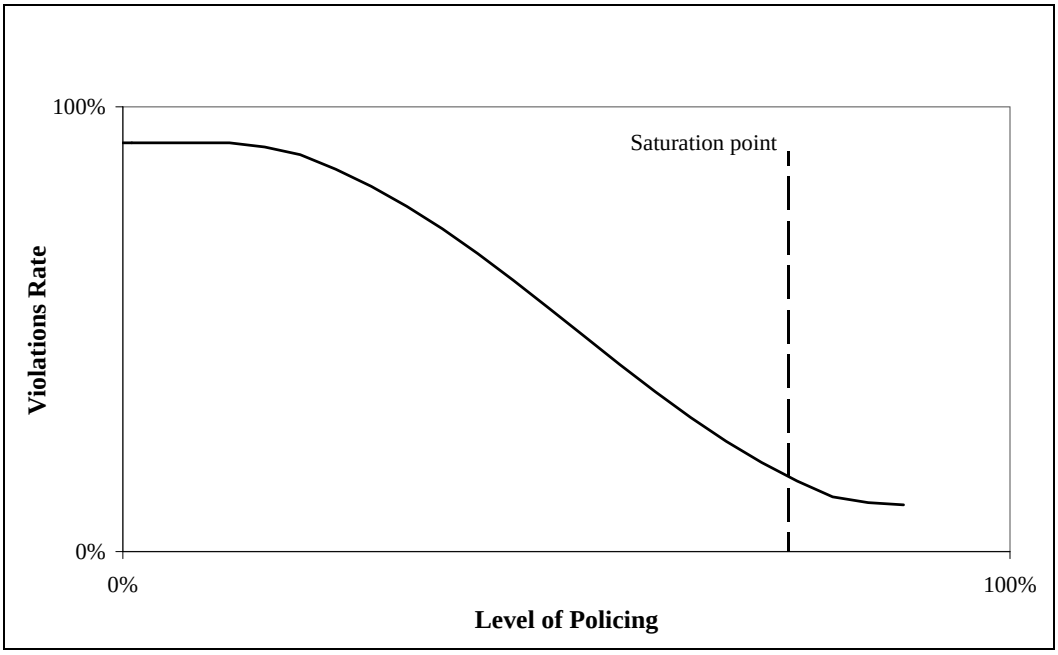

Figure 2.1: Theoretical relationship between violations and Police enforcement

If the level of enforcement on the experimental roads is sufficiently high for an appreciable proportion of drivers to become aware of the Police presence then it is

expected that increased enforcement will lead to improved compliance with speed limits, higher seat belt use and lower hand-held mobile phone use. It is not expected that hands free use will decrease, and may increase due to drivers changing from hand-held to hands free phones.

2.2 Introduction to Operation Radar

The intention with this operation was to increase the amount of Police enforcement to a high level where it is highly likely to have an effect on driver behaviour and thus it should be possible to prove this effect. On the basis of their experience and the results from the research described above, the Metropolitan Police Service Traffic Operational Command Unit planned an operation which ran during May of 2008, code-named Operation Radar. The operational plan involved a mixture of policing methods (stationary and mobile) in a mixture of vehicles (motorcycles and marked and unmarked cars). The increased Police presence was enhanced by a media campaign, including road-side advertising and local press coverage.

Figure 2.2: Increased Police enforcement at Purley Cross

3 The Operation

Operation Radar was designed to increase the visible presence of Police on a stretch of the A23 in Surrey. This route was chosen for a number of reasons including:

- its proximity to two Police garages (the operational bases of the Police Officers involved),
- its mixture of road environments – from wide roads by open parkland to highly populated residential areas,
- its poor record for road accidents – 55 people were killed or seriously injured on this stretch of road between 2005 and 2007.

Two tasking teams were deployed in two shifts per day to the six mile route, with each team comprising of six officers and one sergeant. They concentrated on mobile phone, seat belt and speed offences. The operation ran for four weeks from 6th May 2008, on weekdays from 7am to 7pm, excluding two Bank Holidays.

The operational aims were that each of the six sections of road shown in Figure 3.2 would be subject to increased enforcement each day and that each Police Officer wrote a minimum of 10 Fixed Penalty notices each shift. A mixture of Police enforcement methods were employed including static speed checks and mobile patrolling on motorcycles.

3.1 Police activity

The study that was carried out in support of Operation Radar was designed to measure the relationship between the levels of Police enforcement and driver compliance with traffic laws, so it was important to be able to measure the level of Police enforcement reliably and appropriately. The measurement of Police enforcement is challenging, as discussed in Elliott and Broughton (2005), so this study included several methods for counting the extra Police effort involved in Operation Radar:

- Counts of Police vehicles made by observers standing at the side of the road (observation data)
- Counts of Police vehicles driving or riding passed a point captured on CCTV at one point on the route (video data)
- Daily activity sheets completed by the Operation Radar Police Officers (activity data)

3.1.1 Observation data

As part of the evaluation procedure (see Section 4), weekly observations of mobile phone and seat belt use were made at three sites on the A23 route and three additional sites near the A23 route. Observations were made for a total of four hours on one day per week, from the week before Operation Radar commenced until two weeks after it ended. The observers at these sites also counted the Police cars and motorcycles that passed their site each week. The results are small numbers subject to random variation due to the short period of observations, so they have not been used to estimate policing levels for the study.

3.1.2 Video data

As observations were only taken for a restricted number of hours each week it was not informative to extrapolate these small numbers to five 12 hour days. Two 12-hour days per week of CCTV footage, supplied by Transport for London, at the A23 Purley Way junction with Croydon Road have been analysed in order to objectively measure Police

activity. This footage, shown in Table 3.1, gives a good indication of levels of mobile patrolling along the route and the results have been extrapolated to extend to the whole operation period and take into account missing data in Table 3.2.

Table 3.1: Number of Police vehicles observed in two days at one point on A23

Study week	Car	Solo
Before[1]	9	1
During1	17	28
During2[2]	18	2
During3	16	10
During4	18	2
After1	20	2
After2	10	2

Background and operational levels of Policing have been calculated from the figures in Table 3.1 and are shown in Table 3.2. The background level estimates that on average just over eight Police cars and one Police motorcyclist passed this one junction on the A23 every day. Background policing levels are defined here as the number of Police cars and motorcycles seen before and after the operation. The majority of these vehicles and Officers would not have been Traffic Police patrolling the route, but most likely local Police Officers travelling from one place to another. Operational levels of policing are the number of Police vehicles observed on average during the operation. On average it was estimated that 1.7 Operation Radar cars and 4.5 motorcycles passed this junction per day in addition to the background policing levels during the operation.

Table 3.2: Average number of patrolling Police vehicles observed per day at one point on A23

Study week	Car	Solo
Background	8.3	1.0
Operation	10.0	5.5

These are small numbers compared to approximately 17,000 vehicles that passed that junction each day during the study. However, this was only one point on the operation route and it is therefore not a good measure of the overall levels of enforcement on the route. Much of the Police time targeted certain areas of the route, based on Police intelligence and expert knowledge of the area, and some of the enforcement was stationary which would not be included in these figures.

3.1.3 Activity data

During the operation each Police Officer completed a daily activity sheet which is shown in Appendix A. This included information on where and when they were active in a particular section, shown in Figure 3.2, and whether they were mobile or stationary. These sheets also contained information on offences recorded by each Officer during the operation. Offence information is detailed in Section 4.1 and activity data is shown

[1] No video data available for Tuesday
[2] No video data from 0700-1500 on Tuesday

below. Figure 3.1 shows, for each week, the proportion of Police effort on each section of the route. In week one of the operation (during1) a high proportion of the Police effort was directed at the central part of the operation route – sections C and D. In week 2 (during2), the majority of the effort was based at the southern most point, and a large proportion of this was static speed enforcement. In weeks 3 and 4 the Police effort was more evenly spread along the route with slight higher proportions of effort in sections A, B and E in week 3 and in Section A in week 4.

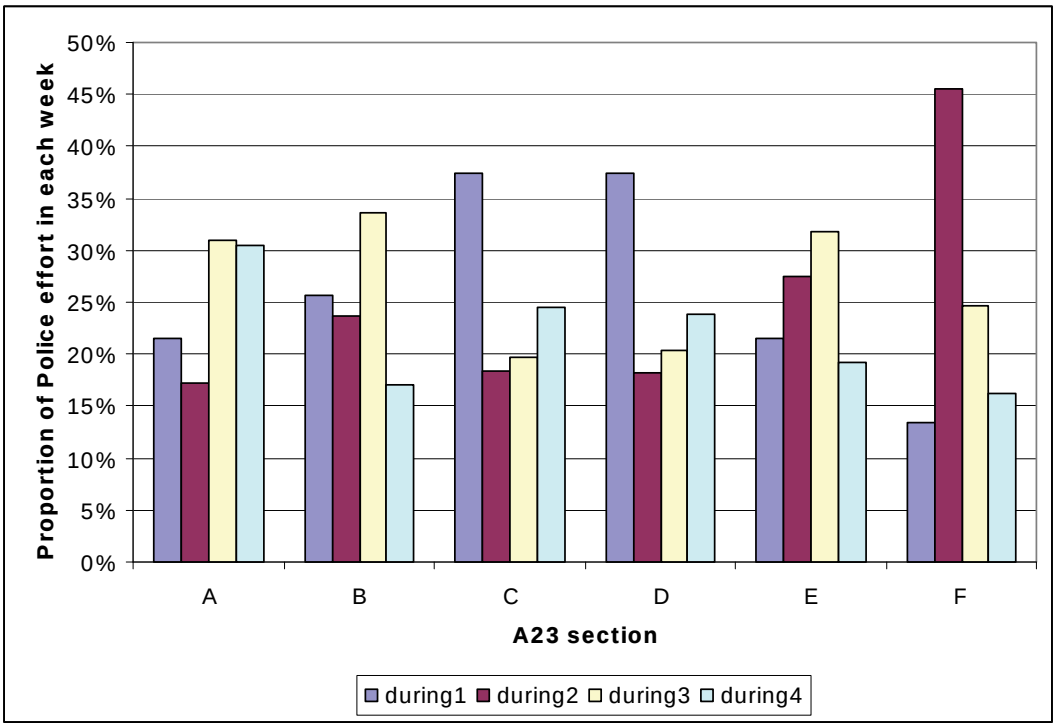

Figure 3.1: Proportion of Police effort in each section by week

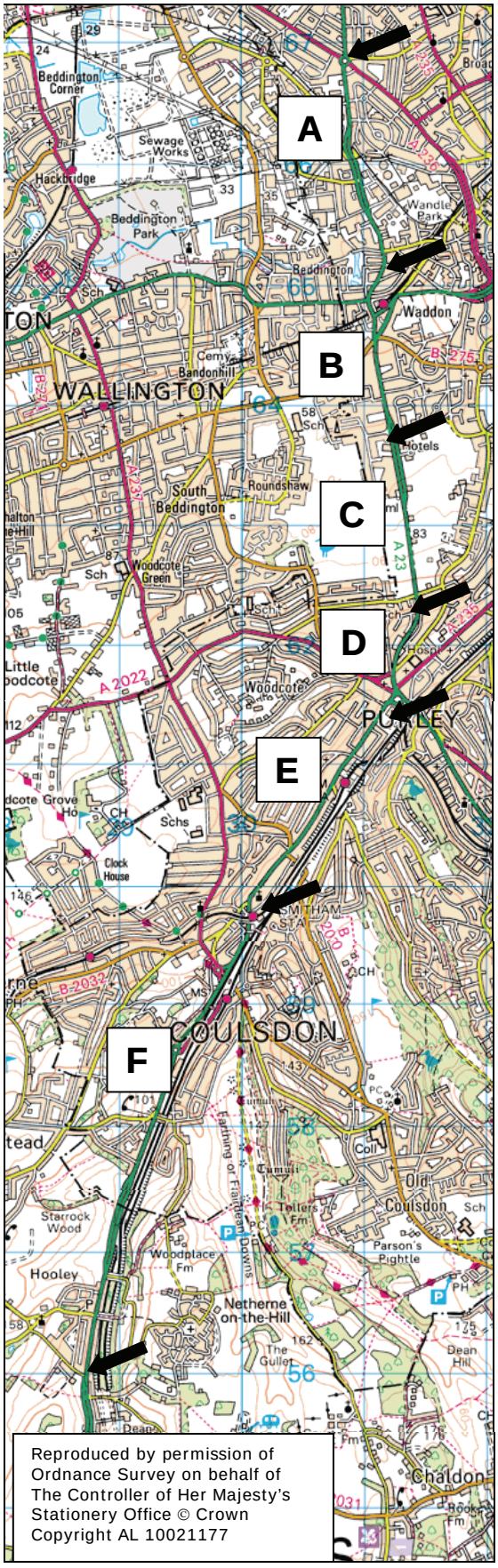

Figure 3.2: Route map divided by Police sections

Figure 3.3 shows the proportions of Police methods by section during the operation. This shows that the majority of the static speed enforcement was based at the Southern end of the route in Section F and a high proportion of the patrolling effort was based in Section E.

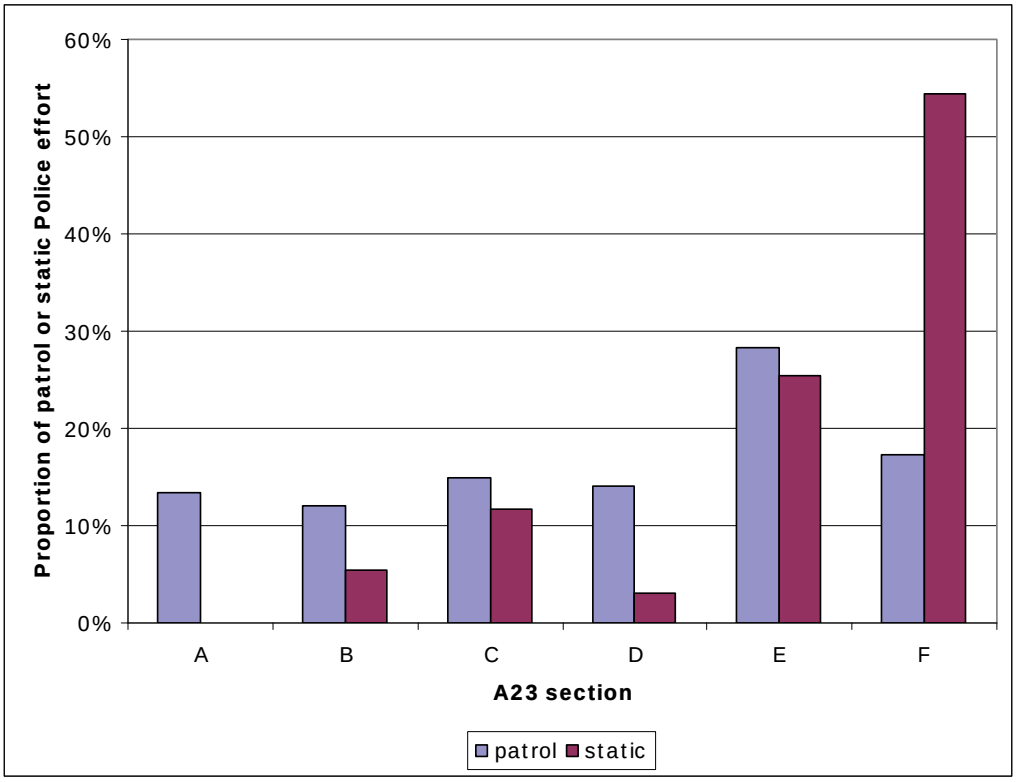

Figure 3.3: Proportion of Police effort in each section by enforcement method

These figures give no indication of the background level of policing, however if one assumes that this remained fairly constant, these results give a good indication as to the sections where the Police were more active, and therefore where a bigger effect may be observed. This information is used in Section 4.3 to compare speed, mobile phone and seat belt results at different points against levels of Police enforcement along the A23 route.

3.2 Media campaign

In their literature review of Police enforcement, Elliott and Broughton (2005) recognised the importance of including publicity and/or education in enforcement programmes. Publicity is seen as reinforcing the effect of increased Police enforcement by affecting offending drivers' perceived risk of being caught. Many of the previous studies across the world that are discussed in the literature review include a media campaign to publicise their enforcement programme. Elliott and Broughton (2005) also reported that once media campaigns are included in enforcement programmes, however, it is impossible to determine whether any effect on offence levels is due to the increased Police effort or to the publicity.

As part of Operation Radar, a publicity plan was implemented. This plan included regular press releases (included in Appendix C) circulated by the Metropolitan Police detailing the concept of the operation and the numbers of offenders already caught. As a result of these press releases, two local papers ran stories about Operation Radar – the Croydon Guardian at the start of the operation, and later, the Croydon Advertiser. In addition to the press, drivers along and near the route could see compelling images and slogans on billboards advising them of the increased enforcement in the area.

Figure 3.4: Billboards promoting increased Police enforcement

Signs along the route also warned drivers of the enforcement programme and detailed the number of offenders already caught during the operation.

Figure 3.5: Police community information boards detailing the numbers of offences caught on the operation route.

4 Evaluation

4.1 Police effect

The daily activity sheets, shown in Appendix A, which were completed daily by each Police Officer, contained information on offences recorded during the operation.

During the operation 17 arrests were made and 939 endorsable FPNs, 1039 non-endorsable FPNs and 96 Process Offences were handed out. Seat belt offences made up half of these tickets, speed and mobile phone offences each made up about a quarter and there were also a small number of no insurance offences recorded, as can be seen in Figure 4.1.

As the operation progressed it became clear on the ground and with the decrease in weekly numbers of endorsable FPNs (see Table 4.1) that it was increasingly difficult to find drivers who were breaking the law. This suggests that the public became increasingly cautious of being stopped for endorsable offences (speeding and mobile phone use) during the operation. However, the number of non-endorsable fixed penalty notices (mainly handed out for seat belt offences during this operation) and the number of seat belt offences recorded (shown in Table 4.2) did not decrease, suggesting that drivers were less concerned about traffic offences that carried no risk of losing their licence.

Table 4.1: Number of offences recorded during operation, by penalty

	Arrest	FPN(E)[3]	FPN(N)[4]	PO[5]
during1	4	209	247	12
during2	5	292	270	28
during3	4	289	275	31
during4	4	149	247	25
Total	17	939	1039	96

Table 4.2: Number of offences recorded during operation by major offence type

	Speed	Mobile phone	Seat belt	No insurance
during1	56	127	211	9
during2	182	126	218	10
during3	123	179	236	9
during4	81	76	215	8
Total	442	508	880	36

Once stopped for other traffic offences, 28 vehicles were found to have no MOT or tax and 41 drivers were not driving in accordance with their licence. Moreover, 12 drivers who were wanted for other offences were detained and 45 vehicles were seized.

[3] Endorsable Fixed Penalty Notice
[4] Non-endorsable Fixed Penalty Notice
[5] Process Offence

In addition to seat belt and mobile phone offences, 175 drivers were reported for offences that would not have been detected using technology alone and 28% of offenders were not the registered keeper of the vehicle they were driving, making it difficult to assign offences to the correct person using technology alone.

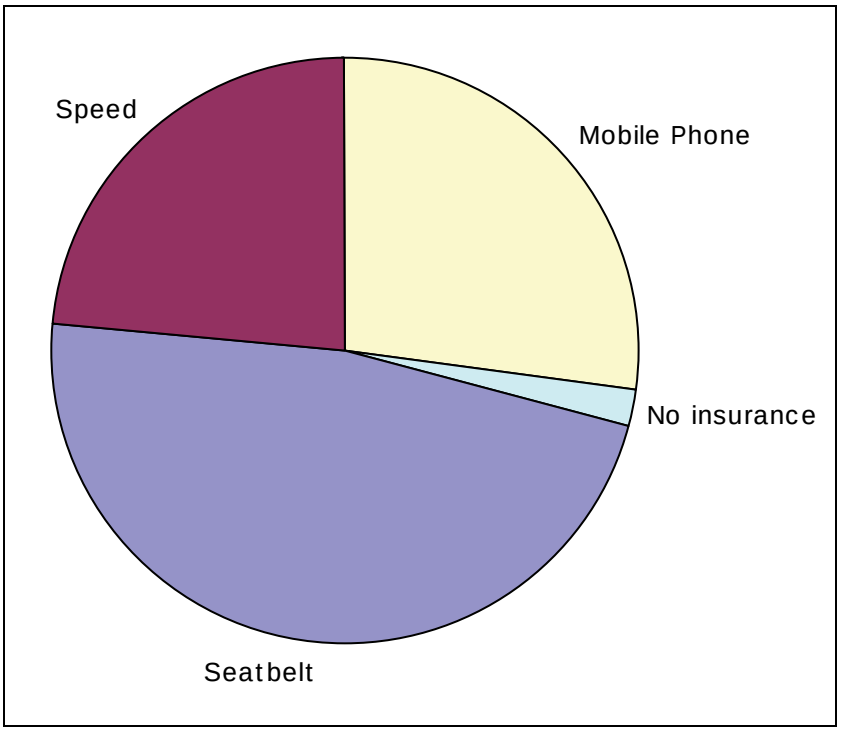

Figure 4.1: Distribution of major offence types during Operation Radar

4.2 Speed, mobile phone and seat belt evaluation

4.2.1 Method

4.2.1.1 Study design

The effects of increased Police enforcement on three aspects of driver behaviour were observed:

- vehicle speed
- drivers' use of mobile phones
- drivers' use of seat belts

Speed measurements and observations of mobile phone use and seat belt wearing were made on the route before, during and after the period of increased enforcement. Extra sites situated away from these roads were also surveyed before, during and after (just speed measurements) the operation to detect any halo effect off the route.

Three hypotheses about drivers' responses to increased enforcement were tested in the experiment:

- drivers would be more likely to observe the speed limit
- drivers would be less likely to use of hand-held mobile phones
- drivers would be more likely to wear seat belts

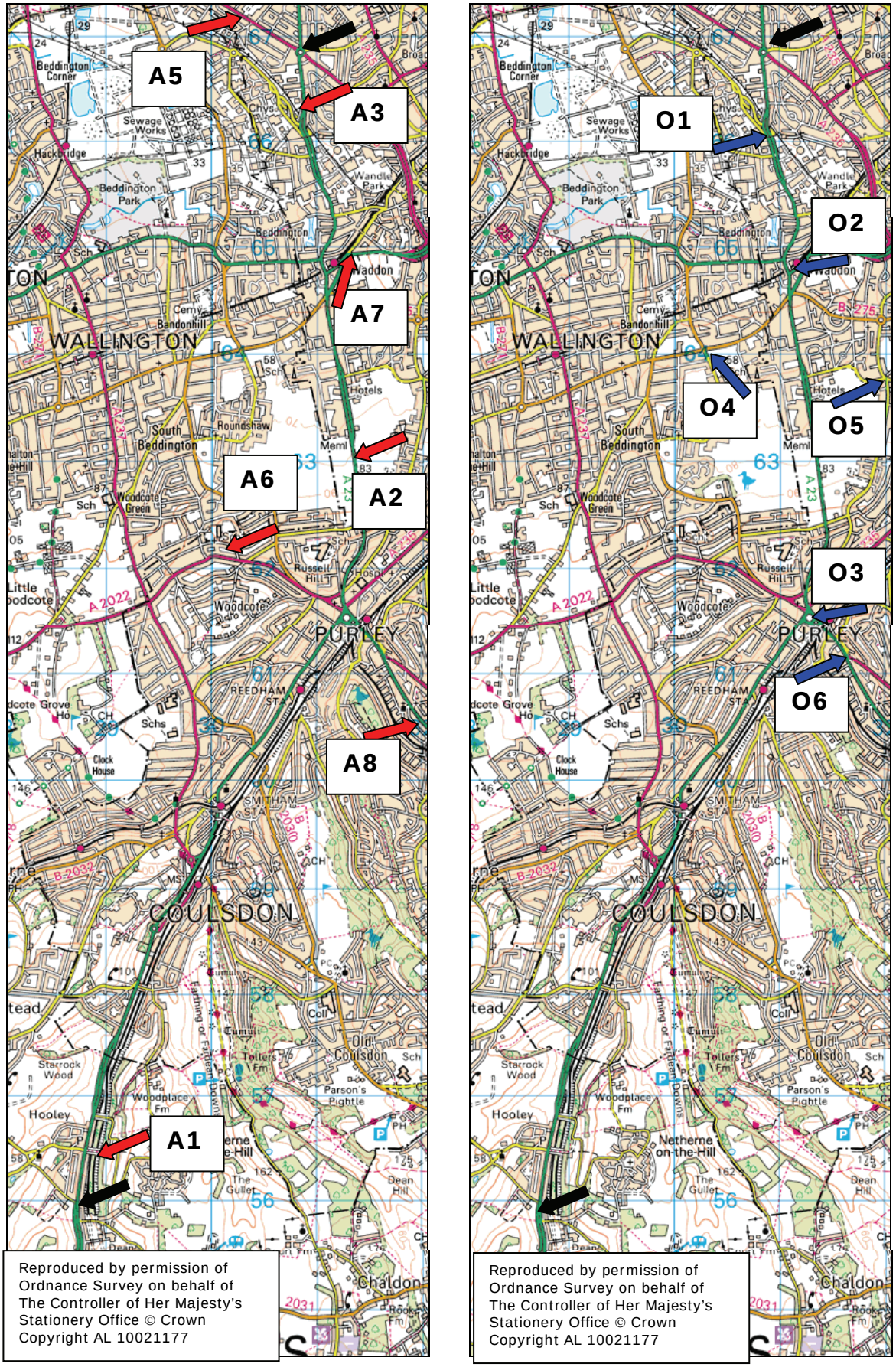

Figure 4.2: Position of speed measurements (left) and mobile phone and seat belt observation (right) sites

4.2.1.2 Site selection

On the route, speed was measured at three positions and observations of seat belt and mobile phone use were made at three junctions. Observations and speed measurements were also made at other sites close to the A23 route. Drivers' use of seat belts and mobile phones changes only slowly in normal circumstances, so it was not necessary to have control observations away from the route. However, studies reviewed in the literature review (Elliott et al, 2005) show that extra enforcement can have an effect on drivers on surrounding roads, as they are uncertain as to the precise area of extra policing. This is referred to as a halo effect and the data from the extra sites around the route were used to investigate this effect.

The route and surrounding area were visited and sites (shown in Figure 4.2) were selected on a series of criteria. The A23 sites were located away from the end of the route so that the observed drivers had potentially been subject to increased enforcement. Observation sites require a light controlled junction and a safe footpath for the observers to walk the length of the traffic queue. Speed measurement sites require a long stretch of un-congested road with no or few junctions, and no permanent speed management. Two of the speed sites on the A23 were required to be situated where most of the static speed checks were planned – Sections C and F, shown in Figure 3.2. Exact site locations are specified in Appendix B.

4.2.1.3 Speed data

Individual vehicle speed data were collected continuously by Automatic Traffic Counters (ATCs) at seven sites (three on the A23 and four on roads close to the A23) enabling mean speeds and distributions to be measured accurately.

Having cleaned the data, the dataset contained un-congested speed data for cars (includes taxis and small LGVs) from Tuesday to Friday for the 12-hour period: 0700-1900. This includes data from one week before Operation Radar commenced to two weeks after it finished, plus an additional week eight weeks later, at three sites on the A23 and four off-route sites.

The data for weekend and night traffic were removed as there was no increased enforcement during these periods. There were Bank Holidays during Week 1 and week 4 of the operation and there was no increased Police presence on these Mondays. Data from all Mondays were also removed in order to make the weeks with and without Bank Holidays comparable. To determine whether the level of enforcement can affect a driver's choice of speed, it is imperative that drivers have the opportunity to choose their own speed, so data for congested traffic were also removed. Congested traffic was defined as vehicles travelling less that 10mph slower than the speed limit at each site, based on the assumption very few drivers on these roads would choose to drive any slower.

The method used for measuring speed is not perfect and some data are missing, for example when tubes are displaced by heavy vehicles, a vehicle parks over or on a loop or the memory becomes full. It is partly for this reason that several loops were deployed along each of the study routes.

4.2.1.4 Seat belt and Mobile phone observations

Drivers' use of seat belts and mobile phones was observed at three sites on the A23 (O1 to O3 in Figure 4.2, right) and three sites near the route (O4-O6). Site O1-O3 (on the A23) were visited weekly from two weeks before the operation started to two weeks after it had finished, plus an additional week eight weeks later. At the halo sites (O4-O6) observations were made weekly from two weeks before up to the end of the operation.

Two people were posted at each site for eight half hour sessions during daylight hours each week. One recorded the number and type of vehicles passing in the observation session while the other recorded restraint and phone use for drivers of vehicles (cars, taxis and LGVs only) that stopped at the traffic signal. The details recorded for each driver are detailed in Table 4.3.

The proportion of drivers using a hand-held or hands free mobile phone has been calculated as the proportion of all vehicles surveyed at each survey site before, during and after the operation. The proportion of drivers wearing seat belts has been calculated in a similar way. Proportions during and after the operation have been compared to the baseline level of use observed before the operation commenced.

At sites where a greater traffic flow is seen, observers may not have time to record the observations for every vehicle stopped at the light controlled junction before the lights change. This biases the results towards those sites where the traffic flow was lower and where sufficient time was available to survey all vehicles in the traffic queue. Weights were applied to the data to ensure that the proportion of vehicles for which detailed data is collected was the same across all sites and sessions, based on the traffic counts in each session.

Table 4.3: Variables and categories of data collected in survey

Variable	Categories
Sex	male, female, unknown.
Age (estimated)	17-29, 30-59, 60+, unknown.
Restraint used	seat belt, unrestrained, cheated (restraint not used properly), unknown
Mobile phone use	hand-held, hands free[6], none
Vehicle type	car, van, hackney carriage, private hire vehicle
Vehicle prefix	L and later registrations, H-K, E-G, C-D, older, other

4.2.2 Expected effects

It was expected that an increased Police presence for a sustained period of time would lead to improved compliance with speed limits, higher seat belt use and lower hand-held mobile phone use. It was not expected that hands free use would decrease, as this is not against the law, or that large improvements in offending rates would be seen at sites where there is a relatively low baseline level of offending. As shown in Figure 3.3, the Police activity was not split exactly equally along the route, and so it was likely that a bigger reduction in offenders would be seen in those areas where there was more Police activity.

4.3 Speed, mobile phone and seat belt results

4.3.1 Speed results

The seven sites (split into two directions) where speeds were recorded were split into four groups:

[6] Drivers were only classified as using a hands free phone if the observer was sure that a hands free mobile phone was being used, so the proportion of drivers using hands free mobile phones may be underestimated.

- sites on the A23 near the targeted speed enforcement (Targeted A23 sites);
- sites off the route but near the targeted speed enforcement (Close off-route sites);
- the other sites on the study route but not near the targeted speed enforcement (Other A23 sites); and
- other sites off the A23 (Other off-route sites) which includes sites near the targeted enforcement heading towards the A23 (those that had not been subject to increased enforcement).

Note that all results that follow are from a cleaned dataset which does not include any vehicle speeds less than 10mph below the speed limit, as described in Section 4.2.1.3, and results in average speeds that are higher than the actual average speeds. These values are comparable across weeks as levels of congestion are similar, but should not be used as definitive speeds at these sites for any other purpose.

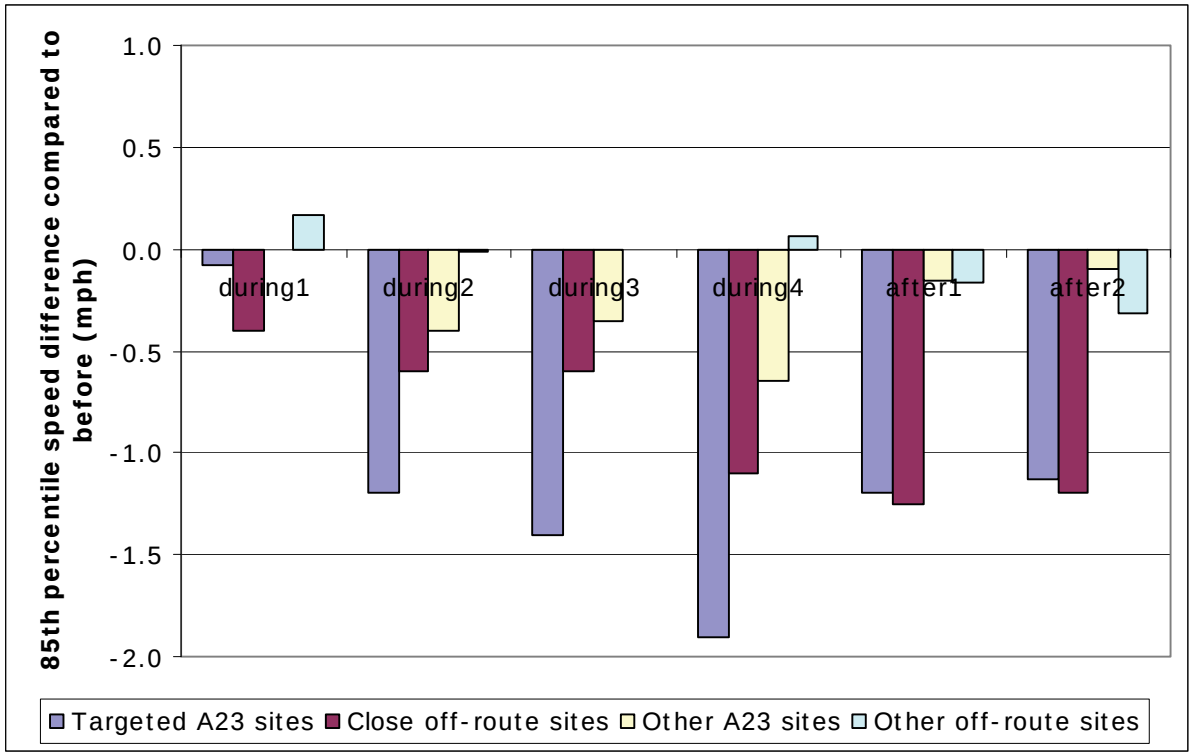

Figure 4.3: 85th percentile speeds compared to before operation (mph)

Figure 4.4 shows the drop in 85th percentile speeds in the four groups of sites described above by week compared to the 85th percentile speeds measured before the operation started. It is clear that the biggest drop in speeds occurred in the Targeted A23 group where the 85th percentile speeds were observed to drop steadily throughout the operation reaching a difference of 1.9mph in the 85th percentile speeds by the end of the operation compared to the before period. The sites that were situated off the route but near the targeted section (Close off-route sites) of the A23 were also affected. These sites contained some traffic that had travelled on or across the A23 and so may have been exposed to increased Police enforcement on the A23, but there was no planned additional Police presence at these halo sites. There was a drop of 1.1mph in the 85th percentile speed by the end of the operation at these sites compared to the baseline before period. For both of these groups, the decrease in speeds continued after the operation had finished. By week four of the operation there was a small decrease (0.6mph) in the 85th percentile speeds in the Other A23 sites group – this group contains both directions of traffic at site A3 near the north of the route and not near any static

speed enforcement activity, although drivers would have been aware of the increased Police presence. Mean speeds also dropped by similar amounts, and the equivalent graphs and tables are shown in Appendix D.1.

As would be expected, a greater reduction was seen at sites where the mean speed before the operation commenced was considerably higher than the speed limit. The differences between the baseline before mean speeds and the speed limit are shown in Table 4.4. This shows that, in particular, at two sites in the Targeted A23 group and the two sites in the Close off-route sites group, mean speeds were substantially higher than the speed limit and it is at these sites where the largest effect was expected.

Table 4.4: Mean speed (mph) above speed limit in before period

	Site	Speed
Targeted A23 sites	Site1 NB	6.4
	Site1 SB	-1.2
	Site2 NB	1.8
	Site2 SB	-0.7
Close off-route sites	Site6 WB	3.4
	Site8 SB	2.8
Other A23 sites	Site3 SB	-0.8
	Site3 NB	-1.4
Other off-route sites	Site5 WB	-3.8
	Site7 EB	0.9
	(Site5 EB)[7]	-4.4
	(Site6 EB)	2.4
	(Site7 WB)	1.3
	(Site8 NB)	1.4

At these two sites in the Targeted A23 group – Site1 NB and Site2 NB - reductions in 85th percentile speed of 3.4mph and 2.2mph were observed in the final week of the operation compared to before the operation commenced, as shown in Figure 4.4. Other sites showed more fluctuation across the operation.

At the Close off-route site Site6 WB the 85th percentile speed dropped by 2.1mph compared to the baseline speed measured in the before period. At Site8 SB however a very small difference of 0.1mph was observed which suggests that fewer drivers on this route were aware of the operation on the A23.

[7] Sites that are in brackets contained traffic moving towards the A23 operation route on the halo sites, and thus had not been subject to increased enforcement

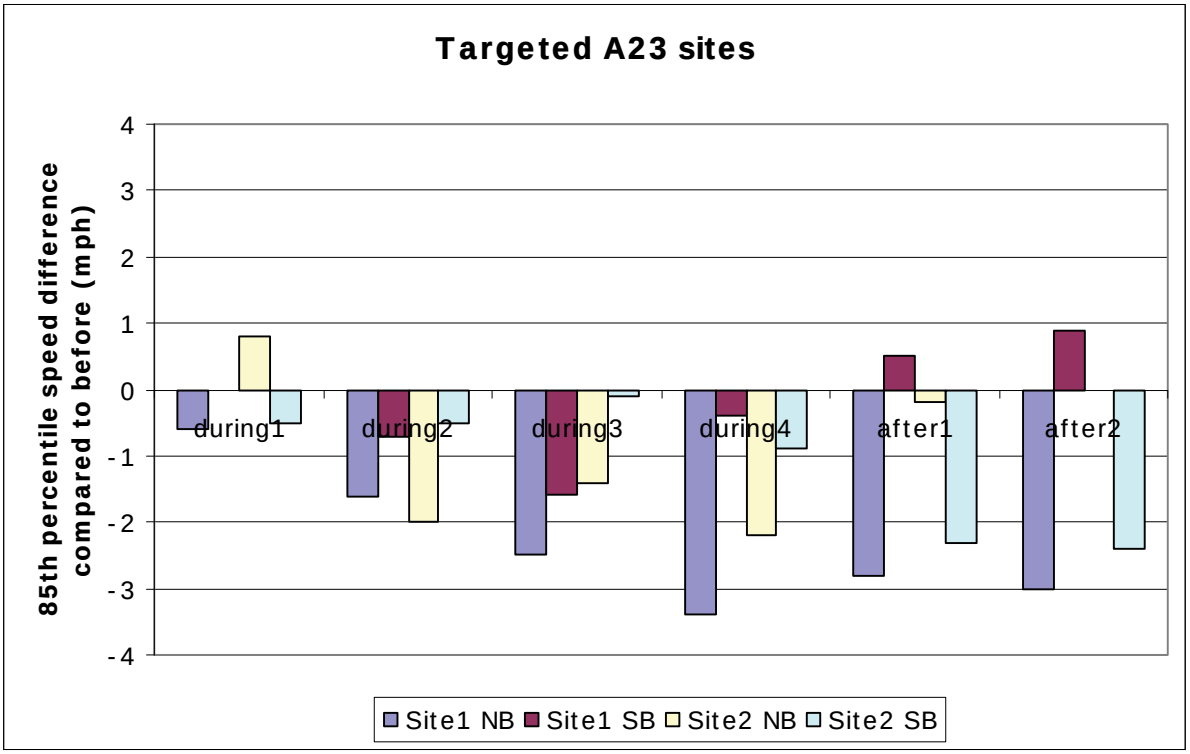

Figure 4.4: 85th percentile speeds compared to before operation at targeted A23 sites (mph)

In addition to a drop in mean and 85th percentile speeds, the proportion of drivers who exceeded certain speed levels were evaluated across the operation. The speed levels investigated were the speed limit, the ACPO recommended enforced speed level (speed limit + 10% + 2mph) and 15mph above the speed limit.

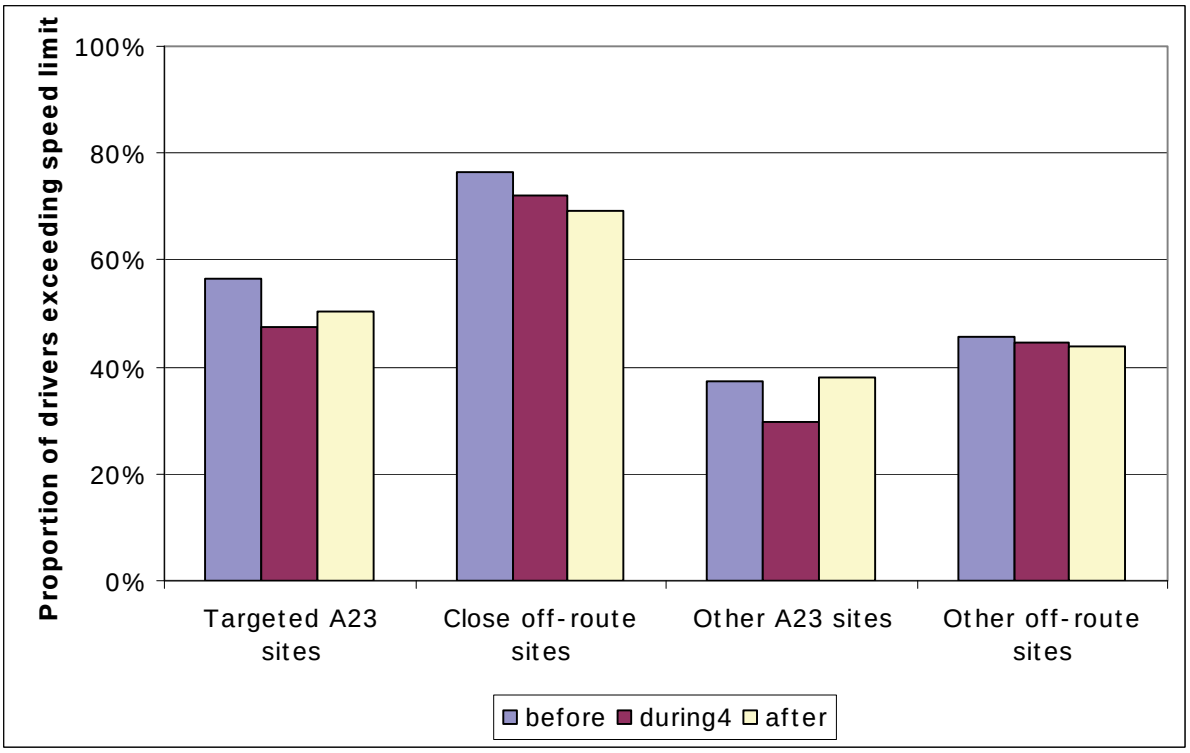

Figure 4.5: Proportion of drivers exceeding the speed limit

Figure 4.5 shows the proportion of drivers exceeding the speed limit across the four groups of sites, before the operation, during the final week of the operation and after the operation had finished. There was a clear decrease in the proportion of drivers exceeding the speed limit by the final week of the operation at the Targeted A23 sites (a drop of 9 percentage points) and the Other A23 sites (dropped by 8 percentage points), and smaller decreases for the Off-route groups (drops of 4 percentage points and 1 percentage point respectively). At the Targeted A23 sites and the Close off-route sites the proportion of drivers exceeding the speed limit remained lower than the baseline before period for two weeks after the operation had finished.

Figure D. 39 and Figure D. 45 show equivalent proportions of drivers exceeding the ACPO recommended speed level and 15mph above the speed limit. Similar patterns can be observed to those described above for Figure 4.5. The biggest difference between the baseline before period and the final week of the operation occurs at the Targeted A23 sites followed by the Close off-route sites (a decrease of 7 and 5 percentage points in Figure D. 39 and a decrease of 2.3 and 0.3 percentage points in Figure D. 45 respectively). Small decreases in drivers exceeding these speed levels were also observed at the Other A23 sites and slight increases in the proportions of drivers were seen at the Other off-route sites.

At the two sites where the biggest mean and 85th percentile speed drop was observed (Site1 NB and Site2 NB) the proportion of drivers exceeding the speed limit dropped from 69% before the operation to 59% in the final week of the operation. The proportion travelling above the ACPO recommended enforced speed level dropped from 35% to 24% and the proportion travelling at excessive speed dropped from 6.4% to 2.7%. This provides additional evidence that seriously high speeders were affected by the increased Police presence.

Table 4.5: Proportion of drivers exceeding three speed levels at Site1 NB and Site2 NB

Period	Speed limit	ACPO	+15mph
before	69%	35%	6.4%
during1	71%	37%	6.9%
during2	62%	29%	4.1%
during3	63%	27%	3.6%
during4	59%	24%	2.7%
after1	66%	28%	4.1%
after2	66%	28%	3.9%
later	69%	35%	6.4%

4.3.2 Seat belt results

The proportion of drivers wearing seat belts has been calculated for each of four periods – before (two weeks), during (four weeks) and after (two weeks) the operation, plus later (one week, eight weeks after the operation). Results for the six observation sites have also been combined into two groups for this section – sites on the A23 (O1-O3 in Figure 4.2) and halo sites, off the route (O4-O6). There is more variability in the week by week, site by site results so the combined results are presented and discussed in the main report, and results for individual sites and weeks can be found in Appendix E.

Table 4.6 shows the overall proportion of drivers wearing seat belts on the A23 operation route, and at the halo sites for the four periods. The baseline level of seat belt use on the A23 was measured at 87% in the before period, and at 85%, on average, at the halo sites. During the operation, the proportion of drivers observed wearing seat belts remained at 87% on the A23 and dropped to 83% at the halo sites. Figure 4.6 shows the same results split by site and this reveals that at sites O1 and O6 a small increase in wearing rates was observed (from 87% to 88% at O1 and from 83% to 85% at O6).

Table 4.6: Proportion of drivers wearing seat belts

Period	A23	Halo
Before	87%	85%
During	87%	83%
After	84%	
Later	91%	

Sites O1, O2 and O3 on the A23 were situated in sections A, B and D/E respectively (see Figure 4.2), and it is shown in Figure 3.3 that of these sections, the highest proportion of Police patrolling effort was concentrated in Section E. This would suggest that the most likely site at which to observe an increase in wearing rates would have been O3. In fact, at site O3 a small decrease was observed from 89% to 88% and therefore it was not possible to conclude that the small changes in seat belt wearing rates were any more than random fluctuations. This is further corroborated by an unexplained drop to 84% in the after period followed by the high wearing rate of 91% observed in the later period on the A23, some time after the operation had finished.

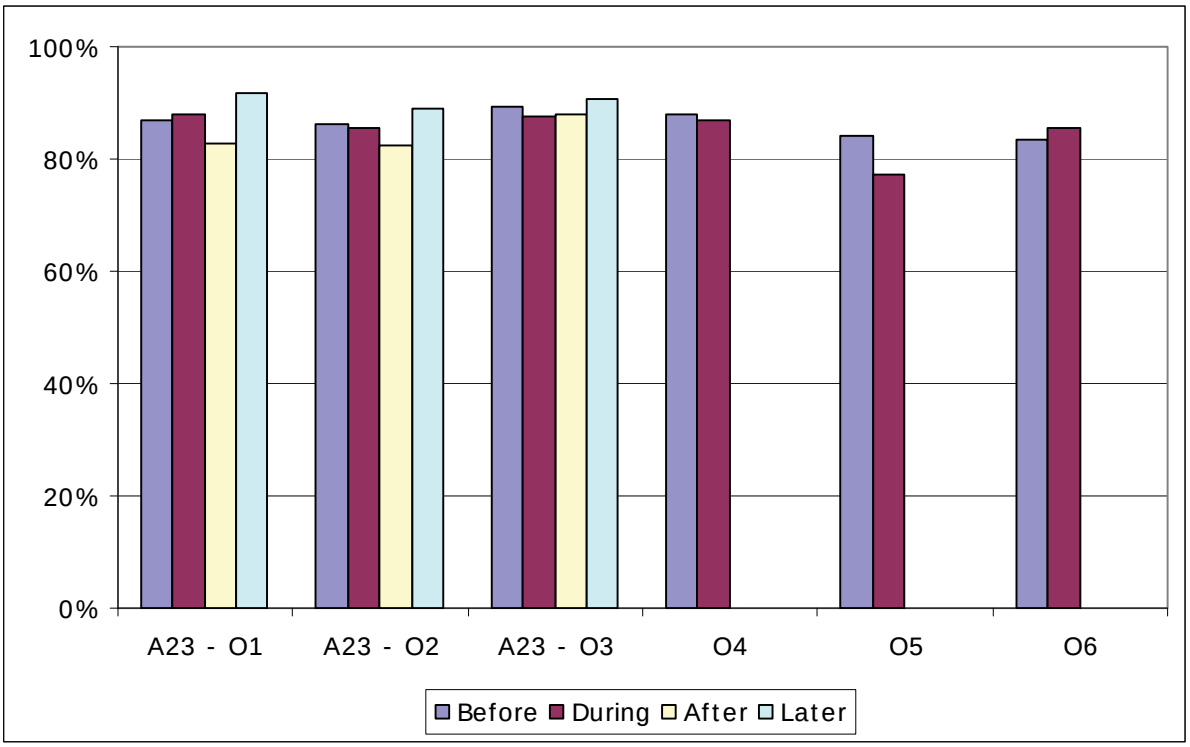

Figure 4.6: Proportion of drivers wearing seat belts, by site.

Additional tables in Appendix E show the A23 wearing rates split by vehicle type (car & taxi, and van), sex, and age group (17-29, 30-59 and 60+). Van drivers and young

drivers (17-29) were observed to increase their wearing rates by 3 percentage points during the operation compared to the baseline, but all other groups remained constant.

4.3.3 Mobile phone results

The use of a hand-held mobile phone whilst driving was made illegal in December 2003 and the penalty was increased to three points and a £60 fine in February 2007. In London in 2008, the average hand-held mobile phone use by drivers was estimated at 1.9% (Knowles et al, 2008). A considerable number of drivers continue to break this law, although this is a small proportion of the number of driving population.

The baseline level of hand-held mobile phone use by drivers on the A23 was observed to be 1.8% and considerably higher (3.3%) at the halo sites. No change in hand-held phone use was observed during the operation at the A23 sites but there is a small drop at the halo sites compared to the baseline level. This is almost entirely driven by the large decrease at site O4 during the operation shown in Figure 4.7. The patterns by site and week, shown in Appendix F are similarly erratic and it has not been possible to draw any consistent patterns out of the data.

Table 4.7: Proportion of drivers using mobile phones.

Sites	Period	Hand-held	Hands free
A23	Before	1.8%	4.3%
	During	1.8%	4.6%
	After	1.6%	5.0%
	Later	2.2%	3.0%
Halo	Before	3.3%	6.7%
	During	2.6%	6.1%

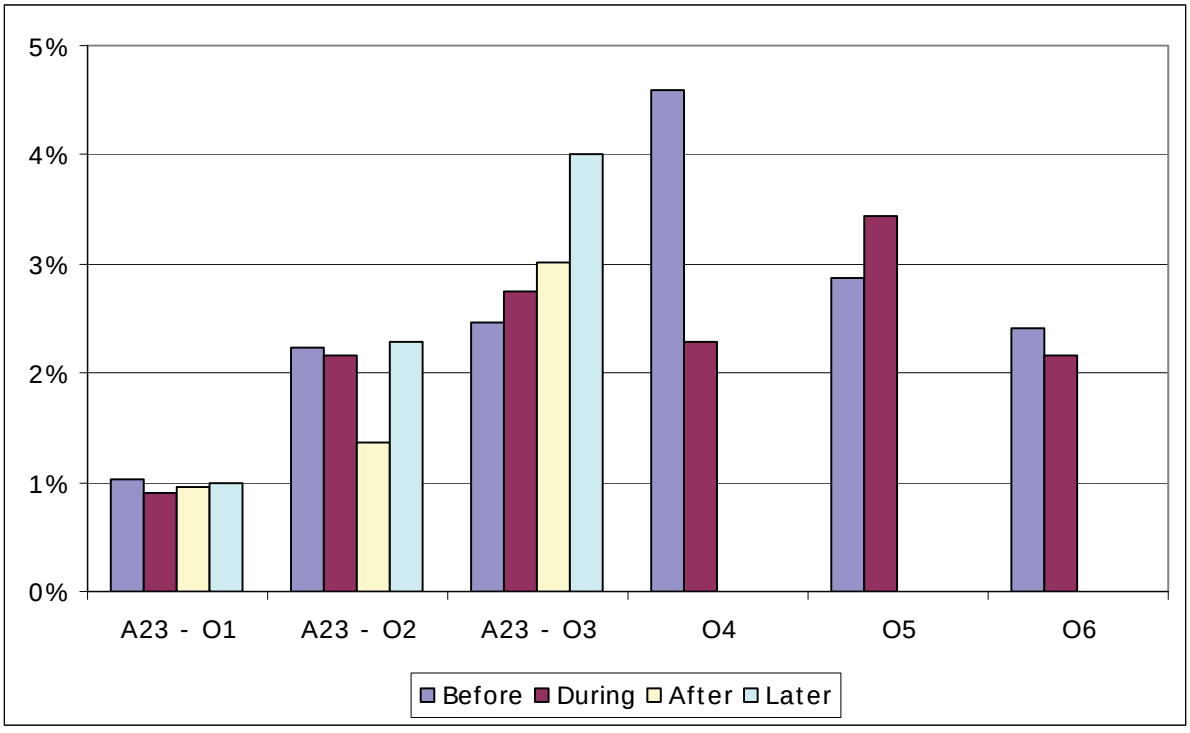

Figure 4.7: Proportion of drivers using hand-held mobile phones, by site.

Hands free mobile phone use increases from baseline to during and again in the after period at the A23 sites but drops again in the later period.

Results have been split by vehicle type (car & taxi, and van), sex, and age group (17-29, 30-59 and 60+) are shown in Appendix F. These results show a notable decrease in hand-held mobile phone use at the A23 sites by young drivers and by females.

4.4 Estimated safety benefit

The expected casualty benefits of the increased enforcement levels can be inferred from the results described in Section 4.3. As there were no discernible effect on mobile phone and seat belt use, the expected casualty benefit will concentrate on the speed reductions observed. There has been a considerable amount of research into the link between speeding and road traffic collisions, for example Taylor et al (2000) concluded that a reduction in mean speed of 1mph on urban medium speed roads was associated with a 4% saving of collisions.

38 road users were fatally or seriously injured in collisions occurring on this six mile stretch of the A23 between 2005 and 2007, and 279 slightly injured casualties. The overall speed reduction has been calculated from the mean of the recorded mean speeds at all targeted A23 sites from week 1 of the operation to two weeks after the operation (35.8mph) compared to the before average mean speed (36.6mph). This is an overall speed reduction of 0.8mph and a relative casualty saving of 3.2% on this stretch of road for the 6-week period during and after the increased enforcement period. Over the three year period 2005-2007 (if this enforcement level and effect had remained) it is estimated that this would have saved 0.1 fatally injured casualty, 1 seriously injured casualty and 9 slightly injured casualties, as shown in Table 4.8. These casualty savings have been converted into a six week period to replicate the operation effective length (the period of time over which a speed reduction was observed) and Table 4.9 shows the casualties that are likely to have been avoided during this time as a result of the speed reduction.

Table 4.8: Estimated casualty saving over three years on A23 using Targeted A23 site mean speeds

Casualty	2005-2007 casualties	Casualty saving	Cost saving
Fatal	3	0.1	£0.1m
Serious	35	1.1	£0.2m
Slight	279	8.9	£0.1m
Total	317	10.2	£0.4m

Table 4.9: Estimated casualty saving over six weeks on A23 using Targeted A23 site mean speeds

Casualty	6 week casualties	Casualty saving	Cost saving
Fatal	0.1	0.004	£5.3k
Serious	1.3	0.043	£6.9k
Slight	10.7	0.343	£4.2k
Total	12.2	0.390	£16.4k

These rates have be used to calculate the value of reducing the numbers of casualties using the values of prevention of road accidents published most recently in Road Casualties Great Britain (DfT, 2008). Table 4.8 shows that the value of the casualty reduction from three years of speed reduction similar to that seen during Operation Radar would be £0.4m. Confined to a six week period, the value would be £16.4k as in Table 4.9.

It is generally accepted that higher speeds lead to higher severity and higher numbers of collisions, so it is likely that proportionately more collisions occurred at sites where a higher mean speed was observed. At the site where the largest difference between mean before speed and speed limit was observed (Site1 NB), 7.2% fewer casualties would be expected. Assuming that the majority of the collisions on this stretch of road occured at or near this site, this corresponds to a probability of saving one fatally or seriously injured casualty of 11% in six weeks and a cost saving of £37k, as shown in Table 4.10.

Table 4.10: Casualty saving over six weeks on A23 using Site1 NB mean speeds

Casualty	6 week casualties	Casualty saving	Cost saving
Fatal	0.1	0.008	£11.9k
Serious	1.3	0.097	£15.6k
Slight	10.7	0.773	£9.6k
Total	12.2	0.878	£37.0k

5 Discussion

5.1 Operational success

The success of Operation Radar was not just defined by results from the supporting study of mobile phone use, seat belt use and speeding. Police Traffic operations are run regularly, without an associated study, to target a range of offences or demographic groups and their success is measured by a number of different aspects. This operation was considered to be very successful for several reasons. Firstly, large numbers of offences were recorded during the operation from seat belt non-endorsable FPNs and mobile phone and speeding endorsable FPNs to vehicle seizures due to defective cars and driving without an appropriate licence or vehicle documentation. In addition a number of drivers were arrested for serious traffic offences or other outstanding offences during the operation. The operation received good feedback overall from the public and local council, and positive media coverage throughout. Police Officers who were part of the operation were keen to be involved in an operation that focussed on traffic policing without being distracted by other policing requirements. Due to its success in this area, the Met Police would consider using this operation plan again in a different area of London.

Other un-measurable benefits to this operation include a possible effect on the ticketed driver – there is evidence to suggest that offenders who are close to being disqualified due to the number of points on their licence modify their behaviour (Broughton, 2008). In addition Police visibility increases drivers' awareness of enforcement strategies and their perceived risk of being caught.

Even with this extensive operation and a large number of drivers convicted for traffic offences, only a small proportion of offences were recorded by Police Officers. Of the 17,000 vehicles driving along this route each day around 7,000 of them were using a mobile phone, not wearing a seat belt and/or driving above the ACPO recommended speed enforcement level. During the operation 1,831 FPNs were distributed for these offences meaning that approximately 1.4% of these offences were recorded by Police Officers. This small proportion is due to the high rate of, in particular, speeding and seat belt offences on the route.

5.2 Speed

Reductions in 85th percentile speeds of up to 3.4mph were measured at sites near the targeted speed enforcement area on the A23 by the end of the operation. There were also considerable speed reductions observed at sites off the A23 which were not exposed to additional Police activity but carried traffic that may have been exposed. These considerable reductions remained at most sites for at least two weeks after the operation had finished and Policing levels went back to their baseline levels. There were even small reductions in speed observed on the A23 where no targeted speed enforcement took place but there was a Police presence .

As well as a reduction in mean and 85th percentile speeds, a considerable drop in the proportion of drivers exceeding certain speed levels was observed, providing additional evidence that seriously high speeders were affected by the increased Police presence. Reducing the speed of drivers who drive at high speeds is especially likely to reduce the severity and number of collisions in the area.

5.3 Seat belts

Seat belt use remained at 87% on average on the route before and during the operation and dropped a little off the route. This offence clearly has a high offending rate on this

route meaning that only a small proportion of the offenders could be stopped by the Police Officers. Approximately 19,000 vehicles travelled along the A23 each day during the operation and around 13% of these were observed not to be wearing a seat belt. Even with the 880 tickets that were distributed by the Police Officers (the highest proportion of FPNs for any offence) for failing to wear a seat belt, this still means that only 2% of offenders were penalised. This apparent static effect is reinforced by the flat profile from the first to the fourth week of the operation for seat belt offences and non-endorsable FPNs. As a non-endorsable FPN, this offence is only punishable with a small fine and the data suggest that drivers are not as aware of or concerned about the accident risk when there is no risk of losing their licence. The reduction in mobile phone offenders caught during the operation might suggest that drivers may be more willing to observe this traffic law if the punishment did jeopardise their licence.

5.4 Mobile phones

No change in the use of hand-held mobile phones was detected on the A23 by the study's weekly observations. However the number of mobile phone offences recorded during the operation decreased steadily over the weeks as it became more difficult on the ground to find drivers committing this offence, providing unsubstantiated evidence that the level of offending did actually reduce. Approximately 8% of all drivers using mobile phones were caught by Police during the operation.

There are several possible reasons for this difference; firstly offenders were still using mobile phones but were more aware of the Police presence and were ready to hide them when they spotted a Police Officer; and random variation. Random variation itself has two possible sources - mobile phone use is difficult to detect by observers walking along the pavement next to cars meaning that they are only recorded as using one if the observer is definite and thus observations are underreported. However, these should be approximately proportionately underreported so a comparison across weeks should not be affected. A more likely cause of this random variation is due to the proportionately small numbers of drivers using mobile phones meaning that just a small number of additional people observed using a phone can dramatically affect the results. This is evidenced by the large decrease at site 4 where Police enforcement was not increased.

Acknowledgements

The work described in this report was carried out in the Statistics and Engineering Group of the Transport Research Laboratory. The author is grateful to Jeremy Broughton who carried out the technical review and auditing of this report, and to Jackie Knowles who carried out the analysis on mobile phones and seat belts.

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Appendix A Police Activity sheet

Operation RADAR

Date	Shift	Crew	Fleet No

SW or SE Garage?	Car ☐ Bike ☐	If car MDT MOI/

***Notes for guidance**: This operation relies on accurate data collection so please complete fully. Start time, end times and detailed activity records are important. Indicate if static stop site or mobile. Comments should be use to expand on Arrest type or where offences reported that couldn't be detected by camera (ie.PG9, No D/L) Local refers to living within 5 miles of stop. R/K is for where vehicle is not registered to driver.*
Remember this form will also be passed to the TRL the external body conducting this study.

	Time	Location	Sector	Activity	End	Arrest	Pro	FPNe	FPNp	Speed	Mob	SBelt	Ins	Local	R/K	Comments
ie	*0700*	*TDP*		*Parade / Brief / Travel*	*0705*											
ie.	*0710*	*Purley Way / Trojan Way*	*A/N*	*Static Speed Check*	*0740*		*2*	*3*								
ie.	*0930*	*Brigton Road / Sydney Ave*	*C/S*	*Stop - AD54TRY*	*0950*		*1*				*1*		*1*		*1*	

	Totals for day														

Sector References (Add S for away from MPS or N for towards MPS) ie (A / N) !			
Ref	**From**	**To**	**Distance**
A	Lombard Roundabout	Purley Way / Mill Lane	1.0 miles
B	Purley Way / Mill Lane	Purley Way / Imperial Way	1.0 miles
C	Purley Way / Imperial Way	Purley Way / Edgehill Rd	1.0 miles
D	Purley Way / Edgehill Rd	Purley Cross (South Side)	0.6 miles
E	Purley Cross (South Side)	Brighton Rd A23 (Start of New Section)	1.3 miles
F	Brighton Rd A23 (Start of New Section)	Brighton Rd A23/A237 (End of New Section)	1.7 miles

Appendix B Site selection

Table 5.1: Observation sites

Site	Road	Junction	Direction
O1	A23 Purley Wy	j/w Beddington Farm Road	NB
O2	A23 Purley Wy	j/w Croydon Rd	SB
O3	A23 Purley Wy	j/w Foxley Lane & Pampisford Road	SB
O4	B271 Stafford Rd	j/w Plough Ln and Morrison Dr	WB
O5	A235 Brighton Rd	j/w Nottingham Ave	NB
O6	A22 Godstone Rd	j/w Downs Court Rd	SEB

Table 5.2: Speed measurement sites

Site	Road	Position
A1	A23 Brighton Rd	Btwn Starrock Rd and Marlpit Ln
A2	A23 Purley Way	Btwn Highfield Road and Waddon Way
A3	A23 Purley Way	Btwn Miller Rd and Beddington Farm Rd
A5	A236 Croydon Rd	Btwn Redhouse Rd and Watney's Rd
A6	A2022 Foxley Ln	Btwn Peaks Hill Rise and Woodcote Ln
A7	A232 Duppas Hill Rd	Btwn Epsom Rd and Duppas Road
A8	A22 Godstone Rd	Btwn Little Roke Rd and Hayes Ln

Appendix C Press releases

Release from May 6th 2008

Met Police traffic Officers will launch a crackdown on speed, hand-held mobile and seat belt offences to reduce death and injury on Croydon's roads today (6.5.08).

Operation Radar will see Officers conducting enforcement work along the A23 over a four-week period.

They will be using speed guns to detect drivers speeding on the road, which has 30mph and 40mph speed limits, and looking out for people using hand-held mobile phones while driving or not bothering to wear their seat belts.

The operation, which has been conducted in partnership with Transport for London Road Safety Unit and Croydon Road Safety Partnership, aims to deter people from committing these offences, all of which contribute to death and injury on our roads.

Over three years (up until the end of 2007), there have been 497 casualties from road traffic collisions along the A23, which represents almost 13% of the 3760 casualties across Croydon over the same period. Of those 497 casualties, four were fatal, 51 people were seriously injured and 442 slightly injured.

For speeding or using a hand-held mobile phone while driving motorists can expect a three-point fine on their licence and a £60 fine, while not wearing a seat belt carries a fixed penalty fine of £60.

Ch Insp Dave McLaren, of the Met Police Traffic Operational Command Unit, said: "This operation is designed to act as deterrent to people who continue to flaunt road traffic laws which exist for the safety of all road users. When statistics show that there were fatal collisions in London last year, work such as this is vital in preventing death and serious injury on London's roads."

Chris Lines, TfL's Head of London Road Safety Unit, said, ''Drivers need to know that if they speed, use a hand-held mobile phone, or don't wear a seat belt, they not only risk a fine, but put themselves and other road users at risk of injury or death. By teaming up with the Met Police and Croydon Road Safety Partnership we want to make further progress on reducing the number of people who are needlessly killed or injured on the borough's roads, which across London has already seen a 41 per cent decrease since the mid to late 1990s.''

Speeding drivers are more likely to be involved in collisions and it is estimated by the Transport Research Laboratory that for every 1% reduction in vehicle speed, a 5% reduction in collisions could be achieved. Research from the same source also shows that drivers on mobiles had slower reaction times and stopping times than those under the influence of alcohol.

A London survey also reveals that seat belt wearing is 87% for drivers and 84% for passengers in London, considerably lower than anywhere else in the country. The survey, conducted by the Transport Research Laboratory in 2007, also found that drivers using handheld mobiles were more likely not to wear seat belts.

May 19th 2008

Met Police traffic Officers conducting an operation to reduce death and injury on Croydon's roads have handed out over 1,000 tickets over a two-week period for speeding, hand-held mobile and seat belt offences on the A23.

During the operation, which began on May 6th and finishes on May 30th, Officers are using speed guns to detect drivers speeding on the road, which has 30mph and 40mph speed limits, and looking out for people using hand-held mobile phones while driving or not bothering to wear their seat belts.

Over three years (up until the end of 2007), almost 13% of the 3760 casualties across Croydon have occurred along the A23. Of those 497 casualties, four were fatal, 51 people were seriously injured and 442 slightly injured.

Ch Insp Dave McLaren, of the Met Police Traffic Operational Command Unit, said: “The fact that we’ve handed out over 1,000 tickets shows that people aren’t taking their safety and the safety of other road users seriously. We are doing this for a reason – to save lives and reduce injury. If we show that we are not prepared to tolerate offences like these, not just by giving out tickets but by explaining to motorists why we are doing so, I believe we can make a really make a difference.

People may not realise there were 234 fatal collisions in London last year, 74 more than the total number of murders.”

Chris Lines, TfL's Head of London Road Safety Unit, said, ''Drivers need to know that if they speed, use a hand-held mobile phone, or don't wear a seat belt, they not only risk a fine, but put themselves and other road users at risk of injury or death. By teaming up with the Met Police and Croydon Road Safety Partnership we want to make further progress on reducing the number of people who are needlessly killed or injured on the borough's roads, which across London has already seen a 41 per cent decrease since the mid to late 1990s.''

For speeding or using a hand-held mobile phone while driving motorists can expect a three-point fine on their licence and a £60 fine, while not wearing a seat belt carries a fixed penalty fine of £30.

The operation, which has been conducted in partnership with Transport for London Road Safety Unit and Croydon Road Safety Partnership, aims to deter people from committing offences, which contribute to death and injury on our roads.

Speeding drivers are more likely to be involved in collisions and it is estimated by the Transport Research Laboratory that for every 1% reduction in vehicle speed, a 5% reduction in collisions could be achieved. Research from the same source also shows that drivers on mobiles had slower reaction times and stopping times than those under the influence of alcohol.

A London survey also reveals that seat belt wearing is 87% for drivers and 84% for passengers in London, considerably lower than anywhere else in the country. The survey, conducted by the Transport Research Laboratory in 2007, also found that drivers using handheld mobiles were more likely not to wear seat belts.

3rd June 2008

Met Police traffic Officers who conducted an operation to reduce death and injury on Croydon's roads have handed out nearly 2,000 tickets over a four-week period for speeding, hand-held mobile and seat belt offences on the A23.

During the operation, which began on May 6th and finished on May 30th, Officers used speed guns to detect drivers speeding on the road, which has 30mph and 40mph speed limits, and stopped people using hand-held mobile phones while driving or not bothering to wear their seat belts.

Over three years (up until the end of 2007), almost 13% of the 3760 casualties across Croydon have occurred along the A23. Of those 497 casualties, four were fatal, 51 people were seriously injured and 442 slightly injured.

Ch Insp Dave McLaren, of the Met Police Traffic Operational Command Unit, said:

"My Officers have worked really hard during this operation and I'm pleased with the results they've achieved. It's hard to believe, though, that some people seem not to care about their own safety and the safety of others and continue to flout the law.

"The fact that we've handed out over 2,000 tickets is a clear indication of this. We are doing this for a reason - to save lives and reduce injury. Last year there were 234 fatal collisions in London, many of which could have been avoided.

"However, if we show that we are not prepared to tolerate offences like these, not just by giving out tickets but by explaining to motorists why we are doing so, I believe we can make a really make a difference."

Chris Lines, TfL's Head of London Road Safety Unit, said:

''Drivers need to know that if they speed, use a hand-held mobile phone, or don't wear a seat belt, they not only risk a fine, but put themselves and other road users at risk of injury or death.

"By teaming up with the Met Police and Croydon Road Safety Partnership we want to make further progress on reducing the number of people who are needlessly killed or injured on the borough's roads, which across London has already seen a 41 per cent decrease since the mid to late 1990s.''

For speeding or using a hand-held mobile phone while driving motorists can expect a three-point fine on their licence and a £60 fine, while not wearing a seat belt carries a fixed penalty fine of £30.

The operation, which has been conducted in partnership with Transport for London Road Safety Unit and Croydon Road Safety Partnership, aims to deter people from committing offences, which contribute to death and injury on our roads.

Speeding drivers are more likely to be involved in collisions and it is estimated by the Transport Research Laboratory that for every 1% reduction in vehicle speed, a 5% reduction in collisions could be achieved. Research from the same source also shows that drivers on mobiles had slower reaction times and stopping times than those under the influence of alcohol.

A London survey also reveals that seat belt wearing is 87% for drivers and 84% for passengers in London, considerably lower than anywhere else in the country. The survey, conducted by the Transport Research Laboratory in 2007, also found that drivers using handheld mobiles were more likely not to wear seat belts.

NOTES TO EDITORS:

Total Offences reported during period of operation = 2238 (includes a prohibition notice issued for having a defective vehicle)

Total Speed offences = 453

Total Mobile phone = 527

Total Seat belt = 900

Total number of fixed penalty notices issued for these three offences - 1880

==========

Arrests=17

5 on suspicion of driving while disqualified
3 on suspicion of insurance fraud (failing to disclose material details i.e. previous disqualification from driving)
2 on suspicion of drink driving
2 on suspicion of drugs offences
1 registered sex offender who failed to notify Police of a change of address
4 other (TBC)

At least 35 cars seized (those driving the car had no insurance, no driving licence or neither)

Appendix D Speed analysis

D.1 Mean speeds

Table 5.3: Difference in mean speed compared to before operation (mph)

	Targeted A23 sites	Close off-route sites	Other A23 sites	Other off-route sites
during1	-0.1	-0.3	0.0	0.2
during2	-0.9	-0.5	-0.3	0.0
during3	-1.1	-0.5	-0.2	0.0
during4	-1.3	-0.9	-0.6	0.1
after1	-0.8	-1.0	-0.1	-0.1
after2	-0.8	-1.1	0.0	-0.2

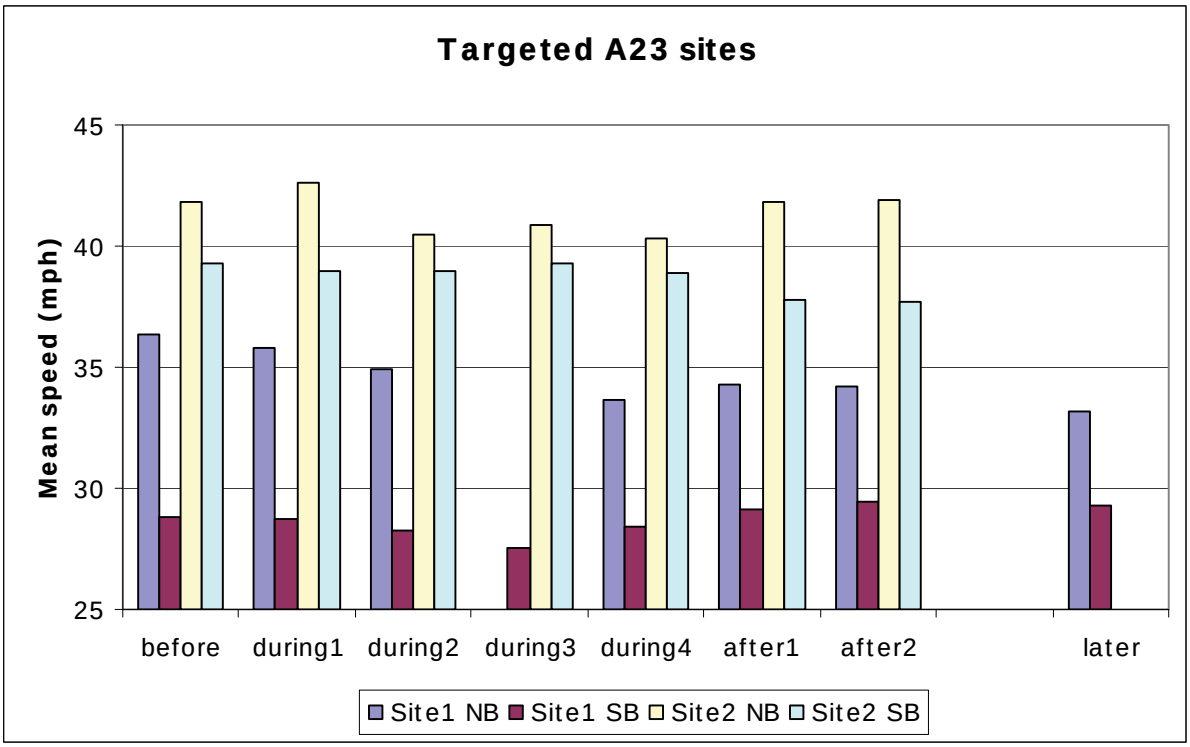

Figure D. 1: Means speeds by site and week for Targeted A23 sites

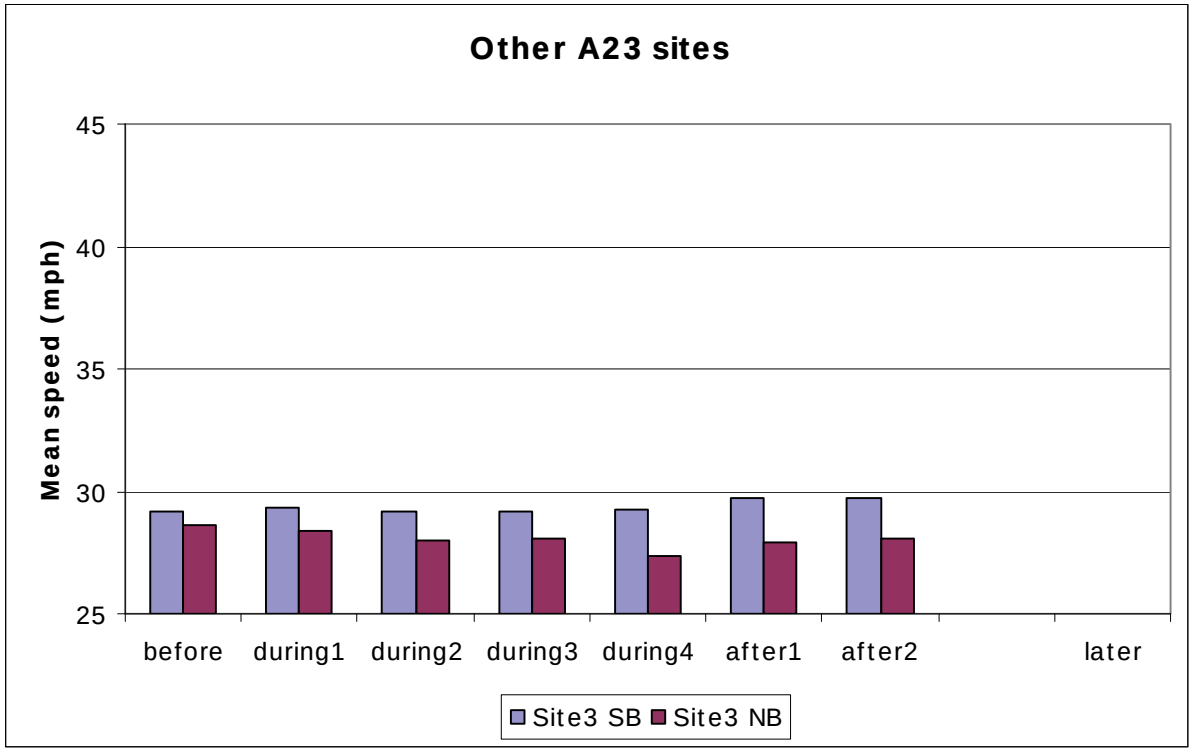

Figure D. 2: Means speeds by site and week for Other A23 sites

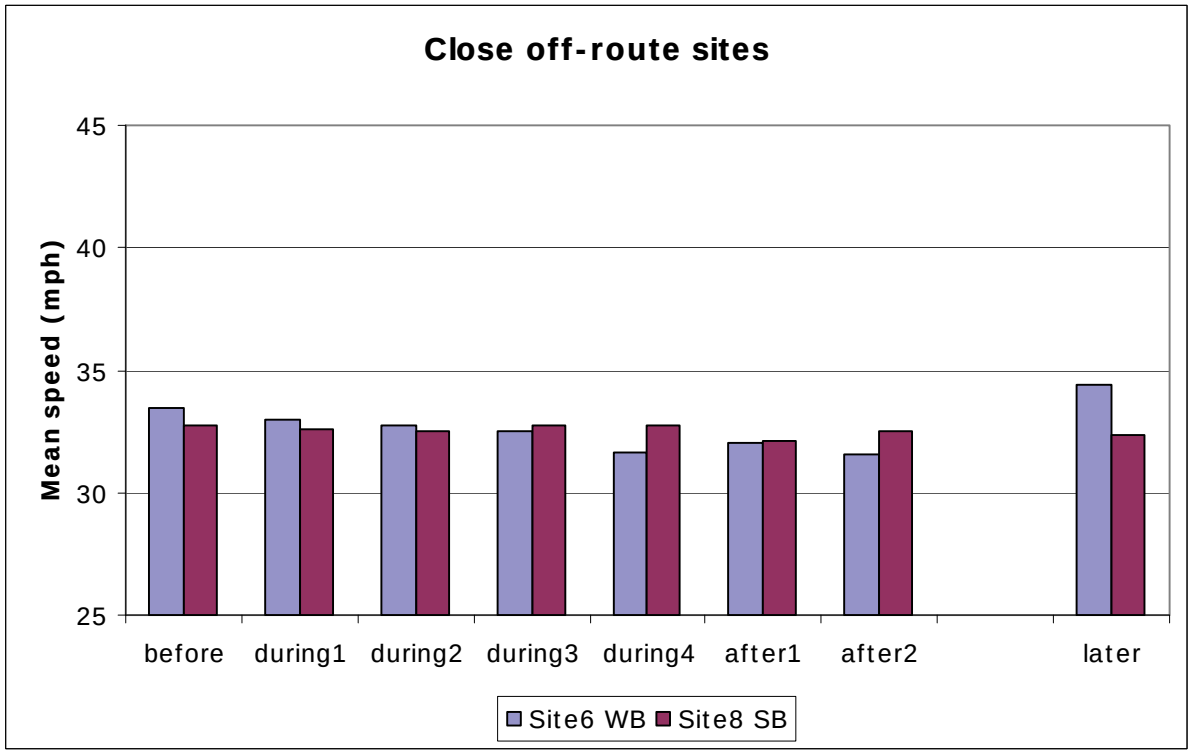

Figure D. 3: Means speeds by site and week for Close off-route sites

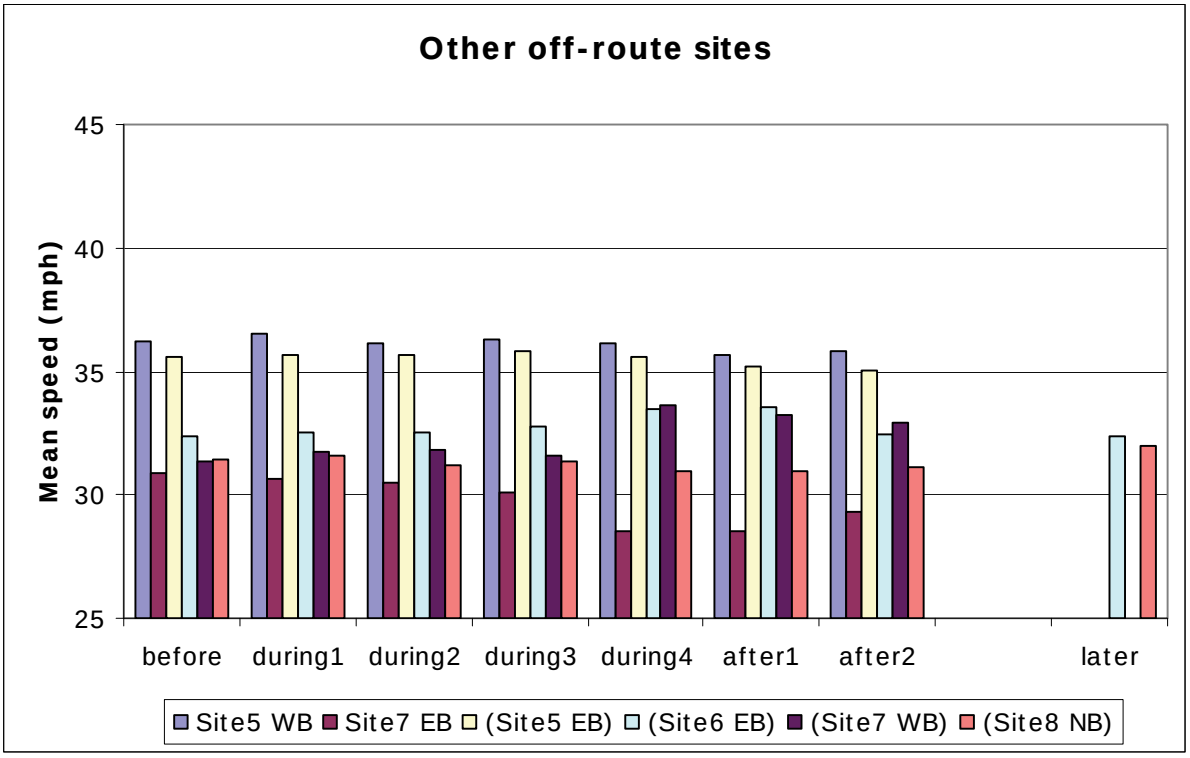

Figure D. 4: Means speeds by site and week for Other off-route sites

D.2 Mean speed difference from speed limit

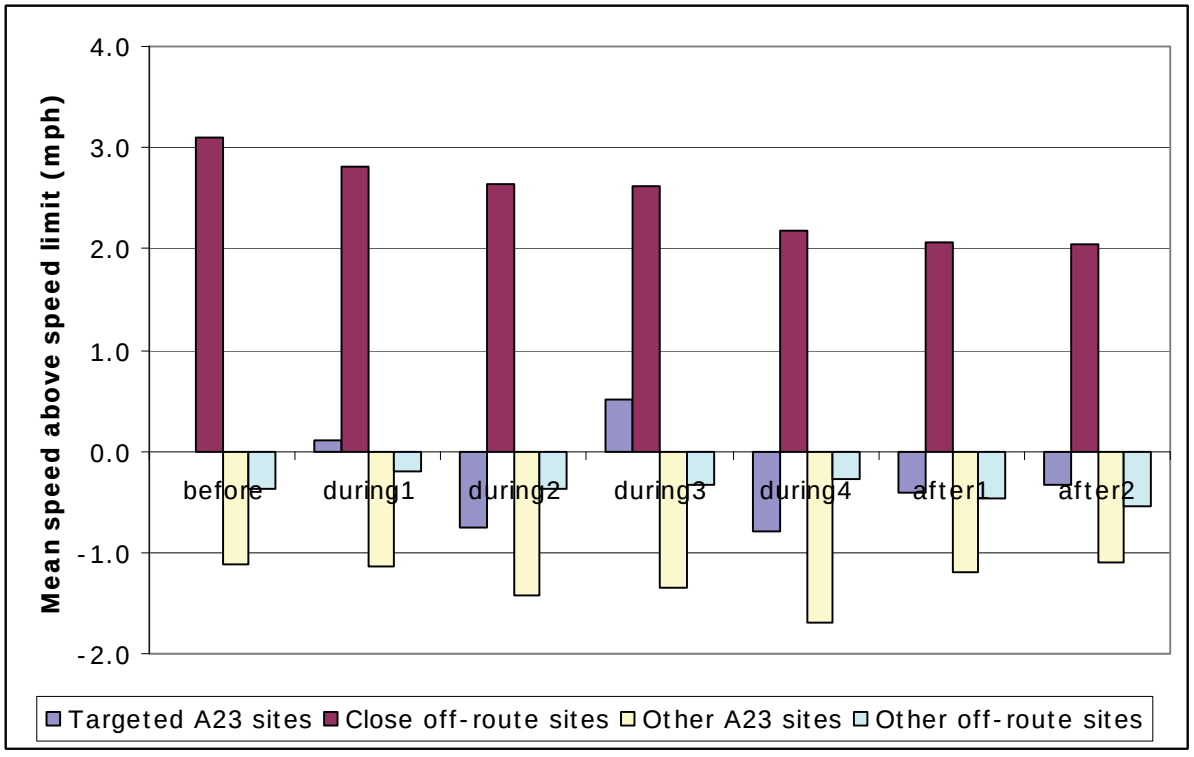

Figure D. 5: Mean speed difference from speed limit by group of sites and week

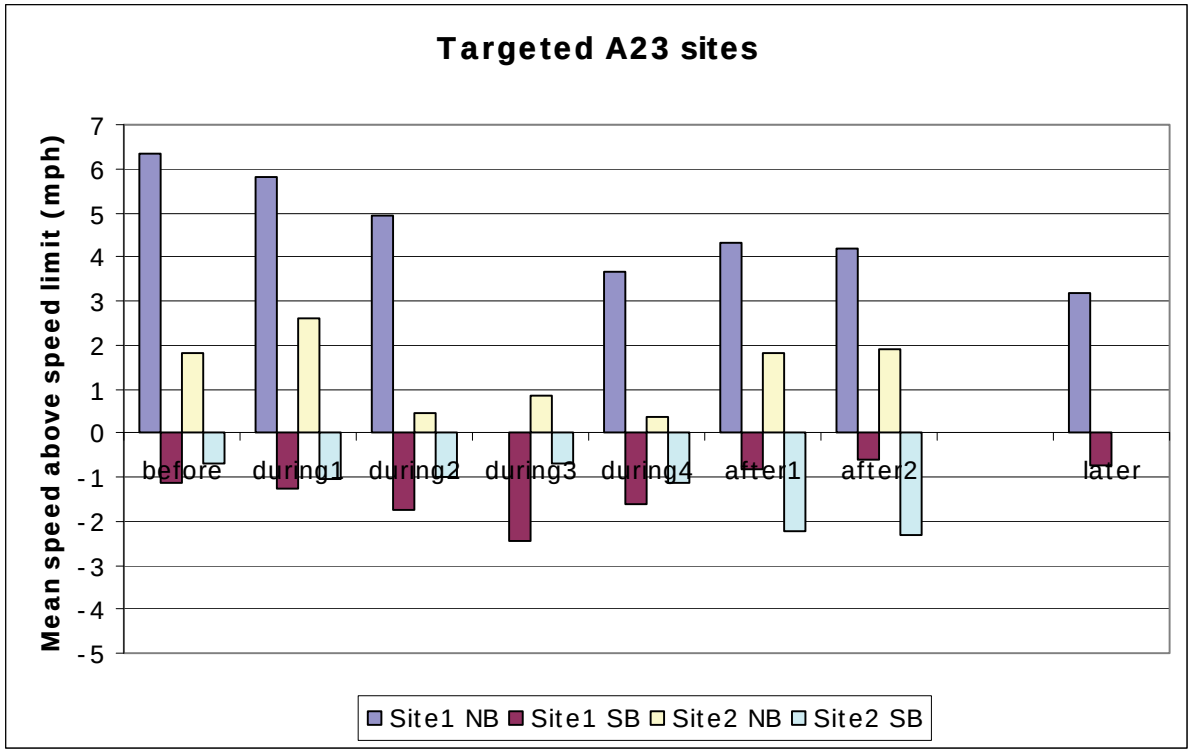

Figure D. 6: Mean speed difference from speed limit by site and week for Targeted A23 sites

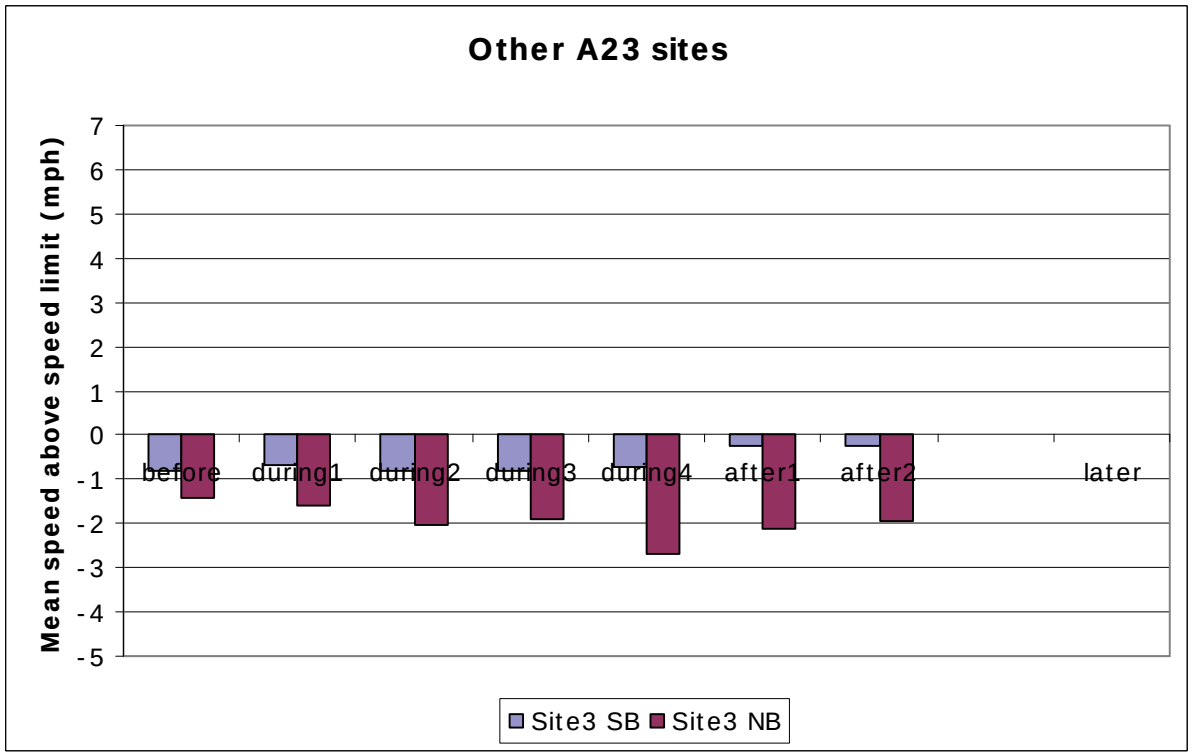

Figure D. 7: Mean speed difference from speed limit by site and week for Other A23 sites

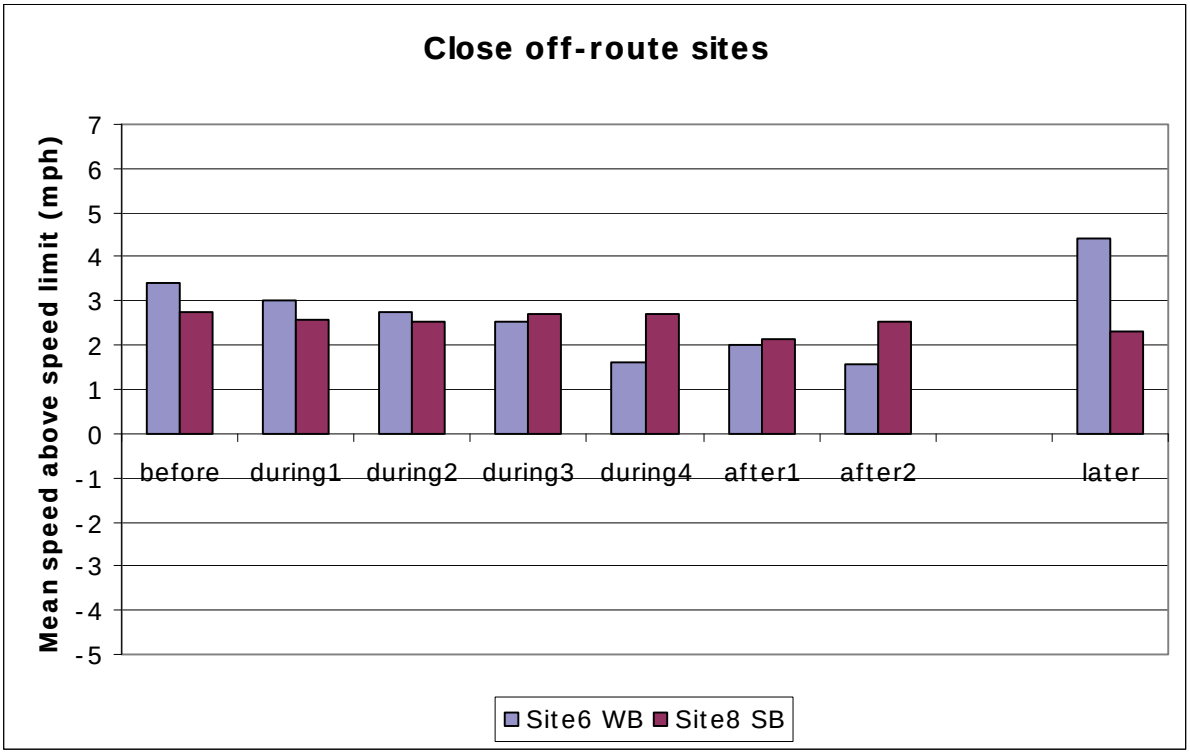

Figure D. 8: Mean speed difference from speed limit by site and week for Close off-route sites

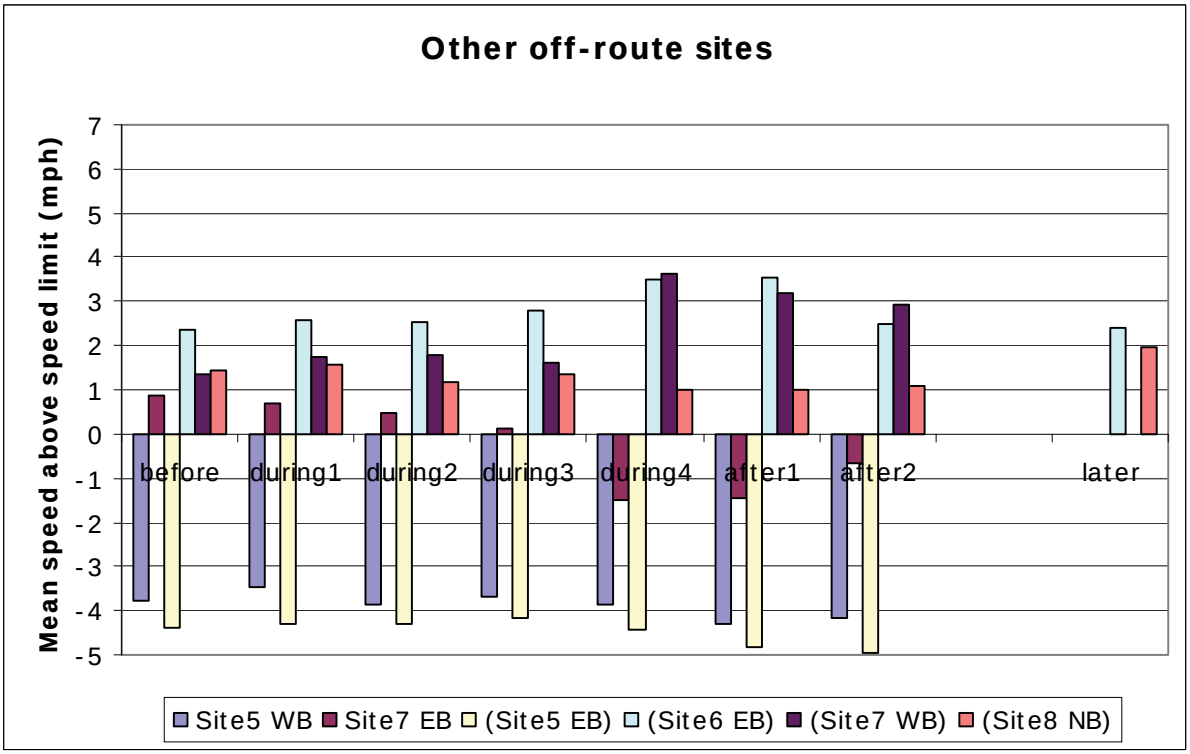

Figure D. 9: Mean speed difference from speed limit by site and week for Other off-route sites

D.3 Mean speed difference compared to before

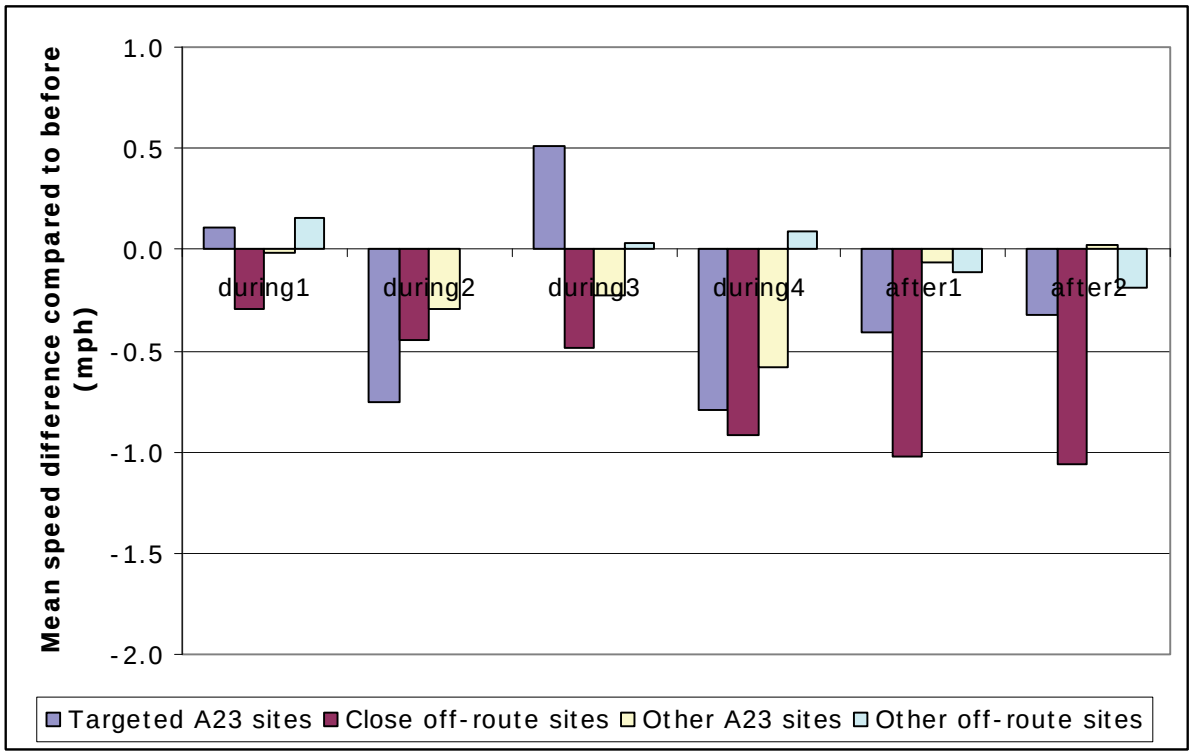

Figure D. 10: Mean speed difference compared to before by group of sites and week

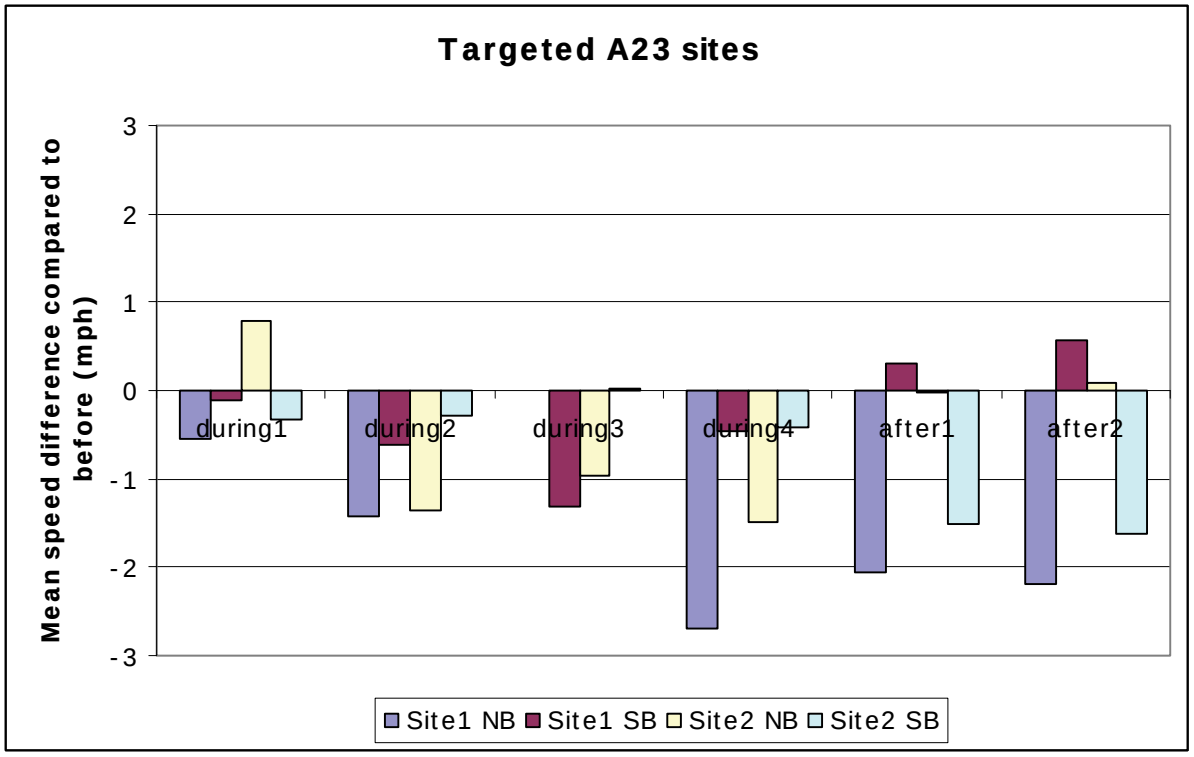

Figure D. 11: Mean speed difference compared to before by site and week for Targeted A23 sites

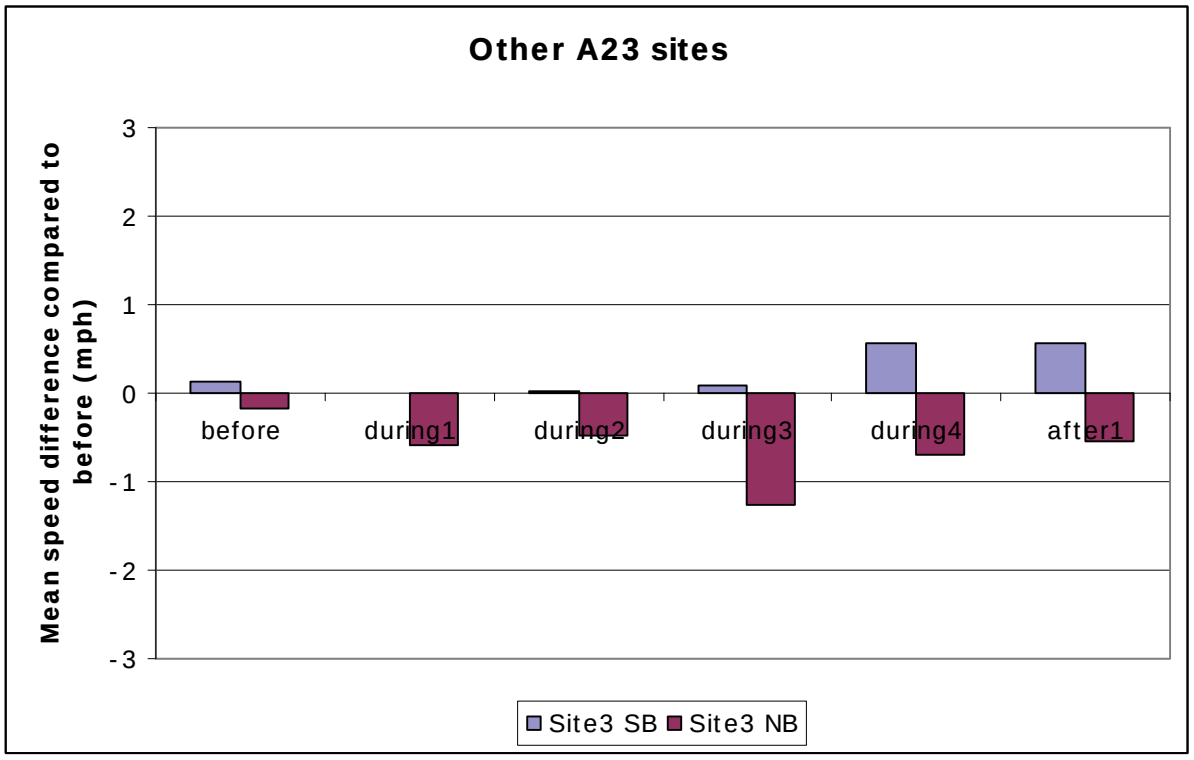

Figure D. 12: Mean speed difference compared to before by site and week for Other A23 sites

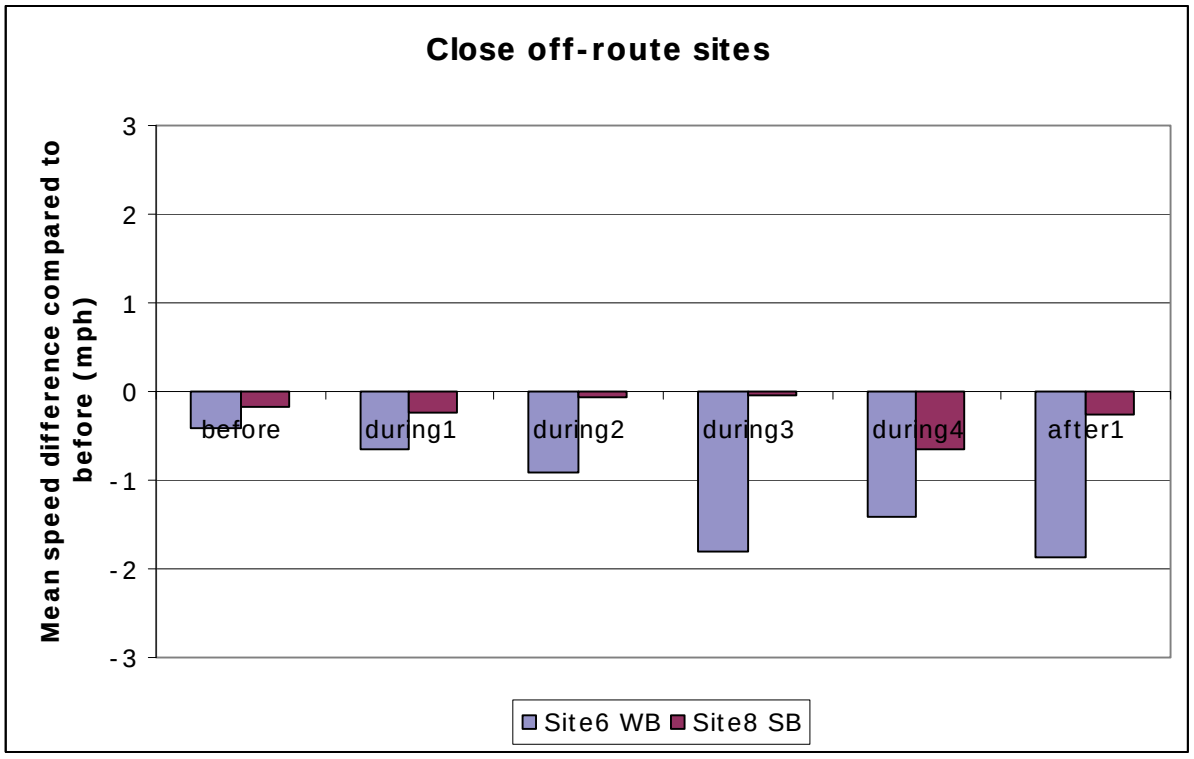

Figure D. 13: Mean speed difference compared to before by site and week for Close off-route sites

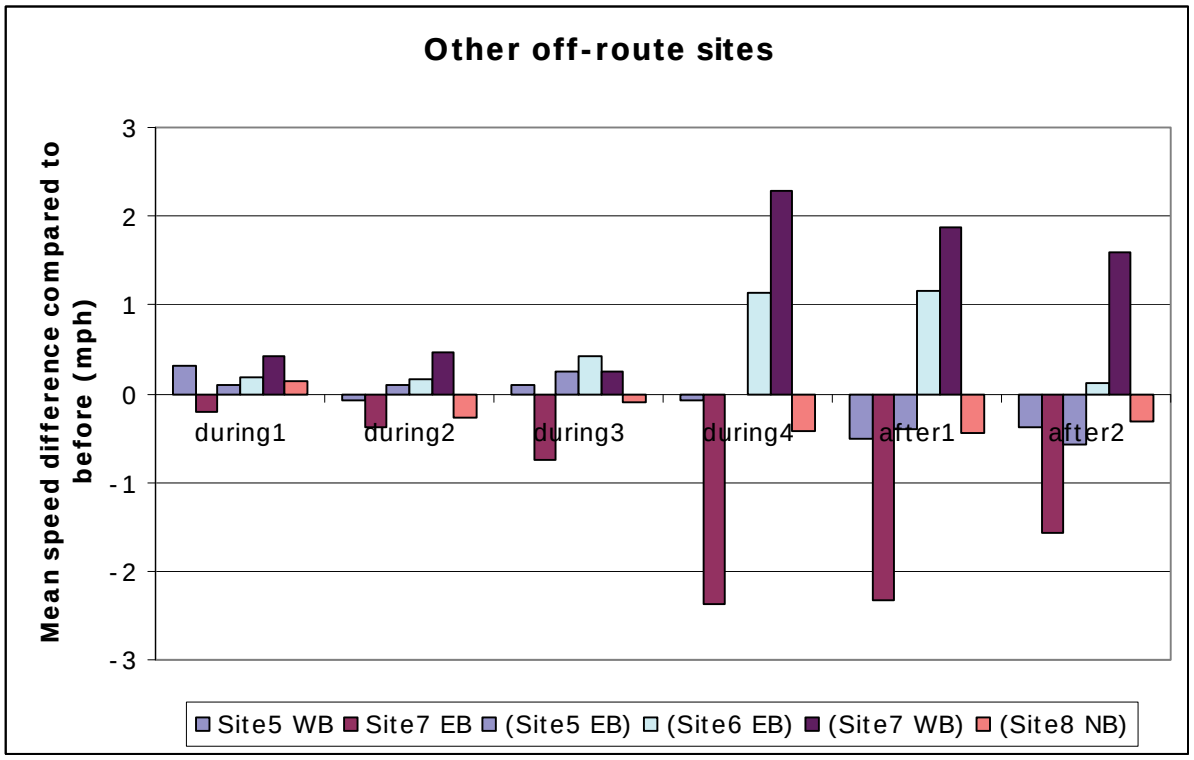

Figure D. 14: Mean speed difference compared to before by site and week for Other off-route sites

D.4 Daily mean speeds

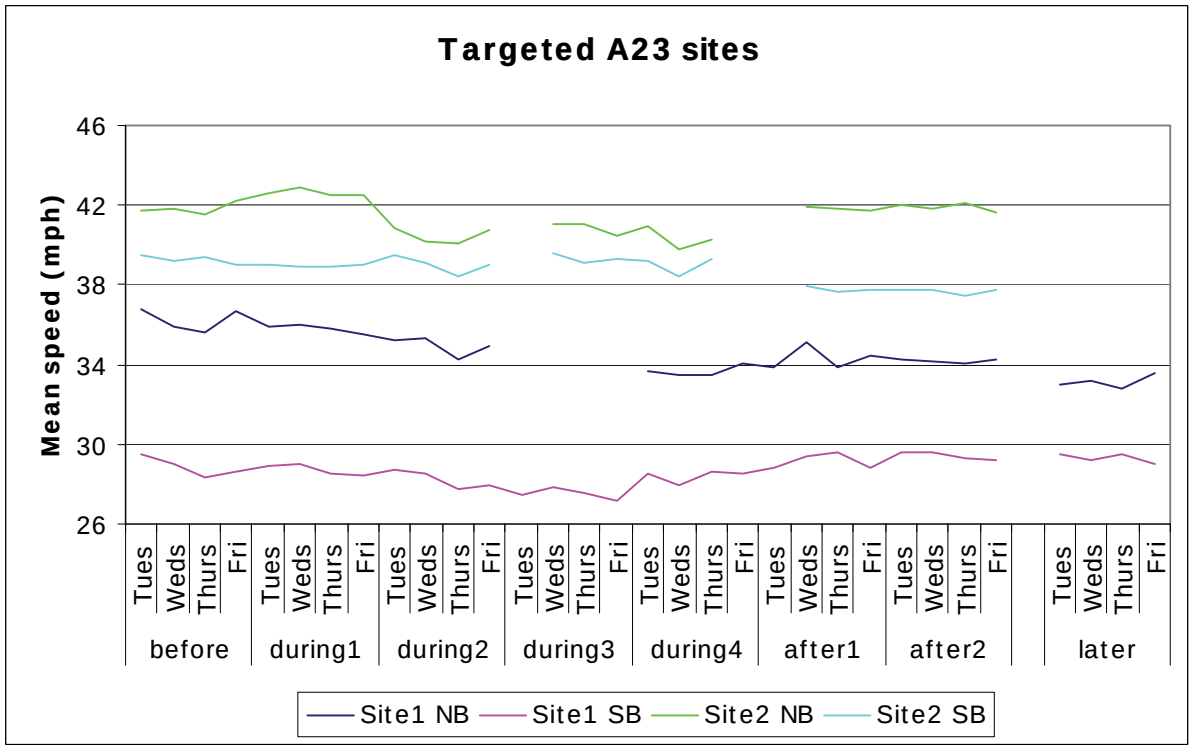

Figure D. 15: Daily mean speeds for Targeted A23 sites

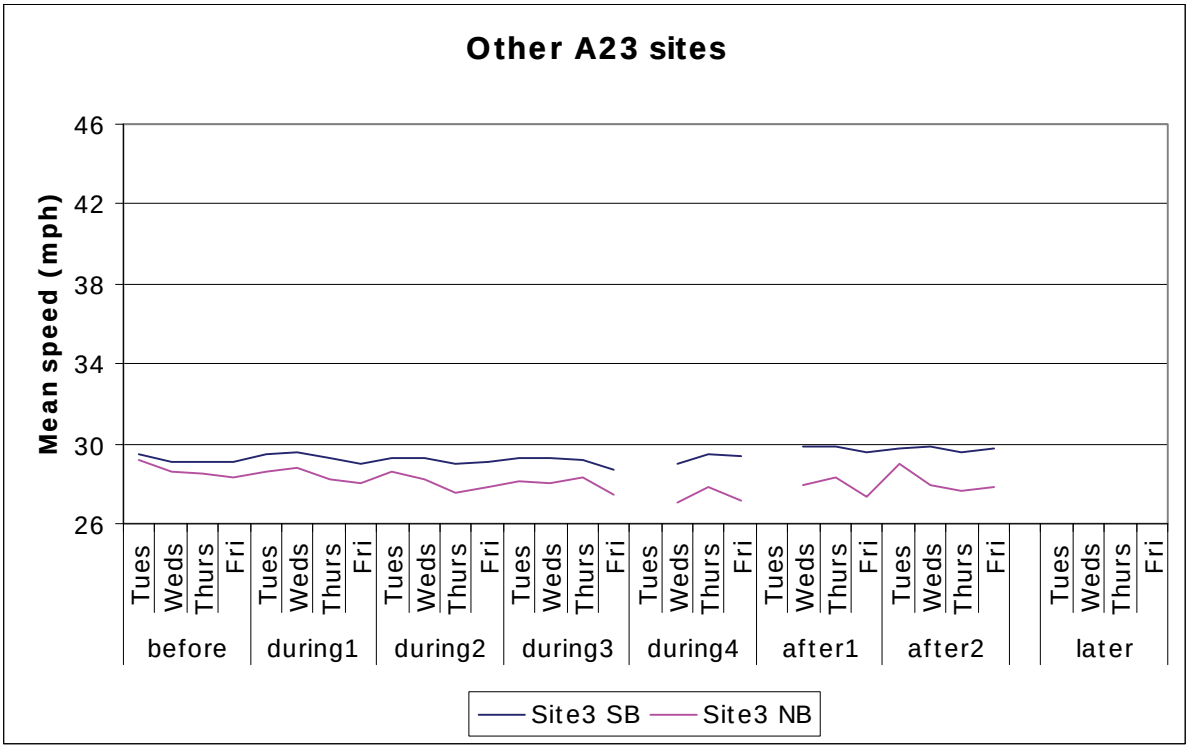

Figure D. 16: Daily mean speeds for Other A23 sites

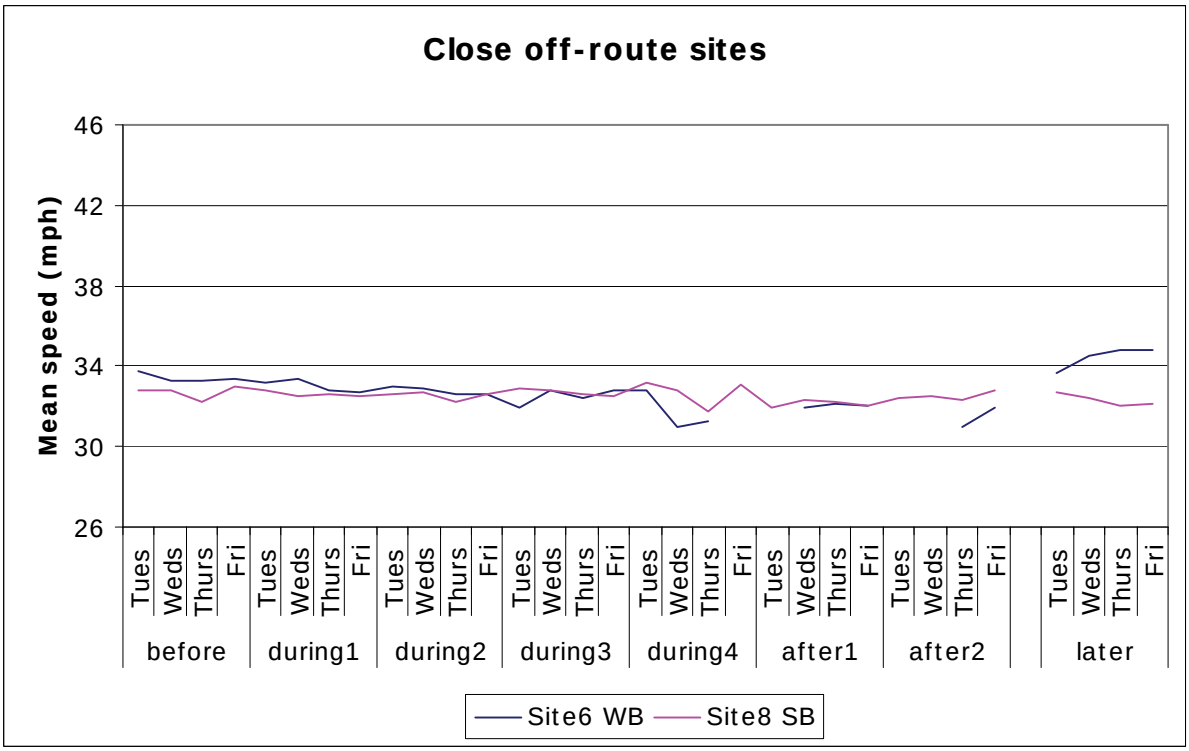

Figure D. 17: Daily mean speeds for Close off-route sites

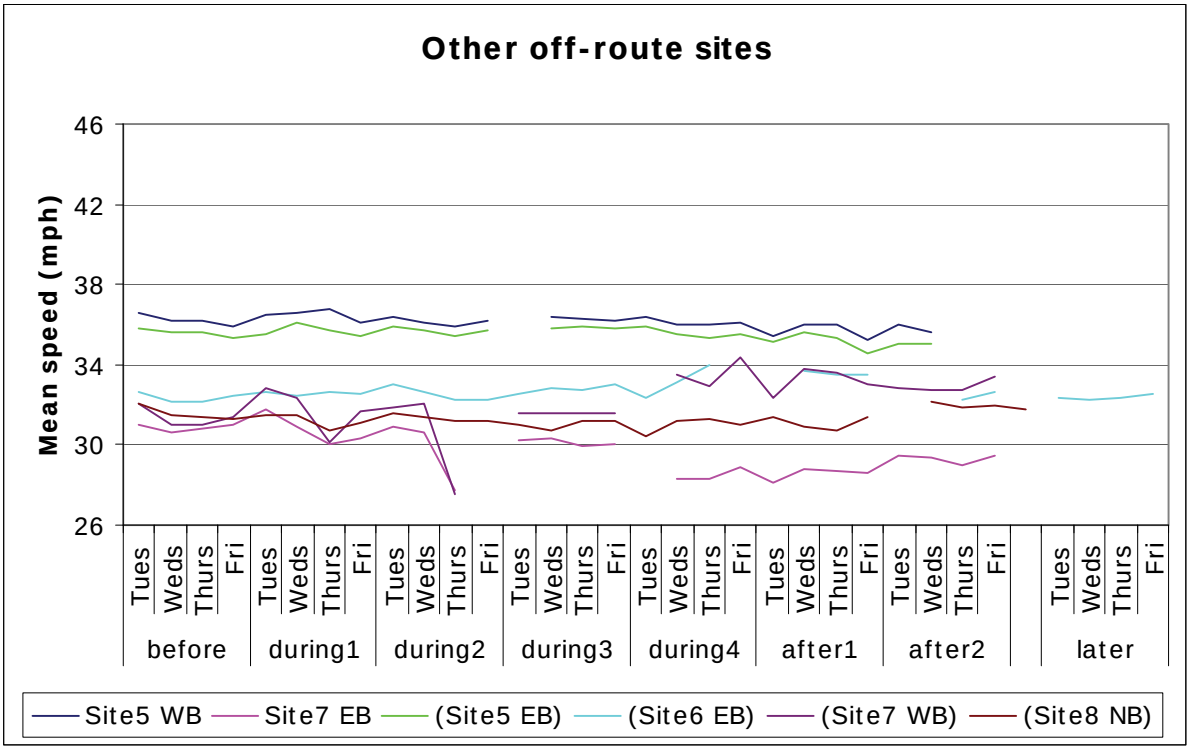

Figure D. 18: Daily mean speeds for Other off-route sites

D.5 Daily mean speed compared to before

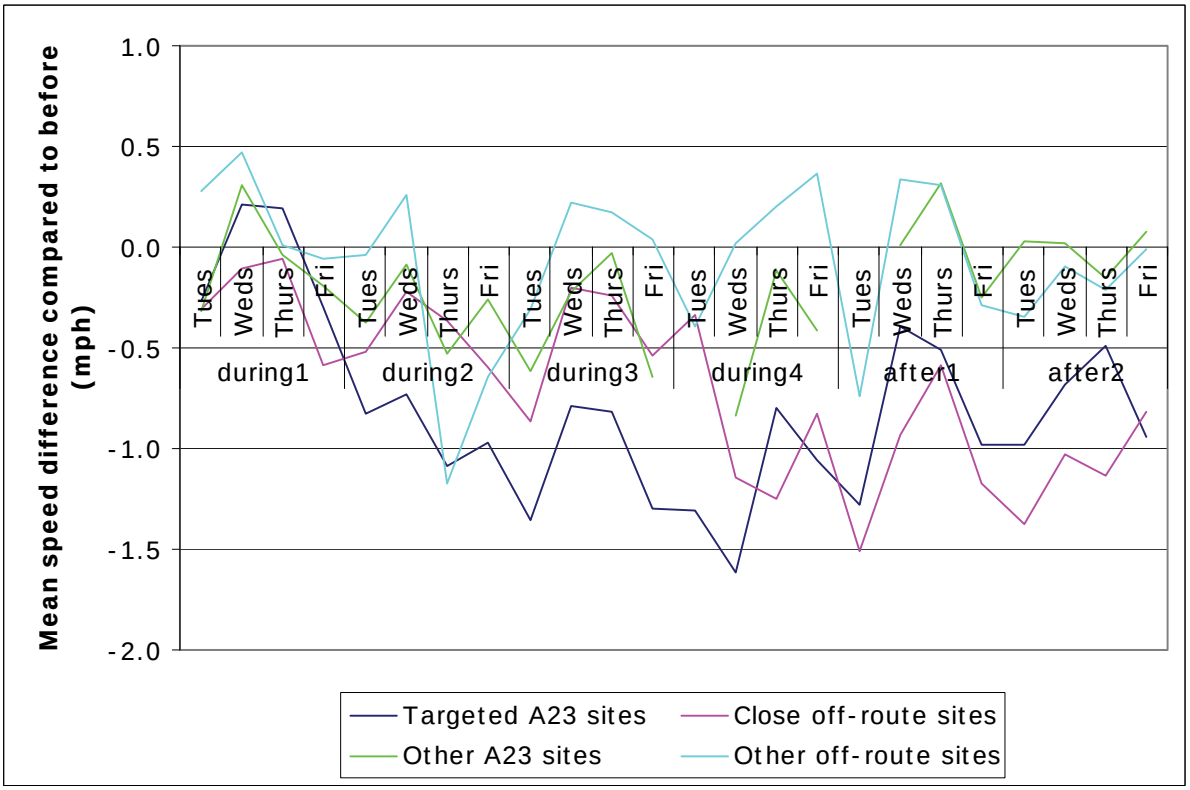

Figure D. 19: Daily mean speeds compared to before by groups of sites

D.6 85th percentile speeds

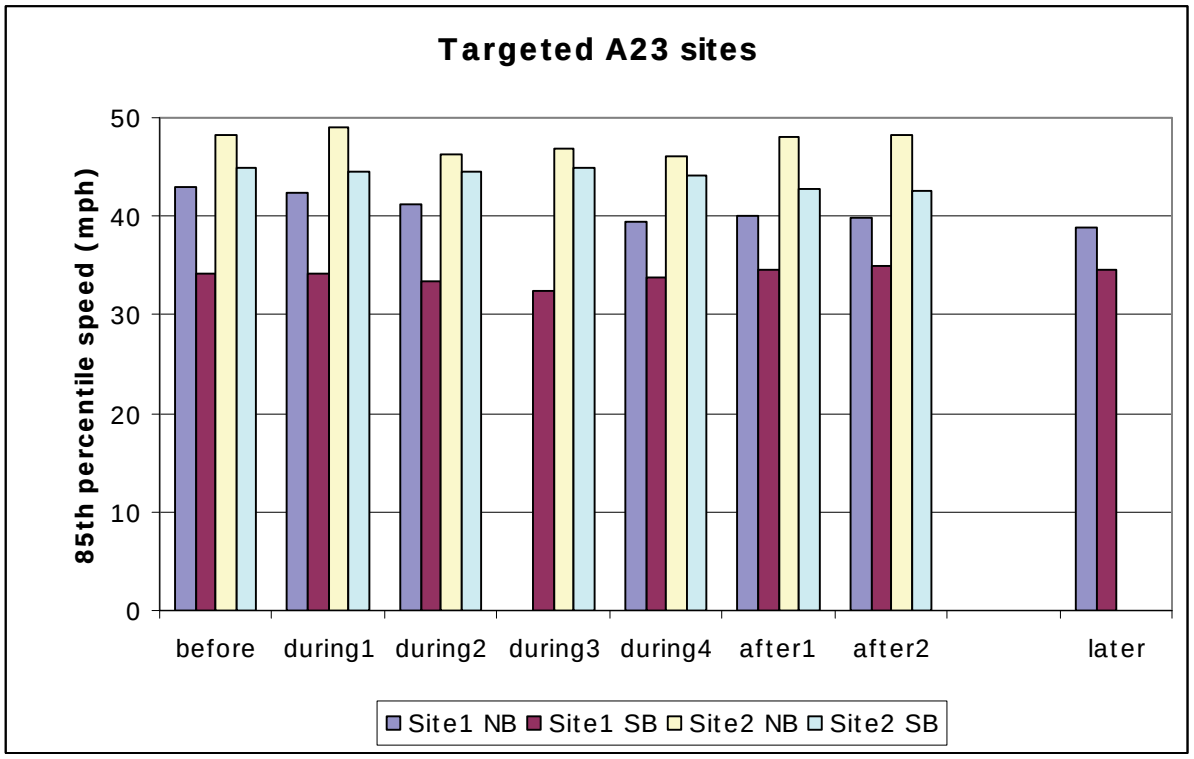

Figure D. 20: 85th percentile speeds by site and week for Targeted A23 sites

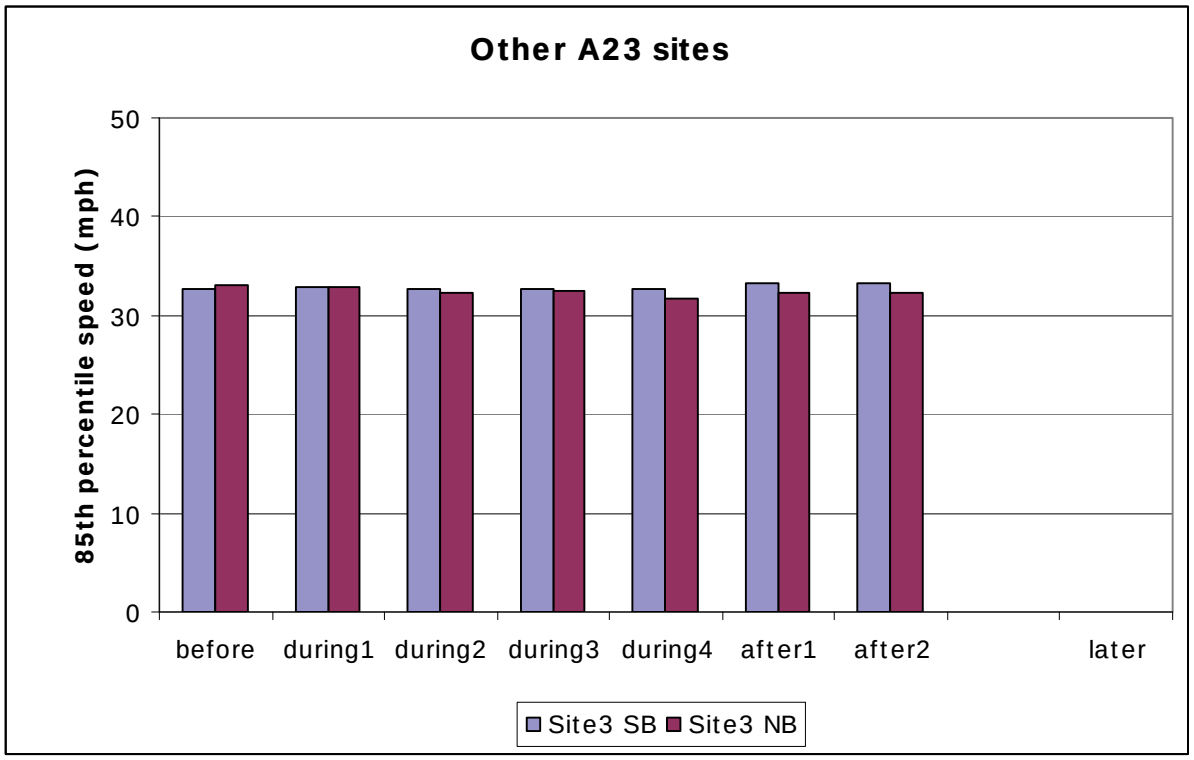

Figure D. 21: 85th percentile speeds by site and week for Other A23 sites

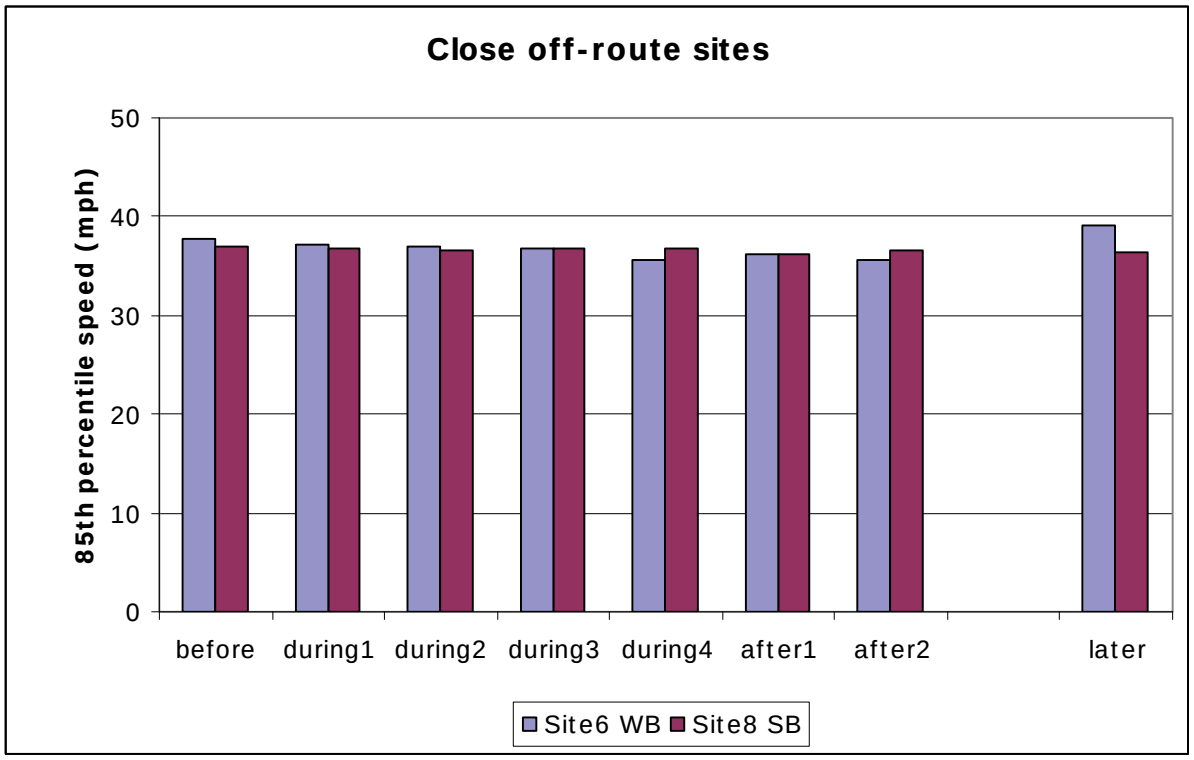

Figure D. 22: 85th percentile speeds by site and week for Close off-route sites

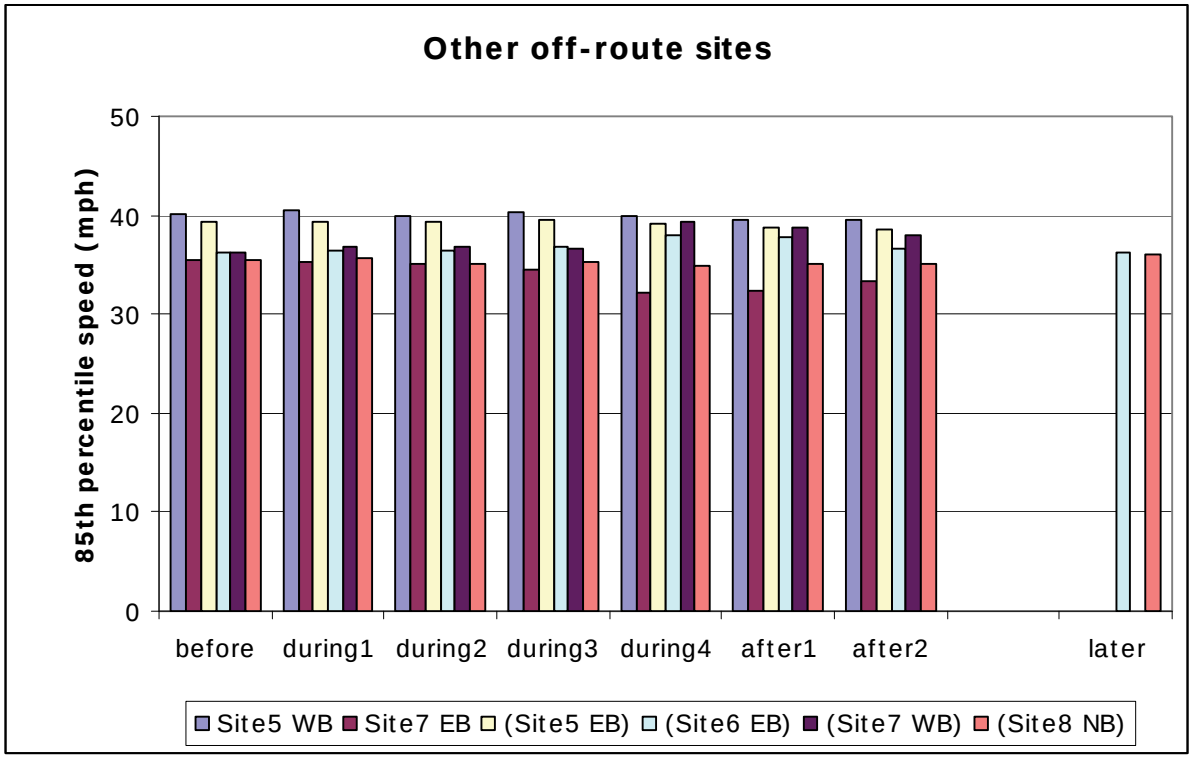

Figure D. 23: 85th percentile speeds by site and week for Other off-route sites

D.7 85th percentile speed compared to before

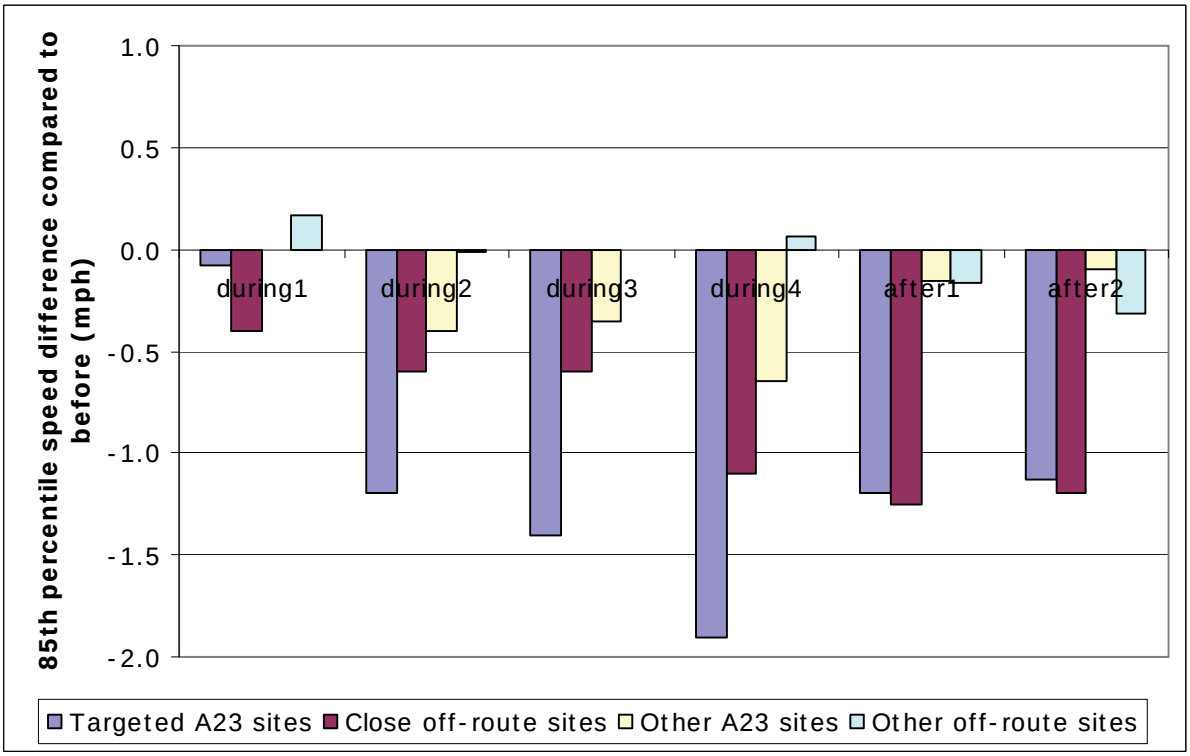

Figure D. 24: 85th percentile speeds compared to before by group of site and week

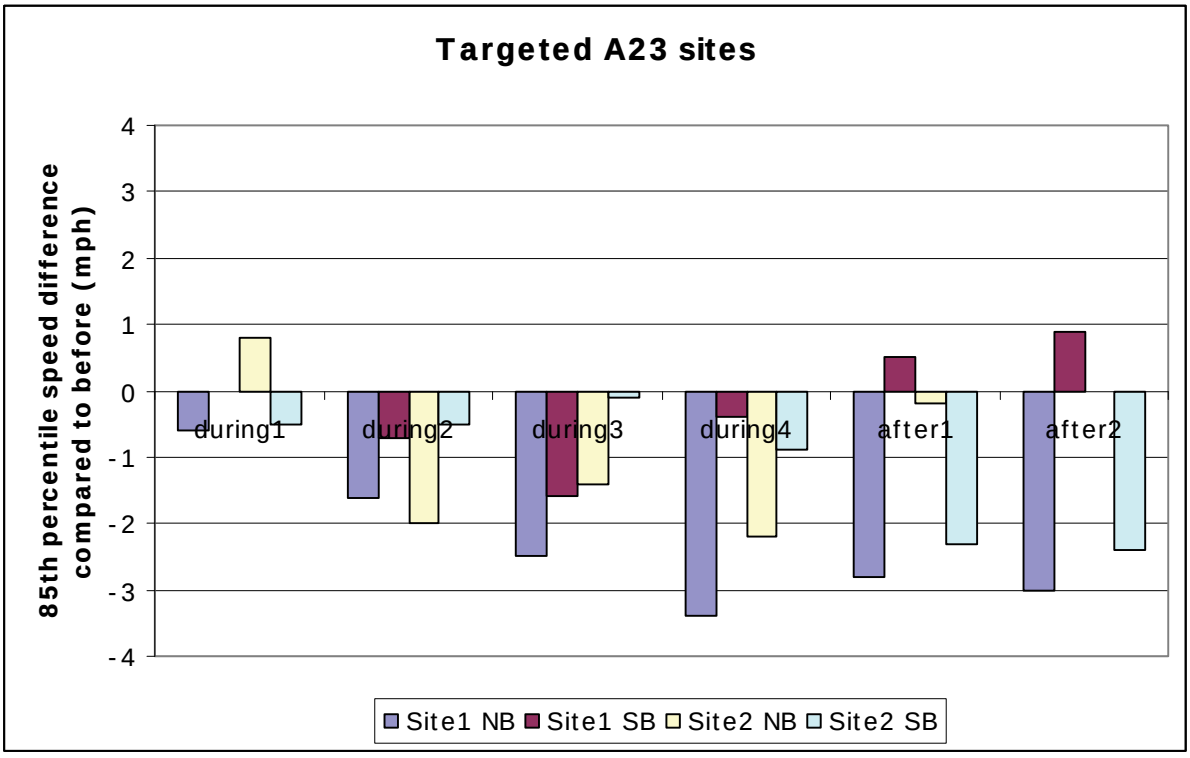

Figure D. 25: 85th percentile speeds compared to before by site and week for Targeted A23 sites

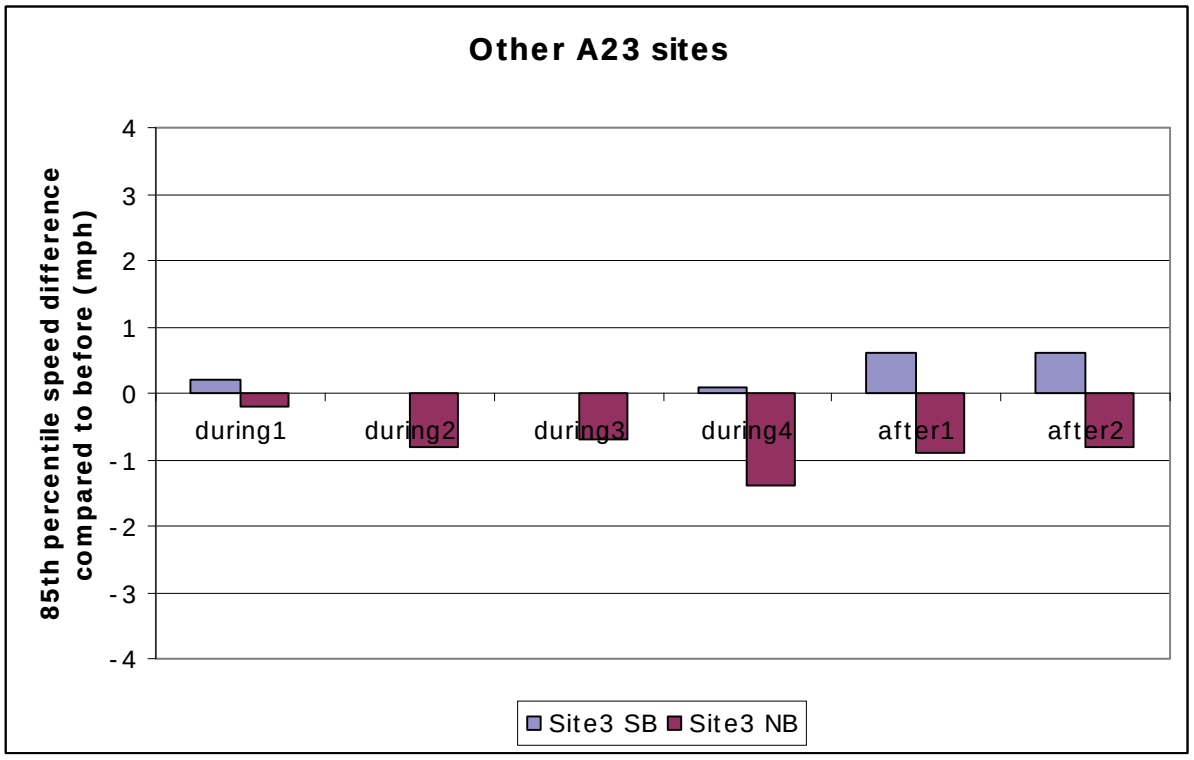

Figure D. 26: 85th percentile speeds compared to before by site and week for Other A23 sites

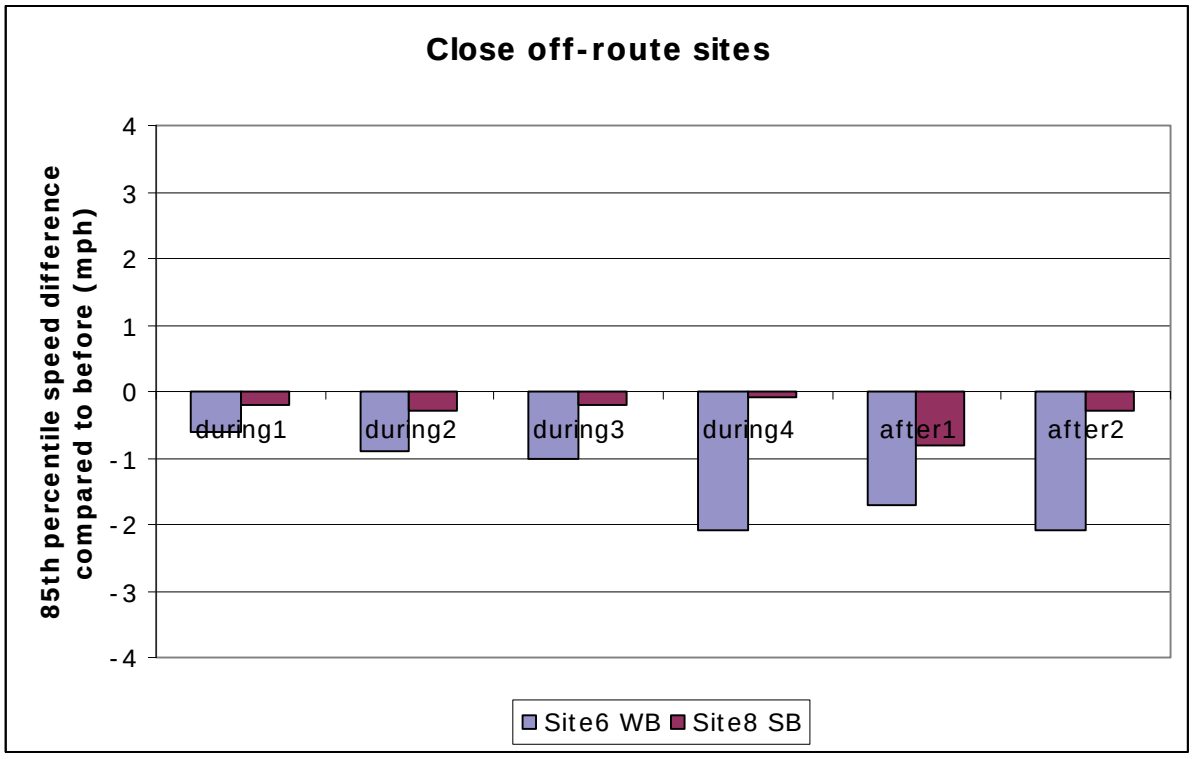

Figure D. 27: 85th percentile speeds compared to before by site and week for Close off-route sites

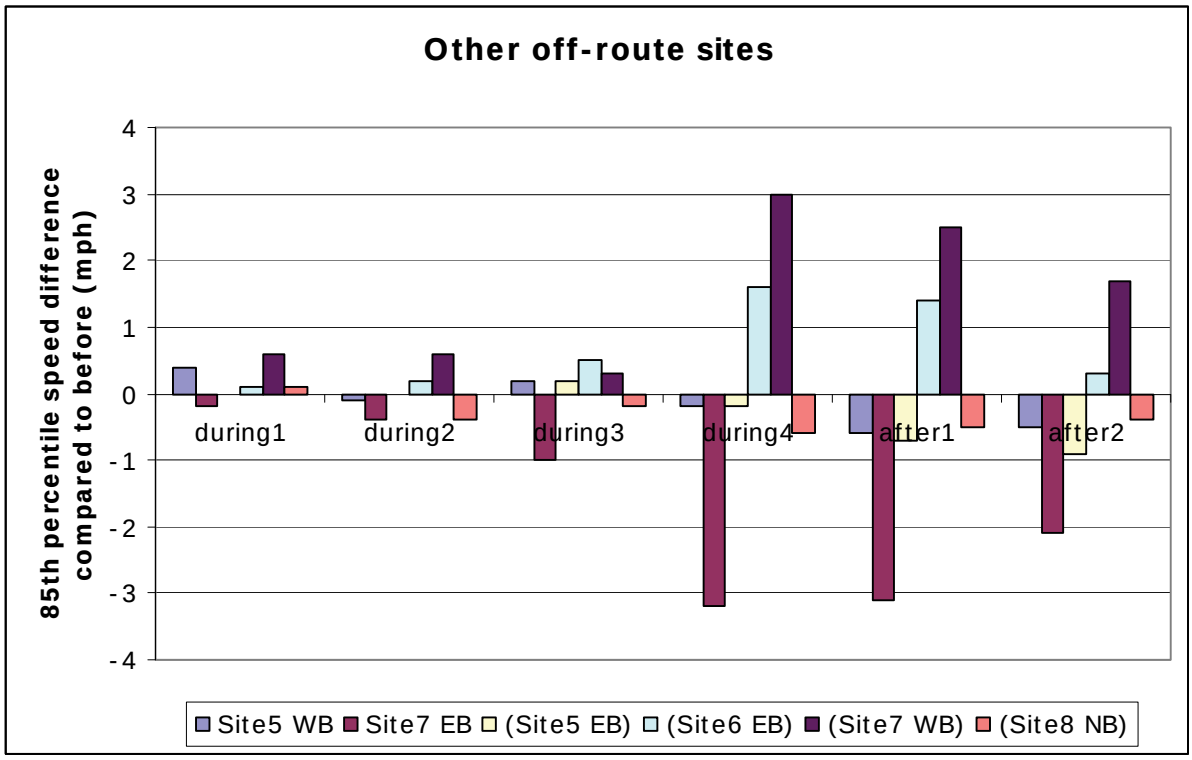

Figure D. 28: 85th percentile speeds compared to before by site and week for Other off-route sites

D.8 Daily 85th percentile speeds

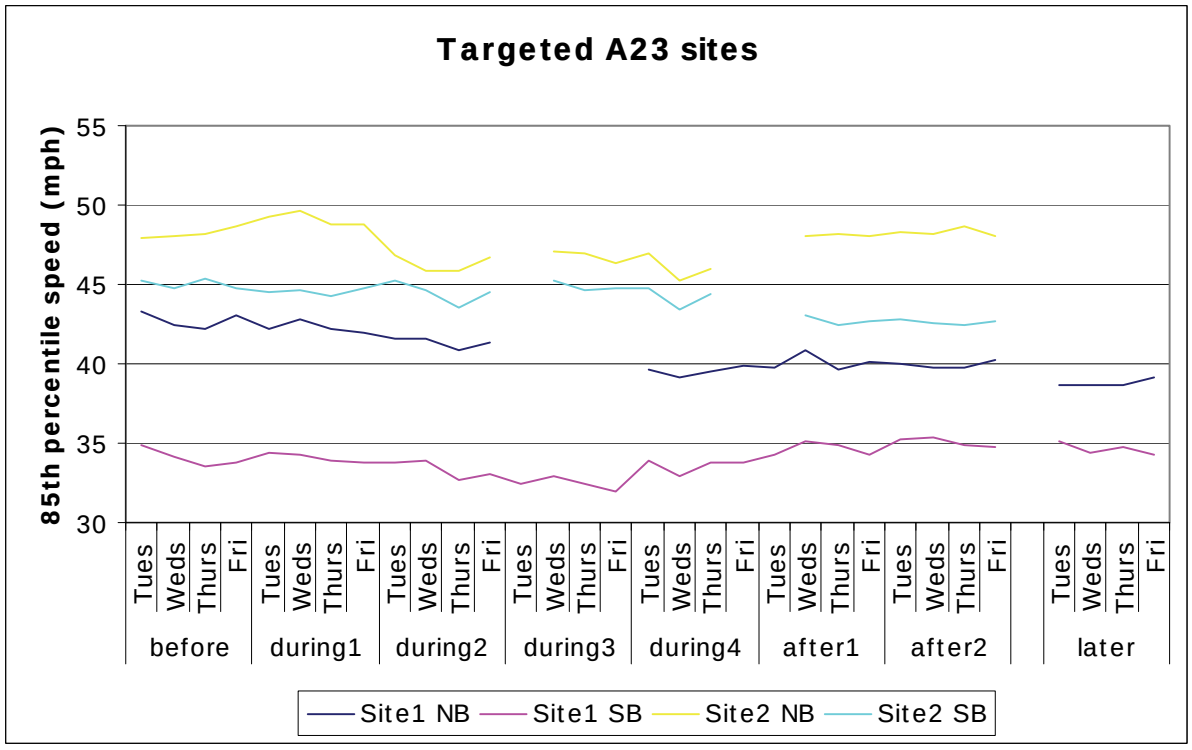

Figure D. 29: Daily 85th percentile speeds for Targeted A23 sites

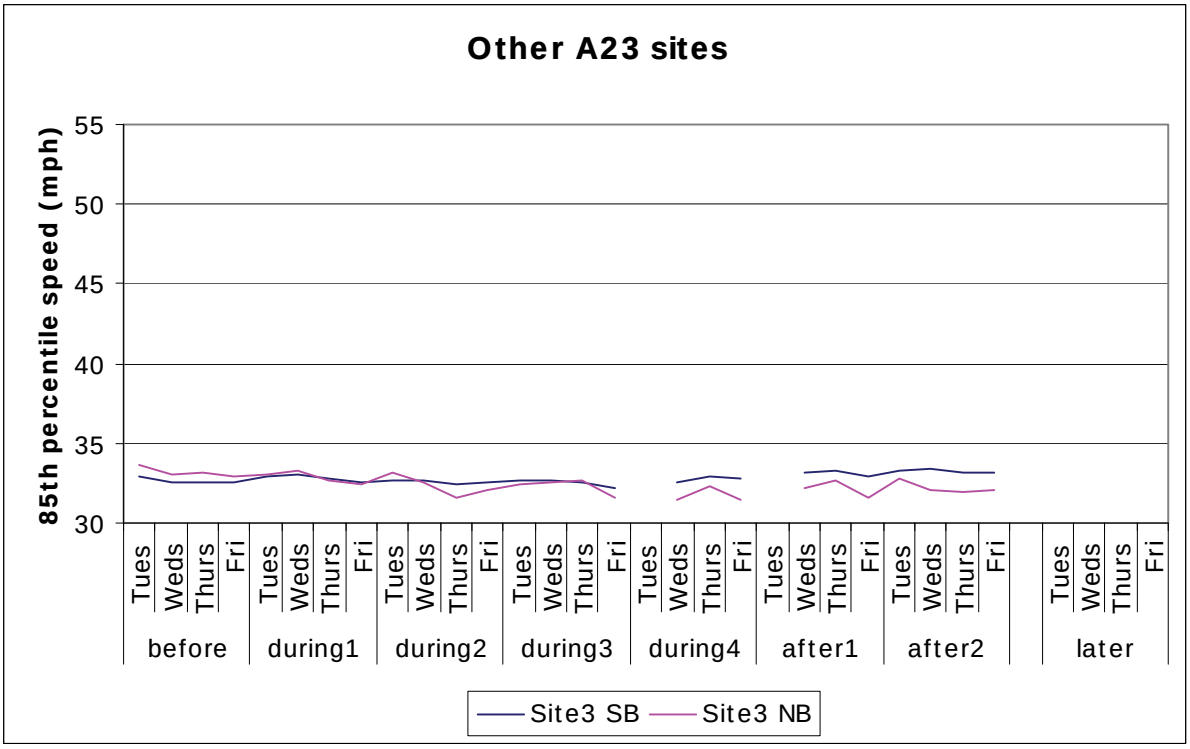

Figure D. 30: Daily 85th percentile speeds for Other A23 sites

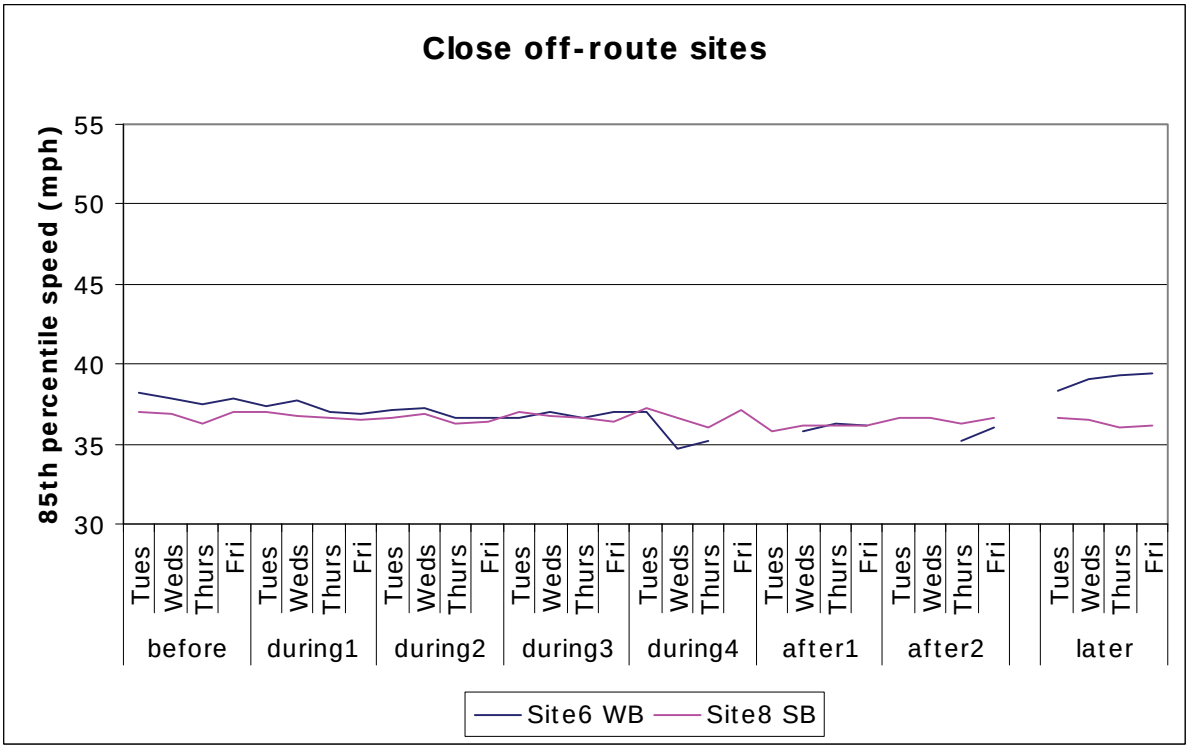

Figure D. 31: Daily 85th percentile speeds for Close off-route sites

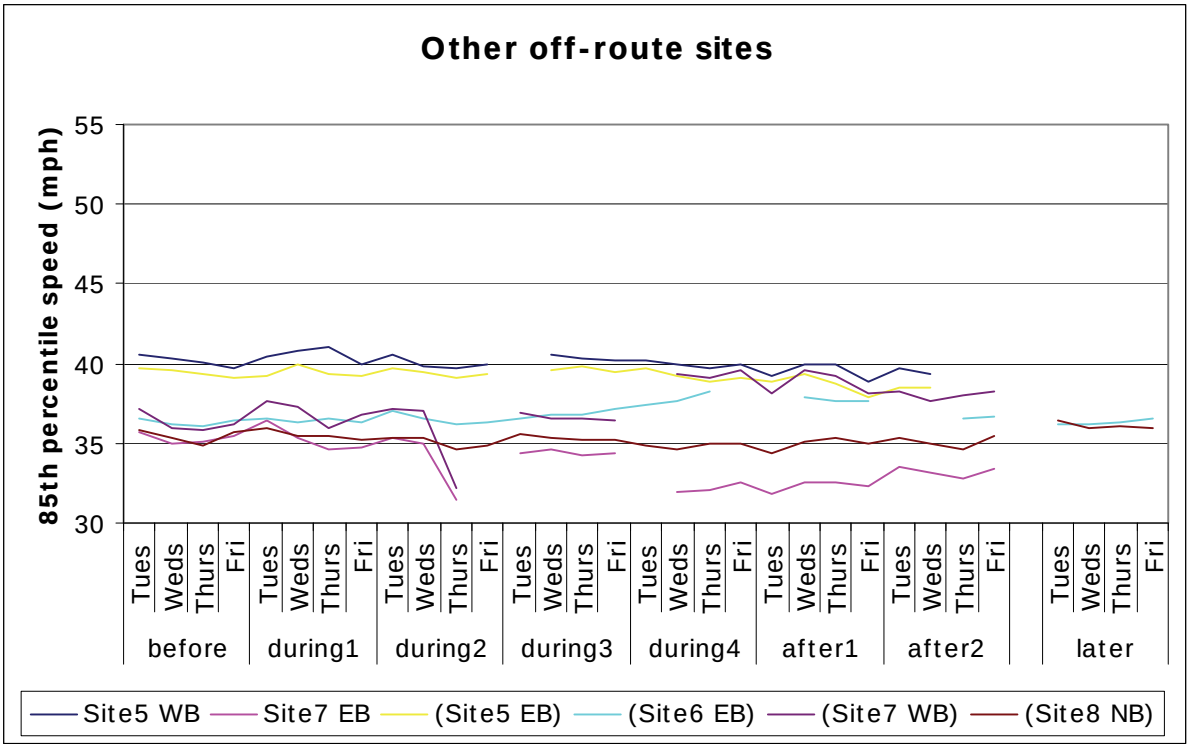

Figure D. 32: Daily 85th percentile speeds for Other off-route sites

D.9 Excessive speed

D.9.1 Exceeding speed limit

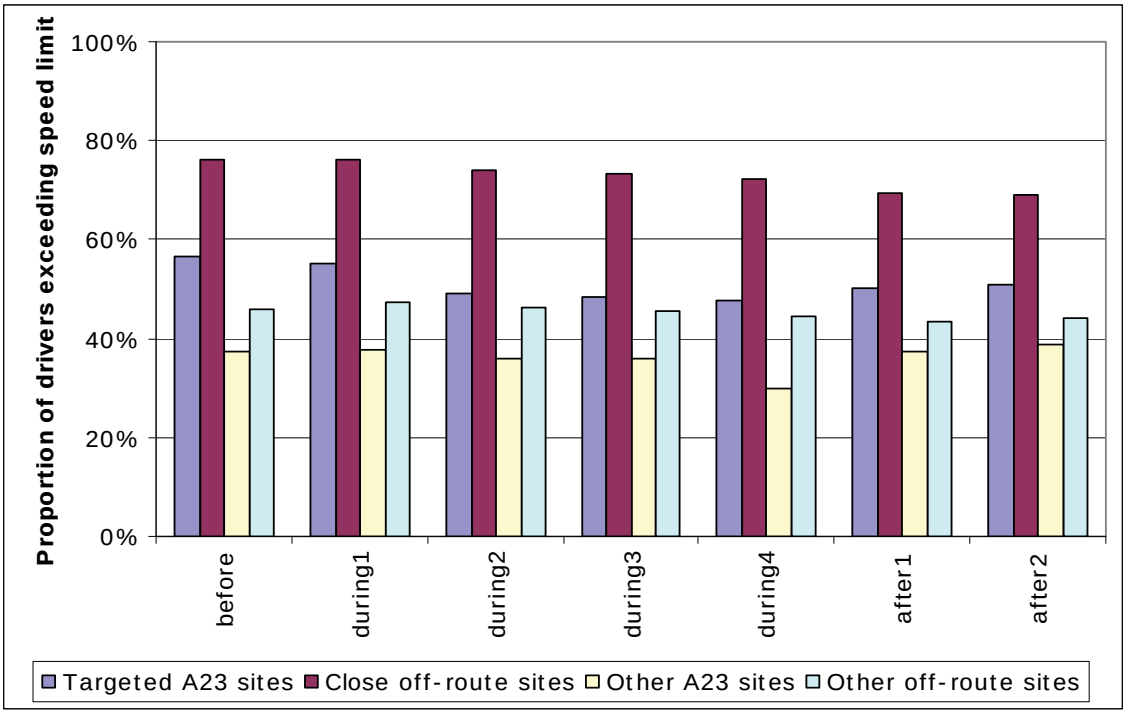

Figure D. 33: Proportion of drivers exceeding speed limit by groups of sites and week

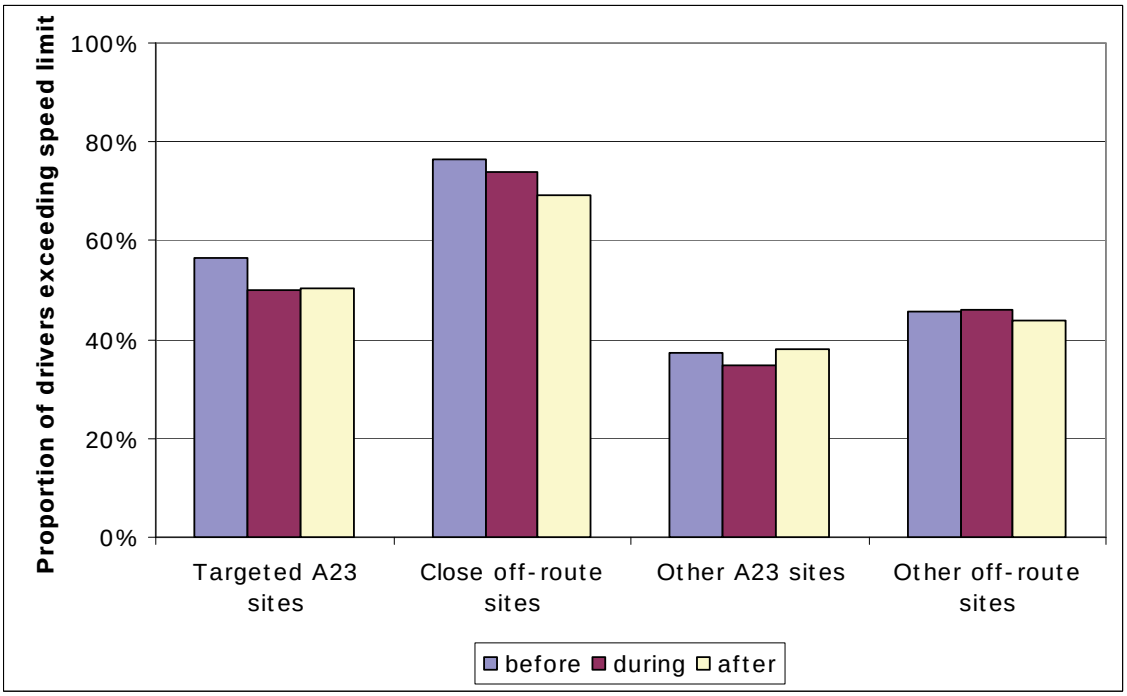

Figure D. 34: Proportion of drivers exceeding speed limit by study period and group of sites

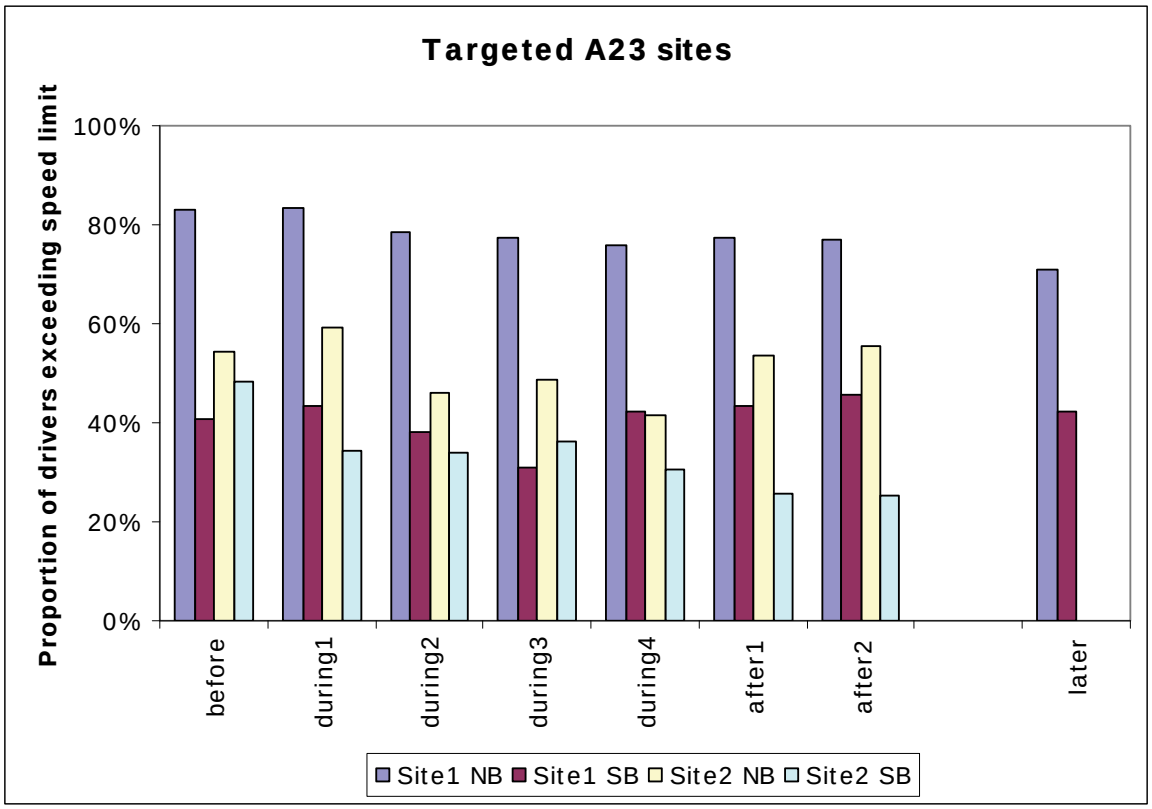

Figure D. 35: Proportion of drivers exceeding speed limit by site and week for Targeted A23 sites

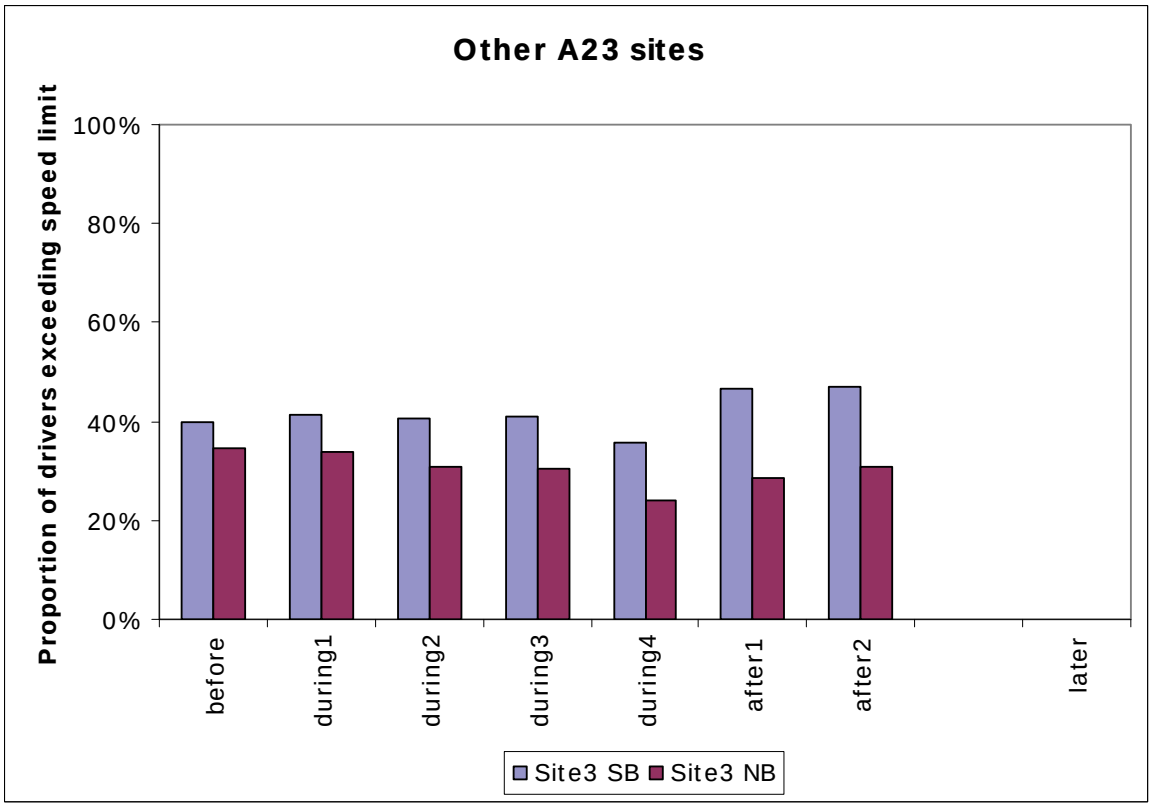

Figure D. 36: Proportion of drivers exceeding speed limit by site and week for Other A23 sites

Figure D. 37: Proportion of drivers exceeding speed limit by site and week for Close off-route sites

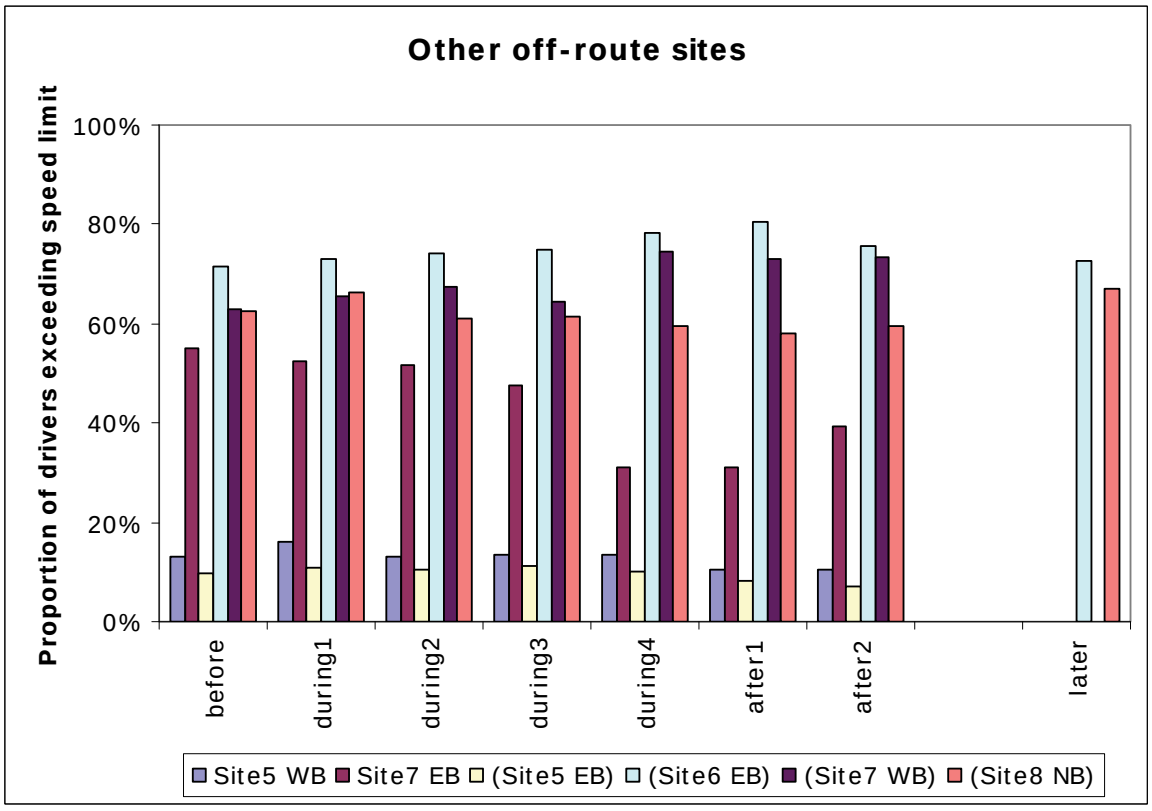

Figure D. 38: Proportion of drivers exceeding speed limit by site and week for Other off-route sites

D.9.2 Exceeding ACPO regulations

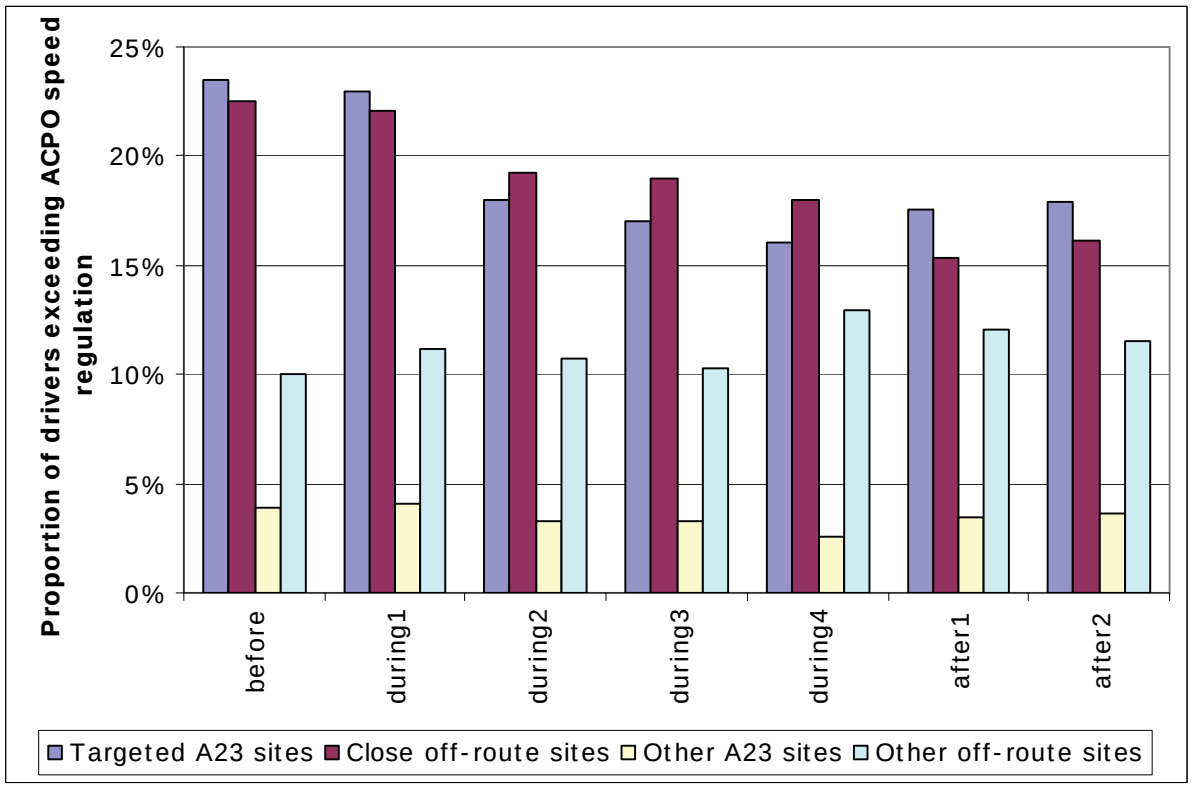

Figure D. 39: Proportion of drivers exceeding ACPO regulation limit by groups of sites and week

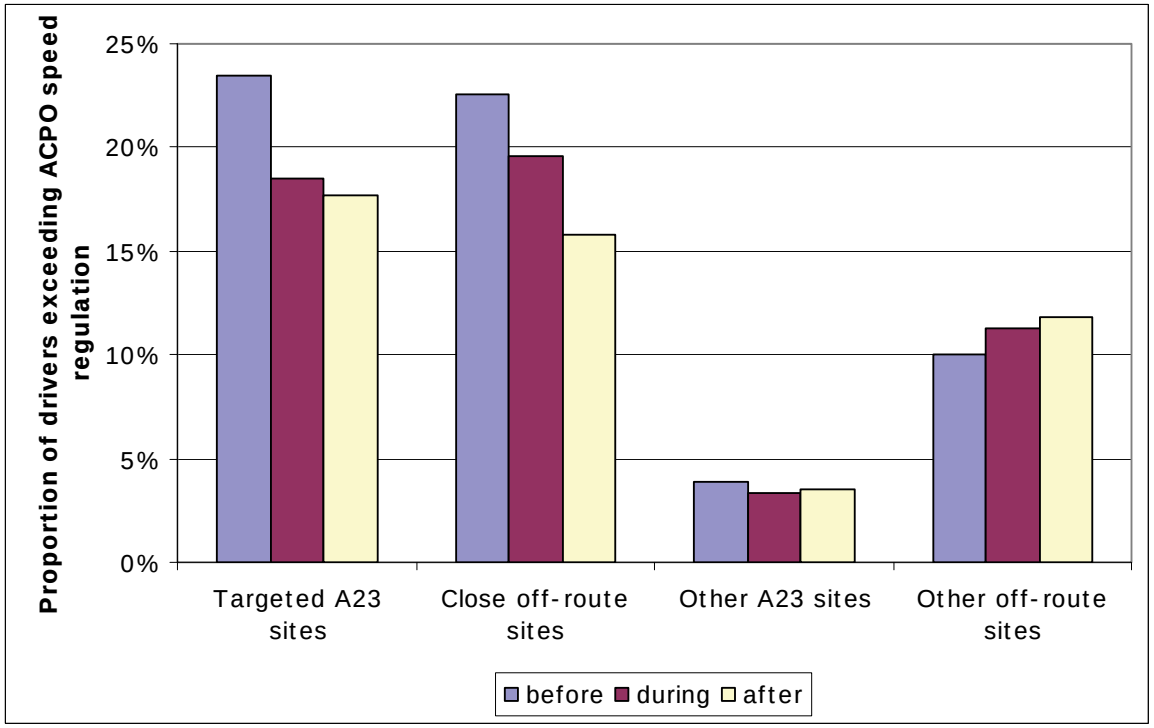

Figure D. 40: Proportion of drivers exceeding ACPO regulation limit by study period and group of sites

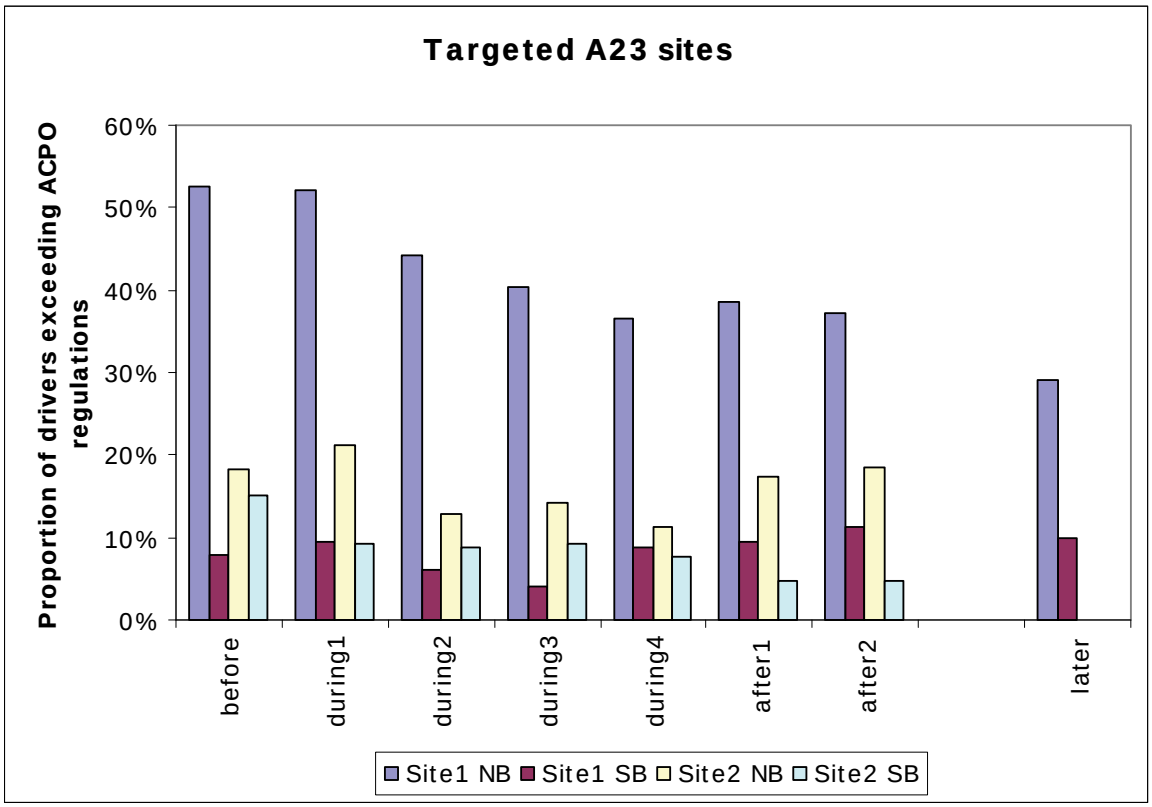

Figure D. 41: Proportion of drivers exceeding ACPO regulations by site and week for Targeted A23 sites

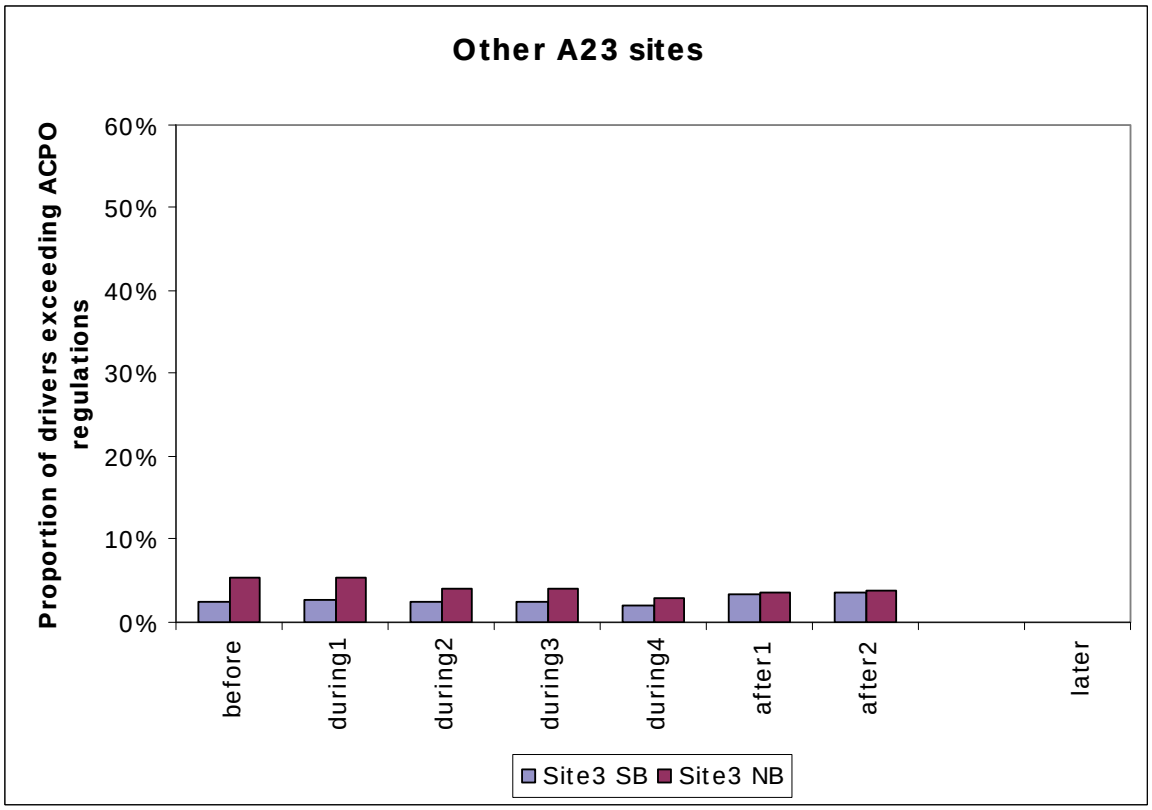

Figure D. 42: Proportion of drivers exceeding ACPO regulations by site and week for Other A23 sites

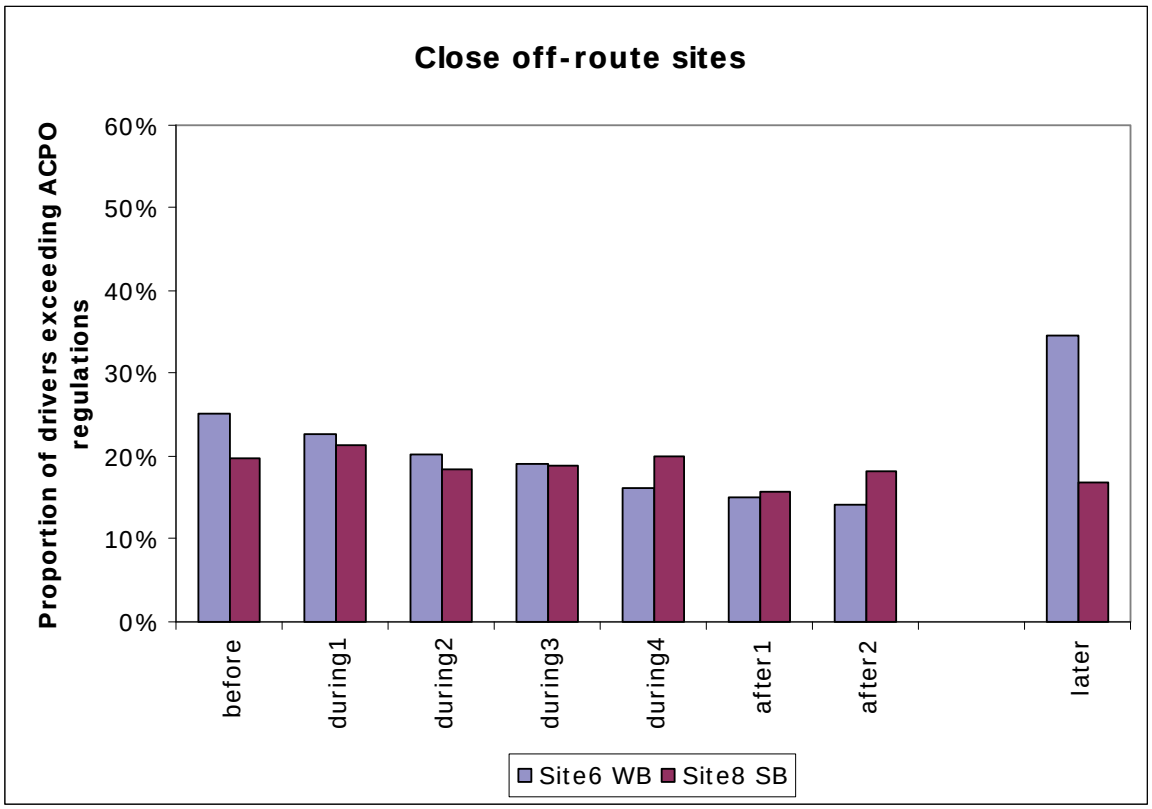

Figure D. 43: Proportion of drivers exceeding ACPO regulations by site and week for Close off-route sites

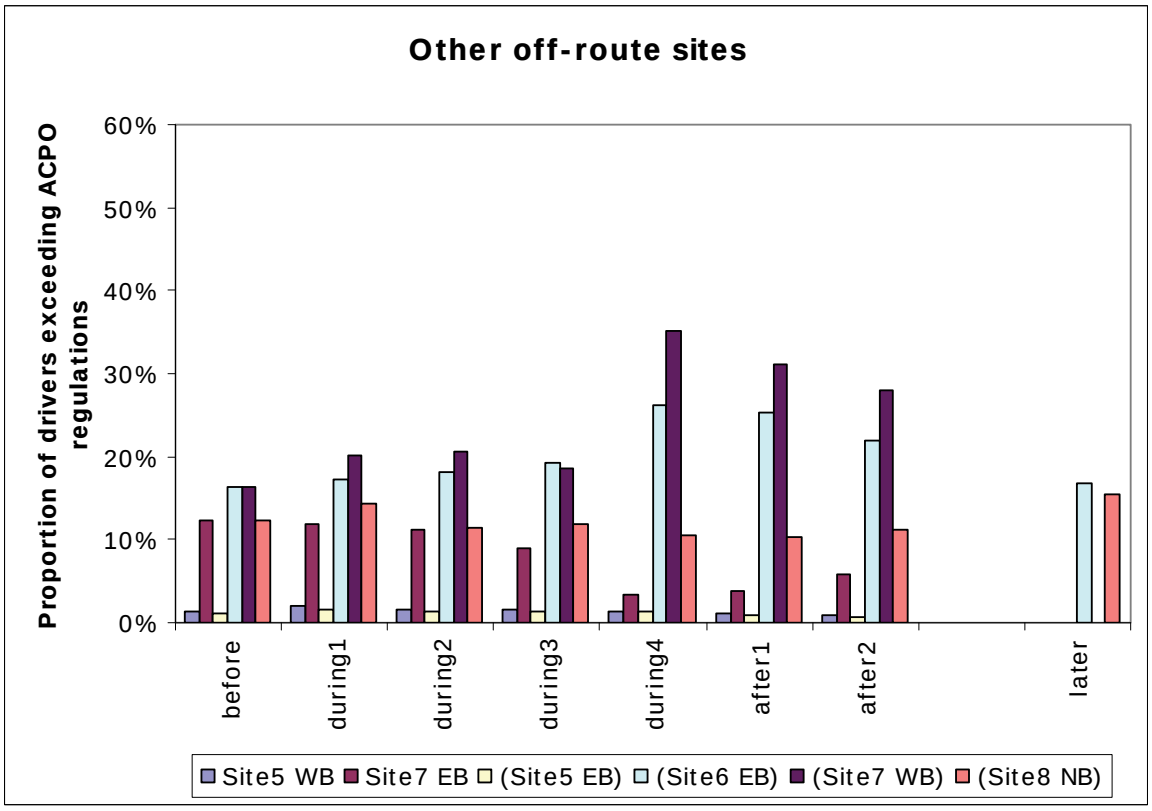

Figure D. 44: Proportion of drivers exceeding ACPO regulations by site and week for Other off-route sites

D.9.3 Exceeding speed limit plus 15mph

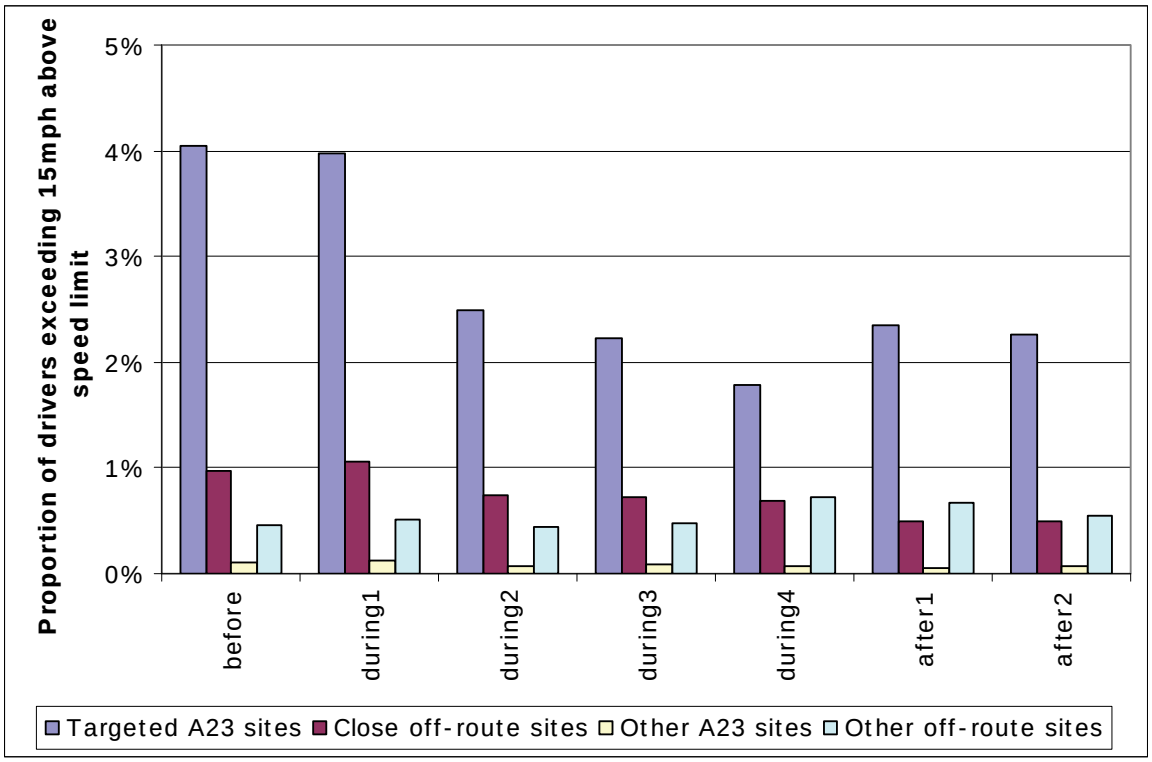

Figure D. 45: Proportion of drivers exceeding speed limit +15mph by group of sites and week

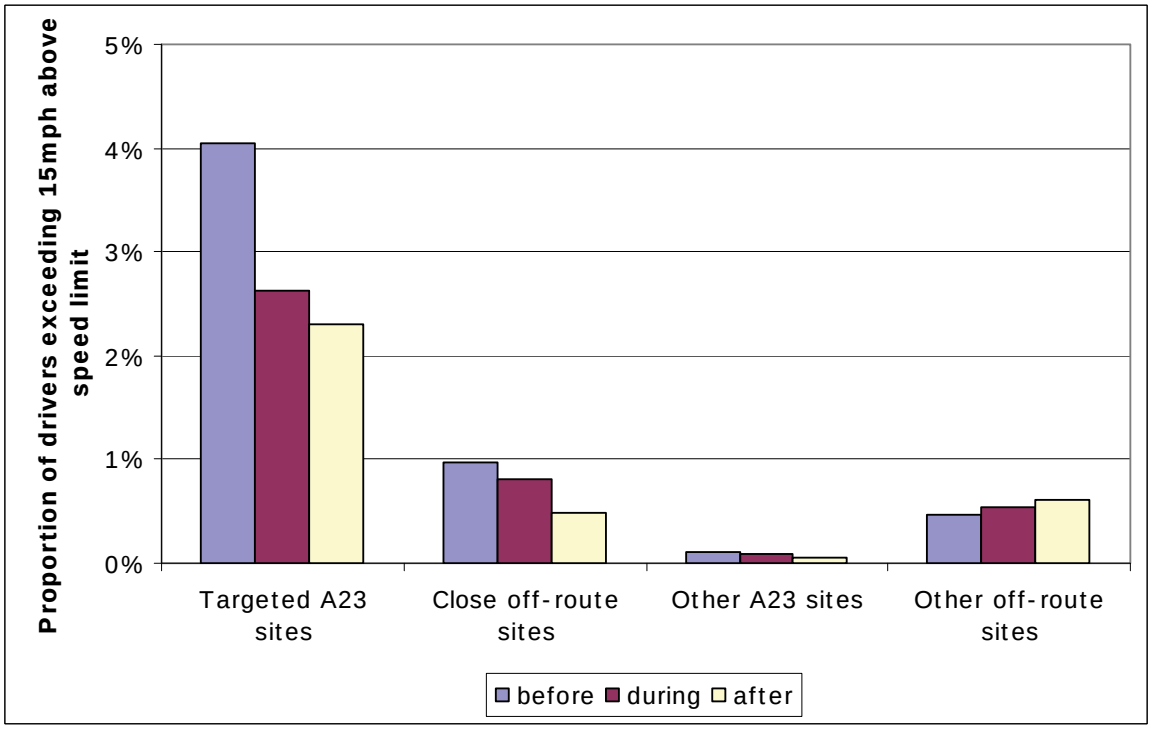

Figure D. 46: Proportion of drivers exceeding speed limit +15mph by study period and group of sites

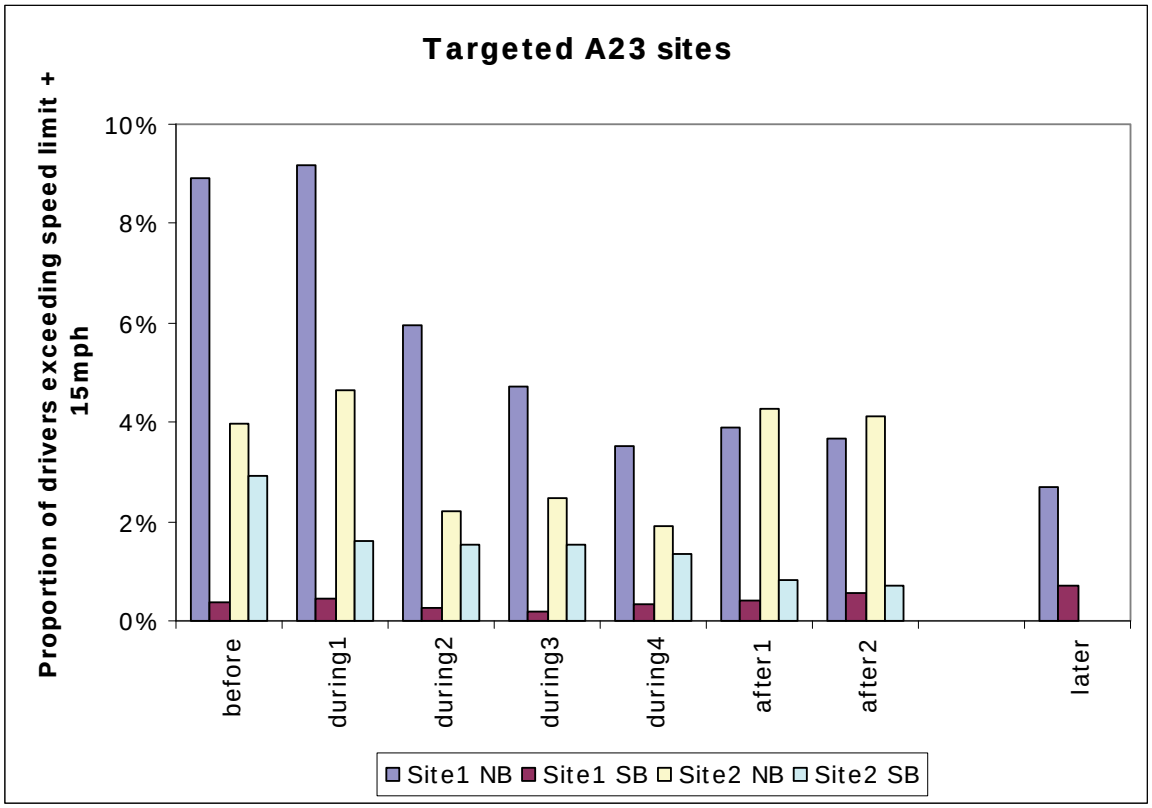

Figure D. 47: Proportion of drivers exceeding speed limit +15mph by site and week for Targeted A23 sites

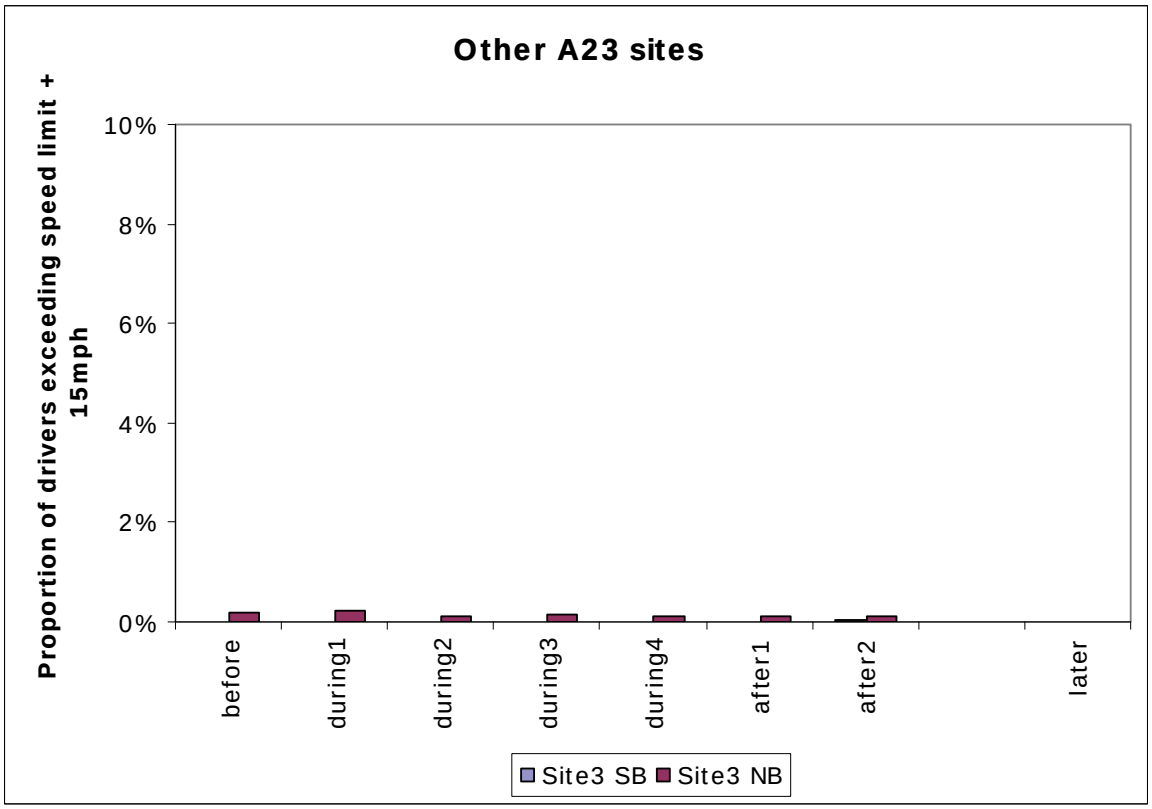

Figure D. 48: Proportion of drivers exceeding speed limit +15mph by site and week for Other A23 sites

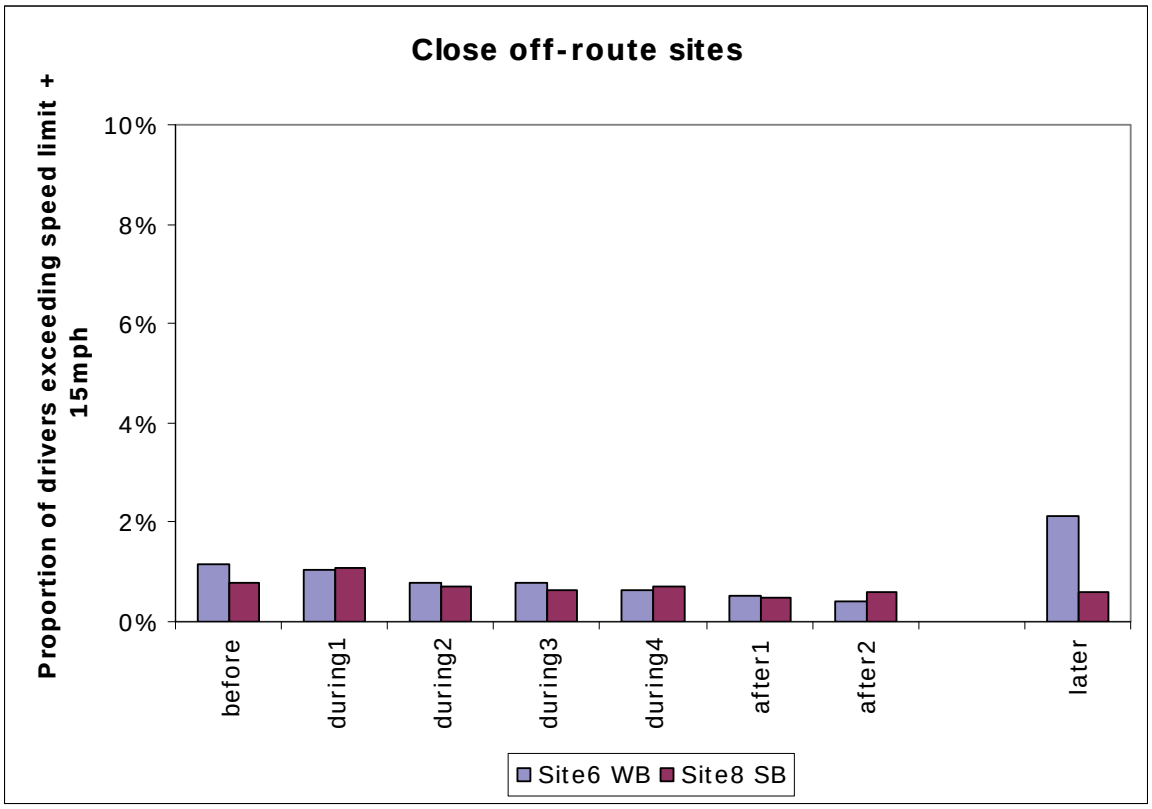

Figure D. 49: Proportion of drivers exceeding speed limit +15mph by site and week for Close off-route sites

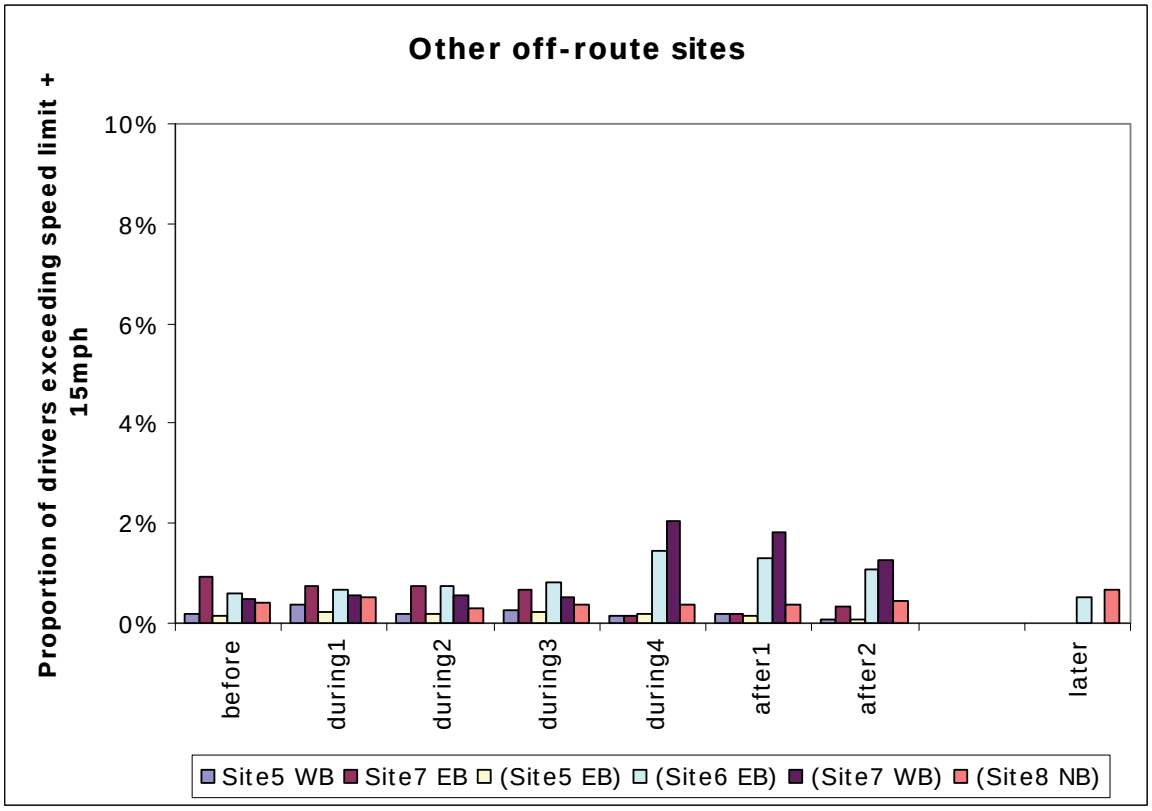

Figure D. 50: Proportion of drivers exceeding speed limit +15mph by site and week for Other off-route sites

Appendix E Seat belt results by site

Table E. 1: Seat belt wearing rates on A23 and at off-route sites by study period

	Wearing rate		Sample size	
	A23	Off-route	A23	Off-route
Before	87%	85%	4,566	5,386
During	87%	83%	10,362	11,670
After	84%		5,453	
Later	91%		2,016	

Table E. 2: Seat belt wearing rates on A23 and at off-route sites by week

	A23	Off-route
Before1	87%	85%
During1	89%	84%
During2	86%	82%
During3	86%	84%
During4	88%	84%
After1	84%	
After2	84%	
Later	91%	

Table E. 3: Proportion of drivers wearing seat belts at A23 sites, by vehicle type.

Period	Car & Taxi	Van
Before	91%	64%
During	91%	67%
After	88%	63%
Later	94%	73%

Table E. 4: Proportion of drivers wearing seat belts at A23 sites, by sex.

Period	Male	Female
Before	84%	94%
During	84%	94%
After	81%	91%
Later	88%	96%

Table E. 5: Proportion of drivers wearing seat belts at A23 sites, by age group.

Period	17-29	30-59	60+
Before	85%	87%	92%
During	88%	87%	92%
After	81%	84%	96%
Later	90%	90%	97%

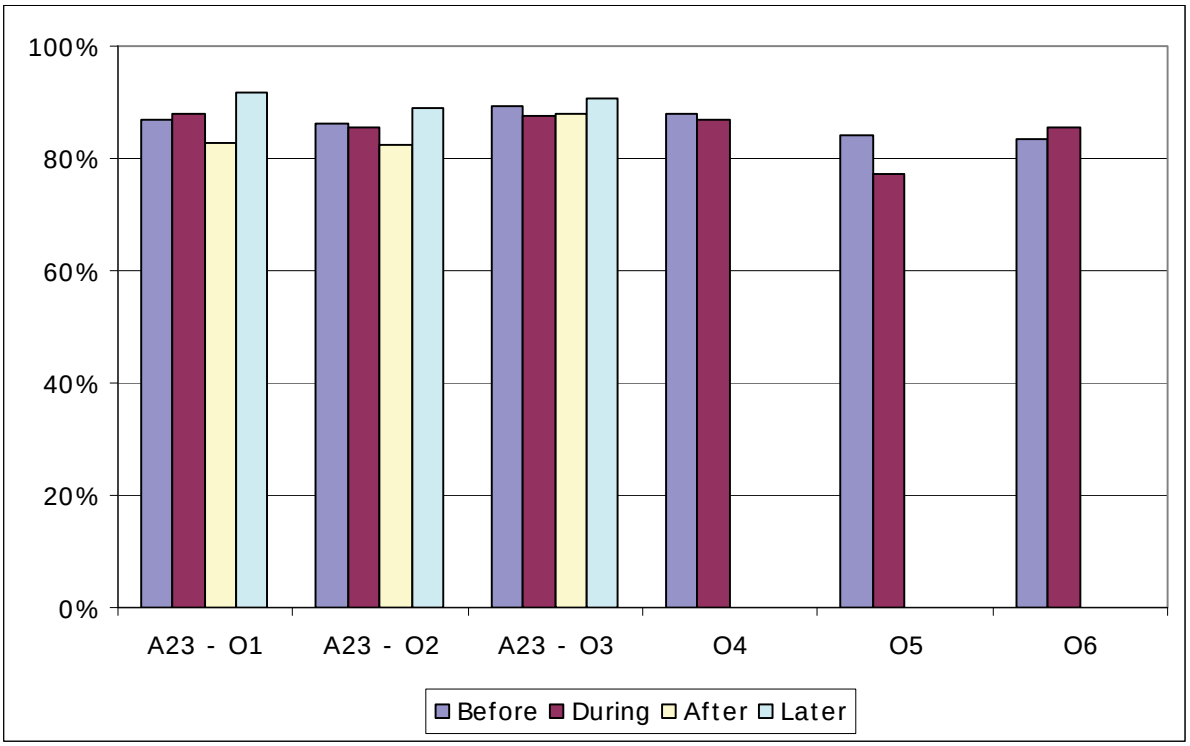

Figure E. 1: Seat belt wearing rates by site and period

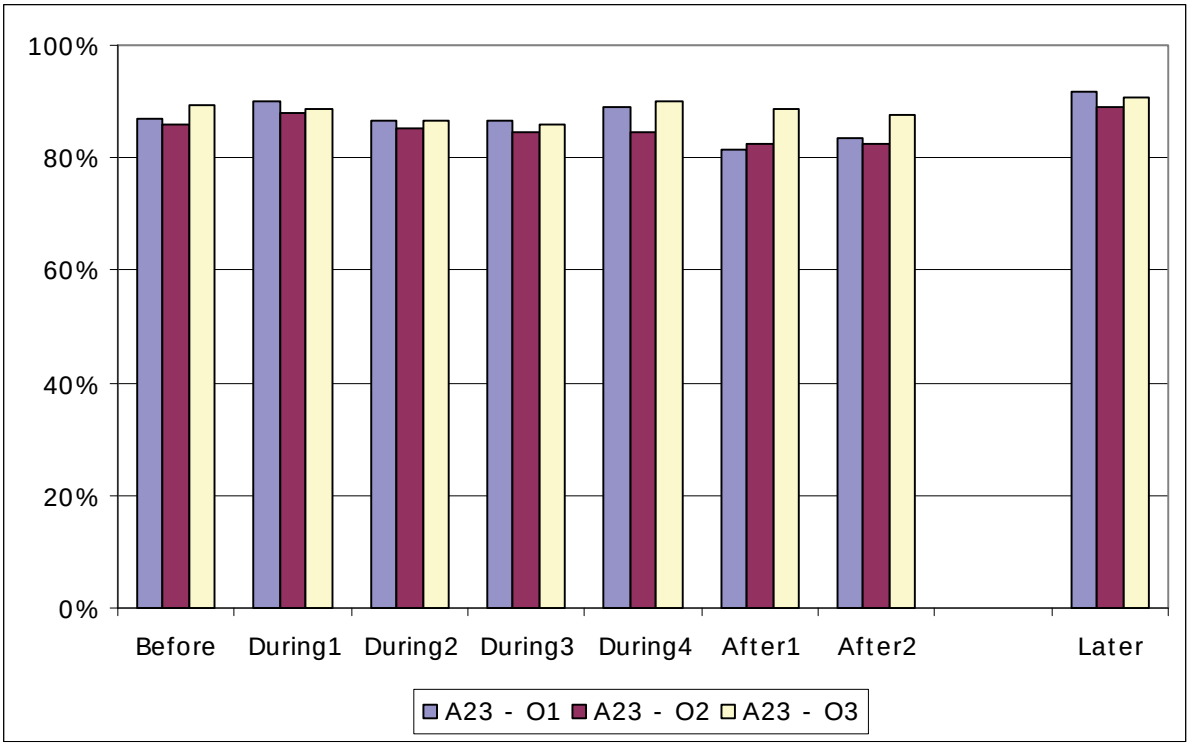

Figure E. 2: Seat belt wearing rates on A23 by week and site

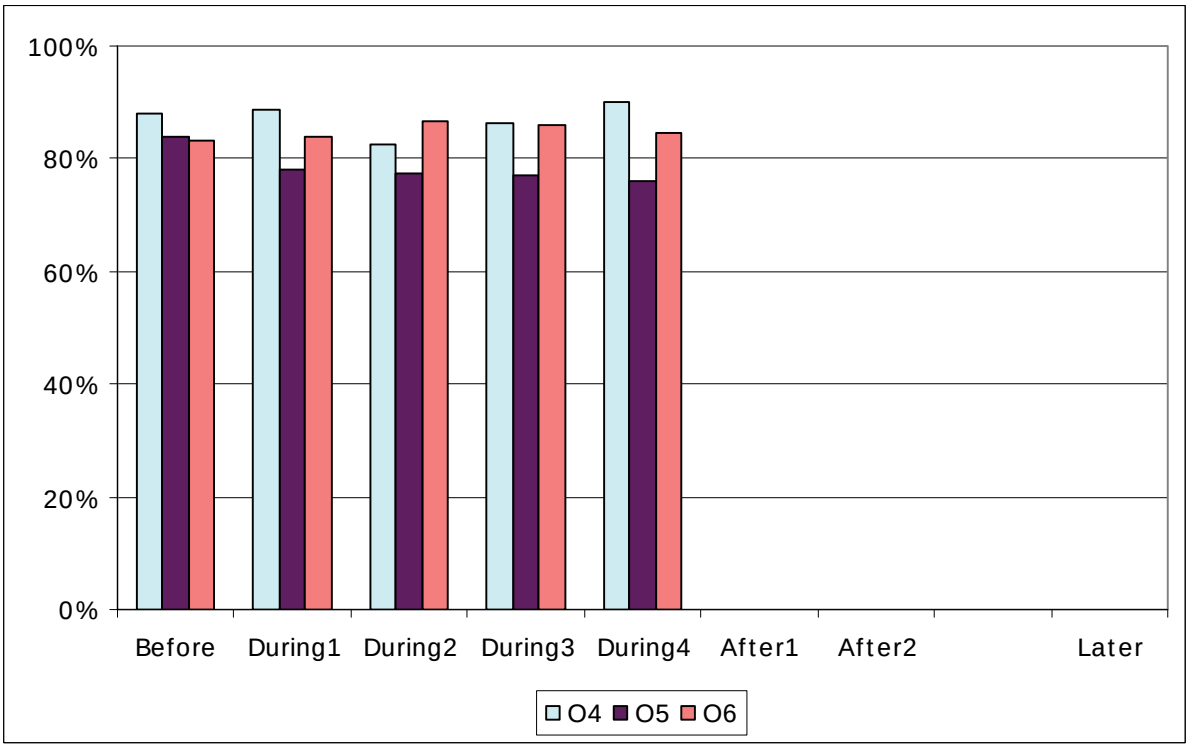

Figure E. 3: Seat belt wearing rates Off-route by week and site

Appendix F Mobile Phone results by site

Table F. 1: Mobile phone use on and off-route by period

Sites	Period	Hand-held	Hands free	Sample size
A23	Before	1.8%	4.3%	4566
	During	1.8%	4.6%	10362
	After	1.6%	5.0%	5453
	Later	2.2%	3.0%	2016
Off route	Before	3.3%	6.7%	5386
	During	2.6%	6.1%	11670

Table F. 2: Mobile phone use on and off-route by week

Sites	Period	Hand-held	Hands free	Sample size
A23	Before1	1.8%	4.3%	4566
	During1	1.3%	5.8%	2179
	During2	2.1%	4.0%	2287
	During3	1.2%	3.8%	2571
	During4	2.4%	5.0%	3325
	After1	1.6%	4.8%	2469
	After2	1.6%	5.2%	2984
	Later	2.2%	3.0%	2016
Off-route	Before1	3.3%	6.7%	5386
	During1	1.9%	6.9%	2526
	During2	3.0%	5.1%	3639
	During3	2.3%	6.8%	3112
	During4	3.0%	5.8%	2393

Table F. 3: Proportion of drivers using hand-held mobile phones, by vehicle type.

Period	Car & Taxi	Van
Before	1.6%	2.8%
During	1.6%	2.7%
After	1.6%	1.8%
Later	2.0%	3.2%

Table F. 4: Proportion of drivers using hand-held mobile phones at A23 sites, by sex.

Period	Male	Female
Before	2.0%	1.5%
During	2.2%	1.0%
After	1.6%	1.5%
Later	2.0%	1.3%

Table F. 5: Proportion of drivers using hand-held mobile phones at A23 sites, by age group.

Period	17-29	30-59	60+
Before	3.3%	1.7%	0.0%
During	2.7%	1.7%	0.5%
After	3.1%	1.3%	0.3%
Later	0.7%	2.5%	0.0%

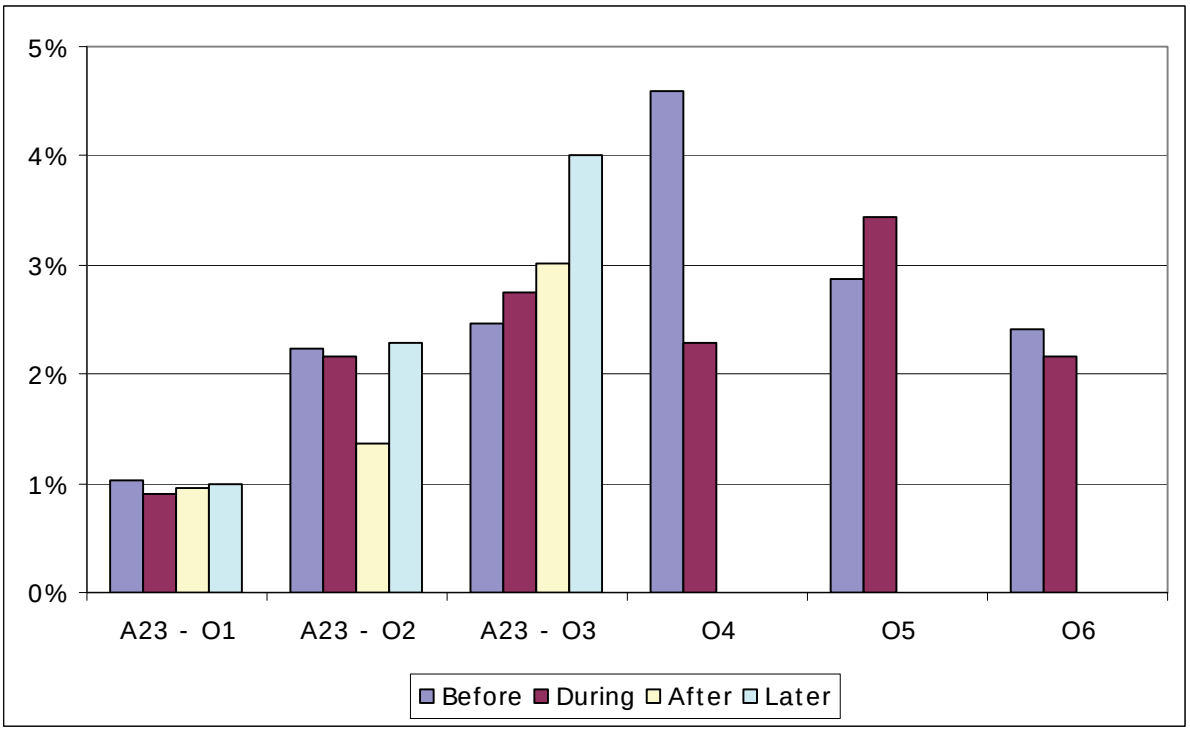

Figure F. 1: Hand-held mobile phone use by site and period

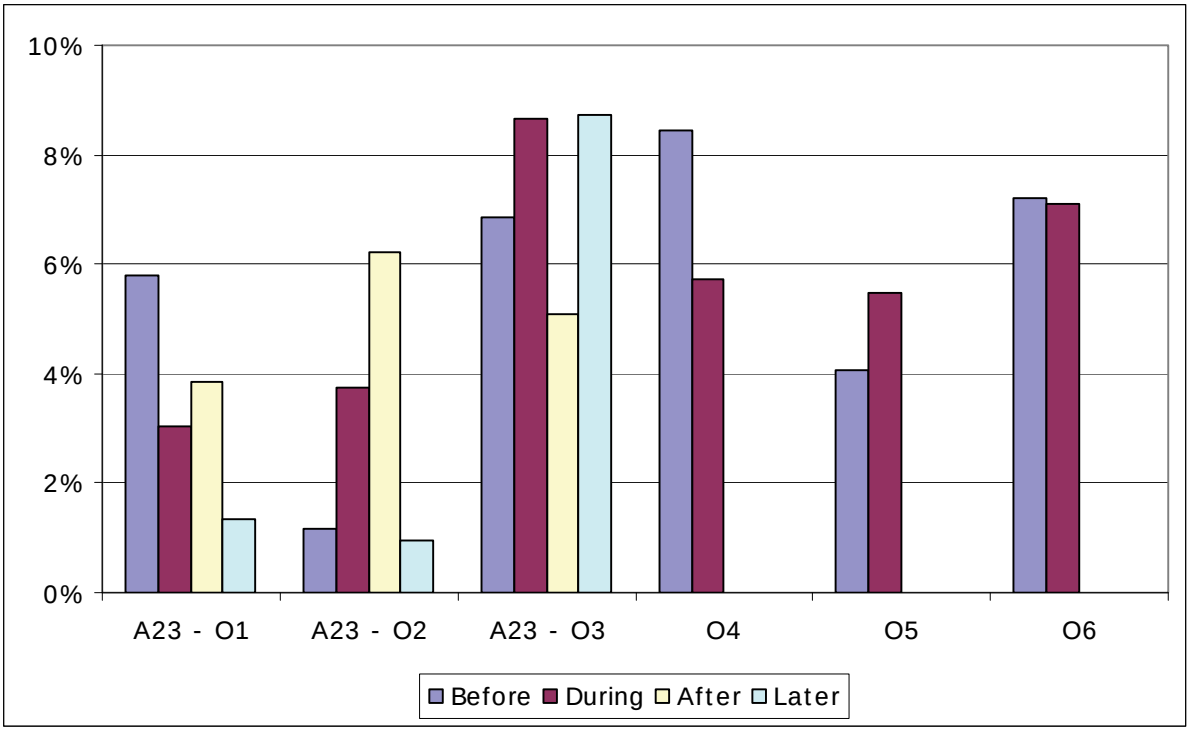

Figure F. 2: Hands free mobile phone use by site and period

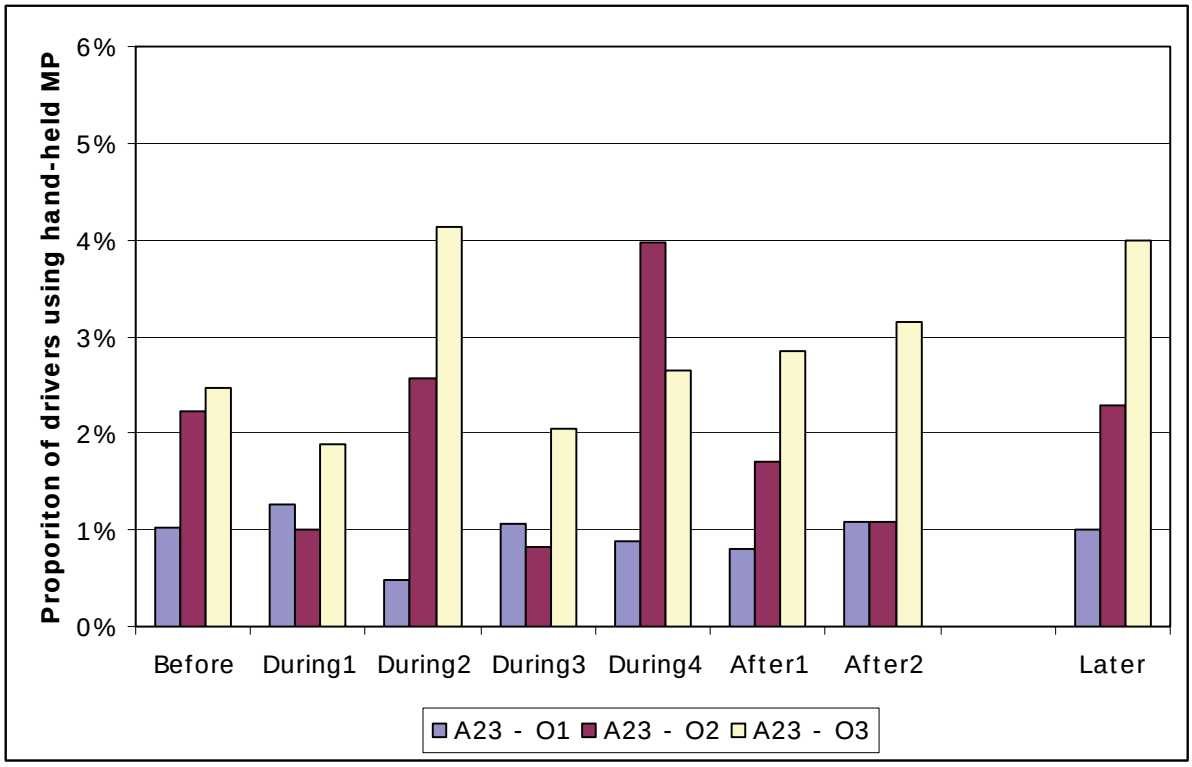

Figure F. 3: Hand-held mobile phone use on A23 by site and week

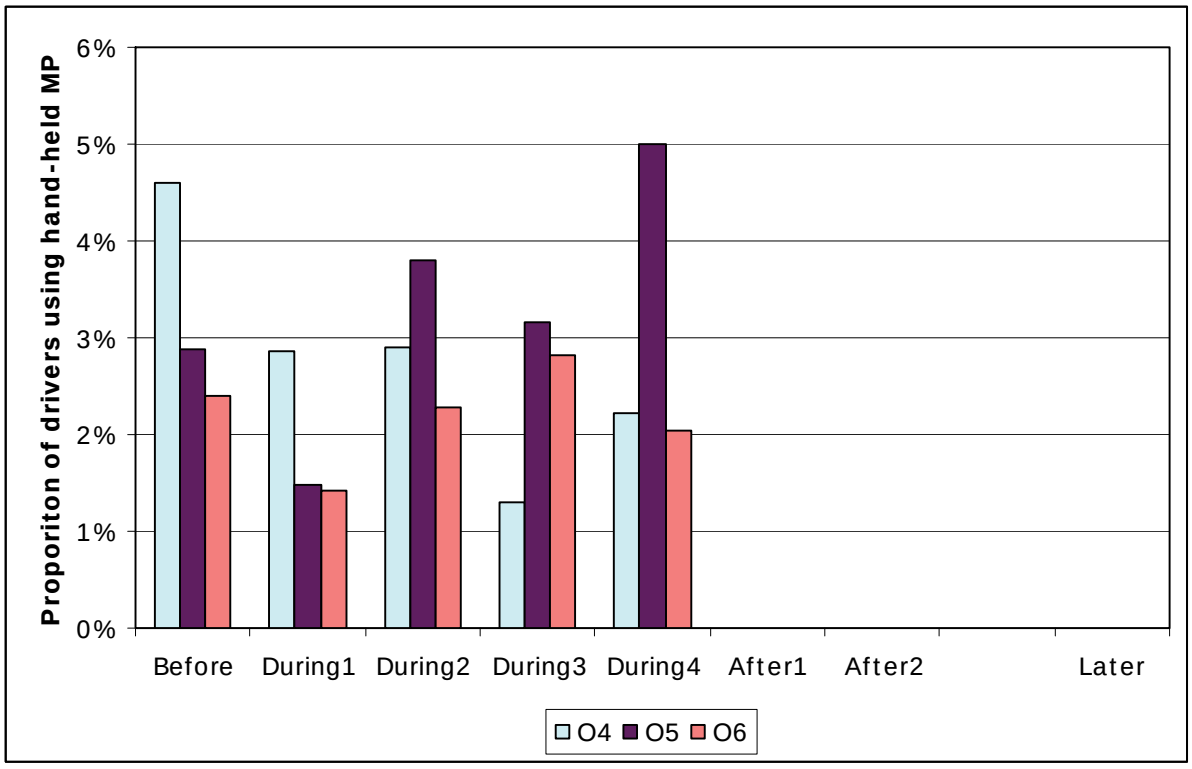

Figure F. 4: Hand-held mobile phone use Off-route by site and week

Evaluation of Operation Radar

This report describes an evaluation of a Police operation, code named Operation Radar, which aimed to establish how methods and levels of policing in London affect road casualty rates.

Operation Radar was planned and implemented by the Metropolitan Police Service Traffic Operational Command Unit. It was designed to increase the visible presence of Police on a stretch of the A23 in Surrey. Teams of officers concentrated on mobile phone, seat belt and speed offences for four weeks in May 2008. A mixture of Police enforcement methods were employed, including static speed checks and mobile patrolling on motorcycles.

A high number of fixed penalty notices were handed out during the operation and mean and 85th percentile speeds reduced significantly during the period, as did the proportion of drivers exceeding the speed limit, exceeding the ACPO recommended enforced speed level (speed limit + 10% + 2mph) and exceeding an excessive speed level (speed limit + 15mph)

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ISSN 0968-4093

ISBN 978-1-84608-762-2

PPR379

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