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# On-Road Evaluation of Perceptual Countermeasures

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**Abstract**

This report describes the fourth and final stage of a comprehensive research program to demonstrate the on-road travel speed, braking and lateral placement effects of two perceptual countermeasures. The first involved an enhanced curvature treatment comprising variable height posts and increased curvature spacing. The second involved a peripheral edgeline "Herringbone" treatment in the approach to an intersection. Treatments were applied to sites in Victoria and New South Wales where similar control sites were available. Data were collected before installation, immediately after and 12 months after installation and comprised speed measures every 20m in the approach to the curve and intersection as well as braking performance and lateral placement. An evaluation of crashes before and after treatment was not possible due to a lack of data. At curves, travel speed results were quite mixed where speed reductions and speed increases were observed immediately after and 12 months later. Braking results tended to support travel speed findings and some improvements in lateral placement were also observed at these locations. At intersections, the results were more stable where speed reductions were more common both immediately after treatment as well as longer-term. There were no differences in braking and lateral placement at these straight-road locations. The findings seem to have been unduly influenced to some degree by misadventure and wear and tear at these sites. It is argued that while the effectiveness of these treatments may be site specific to some degree, they do offer a low-cost solution to reducing travel speed at hazardous locations. Recommendations are made for further research in this area.



**Keywords**

Accidents, Perceptual Countermeasures, Evaluation, Speed, On-road Treatments, Hazardous Locations


**Notes**

(1) ATSB reports are disseminated in the interest of information exchange.
(2) The views expressed are those of the author(s) and do not necessarily represent those of the Australian Government.

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# ACKNOWLEDGMENTS

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This report reflects the contribution of a number of people, either as part of the study design, data collection, or data analysis and interpretation phases. The study team comprised:

| **ARRB TR Team** | **MUARC Team** |
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| Jerima Macauley | Brian Fildes |
| Michael Tziotis | Bruce Corben |
| Melissa Coutts | Stuart Newstead |
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# EXECUTIVE SUMMARY

Speeding has been long recognised as a major factor in the occurrence and severity of road crashes. While enforcement, education/publicity and engineering programs have assisted in reducing speed-related road trauma, supplementary measures to reduce the incidence of unsafe speed behaviours, particularly at hazardous locations, have been sought.

A study was undertaken by Fildes and Lee in 1993 to assess needs for further research and action to reduce excessive speeding. A key outcome of the study, which involved leading experts across Australia, was the need to develop low cost perceptual countermeasures designed to reduce driver speed on roads.

Perceptual countermeasures (PCMs) against excessive speeding refer to manipulations of the road scene presented to a driver that can influence his or her subsequent behaviour. For the most part, these treatments tend to be relatively low cost additions or modifications to the road or roadside setting that can lead to a change in the way the driving environment is perceived by drivers.

The then Federal Office of Road Safety (now Australian Transport Safety Bureau) and the Road and Traffic Authority of New South Wales (RTA NSW) commissioned the Monash University Accident Research Centre (MUARC) and ARRB Transport Research (ARRB TR) to conduct a long-term study of perceptual countermeasure designs and likely effectiveness. A four-phase research program commenced in 1993.

The first stage was a literature review of perceptual countermeasures by Fildes and Jarvis (1994). The second stage of the project was a simulation validation study (Fildes, Godley, Triggs & Jarvis 1997).

The third stage of the project involved the evaluation of a range of PCMs using the driving simulator at MUARC. It was recommended that the effects of the promising treatments from this research be further evaluated on the road to demonstrate the speed reduction benefits, both immediate and longer-term, as well as their safety benefit.

The fourth and final stage of the study (the current stage) involved applying two of the more promising PCM treatments on a sample of mid-block and intersection locations and evaluating their effectiveness and cost-benefits. This report documents the on-road evaluation of two PCM treatments: peripheral transverse lines applied on the approach to intersections and enhanced post spacings with ascending heights applied at road curves.

## Study Design

The treatments were applied at six intersections and six curve sites in Melbourne and Sydney. The evaluation study comprised before and after observations of vehicle braking distance, lateral displacement, and speed profile at the treated sites, and then compared these observations and measurements to sites of similar geometric and geographic characteristics which were untreated (i.e. control sites).

The comparison of data enabled the effects of each treatment to be evaluated, both before and after installation, while controlling for traffic differences at the sites. The inclusion of two 'after' evaluation periods at 1-2 months and 12 months after installation allowed the short- and long-term effects to be evaluated separately.

## Main Results

At both the curve and intersection treatment sites, the results indicate that the treatments were not uniformly effective at reducing travel speeds, although the long-term results were more promising than the short-term findings. Reductions in average speeds were observed more consistently at intersection sites than at curve sites.

### *Curves*

At the curve sites, the treatment effects immediately after installation were quite mixed, with only two of the six treated sites recording significant speed reductions relative to control sites.

In the longer-term, the PCMs produced relative speed reductions at three of the six sites, and had no effect at two sites. At the other treatment site, road condition changes and damage to the treatment during the study period made the results unreliable.

It was noted that the two sites that demonstrated no effect were better delineated by guideposts than the other sites prior to treatment installation. That is, the treatment appears to have been more effective at sites, which were not delineated, or not well delineated, by guideposts prior to treatment installation. Furthermore, one site was a flatter curve than the others and drivers did not need to slow down much to negotiate it, possibly contributing to its lack of effectiveness.

#### *Intersections*

At the intersection sites, the PCMs had more effect on reducing travel speed, relative to the control sites, both short-term and long-term. Speed reductions were observed at a majority of the locations.

An analysis of segment differences between treated and control sites was only partially successful, due to missing data. However, where comparisons were possible, treated intersections showed differences in the speed profile in the approach to the intersection. The results also suggest that while this treatment was expected to have its greatest effect on vehicle speeds in the early stages of the treatment, it is possible that speed reduction effects occurred over the second 200m of the treatment prior to the intersection.

The analysis of braking behaviour and lateral vehicle positioning did not demonstrate any effect of the perceptual treatments at intersections.

### Other Findings

The NSW curve and intersection control sites generally demonstrated an increase in average vehicle speed over the long-term study period. Average vehicle speeds increased at four of the six control sites, with no significant changes at the other two control sites. It has not been possible to establish whether or not this was a general trend in NSW over the study period. The treatment sites, on the other hand, all demonstrated no significant change in average vehicle speed over the long-term study period. If there was an overall increasing trend in vehicle speeds in NSW during the study period, it appears that the treatments may have been successful in diminishing the effect at the treatment sites.

Given that the PCMs tended to be more effective in the long-term, it might suggest that drivers need time to accommodate to them and change their driving behaviour. It is noted that, at all of the sites, the majority of traffic was local and most drivers would probably be very familiar with the road.

### Recommendations

In light of these results, a number of recommendations might be worthy of consideration.

- For sites that demonstrated a positive long-term effect, conduct further speed surveys approximately 2 years after installation of the treatments, to determine whether the speed reduction effects have been sustained.
- If further surveys of the intersection treatment are to be conducted, then there is a need to record and analyse speed measurements over the entire length of treatment (which would require more than one speed laser gun).
- Compare the detailed results of this study with the previous simulation study (Godley, Fildes, Triggs & Brown, 1999) to determine the differences in actual results and simulator results.
- Identify other perceptual countermeasures, from the previous studies, that could be trialled.
- Further research is warranted targeting locations of high traffic exposure and crashes in urban shopping precincts and school and residential zones. Research needs to evaluate speed reductions as well as crash savings.

# 1. INTRODUCTION

## 1.1. Background

Speeding has been long recognised as a major factor in the occurrence and severity of road crashes. Studies overseas and in Australia have identified speed as a factor in about 30% of fatal road crashes.

While enforcement, education/publicity and engineering programs have assisted in reducing speed-related road trauma, supplementary measures to reduce the incidence of unsafe speed behaviours, particularly at hazardous locations, have been sought. A study was undertaken by Fildes and Lee in 1993 to assess needs for further research and action to reduce excessive speeding. A key outcome of the study, which involved leading experts across Australia, was the need to develop low cost perceptual countermeasures designed to reduce driver speed on roads.

## 1.2. Definition

Perceptual countermeasures (PCMs) against excessive speeding refer to manipulations of the road scene presented to a driver that can influence his or her subsequent behaviour. For the most part, these treatments tend to be relatively low cost additions or modifications to the road or immediate roadside settings that can lead to change in the way the driving environment is perceived by drivers. A typical example would be a pattern painted on the road surface to induce the illusion that one is travelling much faster than without the treatment (Godley, Fildes, Triggs, & Brown, 1999).

## 1.3. Project background

The then Federal Office of Road Safety (now Australian Transport Safety Bureau) and the Road and Traffic Authority of New South Wales (RTA NSW) commissioned ARRB Transport Research (ARRB TR) and Monash University Accident Research Centre (MUARC) to conduct a long-term study of perceptual countermeasure designs and likely effectiveness. A four-phase research program commenced in 1993.

The first stage was a literature review of perceptual countermeasures by Fildes and Jarvis (1994). This revealed a range of road treatments likely to affect a driver's perception of speed on the road, some of which had been trialled overseas. These included transverse lines, herringbone and checked patterned edgeline treatments and/or medians, low contrast rumble centreline and edgelines, and raised pavement markers. While some of these treatments had been evaluated in terms of their crash reduction and/or behavioural change, the majority of them had not. Moreover, a systematic study of their relative effectiveness had not been carried out to date, including consideration of whether these treatments are necessarily optimal in reducing travel speed on the road.

The second stage of the project was a simulation validation study (Fildes, Godley, Triggs & Jarvis 1997). The driving simulator was formerly owned by the Transport Accident Commission of Victoria, but was donated to Monash University Accident Research Centre in July 1998. The validation study compared driving through perceptual treatments (transverse rumble strips) on roads in an instrumented vehicle with driving through the same treatments on the simulator. This test was done on the approach to two intersections and two curves. The investigation concluded that mean speed and lateral position were valid dependent measures to use on the simulator when evaluating PCMs.

The third stage of the project was evaluations of a range of PCMs using the driving simulator, which included:

- transverse road markings;
- lane edge and herringbone treatments;
- the Drenthe province treatment from the Netherlands;
- centreline and other edgeline treatments; and

- several enhanced curvature treatments.

Drivers drove a series of test tracks, which had both treated (transverse lines) and untreated road locations. Speed and lateral position measures were compared at these locations. A number of the PCMs appeared effective at reducing travel speed, including:

- full-width transverse lines;
- peripheral transverse lines and lane edge herringbone treatments;
- hatched median (especially with a lane width narrower than 3 metres), with or without intermittent gravel edgelines;
- enhanced post spacings (possible ascending heights) for road curves.

The third stage study report recommended the effects of the promising treatments be further evaluated on the road to demonstrate the speed reduction benefits, both immediate and longer-term, as well as their safety benefit.

The fourth and final stage of the study (the current stage) involved applying two of the more promising PCM treatments on a sample of mid-block and intersection locations and evaluating their effectiveness and cost-benefits.

## 1.4. This Report

This report documents the on-road evaluation of two PCM treatments: peripheral transverse lines applied on the approach to intersections and enhanced post spacings with ascending heights applied at road curves.

The treatments were applied at six intersection and six curve sites in Melbourne and Sydney. The evaluation study comprised before and after observations of vehicle braking distance, lateral displacement, and speed profile at the treated sites, and then compared these observations and measurements to sites of similar geometric and geographic characteristics which were untreated (i.e., control sites). The evaluations also include comparison of pre- and post-crash data at both the treatment and control sites.

The comparison of data enabled the effects of each treatment to be evaluated, both before and after installation, while controlling for traffic differences at the sites. The inclusion of two ‘after’ evaluation periods at 1-2 months and 12 months after installation allowed the short term and long-term effects to be evaluated.

# 2. METHOD

Five major tasks were conducted for the on-road evaluation trial:

- selection of the treatments
- selection of the treatment and control sites
- site observations and data collection
- data analysis
- crash analysis

The methodology for each task is described below.

## 2.1. Selection of the treatments

Workshops were held at VicRoads and the RTA NSW to select the two PCM treatments for the evaluation study. Each workshop involved relevant traffic engineers, service people and regional managers from the road authorities, who were to fund the treatment installations.

At the workshops the research team presented an overview of the findings of the first three stages of the study, particularly emphasising the outcomes of stage three, the simulator study. The simulator study[1] indicated that the most promising PCM treatments, in terms of driver speed reduction, were:

- full-width transverse lines;
- peripheral transverse lines and lane edge herringbone treatments;
- hatched median (especially with a lane width narrower than 3 metres), with or without intermittent gravel edgelines;
- enhanced post spacings (possible ascending heights) for road curves.

These treatments were discussed in detail at the workshop to determine which two treatments should be evaluated in the on-road trials. The considerations discussed included practicality in terms of maintenance, potential safety issues, and availability of appropriate trial sites in outer urban/rural locations.

From discussions at the workshop, the full width transverse lines were discounted from further evaluation because similar treatments had been previously implemented in both Melbourne and Sydney, and it was also considered that they were not practical from a maintenance perspective. Similarly, the hatched median was discounted from further evaluation because it was felt that it would be difficult to find appropriate outer urban/rural sites where the lanes were wide enough to be able to install a painted median. This treatment raised safety concerns as it could encourage drivers to drive closer to the edge of the road, with the potential of increasing run-off-road crashes.

Therefore the two PCM treatments chosen for the on-road evaluations were:

- peripheral transverse lines on the approach to an intersection; and
- enhanced post spacings with ascending post heights for road curves.

These treatments are discussed in more detail in Chapter 3.

[1] Refer to the FORS report *Perceptual Countermeasures: Experimental Research* (Godley et al., 1999) for detailed results of simulation studies of PCM treatments.

## 2.2. Site selection

Following selection of the PCM treatments for the evaluation, the treatment sites were selected. Three sites for each treatment were required in both Melbourne and Sydney. In addition, a control site was required for each treatment site. The control site needed to match the treatment site, in terms of geometric, geographical and traffic characteristics, as closely as possible.

The research team selected sites on the basis of the following considerations:

- For the intersection sites: a long, straight lead up to a cross or T-intersection where vehicle speeds would not be influenced by other factors and where the intersection may be somewhat unexpected.
- For the curve sites: a curve where vehicles may misjudge the speed required to negotiate it, based on its appearance or the preceding road geometry.
- For the control sites: features to match the treatment site, in terms of geometric, geographical and traffic characteristics, as closely as possible.
- Crash history of the site, where speed was likely to have been a contributing factor.
- Suitable vantage point and roadside space in which the video trailer could be stably parked, without posing a hazard to passing traffic.

A total of six treatment sites and six control sites where chosen in both Melbourne and Sydney, making a total of 24 sites for the evaluation study. The sites are detailed in Section 4.

## 2.3. Site surveys

Observational surveys were conducted at each treatment and control site prior to the installation of treatments. 'After' observations were collected following an initial settling in period, approximately 1 month after installation of the treatments, and again after 12 months. Each observational survey was conducted over a 4 to 6 hour period, with a minimum of 100 vehicles recorded. The surveys included video recordings to measure braking distance from the curve/intersection and lateral placement within the lane, and speed measurements to obtain vehicle speed profiles approaching the curve/intersection.

Night surveys were also conducted at three treatment and control sites in Victorian (two curve sites and one intersection site) to determine whether the treatments had a different effect on driver behaviour in the dark.

### 2.3.1. Video recordings

The site observations and measurements were made using CAMDAS (Video Vehicle Detection System owned by ARRB Transport Research) for braking and lateral placement observations. This unit is ideally suited to this work as it can provide discrete observations important for not influencing driver behaviour.

Initial site selection was sensitive to the need of a suitable vantage point and roadside space in which the video trailer could be stably parked, without posing a hazard to passing traffic. At most sites the width of the road shoulder proved adequate. In the other cases roadside clearings were available for stationing the equipment. To ensure stability and safety, the video trailer was kept level at all times, regardless of the landscape.

Both intersection and curve treatments aim to influence driver behaviour on their approaches. Therefore the site surveys were designed to capture the pre-treatment and post-treatment behaviour of drivers on road segment approaching the curve/intersection. The video trailer was therefore stationed approximately 400m before the intersections and 200-300m before the curves. In some cases, the alignment of the road and roadside vegetation restricted sight distances and forced the video trailer closer to the curve/intersection.

Two cameras mounted on the video trailer were employed to capture driver behaviour along the segment of roadway approaching the curve/intersection. The first was zoomed in on the first 200 metres and the second held a wider focus, which included the full length of the road segment. Using picture in picture technology, the two images were displayed on the one screen, for clear viewing of vehicle movements along the entire

stretch of road, in particular vehicle positioning within the lane and braking behaviour. Where the trailer was positioned at less than 200 metres away from the curve/intersection, a single camera proved adequate.

At the commencement of each video recording session, the surveyor was required to walk the length of the road segment being observed with a measuring wheel and flag to the camera at ten metre intervals. Upon viewing the tapes, each point where a signal was made was marked on a transparency on the television screen (i.e., 10m, 20m 30m, etc. from the curve/intersection) to enable the distance at which each vehicle braked to be accurately estimated. The start of the curves (i.e., tangent point) and the stop/holding line at the intersections were nominated as distance 0m.

Video recording of all vehicles that traversed each treatment and control site were made during the before and after observation periods, providing a permanent performance record for analysing at a later time. Measurements of braking distance from the curve/intersection and lateral placement within the lane were taken from the video recordings back in the office.

*Braking distance*

Braking distance was measured as the distance from the intersection or start of curve where a vehicle's brake lights first came on. Note, however, in many cases, it was not clear from the video when, or if, a vehicle's brake lights came on. Therefore, it was not always possible to determine whether a vehicle did not brake, or whether a vehicle braked but at an unknown distance from the intersection or start of curve.

*Lateral placement*

In order to compare the lateral placement of vehicles within the lane, lanes were divided into three sections – edge, centre and right. The centre section of the lane was the middle 1.8m of the lane (which is the width of a typical car). The edge (left) and right sections of lane were 0.6-0.8m wide, depending on the overall lane width, which was typically 3.0-3.4m.

The lateral placement of vehicles, as they travelled along the road sections, was observed from the videos and recorded. If the whole vehicle travelled in the centre section, then their lateral placement was recorded as 'centre'. If part of the vehicle was in the edge (left) or right sections, then their lateral placement was recorded as 'edge' or 'right'. If a vehicle changed its lateral position in the lane as it travelled along the observed section of road, then this was also recorded.

### 2.3.2. Speed Measurements

A laser speed gun was used to discretely record vehicle speeds as vehicles travelled along the observed road section at each site. When aimed at a vehicle, the laser speed gun automatically records speed every 0.4 of a second. This enabled the speed profiles of individual vehicles, as they travelled along the observed road section, to be determined. However, the laser gun has a limited range of approximately 200m over which speeds can be measured. Therefore vehicle speeds were typically measured over 200m prior to the start of the curves, and over 200-400m prior to the intersections. This is where the PCMs were anticipated to have the greatest effect on vehicle speeds.

## 2.4. Follow-Up Site surveys

At the completion of the data collection phase of the research program, each of the sites was again visited and inspected for two reasons:

- To ensure that the sites had not changed dramatically during the 12-18 month installation period in such a way that the findings were spurious (indeed, one of the curved site did require maintenance to the posts prior to the second 'after' period observations and again only 3 of the guideposts remained at the follow-up survey).
- To ensure that the results obtained could be rightly attributed to the effect of the treatment, rather than any road design or other compounding factors.

# 3. TREATMENT AND SITE DETAILS

## 3.1. Curve treatment

Under certain circumstances, road curves can appear to be less curved than they really are, thereby causing drivers to enter them at inappropriately high speeds (Fildes, 1986). The curve treatment evaluated for this study aims to offset such illusions and ensure that drivers adopt more suitable approach and entry speeds into the curve, with potential safety benefits in terms of crash reductions.

The treatment consists of laterally diverging guide posts with ascending heights, applied on the outside of a curve, to create the perceptual illusion of the curve being tighter than it is in reality. A typical installation of the curve treatment is shown in Figure 3.1.

*Figure 3.1: Typical Curve Treatment*

The details of the treatment are described below:

- The start/finish of the treatment coincided with the start/finish of the curve.
- Guideposts around the outside of curve were spaced at half the normal spacing, as given in Table 3.1 of Australian Standard AS1742.2 (See Appendix A). (Note that the approximate radius of the curve was determined/estimated by the road authority for the purposes of installing the treatment).
- Lateral placement of the guideposts increased evenly from the usual offset (typically 1.2m) at the start of the curve, to 3m at the centre of the curve, and then reduced back to the usual offset at the end of the curve.
- The height of the guideposts increased evenly from 1m (i.e., normal height) at the start of the curve, to 2m at the centre of the curve, then reduced back to 1m at the end of the curve.
- Guideposts were standard timber or flexible posts, painted white.
- Two reflectors were provided on each guidepost – one approximately 50mm from the top of post and one at 1m height.
- No changes were made to the guideposts on the inside of the curves.

Note that the treatment evaluated here varied slightly from the treatment assessed in the simulator study in that two reflectors were placed on the guideposts instead of one reflector. A second reflector was installed on the guideposts at a constant height of 1m. This was in response to concerns raised by VicRoads and RTA officers that a single reflector placed 50mm from the top of the guidepost would not provide sufficient

delineation to motorists as they negotiating the bend. Therefore a second reflector was provided on the guideposts that were in excess of 1m in height.

## 3.2. Intersection treatment

Perceptual countermeasures for decelerating manoeuvres are implemented on the approach to hazards such as intersections. They are designed to encourage drivers to decelerate more rapidly than they usually would through influencing their perception. Transverse lines are used in one such perceptual treatment. Several variations of the transverse line treatment have been applied in the UK, Israel and Australia with mixed results. Taking into account these evaluations it was not clear whether transverse lines are an effective long-term countermeasure to speeding, or will only alert drivers of an approaching hazard and become ineffective over time if drivers choose to ignore them (Godley et al., 1999).

The intersection treatment evaluated here consisted of peripheral transverse lines at even spacings. The treatment was designed as a less expensive alternative to full transverse lines and was based on reasoning that transverse lines influence speed through peripheral vision (Godley et al., 1999).

*Figure 3.2: Typical Intersection Treatment*

The details of the treatment are described below:

- Treatment starts approximately 435m from intersection, and goes over 400m (i.e., nothing over 35m immediately prior to intersection).
- Dimensions of peripheral transverse lines: 600mm wide, 600mm long, with a 4.5m gap between the parallel lines. Note that the distance between lines (across the lane) varies depending on the lane width.
- Lines marked in high contrast yellow paint (not long life).

## 3.3. Sites Selected

Control and treatment sites were matched as closely as possible, in terms of geometric, geographical and traffic characteristics. Details of the curve and intersection sites are given below.

### 3.3.1. Curve Treatment Sites

The curve treatment sites consisted of right-hand curves in Victoria and left-hand curves in NSW.

*Victorian sites*

| Treatment site | Control site |
|---|---|
| Gembrook Road<br>Southbound right curve just past no. 605, north of Harvie Road (Melways Ref: 314F10) | Gembrook Road<br>Northbound right curve just past no. 605, north of Harvie Road (Melways Ref: 314F10) |
| Harkaway Road<br>Southbound right curve just past no. 186, opposite 'Melrose' (Melways Ref: 111C1) | Harkaway Road<br>Northbound right curve just past Caserta Drive (Melways Ref: 111C1) |
| Pakenham Road<br>Southbound right curve north of Mann Road (second curve south of no 1005) (Melways Ref: 313K9) | Pakenham Road<br>Southbound right curve south of Paternoster Road/ Mt Burnett Road (near rock wall) (Melways Ref: 313K9) |

Night-time & daytime observations were made at the Gembrook Road and Pakenham Road sites.

*NSW sites*

| Treatment site | Control site |
|---|---|
| The Driftway<br>Southbound left curve at Bonner Road (Sydways Ref: 166B10) | The Driftway<br>Northbound left curve just before Castlereagh Road (Sydways Ref: 166B10) |
| Castlereagh Road<br>South-westbound left curve near no. 460, past Springwood Road (corner private access road) (Sydways Ref: 165P10) | Castlereagh Road<br>South-westbound left curve between Inalls Road and Drift Road (Sydways Ref: 165P10) |
| Scheyville Road<br>Eastbound left curve past Dormitory Hill Road (Sydways Ref: 170 C1) | Scheyville Road<br>Eastbound left curve at Sydney Show Jumping Club (Sydways Ref: 170 C1) |

### 3.3.2. Intersection treatment sites

Again, six sites were selected for the intersection treatment, in both Victoria and NSW, along with similar control sites.

*Victorian sites*

| Treatment site | Control site |
|---|---|
| Ballarto Road at Koo Wee Rup Road<br>West leg (Melways Ref: Key Map 14) | Ballarto Road at Koo Wee Rup Road<br>East leg (Melways Ref: Key Map 14) |
| Bittern Dromana Road at Balnarring Road<br>East leg (Melways Ref 162 K11) | Bittern Dromana Road at Balnarring Road<br>West leg (Melways Ref 162 K11) |
| Myers Road at Coolart Road<br>West leg (Melways Ref: 163 J7) | Myers Road at Coolart Road<br>East leg (Melways Ref: 163 J7) |

Night-time and daytime observations were made at the Ballarto Road site.

*NSW sites*

The details of the intersection sites in NSW are:

| **Treatment site** | **Control site** |
|---|---|
| The Driftway at Londonberry Road<br>West leg (Sydways Ref: 166 J12) | The Driftway at Londonberry Road<br>East leg (Sydways Ref: 166 J12) |
| Old Stock Route Road at Wolseley Road/Oakville Road<br>North leg (Sydways Ref 169 D11) | Old Stock Route Road at Wolseley Road/Oakville Road<br>South leg (Sydways Ref 169 D11) |
| Smith Road/Broos Road at Oakville Road/Stahls Road<br>South leg (Sydways Ref: 169 G11) | Smith Road/Broos Road at Oakville Road/Stahls Road<br>North leg (Sydways Ref: 169 G11) |

Photos of all of the sites are provided in Appendix B.

# 4. DATA COLLECTION

## 4.1. Observations

Pre-treatment data were collected at each of the control and treatment sites in April/May 2000. Treatments were then installed in NSW and Victoria by the respective road authorities. The first series of post treatment observations was completed in August 2000, shortly after an initial settling in period. Analysis of the data obtained from these before and after studies aimed to demonstrate the short-term effects of the treatment installations on driver behaviour.

The second series of 'after' observations occurred approximately 12 months after the initial installation of the treatments. However, at three of the curve treatment sites – the Harkaway Rd site in Victoria, and the Scheyville Rd and The Driftway treatment sites in NSW – a number of guide posts were missing from the original design and the second post-treatment observations had to be delayed while the sites were repaired. This had the potential effect of producing different driver behaviour, and hence, an accurate measure of driver reaction to the proposed treatments could not be made. Analysis of the final stage of observations aimed to qualify and quantify the degree to which the treatments had remained (or become) effective, after drivers had become more familiar with them, or whether familiarity had led motorists to return to their pre-treatment behaviour.

The date observations were made at each site, the number of vehicles observed during each survey period, and treatment installation dates are provided in Appendix C.

## 4.2. Data Collection Issues

### 4.2.1. Speed Data

The amount of data collected for the project was very extensive, and some technical problems were encountered with the recordings of speed measurements. Unfortunately, this resulted in no speed data being suitable for analysis for:

- Ballarto Road control site (daytime measurements)
- Ballarto Road treatment and control sites – immediately after period (daytime and night time measurements)
- Myers Road treatment and control sites – immediately after period

### 4.2.2. Braking and Lateral Positioning Data

As discussed in Section 2.3.1, vehicle braking distance and lateral position in the lane was recorded from the videos. Braking distance was measured as the distance from the intersection or start of curve where a vehicle's brake lights first came on. However, in many cases, it was not clear from the video when, or if, a vehicle's brake lights came on. Therefore, it was not always possible to determine whether a vehicle did not brake, or whether a vehicle braked but at an unknown distance from the intersection or start of curve.

Although this difficulty did not arise during our 'pilot' survey, the project has demonstrated that video recording is not a reliable method to capture braking behaviour. An alternative method should be considered, if future surveys of a similar nature are to be undertaken.

A problem was encountered with one of the video recordings for Old Stock Route Road and it was not possible to record the braking and lateral positioning data at the control site for the long-term period.

## 4.3. Data Analysis

### 4.3.1. Speed data

#### 4.3.1.1. *Visual Inspection of Data*

In order to manage the considerable amount of speed data collected, speeds were binned into 20m road segments for each site. This typically equated to one speed record per vehicle per bin. In the case of slower vehicles, where there were two or more speed records per 20m road segment, the speeds were averaged to give one speed record for that road segment to be binned. This ensured no bias towards lower speeds. A similar exercise was undertaken for faster vehicles.

As a first step in the analysis of the speed data, plots of individual speed profiles were considered. However, due to the considerable variability in individual driving strategies approaching the curves/intersections, no patterns were evident and little sense could be made of the plots. The next step was to plot *average* speed profiles along the road sections for the before, immediately after (1-2 months after) and long-term (12 months after) periods, and compare these for matched treatment and control sites. Thirdly, speeds were averaged over all road segments to give an average before speed, immediately after speed, and long-term speed. Again these were graphed and compared for matched treatment and control sites.

#### 4.3.1.2. *Statistical Analysis of Data*

A preliminary exploration of the data was performed to check the distribution of the sample, to ensure sound measurement, and to ascertain that there were no coding errors. Descriptive statistics were used for this purpose, including means, standard deviations, frequencies and histograms. At this stage it was necessary to manage 'missing' data; typically, some road segments were removed from the analysis due to insufficient observations at particular sites. These road segments tended to be the first or last segments of the observed road section.

The speed data were then analysed independently for each of the curve sites and intersection sites. For each site, statistical tests were undertaken comparing treatment and control sites, over three periods of data collection; before, immediately after (1-2 months after) and long-term (12 months after), and between different road segments. A factorial or three-way Analysis of Variance (ANOVA) was performed to determine whether the speed data collected for each of the twelve sites varied, depending on whether the site was a treatment or control site, the data collection period relative to installation of treatments, and the road segment (broken into 20m intervals). The three-way ANOVA allows us to study interactions between three independent variables, in this case the type of site (treatment or control), the period (before, after, or long-term), or the road segment, to determine their influence on the dependent variable, speed. In a three-way ANOVA, the interactions between all three independent variables are considered, as well as the interaction between the combinations of the variables. That is, the interaction between Factor A, Factor B and Factor C, as well as the interaction between Factor A and Factor B, Factor A and Factor C, and Factor B and Factor C, are considered.

One possible effect is an *interaction* between the three independent variables – which specifically considers the joint influence of the three independent variables on the dependent variable. The other possible effects are known as the *main effects of Factor A, Factor B and of Factor C*. When looking at the *main effects* we disregard any interaction between two factors and look at the separate effect of each factor, averaged across all levels of the other independent variables. This tells us whether there is a significant difference in the dependent variable; in this case speed, between one factor (say Factor A, site type), averaged across all levels of the other factors (say Factor B, period and Factor C, road segment).

However, the three-way ANOVA doesn't tell us which levels of the independent variable differ, but rather determines whether there is a statistically significant difference between any level. Post hoc tests are carried out to determine which levels of Factor A (in this case, site type) statistically differ, remembering that this is based on an average across all levels of Factor B (period) and Factor C (road segment). In the current analyses, these unplanned comparisons have been tested using the Scheffe test.

In a three-factor study such as this, to test the significance of the mean differences of one independent variable within one level of the other independent variable is called testing the *simple main effects*. For example, to determine if speed differs within the three periods of data collection between each of the site types, we need to conduct case specific, individual one-way ANOVAs.

#### 4.3.1.3. *Segment Analysis*

The final analysis undertaken was a segmental analysis of each of the 20m road sectors for the treatment and control sites so that the speed profile leading into the curves and the intersections could be examined. Where data were available, each individual curve and intersection segment at the treated and control sites was compared for their relative speed difference. These values were then modelled using linear regression to illustrate positive or negative speed reductions at treated sites relative to their controls and they were statistically tested for their robustness.

#### 4.3.1.4. *Assumptions of Parametric Testing*

The assumptions of parametric testing are that the samples are independent, random samples from the defined populations; that the scores on the dependent variable are normally distributed in the population; and that the population of variance in all cells of the design are of equal variance. In order to use ANOVA as the method of statistical analysis here, it was necessary to satisfy several assumptions for a three-way ANOVA. Levene's test of homogeneity of variance was computed to test the assumption that each group of the independent variables has the same variance. In some cases this test was violated. However, failure to meet the assumption of homogeneity of variances is not fatal to ANOVA, which is relatively robust, particularly when there are large sample sizes, groups are of equal sample size and are normally distributed (Tabachnick & Fidell, 1996). Despite violating the assumption of homogeneity in some tests, sample sizes were large, and normal distributions were ensured in this report.

In order to satisfy the assumptions necessary to perform ANOVA, outliers were eliminated from our analysis, as outliers tend to distort statistics, and yield non-normal distributions. Outliers were defined for the purpose of the following analysis as being more than plus or minus three standardised residuals from the mean of the variable.

### 4.3.2. Braking Data

Braking data were separated for cars and trucks, as their braking behaviour is likely to be different. The number of trucks observed during the surveys was too small to give any meaningful results. Therefore trucks were discounted from the braking analysis.

*Descriptive Data*

Descriptive statistics were calculated for the car braking data, at each site across each period of data collection. For each site the following was calculated:

- The number of observations, that is the number of cars that were observed braking (minus any obvious outliers),
- The average braking distance from the start of the curve or intersection,
- The standard deviation of braking distance,
- The minimum and maximum braking distance, and
- The variance /dispersion of braking distance around the average.

*Significance testing*

In general the braking data recorded during the day at the nominated curve sites did not satisfy the assumptions required for parametrical significance testing (as discussed above in Section 2.4.1). Investigation of the data indicates that there is considerable variation in the number of observations made both across data collection periods and individual site locations – with very small numbers of vehicle braking observations recorded at many sites. For most sites the braking data are not normally distributed and there are large variations in the observed braking distances around the mean (average braking distance).

Consideration was given to applying non-parametric significance tests (such as chi-squared) to overcome difficulties with data that are not normally distributed and test differences between braking data across the periods of data collection at treatment and control sites. However, applying chi-squared to small samples (of less than 50 records) increases the chances of incorrectly concluding that a statistically significant difference is present when in fact it is not. Given the low number of observations of vehicle braking distance recorded for many sites for one or more of the three data collection periods, the variation in the sample sizes across periods of data collection, and the increased likelihood of concluding inaccurate findings due to these factors, significance testing was not performed.

### 4.3.3. Lateral Placement of Vehicles

The lateral placement of vehicles was summarised into the following three categories:

- Centre of lane
- Left edge or combination of centre and left edge of lane
- Right side or combination of centre and right side of lane.

The lateral positions of vehicles during the before, immediately after, and long-term observation periods, at the treatment and control sites, was compared.

## 4.4. Crash Analysis

To supplement the performance differences observed at each treatment site, crash data at each treatment and control site were collected to measure the crash reduction potential of each treatment. Crash data from police accident records were sought for a period of three years prior, and one year after, installation of the treatments, from the appropriate authority.

Before and after comparisons of crash data at each treatment and control site were undertaken. It would have been ambitious to expect significant crash reductions at only 6 treatment sites over a 12-month period, even if the treatments had large effects. However, the crash data were sought to show any apparent hints or trends of crash effectiveness. Obviously, more sites and longer observation periods would be preferable in terms of establishing significance of any crash trends.

# 5. RESULTS – CURVE TREATMENTS (DAY)

## 5.1. Speed Profiles

Average speed profiles have been graphed for each site for the before, after (1 month after) and long-term (12 months after) data collection periods, and are shown in Appendix D. In addition, speeds have been averaged over the observed road section and graphed for each control site and data collection period, with matched treatment and control sites presented on the same graph. These graphs also show 85$^{th}$ percentile speeds over the observed road sections, and are shown in Appendix E. Note that these graphs display the observed data and outliers have not been removed.

The results of the statistical analysis of the speed data are reported below. First, absolute mean speeds and changes in mean speeds are examined and presented. Second, the segment analysis is presented and reports speed changes relative to control sites. While standard deviations are not reported, it is noted that there were little differences in standard deviations between control and treatment sites for the before, immediately after, and long-term periods.

### 5.1.1. Gembrook Road, Victoria

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, 1-2 months after or 12 months after the installation of the PCM) and the road segment (in 20m intervals).

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the road segment on mean speed, $F(10,4382) = 1.680$; $p>0.05$. Therefore, the combined effect of site type, period and road segment did not have a significant effect on mean speed.

*Interactions: Site type and road segment*

There was a significant interaction between site type and road segment on mean speed, $F(8,4382) = 11.012$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effect of site type and road segment had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the road segment was significant, $F(14, 4382) = 2.440$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of period and road segment had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the site type and data collection period, $F(2, 4382) = 5.375$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of site type and period had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there were three significant interactions found, it was appropriate to investigate the simple main effects.

Despite site type and road segment interacting, and period and road segment interacting significantly on mean speed, further analysis using simple main effects in these cases would be inconclusive, as the results of these analysis would involve averaging mean speed across the three periods, or in the second case, averaging across mean speed for site type.

There was also significant interaction between site type and period on mean speed. The results of the analysis of the simple main effects for site type and each period separately indicate that, for the before period, there

was a statistically significant difference between the mean speed at the treatment site (73.3 km/h) and the control site (65.2 km/h). For the immediately after period, there was a statistically significant difference between the mean speed at the treatment site (76.2 km/h) and the control site (71.5 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (77.2 km/h) and the control site (70.0 km/h).

The results of the analysis of simple main effects for period at each site type indicate that, for the treatment site, there were differences in the mean speed for each of the three periods of data collection. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed for the before period (73.3 km/h) was less than the mean speed for the after period (76.2 km/h) and long-term period (77.2 km/h). There was no significant difference in mean speed for the after and long-term periods at the treatment site.

For the control site, there were differences in mean speed for each of the three periods of data collection. The Scheffe test revealed that when data were averaged across the control site, the mean speed for the before period (65.2 km/h) was less than the mean speed for both the after (71.5 km/h) and long-term (70.0) periods. Mean speed for the long-term period was also significantly lower than for the immediately after period at the control site.

*Summary*

The statistical analysis has shown that the mean speed of vehicles travelling along Gembrook Road varied significantly at the treatment and control sites depending on which period was considered, and also varied for the period depending on which site. Results indicate that, at the treatment site, mean vehicle speeds were lowest for the before period (73.3 km/h) and similar immediately after (76.2 km/h) and long-term (77.2 km/h). In comparison, at the control site, mean vehicle speeds were also lowest during the before period (65.2 km/h), increased in the immediately after period (71.5) and was not significantly different in the long-term period (70.0 km/h). This is shown graphically in Figure 5.1.

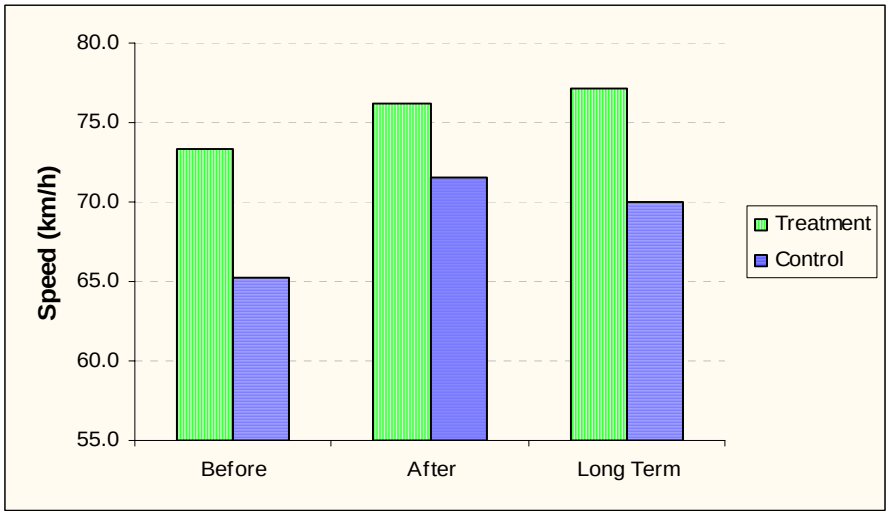


*Figure 5.1: Mean speed during day at Gembrook Road and control site for each period*

*Segment Analysis*

An analysis was also undertaken of each of the 20m segments from the start to end of the treated and control sites to show any progressive benefit of these treatments. Figures 5.2 and 5.3 show the immediate and long-term effects of the speed effects across these segments. Unfortunately, data were not available for all segments for both the treated and control sites, hence only those available pairs could be analysed.

As noted above, there was a significant decrease of around 4km/h in travel speed (relative to the control site) for both the immediate ($p<0.0001$) and long-term analyses ($p<0.0001$) in the early stages of the curve at the Gembrook Road site (segments 3, 4 and 5). However, by segment 7, travel speed was actually significantly more at the treated curve, suggesting that the treatments may have had their desired effects in the lead up to the curve.

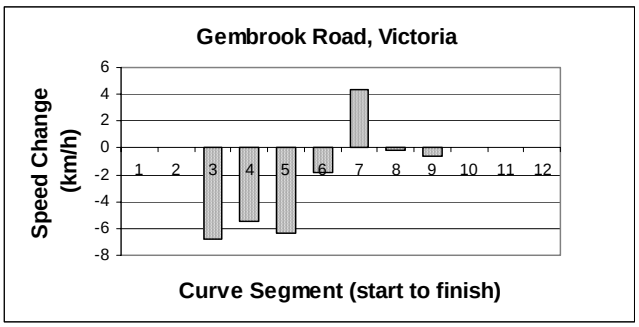


*Figure 5.2: Immediate speed effects at Gembrook Road site*

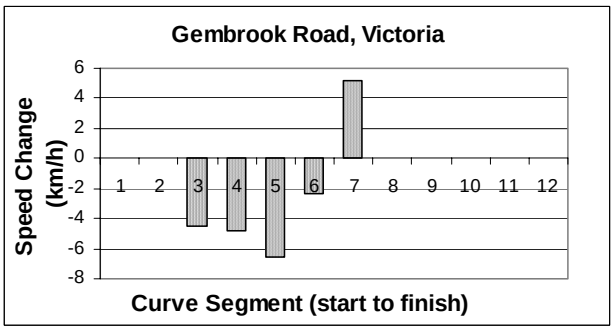


*Figure 5.3: Long-term speed effects at Gembrook Road site*

### 5.1.2. Harkaway Road, Victoria

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, 1-2 months after or 12 months after the installation of the PCM) and the road segment (in 20m intervals).

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the road segment on mean speed, $F(8, 11164) = 0.663$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road segment had a significant effect on mean speed.

*Interactions: Site type and road segment*

There was a significant interaction between site type and road segment on mean speed, $F(4, 11164) = 12.267$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effect of site type and road segment had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the road segment was not significant, $F(8, 11164) = 1.601$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of period and road segment had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between site type and the period the data were collected, $F(2, 11164) = 66.815$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of site type and period had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there were two significant interactions found, it was appropriate to investigate the simple main effects.

Despite site type and road segment interacting significantly on mean speed, further analysis using simple main effects would be inconclusive in this case, as the results of this analysis would involve averaging mean speed across the three periods.

There was also significant interaction between the site type and the period the data were collected on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the period before the treatment was installed, there was a statistically significant difference between the mean speed at the treatment site (74.3 km/h) and the control site (73.1 km/h). For the immediately after period, there was a statistically significant difference between the mean speed at the treatment site (75.6 km/h) and

the control site (70.4 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (74.7 km/h) and the control site (71.7 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, there was a difference in the mean speed for each of the three periods of data collection. The Scheffe test revealed that, when data were averaged across the treatment site, the mean speed immediately after (75.7 km/h) was greater than both the mean speed before (74.3 km/h) and long-term (74.7 km/h). The mean speed for the long-term period did not vary significantly from the before period.

For the control site, there were differences in mean speed for each of the three periods of data collection. The Scheffe test revealed that, when data were averaged across the control site, the mean speed before (73.1 km/h) was greater than the mean speed both immediately after (70.4 km/h) and long-term (71.7 km/h). Mean speed for the long-term period was also significantly greater than for the immediately after period, at the control site.

*Summary*

The statistical analysis has shown that, at the treatment site, mean vehicle speeds were lowest for the before and long-term periods and significantly higher immediately after installation of the PCM. In comparison, at the control site, mean vehicle speeds were highest during the before period, and decreased in the immediately after period and increased slightly in the long-term period. This is shown graphically in Figure 5.4.

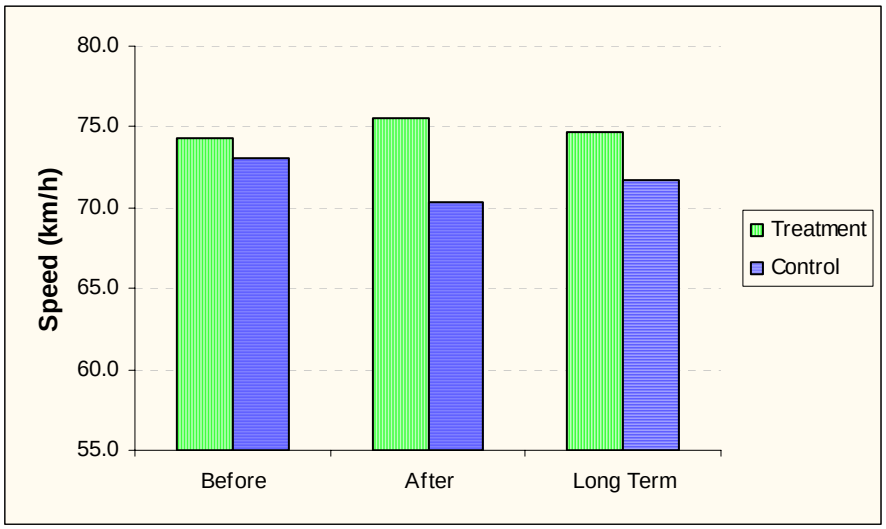


*Figure 5.4: Mean speed during day at Harkaway Road and control site for each period*

*Segment analysis*

The segment analysis for the Harkaway Road site is shown in Figures 5.5 and 5.6 for both immediate and long-term speed effects. These results show an immediate significant increase of around 4km/h in travel speed ($p<0.0001$) (relative to the control site) mainly in the approach to the treated curve over the untreated one, although it was only possible to measure this in the early stage of negotiation. The effect was consistent (albeit slightly less at 2km/h) at 12-months after treatment ($p<0.0001$).

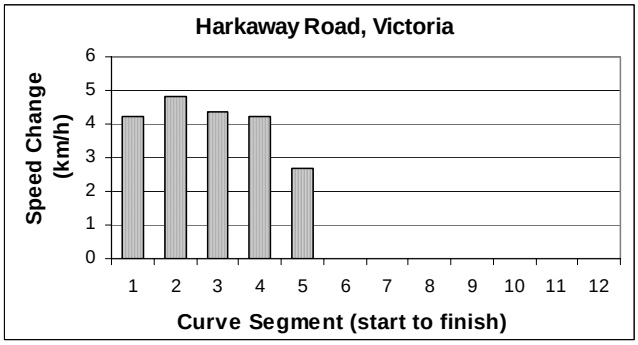


*Figure 5.5: Immediate speed effects at Harkaway Road site*

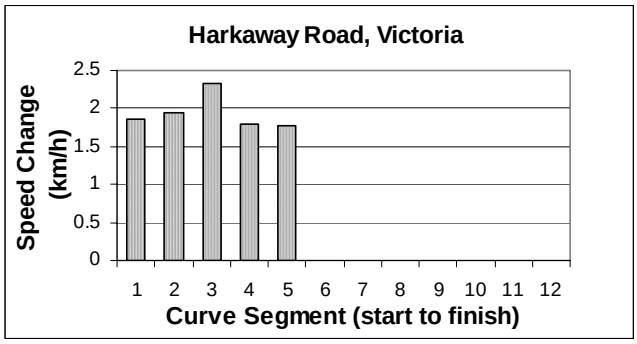


*Figure 5.6: Long-term speed effects at Harkaway Road site*

### 5.1.3. Pakenham Road, Victoria

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, 1-2 months after or 12 months after the installation of the PCM) and the road segment (in 20m intervals).

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the road segment on mean speed, $F(5, 3517) = 1.210$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road segment had a significant effect on mean speed.

*Interactions: Site type and road segment*

There was no significant interaction between site type and road section on mean speed, $F(3, 3517) = 1.440$; $p>0.05$. Therefore, there was sufficient evidence to indicate that the combined effect of site type and road segment had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the road segment was not significant, $F(6, 3517) = 1.559$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of period and road segment had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the site type and the data collection period, $F(2, 3517) = 11.262$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of site type and period had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between site type and period on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the before period, there was a statistically significant difference between the mean speed at the treatment site (70.0 km/h) and the control site (76.2 km/h). For the immediately after period, there was a statistically significant difference between the mean speed at the treatment site (72.5 km/h) and the control site (75.0 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (71.4 km/h) and the control site (76.8 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, there was a difference in the mean speed for each of the three periods of data collection. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed for the before period (70.0 km/h) was lower than the mean speed for the immediately after period (72.5 km/h). The mean speed for the long-term period (71.2 km/h) did not vary significantly from the before or immediately after periods, at the treatment site.

For the control site, there were differences in mean speed for each of the three periods of data collection. The Scheffe test revealed that when data were averaged across the control site, the mean speed for the before period (76.2 km/h) was not significantly different to either the immediately after or long-term periods. However, mean speed for the immediately after period (75.0 km/h) was significantly lower than mean speed for the long-term period (76.8 km/h) at the control site.

*Summary*

The statistical analysis has shown that the mean speed of vehicles approaching the Pakenham Road curve sites varied significantly depending on whether it was the treatment or the control site, as well as depending on which period the data were collected.

Results indicate that, at the treatment site, mean speed increased by an average 2.5 km/h from the before period to the immediately after period, although there was no significant change in vehicle speeds from the before period to the long-term period. At the control site, there was no significant change in mean speed from the before period to the immediately after or long-term periods. This is shown in Figure 5.7.

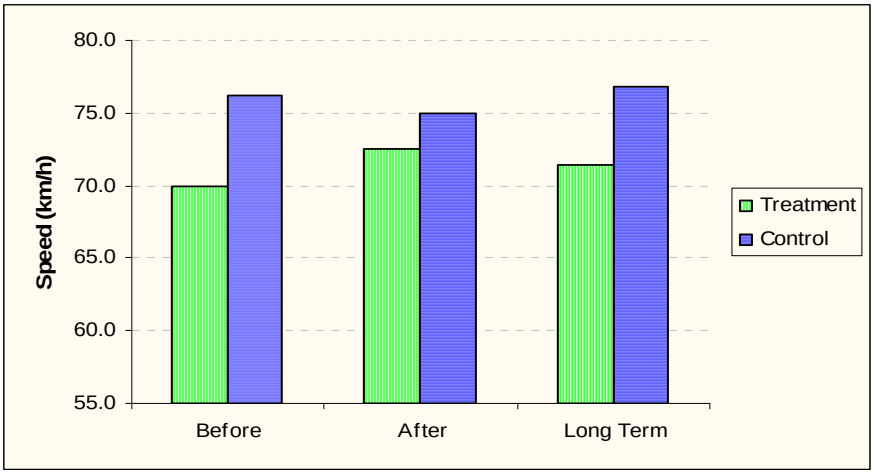


*Figure 5.7: Mean speed during day at Pakenham Road and control site for each period*

*Segment analysis*

The segment analysis for the Pakenham Road site is shown in Figures 5.8 and 5.9 for both immediate and long-term speed effects.

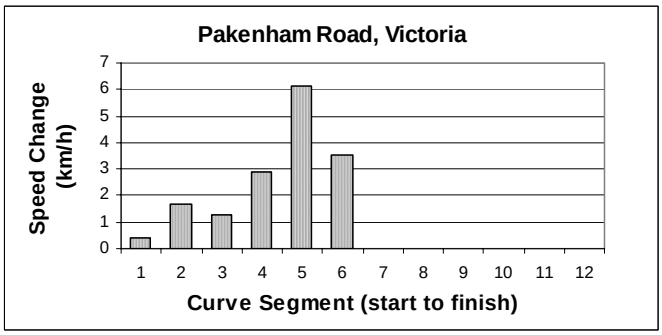


*Figure 5.8: Immediate speed effects at Pakenham Road site*

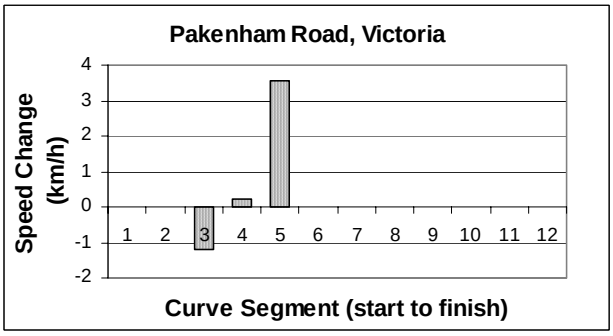


*Figure 5.9: Long-term speed effects at Pakenham Road site*

Like the previous treatment, there was a significant increase of 3km/h in travel speed (relative to the control site) in the early stage of the approach zone of the treated Pakenham Road curve site immediately after treatment (p=0.0007) but this was not sustained at the 12-months observation period (p=0.2955).

### 5.1.4. The Driftway, NSW

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, 1-2 months after or 12 months after the installation of the PCM) and the road segment (in 20m intervals).

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the road segment on mean speed, $F(14, 5230) = 0.611$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road segment had a significant effect on mean speed.

*Interactions: Site type and road segment*

There was a significant interaction between site type and road segment on mean speed, $F(8, 5230) = 5.456$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effect of site type and road segment had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the road segment was not significant, $F(16, 5230) = 0.516$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of period and road segment had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the site type and the period the data were collected, $F(2, 5230) = 84.565$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of site type and period had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there were two significant interactions found, it was appropriate to investigate the simple main effects.

Despite site type and road segment interacting significantly on mean speed, further analysis using simple main effects in this case would be inconclusive, as the results of this analysis would involve averaging mean speed across the three periods.

There was also a significant interaction between site type and period on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the before period, there was a statistically significant difference between the mean speed at the treatment site (67.6 km/h) and the control site (70.9 km/h). For the immediately after period, there was a statistically significant difference between the mean speed at the treatment site (70.1 km/h) and the control site (68.2 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (68.1 km/h) and the control site (73.9 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, there was a difference in the mean speed for each of the three periods of data collection. The Scheffe test revealed that, when data were averaged across the treatment site, the mean speed for the immediately after period (70.1 km/h) was greater than the mean speed for the before (67.6 km/h) and long-term (68.1 km/h) periods.

For the control site, there were differences in mean speed for each of the three periods of data collection. The Scheffe test revealed that, when data were averaged across the control site, the mean speed for the long-term

period (73.9 km/h) was significantly greater than the mean speed for the before (70.9 km/h) and immediately after (68.2 km/h) periods. Mean speed for the immediately after period was also significantly less than for the before period, at the control site.

*Summary*

The statistical analysis has shown that the mean speed of vehicles approaching The Driftway curve sites was significantly different at the treatment and control sites and during the three data collection periods.

Results indicate that, at the treatment site, there was a significant reduction in mean vehicle speed for the long-term period in comparison to the control site. However, the results also show that mean speed was actually fastest at the treatment site for the immediately after period when compared to the period or when compared to the control site. This is shown graphically in Figure 5.10.


*Figure 5.10: Mean speed during day at The Driftway and control site for each period*

*Segment analysis*

The segment analysis for the Driftway Road site is shown in Figures 5.11 and 5.12 for both immediate and long-term speed effects. These results show an immediate significant speed increase (relative to the control site) of 5km/h after treatment ($p<0.0001$), although the effect had dissipated and actually turned into a significant speed decrease of around 2km/h when observed 12-months later ($p=0.0077$). It should be noted that this curve had existing advisory speed signs prior to treatment because of its small radius.

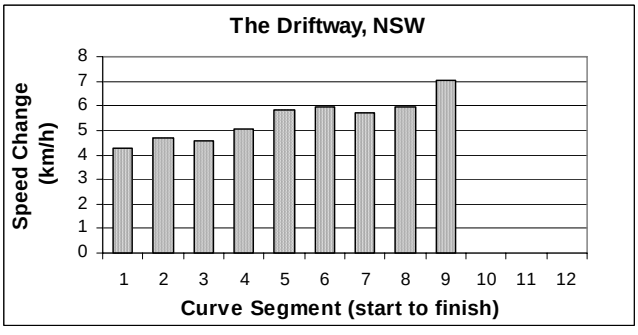


*Figure 5.11: Immediate speed effects at The Driftway site*

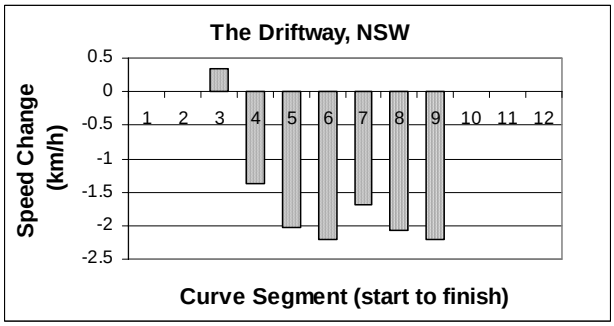


*Figure 5.12: Long-term speed effects at The Driftway site*

### 5.1.5. Castlereagh Road, NSW

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, 1-2 months after or 12 months after the installation of the treatment), and the section of road the data were collected.

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the section of the road on mean speed, $F(10, 5313) = 0.217$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road section had a significant effect on mean speed.

*Interactions: Site type and road segment*

The interaction between site type and road section on mean speed was not significant, $F(5, 5313) = 0.184$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of site type and road section had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the section of the road was not significant, $F(10, 5313) = 0.330$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the section of the road had a significant effect on mean speed.

*Interactions: Site type and period*

The interaction between the period the data were collected and the site type was not significant**,** $F(2, 5313) = 0.145$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the site type and the period the data were collected had a significant effect on mean speed.

*Main Effects*

The main effect for each independent variable is usually considered next. However, in this analysis, main effects will not contribute to our knowledge on whether speed differs as a consequence of the installation of the treatment. This is due to the nature of main effects; when testing the main effect of Factor A on the dependent variable, Factor B and Factor C are averaged. For example, if we looked at the main effect of site type on speed, the period the data were collected and the road section would be averaged. Therefore, even if there was a significant difference in speed, depending on the site from which the data were collected, the significance would be based upon the average speed of all three periods and all sections of the road. Averaging the speed across the period includes speeds collected before as well as after the treatment was installed.

*Summary*

The statistical analysis has shown that the mean speed by vehicles travelling along Castlereagh Road was similar for the treatment site and the control site, when averaged across the periods and the sections of the road. The average speed was also similar before, 1 to 2 months after, and 12 months after the installation of the treatment when averaged across the site type and road section (see Figure 5.13).

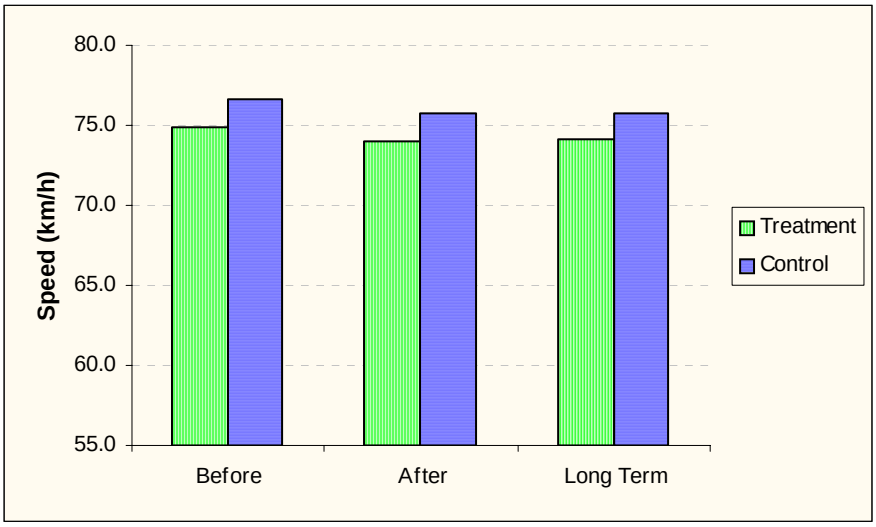


*Figure 5.13: Mean Speed during day at Castlereagh Road and control site for each period*

*Segment analysis*

The segment analysis for the Castlereagh Road site is shown in Figures 5.14 and 5.15 for both immediate and long-term speed effects. The differences in speed at each segment analysed between the treated and control sites were not significant either after treatment (p=0.1256) or 12-months later (p=0.7307).

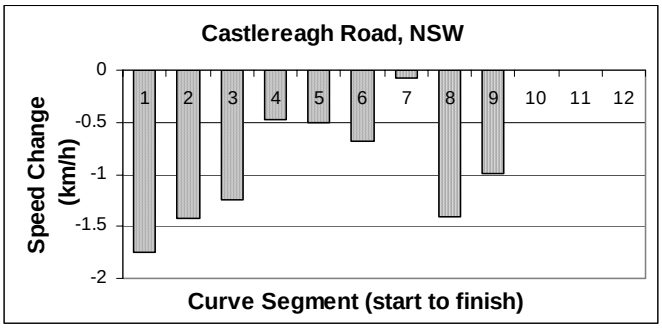


*Figure 5.14: Immediate speed effects at Castlereagh Road site*

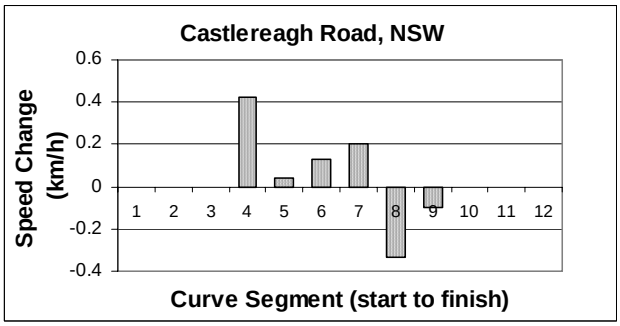


*Figure 5.15: Long-term speed effects at Castlereagh Road site*

### 5.1.6. Scheyville Road, NSW

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, 1-2 months after, or 12 months after the installation of the treatment) and the section of road the data were collected.

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the section of the road on mean speed, $F(9, 3753) = 0.184$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road section had a significant effect on mean speed at Scheyville Road, NSW.

*Interactions: Site type and road segment*

The interaction between site type and road section on mean speed was not significant, $F(5, 3753) = 0.466$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type and road section had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the section of the road was not significant, $F(10, 3753) = 0.702$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the section of the road had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the period the data were collected and the site type, $F(2, 3753) = 7.044$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of the site type and the period in which the data were collected had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between the site type and the period the data were collected on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the period before the treatment was installed, mean speed between the two sites did not vary significantly; the treatment site (73.9 km/h) and the control site (73.3 km/h). For the period 1 to 2 months after the treatment was installed, mean speed did not differ significantly between the two site types; the treatment site (72.9 km/h) and the control site (73.5 km/h). For the period 12 months after the treatment was installed, there was a statistically significant difference between the mean speed at the site that had a PCM installed (74.1 km/h) and the control site (75.7 km/h). The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, mean speed did not vary significantly between the three periods of data collections.

However, for the control site, there was a difference in the mean speed for each of the three periods. The Scheffe test was used to determine at which period mean speed varied. The Scheffe test revealed that when data were averaged across the control site, the mean speed 12 months after the time of the installation of the treatment (75.7 km/h) was greater than the mean speed before (73.3 km/h) and 1 to 2 months after (73.5 km/h) the treatment was installed. At the control site there was no difference between the before and 1 to 2 months after data collection periods.

*Summary*

The statistical analysis has shown that the mean speed of vehicles travelling along Scheyville road, varied only in the long-term. Vehicle's mean speed was slower at the treatment site in the long-term period; however, when looking at the treatment site only, while mean speed did reduce after the installation of the PCM, there was no significant difference between the before and long-term period (see Figure 5.16).

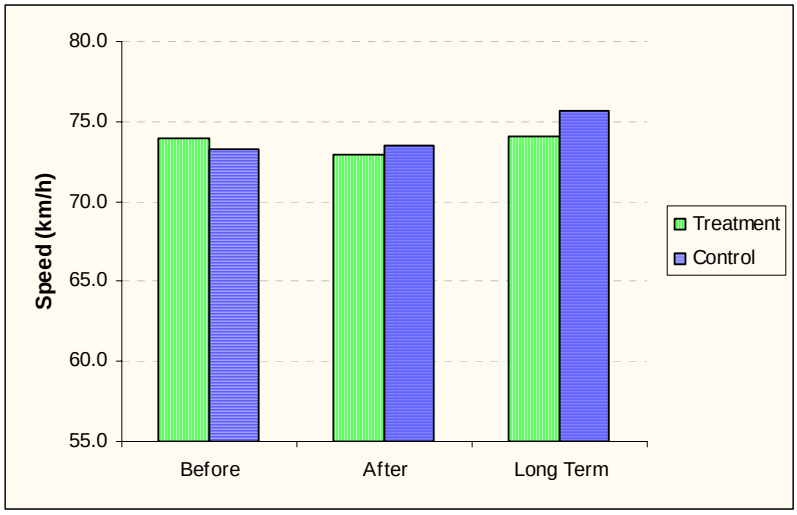


*Figure 5.16: Mean speed during day at Scheyville Road and control site for each period*

*Segment analysis*

The segment analysis for the Scheyville Road site is shown in Figures 5.17 and 5.18 for both immediate and long-term speed effects. A small reduction in travel speed of 1.5km/h (relative to the control site) was apparent at this site in the early stage of the curve immediately after treatment (p=0.0344) and at the 12-month observation period (p=0.0008).

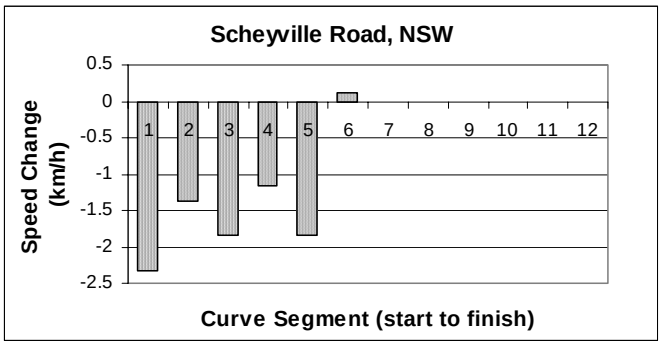


*Figure 5.17: Immediate speed effects at Scheyville Road site*

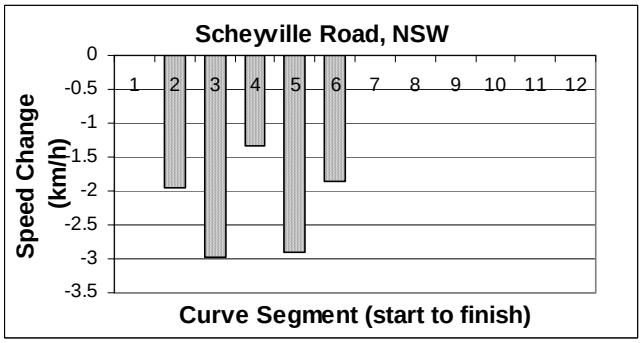


*Figure 5.18: Long-term speed effects at Scheyville Road site*

## 5.2. Braking

A summary of car braking behaviour is given in Table 5.1. The table indicates the percentage of cars that braked along the observed road section. Note that cars and trucks were separated for data analysis, as their braking behaviour is likely to be different. The number of trucks observed during the surveys was too small to give any meaningful results. Therefore trucks have been discounted from the braking analysis. Note also that the table indicates the percentage of cars that did not brake, or that had unknown braking distances. As discussed earlier, it was not always clear from the video when, or if, a vehicle's brake lights came on. Therefore, it was not always possible to determine whether a vehicle did not brake, or whether a vehicle braked but at an unknown distance from the start of curve. Full records of braking observations, including truck observations, are given in Appendix F.

**Table 5.1. Braking Characteristics of Cars at Curve Sites**

| Site | % of Cars that Braked | | | % of Cars that Didn't Brake / Unknown | | | Total Number of Cars Observed | | |
|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Long-term | Before | After | Long-term | Before | After | Long-term |
| *Gembrook Road* | | | | | | | | | |
| Treatment | 54 | 37 | 36 | 46 | 63 | 64 | 86 | 147 | 89 |
| Control | 1 | 0 | 4 | 99 | 100 | 96 | 106 | 111 | 140 |
| *Harkaway Road* | | | | | | | | | |
| Treatment | 2 | 2 | 2 | 98 | 98 | 98 | 204 | 563 | 1053 |
| Control | 6 | 1 | 0 | 94 | 99 | 100 | 121 | 846 | 747 |
| *Pakenham Road* | | | | | | | | | |
| Treatment | 6 | 6 | 3 | 94 | 94 | 97 | 124 | 210 | 157 |
| Control | 30 | 58 | 28 | 70 | 42 | 72 | 111 | 244 | 169 |
| *The Driftway* | | | | | | | | | |
| Treatment | 14 | 36 | 60 | 86 | 64 | 40 | 132 | 171 | 161 |
| Control | 38 | 20 | 26 | 62 | 80 | 74 | 442 | 116 | 207 |
| *Castlereagh Road* | | | | | | | | | |
| Treatment | 0 | 1 | 1 | 100 | 99 | 99 | 122 | 464 | 533 |
| Control | 0 | 1 | 2 | 100 | 99 | 98 | 113 | 716 | 674 |
| *Scheyville Road* | | | | | | | | | |
| Treatment | 12 | 32 | 25 | 88 | 68 | 75 | 142 | 120 | 130 |
| Control | 3 | 1 | 3 | 97 | 99 | 97 | 246 | 192 | 151 |

Detailed analysis of the braking data observed for cars has also been undertaken (Note that this analysis excludes trucks). The tables in the following sections present descriptive data for those cars that did brake at each site across each period of data collection. For each site the following data are presented:

- the number of observations, i.e., number of cars that were observed braking (less any obvious outliers),
- the average braking distance from the start of the curve,
- the standard deviation of braking distance,
- the minimum and maximum braking distance, and
- the variance /dispersion of braking distance around the average.

### 5.2.1. Gembrook Road, Victoria

**Table 5.2. Braking Characteristics of Cars at the Gembrook Road Curve**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 46 | 67.4 | 20 | 140 | 32.6 | 1,064.2 |
| Immediate | 57 | 25.1 | 0 | 130 | 28.1 | 789.7 |
| Long-term | 46 | 78.5 | 10 | 210 | 48.1 | 2,315.4 |
| Control | | | | | | |
| Before | 38 | 33.9 | 0 | 140 | 46.8 | 2,190.8 |
| Immediate | 1 | 00.0 | 0 | 0 | 0 | 00.0 |
| Long-term | 5 | 120.0 | 20 | 180 | 58.3 | 3,400.0 |

### 5.2.2. Harkaway Road, Victoria

**Table 5.3. Braking Characteristics of Cars at the Harkaway Road Curve**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 6 | 165.0 | 160 | 180 | 8.4 | 70.0 |
| Immediate | 13 | 238.5 | 100 | 590 | 70.2 | 4,930.8 |
| Long-term | 21 | 46.2 | 0 | 160 | 59.1 | 3,494.8 |
| Control | | | | | | |
| Before | 7 | 54.3 | 40 | 60 | 9.8 | 95.2 |
| Immediate | 4 | 60.0 | 0 | 80 | 40.0 | 1,600.0 |
| Long-term | 0 | - | - | - | - | - |

### 5.2.3. Pakenham Road, Victoria

**Table 5.4. Braking Characteristics of Cars at the Pakenham Road Curve**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 6 | 35.8 | 0 | 95 | 40.8 | 1,664.2 |
| Immediate | 14 | 35.7 | 0 | 100 | 29.8 | 887.9 |
| Long-term | 4 | 47.5 | 30 | 80 | 22.2 | 491.7 |
| Control | | | | | | |
| Before | 33 | 105.8 | 30 | 130 | 31.6 | 1,000.2 |
| Immediate | 138 | 45.2 | 0 | 120 | 28.9 | 836.8 |
| Long-term | 46 | 70.4 | 10 | 140 | 33.3 | 1,110.9 |

### 5.2.4. Castlereagh Road, NSW

**Table 5.5. Braking Characteristics of Cars at the Castlereagh Road Curve**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 0 | - | - | - | - | - |
| Immediate | 3 | 40.0 | 20 | 60 | 20.0 | 400.0 |
| Long-term | 1 | 00.0 | 0 | 0 | 00.0 | 00.0 |
| Control | | | | | | |
| Before | 0 | - | - | - | - | - |
| Immediate | 2 | 30.0 | 30 | 30 | 00.0 | 00.0 |
| Long-term | 10 | 45.0 | 0 | 130 | 45.0 | 2027.8 |

### 5.2.5. Scheyville Road, NSW

**Table 5.6. Braking Characteristics of Cars at the Scheyville Road Curve**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 17 | 67.6 | 20 | 100 | 21.4 | 456.6 |
| Immediate | 42 | 42.6 | 0 | 110 | 26.4 | 697.9 |
| Long-term | 39 | 21.8 | 0 | 70 | 19.4 | 378.3 |
| Control | | | | | | |
| Before | 7 | 34.3 | 10 | 65 | 21.3 | 453.6 |
| Immediate | 2 | 55.0 | 20 | 90 | 49.5 | 2450.0 |
| Long-term | 4 | 22.5 | 0 | 40 | 17.1 | 291.7 |

## 5.3. Lateral Placement of Vehicles

A summary of the lateral positioning of vehicles is given in Table 5.7. The table gives percentages of vehicles that were observed with the following lateral position in the lane:

- centre of lane
- left edge or combination of centre and left edge of lane
- right side or combination of centre and right side of lane

The above combinations can describe the lateral positioning of most observed vehicles, although other combinations of lateral positioning were observed, i.e., left edge and right side of lane, left edge, centre and right side of lane. A full record of the lateral positioning observations is given in Appendix F.

Inspection of Table 5.7 shows that there is considerable variability in the lateral positions of vehicles approaching the curve sites during the before, immediately after and long-term observation periods, at both the treatment and control sites. Therefore it is not possible to draw any conclusive trends in lateral vehicle positioning due to the PCMs. However, it is noted that there was generally an increase in cars tracking towards the left side of the lane at the left and right curve treatment sites following the installation of the PCMs (immediately after and long-term).

**Table 5.7. Lateral Positioning of Vehicles Approaching Curve Sites**

| Site | Lateral Positioning of Vehicles[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Centre (%) | | | Left/Centre & Left (%) | | | Right/Centre & Right (%) | | |
| | Before | After | Long-term | Before | After | Long-term | Before | After | Long-term |
| *Gembrook Road* | | | | | | | | | |
| Treatment | 25 | 20 | 10 | 27 | 15 | 34 | 33 | 51 | 26 |
| Control | 23 | 27 | 5 | 8 | 3 | 11 | 62 | 66 | 59 |
| *Harkaway Road* | | | | | | | | | |
| Treatment | 66 | 33 | 6 | 10 | 38 | 11 | 23 | 21 | 68 |
| Control | 19 | 41 | 69 | 2 | 25 | 10 | 73 | 31 | 60 |
| *Pakenham Road* | | | | | | | | | |
| Treatment | 48 | 42 | 38 | 33 | 47 | 48 | 14 | 7 | 11 |
| Control | 27 | 33 | 25 | 10 | 29 | 17 | 37 | 32 | 44 |
| *The Driftway* | | | | | | | | | |
| Treatment | 17 | 44 | 7 | 4 | 19 | 42 | 75 | 33 | 25 |
| Control | 28 | 25 | 7 | 4 | 15 | 15 | 65 | 45 | 56 |
| *Castlereagh Road* | | | | | | | | | |
| Treatment | 41 | 50 | 9 | 0 | 5 | 15 | 58 | 45 | 57 |
| Control | 30 | 54 | 4 | 66 | 39 | 57 | 2 | 6 | 16 |
| *Scheyville Road* | | | | | | | | | |
| Treatment | 0 | 56 | 10 | 0 | 3 | 57 | 99 | 41 | 13 |
| Control | 5 | 34 | 3 | 29 | 2 | 23 | 41 | 61 | 40 |

Note 1: Percentages do not add up to 100 as not all combinations of lateral positioning are included in this table. Refer to Appendix F for complete record of vehicle lateral positioning.

## 5.4. Crash Analysis

An additional analysis was planned to compare the number and type of crashes at each of the treated and control sites in the pre- and post-year after treatment to further illustrate their benefits. However, all treatment and control sites, except one, had no reported casualty crashes in the three-year period before installation, and one-year period after installation of the treatments. Therefore, the crash analysis does not give any indication as to the improvement in safety, or otherwise, resulting from the treatments.

## 5.5. Overview of Daytime Curve Results

The daytime curve findings were quite mixed across the six sites. There was a general trend of a speed increase of up to 5km/h at four of the sites, which persisted up until the 12-month observation period. For the other two sites, though, there was a hint of a speed decrease at the treated sites. There was no speed reduction at all at the treated Castlereagh Road site.

The braking results showed little difference in the proportion of cars that braked during curve negotiation both before, immediately after and longer-term after treatment and the differences between treated and control sites were inconsistent across the six sites.

Lateral placement results showed a general increase in movement away from the centreline for both the immediate and long-term observations for Left-Hand curves, while the results for Right-Hand curves were less clear.

It was not possible to evaluate the effects of the treatments on crashes, due to the small number of treated sites and the lack of crashes over the 12-month observation periods.

# 6. RESULTS – CURVE TREATMENTS (NIGHT)

## 6.1. Speed Profiles

### 6.1.1. Gembrook Road, Victoria

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, 1-2 months after or 12 months after the installation of the PCM) and the road segment (in 20m intervals).

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the road segment on mean speed, $F(10, 1088)=0.416$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road segment had a significant effect on mean speed.

*Interactions: Site type and road segment*

There was no significant interaction between site type and road segment on mean speed, $F(5, 1088) = 0.645$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type and road segment had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the road segment was not significant, $F(10, 1088) = 0.555$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the road segment had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the site type and data collection period, $F(2, 1088) = 4.332$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of the site type and period had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between site type and period on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the before period, there was no statistically significant difference between mean speed at the treatment site (73.1 km/h) and the control site (73.7 km/h). For the period immediately after the installation of the PCM, mean speed was significantly different at the treatment site (77.6 km/h) when compared to the control site (75.1 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (78.1 km/h) and the control site (74.1 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, mean speed varies significantly between the three periods; before, immediately after and long-term. The Scheffe test was used to determine which period mean speed varied for the treatment site. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed for the before period (73.1 km/h) was significantly less than the mean speed both immediately after (77.6 km/h) and long-term (78.1 km/h). Mean speed did not differ between immediately after and long-term.

For the control site, simple main effects indicated that mean speed did not vary significantly between the three periods of data collection at the control site. When data were averaged across the control site, mean

speed did not vary significantly between the three periods; before (73.7 km/h), immediately after (75.0 km/h) or long-term (74.1 km/h).

*Summary*

The statistical analysis has shown that the mean speed of vehicles travelling at night along Gembrook Road was not statistically different before the PCM was installed when comparing the two sites. However, mean vehicle speed was significantly greater at the treatment site when compared to the control site immediately after the installation of the PCM, mean vehicle speed was also greater at the treatment site in the long-term period. Results indicate that when considering the control site only, mean speed did not vary significantly between the three periods. However, at the treatment site, mean vehicle speeds actually significantly increased both immediately after and long-term once the PCM was installed. Considering that the statistical test highlights that before the PCM was installed, the two sites where matched well (i.e., no difference in mean speed), it was interesting that mean speed changed only at the treatment site after the installation of the PCM, disappointingly, mean vehicle speed actually increased. This is shown graphically in Figure 6.1.

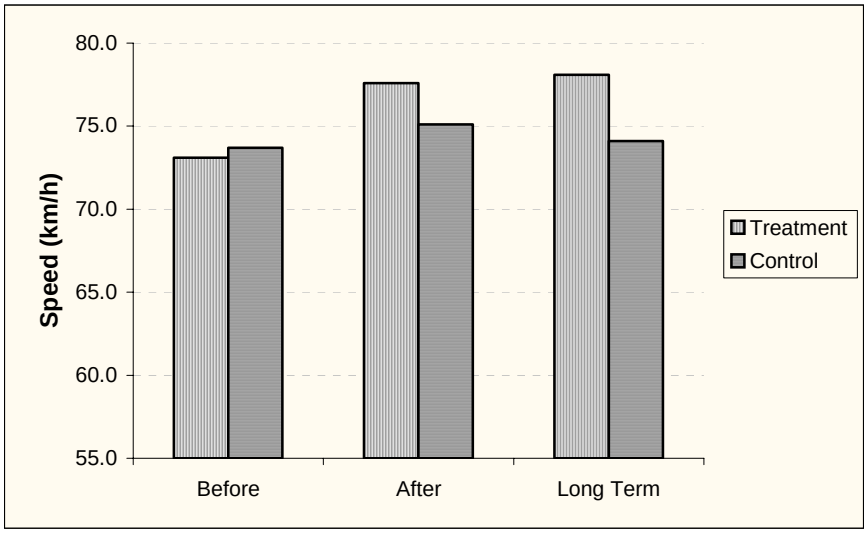


*Figure 6.1: Mean speed at night at Gembrook Road and control site for each period*

*Segment analysis*

The segment analysis for the night observations at the Gembrook Road site is shown in Figures 6.2 and 6.3 for both immediate and long-term speed effects. While there was no effect apparent immediately after treatment (p=0.6915), there was a significant speed increase of around between 3 and 5km/h (relative to the control site) observed during the 12-month observation period (p=0.0222).

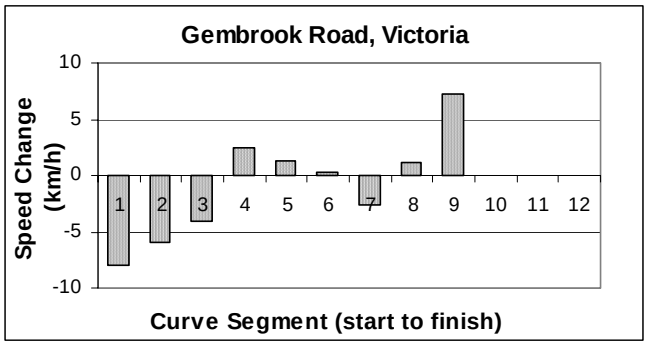


*Figure 6.2: Immediate speed effects at Gembrook Road site at night*

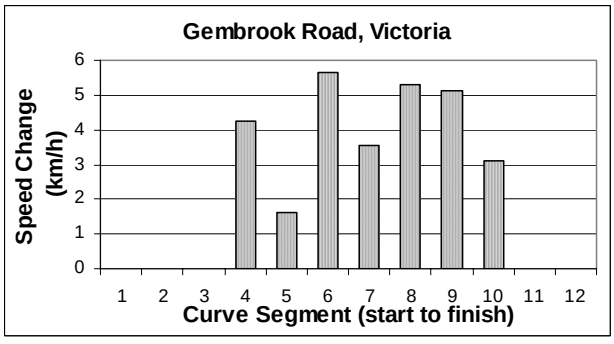


*Figure 6.3: Long-term speed effects at the Gembrook Road site at night*

### 6.1.2. Pakenham Road, Victoria

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, immediately after or 12 months after the installation of the PCM) and the road segment (in 20m intervals).

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the road segment on mean speed, $F(6, 1194) = 0.766$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road segment had a significant effect on mean speed.

*Interactions: Site type and road segment*

There was no significant interaction between site type and road segment on mean speed, $F(3, 1194) = 0.118$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type and road segment had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the road segment was not significant, $F(6, 1194) = 0.133$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the road segment had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the site type and data collection period, $F(2, 1194) = 5.721$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of the site type and period had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between site type and period on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the before period, there was a statistically significant difference between mean speed at the treatment site (73.9 km/h) and the control site (77.2 km/h). In the period immediately after the installation of the PCM, mean speed was statistically different at the treatment site (71.1 km/h) when compared to the control site (77.9 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (76.1 km/h) and the control site (78.8 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site only, mean speed varied significantly between the three periods of data collection. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed for both the before period (73.9 km/h) and the long-term period (76.1 km/h) was significantly faster than immediately after (71.1 km/h) period. There was no difference in mean speed between the before and long-term period.

For the control site, simple main effects indicated that mean speed did not vary significantly between the three periods of data collection at the control site. When data were averaged across the control site, the mean speed did not vary significantly from the before period (77.2 km/h), immediately after (77.9 km/h) or long-term (78.8 km/h).

*Summary*

Pakenham Road has shown that in the immediately after period, mean speed is significantly slower at the treatment site when compared to both the control site and the before period. The results indicate that, when analysing the three periods at the treatment sight only, speed is significantly lower in the immediately after period, which compares favourably against the control sight, where the results indicated that there was no significant difference in mean speed between the three periods. Similarly, when comparing the sites with one

another, the control site is the faster site in each of the three periods. However, what is interesting to note is that the difference in mean speed at the before period is 3.3 km/h, while the difference increases to 6.8 km/h in the immediately after period, with the major shift in speed occurring at the treatment site. Mean speed at the control site was 77.2 km/h in the before period, which increase to 77.9 km/h in the immediately after period, a difference of 0.7km/h. At the treatment site, mean speed before was 73.9 km/h, which decreased significantly by 2.8 km/h. Despite the difficulty of comparing the two sites in the immediately after period due to the control site having significantly greater speeds in the before period, it can be seen that the differences from before to immediately after still demonstrate that the treatment site had a large reduction in speed after the installation of the PCM. This is shown graphically in Figure 6.4

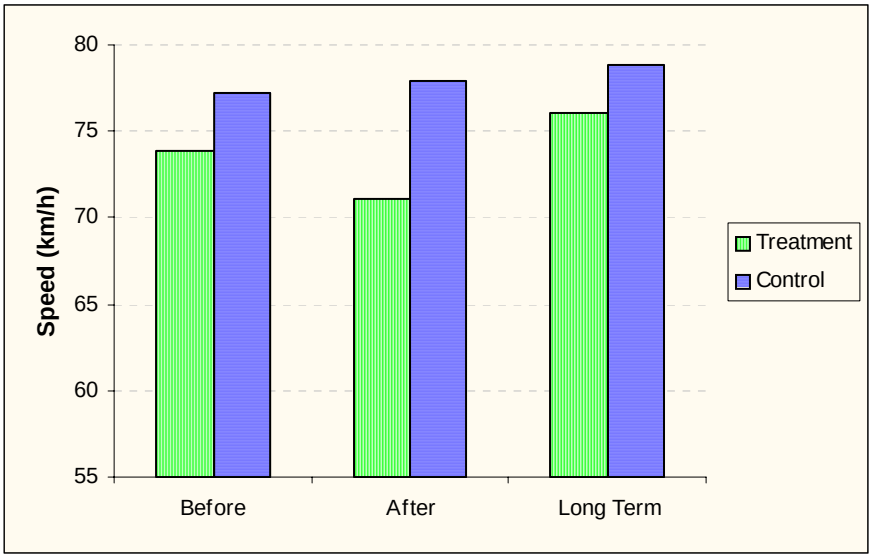


*Figure 6.4: Mean speed at night at Pakenham Road and control site for each period*

*Segment analysis*

The segment analysis for the night observations at the Pakenham Road site is shown in Figures 6.5 and 6.6 for both immediate and long-term speed effects. There was a 3km/h decrease in travel speed (relative to the control site) immediately after treatment (p=0.0039) between the treated and control sites, but this dissipated at the 12-month observation period (p=0.2803).

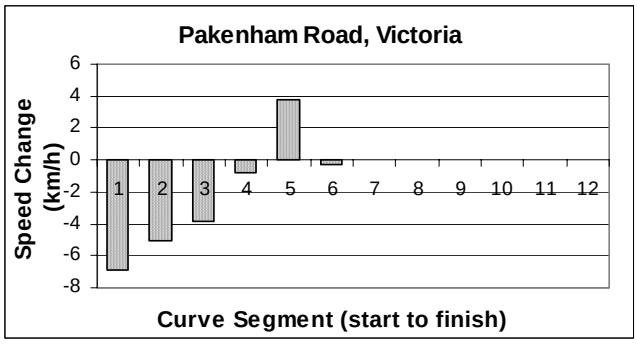


*Figure 6.5: Immediate speed effects at the Pakenham Road site at night*

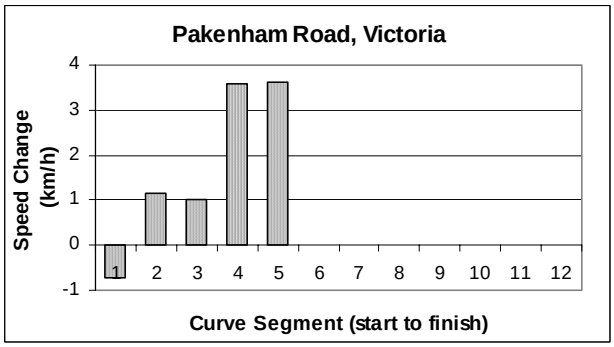


*Figure 6.6: Long-term speed effects at the Pakenham Road site at night*

## 6.2. Braking

A summary of car braking behaviour is given in Table 6.1. The table indicates the percentage of cars that braked along the observed road section. Note that cars and trucks were separated for data analysis, as their braking behaviour is likely to be different. The number of trucks observed during the surveys was too small to give any meaningful results. Therefore trucks have been discounted from the braking analysis.

Note also that the table indicates the percentage of cars that did not brake, or that had unknown braking distances. As discussed earlier, it was not always clear from the video when, or if, a vehicle's brake lights came on. Therefore, it was not always possible to determine whether a vehicle did not brake, or whether a vehicle braked but at an unknown distance from the start of curve. Full records of braking behaviour observations, including trucks, are given in Appendix F.

**Table 6.1. Braking Characteristics of Cars approaching Curve Sites at Night**

| Site | % of Cars that Braked | | | % of Cars that Didn't Brake / Unknown | | | Total Number of Cars Observed | | |
|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Long-term | Before | After | Long-term | Before | After | Long-term |
| *Gembrook Road* | | | | | | | | | |
| Treatment | 75 | 75 | 79 | 25 | 25 | 21 | 45 | 65 | 38 |
| Control | 5 | 3 | 18 | 95 | 97 | 82 | 103 | 93 | 113 |
| *Pakenham Road* | | | | | | | | | |
| Treatment | 64 | 38 | 30 | 36 | 62 | 70 | 88 | 48 | 54 |
| Control | 81 | 90 | 83 | 19 | 10 | 17 | 160 | 146 | 36 |

Detailed analysis of the braking data observed for cars has also been undertaken (Note that this analysis excludes trucks). The following tables present descriptive data for those cars that did brake at each site across each period of data collection. For each site the following data are presented:

- the number of observations (minus any obvious outliers),
- the average braking distance from the start of the curve,
- the standard deviation of braking distance,
- the minimum and maximum braking distance, and
- the variance /dispersion of braking distance around the average.

### 6.2.1. Gembrook Road, Victoria

**Table 6.2. Braking Characteristics of Cars approaching the Gembrook Sites at Night**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 34 | 46.8 | 0 | 130 | 33.4 | 1,113.5 |
| Immediate | 46 | 32.4 | 0 | 130 | 29.1 | 849.7 |
| Long-term | 30 | 67.0 | 10 | 150 | 38.5 | 1,483.8 |
| Control | | | | | | |
| Before | 7 | 22.9 | 0 | 50 | 23.6 | 557.1 |
| Immediate | 3 | 103.3 | 60 | 170 | 58.6 | 3,433.3 |
| Long-term | 21 | 183.3 | 30 | 230 | 72.1 | 5,203.3 |

### 6.2.2. Pakenham Road, Victoria

**Table 6.3. Braking Characteristics of Cars approaching the Pakenham Sites at Night**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 39 | 37.9 | 0 | 100 | 35.8 | 1,279.9 |
| Immediate | 18 | 35.0 | 0 | 100 | 34.2 | 1,167.6 |
| Long-term | 16 | 51.3 | 10 | 100 | 23.1 | 531.7 |
| Control | | | | | | |
| Before | 127 | 53.5 | 0 | 120 | 29.7 | 880.0 |
| Immediate | 127 | 49.2 | 0 | 110 | 24.8 | 613.7 |
| Long-term | 30 | 50.3 | 0 | 130 | 31.8 | 1,010.2 |

## 6.3. Lateral Placement of Vehicles

A summary of the lateral positioning of vehicles is given in Table 6.4. The table gives percentages of vehicles that were observed with the following lateral position in the lane:

- centre of lane
- left edge or combination of centre and left edge of lane
- right side or combination of centre and right side of lane

The lateral positioning of most observed vehicles can be described by the above combinations, although other combinations of lateral positioning were observed, i.e. left edge and right side of lane, left edge, centre and right side of lane. A full record of the lateral positioning observations is given in Appendix F.

**Table 6.4. Lateral Positioning of Vehicles Approaching Curve Sites at Night**

| Site | Lateral Positioning of Vehicles[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Centre (%) | | | Left/Centre & Left (%) | | | Right/Centre & Right (%) | | |
| | Before | After | Long-term | Before | After | Long-term | Before | After | Long-term |
| *Gembrook Road* | | | | | | | | | |
| Treatment | 44 | 22 | 0 | 27 | 4 | 62 | 29 | 68 | 10 |
| Control | 14 | 17 | 2 | 13 | 1 | 3 | 73 | 81 | 72 |
| *Pakenham Road* | | | | | | | | | |
| Treatment | 62 | 74 | 50 | 24 | 16 | 48 | 12 | 6 | 24 |
| Control | 37 | 49 | 37 | 6 | 13 | 13 | 55 | 38 | 48 |

Note 1: Percentages do not add up to 100 as not all combinations of lateral positioning are included in this table. Refer to Appendix F for complete record of vehicle lateral positioning.

Table 6.4 shows that, similar to the daytime observations, there appears to be an increase in vehicles tracking towards the left side of the lane at the treatment sites, following the installation of the PCMs.

## 6.4. Overview of Night-time Curve Results

The speed results at night at the two treated sites were quite mixed. There was no reduction immediately after treatment at Gembrook but there was a speed decrease at Pakenham Road. In the longer-term though, a 3 to 5 km/h speed increase was observed at the Gembrook site at night while the immediate decrease in speed disappeared at the Pakenham Road site.

There was no difference in the proportion of cars that braked across the three study periods at the Gembrook site and there were fewer instances of braking compared with the control site. However, there was more braking observed at the Pakenham Road site immediately and long-term after treatment and more compared with its control.

Lateral position results were consistent with those reported during the day.

# 7. DISCUSSION OF RESULTS – CURVE SITES

## 7.1. Effect of Treatments on Vehicle Speeds

### 7.1.1. Average Vehicle Speeds

A first glance of the statistical analysis of the speed data for the curve sites did not indicate any consistent effects of the perceptual treatment. However, a closer look at the results for the individual sites, reveals some interesting changes in average vehicle speeds (averaged across the observed road section) during the before, immediately after and long-term observation periods, at both the control and treatment sites.

- At Gembrook Road, there were significant differences in speed at both the treated and control sites for the before, immediately after and long-term periods. Overall, the analysis revealed a significant decrease in average vehicle speed of around 4km/h at the treated site compared with its control for both the immediate and long-term 'after-treatment' periods.
- At Pakenham Road, there were significant changes in speed across the before, immediately after and long-term periods. Here, the analysis showed an increase in travel speed at the treated site of 3km/h immediately after treatment compared with its control, which all but disappeared by the 12-month observation period.
- At Harkaway Road, the speed changes were more moderate across the three observation periods and sites. However, overall, the analysis did reveal a significant increase in travel speed of around 4km/h immediately after treatment compared with its control, which had moderated to a 2km/h (but still significant) increase long-term.
- At The Driftway, there was a significant increase in vehicle speed compared to its control of around 5km/h immediately after treatment. However this changed to a relative decrease in travel speed of close to 2km/h in the longer-term.
- The treatment does not appear to have had an effect on average vehicle speed at the Castlereagh Road site. There were no significant changes in average vehicle speed during the before, immediately after or long-terms periods, at either the control or treatment site, and hence, no significant differences that could be attributed to the treatment.
- At Scheyville Road, there was no significant change in travel speed at the treatment site during the before, immediate or long-term observations but there were significant changes at the control site. Thus, a small but significant decrease in travel speed of 1.5 to 2km/h was observed at the treated site compared with its control both immediately after-treatment as well as long-term.

In summary, there was an immediate speed increase at three of the six treated curve sites, and speed reductions at another two. The longer-term results were more impressive as they showed significant reductions in travel speed at three sites but only a significant increase at one site.

### 7.1.2. Other Performance Measures

The braking results showed little difference in the proportion of cars that braked during curve negotiation both before, and after treatment at the treated sites. However, there were some differences observed between the treated and control sites in terms of the proportion of cars that braked. It is difficult to be too definitive about these findings as, like the speed results, they were somewhat inconsistent across the six sites. Nevertheless, these findings did appear to be reasonably consistent with the speed results.

Lateral placement results showed a general increase in distance away from the centreline for both the immediate and long-term observations for Left-Hand curves, while the reverse was true for Right-Hand curves. Given the sight distance advantages of RH curves over LH ones generally, these findings suggest that the treatments were having an advantage in providing an improved travel path for the drivers during the approach and negotiation phase.

It was not possible to evaluate the effects of the treatments on crashes, due to the small number of treated sites and the lack of crashes over the 12-month observation periods.

### 7.1.3. Night Time Effects

Observations were made at two of the curves (Gembrook and Pakenham Roads) at night to test if these treatments were better or worse at night under low illumination conditions. The speed results for these observations were quite mixed. There was no reduction immediate after treatment at Gembrook but a 3km/h reduction was observed at Pakenham Road. In the longer-term though, a 3km/h speed increase was observed at the Gembrook site at night while the earlier speed reduction disappeared at the Pakenham Road site.

There was no difference in the proportion of cars that braked across the three study periods at the Gembrook site and there were fewer instances of braking compared with the control site. However, there was more braking observed at the Pakenham Road site immediately and long-term after treatment and more compared with its control. Lateral position results were consistent with those reported during the day.

### 7.1.4. General Comments

The treatment effects observed here in terms of travel speed effects and braking were clearly site specific and this needs to be taken into account when selecting the most appropriate curve perceptual treatment to apply to reduce travel speed at a particular location. The night-time effects, also, are likely to be different to those during the day. Chapter 11 reports the findings from a follow-up visit of all sites some 2 to 3 years later where some of the curve posts were either missing or had their delineation supplemented with additional signage or markings. Such are the problems associated with real world evaluations where it is almost impossible to control for extraneous factors.

The experimental findings reported in Godley et al., (1999) did demonstrate significant speed reduction benefits for these treatments in a driving simulator where environmental influences could be controlled. Thus, one should be careful not to dismiss these treatments outright on the basis of the results found from the real world evaluation.

The results for travel speed by 20m segments were somewhat disappointing, again because of lack of data at either the treated or control sites. In spite of this shortcoming, though, there were some interesting and clear differences in the way drivers approached the oncoming road curve. In some instances, drivers were seen to adopt a more cautious approach while at others, they clearly left braking to the last minute, presumably because of some enhanced view of the curve. It could be argued that in spite of the mixed findings for speed reductions, there were clear performance effects at the sites where these treatments had been installed.

It would seem useful, therefore, to explore further where these treatments can be used to optimise safety on the road. A more intensive trial seems warranted to look at this and in particular, what are the crash reduction benefits of these low cost perceptual countermeasures.

# 8. RESULTS – INTERSECTION TREATMENTS (DAY)

## 8.1. Speed Profiles

Average speed profiles have been graphed for each site for the before, after (1 month after) and long-term (12 months after) data collection periods, and are shown in Appendix D. In addition, speeds have been averaged over the observed road section and graphed for each intersection site and data collection period, with matched treatment and control sites presented on the same graph. These graphs also show 85$^{th}$ percentile speeds over the observed road sections, and are shown in Appendix E. Note that these graphs display the observed data and outliers have not been removed.

The results of the statistical analysis of the speed data are reported below. First, absolute mean speeds and changes in mean speeds are examined and presented. Second, the segment analysis is presented and reports speed changes relative to control sites. While standard deviations are not reported, it is noted that there were little differences in standard deviations between control and treatment sites for the before, immediately after, and long-term periods.

### 8.1.1. Ballarto Road, Victoria

Due to technical problems during the observations, the speed analysis for Ballarto Road included only the treatment site, as control site data were unavailable. Ballarto Road also only included two periods; before and long-term in the analysis, as there was insufficient speed data collected in the immediately after period. Unfortunately, it was necessary to remove this period from the analysis. However, an analysis was still performed for the treatment site, to assess whether a difference could be detected in mean speed before the installation and 12 months after the installation of the treatment.

A two-way ANOVA was performed to determine whether the mean speed varied depending on the period in which the data were collected (before or long-term) and the section of road the data were collected at the treatment site only.

*Interactions: Period and road segment*

Results indicated that mean speed did not vary significantly depending on the Period and road segment, $F(4, 1428)= 0.485$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of period and road segment had a significant effect on mean speed at Ballarto Road in Victoria.

*Main Effects*

When results indicate that there were no significant interactions occurring, Main Effects are considered next in the analysis. Main Effects test how one factor, i.e., the independent variable 'period' influenced the dependent variable, 'speed' when all other factors were averaged. There was a significant main effect for Period, $F(1, 1428) = 206.999$; $p<.05$. Therefore, the results indicate that when road segment is averaged, the mean speed varies significantly depending on which period the vehicle is travelling. The mean speed in the period before (82.8 km/h) was significantly greater than the mean speed in the long-term period (73.7 km/h).

*Summary*

The statistical analysis has show that the mean speed of vehicles travelling along the treatment site at Ballarto Road in Victoria was significantly affected by the period in which they travelled; before or long-term. Mean speed was considerably less in the long-term period when compared to the before period, a reduction in mean speed of 9.1 km/h, see Figure 8.1.

*Segment Analysis*

With deficiencies in the control data, it was not possible to conduct a segment analysis at this site.

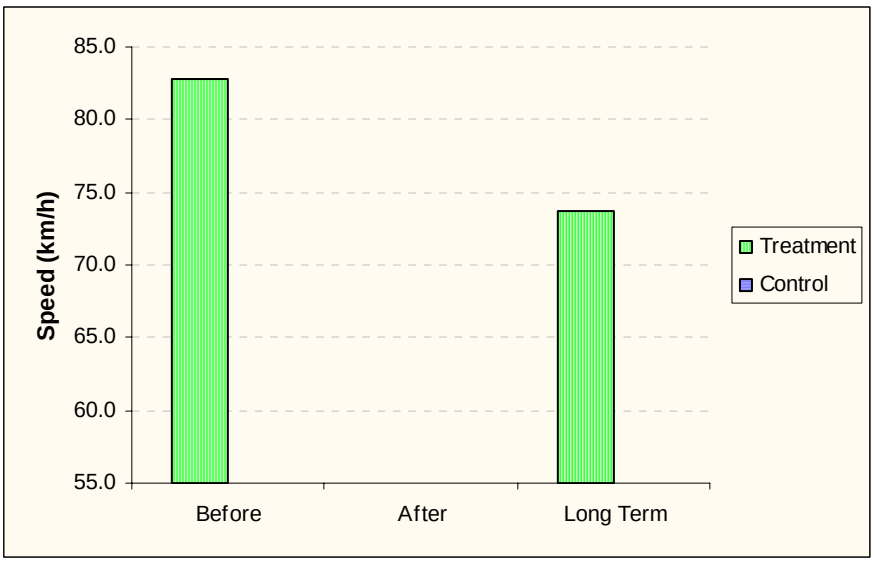


*Figure 8.1: Mean speed during day at Ballarto Road and control site for each period*

### 8.1.2. Bittern Dromana Road, Victoria

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (Treatment or Control), the period in which the data were collected (before, 1-2 months after or 12 months after the installation of the PCM) and the section of road the data were collected.

*Interactions: Site type, period and road segment*

Results indicated that there was a significant interaction between the type of site, the period of collection and the section of the road on mean speed, $F(8, 3522) = 3.788$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effect of site type, period and road section had a significant effect on mean speed at Bittern Dromana Road in Victoria.

*Interactions: Site type and road segment*

The interaction between site type and road section on mean speed was significant, $F(4, 3522) = 6.539$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effect of site type and road section had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the section of the road was not significant, $F(8, 3522) = 1.156$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the section of the road had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the period the data were collected and the site type, $F(2, 3522) = 19.387$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of the site type and the period in which the data were collected had a significant effect on mean speed.

*Simple Main Effects*

When results indicate a significant interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there were significant interactions found, it was appropriate to investigate the simple main effects.

*Simple Main Effects: Site type, period and road segment*

There was a significant interaction between all three factors; site type, the period and road section at Bittern Dromana Road in Victoria. The results of the analysis of the simple main effects for treatment site, indicate that, it is the immediately after period, when mean speed varied between sections of the road. Mean speed was significantly faster through road sections 8 and 9 (280 to 320 metres from the intersection) (72.2 km/h) than road section 11 and 12 (340 to 380 metres from the intersection) (66.2 km/h), slowing down an average of 6 km/h within that distance of road section. Mean speed did not vary significantly for the periods before and long-term, between the road sections at the treatment site.

The results of the analysis of simple main effects for the control site, indicated that, similar to the treatment site, it was the immediately after period, when mean speed varied between sections of the road, not before or long-term. However, at the control site, mean speed was significantly faster at sections 11 and 12 (80.7 km/h) than for section 8 (77.5 km/h) along the road in the immediately after period.

*Simple Main Effects: Site type and period*

Mean speed differed significantly due to the interaction between the site type and the period the data were collected. The results of the analysis of the simple main effects for site type and period indicate that, for all three periods, mean speed differed significantly between the two sites. For each period, mean speed was greater at the control site, the treatment site mean speed before was 78.0 km/h compared to the control site mean speed of 87.2 km/h. Mean speed immediately after was 70.3 km/h at the treatment site, compared to 79.8 km/h at the control site. Mean speed long-term was 78.0 km/h at the treatment site, compared with 83.5 km/h at the control site.

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, there was a difference in the mean speed for each of the three periods. The Scheffe test revealed that when data were averaged across the treatment sites, the mean speed before (78.0 km/h) and 12 months after (78.0 km/h) did not differ significantly. However, mean speed immediately after (70.3 km/h) the installation of the PCM, was significantly lower than the mean speed either before or long-term.

For the control site, simple main effects indicated that mean speed varied significantly between the three periods. The Scheffe test revealed that when data were averaged across the control site, the mean speed before (87.2 km/h) was greater than the mean speed immediately after (79.8 km/h) and long-term (83.5 km/h). Mean speed long-term was greater than the period immediately after.

*Summary*

The statistical analysis has show that the mean speed of vehicles travelling along Bittern Dromana Road in Victoria was significantly affected by a combination of the three factors interacting with each other. Mean speed varied depending upon which site the vehicle was travelling, which varied according to if it was before, immediately after or long-term, which varied depending on the distance from the intersection (road section). It was interesting that mean speed varied significantly in the immediately after period along particular sections of the road, for both the treatment site and control site, with vehicle speeds actually showing an opposite pattern in their approach to the intersection, with a much greater difference observed at the treatment site (on average 6kmh variation between road sections). Interestingly, at the treatment site, vehicles mean speed was less immediately after, compared to before (on average decreasing by 7.7 km/h). However, this pattern was also evident at the control site, with mean speed significantly less in the period immediately after, compared to before (also decreasing on average by 7.4 km/h), see Figure 8.2.

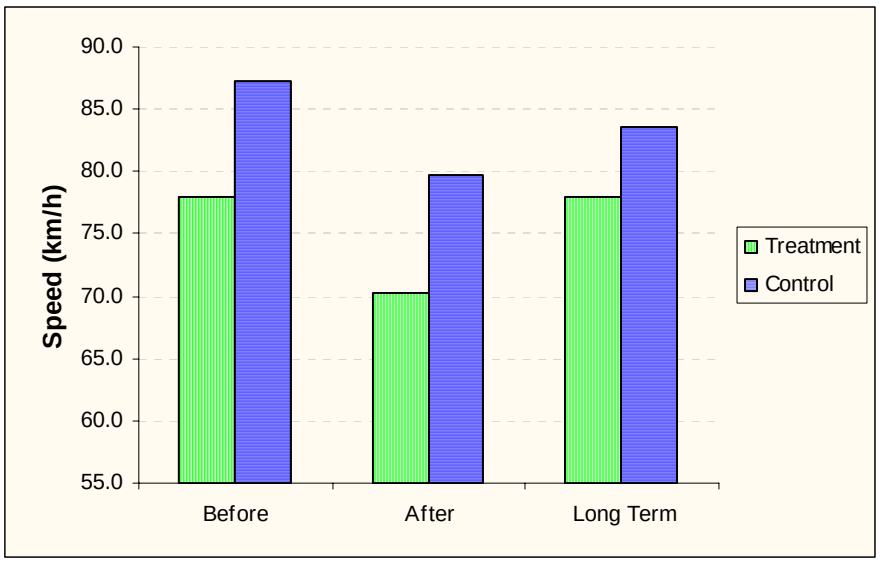


*Figure 8.2: Mean speed during day at Bittern-Dromana Road and control site for each period*

*Segment Analysis*

Figures 8.3 and 8.4 show the additional analysis performed on the available matched segments between the treated and control sites at Bittern Road site immediately after and 12-months after treatment. The effects immediately after treatment were not significantly different ($p=0.5883$), although interestingly there was a significant speed increase of around 4km/h (relative to the control site) 12-months afterwards ($p<0.0001$).

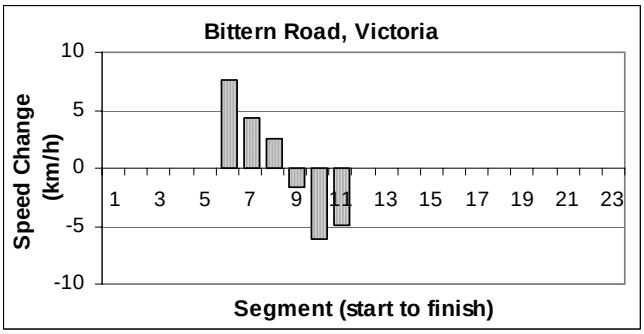


*Figure 8.3: Immediate speed reductions at the Bittern Road site.*

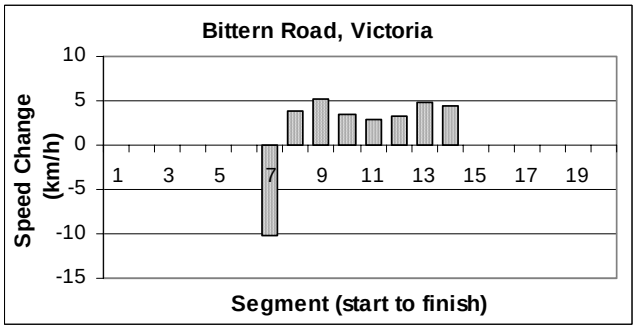


*Figure 8.4: Long-term speed reductions at the Bittern Road Site*

### 8.1.3. Myers Road, Victoria

The results of the statistical analysis of the speed data are reported below.

There was insufficient speed data collected at Myers Road in the period 1 to 2 months after the installation of the PCM. Unfortunately, it was necessary to remove this period from the analysis. Analysis was still performed for Myers Road, to assess whether a difference could be detected in mean speed before the installation and 12 months after the PCM was set up.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (Treatment or Control), the period in which the data were collected (before and 12 months after) and the section of road.

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the section of the road on mean speed, $F(6, 2837) = 0.217$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road section had a significant effect on mean speed at Myers Road, Victoria.

*Interactions: Site type and road segment*

The interaction between site type and road section on mean speed was not significant, $F(6, 2837) = 0.329$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type and road section had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the section of the road was not significant, $F(6, 2837) = 0.833$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the section of the road had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the period the data were collected and the site type, $F(2, 2837) = 8.952$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of the site type and the period in which the data were collected had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between the site type and the period the data were collected on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the period before the treatment was installed, mean speed was greater at the treatment site (84.9 km/h) compared to the control site (79.7 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (86.4 km/h) and the control site (83.6 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, there was a difference in the mean speed for both periods. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed before (84.9) was significantly less than the mean speed Long-term (86.4).

For the control site, simple main effects indicated that mean speed varied significantly between the three periods. The Scheffe test revealed that when data were averaged across the control site, the mean speed before (79.7) was greater than the mean speed long-term (83.6).

*Summary*

The statistical analysis has shown that the mean speed of vehicles travelling along Myers Road was significantly different when comparing the sites and the periods. Mean speed was lower in the before period at both the treatment site and control site, when compared to 12 months later. In comparison to the control site, whilst mean speed was lower at the treatment site long-term, it was also already significantly lower at the treatment site in the before period, see Figure 8.5.


*Figure 8.5: Mean speed during day at Myers Road and control site for each period*

*Segment Analysis*

Figures 8.6 and 8.7 show the additional analysis performed on the available matched segments between the treated and control sites at Myers Road site immediately after and 12-months after treatment. There was a significant decrease in speed (relative to the control site) immediately after treatment ($p<0.001$) and this was still significant 12-months afterwards ($p<0.0062$).

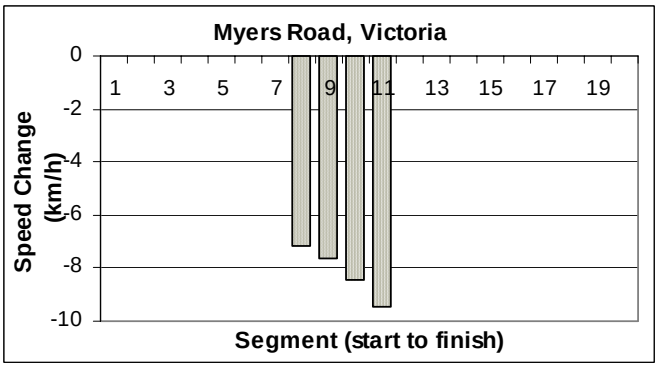


*Figure 8.6: Immediate speed reductions at the Myers Road site.*

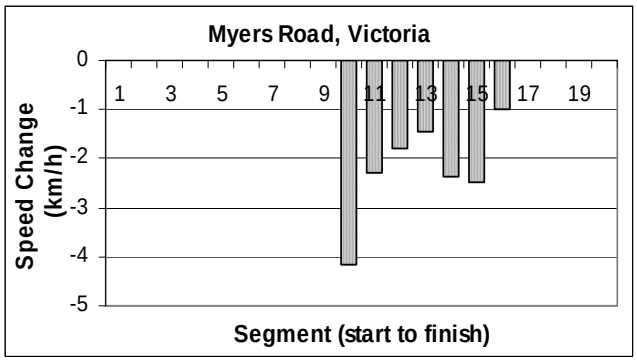


*Figure 8.7: Long-term speed reductions at the Myers Road Site*

### 8.1.4. The Driftway, NSW

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before, immediately after or long-term) and the section of road the data were collected.

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the section of the road on mean speed, $F(15, 4789) = 0.170$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road section had a significant effect on mean speed at The Driftway, NSW.

*Interactions: Site type and road segment*

The interaction between site type and road section on mean speed was not significant, $F(8, 4789) = 0.303$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type and road section had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the section of the road was not significant, $F(16, 4789) = 0.206$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the section of the road had a significant effect on mean speed.

*Interactions: Site type and Period*

The was a significant interaction between the period the data were collected and the site type, $F(2, 4789) = 34.651$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of the site type and the period in which the data were collected had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between the site type and the period the data were collected on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the period before the treatment was installed, mean speed did not differ significantly between the treatment site (74.3 km/h) and the control site (73.8 km/h). For the period immediately after installation, mean speed differed significantly between the two site types, mean speed at the treatment site (76.8 km/h) was greater than mean speed at the control site (73.7 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (74.2 km/h) and the control site (75.8 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, there was a difference in the mean speed for each of the three periods of data collection. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed immediately after (76.8 km/h) was significantly greater than the mean speed before (74.3 km/h) and long-term (74.2 km/h). However, mean speed did not differ between before and long-term at the treatment site.

For the control site, simple main effects indicated that mean speed varied significantly between the three periods. The Scheffe test revealed that when data were averaged across the control site, the mean speed long-term (75.8 km/h) was greater than the mean speed before (73.8 km/h) and immediately after (73.7 km/h). At the control site there was no difference between the period before and immediately after.

*Summary*

The statistical analysis has shown that when comparing vehicles travelling along the treatment site and the control site for The Driftway, mean speed was lower in the immediately after period at the control site, not the treatment site. However, in the long-term period, speed was lower at the treatment site, when compared to the control site. When looking at the treatment site only, mean speed increased in the immediately after period, and it also did not differ between the period before and the long-term. Therefore, despite the favourable results in the long-term at the treatment site in comparison to the control, there was no effect long-term independently at the treatment site. Figure 8.8 shows these effects graphically.

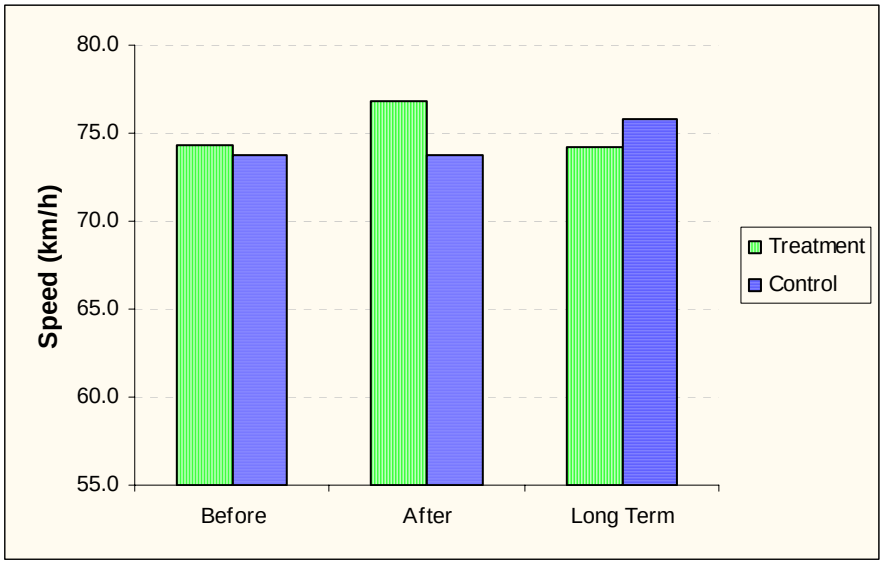


*Figure 8.8: Mean speed during day at The Driftway and control site for each period*

*Segment Analysis*

Figures 8.9 and 8.10 show the additional analysis performed on the available matched segments between the treated and control sites at The Driftway site immediately after and 12-months after treatment. There was a significant increase in travel speed of around 3km/h (relative to the control site) immediately after treatment ($p<0.0002$), which changed to a significant 2km/h decrease 12-months afterwards ($p<0.0059$).

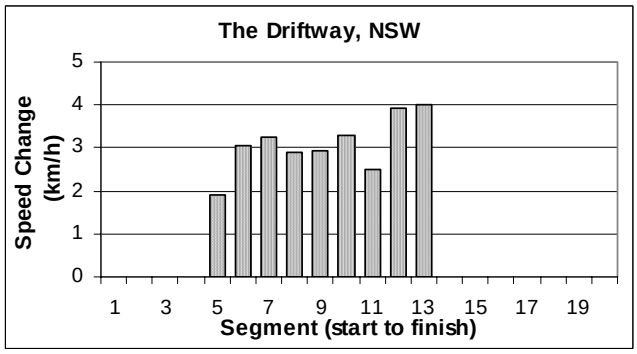


*Figure 8.9: Immediate speed reductions at the The Driftway site.*

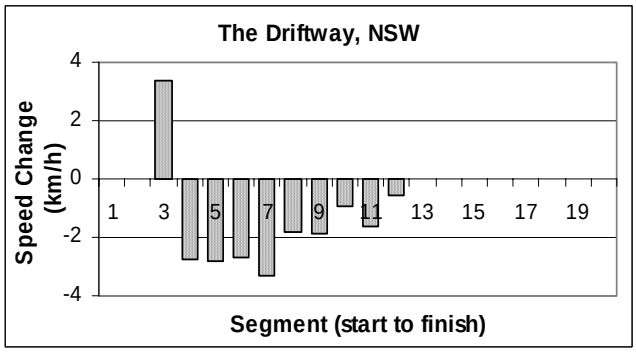


*Figure 8.10: Long-term speed reductions at the The Driftway Site*

### 8.1.5. Old Stock Route, NSW

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (Treatment or Control), the period in which the data were collected (before, immediately after or long-term) and the section of road the data were collected.

*Interactions: Site type, Period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the section of the road on mean speed, $F(10, 3376)= 0.632$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road section had a significant effect on mean speed at the Old Stock Route, NSW.

*Interactions: Site type and road section*

The interaction between site type and road section on mean speed was not significant, $F(6, 3376) = 1.232$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type and road section had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the section of the road was not significant, $F(12, 3376) = 0.583$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the section of the road had a significant effect on mean speed.

*Interactions: Site type and period*

There was a significant interaction between the period the data were collected and the site type, $F(2, 3376) = 7.231$; $p<0.05$. Therefore, there was sufficient evidence to indicate that the combined effects of the site type and the period in which the data were collected had a significant effect on mean speed.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a post hoc procedure, called the test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between the site type and the period the data were collected on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the period before, mean speed differed significantly between the treatment site and the control site, mean speed at the treatment site (68.7 km/h) was greater than at the control site (66.2 km/h). For the period immediately after as well as long-term, mean speed did not differ significantly between the two site types (Treatment 71.5 km/h to control 72.3 km/h and treatment 70.1 km/h to control 69.3 km/h respectively).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, there was a difference in the mean speed for each of the three periods. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed immediately after (71.5 km/h) was significantly greater than the mean speed before (68.7 km/h). Mean speed did not differ between the before period and the long-term period at the treatment site.

For the control site, simple main effects indicated that mean speed varied significantly between the three periods. The Scheffe test revealed that when data were averaged across the control site, the mean speed before (66.2 km/h) was lower than the mean speed after (72.3 km/h) and long-term (69.3 km/h). At the control site, mean speed immediately after was significantly greater than long-term.

*Summary*

The statistical analysis has shown that when comparing the site types for The Old Stock Route, mean speed was greater for the before period at the treatment site. However, in the immediately after period as well as the long-term period, mean speed did not differ between the sites. When looking at the treatment site only, mean speed increased immediately after, and it also did not differ between the period before and long-term (See Figure 8.11).

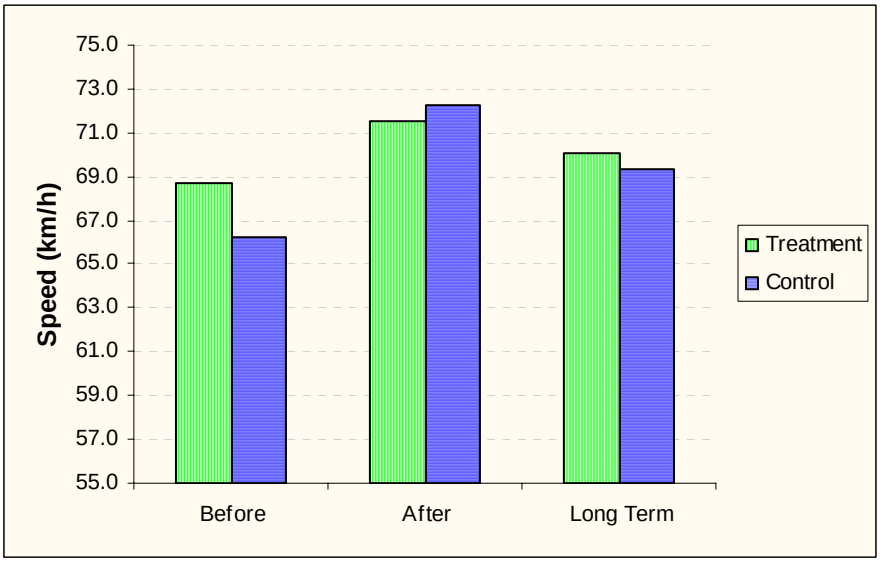


*Figure 8.11: Mean speed during day at The Old Stock Route and control site for each period*

*Segment Analysis*

Figures 8.12 and 8.13 show the additional analysis performed on the available matched segments between the treated and control sites at The Old Stock Route site immediately after and 12-months after treatment. There was a significant decrease in travel speed of around 4km/h (relative to the control site) immediately after treatment ($p<0.0001$), which was still a significant 3km/h decrease 12-months afterwards ($p<0.0027$).

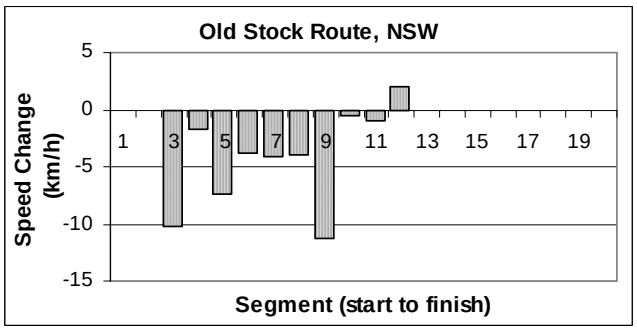


*Figure 8.12: Immediate speed reductions at the The Old Stock Route site.*

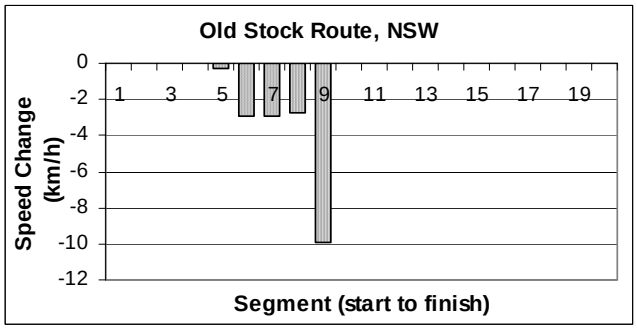


*Figure 8.13: Long-term speed reductions at the The Old Stock Route site.*

### 8.1.6. Smith Road, NSW

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (Treatment or Control), the period in which the data were collected (before, immediately after or long-term) and the section of road the data were collected.

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the section of the road on mean speed, $F(10, 3372) = 0.020$; $p>0.05$. Therefore, there was insufficient evidence to indicate that at Smith Road the combined effect of site type, period and road section had a significant effect on mean speed.

*Interactions: Site type and road segment*

The interaction between site type and road section on mean speed was not significant, $F(5, 3372) = 0.306$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of site type and road section had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the section of the road was not significant, $F(10, 3372) = 0.170$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the section of the road had a significant effect on mean speed.

*Interactions: Site type and period*

The interaction between the period the data were collected and the site type was not significant**,** $F(2, 3372) = 1.901$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the site type and the period the data were collected had a significant effect on mean speed at the Smith Road, NSW Site.

*Main Effects*

The main effect for each independent variable is usually considered next. However, in this analysis main effects will not contribute to our knowledge on whether speed differs as a consequence of the installation of a PCM. This is due to the nature of main effects; when testing the main effect of Factor A on the dependent variable, Factor B and Factor C are averaged. For example, if we looked at the main effect of Site type on speed, the period the data were collected and the road section would be averaged. Therefore, even if there were a significant difference in speed depending on the site from which the data were collected, the significance would be based upon the average speed of all three periods and all sections of the road. Averaging the speed across the period includes speeds collected before as well as after the PCM was installed.

*Summary*

The statistical analysis has shown that the mean speed of vehicles travelling on Smith Road was similar for both site types; control and treatment, when averaged across period and road section. The average speed of vehicles travelling on Smith Road did not vary significantly between the three periods (before, immediately after and long-term) when averaged across site type and road section, see Figure 8.14.


*Figure 8.14: Mean speed during day at Smith Road and control site for each period*

*Segment Analysis*

Figures 8.15 and 8.16 show the additional analysis performed on the available matched segments between the treated and control sites at the Smith Road site immediately after and 12-months after treatment. There was a significant decrease in travel speed of around 2km/h (relative to the control site) immediately after treatment ($p<0.0109$), which was not significant 12-months afterwards ($p=0.4861$).

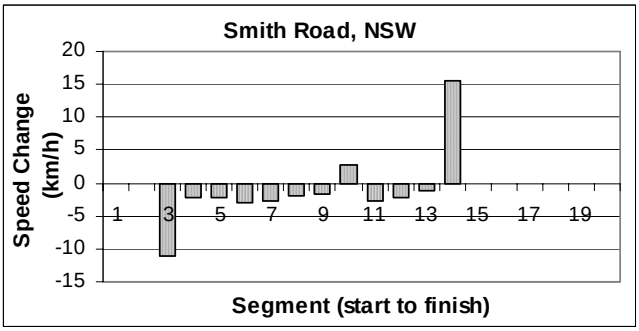


*Figure 8.15: Immediate speed reductions at the Smith Road site.*

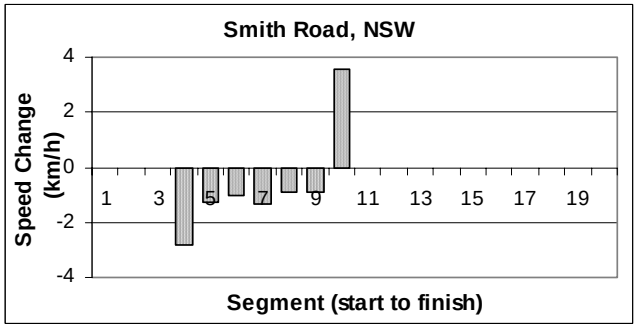


*Figure 8.16: Long-term speed reductions at the Smith Road site.*

## 8.2. Braking

A summary of car braking behaviour is given in Table 8.1. The table indicates the percentage of cars that braked along the observed road section. Note that cars and trucks were separated for data analysis, as their braking behaviour is likely to be different. The number of trucks observed during the surveys was too small to give any meaningful results. Therefore trucks have been discounted from the braking analysis.

**Table 8.1. Braking Characteristics of Cars at Intersection Sites**

| Site | % of Cars that Braked | | | % of Cars that Didn't Brake / Unknown | | | Total Number of Cars Observed | | |
|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Long -term | Before | After | Long -term | Before | After | Long -term |
| *Ballarto Road* | | | | | | | | | |
| Treatment | 96 | 94 | 17 | 4 | 6 | 83 | 319 | 66 | 279 |
| Control | 3 | 2 | 5 | 97 | 98 | 95 | 153 | 123 | 183 |
| *Bittern Dromana Rd* | | | | | | | | | |
| Treatment | 0 | 41 | 30 | 100 | 59 | 70 | 171 | 172 | 163 |
| Control | 40 | 18 | 7 | 60 | 82 | 94 | 177 | 236 | 245 |
| *Myers Road* | | | | | | | | | |
| Treatment | 91 | 30 | 45 | 9 | 70 | 55 | 116 | 73 | 96 |
| Control | 82 | 32 | 12 | 18 | 68 | 88 | 164 | 117 | 138 |
| *The Driftway* | | | | | | | | | |
| Treatment | 52 | 46 | 7 | 48 | 54 | 9 | 224 | 127 | 161 |
| Control | 0 | 36 | 17 | 100 | 64 | 83 | 64 | 132 | 149 |
| *Old Stock Route Rd* | | | | | | | | | |
| Treatment | 37 | 28 | 20 | 63 | 72 | 80 | 119 | 111 | 151 |
| Control | 77 | 55 | - | 23 | 45 | - | 115 | 96 | - |
| *Smith Road* | | | | | | | | | |
| Treatment | 77 | 16 | 55 | 23 | 84 | 45 | 105 | 104 | 110 |
| Control | 72 | 51 | 65 | 28 | 49 | 35 | 120 | 120 | 122 |

Note also that the table indicates the percentage of cars that did not brake, or that had unknown braking distances. As discussed earlier, it was not always clear from the video when, or if, a vehicle's brake lights came on. Therefore, it was not always possible to determine whether a vehicle did not brake, or whether a

vehicle braked but at an unknown distance from the intersection. Full records of braking observations, including truck observations, are given in Appendix F.

Detailed analysis of the braking data observed for cars has also been undertaken (Note that this analysis excludes trucks). The following tables present descriptive data for those cars that did brake at each site across each period of data collection. For each site the following data are presented:

- the number of observations (minus any obvious outliers),
- the average braking distance from the start of the curve,
- the standard deviation of braking distance,
- the minimum and maximum braking distance, and
- the variance /dispersion of braking distance around the average.

### 8.2.1. Ballarto Road, Victoria

**Table 8.2. Braking Characteristics of Cars at Ballarto Intersection Site**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 304 | 77.6 | 20 | 160 | 20.2 | 409.9 |
| Immediate | 19 | 104.7 | 0 | 400 | 135.1 | 18,259.6 |
| Long-term | 47 | 85.3 | 0 | 370 | 64.6 | 4,168.9 |
| Control | | | | | | |
| Before | 5 | 34.0 | 10 | 50 | 15.2 | 230.0 |
| Immediate | 2 | 240.0 | 240 | 240 | 00.0 | 0.0 |
| Long-term | 10 | 177.0 | 150 | 230 | 27.9 | 778.9 |

### 8.2.2. Bittern Dromana Road, Victoria

**Table 8.3. Braking Characteristics of Cars at Bittern-Dromana Intersection**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 0 | - | - | - | - | - |
| Immediate | 70 | 78.1 | 20 | 310 | 62.8 | 3,940.0 |
| Long-term | 50 | 180.6 | 40 | 520 | 124.8 | 15,577.2 |
| Control | | | | | | |
| Before | 72 | 113.5 | 60 | 200 | 22.3 | 496.2 |
| Immediate | 43 | 87.7 | 20 | 330 | 62.3 | 3,875.4 |
| Long-term | 16 | 376.9 | 140 | 480 | 121.1 | 14,676.3 |

### 8.2.3. Myers Road, Victoria

**Table 8.4. Braking Characteristics of Cars at Myers Road Intersection**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 105 | 89.9 | 20 | 280 | 56.3 | 3,170.2 |
| Immediate | 23 | 90.9 | 0 | 340 | 81.0 | 6,553.8 |
| Long-term | 46 | 79.6 | 20 | 400 | 60.6 | 3,666.5 |
| Control | | | | | | |
| Before | 132 | 104.8 | 40 | 240 | 47.9 | 2,290.8 |
| Immediate | 37 | 135.4 | 30 | 320 | 65.9 | 4,347.7 |
| Long-term | 17 | 89.4 | 40 | 160 | 34.4 | 1,180.9 |

### 8.2.4. The Driftway, NSW

**Table 8.5. Braking Characteristics of Cars at the Driftway Intersection**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 114 | 76.9 | 15 | 220 | 43.3 | 1,873.2 |
| Immediate | 57 | 145.8 | 40 | 370 | 55.8 | 3,117.7 |
| Long-term | 11 | 154.5 | 80 | 240 | 57.2 | 3,267.3 |
| Control | | | | | | |
| Before | 0 | - | - | - | - | - |
| Immediate | 46 | 42.6 | 10 | 170 | 25.2 | 637.5 |
| Long-term | 24 | 94.2 | 40 | 240 | 59.6 | 3,547.1 |

### 8.2.5. Old Stock Route, NSW

**Table 8.6. Braking Characteristics of Cars at Old Stock Route Intersection**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 46 | 76.1 | 30 | 160 | 29.7 | 882.1 |
| Immediate | 31 | 132.9 | 20 | 350 | 76.3 | 5,814.6 |
| Long-term | 31 | 55.2 | 20 | 120 | 20.8 | 432.5 |
| Control | | | | | | |
| Before | 88 | 93.1 | 30 | 220 | 30.4 | 924.9 |
| Immediate | 56 | 87.1 | 20 | 270 | 42.9 | 1,839.0 |
| Long-term | - | - | - | - | - | - |

### 8.2.6. Smith Road, NSW

**Table 8.7. Braking Characteristics of Cars at Smith Road Intersection**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 82 | 19.5 | 0 | 70 | 13.8 | 191.7 |
| Immediate | 16 | 86.9 | 60 | 140 | 23.3 | 542.9 |
| Long-term | 77 | 58.2 | 0 | 140 | 37.6 | 1412.4 |
| Control | | | | | | |
| Before | 85 | 25.5 | 10 | 70 | 16.5 | 270.8 |
| Immediate | 61 | 51.1 | 20 | 90 | 16.2 | 263.7 |
| Long-term | 80 | 67.3 | 0 | 220 | 29.5 | 868.3 |

## 8.3. Lateral Placement of Vehicles

A summary of the lateral positioning of vehicles approaching intersections is given in Table 8.8. The table gives percentages of vehicles that were observed with the following lateral position in the lane:

- centre of lane
- left edge or combination of centre and left edge of lane
- right side or combination of centre and right side of lane

The above combinations can describe the lateral positioning of most observed vehicles, although other combinations of lateral positioning were observed, i.e., Left-edge and Right-side of lane, Left-edge, Centre and Right-side of lane. A full record of the lateral positioning observations is given in Appendix F.

**Table 8.8. Lateral Positioning of Vehicles Approaching Intersection Sites**

| Site | Lateral Positioning of Vehicles[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Centre (%) | | | Left/Centre & Left (%) | | | Right/Centre & Right (%) | | |
| | Before | After | Long-term | Before | After | Long-term | Before | After | Long-term |
| *Ballarto Road* | | | | | | | | | |
| Treatment | 58 | 46 | 8 | 23 | 34 | 35 | 17 | 18 | 37 |
| Control | 53 | 27 | 5 | 27 | 15 | 30 | 15 | 50 | 41 |
| *Bittern Dromana Road* | | | | | | | | | |
| Treatment | 64 | 68 | 20 | 27 | 24 | 23 | 9 | 7 | 38 |
| Control | 61 | 58 | 29 | 33 | 15 | 31 | 6 | 24 | 30 |
| *Myers Road* | | | | | | | | | |
| Treatment | 66 | 64 | 33 | 7 | 11 | 22 | 28 | 20 | 36 |
| Control | 74 | 29 | 40 | 18 | 3 | 37 | 4 | 59 | 19 |
| *The Driftway* | | | | | | | | | |
| Treatment | 5 | 49 | 5 | 42 | 34 | 35 | 14 | 14 | 26 |
| Control | 50 | 57 | 2 | 48 | 32 | 84 | 0 | 11 | 4 |
| *Old Stock Route Road* | | | | | | | | | |
| Treatment | 0 | 59 | 12 | 10 | 3 | 44 | 19 | 38 | 19 |
| Control | 2 | 51 | - | 2 | 30 | - | 90 | 19 | - |
| *Smith Road* | | | | | | | | | |
| Treatment | 55 | 57 | 5 | 17 | 26 | 67 | 27 | 17 | 20 |
| Control | 32 | 50 | 1 | 50 | 24 | 60 | 11 | 20 | 23 |

Note 1: Percentages do not add up to 100 as not all combinations of lateral positioning are included in this table.
Refer to Appendix F for complete record of vehicle lateral positioning.

Inspection of Table 8.8 shows that there is considerable variability in the lateral positions of vehicles approaching the intersection sites during the before, immediately after and long-term observation periods, at both the treatment and control sites. Therefore it is not possible to draw any conclusive trends in lateral vehicle positioning due to the PCMs.

## 8.4. Crash Analysis

Crash analyses were attempted at each of the treatment and control sites. While there were four casualty crashes at four of the treatment and control sites during the three-year 'before' period, there were none during the one-year 'after' period. Hence, it was not possible again to undertake this analysis.

## 8.5. Overview of Day Intersection Results

The approach zones of six intersections were treated with edgeline hatching in an attempt to slow down travel speed of approaching vehicles. The speed results were more consistent and as expected than were those at the curves. Of the five sites treated where a complete analysis was possible, there were immediate and long-term speed reductions at three of them. An immediate increase in speed after treatment was observed at only The Driftway Road site but this had dissipated by the time of the long-term observations.

Braking differences were apparent between the before and after treatment data as well as across the treated and control sites. These data were quite inconsistent with no systematic pattern obvious to illustrate any advantages of these treatments. Similarly, there were also no clear patterns of improvement or otherwise from the lateral placement data either.

# 9. RESULTS – INTERSECTION TREATMENTS (NIGHT)

## 9.1. Speed Profiles

### 9.1.1. Ballarto Road, Victoria

Due to technical problems during the observations, the speed analysis for Ballarto Road does not consider the period immediately after. However, it was possible to look at whether there was any variation in speed from the before period to the long-term period.

The results of the statistical analysis of the speed data are reported below.

A three-way ANOVA was performed to determine whether the mean speed varied depending on the type of site (treatment or control), the period in which the data were collected (before or long-term) and the road segment (in 20m intervals).

*Interactions: Site type, period and road segment*

Results indicated that there was no significant interaction between the type of site, the period of collection and the road segment on mean speed, $F(7, 1676)= 0.608$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type, period and road segment had a significant effect on mean speed.

*Interactions: Site type and road segment*

There was no significant interaction between site type and road segment on mean speed, $F(7, 1676) = 0.106$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effect of site type and road segment had a significant effect on mean speed.

*Interactions: Period and road segment*

The interaction between the period the data were collected and the road segment was not significant, $F(7, 1676) = 0.266$; $p>0.05$. Therefore, there was insufficient evidence to indicate that the combined effects of the period in which the data were collected and the road segment had a significant effect on mean speed.

*Interactions: Site type and period*

The was a significant interaction between the site type and data collection period, $F(1, 1676) = 5.594$; $p<0.05$. A significant difference in speeds between the treated and control sites was observed for the before and long-term after observation periods.

*Simple Main Effects*

When a significant difference is found for the interaction between the independent variables on the dependent variable, a test of simple effects, is used to interpret the interaction. Given that there was a significant interaction found, it was appropriate to investigate the simple main effects.

There was a significant interaction between site type and period on mean speed. The results of the analysis of the simple main effects for site type and period indicate that, for the before period, there was a statistically significant difference between mean speed at the treatment site (77.9 km/h) and the control site (87.3 km/h). For the long-term period, there was a statistically significant difference between the mean speed at the treatment site (79.2 km/h) and the control site (85.6 km/h).

The results of the analysis of simple main effects for site type and period indicate that, for the treatment site, mean speed did not vary significantly between the two periods; before and long-term. The Scheffe test revealed that when data were averaged across the treatment site, the mean speed for the before period (77.9 km/h) did not differ from the mean speed long-term (79.2 km/h).

The Scheffe test revealed that when data were averaged across the control site, the mean speed did not vary significantly from the before period (87.3 km/h) when compared to the mean speed long-term (85.6 km/h).

*Summary*

The statistical analysis showed a significant interaction between the speed across the treated and control sites for vehicles travelling at night along Ballarto Road during the before and long-term data collection periods. However, simple effects analyses revealed that, when analysing the treatment sites only, there was no difference in mean vehicle speeds between the before and long-term period. This was similar at the control site, where mean vehicle speed did not vary between before and long-term. Hence, it can be concluded that the PCM at this site did not significantly reduce travel speeds long-term at night. This is shown in Figure 9.1.


*Figure 9.1: Mean speed at night at Ballarto Road and control site for each period*

*Segment Analysis*

A 20m-segment analysis was undertaken again for the night observations at the Ballarto site. Unfortunately, there were no reliable data available immediately after installation of the treatment because of technical failure so it was only possible to analyse the segment data at the long-term mark (12-months after installation). These results are shown in Figure 9.2 below where a significant speed increase (relative to the control site) was observed over the control data at the treated site at night.

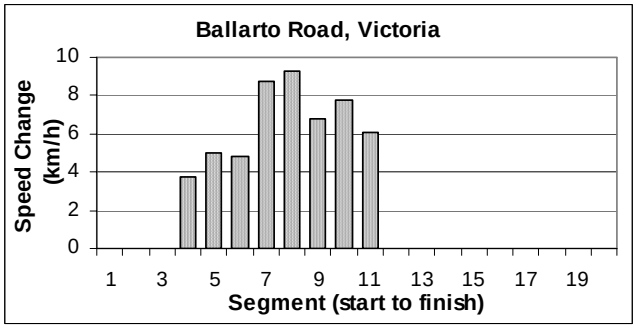


*Figure 9.2: Long-term speed reductions at the Ballarto site at night.*

## 9.2. Braking

A summary of car braking behaviour is given in Table 9.1, indicating the percentage of cars that braked along the observed road section. Note that cars and trucks were separated for data analysis, as their braking behaviour is likely to be different. The number of trucks observed during the surveys was too small to give any meaningful results. Therefore trucks have been discounted from the braking analysis.

Note also that the table indicates the percentage of cars that did not brake, or that had unknown braking distances. As discussed earlier, it was not always clear from the video when, or if, a vehicle's brake lights came on. Therefore, it was not always possible to determine whether a vehicle did not brake, or whether a vehicle braked but at an unknown distance from the intersection. Full records of braking observations, including truck observations, are given in Appendix F.

**Table 9.1. Braking Characteristics of Cars Approaching Intersection Site at Night**

| Site | % of Cars that Braked | | | % of Cars that Didn't Brake / Unknown | | | Total Number of Cars Observed | | |
|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Long-term | Before | After | Long-term | Before | After | Long-term |
| *Ballarto Road* | | | | | | | | | |
| Treatment | 80 | 95 | 100 | 20 | 5 | 0 | 193 | 67 | 72 |
| Control | 55 | 75 | 50 | 45 | 25 | 50 | 95 | 73 | 61 |

Detailed analysis of the braking data observed for cars has also been undertaken (Note that this analysis excludes trucks). The following tables present descriptive data for those cars that did brake at the nominated intersection at night site across each period of data collection. The following data are presented:

- The number of observations (minus any obvious outliers),
- the average braking distance from the start of the curve,
- the standard deviation of braking distance,
- the minimum and maximum braking distance, and
- the variance /dispersion of braking distance around the average.

### 9.2.1. Ballarto Road, Victoria

**Table 9.2. Braking Characteristics of Cars Approaching the Ballarto Site at Night**

| | Number of Observations | Braking Distance | | | Standard Deviation | Variance |
|---|---|---|---|---|---|---|
| | | Average | Minimum | Maximum | | |
| Treatment | | | | | | |
| Before | 156 | 87.9 | 20 | 300 | 42.9 | 1,842.2 |
| Immediate | 63 | 151.9 | 20 | 420 | 92.3 | 8,512.4 |
| Long-term | 72 | 134.0 | 10 | 390 | 104.2 | 10,866.6 |
| Control | | | | | | |
| Before | 47 | 112.3 | 70 | 260 | 28.6 | 1,492.2 |
| Immediate | 53 | 110.8 | 20 | 280 | 69.0 | 4,761.0 |
| Long-term | 31 | 123.9 | 90 | 210 | 29.5 | 871.2 |

## 9.3. Lateral Placement of Vehicles

A summary of the lateral positioning of vehicles is given in Table 9.3. The table gives percentages of vehicles that were observed with the following lateral position in the lane:

- centre of lane
- left edge or combination of centre and left edge of lane
- right side or combination of centre and right side of lane

The above combinations can describe the lateral positioning of most observed vehicles, although other combinations of lateral positioning were observed, i.e. left edge and right side of lane, left edge, centre and right side of lane. A full record of the lateral positioning observations is given in Appendix F.

**Table 9.3. Lateral Positioning of Vehicles Approaching the Ballarto Site at Night**

| Site | Lateral Positioning of Vehicles[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Centre (%) | | | Left/Centre & Left (%) | | | Right/Centre & Right (%) | | |
| | Before | After | Long-term | Before | After | Long-term | Before | After | Long-term |
| *Ballarto Road* | | | | | | | | | |
| Treatment | 64 | 46 | 20 | 19 | 34 | 30 | 17 | 18 | 44 |
| Control | 36 | 29 | 0 | 45 | 41 | 0 | 16 | 12 | 17 |

Note: 1 Percentages do not add up to 100 as not all combinations of lateral positioning are included in this table. Refer to Appendix F for complete record of vehicle lateral positioning.

Again, these data do not give any indication of change in the lateral positions of vehicles at the treatment site, in comparison to the control site, following the installation of the treatment.

## 9.4. Overview of Night Intersection Results

The speed analysis at Ballarto Road unfortunately could not consider the effects immediately after treatment due to a lack of speed data. There was no significant difference in travel speed when comparing the 'before' and 'long-term after' observations at both treated and control sites at night.

There were fewer episodes of braking at the treated site compared to both the before and control data, suggesting that the treatments may have had a positive influenced on the speed profile in the approach to the intersection.

Again, there was little indication of any change in the lateral positions of vehicles at the treatment site at night, compared to the control site, following the installation of the treatment.

# 10. DISCUSSION OF RESULTS – INTERSECTION SITES

## 10.1. Effect of Treatments on Vehicle Speeds

### 10.1.1. Average Vehicle Speeds

Unlike the earlier curve results, the analysis of the travel speed data shows reasonable consistent travel speed reductions from the perceptual treatment. The individual site findings reveal that some interesting changes in travel speeds (averaged across the observed road section) have occurred during the before, immediately after and long-term observation periods, at both the control and treatment sites.

- At Ballarto Road, there was a significant reduction in travel speed at the treatment site from the before to long-term observation periods. Unfortunately, due to data collection difficulties, the speed data for the control site could not be reliably analysed.
- At Bittern-Dromana Road, there was a significant reduction in travel speed at the treatment and control sites immediately after treatment which subsided slightly over the next 12-months. However, the treated Bittern Road intersection approach speeds were not different to the control site speeds immediately after treatment, although the travel speeds were 4km/h slower at the 12-month observation period.
- At Myers Road, travel speeds decreased substantially immediately after treatment (8km/h or more) compared to the control site, but this moderated to a 2km/h significant reduction 12-months after treatment.
- At The Driftway site, there were no significant differences overall in travel speed before, immediately after or at the 12-month period. However, there was an increase of 3km/h in travel speed at the treatment site, relative to its control immediately after treatment, although, interestingly, this had changed to a 2km/h decrease by the 12-month mark.
- At the Old Stock Route Road site, there was a short-term increase in average vehicle speed generally between the before and immediate after periods. However, when comparing the treated and control site differences, travel speeds had decreased by 4km/h immediately after treatment and 3km/h after 12-months.
- Travel speed reductions were less apparent at the Smith Road site overall, although there was a 2km/h speed reduction at the treated, relative to the control site immediately after treatment. This benefit though had subsided to nothing at the 12-month observation period.

In short, the hatched edgeline perceptual treatment had a significant and relatively stable benefit generally in terms of reductions in travel speed in the approach to the treated intersections.

### 10.1.2. Speed Profiles

The analysis has demonstrated the changes in average vehicle speeds, averaged across the observed road section at each site, for the before, immediately after, and long-term periods. However, the statistical analysis did not find any significant differences in the average vehicle speed of each road segment (in 20m intervals) when interacting with site type and period, with one exception. At the Bittern-Dromana Road treatment site, the average speed profile for the immediately after period shows a significant reduction in average speed at approximately 370m prior to the intersection (i.e., just after the start of the treatment), followed by a steady increase in average speed over the next 100m or so, towards the intersection. It appears that the treatment had an immediate effect on drivers (who reduced their speed) but that the effect was not maintained over the length of the treatment (drivers began to speed up again), although the average speed over the entire road section was lower for this observation period. This effect, however, was not sustained, it appears, in the long-term.

### 10.1.3. Other Performance Benefits

The analysis of braking data did not give any indication of changes in braking behaviour by motorists approaching the intersection sites. This is partly because the number of braking observations was small in many cases, and the standard deviation of braking distances was large. Given that there was considerable variability in the lateral positions of vehicles approaching the intersection sites during each observation period, at both the treatment and control sites, it was not possible to draw any conclusive trends.

This is not a surprising finding, though, given that motorists had to brake as they approached an intersection with or without any perceptual countermeasures. Differences would have been expected where they commenced braking rather than whether they did or not. Unfortunately, the data collected could not be analysed for braking across the various 20m segments, which prevented such an analysis.

### 10.1.4. Night Time Effects

The night-time observation data undertaken at Ballarto Road were only available at the 12-month observation period because of technical difficulties. Comparing the before and 12-month after treatment data across the treated and control sites did show a significant increase in travel speed at the treated site. Given the small amount of data from a single site, it is, unwise to draw any conclusions from these observations, however.

### 10.1.5. General Comments

From the results, it appears that the PCM treatments have been somewhat effective in reducing vehicle speeds, in the approach zones at most of the sites tested here in both the short- and long-term. Given that the PCMs were generally more effective in the long-term, it is possible that drivers took some time (i.e. more than 2 months) to change their driving behaviour. It is noted that, at all of the sites, the majority of traffic is local and most drivers would probably be very familiar with the road.

This is similar to the finding for the curve treatment evaluation, and it may be that perceptual treatments take longer to affect the driving behaviour of regular road users who are not actively looking for advanced cues of road geometry. This offers future research opportunities to outline how these treatments might be improved and road settings where they might be more or less effective.

# 11. REVIEW OF SITES

In order to determine whether there were any road and road environment factors that may have influenced the effectiveness results of the treatments, a detailed follow-up of all sites was conducted at the conclusion of the project by the study team.

Site inspections were carried out by senior researches from ARRB TR and MUARC in January and February 2003. It must be noted that this was more than 12 months after the data collection task had been completed and it is possible that some changes may have occurred at some sites during that period unknown to the researchers.

## 11.1. Curve Sites

No obvious features or apparent recent changes to road and road environment conditions were observed at any of the curve treatment or control sites that could explain the variations in vehicle speed and/or effectiveness of the treatment at the sites surveyed. However the following points of interest were noted:

- The treatment at Harkaway Road was again largely missing (only 3 guideposts remained) after being re-installed in September 2001 for the second 'after' observations. It is doubtful how long the treatment remained intact after its first installation in June 2000 and the first 'after' observations. Therefore the data from this site are likely to be an inaccurate measure of driver response to the treatment.
- Harkaway Road was widened during the study period (during late 2000/early 2001), as part of the black spot program. The pavement width was increased so that the sealed lane width increased and the unsealed shoulder width decreased, leaving virtually no shoulders at all. Speeds at the control curve decreased during the study period, perhaps as a result of the reduced shoulder width, although speeds at the treatment curve showed no long-term change. A curve warning sign and advisory speed sign was also installed at the treatment curve following installation of the treatment and may have influenced vehicle speeds.
- The Castlereagh Road treatment and control curves are much flatter than the other curves. The treatment appears to be too 'short' for the length of the curve and may not have the same visual/perceptual effect. Furthermore drivers do not need to slow down much (in comparison to the other curves surveyed) to negotiate this curve. This may explain why there was no change in vehicle speeds at either the control or treatment curve.
- Of the five curve treatment sites, disregarding Harkaway Road, Pakenham Road and Castlereagh Road were better delineated by guideposts than the other sites before the treatments were installed. It is interesting to note that these two sites showed a neutral effect in terms of vehicle speeds compared to the control sites, whereas the other three sites demonstrated a positive effect. That is, the treatment appears to have been more effective at sites, which were not delineated, or not well delineated, by guideposts prior to treatment installation.
- Scheyville Road and The Driftway treatment sites had existing advisory curve and speed warning signs. Both these sites demonstrated a positive effect in terms of vehicle speeds compared to the control sites following installation of the treatment.

## 11.2. Intersection Sites

The treatments had faded considerably by the time of the site reviews, some 2.5 years after their installation, and were not very conspicuous on the approach to the start of treatment. However, the perceptual effect on a motorist as he drives along the treated section of road may still be significant. Again no obvious features or apparent recent changes to road and road environment conditions were observed at any of the intersection sites that could explain the variations in vehicle speed and/or effectiveness of the treatment at the sites surveyed. The following points of interest were noted:

- The intersection sites varied with respect to the presence of advanced Give Way/Stop signs and splitter islands, however there was no correlation between treatment sites that had these features and those that demonstrated a positive effect on vehicle speeds.
- The Ballarto Road intersection differed from the other intersections in that it was a staggered T intersection, not a cross intersection. This intersection also has large directional signage on its approaches and chevron boards on the far side of the intersection to assist drivers. The treatment site here demonstrated the largest decrease in average vehicle speed following installation of the treatment. (Note, however, that the control data were not useable)

The results show that there was no change in average vehicle speeds at four of the treatment sites. However, it must be remembered that vehicle speeds were measured over the section of road 200-400m from the intersection (that is, the first 200m of the 400m long treatment). While this is where the treatment was expected to have its greatest effect on vehicle speeds (from previous simulator studies), it is possible that speed reduction effects occurred over the second 200m of the treatment (that is, the 200m immediately prior to the intersection). If further surveys of this treatment are conducted, then it would be desirable to record speed measurements over the entire length of treatment (which would require more than one speed laser gun).

## 11.3. General Observations

Some further general observations were made during the review of sites:

- The NSW curve and intersection control sites generally demonstrated an increase in average vehicle speed over the long-term study period. Average vehicle speeds increased at four of the six control sites, with no significant changes at the other two control sites. It has not been possible to establish whether or not this was a general trend in NSW over the study period.
- The treatment sites, on the other hand, all demonstrated no significant change in average vehicle speed over the long-term study period. If there was an overall increasing trend in vehicle speeds in NSW during the study period, it appears that the treatments may have been successful in diminishing the effect at the treatment sites.

There were some signs of lack of maintenance or wear-and-tear to some of the treatments, which would have undoubtedly had an influence on their effectiveness in improving performance at these sites. However, this was part of the trial to evaluate not only the short-term benefits but also their long-term effectiveness. Hence, it will be important to ensure these treatments are properly maintained and checked regularly if they are to be effective at reducing travel speed. The degree to which this may have affected the results is impossible to calculate but it would be reasonable to conclude that some of the long-term effectiveness may have been ameliorated by the shortcomings noted above.

# 12. CONCLUSIONS AND RECOMMENDATIONS

## 12.1. Main Findings

At both the curve and intersection treatment sites, the results indicate that the PCMs were not totally effective in reducing average vehicle speeds. While speed reductions of 5 or 8 km/h were observed at some sites, travel speed at others was either unaffected by the treatments or in a few instances increased after treatment. Long-term effects were observed but generally of less magnitude.

### 12.1.1. Curve Treatment

At the curve sites, it would appear that, in the long-term, the post treatment PCM had a positive influence on travel speed at half of the six sites, and no effect at two sites. At the other treatment site (Harkaway Road), road condition changes and damage to the treatment during the study period make the results difficult to interpret. It should be noted that the two sites that demonstrated no effect (Castlereagh Road and Pakenham Road) were better delineated by guideposts than the other sites prior to treatment installation. That is, the treatment appears to have been more effective at sites, which were not delineated or not well delineated by guideposts prior to treatment installation. Furthermore, Castlereagh Road is a flatter curve than the other sites and drivers do not need to slow down much to negotiate it, possibly contributing to the non-effectiveness of the treatment at this site.

Given that the PCMs were not effective in the short term, but that there were positive long-term effects on average vehicle speeds at three of the curve sites and four of the intersection, it is possible that drivers took some time (i.e. more than 2 months) to change their driving behaviour. It is noted that, at all of the sites, the majority of traffic is local and most drivers would probably be very familiar with the road. It may be that perceptual treatments take longer to affect the driving behaviour of regular road users who are not actively looking for advanced cues of road geometry.

### 12.1.2. Intersection Treatment

At the intersection sites, it would appear that the edgeline hatching PCM had a reasonably positive effect on reducing travel speed, relative to the control sites, at up to 80 percent of the sites tested in both the short- and long-term. At another site (Ballarto Road), the treatment appeared to have resulted in travel speed reductions in the long-term also, but this could not be confirmed short-term because of difficulties experienced in data collection. At the other treatment site, average speed was no higher following the installation of the treatment then before.

The 20m segment results show that there were signs of speed differences in the lead up to the intersection between the treated and control sites immediately after treatment as well as 12-months afterwards. It must be remembered that vehicle speed measurements were spasmodic over the full treated section of road, between 200-400m from the intersection. While this treatment was expected (from previous simulator studies) to have its greatest effect on vehicle speeds in the initial treated section, it is possible that speed reduction effects occurred over the second 200m of the treatment (that is, the 200m immediately prior to the intersection). These segment data were not sufficient to test this hypothesis completely.

### 12.1.3. Jurisdiction Effects

The NSW curve and intersection control sites generally demonstrated an increase in average vehicle speed over the long-term study period. Average vehicle speeds increased at four of the six control sites, with no significant changes at the other two control sites. It has not been possible to establish whether or not this was a general trend in NSW over the study period. The treatment sites, on the other hand, all demonstrated no significant change in average vehicle speed over the long-term study period. If there was an overall increasing trend in vehicle speeds in NSW during the study period, it appears that the treatments may have been successful in diminishing the effect at the treatment sites.

### 12.1.4. Limitations

While these treatments were positive at some sites, they were not uniformly beneficial in reducing travel speed as expected from previous results (Godley et al., 1999). There are a number of reasons why this may have been so.

1. As noted above, the treatments may be more or less effective depending on the characteristics of the sites they were applied at. This was argued earlier although there were no data available to support this.

2. The treatments may have been degraded through misadventure or wear and tear over the 12-month period from installation. Given that many of the effects tended to diminish with time, this offers some support for this, although the majority of sites showed significant speed reductions long-term.

3. The selection of treatment sites was made on the basis of availability and availability of a similar control location. As it turned out, they were all low volume sites and none were chosen because they were accident-prone (black-spots). Lack of high exposure may have acted to ameliorate the treatment effectiveness.

Under the circumstances, then, a 1 to 2km/h speed reduction should be seen to be quite an achievement for these treatments given these features. It should also be pointed out that a widespread 1 to 2km/h reduction in speed would equate to a sizeable improvement in crash and injury prevention.

## 12.2. Recommendations

In light of the results of the analysis, the following recommendations are made.

- For sites that demonstrated a positive long-term effect, conduct further speed surveys approximately 2 years after installation of the treatments, to determine whether the speed reduction effects have been sustained.
- If further surveys of the intersection treatment are to be conducted, then there is a need to record and analyse speed measurements over the entire length of treatment (which would require more than one speed laser gun).
- Compare the detailed results of this study with the previous simulation study (Godley et al., 1999) to determine the differences in actual results and simulator results.
- Identify other perceptual countermeasures, from the previous studies, that could be trialled.

### 12.2.1. Future Research

Bearing in mind the limitations discussed above, there would still be merit in conducting further on-road research involving the application of perceptual countermeasures in more relevant locations. This should involve areas where high travel speed is problematic, probably in urban residential locations.

Throughout this research program, there has been considerable interest among road safety experts and traffic engineers in the applicability of low-cost perceptual treatments to reduce travel speed. Much of this interest stems from their possible use as a low-cost black-spot treatment option.

It would be possible to develop an urban treatment perceptual countermeasure strategy to address speeding in strip shopping centres or school or residential zones. These treatments could be applied by themselves or in conjunction with high skid-resistance surfacing and/or rumble effects to enhance their crash reduction benefits.

In the event that a further on-road trial was conducted, it would be desirable to ensure that they are applied widely enough to assess both the speed reduction and crash effects.

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# APPENDIX A : EXTRACT FROM AUSTRALIAN STANDARD AS 1742.2 SPACING FOR GUIDEPOSTS AT CURVES

**Extract from AS 1742.2 Manual of uniform traffic control devices Part 2 – Traffic control devices for general use**

**Table 3.1**
**SPACING OF GUIDE POSTS ON CURVES**
**(Including spacing of guard fence delineators)**

| Curve radius (Note 1) | Spacing (Note 2) metres | |
|---|---|---|
| | On outside of curve | On inside of curve (Note 3) |
| <100 | 6 | 12 |
| 100-199 | 10 | 20 |
| 200-299 | 15 | 30 |
| 300-399 | 20 | 40 |
| 400-599 | 30 | 60 |
| 600-799 | 40 | 60 |
| 800-1 999 | 60 | 60 |
| 1 200-2 000 | 90 (Note 4) | 90 (Note 4) |
| >2 000 incl. straights | 150 (Note 4) | 150 (Note 4) |

**NOTES:**

1. Where the radius of an existing curve is not available from records, it may be determined approximately by measuring the middle ordinate offset from a chord of known length using either the edge of pavement or a marked longitudinal line as a guide.

2. On guard fence, spacing should be adjusted, if necessary, to the nearest multiple of post spacing.

3. Each post on the inside of a curve is placed opposite a post on the outside of the curve wherever practicable.

4. Spacing is reduced to 60 m in areas subject to fog.

# APPENDIX B: PHOTOS OF SITES

## PHOTOS OF CURVE SITES

## BEFORE AND AFTER TREATMENT SITES, AND CONTROL SITES

Figure 1: Gembrook Road, Victoria (northbound, opposite no. 605): Control Site

Figure 2: Gembrook Road, Victoria (southbound, opposite no. 605): Treatment Site – Before Installation of Treatment

Figure 3: Gembrook Road, Victoria (southbound, opposite no. 605): Treatment Site – After Installation of Treatment

Figure 4: Pakenham Road, Victoria (southbound, south of Paternoster Road): Control Site

Figure 5: Pakenham Road, Victoria (southbound, north of Mann Road): Treatment Site – Before Installation of Treatment

Figure 6: Pakenham Road, Victoria (southbound, north of Mann Road): Treatment Site – After Installation of Treatment

Figure 7: Harkaway Road, Victoria (northbound, past Caserta Drive): Control Site

Figure 8: Harkaway Road, Victoria (southbound, past no. 186 opposite 'Melrose'): Treatment Site – Before Installation of Treatment

Figure 9: Harkaway Road, Victoria (southbound, past no. 186 opposite 'Melrose'): Treatment Site – After Installation of Treatment

Figure 10: The Driftway, NSW (northbound, just before Castlereagh Road): Control Site

Figure 11: The Driftway, NSW (southbound, at Bonner Road): Treatment Site - Before Installation of Treatment


Figure 12: The Driftway, NSW (southbound, at Bonner Road): Treatment Site - After Installation of Treatment

Figure 13: Castlereagh Road, NSW (south-westbound, between Inalls Road and Drift Road): Control Site

Figure 14: Castlereagh Road, NSW (south-westbound, past Springwood /road near no. 460): Treatment Site – Before Installation of Treatment

Figure 15: Castlereagh Road, NSW (south-westbound, past Springwood /road near no. 460): Treatment Site – After Installation of Treatment. Note: Wide spacing of posts due in part to driveways

Figure 16: Scheyville Road, NSW (eastbound, at Sydney Show Jumping Club): Control Site


Figure 17: Scheyville Road, NSW (eastbound, past Dormitory Hill Road): Treatment Site – After Installation of Treatment. Note: Posts very close together

## PHOTOS OF INTERSECTION SITES –
## BEFORE AND AFTER TREATMENT SITES, AND CONTROL SITES

Figure 18: Ballarto Road at Koo Wee Rup Road, Victoria: Control Site


Figure 19: Ballarto Road at Koo Wee Rup Road, Victoria: Treatment Site – Before Installation of Treatment

Figure 20: Ballarto Road at Koo Wee Rup Road, Victoria: Treatment Site – After Installation of Treatment

Figure 21: Bittern Dromana Road at Balnarring Road, Victoria: Control Site

Figure 22: Bittern Dromana Road at Balnarring Road, Victoria: Treatment Site – Before Installation of Treatment

Figure 23: Bittern Dromana Road at Balnarring Road, Victoria: Treatment Site – After Installation of Treatment

Figure 24: Myers Road at Coolart Road, Victoria – Control Site

Figure 25: Myers Road at Coolart Road, Victoria: Treatment Site – After Installation of Treatment


Figure 26: The Driftway at Londonberry Road, NSW: Control Site

Figure 27: The Driftway at Londonberry Road, NSW: Treatment Site – Before Installation of Treatment

Figure 28: The Driftway at Londonberry Road, NSW: Treatment Site – After Installation of Treatment

Figure 29: Old Stock Route Road at Wolseley Road, NSW: Control Site

Figure 30: Old Stock Route Road at Wolseley Road, NSW: Treatment Site – Before Installation of Treatment

Figure 31: Old Stock Route Road at Wolseley Road, NSW: Treatment Site – After Installation of Treatment

Figure 32: Smith Road at Broos Road, NSW: Control Site

Figure 33: Smith Rd at Broos Road, NSW: Treatment Site – After Installation of Treatment

# APPENDIX C: DATA COLLECTION DETAILS

**Table A1: Perceptual Countermeasure Trial Sites in Victoria**

| Treatment description | | Road | Site description | Date of treatment installation (approx) | Pre treatment | Immediate post treatment | Long-term post treatment |
|---|---|---|---|---|---|---|---|
| | | | | | Observations made | Observations made | Observations made |
| Curve (VIC) | Treatment | Gembrook Rd | S bound RH curve just past no. 605 (north of Harvie Rd) | 06/00 | 09/2/00 | 17/08/00 | 17/7/01 |
| | Control | Gembrook Rd | N bound RH curve just past no. 605 (north of Harvie Rd) | | 04/2/00 | 17/08/00 | 19/7/01 |
| | Treatment | Harkaway Rd | S bound RH curve just past no. 186 (opposite 'Melrose') | 06/00 | 10/03/00 | 14/08/00 | 12/10/01 |
| | Control | Harkaway Rd | N bound RH curve just past Caserta Dr | | 14/02/00 | 14/08/00 | 27/07/01 |
| | Treatment | Pakenham Rd | S bound RH curve north of Mann Rd (second curve south of no. 1005) | 06/00 | 10/02/00 | 18/08/00 & 12/09/00 | 5/09/01 |
| | Control | Pakenham Rd | S bound RH curve south of Paternoster Rd/Mt Burnett Rd (near rock wall) | | 10/02/00 | 18/08/00 | 10/09/01 |
| Intersection (VIC) | Treatment | Ballarto Rd at Koo Wee Rup Rd | North leg | 06/00 | 29/02/00 | 8/11/00 | November 2001 |
| | Control | Ballarto Rd at Koo Wee Rup Rd | South leg | | 29/02/00 | 6/11/00 | November 2001 |
| | Treatment | Bittern Dromana Rd at Balnarring Rd | East leg | 06/00 | 01/03/00 | 07/09/00 & 12/09/00 | 31/07/01 |
| | Control | Bittern Dromana Rd at Balnarring Rd | West leg | | 10/03/00 | 05/09/00 | 31/07/01 |
| | Treatment | Myers Rd at Coolart Rd | West leg | 06/00 | 03/03/00 | 07/09/00 | 2/8/01 |
| | Control | Myers Rd at Coolart Rd | East leg | | 03/03/00 | 15/09/00 | 2/8/01 |

**Table A2: Perceptual Countermeasure Trial Sites in NSW**

| Treatment description | | Road | Site description | Date of treatment installation (approx) | Pre treatment | Immediate post treatment | Long-term post treatment |
|---|---|---|---|---|---|---|---|
| | | | | | Observations made | Observations made | Observations made |
| *Curve (NSW)* | Treatment | Castleraegh Rd | SW bound LH curve near no. 460, past Springwood Rd (cnr private access road) | 06/00 | 23/02/00 | 24/08/00 | 23/08/01 |
| | Control | Castleraegh Rd | SW bound LH curve between Inalls Rd & Drift Rd | | 17/02/00 | 24/08/00 | 23/08/01<br>24/08/01 |
| | Treatment | Scheyville Rd | E bound, LH curve past Dormitory Hill Rd | 06/00 | 21/02/00 | 28/08/00<br>29/08/00 | November 2001 |
| | Control | Scheyville Rd | E bound LH curve at Sydney Show Jumping Club | | 22/02/00 | 22/08/00 | November 2001 |
| | Treatment | The Driftway | S bound LH curve at Bonner Rd | 06/00 | 18/02/00 | 25/08/00 | November 2001 |
| | Control | The Driftway | N bound LH curve just before Castleraegh Rd | | 18/02/00 | 25/08/00 | November 2001 |
| *Intersection (NSW)* | Treatment | The Driftway at Londonberry Rd | West leg | 06/00 | 16/02/00 | 23/08/00<br>25/08/00 | 24/08/01 |
| | Control | The Driftway at Londonberry Rd | East leg | | 16/02/00 | 23/08/00 | 24/08/01 |
| | Treatment | Old Stock Route Rd at Sanders Rd | North leg | 06/00 | 19/02/00 | 23/08/00 | 25/08/01 |
| | Control | Old Stock Route Rd at Sanders Rd | South leg | | 23/02/00 | 28/08/00 | 28/08/01<br>30/08/01 |
| | Treatment | Smith Rd/Broos Rd at Oakville Rd/Stahls Rd | South leg | 06/00 | 24/02/00 | 29/08/00 | 22/08/01<br>23/08/01<br>24/08/01 |
| | Control | Smith Rd/Broos Rd at Oakville Rd/Stahls Rd | North leg | | 22/02/00 | 29/08/00 | 27/08/01<br>28/08/01 |

**Table A3: Night-time Investigations in Victoria**

| Treatment description | | Road | Site description | Date of treatment installation (approx) | Pre treatment | Immediate post treatment | Long-term post treatment |
|---|---|---|---|---|---|---|---|
| | | | | | Observations made | Observations made | Observations made |
| Curve (VIC) | Treatment | Gembrook Rd | S bound RH curve just past no. 605 (north of Harvie Rd) | 06/00 | 03/05/00 | 16/08/00 | 24/7/01 |
| | Control | Gembrook Rd | N bound RH curve just past no. 605 (north of Harvie Rd) | | 03/05/00 | 18/08/00 | 26/07/01 |
| | Treatment | Pakenham Rd | S bound RH curve north of Mann Rd (second curve south of no. 1005) | 06/00 | 27/04/00 | 12/09/00 | 5/09/01 |
| | Control | Pakenham Rd | S bound RH curve south of Paternoster Rd/Mt Burnett Rd (near rock wall) | | 29/04/00 | 05/10/00 | 10/09/01 |
| Intersection (VIC) | Treatment | Ballarto Rd at Koo Wee Rup Rd | North leg | 06/00 | 07/06/00 | 23/11/00 | 10/10/01 & 11/10/01 |
| | Control | Ballarto Rd at Koo Wee Rup Rd | South leg | | 05/05/00 | 24/11/00 | 16/10/01 & 18/10/01 |

# APPENDIX D: AVERAGE VEHICLE SPEED PROFILES – BEFORE, AFTER AND LONG-TERM

**Figure A1Gembrook RdCurve Treatment Site: Daytime**

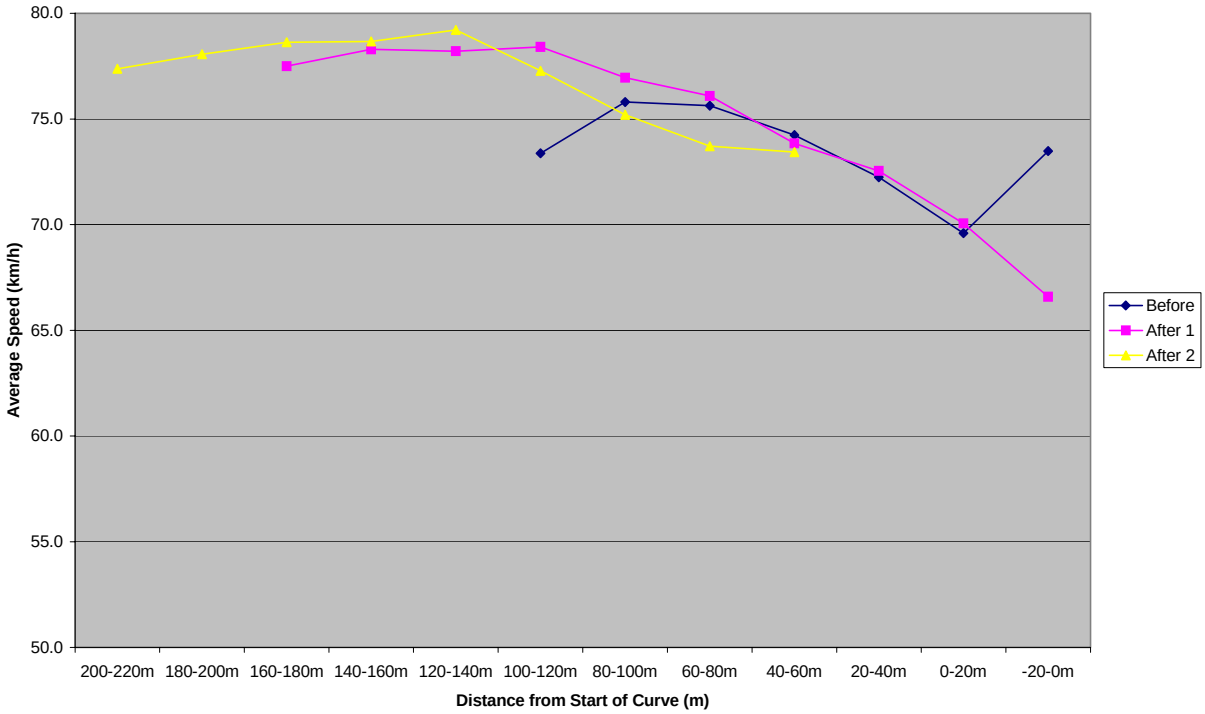



**Figure A2 Gembrook Rd Curve Control Site: Daytime**

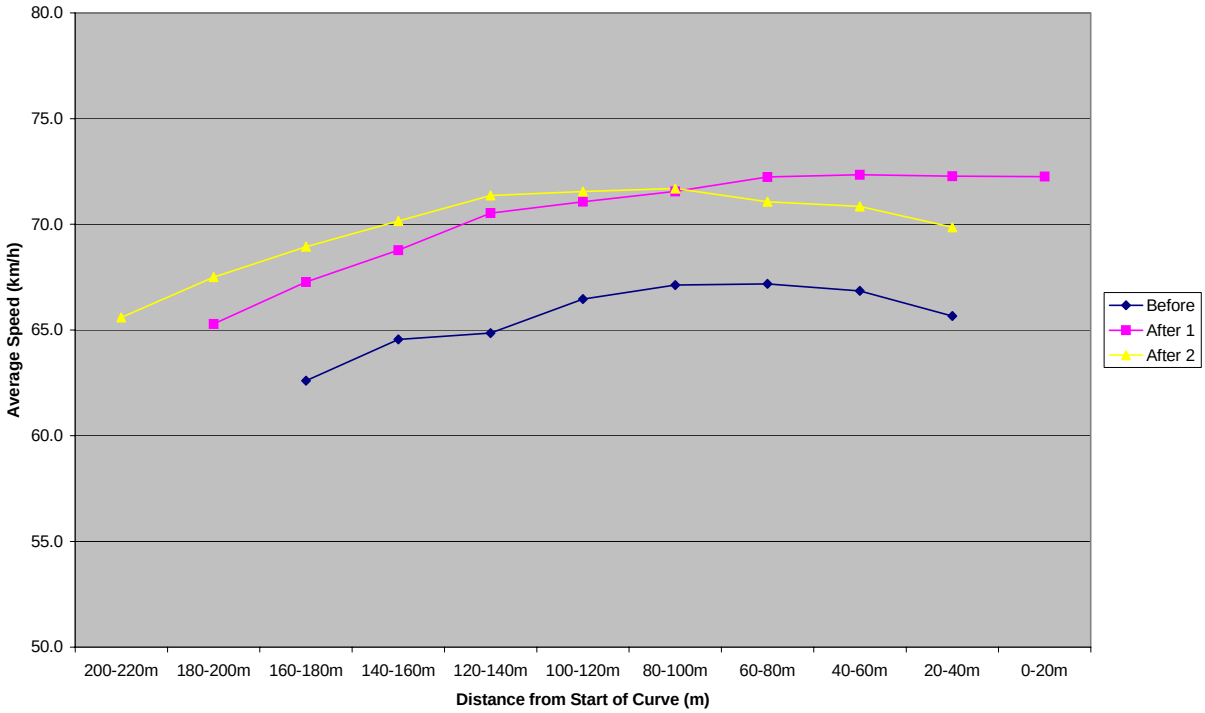


**Figure A3 Harkaway Rd Curve Treatment Site: Daytime**

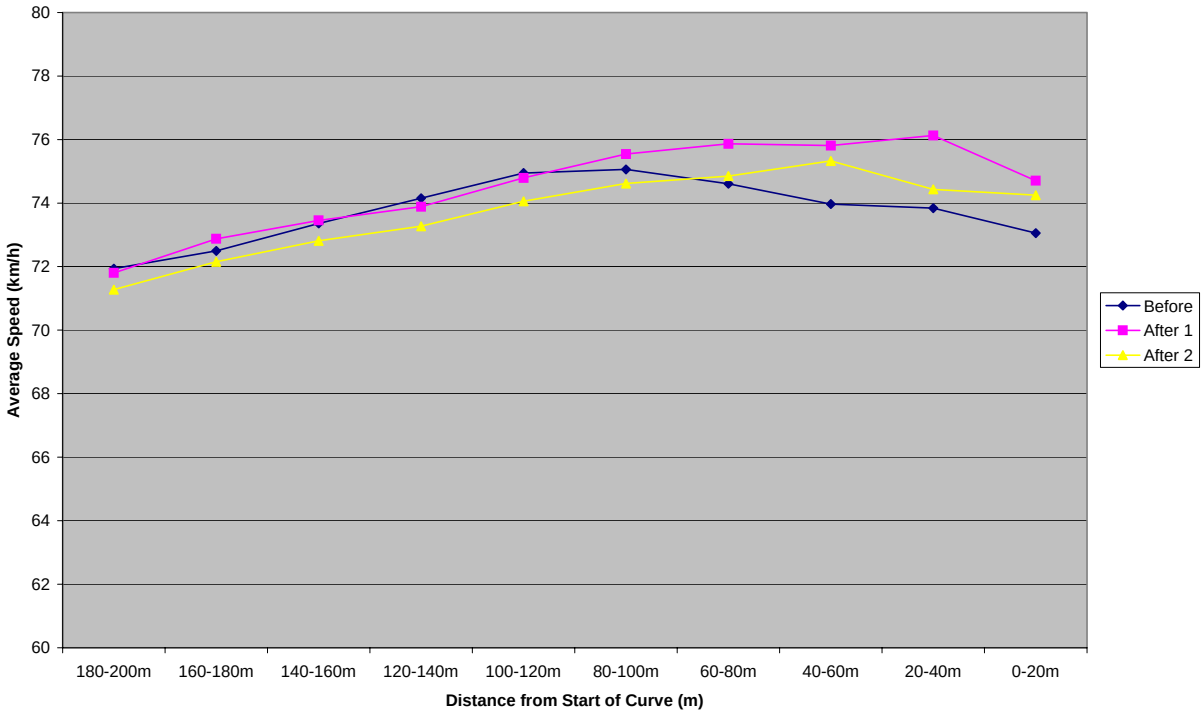



**Figure A4 Harkaway Rd Curve Control Site: Daytime**

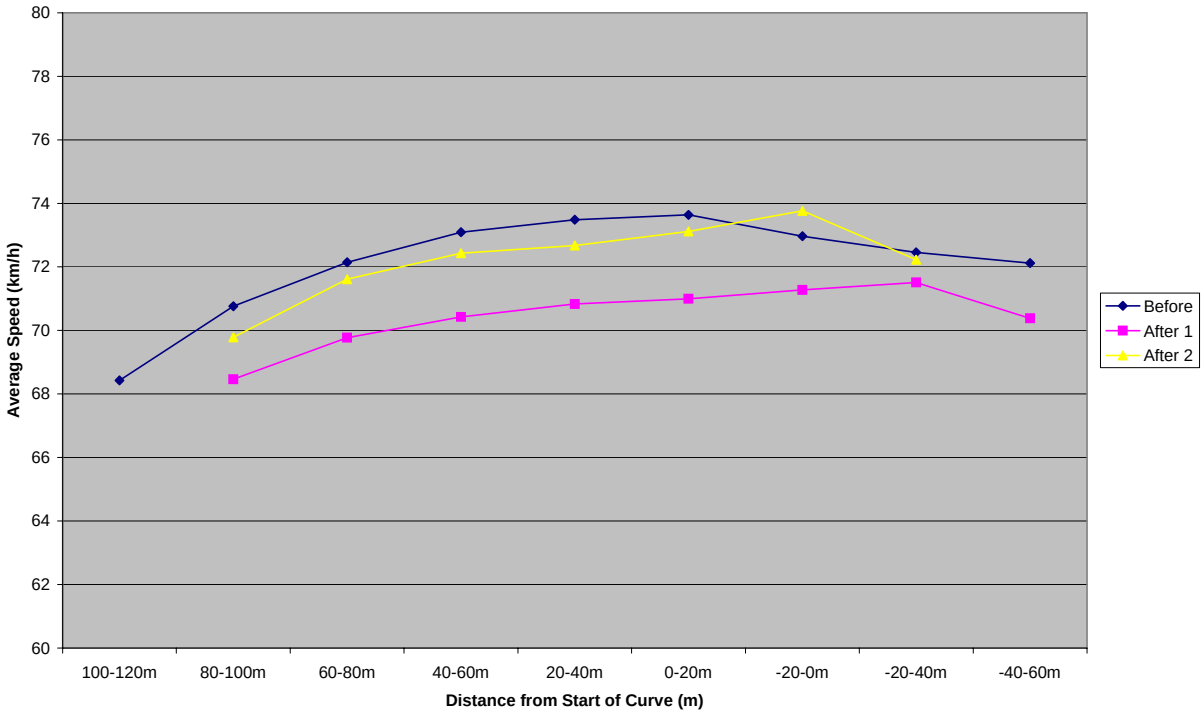


**Figure A5 Pakenham Rd Curve Treatment Site: Daytime**

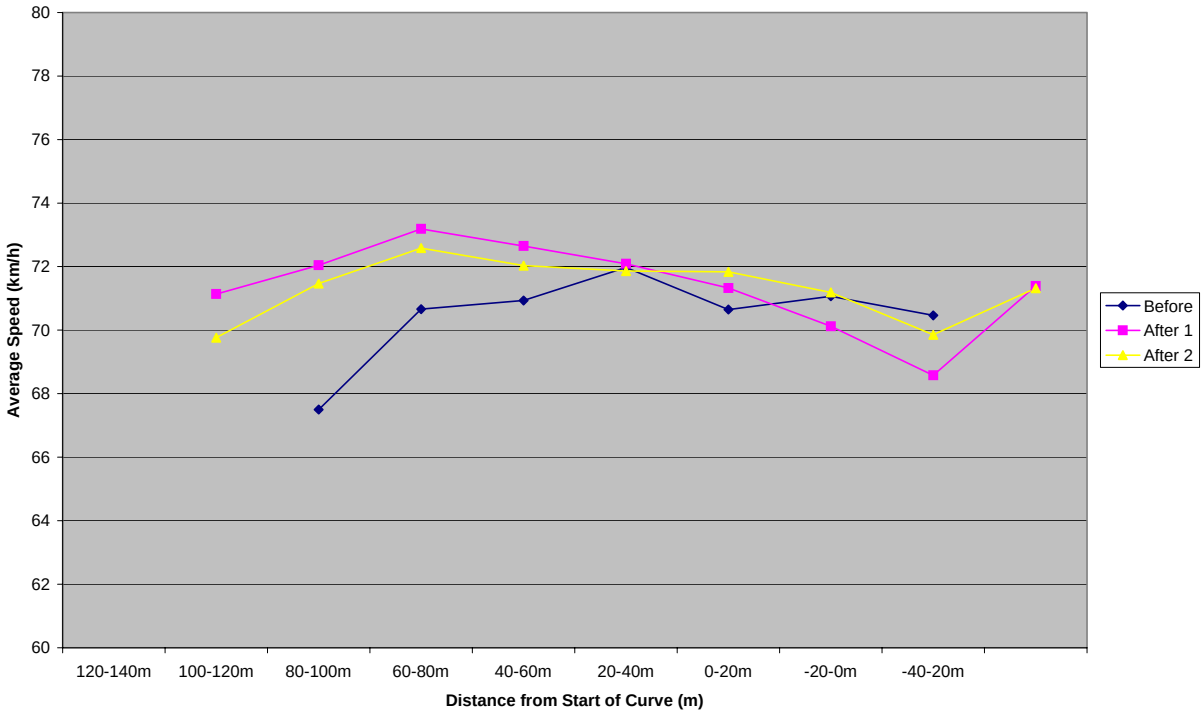



**Figure A6 Pakenham Rd Curve Control Site: Daytime**

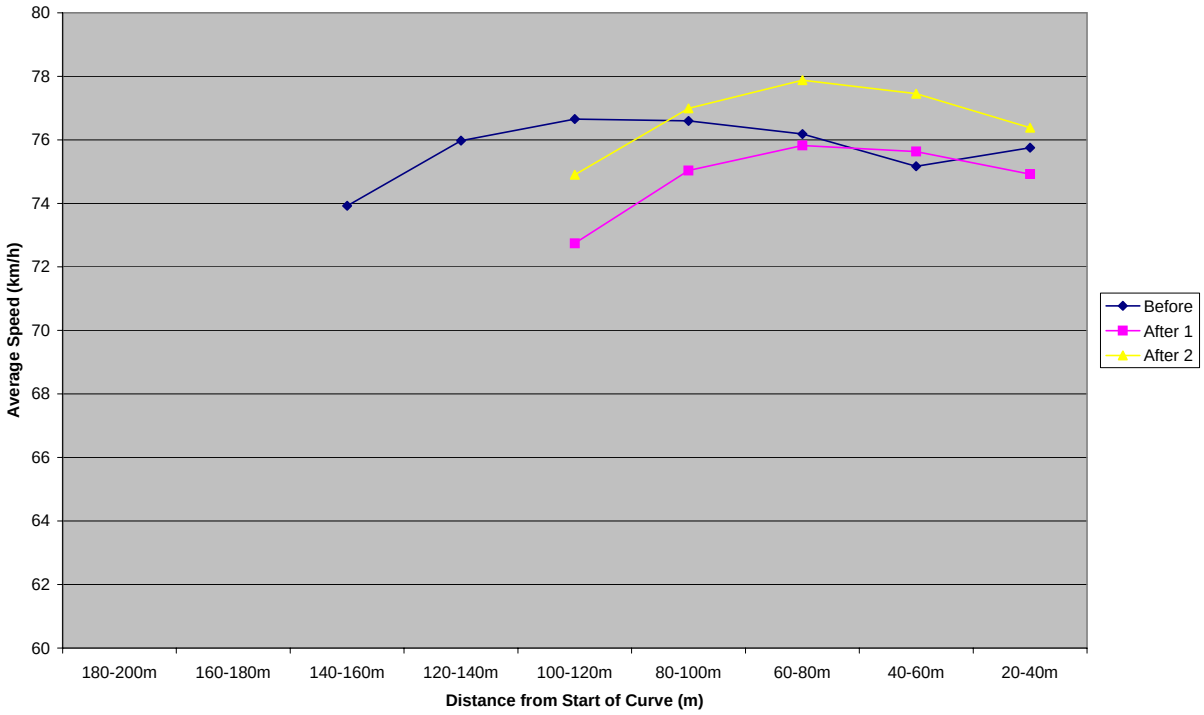


**Figure A7 The Driftway Curve Treatment Site: Daytime**

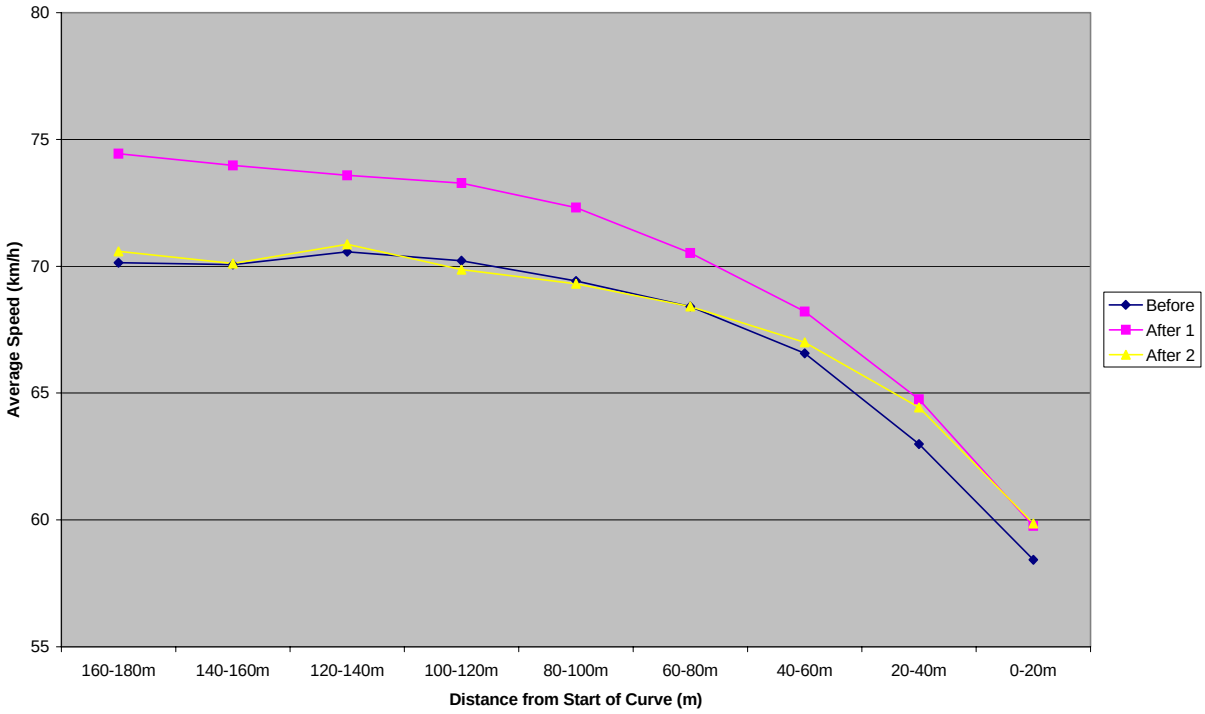



**Figure A8 The Driftway Curve Control Site: Daytime**

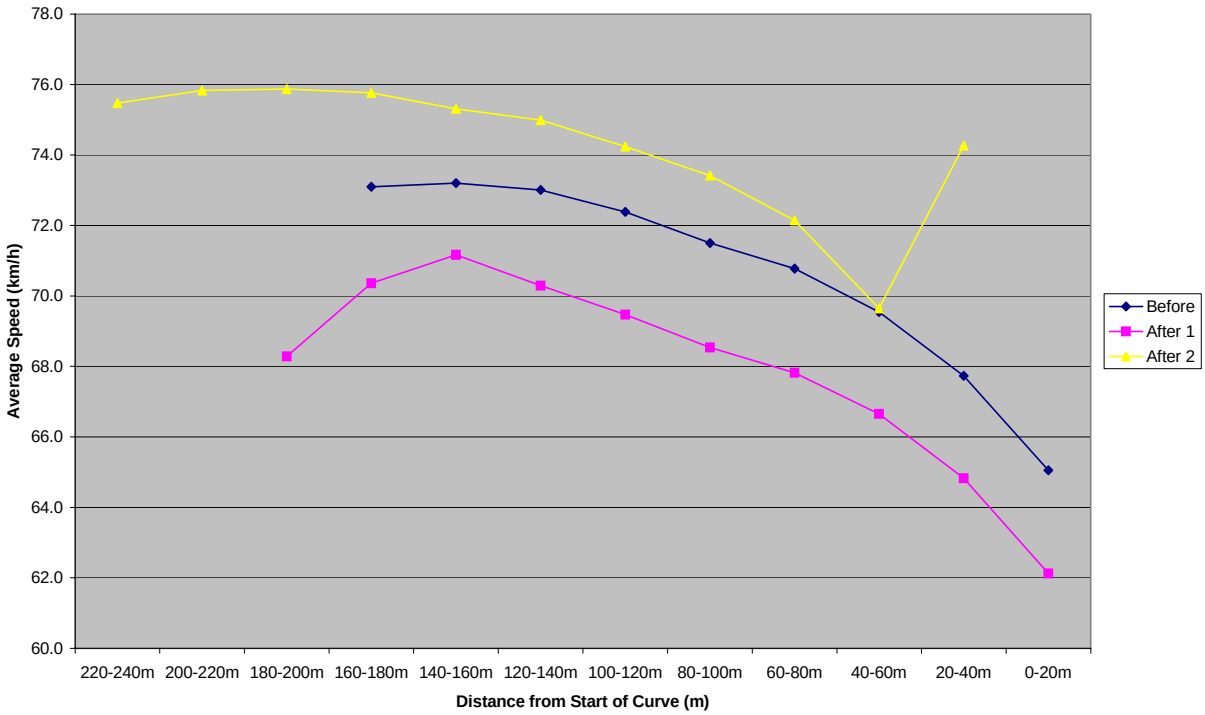


**Figure A9 Castlereagh Rd Curve Treatment Site: Daytime**

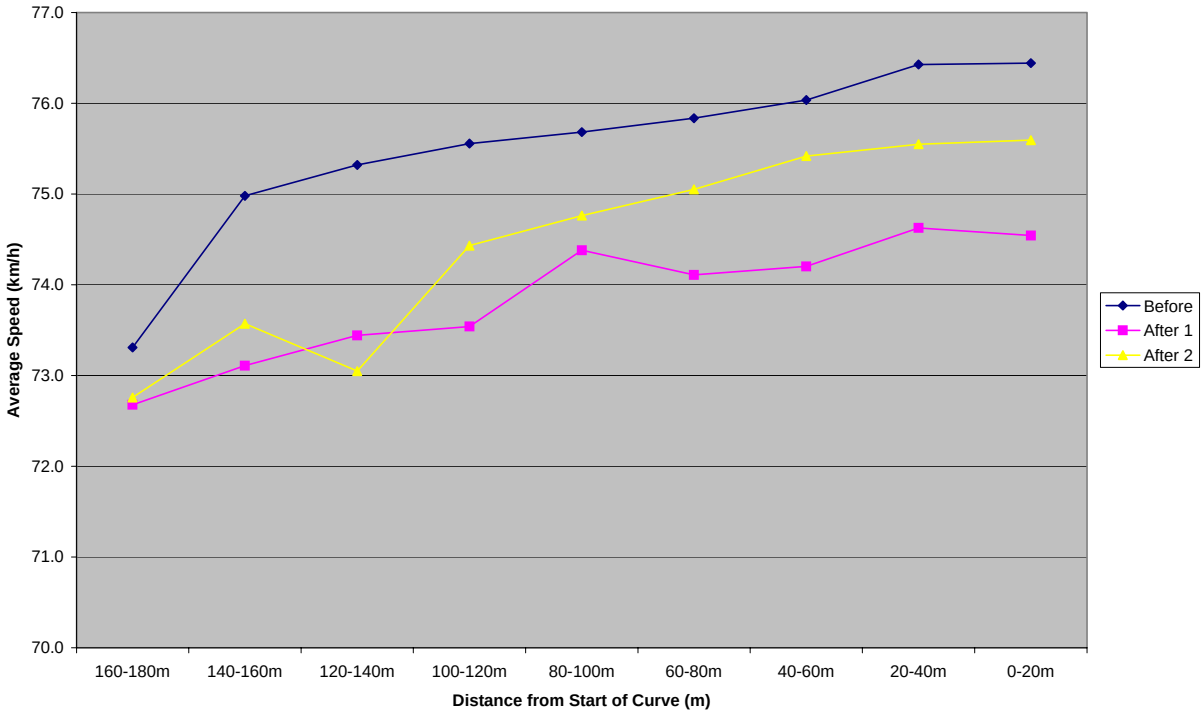



**Figure A10 Castlereagh Rd Curve Control Site: Daytime**

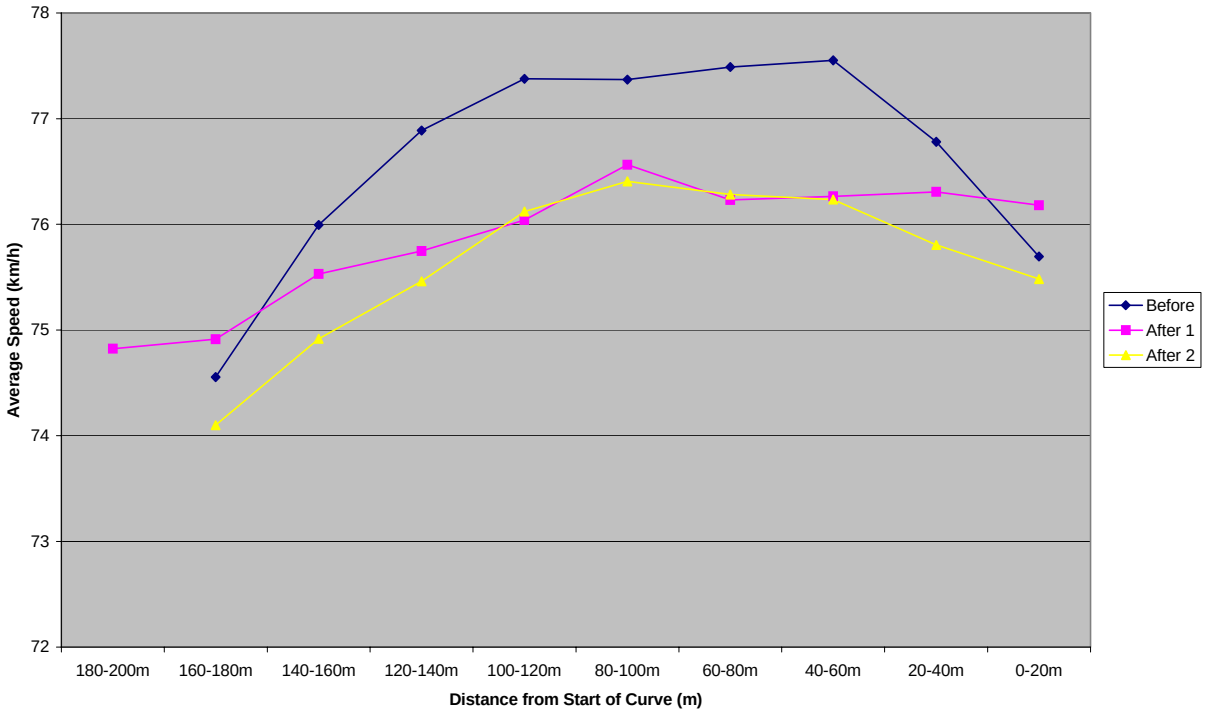


**Figure A11 Scheyville Rd Curve Treatment Site: Daytime**

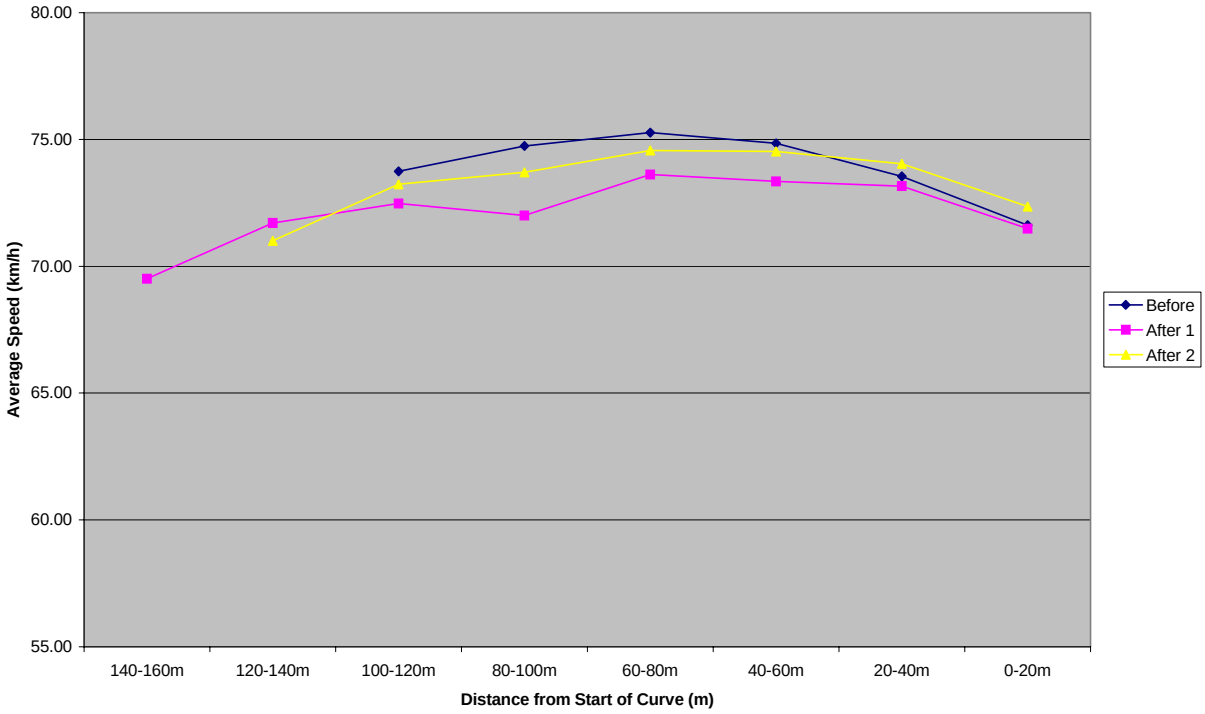



**Figure A12 Scheyville Rd Curve Control Site: Daytime**

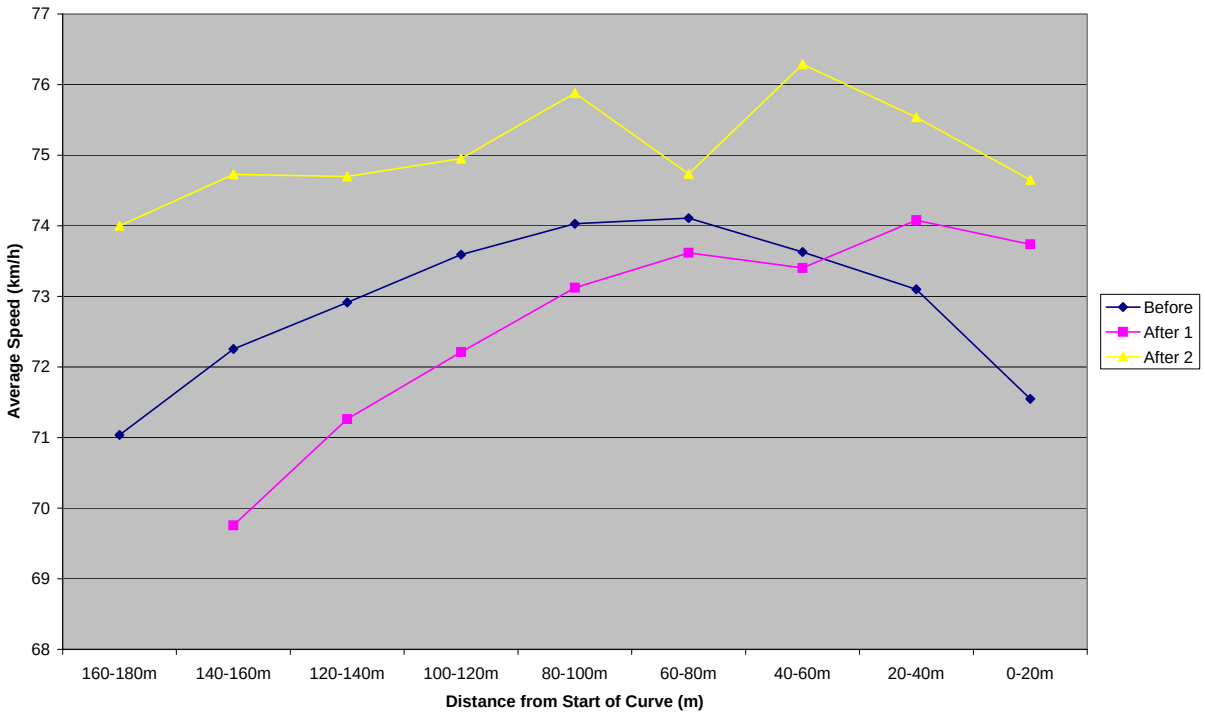


**Figure A13 Gembrook Rd Curve Treatment Site: Night time**

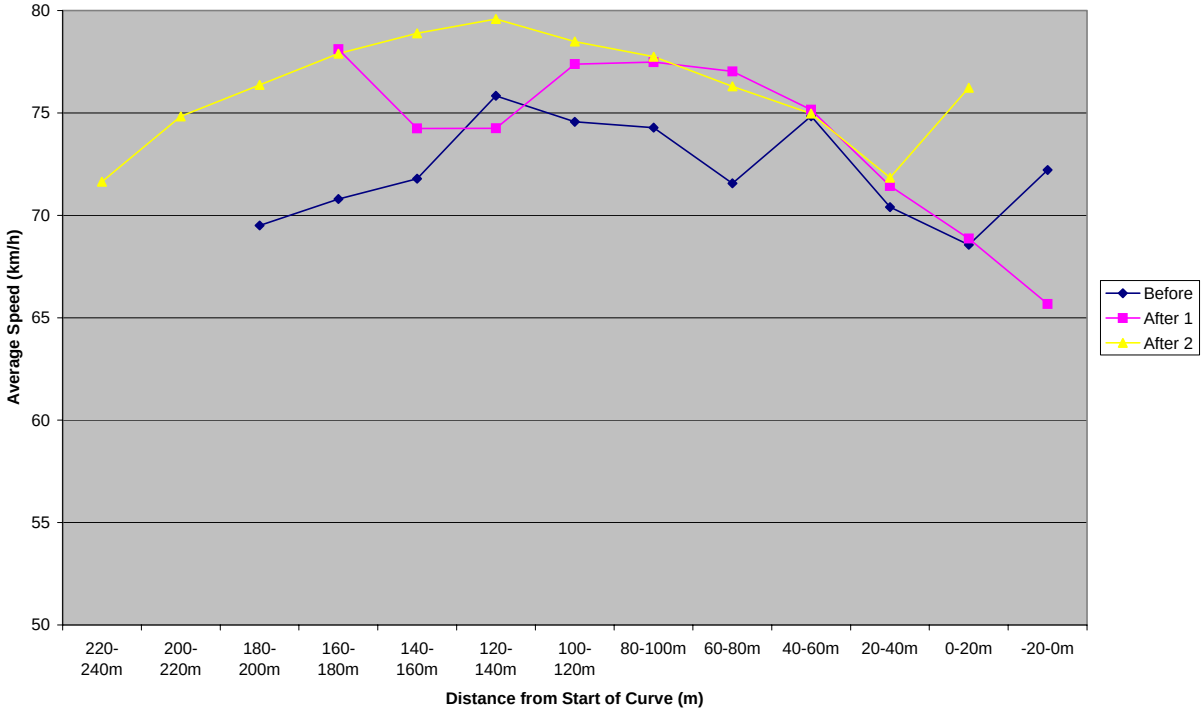



**Figure A14 Gembrook Rd Curve Control Site: Night time**

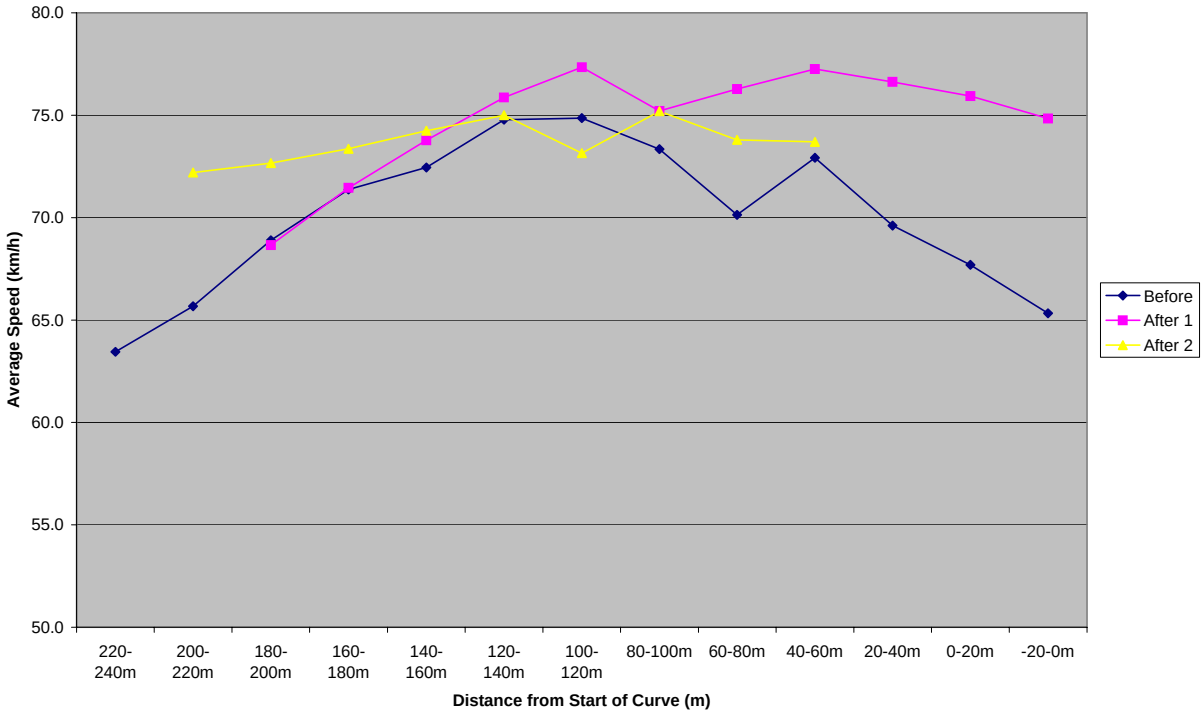


**Figure A15 Pakenham Rd Curve Treatment Site: Night time**

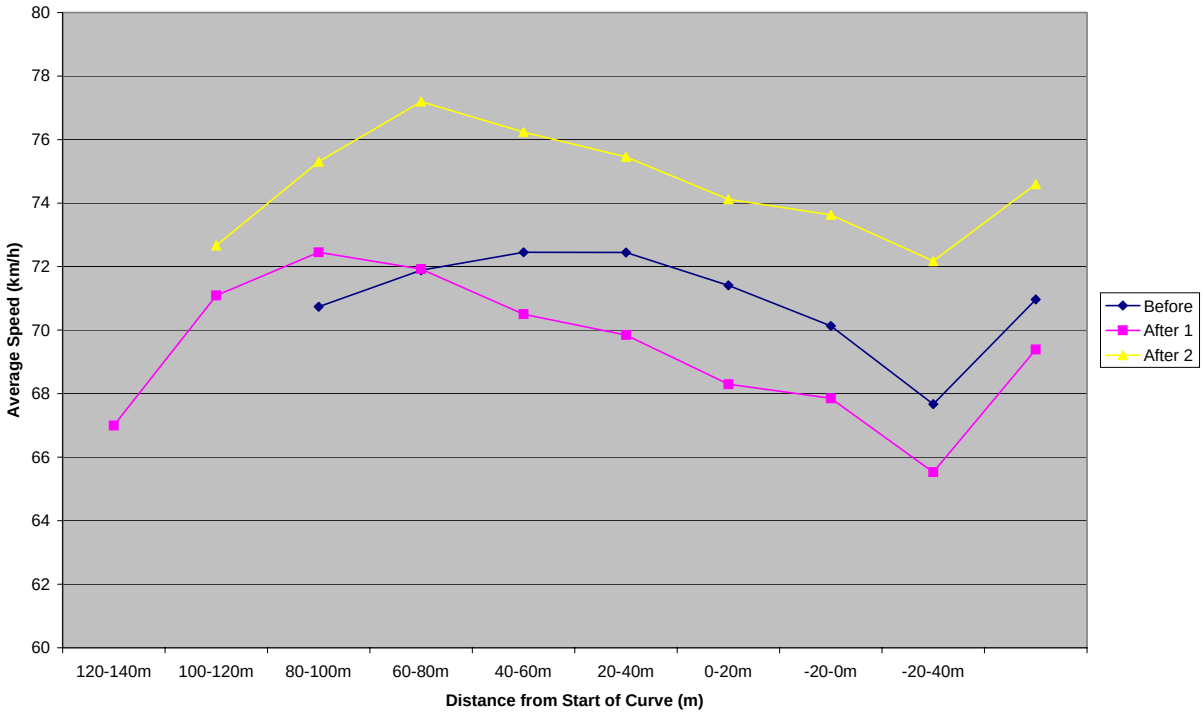



**Figure A16 Pakenham Rd Curve Control Site: Night time**

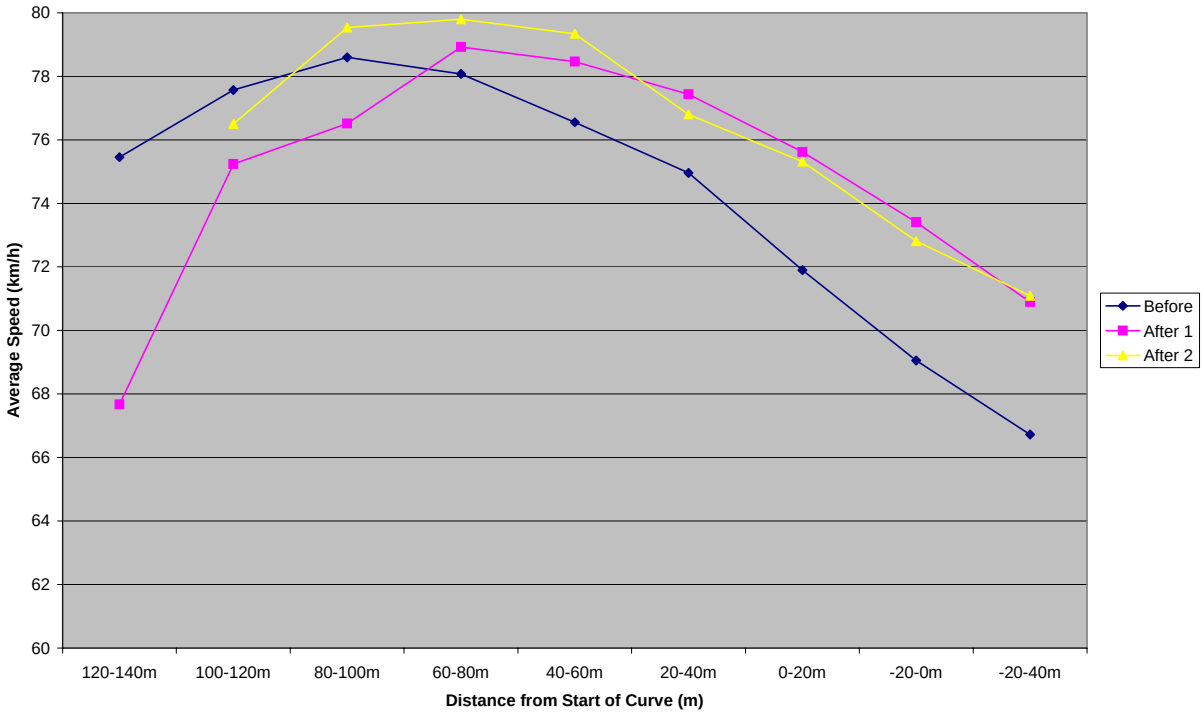


**Figure A17 Ballarto Rd Intersection Treatment Site: Day time**

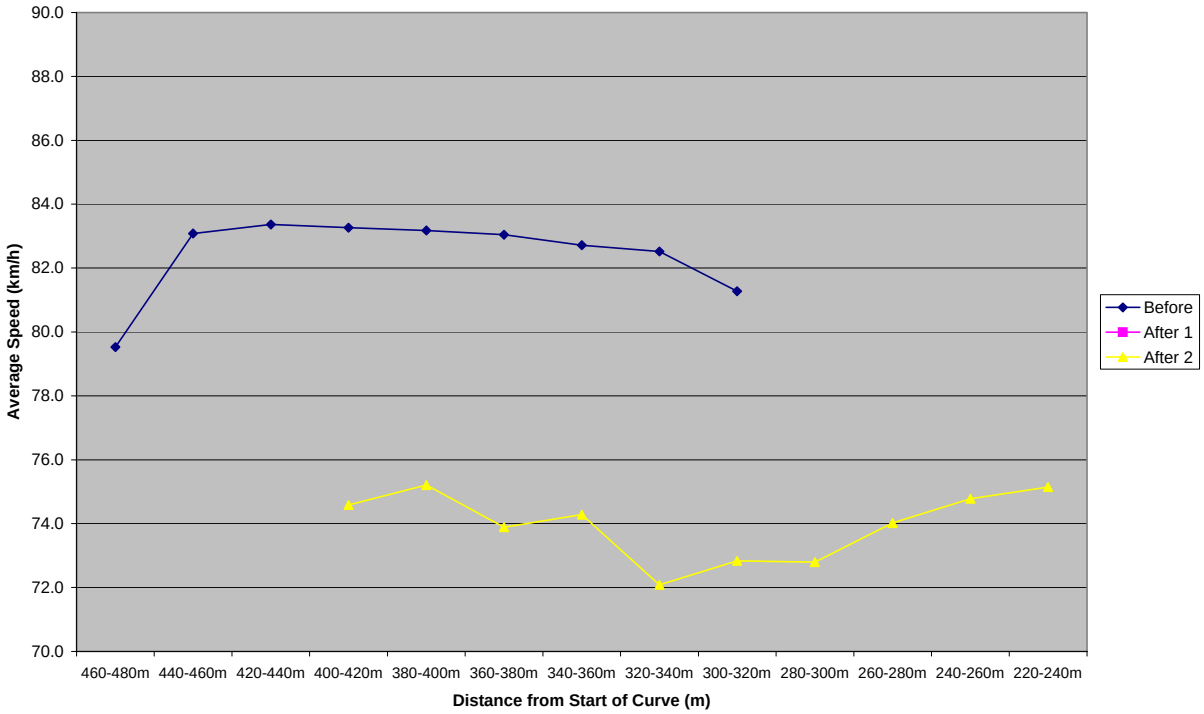


**Figure A18 Bittern Rd Intersection Treatment Site: Day time**

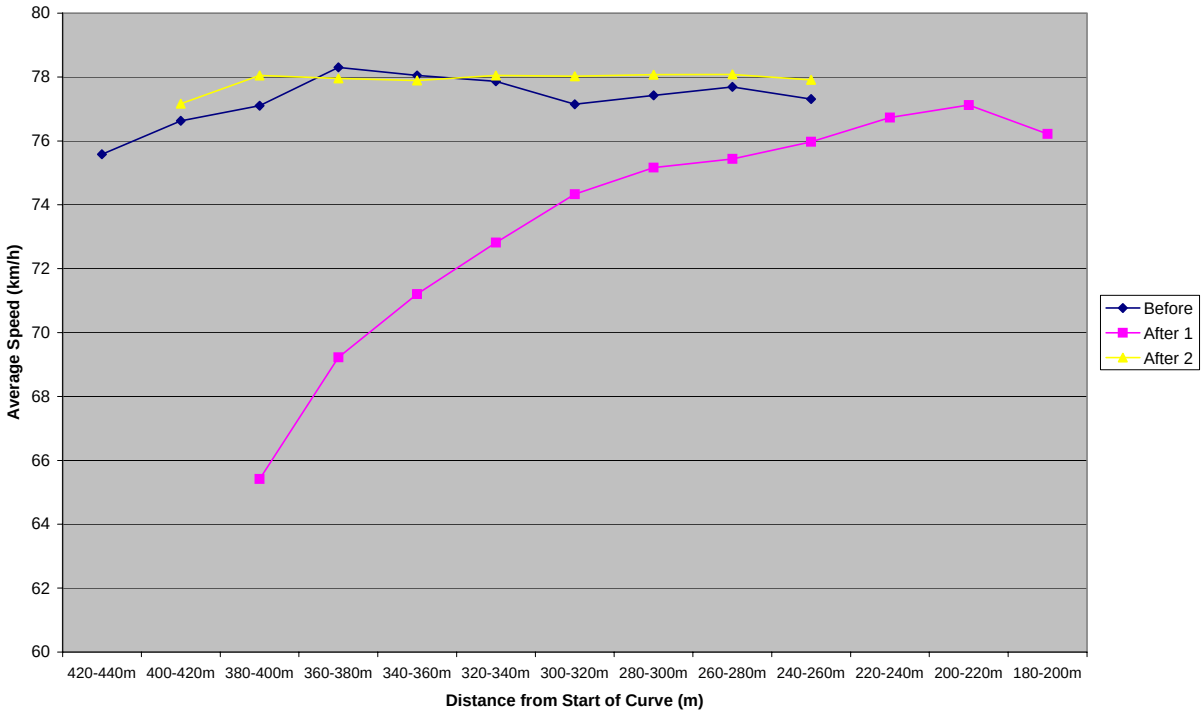



**Figure A19 Bittern Rd Intersection Control Site: Day time**

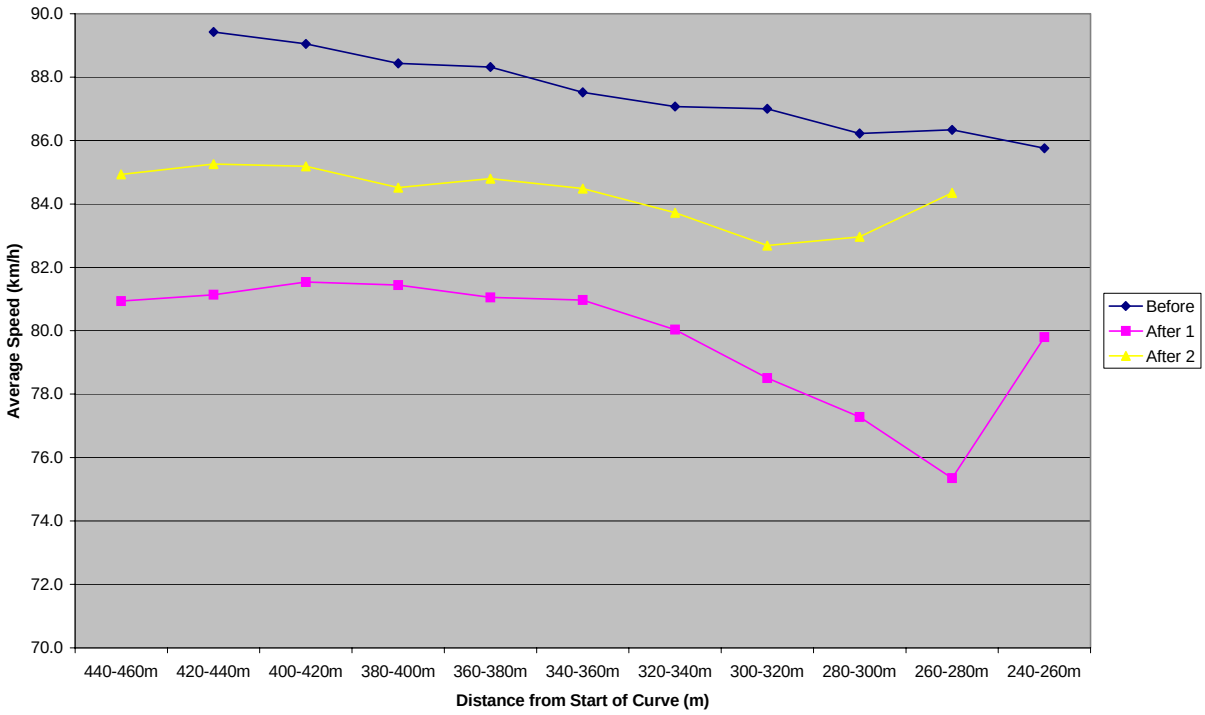


**Figure A20 Myers Rd Intersection Treatment Site: Day time**

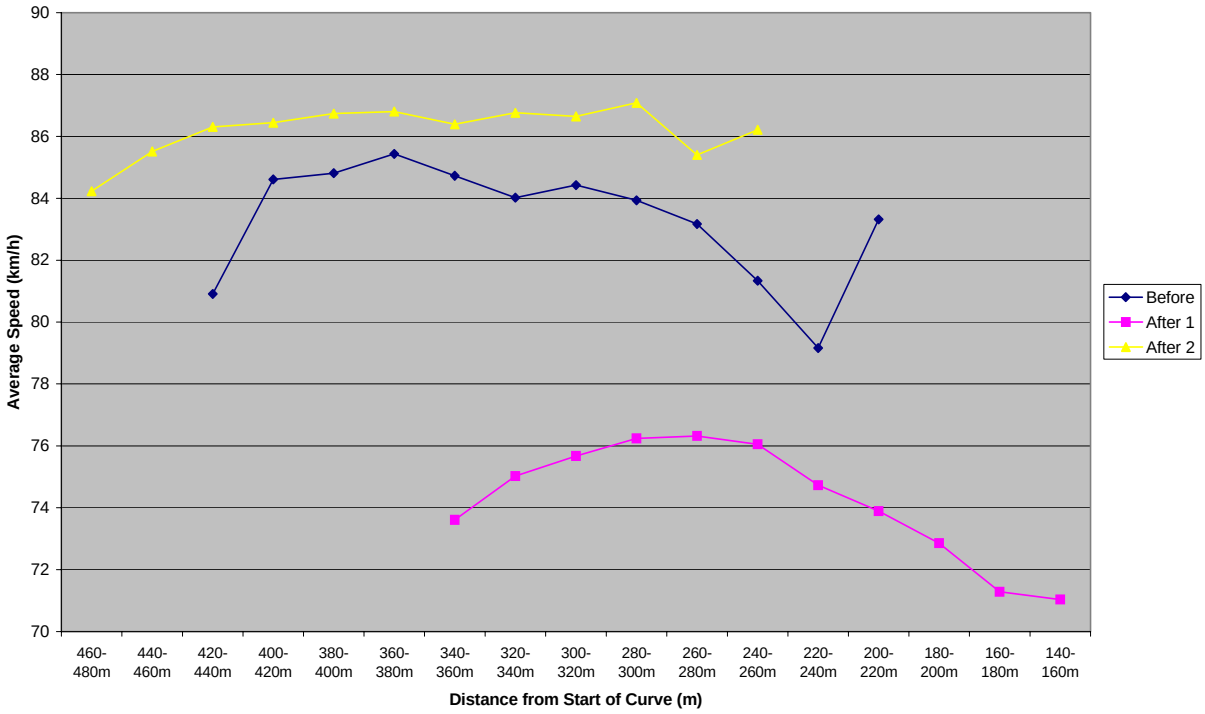



**Figure A21 Myers Rd Intersection Control Site: Day time**

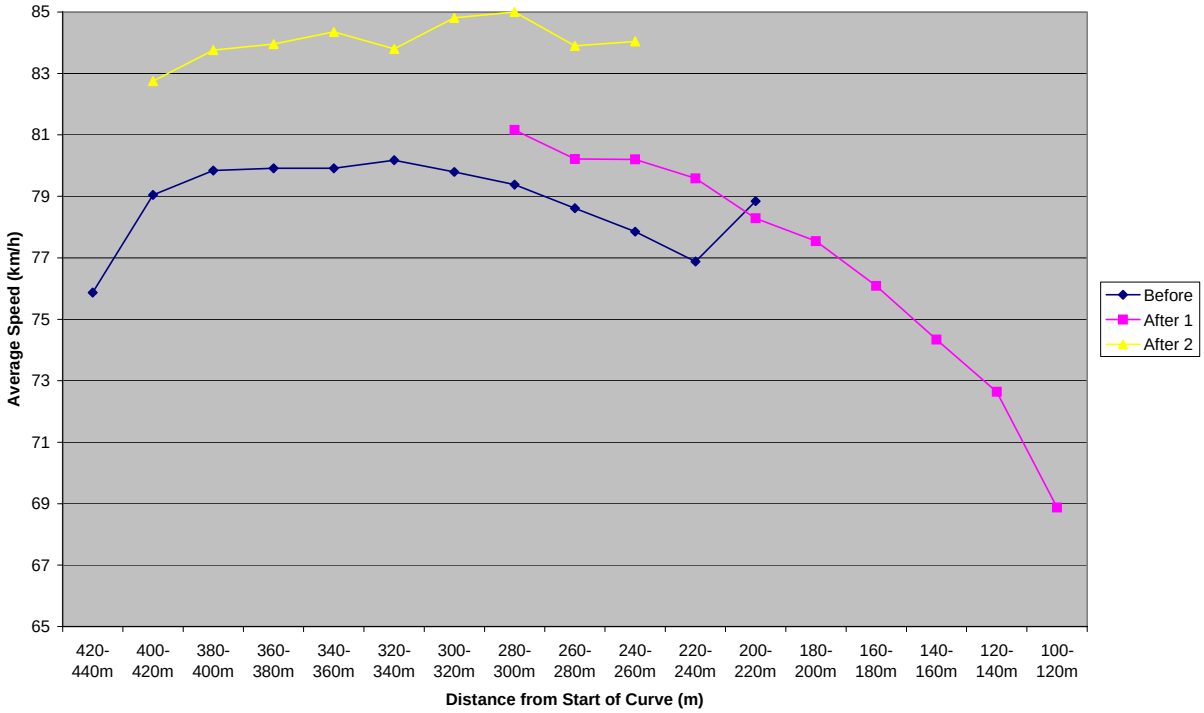


**Figure A22 The Driftway Intersection Treatment Site: Day time**

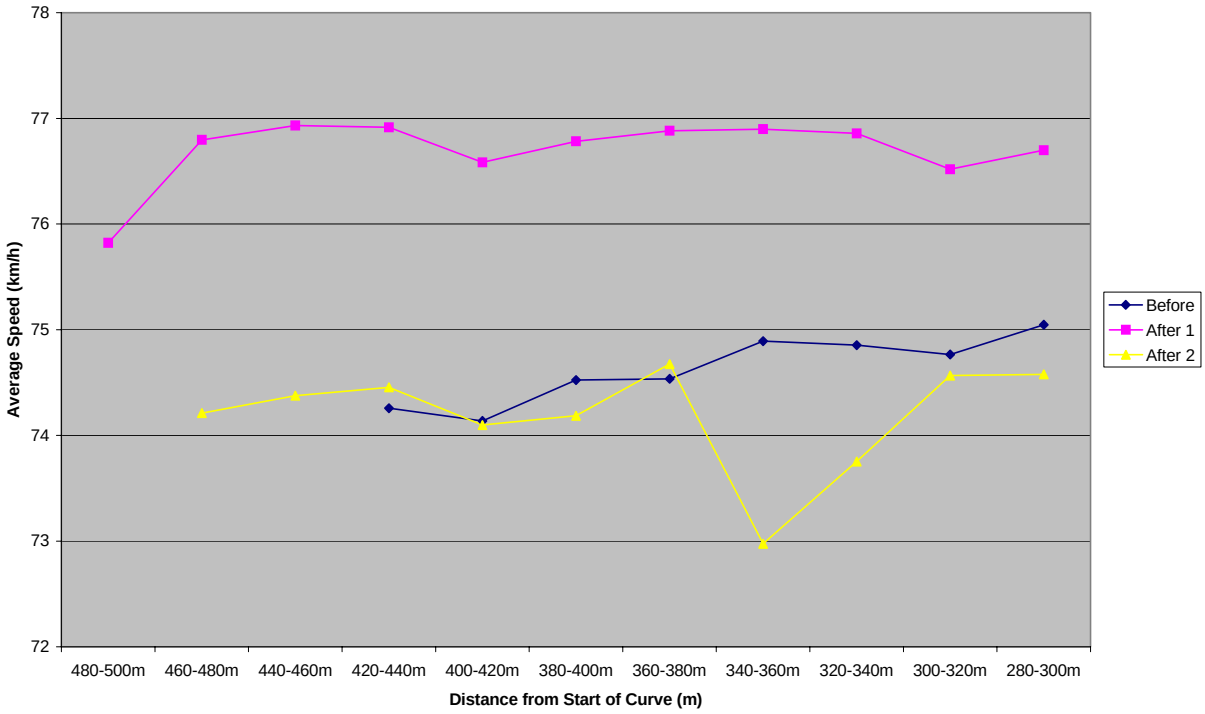



**Figure A23 The Driftway Intersection Control Site: Day time**

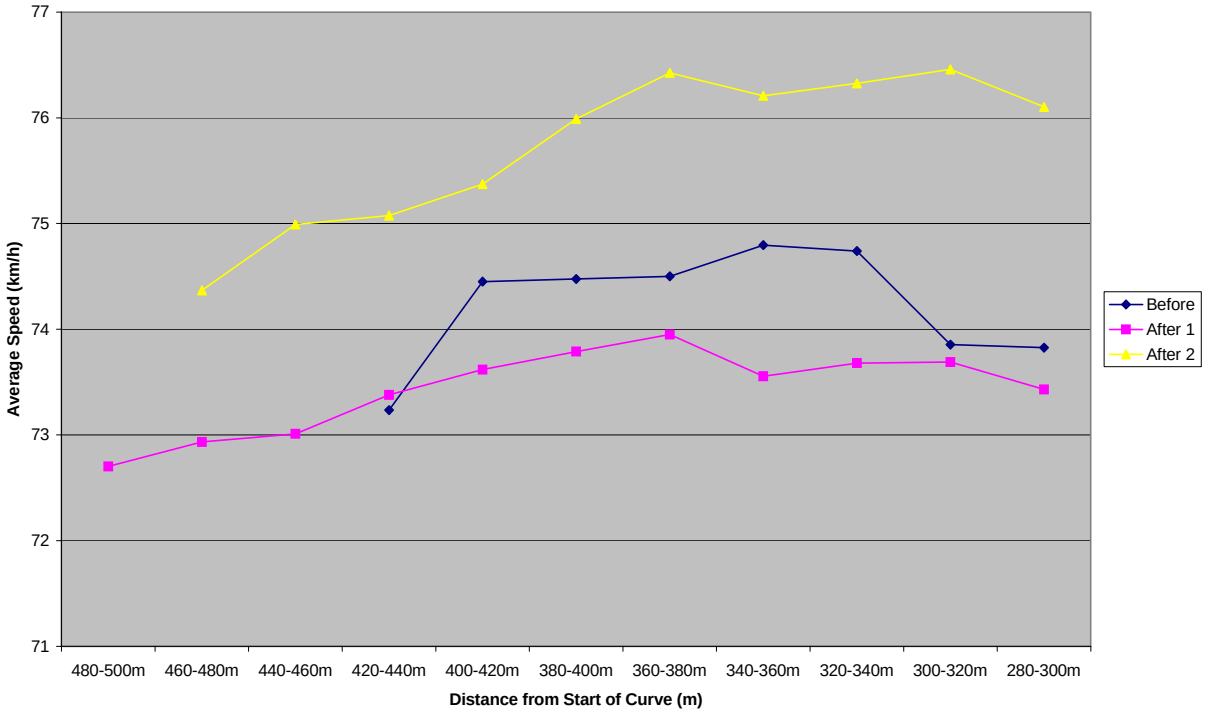


**Figure A24 Old Stock Route Intersection Treatment Site: Day time**

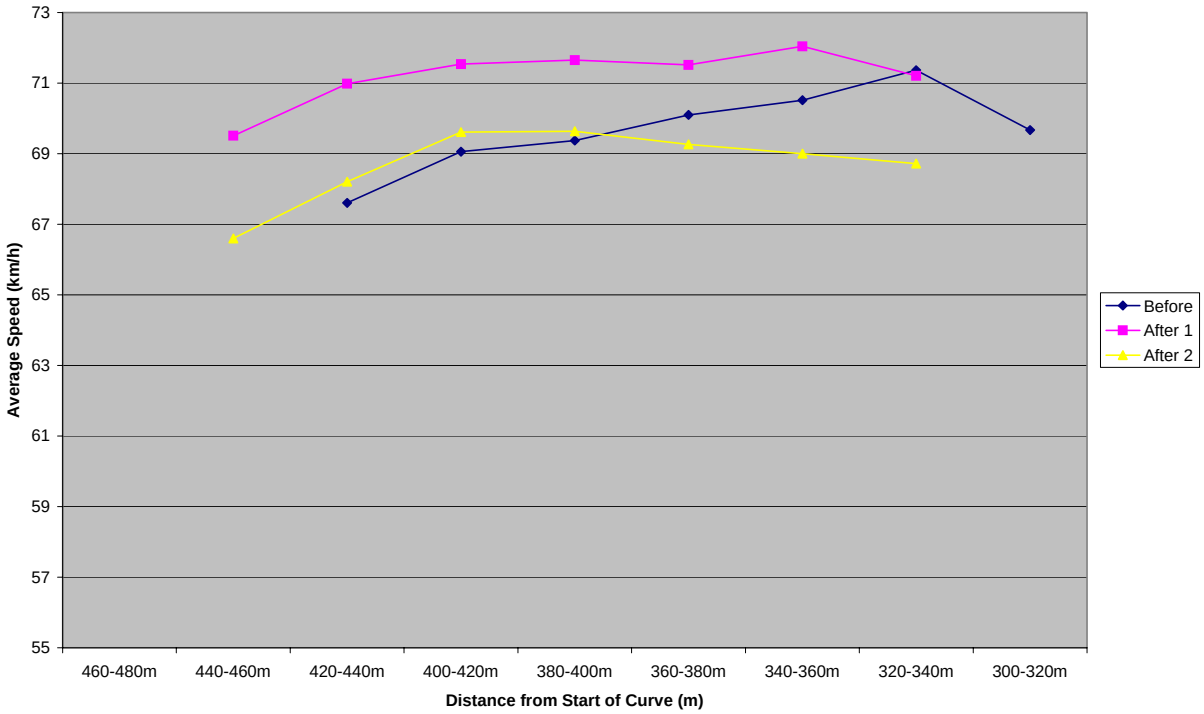



**Figure A25 Old Stock Route Intersection Control Site: Day time**

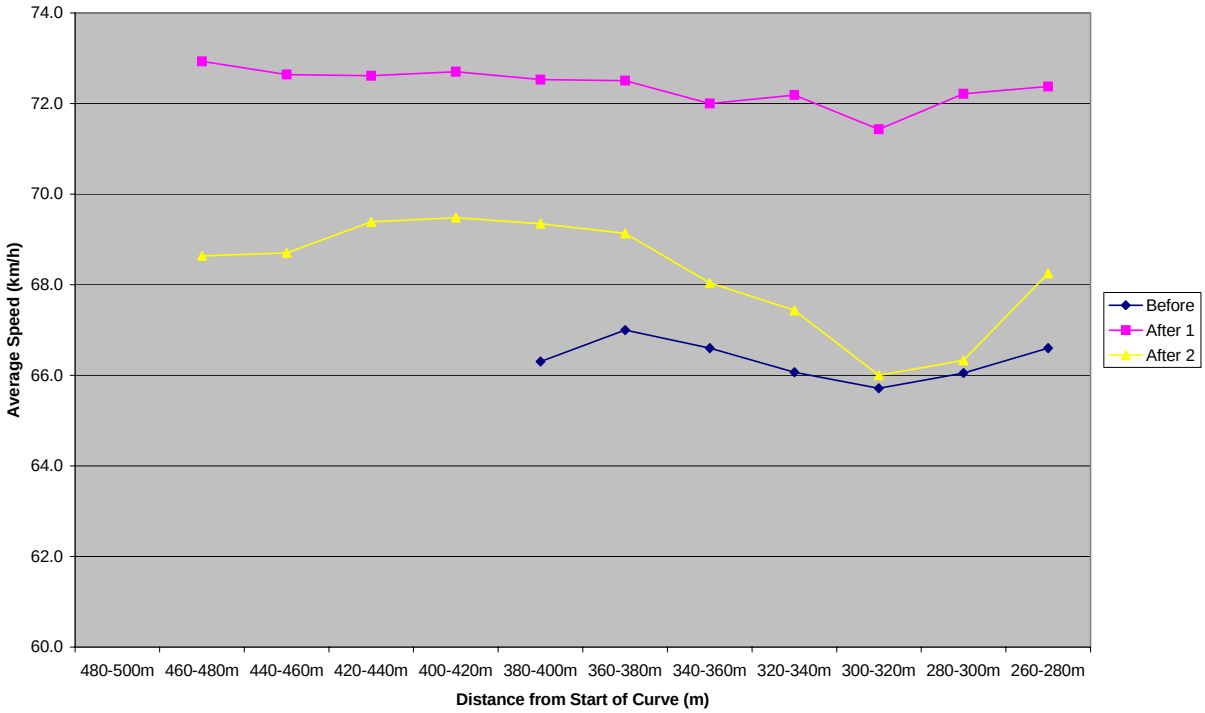


**Figure A26 Smith Rd Intersection Treatment Site: Day time**

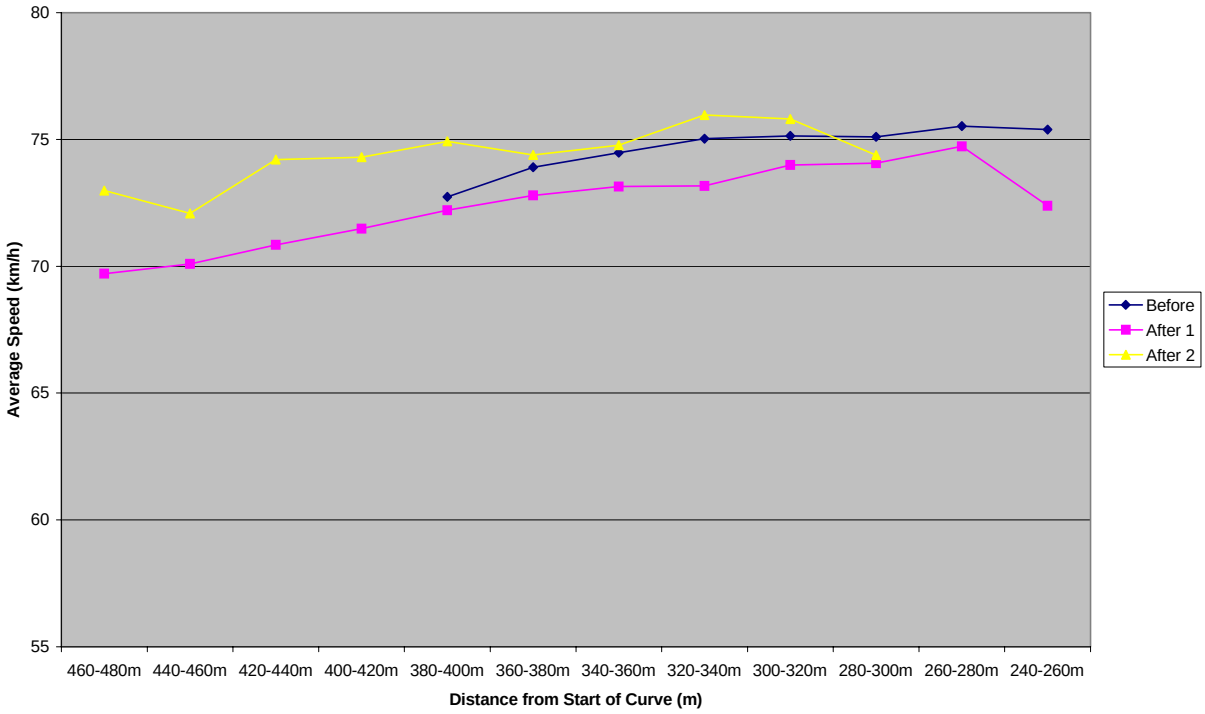



**Figure A27 Smith Rd Intersection Control Site: Day time**

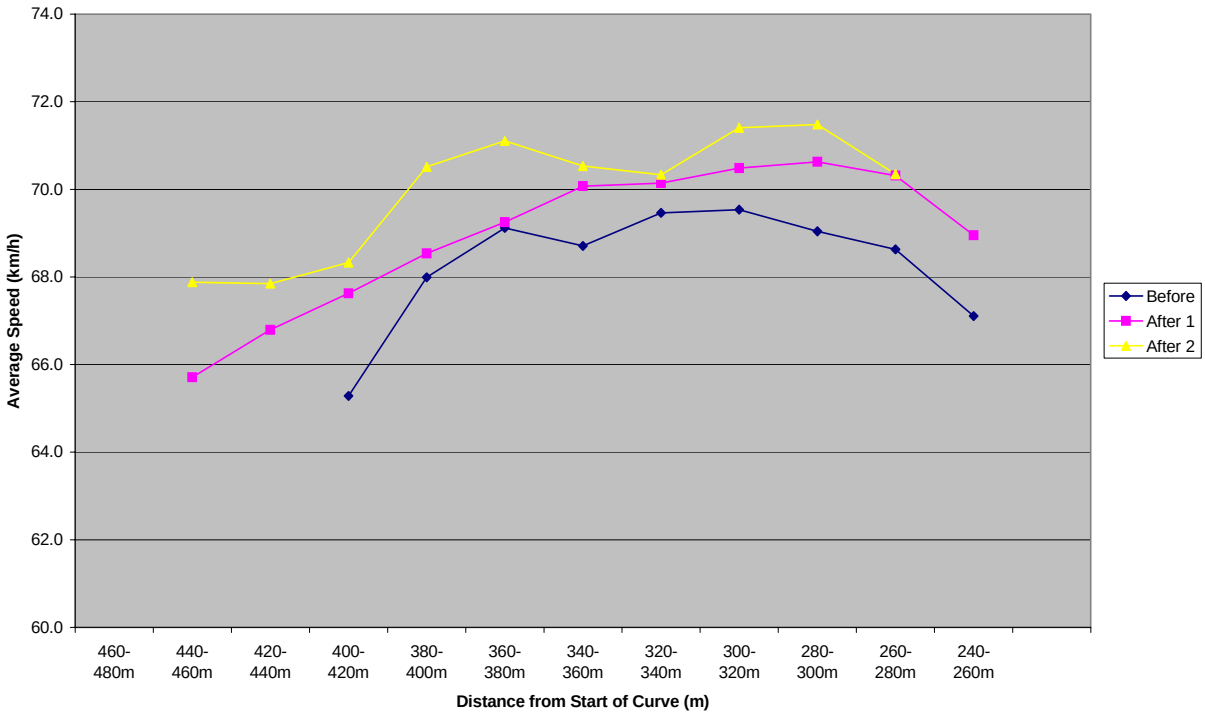


**Figure A28 Ballarto Rd Intersection Treatment Site: Night time**

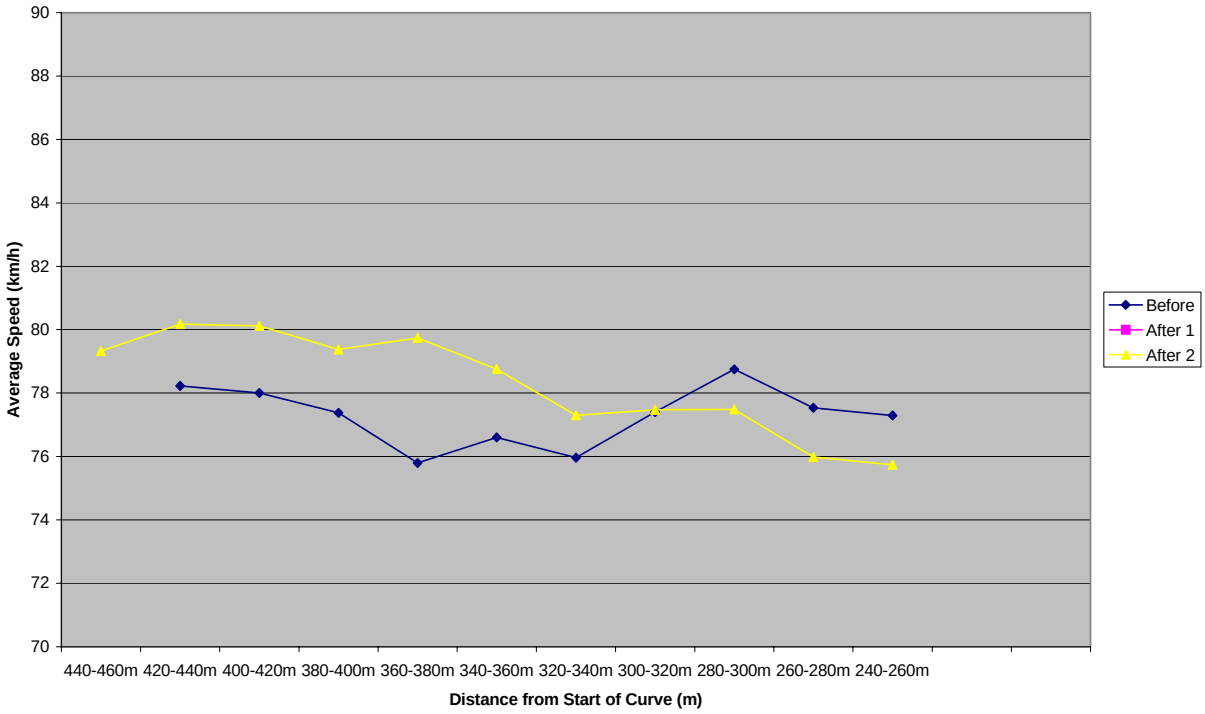
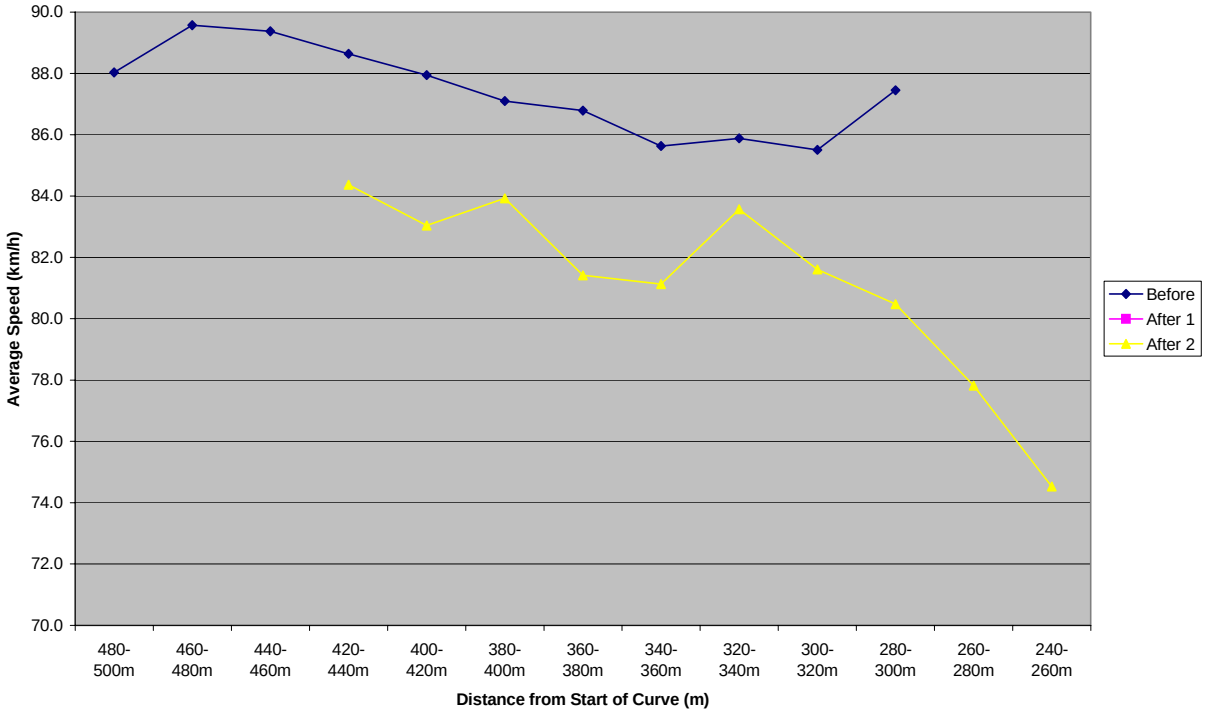



**Figure A29 Ballarto Rd Intersection Control Site: Night time**



# APPENDIX E: AVERAGE AND 85TH PERCENTILE VEHICLE SPEEDS – BEFORE, AFTER AND LONG-TERM

**Figure A30 Gembrook Rd Curve Site: Day time**

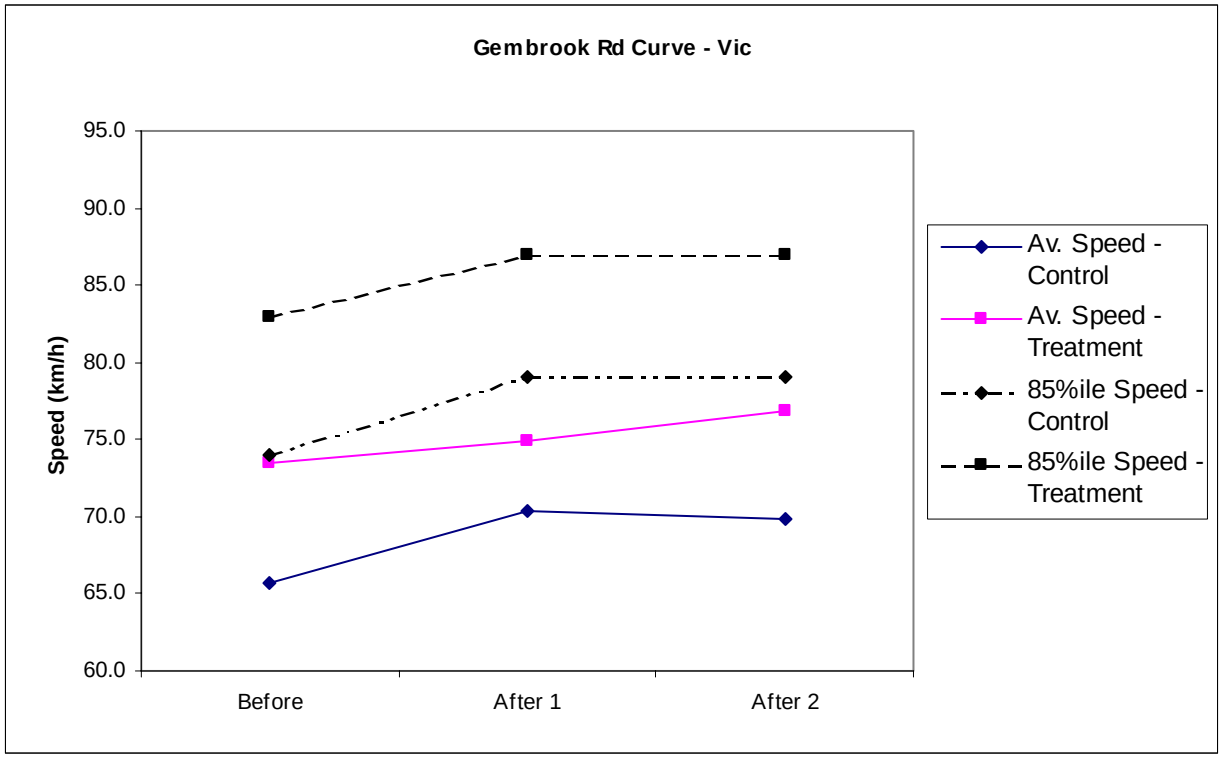



**Figure A31 Harkaway Rd Curve Site: Day time**

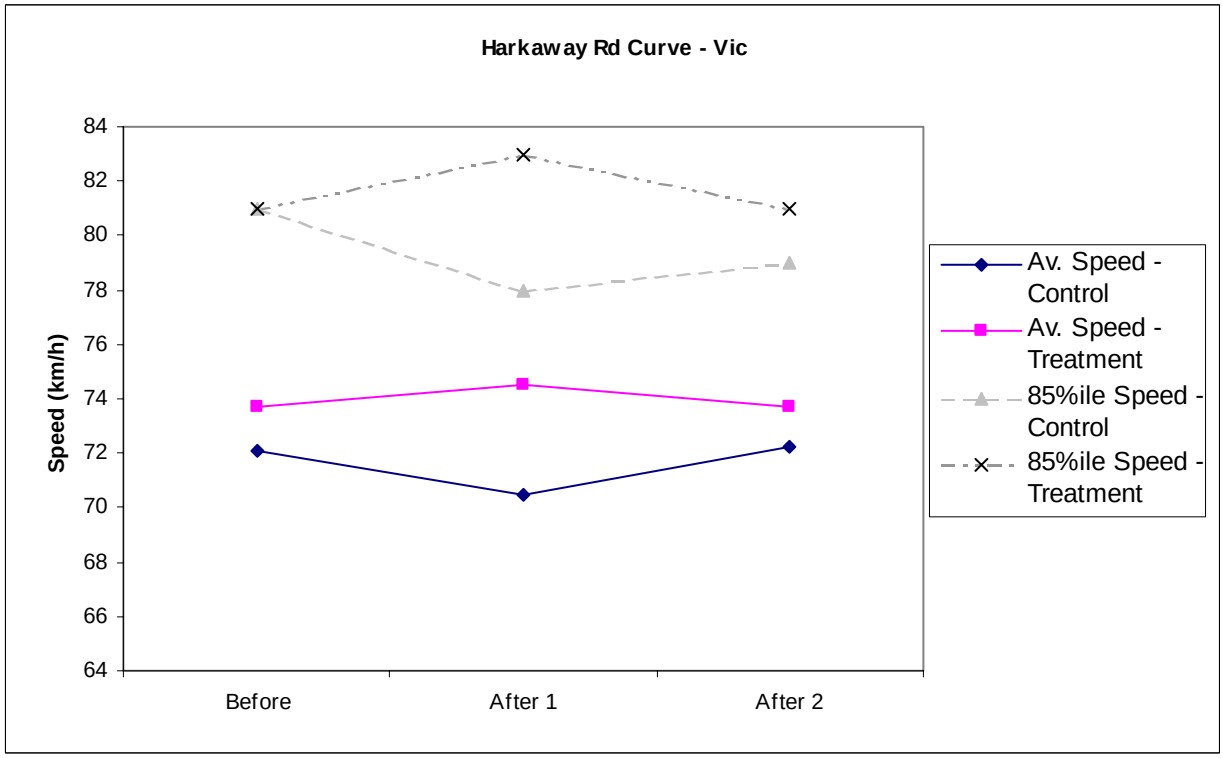


**Figure A32 Pakenham Rd Curve Site: Day time**

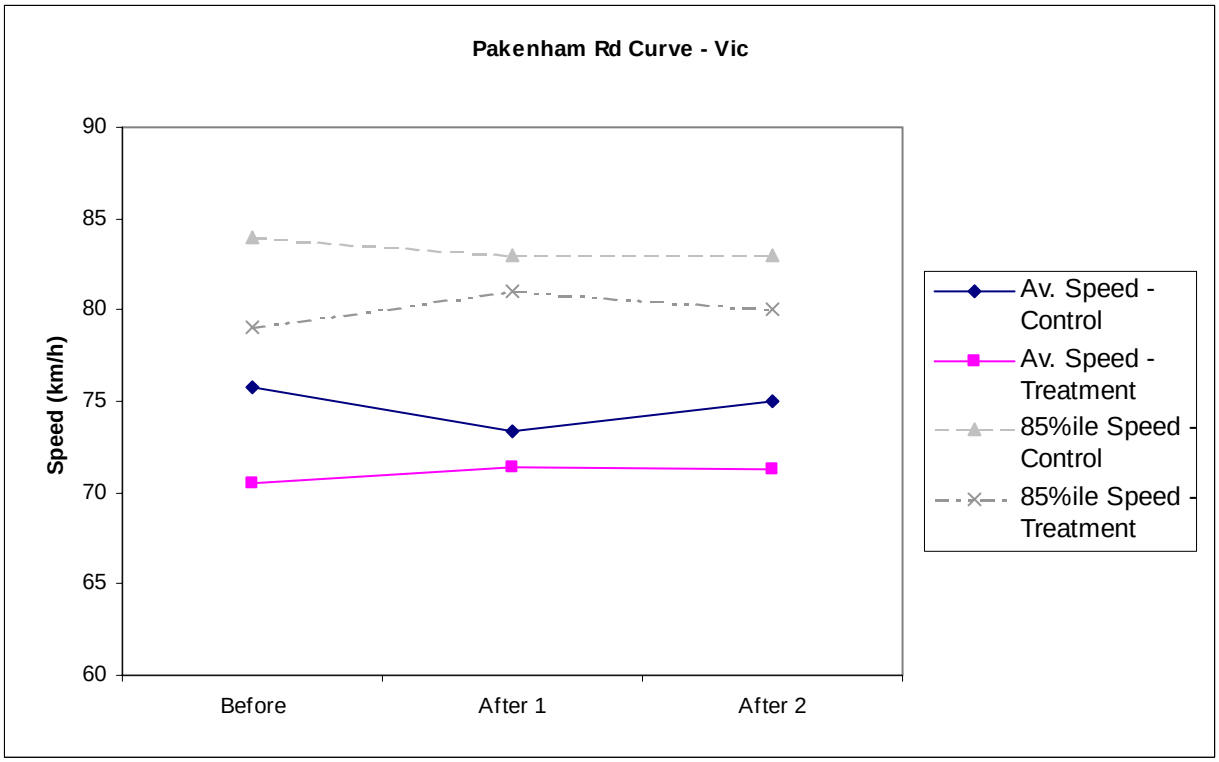



**Figure A33 The Driftway Curve Site: Day time**

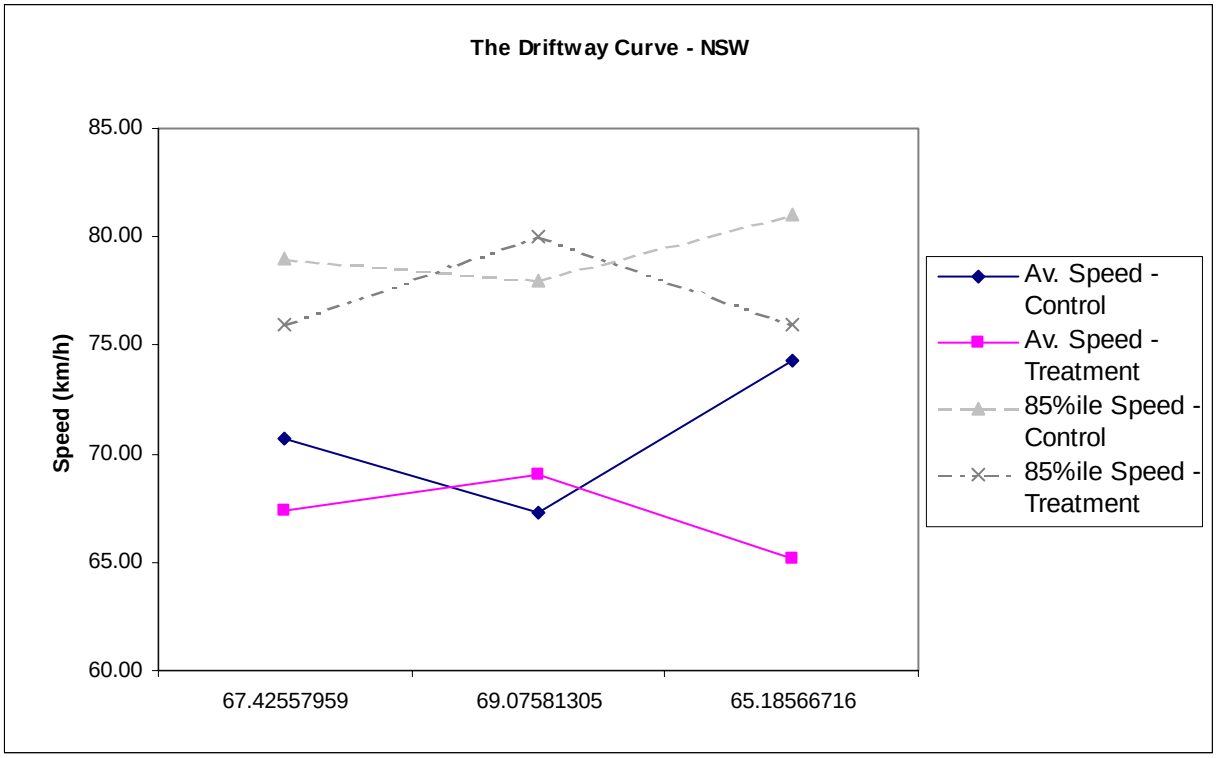


**Figure A34 Castlereagh Rd Curve Site: Day time**

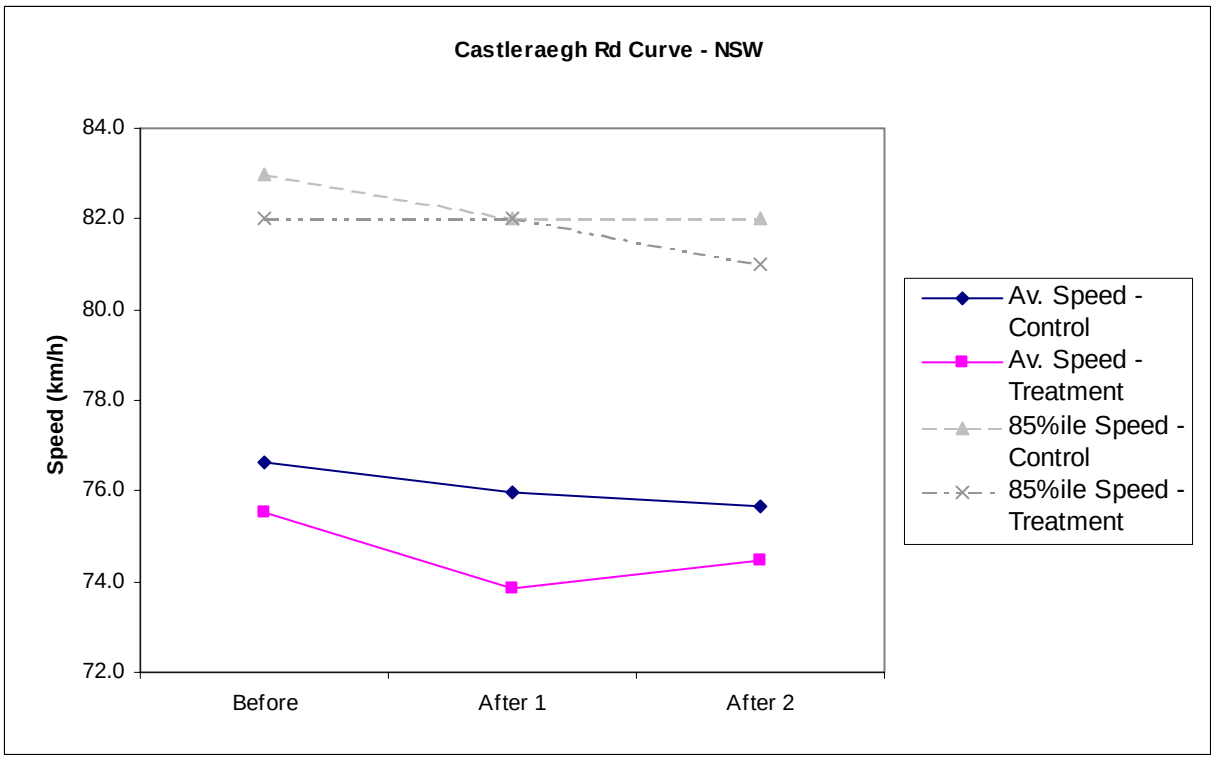



**Figure A35 Scheyville Rd Curve Site: Day time**

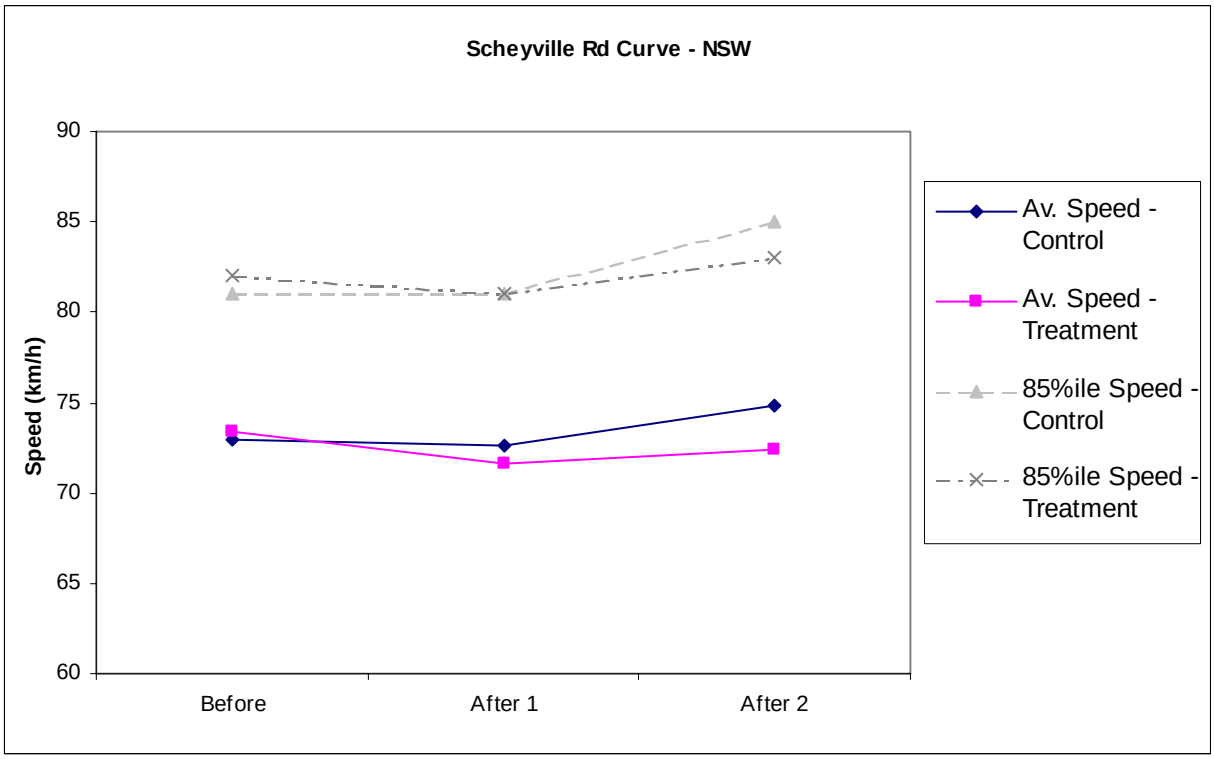


**Figure A36 Gembrook Rd Curve Site: Night time**

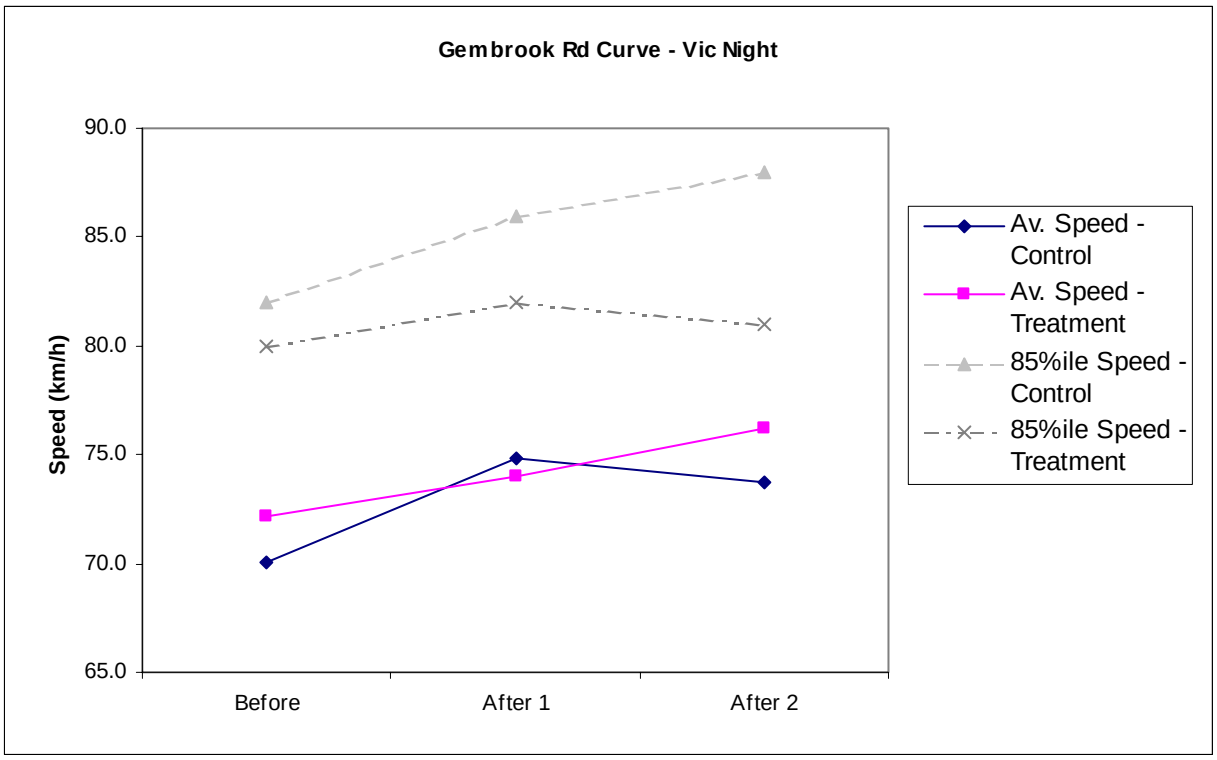



**Figure A37 Pakenham Rd Curve Site: Night time**

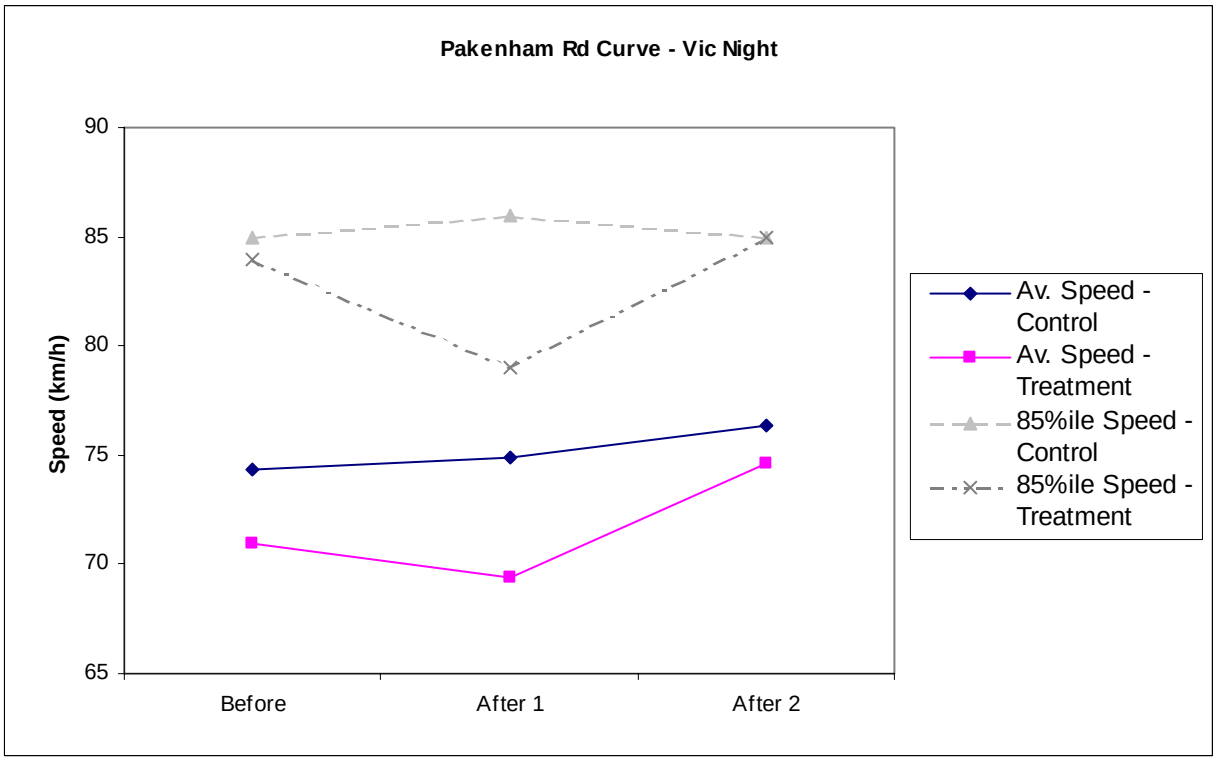


**Figure A38 Bittern Rd Intersection Site: Day time**

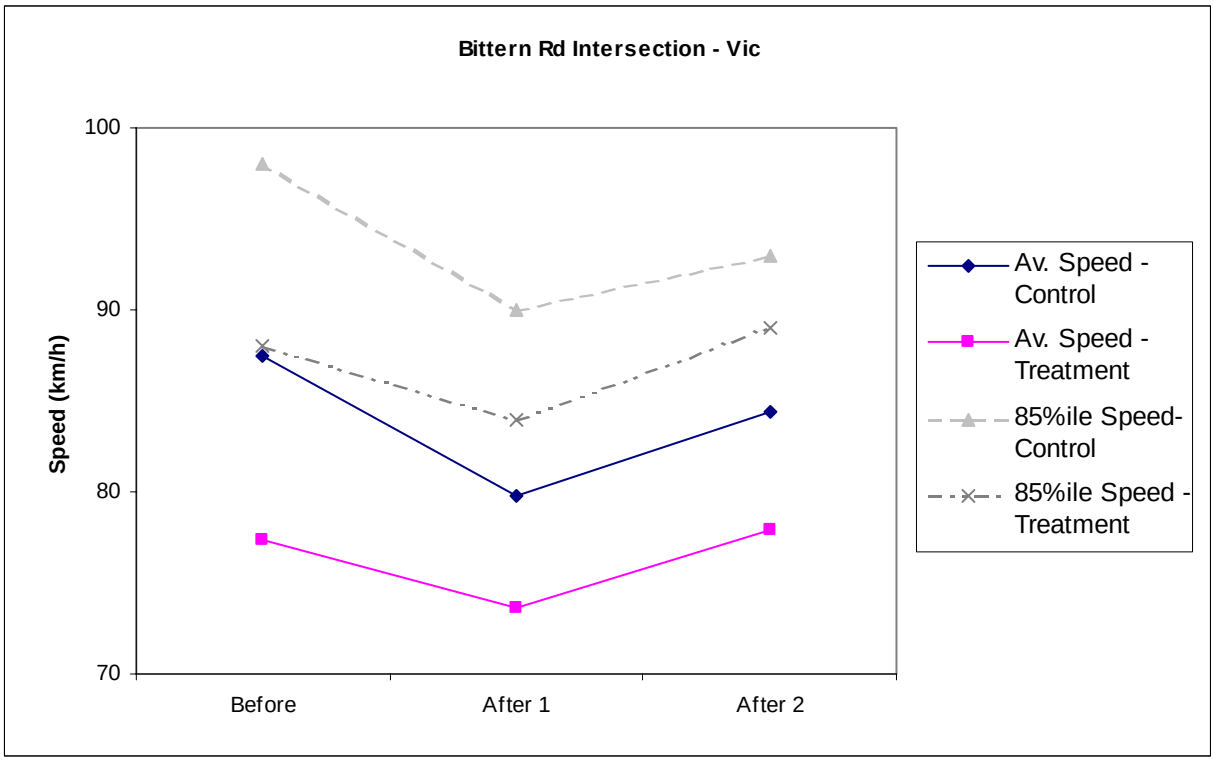



**Figure A39 Myers Rd Intersection Site: Day time**

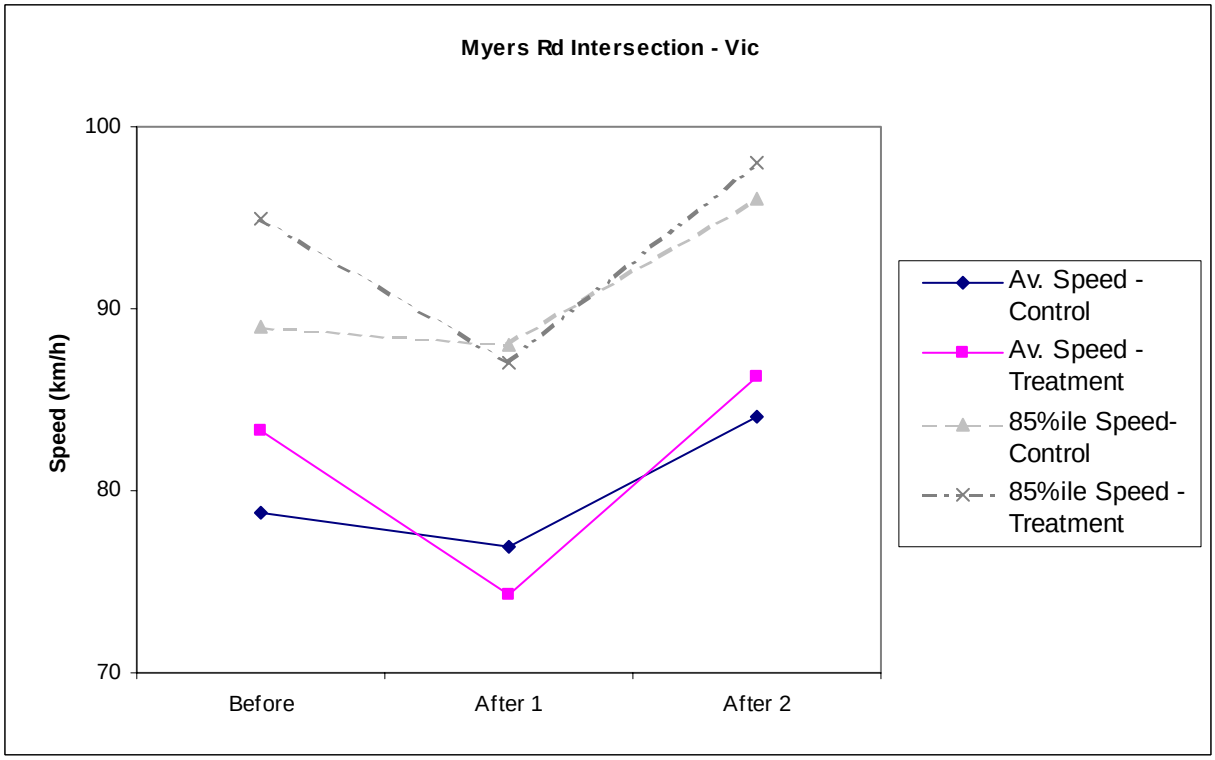


**Figure A40 The Driftway Intersection Site: Day time**

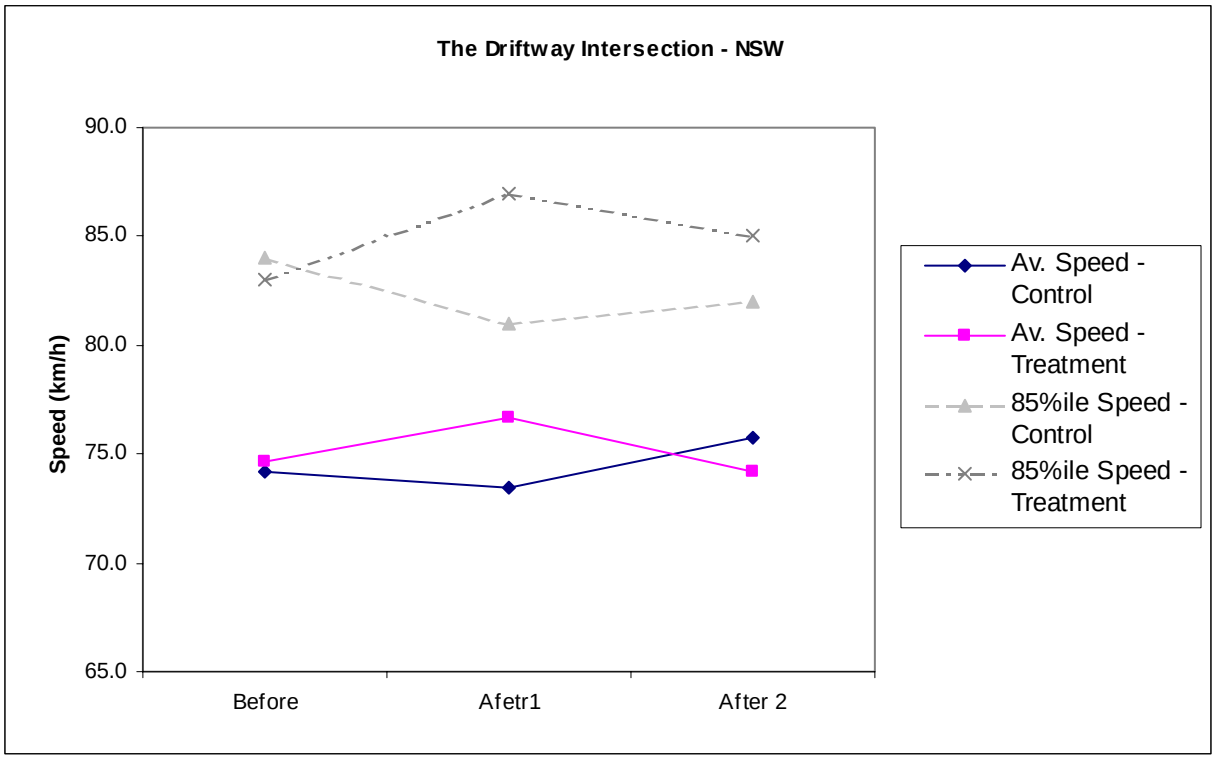



**Figure A41 Old Stock Route Intersection Site: Day time**

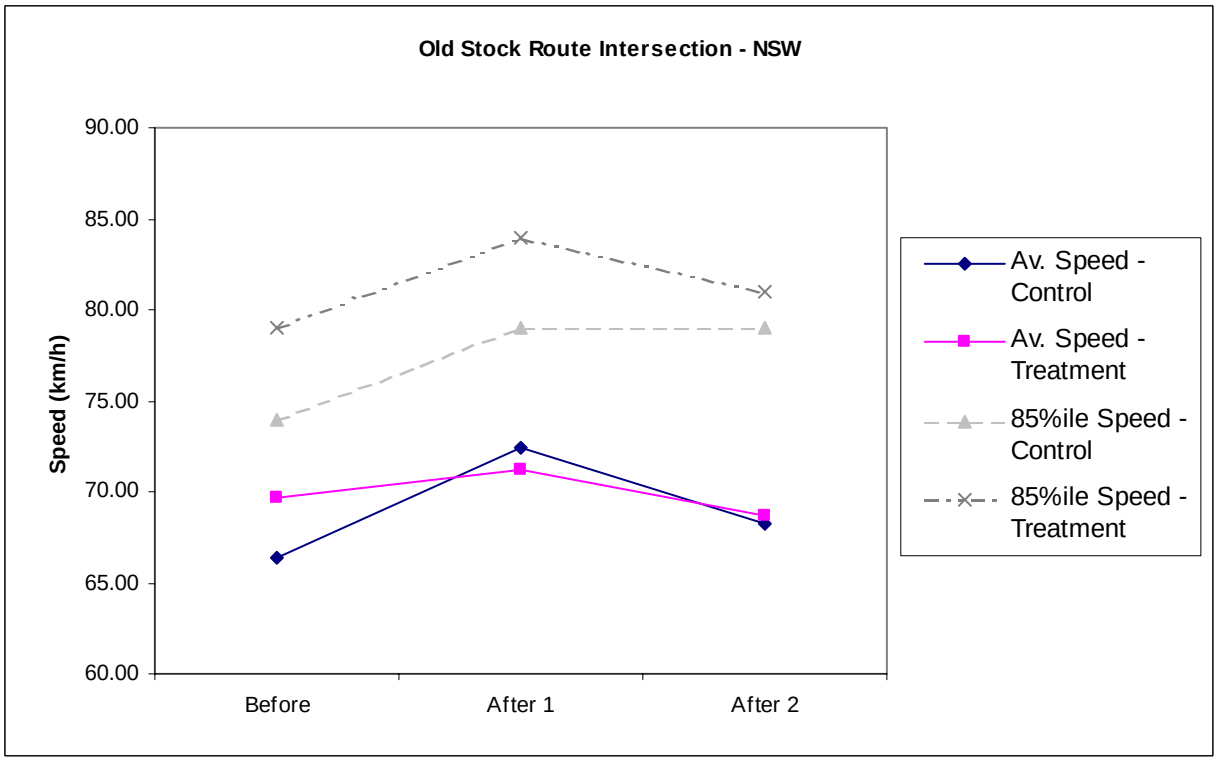


**Figure A42 Smith Rd Intersection Site: Day time**

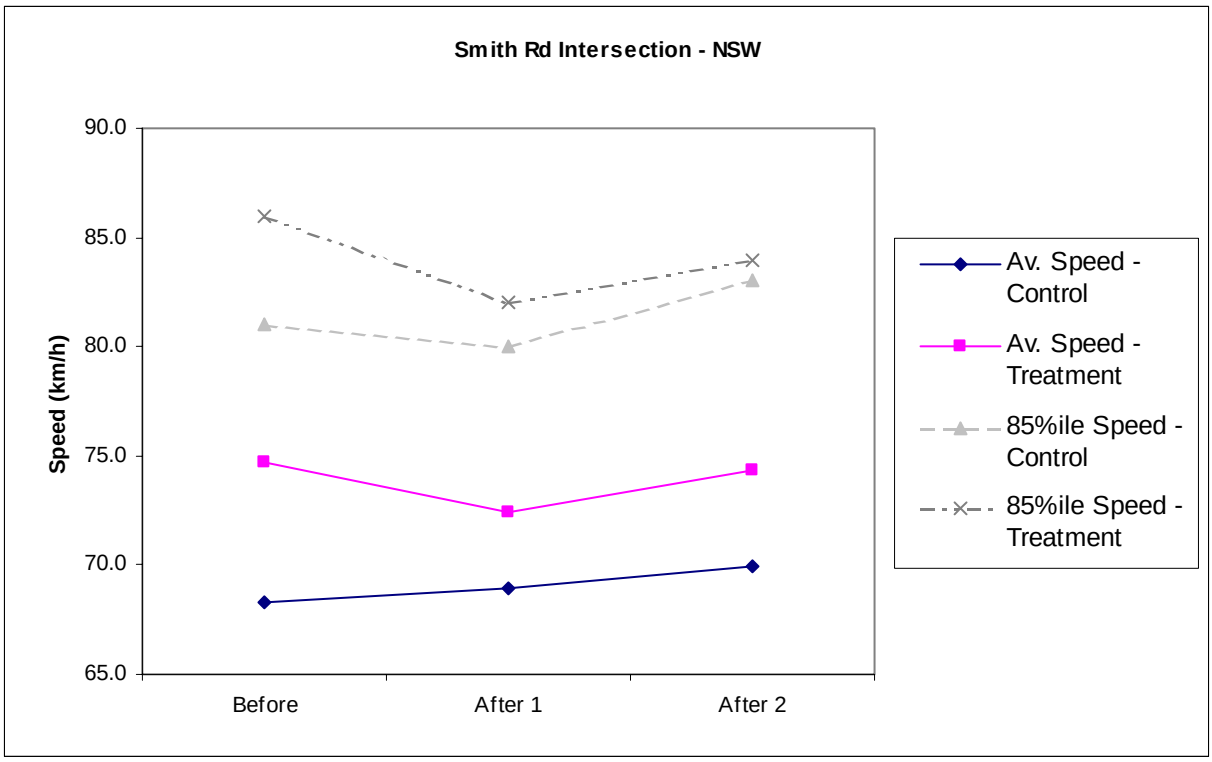
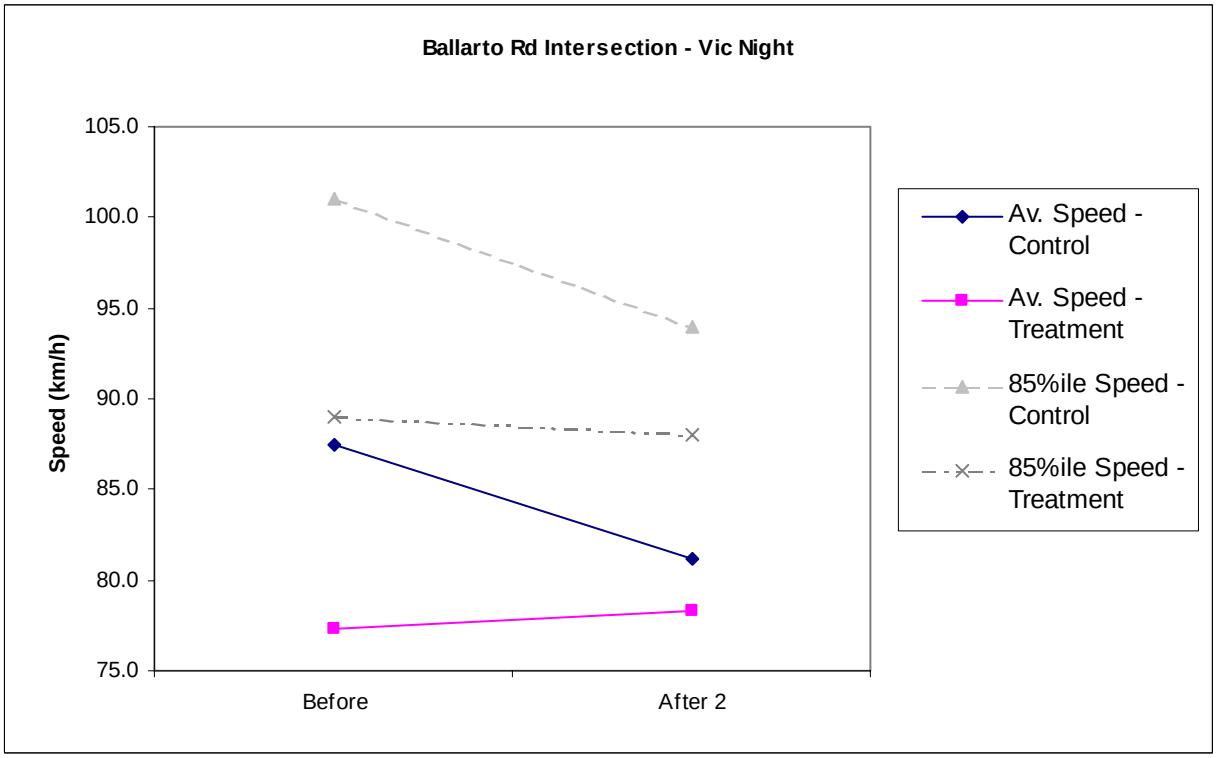



**Figure A43 Ballarto Rd Intersection Site: Night time**



# APPENDIX F: BRAKING AND LATERAL PLACEMENT OBSERVATIONS FROM VIDEOS - BEFORE, AFTER AND LONG-TERM

## Curve Sites: Victoria – Before Period

**Gembrook Road - Control - *Before***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 106 | 93.0 |
| | Trucks | 8 | 7.0 |
| | **Total** | **114** | **100** |
| **Braking** **Cars** | Braked | 1 | 1.0 |
| | Did not brake | 105 | 99.0 |
| **Trucks** | Braked | 0 | 0 |
| | Did not brake | 8 | 100 |
| **Lateral placement** | Mostly Centre | 27 | 23.7 |
| | Mostly Edge | 0 | 0 |
| | Mostly Right | 36 | 31.6 |
| | Mostly Centre and Edge | 9 | 7.9 |
| | Mostly Centre and Right | 33 | 28.9 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 8 | 7.0 |
| | Unknown | 1 | <1 |

**Gembrook Road - Treatment - *Before***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 86 | 94.5 |
| | Trucks | 5 | 5.5 |
| | **Total** | **91** | **100** |
| **Braking** **Cars** | Braked | 46 | 53.6 |
| | Did not brake | 40 | 46.4 |
| **Trucks** | Braked | 1 | 20.0 |
| | Did not brake | 4 | 80.0 |
| **Lateral placement** | Mostly Centre | 23 | 25.3 |
| | Mostly Edge | 6 | 6.6 |
| | Mostly Right | 6 | 6.6 |
| | Mostly Centre and Edge | 19 | 20.9 |
| | Mostly Centre and Right | 24 | 26.4 |
| | Mostly Edge and Right | 3 | 3.3 |
| | All Sections used | 11 | 12.1 |
| | Unknown | 0 | 0 |

## Curve Sites: Victoria – Before Period cont.

**Harkaway Road - Control - *Before***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| **Vehicle Type** | Cars | 121 | 96.8 |
| | Trucks | 4 | 3.2 |
| | **Total** | **154** | **100** |
| **Braking** **Cars** | Braked | 7 | 6.0 |
| | Did not brake | 114 | 94.0 |
| **Trucks** | Braked | 0 | 0 |
| | Did not brake | 4 | 100 |
| **Lateral placement** | Mostly Centre | 24 | 19.2 |
| | Mostly Edge | 1 | .0 |
| | Mostly Right | 9 | 7.2 |
| | Mostly Centre and Edge | 2 | 1.6 |
| | Mostly Centre and Right | 83 | 66.4 |
| | Mostly Edge and Right | 2 | 1.6 |
| | All Sections used | 4 | 3.2 |
| | Unknown | 0 | 0 |

**Harkaway Road - Treatment - *Before***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| **Vehicle Type** | Cars | 204 | 94.8 |
| | Trucks | 11 | 5.2 |
| | **Total** | **215** | **100** |
| **Braking** **Cars** | Braked | 4 | 2.0 |
| | Did not brake | 200 | 98.0 |
| **Trucks** | Braked | 0 | 0 |
| | Did not brake | 11 | 100 |
| **Lateral placement** | Mostly Centre | 141 | 65.5 |
| | Mostly Edge | 0 | 4.7 |
| | Mostly Right | 38 | 17.6 |
| | Mostly Centre and Edge | 12 | 5.6 |
| | Mostly Centre and Right | 12 | 5.6 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 2 | 1.0 |
| | Unknown | 0 | 0 |

## Curve Sites: Victoria – Before Period cont.

**Pakenham Road –<u>Treatment</u> - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 124 | 86 |
| | | Trucks | 20 | 14 |
| | | **Total** | **144** | **100** |
| **Braking** | **Cars** | Braked | 7 | 5.6 |
| | | Did not brake | 117 | 94.4 |
| | **Trucks** | Braked | 3 | 15 |
| | | Did not brake | 18 | 85 |
| **Lateral placement** | | Mostly Centre | 69 | 48 |
| | | Mostly Edge | 12 | 8 |
| | | Mostly Right | 3 | 2 |
| | | Mostly Centre and Edge | 36 | 25 |
| | | Mostly Centre and Right | 18 | 12 |
| | | Mostly Edge and Right | 3 | 2 |
| | | All Sections used | 5 | 3 |

**Pakenham Road – <u>Control</u> - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 111 | |
| | | Trucks | 13 | |
| | | Motorbikes | 1 | |
| | | **Total** | **125** | |
| **Braking** | **Cars** | Braked | 33 | 29.7 |
| | | Did not brake | 78 | 70.3 |
| | **Trucks** | Braked | 4 | 30.7 |
| | | Did not brake | 9 | 65.3 |
| **Lateral placement** | | Mostly Centre | 34 | 27.2 |
| | | Mostly Edge | 3 | 2.4 |
| | | Mostly Right | 32 | 26.0 |
| | | Mostly Centre and Edge | 9 | 7.2 |
| | | Mostly Centre and Right | 23 | 19.0 |
| | | Mostly Edge and Right | 14 | 11.2 |
| | | All Sections used | 8 | 7.0 |
| | | Unknown | 2 | 1.6 |

## Curve Sites: NSW – Before Period cont.

**The Driftway – Treatment - *Before***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 132 | 79 |
| | Trucks | 32 | 20 |
| | Motorbikes | 2 | 1 |
| | **Total** | **166** | **100** |
| Braking – Cars | Braked | 18 | 13.6 |
| | Did not brake | 114 | 86.4 |
| Braking – Trucks | Braked | 0 | 0 |
| | Did not brake | 32 | 100 |
| Lateral placement | Mostly Centre | 29 | 17.4 |
| | Mostly Edge | 0 | 0 |
| | Mostly Right | 9 | 5.4 |
| | Mostly Centre and Edge | 6 | 3.6 |
| | Mostly Centre and Right | 115 | 69.3 |
| | All Section used | 6 | 3.6 |
| | Unknown | 1 | <1 |

**The Driftway – Control - *Before***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 442 | 90 |
| | Trucks | 38 | 8 |
| | Motorbikes | 10 | 2 |
| | **Total** | **490** | **100** |
| Braking – Cars | Braked | 170 | 38 |
| | Did not brake | 432 | 62 |
| Braking – Trucks | Braked | 5 | 13 |
| | Did not brake | 33 | 87 |
| Lateral placement | Mostly Centre | 139 | 28.4 |
| | Mostly Edge | 0 | |
| | Mostly Right | 93 | 19 |
| | Mostly Centre and Edge | 18 | 3.7 |
| | Mostly Centre and Right | 227 | 46.3 |
| | Mostly Edge and Right | 0 | |
| | All Sections used | 11 | 2.2 |
| | Unknown | 2 | .4 |

## Curve Sites: NSW – Before Period cont.

**Castlereagh Road - Treatment - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 122 | 98 |
| | | Trucks | 3 | 2 |
| | | **Total** | **125** | **100** |
| Braking | Cars | Braked | 0 | |
| | | Did not brake | 0 | |
| | Trucks | Braked | 0 | |
| | | Did not brake | 0 | |
| Lateral placement | | Mostly Centre | 51 | 40.8 |
| | | Mostly Edge | 0 | |
| | | Mostly Right | 33 | 26.4 |
| | | Mostly Centre and Edge | 0 | |
| | | Mostly Centre and Right | 39 | 31.2 |
| | | All Sections used | 1 | |
| | | Unknown | 2 | 1.6 |

**Castlereagh Road – Control - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 113 | 90 |
| | | Trucks | 10 | 9 |
| | | Motorbikes | 2 | 1 |
| | | **Total** | **125** | **100** |
| Braking | Cars | Braked | 0 | |
| | | Did not brake | 0 | |
| | Trucks | Braked | 0 | |
| | | Did not brake | 0 | |
| Lateral placement | | Mostly Centre | 37 | 29.6 |
| | | Mostly Edge | 26 | 20.8 |
| | | Mostly Right | 0 | |
| | | Mostly Centre and Edge | 57 | 45.6 |
| | | Mostly Centre and Right | 2 | 1.6 |
| | | Mostly Edge and Right | 0 | |
| | | All Sections used | 1 | .8 |
| | | Unknown | 2 | 1.6 |

## Curve Sites: NSW – Before Period cont.

**Scheyville Road – Treatment - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 142 | 91 |
| | | Trucks | 12 | 8 |
| | | Motorbikes | 2 | 1 |
| | | **Total** | **156** | **100** |
| Braking | Cars | Braked | 17 | 12 |
| | | Did not brake | 125 | 88 |
| | Trucks | Braked | 2 | 17 |
| | | Did not brake | 10 | 8.3 |
| Lateral placement | | Mostly Centre | 0 | |
| | | Mostly Edge | 0 | |
| | | Mostly Right | 143 | 91.7 |
| | | Mostly Centre and Edge | 0 | |
| | | Mostly Centre and Right | 12 | 7.7 |
| | | Mostly Edge and Right | 0 | |
| | | All Sections used | 1 | <1 |

**Scheyville Road – Control - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 246 | 91 |
| | | Trucks | 22 | 8 |
| | | Motorbikes | 1 | 1 |
| | | **Total** | **269** | **100** |
| Braking | Cars | Braked | 7 | 2.8 |
| | | Did not brake | 239 | 97.2 |
| | Trucks | Braked | 0 | |
| | | Did not brake | 22 | 100 |
| Lateral placement | | Mostly Centre | 12 | 4.5 |
| | | Mostly Edge | 6 | 2.2 |
| | | Mostly Right | 22 | 8.2 |
| | | Mostly Centre and Edge | 72 | 26.8 |
| | | Mostly Centre and Right | 89 | 33 |
| | | Mostly Edge and Right | 0 | |
| | | All Sections used | 68 | 25.3 |
| | | Unknown | 0 | |

## Curve Sites: Victoria – Immediately After (1 month after) Period

**Gembrook Road - Control - *1st After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 111 | 88.0 |
| | | Trucks | 13 | 12.0 |
| | | **Total** | **126** | **100** |
| Braking | Cars | Braked | 0 | 0 |
| | | Did not brake | 111 | 100 |
| | Trucks | Braked | 0 | 0 |
| | | Did not brake | 13 | 100 |
| Lateral placement | | Mostly Centre | 34 | 27.0 |
| | | Mostly Edge | 0 | 0 |
| | | Mostly Right | 29 | 23.0 |
| | | Mostly Centre and Edge | 4 | 3.2 |
| | | Mostly Centre and Right | 54 | 43.0 |
| | | Mostly Edge and Right | 1 | <1 |
| | | All Sections used | 4 | 3.2 |
| | | Unknown | 0 | 0 |

**Gembrook Road - Treatment - *1st After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 147 | 89.6 |
| | | Trucks | 17 | 10.4 |
| | | **Total** | **164** | **100** |
| Braking | Cars | Braked | 54 | 37.0 |
| | | Did not brake | 93 | 63.0 |
| | Trucks | Braked | 3 | 18 |
| | | Did not brake | 14 | 82 |
| Lateral placement | | Mostly Centre | 33 | 20.2 |
| | | Mostly Edge | 3 | 1.8 |
| | | Mostly Right | 20 | 12.2 |
| | | Mostly Centre and Edge | 22 | 13.4 |
| | | Mostly Centre and Right | 62 | 39.0 |
| | | Mostly Edge and Right | 4 | 2.4 |
| | | All Sections used | 18 | 11.0 |
| | | Unknown | 0 | 0 |

## Curve Sites: Victoria – Immediately After (1 month after) Period cont.

**Harkway Road - Control - *1st After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 846 | 94.1 |
| | | Trucks | 51 | 5.7 |
| | | Motorbikes | 2 | <1.0 |
| | | **Total** | **899** | **100** |
| Braking | Cars | Braked | 2 | <1.0 |
| | | Did not brake | 884 | 99.8 |
| | Trucks | Braked | 1 | 2.0 |
| | | Did not brake | 50 | 98 |
| Lateral placement | | Mostly Centre | 372 | 41.4 |
| | | Mostly Edge | 45 | 5.0 |
| | | Mostly Right | 51 | 5.7 |
| | | Mostly Centre and Edge | 173 | 20.0 |
| | | Mostly Centre and Right | 228 | 25.0 |
| | | Mostly Edge and Right | 1 | <1.0 |
| | | All Sections used | 0 | 0 |
| | | Unknown | 29 | 3.0 |

**Harkway Road – Treatment - *1st After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 563 | 92.4 |
| | | Trucks | 43 | 7.1 |
| | | Motorbikes | 3 | <1.0 |
| | | **Total** | **609** | **100** |
| Braking | Cars | Braked | 13 | 2.3 |
| | | Did not brake | 550 | 97.7 |
| | Trucks | Braked | 1 | 2.3 |
| | | Did not brake | 42 | 97.7 |
| Lateral placement | | Mostly Centre | 202 | 33.0 |
| | | Mostly Edge | 11 | 1.8 |
| | | Mostly Right | 12 | 2.0 |
| | | Mostly Centre and Edge | 218 | 35.8 |
| | | Mostly Centre and Right | 114 | 18.7 |
| | | Mostly Edge and Right | 4 | <1.0 |
| | | All Sections used | 48 | 8.1 |
| | | Unknown | 0 | 0 |

## Curve Sites: Victoria – Immediately After (1 month after) Period cont.

**Pakenham Road -Control - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 244 | 87.1 |
| | | Trucks | 32 | 11.4 |
| | | Motorbikes | 4 | 1.4 |
| | | **Total** | **280** | **100** |
| Braking | Cars | Braked | 144 | 58.0 |
| | | Did not brake | 104 | 42.0 |
| | Trucks | Braked | 10 | 32.3 |
| | | Did not brake | 22 | 68.8 |
| Lateral placement | | Mostly Centre | 93 | 32.7 |
| | | Mostly Edge | 11 | 3.9 |
| | | Mostly Right | 6 | 2.1 |
| | | Mostly Centre and Edge | 72 | 25.3 |
| | | Mostly Centre and Right | 85 | 30.0 |
| | | Mostly Edge and Right | 3 | 1.1 |
| | | All Sections used | 14 | 5.0 |
| | | Unknown | 0 | 0 |

**Pakenham Road - Treatment - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 210 | 87.5 |
| | | Trucks | 28 | 11.7 |
| | | Motorbikes | 2 | <1.0 |
| | | **Total** | **240** | **100** |
| Braking | Cars | Braked | 13 | 6.2 |
| | | Did not brake | 197 | 93.8 |
| | Trucks | Braked | 2 | 7.0 |
| | | Did not brake | 26 | 93.0 |
| Lateral placement | | Mostly Centre | 100 | 42.0 |
| | | Mostly Edge | 9 | 3.8 |
| | | Mostly Right | 4 | 1.9 |
| | | Mostly Centre and Edge | 104 | 43.3 |
| | | Mostly Centre and Right | 12 | 5.0 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 11 | 4.0 |
| | | Unknown | 0 | 0 |

## Curve Sites: NSW – Immediately After (1 month after) Period

**The Driftway - Treatment - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 171 | 86 |
| | | Trucks | 26 | 13 |
| | | Motorbikes | 1 | 1 |
| | | **Total** | **198** | **100** |
| Braking | Cars | Braked | 62 | 36 |
| | | Did not brake | 109 | 64 |
| | Trucks | Braked | 2 | 7.7 |
| | | Did not brake | 24 | 92.3 |
| | | Motorbikes that didn't brake | 1 | 100 |
| Lateral placement | | Mostly Centre | 88 | 44.4 |
| | | Mostly Edge | 1 | <1% |
| | | Mostly Right | 4 | 2% |
| | | Mostly Centre and Edge | 36 | 18.2 |
| | | Mostly Centre and Right | 62 | 31.4 |
| | | Mostly Edge and Right | 1 | <1 |
| | | All Sections used | 7 | 3.5 |

**The Driftway - Control - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 116 | 77 |
| | | Trucks | 33 | 22 |
| | | Motorbikes | 1 | 1 |
| | | **Total** | **149** | **100** |
| Braking | Cars | Braked | 23 | 20 |
| | | Did not brake | 93 | 80 |
| | Trucks | Braked | 3 | 9 |
| | | Did not brake | 30 | 91 |
| | | Motorbikes that didn't brake | 1 | 100 |
| Lateral placement | | Mostly Centre | 37 | 24.7 |
| | | Mostly Edge | 2 | 1.4 |
| | | Mostly Right | 20 | 13.5 |
| | | Mostly Centre and Edge | 20 | 13.5 |
| | | Mostly Centre and Right | 47 | 31.5 |
| | | Mostly Edge and Right | 9 | 6 |
| | | All Sections used | 14 | 9.4 |
| | | Unknown | | |

## Curve Sites: NSW – Immediately After (1 month after) Period cont.

**Castlereagh Road - Treatment - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 464 | 84 |
| | | Trucks | 86 | 15 |
| | | Motrobikes | 1 | 1 |
| | | Total | **551** | **100** |
| Braking | Cars | Braked | 3 | .6 |
| | | Did not brake | 461 | 99.4 |
| | Trucks | Braked | 0 | |
| | | Did not brake | 86 | 100 |
| Lateral placement | | Mostly Centre | 278 | 50.4 |
| | | Mostly Edge | 2 | .4 |
| | | Mostly Right | 111 | 20.2 |
| | | Mostly Centre and Edge | 23 | 4.3 |
| | | Mostly Centre and Right | 134 | 24.1 |
| | | Mostly Edge and Right | | |
| | | All Sections used | 3 | .6 |

**Castlereagh Road - Control - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 716 | 92 |
| | | Trucks | 57 | 8 |
| | | Motorbikes | 6 | 0 |
| | | **Total** | **779** | **100** |
| Braking | Cars | Braked | 2 | 1 |
| | | Did not brake | 714 | 99 |
| | Trucks | Braked | 0 | 0 |
| | | Did not brake | 57 | 100 |
| Lateral placement | | Mostly Centre | 418 | 53.6 |
| | | Mostly Edge | 165 | 21.1 |
| | | Mostly Right | 2 | .3 |
| | | Mostly Centre and Edge | 146 | 18.7 |
| | | Mostly Centre and Right | 43 | 5.6 |
| | | Mostly Edge and Right | 0 | |
| | | All Sections used | 3 | .4 |
| | | Unknown | 2 | .3 |

## Curve Sites: NSW – Immediately After (1 month after) Period cont.

**Scheyville Road - Treatment - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 120 | 90 |
| | | Trucks | 12 | 10 |
| | | **Total** | **132** | **100** |
| Braking | Cars | Braked | 38 | 32 |
| | | Did not brake | 82 | 68 |
| | Trucks | Braked | 1 | 8.3 |
| | | Did not brake | 11 | 91.7 |
| Lateral placement | | Mostly Centre | 74 | 56 |
| | | Mostly Edge | 4 | 3 |
| | | Mostly Right | 54 | 41 |
| | | Mostly Centre and Edge | 0 | 0 |
| | | Mostly Centre and Right | 0 | 0 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 0 | 0 |

**Scheyville Road - Control - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 192 | 91 |
| | | Trucks | 17 | 8 |
| | | Motorbikes | 2 | 1 |
| | | **Total** | **211** | **100** |
| Braking | Cars | Braked | 2 | 1 |
| | | Did not brake | 190 | 99 |
| | Trucks | Braked | 0 | |
| | | Did not brake | 17 | 100 |
| Lateral placement | | Mostly Centre | 72 | 34 |
| | | Mostly Edge | 0 | |
| | | Mostly Right | 28 | 13.3 |
| | | Mostly Centre and Edge | 5 | 2.4 |
| | | Mostly Centre and Right | 101 | 47.9 |
| | | Mostly Edge and Right | 0 | |
| | | All Sections used | 5 | 2.4 |
| | | Unknown | 0 | |

## Curve Sites: Victoria – Long-term (12 months after) Period

**Gembrook Road - Control - *2nd After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 140 | 87.5 |
| | Trucks | 20 | 12.5 |
| | **Total** | **160** | **100** |
| **Braking** **Cars** | Braked | 5 | 4.0 |
| | Did not brake | 135 | 96.0 |
| **Trucks** | Braked | 1 | 5.0 |
| | Did not brake | 19 | 95.0 |
| **Lateral placement** | Mostly Centre | 8 | 5.0 |
| | Mostly Edge | 3 | 1.9 |
| | Mostly Right | 26 | 16.3 |
| | Mostly Centre and Edge | 15 | 9.4 |
| | Mostly Centre and Right | 69 | 43.1 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 39 | 24.3 |

**Gembrook Road - Treatment – *2nd After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 89 | 91.8 |
| | Trucks | 8 | 8.2 |
| | **Total** | **97** | **100** |
| **Braking** **Cars** | Braked | 32 | 36.0 |
| | Did not brake | 57 | 64.0 |
| **Trucks** | Braked | 3 | 38.0 |
| | Did not brake | 5 | 62.0 |
| **Lateral placement** | Mostly Centre | 10 | 10.3 |
| | Mostly Edge | 9 | 9.3 |
| | Mostly Right | 3 | 3.0 |
| | Mostly Centre and Edge | 24 | 24.7 |
| | Mostly Centre and Right | 22 | 22.7 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 31 | 32.0 |

## Curve Sites: Victoria – Long-term (12 months after) Period cont.

**Harkway Road - Control - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 747 | 94.4 |
| | Trucks | 43 | 5.4 |
| | Motorbikes | 1 | <1.0 |
| | **Total** | **791** | **100** |
| Braking – Cars | Braked | 0 | 0 |
| | Did not brake | 709 | 100 |
| Braking – Trucks | Braked | 0 | 0 |
| | Did not brake | 44 | 100 |
| Lateral placement | Mostly Centre | 542 | 68.5 |
| | Mostly Edge | 11 | 1.4 |
| | Mostly Right | 33 | 4.2 |
| | Mostly Centre and Edge | 74 | 9.4 |
| | Mostly Centre and Right | 121 | 15.3 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 10 | 1.3 |
| | Unknown | 0 | 0 |

**Harkway Road - Treatment - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 1053 | 93.6 |
| | Trucks | 54 | 4.8 |
| | Buses | 1 | <1.0 |
| | Motorbikes | 17 | 1.5 |
| | **Total** | **1125** | **100** |
| Braking – Cars | Braked | 16 | 2.0 |
| | Did not brake | 1037 | 98.0 |
| Braking – Trucks | Braked | 1 | 1.0 |
| | Did not brake | 53 | 99.0 |
| Lateral placement | Mostly Centre | 65 | 5.8 |
| | Mostly Edge | 3 | <1.0 |
| | Mostly Right | 71 | 6.3 |
| | Mostly Centre and Edge | 117 | 10.4 |
| | Mostly Centre and Right | 698 | 62.0 |
| | Mostly Edge and Right | 22 | 2.0 |
| | All Sections used | 149 | 13.0 |
| | Unknown | 0 | 0 |

## Curve Sites: Victoria – Long-term (12 months after) Period cont.

**Pakenham Road -Control - *2nd After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 169 | 87.6 |
| | | Trucks | 20 | 10.4 |
| | | Motorbikes | 4 | 2.1 |
| | | **Total** | **193** | **100** |
| **Braking** | **Cars** | Braked | 47 | 28.0 |
| | | Did not brake | 122 | 72.0 |
| | **Trucks** | Braked | 5 | 25.0 |
| | | Did not brake | 15 | 75.0 |
| **Lateral placement** | | Mostly Centre | 49 | 25.4 |
| | | Mostly Edge | 4 | 2.0 |
| | | Mostly Right | 23 | 12.0 |
| | | Mostly Centre and Edge | 28 | 14.5 |
| | | Mostly Centre and Right | 62 | 32.1 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 27 | 14.0 |
| | | Unknown | 0 | 0 |

**Pakenham Road -Treatment - *2nd After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 157 | 90.8 |
| | | Trucks | 15 | 8.7 |
| | | Motorbikes | 1 | <1.0 |
| | | **Total** | **173** | **100** |
| **Braking** | **Cars** | Braked | 4 | 2.5 |
| | | Did not brake | 153 | 97.5 |
| | **Trucks** | Braked | 0 | 0 |
| | | Did not brake | 5 | 100 |
| **Lateral placement** | | Mostly Centre | 65 | 37.5 |
| | | Mostly Edge | 31 | 18.0 |
| | | Mostly Right | 1 | <1.0 |
| | | Mostly Centre and Edge | 52 | 30.1 |
| | | Mostly Centre and Right | 17 | 9.8 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 7 | 4.0 |
| | | Unknown | 0 | 0 |

## Curve Sites: NSW – Long-term (12 months after) Period

**The Driftway – <u>Treatment</u> - *2nd After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 161 | 77 |
| | | Trucks | 48 | 22 |
| | | Motorbikes | 1 | 1 |
| | | **Total** | **210** | **100** |
| Braking | Cars | Braked | 97 | 60 |
| | | Did not brake | 64 | 40 |
| | Trucks | Braked | 15 | 31 |
| | | Did not brake | 33 | 69 |
| | | Motorbikes that didn't brake | 1 | 100 |
| Lateral placement | | Mostly Centre | 15 | 7 |
| | | Mostly Edge | 1 | 1 |
| | | Mostly Right | 0 | |
| | | Mostly Centre and Edge | 86 | 41 |
| | | Mostly Centre and Right | 52 | 25 |
| | | Mostly Edge and Right | 14 | 6 |
| | | All Sections used | 42 | 20 |

**The Driftway – <u>Control</u> - *2nd After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 207 | 92 |
| | | Trucks | 16 | 7 |
| | | Motorbikes | 2 | 1 |
| | | **Total** | **225** | **100** |
| Braking | Cars | Braked | 53 | 26 |
| | | Did not brake | 154 | 74 |
| | Trucks | Braked | 3 | 19 |
| | | Did not brake | 13 | 81 |
| | | Motorbikes braked | 1 | 50 |
| | | Didn't brake | 1 | 50 |
| Lateral placement | | Mostly Centre | 16 | 7 |
| | | Mostly Edge | 4 | 2 |
| | | Mostly Right | 21 | 9 |
| | | Mostly Centre and Edge | 29 | 13 |
| | | Mostly Centre and Right | 106 | 47 |
| | | Mostly Edge and Right | 7 | 3 |
| | | All Sections used | 42 | 19 |

## Curve Sites: NSW – Long-term (12 months after) Period cont.

**Castlereagh Road – Treatment - *2nd After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 533 | 89 |
| | | Trucks | 63 | 10 |
| | | Motorbikes | 3 | 1 |
| | | **Total** | **599** | **100** |
| Braking | Cars | Braked | 0 | |
| | | Did not brake | 533 | 100 |
| | Trucks | Braked | 0 | |
| | | Did not brake | 63 | 100 |
| | | Motorbikes didn't brake | 3 | 100 |
| Lateral placement | | Mostly Centre | 56 | 9 |
| | | Mostly Edge | 3 | 1 |
| | | Mostly Right | 52 | 8 |
| | | Mostly Centre and Edge | 86 | 14 |
| | | Mostly Centre and Right | 292 | 49 |
| | | Mostly Edge and Right | 3 | 1 |
| | | All Sections used | 107 | 18 |

**Castlereagh Road – Control - *2nd After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 674 | 94 |
| | | Trucks | 36 | 5 |
| | | Motorbikes | 3 | 1 |
| | | **Total** | **713** | **100** |
| Braking | Cars | Braked | 6 | 1 |
| | | Did not brake | 668 | 99 |
| | Trucks | Braked | 0 | |
| | | Did not brake | 36 | 100 |
| | | Motorbikes didn't brake | 3 | 100 |
| Lateral placement | | Mostly Centre | 27 | 4 |
| | | Mostly Edge | 114 | 16 |
| | | Mostly Right | 8 | 1 |
| | | Mostly Centre and Edge | 293 | 41 |
| | | Mostly Centre and Right | 109 | 15 |
| | | Mostly Edge and Right | 25 | 4 |
| | | All Sections used | 137 | 19 |

## Curve Sites: NSW – Long-term (12 months after) Period cont.

**Schyeville Road – <u>Treatment</u> - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| **Vehicle Type** | Cars | 130 | 86 |
| | Trucks | 21 | 14 |
| | **Total** | **151** | **100** |
| **Braking** – **Cars** | Braked | 33 | 25 |
| | Did not brake | 97 | 75 |
| **Braking** – **Trucks** | Braked | 4 | 19 |
| | Did not brake | 17 | 81 |
| **Lateral placement** | Mostly Centre | 16 | 10 |
| | Mostly Edge | 10 | 7 |
| | Mostly Right | 0 | 0 |
| | Mostly Centre and Edge | 76 | 50 |
| | Mostly Centre and Right | 19 | 13 |
| | Mostly Edge and Right | 18 | 12 |
| | All Sections used | 12 | 8 |

**Schyeville Road – <u>Control</u> - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| **Vehicle Type** | Cars | 151 | 85.8 |
| | Trucks | 24 | 13.6 |
| | Motorbikes | 1 | 0.6 |
| | **Total** | **176** | **100** |
| **Braking** – **Cars** | Braked | 4 | 2.6 |
| | Did not brake | 147 | 97.4 |
| **Braking** – **Trucks** | Braked | 0 | 0 |
| | Did not brake | 24 | 100 |
| **Lateral placement** | Mostly Centre | 6 | 3.4 |
| | Mostly Edge | 7 | 4.0 |
| | Mostly Right | 22 | 12.5 |
| | Mostly Centre and Edge | 34 | 19.3 |
| | Mostly Centre and Right | 48 | 27.3 |
| | Mostly Edge and Right | 30 | 17.0 |
| | All Sections used | 29 | 16.5 |
| | Unknown | 0 | 0 |

## Curve Sites – Night Observations: Victoria – Before Period

**Gembrook Road - Control - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 103 | 97.2 |
| | | Trucks | 2 | 1.9 |
| | | Motorbikes | 1 | <1.0 |
| | | **Total** | **106** | **100** |
| Braking | Cars | Braked | 5 | 4.9 |
| | | Did not brake | 98 | 95.1 |
| | Trucks | Braked | 0 | 0 |
| | | Did not brake | 2 | 100 |
| Lateral placement | | Mostly Centre | 15 | 14.2 |
| | | Mostly Edge | 12 | 11.3 |
| | | Mostly Right | 52 | 49.0 |
| | | Mostly Centre and Edge | 2 | 1.9 |
| | | Mostly Centre and Right | 25 | 23.6 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 0 | 0 |
| | | Unknown | 0 | 0 |

**Gembrook Road - Treatment - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 45 | 93.8 |
| | | Trucks | 3 | 6.2 |
| | | **Total** | **48** | **100** |
| Braking | Cars | Braked | 34 | 75.0 |
| | | Did not brake | 11 | 25.0 |
| | Trucks | Braked | 3 | 100 |
| | | Did not brake | 0 | 0 |
| Lateral placement | | Mostly Centre | 21 | 43.8 |
| | | Mostly Edge | 10 | 20.8 |
| | | Mostly Right | 8 | 16.7 |
| | | Mostly Centre and Edge | 3 | 6.3 |
| | | Mostly Centre and Right | 6 | 12.5 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 0 | 0 |

## Curve Sites – Night Observations: Victoria – Before Period cont.

**Pakenham Road -Treatment - *Before***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 88 | 90.7 |
| | Trucks | 9 | 9.3 |
| | **Total** | **97** | **100** |
| Braking – Cars | Braked | 56 | 63.6 |
| | Did not brake | 32 | 36.4 |
| Braking – Trucks | Braked | 6 | 66.6 |
| | Did not brake | 3 | 33.3 |
| Lateral placement | Mostly Centre | 60 | 61.9 |
| | Mostly Edge | 11 | 11.3 |
| | Mostly Right | 4 | 4.1 |
| | Mostly Centre and Edge | 13 | 13.4 |
| | Mostly Centre and Right | 8 | 8.2 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 1 | 1.0 |

**Pakenham Road - Control - *Before***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 160 | 92.5 |
| | Trucks | 12 | 6.9 |
| | Motorbikes | 1 | <1.0 |
| | **Total** | **173** | **100** |
| Braking – Cars | Braked | 129 | 80.6 |
| | Did not brake | 31 | 19.4 |
| Braking – Trucks | Braked | 10 | 83.3 |
| | Did not brake | 2 | 16.7 |
| Lateral placement | Mostly Centre | 64 | 40.0 |
| | Mostly Edge | 2 | 1.2 |
| | Mostly Right | 49 | 28.3 |
| | Mostly Centre and Edge | 8 | 0 |
| | Mostly Centre and Right | 47 | 27.2 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 3 | 1.7 |
| | Unknown | 0 | 0 |

## Curve Sites – Night Observations: Victoria – Immediately After (1 month after) Period

**Gembrook Road - Control - 1st *After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 93 | 95.9 |
| | | Trucks | 4 | 4.1 |
| | | **Total** | **97** | **100** |
| **Braking** | **Cars** | Braked | 3 | 3.0 |
| | | Did not brake | 90 | 97.0 |
| | **Trucks** | Braked | 1 | 25.0 |
| | | Did not brake | 3 | 75.0 |
| **Lateral placement** | | Mostly Centre | 16 | 16.5 |
| | | Mostly Edge | 0 | 0 |
| | | Mostly Right | 56 | 57.7 |
| | | Mostly Centre and Edge | 1 | 1.0 |
| | | Mostly Centre and Right | 23 | 23.7 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 1 | 1.0 |

**Gembrook Road - Treatment - *1st After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 65 | 95.6 |
| | | Trucks | 3 | 4.4 |
| | | **Total** | **68** | **68** |
| **Braking** | **Cars** | Braked | 49 | 75.0 |
| | | Did not brake | 16 | 25.0 |
| | **Trucks** | Braked | 3 | 100 |
| | | Did not brake | 0 | 0 |
| **Lateral placement** | | Mostly Centre | 15 | 22.1 |
| | | Mostly Edge | 1 | 1.5 |
| | | Mostly Right | 23 | 33.8 |
| | | Mostly Centre and Edge | 2 | 2.9 |
| | | Mostly Centre and Right | 23 | 33.8 |
| | | Mostly Edge and Right | 1 | 1.5 |
| | | All Sections used | 3 | 4.4 |

## Curve Sites – Night Observations: Victoria – Immediately After (1 month after) Period cont.

**Pakenham - Treatment - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 48 | 90.6 |
| | | Trucks | 5 | 9.4 |
| | | **Total** | **53** | **100** |
| Braking | Cars | Braked | 18 | 38.0 |
| | | Did not brake | 30 | 62.0 |
| | Trucks | Braked | 2 | 40.0 |
| | | Did not brake | 3 | 60.0 |
| Lateral placement | | Mostly Centre | 40 | 75.5 |
| | | Mostly Edge | 4 | 7.5 |
| | | Mostly Right | 1 | 1.9 |
| | | Mostly Centre and Edge | 5 | 9.4 |
| | | Mostly Centre and Right | 2 | 3.8 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 2 | 3.8 |

**Pakenham - Control - *1st After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 146 | 93.0 |
| | | Trucks | 9 | 5.7 |
| | | Motorbikes | 2 | 1.3 |
| | | **Total** | **157** | **100** |
| Braking | Cars | Braked | 132 | 90.4 |
| | | Did not brake | 14 | 9.6 |
| | Trucks | Braked | 6 | 6.7 |
| | | Did not brake | 3 | 3.3 |
| Lateral placement | | Mostly Centre | 71 | 45.2 |
| | | Mostly Edge | 18 | 11.5 |
| | | Mostly Right | 41 | 26.1 |
| | | Mostly Centre and Edge | 1 | <1.0 |
| | | Mostly Centre and Right | 15 | 9.6 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 0 | 0 |
| | | Unknown | 0 | 0 |

## Curve Sites – Night Observations: Victoria – Long-term (12 months after) Period

**Gembrook Road – Control - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 113 | 96.6 |
| | Trucks | 3 | 2.6 |
| | Motorbikes | 1 | <1.0 |
| | **Total** | **117** | **100** |
| Braking – Cars | Braked | 20 | 18.0 |
| | Did not brake | 93 | 82.0 |
| Braking – Trucks | Braked | 0 | 0 |
| | Did not brake | 3 | 100 |
| Lateral placement | Mostly Centre | 2 | 1.7 |
| | Mostly Edge | 0 | 0 |
| | Mostly Right | 14 | 12.0 |
| | Mostly Centre and Edge | 3 | 2.6 |
| | Mostly Centre and Right | 70 | 59.8 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 28 | 23.9 |
| | Unknown | 0 | 0 |

**Gembrook Road – Treatment - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 38 | 97.4 |
| | Trucks | 0 | 0 |
| | Motorbikes | 1 | 2.6 |
| | **Total** | **39** | **39** |
| Braking – Cars | Braked | 30 | 79.0 |
| | Did not brake | 8 | 21.0 |
| Braking – Truck | Braked | 0 | 0 |
| | Did not brake | 0 | 0 |
| Lateral placement | Mostly Centre | 0 | 0 |
| | Mostly Edge | 6 | 15.4 |
| | Mostly Right | 0 | 0 |
| | Mostly Centre and Edge | 18 | 46.2 |
| | Mostly Centre and Right | 4 | 10.3 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 11 | 28.2 |
| | Unknown | 0 | 0 |

## Curve Sites – Night Observations: Victoria – Long-term (12 months after) Period cont.

**Pakenham -Treatment - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 54 | 93.0 |
| | Trucks | 4 | 6.9 |
| | **Total** | **58** | **100** |
| Braking Cars | Braked | 16 | 29.6 |
| | Did not brake | 38 | 70.4 |
| Braking Trucks | Braked | 3 | 75.0 |
| | Did not brake | 1 | 25.0 |
| Lateral placement | Mostly Centre | 29 | 50.0 |
| | Mostly Edge | 1 | 2.6 |
| | Mostly Right | 1 | 2.6 |
| | Mostly Centre and Edge | 18 | 31.0 |
| | Mostly Centre and Right | 4 | 6.9 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 5 | 9.0 |

**Pakenham - Control - *2nd After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 36 | 94.7 |
| | Trucks | 2 | 5.3 |
| | Motorbikes | 0 | 0 |
| | **Total** | **38** | **100** |
| Braking Cars | Braked | 30 | 83.0 |
| | Did not brake | 6 | 17.0 |
| Braking Truck | Braked | 2 | 100 |
| | Did not brake | 0 | 0 |
| Lateral placement | Mostly Centre | 14 | 36.8 |
| | Mostly Edge | 0 | 0 |
| | Mostly Right | 12 | 31.6 |
| | Mostly Centre and Edge | 5 | 13.0 |
| | Mostly Centre and Right | 6 | 16.0 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 1 | 2.6 |
| | Unknown | 0 | 0 |

## Intersection Sites: Victoria – Before Period

**Ballarto Road- Treatment – *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 319 | 89.6 |
| | | Trucks | 34 | 9.6 |
| | | Motorbikes | 3 | <1 |
| | | **Total** | **356** | **100** |
| Braking | Cars | Braked | 306 | 96.0 |
| | | Did not brake | 12 | 4.0 |
| | Truck | Braked | 33 | 97.0 |
| | | Did not brake | 1 | 3.0 |
| Lateral placement | | Mostly Centre | 205 | 57.6 |
| | | Mostly Edge | 48 | 13.4 |
| | | Mostly Right | 29 | 8.2 |
| | | Mostly Centre and Edge | 34 | 9.6 |
| | | Mostly Centre and Right | 30 | 8.4 |
| | | Mostly Edge and Right | 5 | 1.4 |
| | | All Sections used | 5 | 1.4 |

**Ballarto Road - Control - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 153 | 89.5 |
| | | Trucks | 17 | 9.9 |
| | | Motorbikes | 1 | <1.0 |
| | | **Total** | **171** | **100** |
| Braking | Cars | Braked | 5 | 3.3 |
| | | Did not brake | 148 | 96.7 |
| | Trucks | Braked | 0 | 0 |
| | | Did not brake | 17 | 100 |
| Lateral placement | | Mostly Centre | 91 | 53.2 |
| | | Mostly Edge | 27 | 16.5 |
| | | Mostly Right | 13 | 8.0 |
| | | Mostly Centre and Edge | 16 | 10.2 |
| | | Mostly Centre and Right | 12 | 7.3 |
| | | Mostly Edge and Right | 1 | <1 |
| | | All Sections used | 6 | 4.0 |

## Intersection Sites: Victoria – Before Period cont.

**Bittern-Dromana Road- Control - *Before***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 177 | 88.5 |
| | | Trucks | 14 | 7.0 |
| | | Motorbikes | 9 | 4.5 |
| | | **Total** | **200** | **100** |
| Braking | Cars | Braked | 72 | 40.7 |
| | | Did not brake/unknown | 105 | 59.3 |
| | Trucks | Braked | 2 | 14.2 |
| | | Did not brake/unknown | 12 | 85.8 |
| Lateral placement | | Mostly Centre | 122 | 61.0 |
| | | Mostly Edge | 41 | 20.5 |
| | | Mostly Right | 3 | 1.5 |
| | | Mostly Centre and Edge | 24 | 12.0 |
| | | Mostly Centre and Right | 8 | 4.0 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 2 | 1.0 |
| | | Unknown | 0 | 0 |

**Bittern-Dromana Road - Treatment - *Before***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 171 | 86.4 |
| | | Trucks | 27 | 13.6 |
| | | Motorbikes | 0 | 0 |
| | | **Total** | **198** | **100** |
| Braking | Cars | Braked | 0 | 0 |
| | | Did not brake | 171 | 100 |
| | Trucks | Braked | 0 | 0 |
| | | Did not brake | 27 | 100 |
| Lateral placement | | Mostly Centre | 126 | 63.6 |
| | | Mostly Edge | 53 | 26.8 |
| | | Mostly Right | 19 | 9.6 |
| | | Mostly Centre and Edge | 0 | 0 |
| | | Mostly Centre and Right | 0 | 0 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 0 | 0 |
| | | Unknown | 0 | 0 |

## Intersection Sites: Victoria – Before Period cont.

**Myers Road – Control - *Before***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 164 | 94.3 |
| | Trucks | 10 | 5.7 |
| | **Total** | **174** | **100** |
| Braking – Cars | Braked | 134 | 81.7 |
| | Did not brake | 30 | 18.3 |
| Braking – Trucks | Braked | 8 | 80.0 |
| | Did not brake | 2 | 20.0 |
| Lateral placement | Mostly Centre | 129 | 74.1 |
| | Mostly Edge | 24 | 13.8 |
| | Mostly Right | 1 | <1.0 |
| | Mostly Centre and Edge | 7 | 4.0 |
| | Mostly Centre and Right | 5 | 2.9 |
| | Mostly Edge and Right | 1 | <1.0 |
| | All Sections used | 2 | 1.1 |
| | Unknown | 5 | 2.9 |

**Myers Road - Treatment - *Before***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 116 | 100 |
| | Trucks | 0 | 0 |
| | **Total** | **116** | **100** |
| Braking – Cars | Braked | 106 | 91.3 |
| | Did not brake | 10 | 8.7 |
| Lateral placement | Mostly Centre | 76 | 65.5 |
| | Mostly Edge | 6 | 5.0 |
| | Mostly Right | 15 | 12.0 |
| | Mostly Centre and Edge | 2 | 1.7 |
| | Mostly Centre and Right | 18 | 15.5 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 1 | <1.0 |

## Intersection Sites: NSW – Before Period

**The Driftway – <u>Treatment</u> - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 224 | 83 |
| | | Trucks | 47 | 17 |
| | | **Total** | **271** | **100** |
| **Braking** | **Cars** | Braked | 116 | 52 |
| | | Did not brake | 108 | 48 |
| | **Trucks** | Braked | 17 | 36 |
| | | Did not brake | 30 | 64 |
| **Lateral placement** | | Mostly Centre | 13 | 4.8 |
| | | Mostly Edge | 1 | 0.3 |
| | | Mostly Right | 1 | 0.3 |
| | | Mostly Centre and Edge | 113 | 42. |
| | | Mostly Centre and Right | 36 | 13.2 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 107 | 39.4 |

**The Driftway – <u>Control</u> - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| **Vehicle Type** | | Cars | 51 | 79.7 |
| | | Trucks | 13 | 20.3 |
| | | Motorbikes | 0 | 0 |
| | | **Total** | **64** | **100** |
| **Braking** | **Cars** | Braked | 0 | 0 |
| | | Did not brake | 51 | 100 |
| | **Trucks** | Braked | 0 | 0 |
| | | Did not brake | 13 | 100 |
| **Lateral placement** | | Mostly Centre | 32 | 50.0 |
| | | Mostly Edge | 18 | 28.1 |
| | | Mostly Right | 0 | 0 |
| | | Mostly Centre and Edge | 13 | 20.3 |
| | | Mostly Centre and Right | 0 | 0 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 1 | 1.6 |
| | | Unknown | 0 | 0 |

## Intersection Sites: NSW – Before Period cont.

**Old Stock Route Road – Treatment - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 119 | 88 |
| | | Trucks | 16 | 12 |
| | | **Total** | **135** | **100** |
| Braking | Cars | Braked | 44 | 37 |
| | | Did not brake | 75 | 63 |
| | Trucks | Braked | 3 | 6 |
| | | Did not brake | 13 | 94 |
| Lateral placement | | Mostly Centre | 0 | |
| | | Mostly Edge | 1 | .7 |
| | | Mostly Right | 0 | |
| | | Mostly Centre and Edge | 25 | 9.6 |
| | | Mostly Centre and Right | 13 | 19 |
| | | Mostly Edge and Right | 1 | .7 |
| | | All Sections used | 95 | 70 |

**Old Stock Route Road – Control - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 115 | 88 |
| | | Trucks | 15 | 11 |
| | | Motorbikes | 2 | 1 |
| | | **Total** | **132** | **100** |
| Braking | Cars | Braked | 88 | 76.5 |
| | | Did not brake | 27 | 23.5 |
| | Trucks | Braked | 9 | 60 |
| | | Did not brake | 6 | 40 |
| Lateral placement | | Mostly Centre | 2 | 1.5 |
| | | Mostly Edge | 0 | |
| | | Mostly Right | 16 | 12.1 |
| | | Mostly Centre and Edge | 2 | 1.5 |
| | | Mostly Centre and Right | 103 | 78 |
| | | Mostly Edge and Right | 0 | |
| | | All Sections used | 9 | 6.9 |
| | | Unknown | 0 | 0 |

## Intersection Sites: NSW – Before Period cont.

**Smith Road - Treatment - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 105 | 87 |
| | | Trucks | 16 | 13 |
| | | **Total** | **121** | **100** |
| Braking | Cars | Braked | 81 | 77 |
| | | Did not brake | 24 | 23 |
| | Trucks | Braked | 11 | 69 |
| | | Did not brake | 5 | 31 |
| Lateral placement | | Mostly Centre | 67 | 55 |
| | | Mostly Edge | 5 | 4.1 |
| | | Mostly Right | 13 | 10.7 |
| | | Mostly Centre a nd Edge | 15 | 13 |
| | | Mostly Centre and Right | 20 | 16.2 |
| | | Mostly Edge and Right | 0 | |
| | | All Sections used | 1 | 1 |

**Smith Road – Control - *Before***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 120 | 90 |
| | | Trucks | 14 | 10 |
| | | Motorbikes | 0 | 0 |
| | | Total | **134** | **100** |
| Braking | Cars | Braked (avg. distance m) | 86 | 72 |
| | | Did not brake | 34 | 28 |
| | Trucks | Braked (avg. distance m) | 7 | 50 |
| | | Did not brake | 7 | 50 |
| Lateral placement | | Mostly Centre | 43 | 32 |
| | | Mostly Edge | 6 | 4.4 |
| | | Mostly Right | 0 | 0 |
| | | Mostly Centre and Edge | 61 | 45.5 |
| | | Mostly Centre and Right | 15 | 11.3 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 9 | 6.8 |
| | | Unknown | 0 | 0 |

## Intersection Sites: Vic – Immediately After (1 month after) Period

**Ballarto Road - Control - *1st After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 123 | 87.2 |
| | Trucks | 18 | 12.8 |
| | **Total** | **141** | **100** |
| Braking – Cars | Braked | 2 | 1.6 |
| | Did not brake | 121 | 98.4 |
| Braking – Trucks | Braked | 0 | 0 |
| | Did not brake | 18 | 100 |
| Lateral placement | Mostly Centre | 38 | 27.0 |
| | Mostly Edge | 2 | 1.5 |
| | Mostly Right | 16 | 11.4 |
| | Mostly Centre and Edge | 19 | 13.1 |
| | Mostly Centre and Right | 54 | 38.5 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 12 | 8.5 |

**Ballarto Road - Treatment - *1st After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| Vehicle Type | Cars | 66 | 94.3 |
| | Trucks | 3 | 4.3 |
| | Motorbikes | 1 | 1.4 |
| | Total | 70 | 100 |
| Braking – Cars | Braked | 62 | 94 |
| | Did not brake | 4 | 6 |
| Braking – Trucks | Braked | 2 | 66.6 |
| | Did not brake | 1 | 33.4 |
| Lateral placement | Mostly Centre | 32 | 45.7 |
| | Mostly Edge | 11 | 15.7 |
| | Mostly Right | 3 | 4.1 |
| | Mostly Centre and Edge | 13 | 18.5 |
| | Mostly Centre and Right | 10 | 14.0 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 2 | 2.0 |

## Intersection Sites: Vic – Immediately After (1 month after) Period cont.

**Bittern-Dromana Road - Control - *1st After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 236 | 86.8 |
| | Trucks | 34 | 12.5 |
| | Motorbikes | 2 | <1.0 |
| | **Total** | **272** | **100** |
| **Braking** **Cars** | Braked | 43 | 18.2 |
| | Did not brake | 193 | 82.8 |
| **Trucks** | Braked | 2 | 5.9 |
| | Did not brake | 32 | 94.1 |
| **Lateral placement** | Mostly Centre | 158 | 58.0 |
| | Mostly Edge | 2 | <1.0 |
| | Mostly Right | 6 | 2.2 |
| | Mostly Centre and Edge | 39 | 14.3 |
| | Mostly Centre and Right | 60 | 22.1 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 7 | 2.6 |
| | Unknown | 0 | 0 |

**Bittern-Dromana Road - Treatment - *1st After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 172 | 93.0 |
| | Trucks | 12 | 6.5 |
| | Motorbikes | 1 | <1.0 |
| | **Total** | **185** | **100** |
| **Braking** **Cars** | Braked | 70 | 41.0 |
| | Did not brake | 102 | 59.0 |
| **Trucks** | Braked | 6 | 50.0 |
| | Did not brake | 6 | 50.0 |
| **Lateral placement** | Mostly Centre | 127 | 68.0 |
| | Mostly Edge | 33 | 17.8 |
| | Mostly Right | 5 | 2.7 |
| | Mostly Centre and Edge | 12 | 6.5 |
| | Mostly Centre and Right | 7 | 3.8 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 1 | <1.0 |
| | Unknown | 0 | 0 |

## Intersection Sites: Vic – Immediately After (1 month after) Period cont.

**Myers Road - Control - *1st After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 117 | 96.7 |
| | | Trucks | 3 | 2.5 |
| | | Motorbikes | 1 | <1 |
| | | **Total** | **121** | **100** |
| Braking | Cars | Braked | 37 | 31.6 |
| | | Did not brake | 80 | 68.4 |
| | Trucks | Braked | 0 | 0 |
| | | Did not brake | 3 | 100 |
| Lateral placement | | Mostly Centre | 35 | 28.9 |
| | | Mostly Edge | 0 | 0 |
| | | Mostly Right | 32 | 26.4 |
| | | Mostly Centre and Edge | 4 | 3.3 |
| | | Mostly Centre and Right | 39 | 32.2 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 11 | 9.1 |
| | | Unknown | 0 | 0 |

**Myers Road - Treatment - *1st After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 73 | 97.3 |
| | | Trucks | 2 | 2.7 |
| | | **Total** | **75** | **100** |
| Braking | Cars | Braked | 22 | 30.0 |
| | | Did not brake | 51 | 70.0 |
| | Trucks | Braked | 1 | 50.0 |
| | | Did not brake | 1 | 50.0 |
| Lateral placement | | Mostly Centre | 48 | 64.0 |
| | | Mostly Edge | 2 | 3.0 |
| | | Mostly Right | 4 | 5.3 |
| | | Mostly Centre and Edge | 6 | 8.0 |
| | | Mostly Centre and Right | 11 | 14.7 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 3 | 4.0 |
| | | Unknown | 1 | 1.0 |

## Intersection Sites: NSW – Immediately After (1 month after) Period

**The Driftway -Treatment - *After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 127 | 86 |
| | Trucks | 19 | 14 |
| | **Total** | **146** | **100** |
| **Braking** Cars | Braked | 59 | 46 |
| | Did not brake | 68 | 54 |
| **Braking** Trucks | Braked | 8 | 42 |
| | Did not brake | 11 | 58 |
| **Lateral placement** | Mostly Centre | 17 | 48.6 |
| | Mostly Edge | 19 | 13 |
| | Mostly Right | 5 | 3.4 |
| | Mostly Centre and Edge | 31 | 21 |
| | Mostly Centre and Right | 16 | 11 |
| | Mostly Edge and Right | | |
| | All Sections used | 4 | 3 |

**The Driftway - Control - *1st After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 132 | 81 |
| | Trucks | 29 | 19 |
| | Motorbikes | 0 | |
| | Total | 161 | 100 |
| **Braking** Cars | Braked | 47 | 35 |
| | Did not brake | 185 | 65 |
| **Braking** Trucks | Braked | 7 | 25 |
| | Did not brake | 22 | 75 |
| **Lateral placement** | Mostly Centre | 91 | 56.5 |
| | Mostly Edge | 10 | 6.2 |
| | Mostly Right | 0 | |
| | Mostly Centre and Edge | 41 | 25.5 |
| | Mostly Centre and Right | 17 | 10.6 |
| | Mostly Edge and Right | 0 | |
| | All Sections used | 2 | 1.2 |
| | Unknown | 0 | 0 |

## Intersection Sites: NSW – Immediately After (1 month after) Period cont.

**Old Stock Route Road – Treatment - *1st After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 111 | 93 |
| | Trucks | 7 | 5 |
| | Motrobikes | 2 | 2 |
| | **Total** | **120** | **100** |
| **Braking** – **Cars** | Braked | 31 | 28 |
| | Did not brake | 80 | 72 |
| **Braking** – **Trucks** | Braked | 1 | 14 |
| | Did not brake | 6 | 86 |
| **Lateral placement** | Mostly Centre | 71 | 59.1 |
| | Mostly Edge | 3 | 2.5 |
| | Mostly Right | 41 | 34.2 |
| | Mostly Centre and Edge | 0 | |
| | Mostly Centre and Right | 5 | 4.2 |
| | Mostly Edge and Right | 0 | |
| | All Sections used | 0 | |

**Old Stock Route Road – Control - *1st After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 96 | 93 |
| | Trucks | 8 | 7 |
| | Motorbikes | 0 | |
| | **Total** | **104** | **100** |
| **Braking** – **Cars** | Braked | 53 | 55 |
| | Did not brake | 45 | 45 |
| **Braking** – **Trucks** | Braked | 2 | 25 |
| | Did not brake | 6 | 75 |
| **Lateral placement** | Mostly Centre | 53 | 51 |
| | Mostly Edge | 23 | 22 |
| | Mostly Right | 19 | 18.3 |
| | Mostly Centre and Edge | 8 | 7.6 |
| | Mostly Centre and Right | 1 | 1 |
| | Mostly Edge and Right | 0 | |
| | All Sections used | 0 | |
| | Unknown | 0 | |

## Intersection Sites: NSW – Immediately After (1 month after) Period cont.

**Smith Road –<u>Treatment</u> - *1st After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 104 | 92 |
| | Trucks | 9 | 6 |
| | Motorbikes | 2 | 2 |
| | **Total** | **115** | **100** |
| **Braking** – **Cars** | Braked | 16 | 16 |
| | Did not brake | 88 | 84.6 |
| **Braking** – **Trucks** | Braked | 1 | 11 |
| | Did not brake | 8 | 89 |
| **Lateral placement** | Mostly Centre | 65 | 56.5 |
| | Mostly Edge | 30 | 26 |
| | Mostly Right | 20 | 17.4 |
| | Mostly Centre and Edge | 0 | |
| | Mostly Centre and Right | 0 | |
| | Mostly Edge and Right | 0 | |
| | All Sections used | 0 | |
| | Unknown | 1 | <1 |

**Smith Road – <u>Control</u> - *1st After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 120 | 97 |
| | Trucks | 4 | 3 |
| | Motorbikes | 0 | 0 |
| | **Total** | **124** | **100** |
| **Braking** – **Cars** | Braked | 61 | 51 |
| | Did not brake | 59 | 49 |
| **Braking** – **Trucks** | Braked | 1 | 25 |
| | Did not brake | 3 | 75 |
| **Lateral placement** | Mostly Centre | 62 | 50 |
| | Mostly Edge | 30 | 24 |
| | Mostly Right | 25 | 20 |
| | Mostly Centre and Edge | 5 | 4 |
| | Mostly Centre and Right | 1 | 1 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 0 | 0 |
| | Unknown | 1 | 1 |

## Intersection Sites: Victoria – Long-term (12 months after) Period

**Ballarto Road - Control - *2nd After***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 183 | 85.5 |
| | Trucks | 31 | 14.5 |
| | **Total** | **214** | **100** |
| Braking – Cars | Braked | 10 | 5.5 |
| | Did not brake | 173 | 94.5 |
| Braking – Trucks | Braked | 0 | 0 |
| | Did not brake | 31 | 100 |
| Lateral placement | Mostly Centre | 10 | 4.7 |
| | Mostly Edge | 7 | 3.3 |
| | Mostly Right | 30 | 14.0 |
| | Mostly Centre and Edge | 58 | 27.1 |
| | Mostly Centre and Right | 58 | 27.1 |
| | Mostly Edge and Right | 6 | 3.0 |
| | All Sections used | 45 | 21.0 |

**Ballarto Road - Treatment - *2nd After***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 279 | 85.8 |
| | Trucks | 45 | 13.8 |
| | Motorbikes | 1 | 0.4 |
| | **Total** | **325** | **100** |
| Braking – Cars | Braked | 47 | 16.8 |
| | Did not brake | 232 | 83.2 |
| Braking – Trucks | Braked | 3 | 6.7 |
| | Did not brake | 42 | 93.3 |
| Lateral placement | Mostly Centre | 26 | 8.0 |
| | Mostly Edge | 26 | 8.0 |
| | Mostly Right | 34 | 10.5 |
| | Mostly Centre and Edge | 88 | 27.1 |
| | Mostly Centre and Right | 87 | 26.7 |
| | Mostly Edge and Right | 14 | 4.3 |
| | All Sections used | 49 | 15.1 |
| | Unknown | 1 | 0.3 |

## Intersection Sites: Victoria – Long-term (12 months after) Period cont.

**Bittern-Dromana Road- Control - *2nd After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 245 | 83.9 |
| | | Trucks | 44 | 15.1 |
| | | Motorbikes | 3 | 1.0 |
| | | **Total** | **292** | **100** |
| Braking | Cars | Braked | 16 | 6.5 |
| | | Did not brake | 299 | 93.5 |
| | Trucks | Braked | 5 | 11.0 |
| | | Did not brake | 39 | 89.0 |
| Lateral placement | | Mostly Centre | 85 | 29.0 |
| | | Mostly Edge | 17 | 5.8 |
| | | Mostly Right | 10 | 3.4 |
| | | Mostly Centre and Edge | 74 | 25.3 |
| | | Mostly Centre and Right | 79 | 27.0 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 26 | 9.0 |
| | | Unknown | 1 | <1.0 |

**Bittern-Dromana Road- Treatment - *2nd After***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 163 | 88.1 |
| | | Trucks | 21 | 11.4 |
| | | Motorbikes | 1 | <1.0 |
| | | **Total** | **185** | **100** |
| Braking | Cars | Braked | 49 | 30.0 |
| | | Did not brake | 114 | 70.0 |
| | Trucks | Braked | 5 | 24.0 |
| | | Did not brake | 16 | 76.0 |
| Lateral placement | | Mostly Centre | 37 | 20.0 |
| | | Mostly Edge | 4 | 2.2 |
| | | Mostly Right | 4 | 2.2 |
| | | Mostly Centre and Edge | 39 | 21.0 |
| | | Mostly Centre and Right | 66 | 35.6 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 35 | 19.0 |
| | | Unknown | 0 | 0 |

## Intersection Sites: Victoria – Long-term (12 months after) Period cont.

**Myers Road- Control - 2nd *After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 138 | 97.2 |
| | | Trucks | 4 | 2.8 |
| | | **Total** | **142** | **100** |
| Braking | Cars | Braked | 16 | 11.6 |
| | | Did not brake | 122 | 88.4 |
| | Trucks | Braked | 0 | 0 |
| | | Did not brake | 4 | 100 |
| Lateral placement | | Mostly Centre | 57 | 40.0 |
| | | Mostly Edge | 8 | 5.6 |
| | | Mostly Right | 4 | 2.8 |
| | | Mostly Centre and Edge | 45 | 31.6 |
| | | Mostly Centre and Right | 23 | 16.2 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 5 | 3.5 |

**Myers Road - Treatment - *2nd After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 96 | 96.0 |
| | | Trucks | 4 | 4.0 |
| | | **Total** | **100** | **100** |
| Braking | Cars | Braked | 43 | 44.8 |
| | | Did not brake | 53 | 55.2 |
| | Trucks | Braked | 3 | 75.0 |
| | | Did not brake | 1 | 25.0 |
| Lateral placement | | Mostly Centre | 33 | 33.0 |
| | | Mostly Edge | 5 | 5.0 |
| | | Mostly Right | 12 | 12.0 |
| | | Mostly Centre and Edge | 17 | 17.0 |
| | | Mostly Centre and Right | 24 | 24.0 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 9 | 9.0 |

## Intersection Sites: NSW – Long-term (12 months after) Period

**The Driftway -Treatment - *2nd After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 161 | 75 |
| | | Trucks | 50 | 23 |
| | | Motorbikes | 2 | 2 |
| | | **Total** | **213** | **100** |
| Braking | Cars | Braked | 11 | 7 |
| | | Did not brake | 150 | 93 |
| | Trucks | Braked | 1 | 2 |
| | | Did not brake | 49 | 98 |
| | M'bikes | Braked | 1 | 50 |
| | | Did not brake | 1 | 50 |
| Lateral placement | | Mostly Centre | 12 | 5 |
| | | Mostly Edge | 14 | 6 |
| | | Mostly Right | 14 | 6 |
| | | Mostly Centre and Edge | 61 | 29 |
| | | Mostly Centre and Right | 42 | 20 |
| | | Mostly Edge and Right | 8 | 4 |
| | | All Sections used | 62 | 30 |

**The Driftway - Control - *2nd After***

| | | Description | Vehicles Observed No. | % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 149 | 86 |
| | | Trucks | 24 | 13 |
| | | Motorbikes | 1 | 1 |
| | | **Total** | **174** | **100** |
| Braking | Cars | Braked | 25 | 17 |
| | | Did not brake | 124 | 83 |
| | Trucks | Braked | 2 | 8 |
| | | Did not brake | 22 | 92 |
| | | Motorbikes Did not brake | 1 | 100 |
| Lateral placement | | Mostly Centre | 2 | 2 |
| | | Mostly Edge | 72 | 41 |
| | | Mostly Right | 1 | 1 |
| | | Mostly Centre and Edge | 75 | 43 |
| | | Mostly Centre and Right | 6 | 3 |
| | | Mostly Edge and Right | 4 | 2 |
| | | All Sections used | 14 | 8 |

## Intersection Sites: NSW – Long-term (12 months after) Period cont.

**Old Stock Route Road - Treatment - *2nd After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 151 | 91.5 |
| | Trucks | 14 | 8.5 |
| | **Total** | **165** | **100** |
| **Braking** – **Cars** | Braked | 31 | 20.5 |
| | Did not brake | 120 | 79.5 |
| **Braking** – **Trucks** | Braked | 1 | 7.1 |
| | Did not brake | 13 | 92.9 |
| **Lateral placement** | Mostly Centre | 20 | 12.1 |
| | Mostly Edge | 11 | 6.7 |
| | Mostly Right | 3 | 1.8 |
| | Mostly Centre and Edge | 61 | 37.0 |
| | Mostly Centre and Right | 29 | 17.6 |
| | Mostly Edge and Right | 13 | 7.8 |
| | All Sections used | 28 | 17.0 |

**Old Stock Route Road – Control - *2nd After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | | |
| | Trucks | | |
| | Motorbikes | | |
| | **Total** | | |
| **Braking** – **Cars** | Braked | | |
| | Did not brake | | |
| **Braking** – **Trucks** | Braked | | |
| | Did not brake | | |
| **Lateral placement** | Mostly Centre | | |
| | Mostly Edge | | |
| | Mostly Right | | |
| | Mostly Centre and Edge | | |
| | Mostly Centre and Right | | |
| | Mostly Edge and Right | | |
| | All Sections used | | |
| | Unknown | | |

## Intersection Sites: NSW – Long-term (12 months after) Period cont.

**Smith Road – Treatment – *2nd After***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 110 | 99 |
| | Trucks | 11 | 1 |
| | **Total** | **121** | **100** |
| Braking – Cars | Braked | 60 | 55 |
| | Did not brake | 50 | 45 |
| Braking – Trucks | Braked | 5 | 45 |
| | Did not brake | 6 | 55 |
| Lateral placement | Mostly Centre | 6 | 5 |
| | Mostly Edge | 25 | 21 |
| | Mostly Right | 1 | 1 |
| | Mostly Centre and Edge | 56 | 46 |
| | Mostly Centre and Right | 23 | 19 |
| | Mostly Edge and Right | 1 | 1 |
| | All Sections used | 9 | 7 |

**Smith Road – Control - *2nd After***

| | Description | Vehicles Observed | |
|---|---|---|---|
| | | No. | % |
| Vehicle Type | Cars | 122 | 87 |
| | Trucks | 18 | 13 |
| | **Total** | **140** | **100** |
| Braking – Cars | Braked | 79 | 65 |
| | Did not brake | 43 | 35 |
| Braking – Trucks | Braked | 5 | 28 |
| | Did not brake | 13 | 72 |
| Lateral placement | Mostly Centre | 2 | 1 |
| | Mostly Edge | 34 | 24 |
| | Mostly Right | 2 | 1 |
| | Mostly Centre and Edge | 50 | 36 |
| | Mostly Centre and Right | 30 | 22 |
| | Mostly Edge and Right | 3 | 2 |
| | All Sections used | 19 | 14 |
| | Unknown | 0 | |

## Intersection Sites – Night Observations: Victoria – Before Period

**Ballarto Road- Control - *Before***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 95 | 94.1 |
| | | Trucks | 6 | 5.9 |
| | | Motorbikes | 0 | 0 |
| | | **Total** | **101** | **100** |
| Braking | Cars | Braked | 52 | 55.0 |
| | | Did not brake | 43 | 45.0 |
| | Trucks | Braked | 4 | 66.0 |
| | | Did not brake | 2 | 34.0 |
| Lateral placement | | Mostly Centre | 36 | 35.6 |
| | | Mostly Edge | 33 | 32.7 |
| | | Mostly Right | 6 | 5.9 |
| | | Mostly Centre and Edge | 12 | 11.9 |
| | | Mostly Centre and Right | 10 | 9.9 |
| | | Mostly Edge and Right | 1 | <1.0 |
| | | All Sections used | 3 | 3.0 |
| | | Unknown | 0 | 0 |

**Ballarto Road- Treatment - *Before***

| | | Description | Vehicles Observed No. | Vehicles Observed % |
|---|---|---|---|---|
| Vehicle Type | | Cars | 193 | 96.5 |
| | | Trucks | 7 | 3.5 |
| | | Motorbikes | 0 | 0 |
| | | **Total** | **200** | **100** |
| Braking | Cars | Braked | 154 | 79.8 |
| | | Did not brake | 39 | 20.2 |
| | Trucks | Braked | 3 | 42.9 |
| | | Did not brake | 4 | 57.1 |
| Lateral placement | | Mostly Centre | 127 | 63.5 |
| | | Mostly Edge | 27 | 13.5 |
| | | Mostly Right | 24 | 12.0 |
| | | Mostly Centre and Edge | 11 | 5.5 |
| | | Mostly Centre and Right | 11 | 5.5 |
| | | Mostly Edge and Right | 0 | 0 |
| | | All Sections used | 0 | 0 |
| | | Unknown | 0 | 0 |

## Intersection Sites – Night Observations: Victoria – Immediately After (1 month after) Period

**Ballarto Road- Control - *1st After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| **Vehicle Type** | Cars | 73 | 86 |
| | Trucks | 10 | 12 |
| | Motorbikes | 2 | 2 |
| | **Total** | **85** | **100** |
| **Braking** **Cars** | Braked | 55 | 75 |
| | Did not brake | 18 | 25 |
| **Trucks** | Braked | 7 | 70 |
| | Did not brake | 3 | 30 |
| | Motorbikes didn't brake | 2 | 100 |
| **Lateral placement** | Mostly Centre | 24 | 29 |
| | Mostly Edge | 9 | 11 |
| | Mostly Right | 11 | 12 |
| | Mostly Centre and Edge | 25 | 30 |
| | Mostly Centre and Right | 12 | 14 |
| | Mostly Edge and Right | 0 | 0 |
| | All Sections used | 4 | 4 |

**Ballarto Road- Treatment - *1st After***

| | Description | Vehicles Observed No. | % |
|---|---|---|---|
| **Vehicle Type** | Cars | 67 | 95 |
| | Trucks | 3 | 4 |
| | Motorbikes | 1 | 1 |
| | **Total** | **71** | **100** |
| **Braking** **Cars** | Braked | 63 | 95 |
| | Did not brake | 4 | 5 |
| **Trucks** | Braked | 2 | 66 |
| | Did not brake | 1 | 34 |
| | Motorbikes that braked | 1 | 100 |
| **Lateral placement** | Mostly Centre | 32 | 46 |
| | Mostly Edge | 11 | 15 |
| | Mostly Right | 2 | 2 |
| | Mostly Centre and Edge | 13 | 19 |
| | Mostly Centre and Right | 11 | 16 |
| | Mostly Edge and Right | | |
| | All Sections used | 2 | 2 |

## Intersection Sites – Night Observations: Victoria – Long-term (12 months after) Period

**Ballarto Road- Control - *2nd After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 61 | 87 |
| | Trucks | 9 | 13 |
| | Motorbikes | 0 | |
| | **Total** | **70** | **100** |
| **Braking** Cars | Braked | 31 | 50 |
| | Did not brake | 30 | 50 |
| **Trucks** | Braked | 8 | 90 |
| | Did not brake | 1 | 10 |
| **Lateral placement** | Mostly Centre | 0 | |
| | Mostly Edge | 0 | |
| | Mostly Right | 0 | |
| | Mostly Centre and Edge | 0 | |
| | Mostly Centre and Right | 12 | 17 |
| | Mostly Edge and Right | 37 | 53 |
| | All Sections used | 21 | .03 |

**Ballarto Road - Treatment - *2nd After***

| | | Vehicles Observed | |
|---|---|---|---|
| | **Description** | **No.** | **%** |
| **Vehicle Type** | Cars | 72 | 82 |
| | Trucks | 16 | 18 |
| | Motorbikes | 0 | |
| | **Total** | **88** | **100** |
| **Braking** Cars | Braked | 72 | 100 |
| | Did not brake | 0 | |
| **Trucks** | Braked | 16 | 100 |
| | Did not brake | 0 | |
| **Lateral placement** | Mostly Centre | 18 | 20 |
| | Mostly Edge | 4 | 4 |
| | Mostly Right | 15 | 17 |
| | Mostly Centre and Edge | 22 | 26 |
| | Mostly Centre and Right | 23 | 27 |
| | Mostly Edge and Right | 2 | 2 |
| | All Sections used | 4 | 4 |

# APPENDIX G: SUMMARY OF SEGMENT ANALYSES

## Summary of Net Average Speed Reductions Associated With Curve PCM Treatments

| Road | Gembrook (Day) | | Harkaway | | Pakenham | | Gembrook (Night) | | Pakenham (Night) | | Driftway | | Castlereagh | | Scheyville | | All Sites | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. |
| **After** | | | | | | | | | | | | | | | | | | |
| 1 | | | <.0001 | 4.2052 | 0.7563 | 0.3948 | 0.0297 | -7.9393 | 0.0029 | -6.8355 | 0.0144 | 4.2586 | 0.2266 | -1.7488 | 0.1587 | -2.3259 | 0.0241 | 1.4899 |
| 2 | | | <.0001 | 4.8333 | 0.1744 | 1.6908 | 0.0816 | -5.9815 | 0.0222 | -5.0749 | 0.0041 | 4.6784 | 0.316 | -1.4248 | 0.4091 | -1.3645 | 0.0001 | 2.4198 |
| 3 | 0.001 | -6.7987 | <.0001 | 4.3836 | 0.378 | 1.2505 | 0.1927 | -4.0216 | 0.0856 | -3.8581 | 0.0048 | 4.5448 | 0.3802 | -1.2454 | 0.2493 | -1.8462 | 0.0043 | 1.5458 |
| 4 | 0.0006 | -5.4964 | <.0001 | 4.2245 | 0.0672 | 2.8887 | 0.4394 | 2.4975 | 0.7693 | -0.8063 | 0.0014 | 5.0664 | 0.7289 | -0.4711 | 0.4708 | -1.1592 | 0.0005 | 1.7678 |
| 5 | 0.0001 | -6.3204 | 0.0009 | 2.6968 | 0.0005 | 6.1074 | 0.6619 | 1.3358 | 0.17 | 3.7913 | 0.0002 | 5.8496 | 0.716 | -0.4966 | 0.2512 | -1.8374 | 0.0034 | 1.5087 |
| 6 | 0.2685 | -1.7875 | | | 0.0331 | 3.5283 | 0.913 | 0.3387 | 0.9615 | -0.3082 | 0.0002 | 5.9725 | 0.6155 | -0.6795 | 0.9468 | 0.1097 | 0.2006 | 0.9309 |
| 7 | 0.0724 | 4.3915 | | | | | 0.3715 | -2.6665 | | | 0.0003 | 5.7348 | 0.9523 | -0.0809 | | | 0.0306 | 1.9359 |
| 8 | 0.8965 | -0.2254 | | | | | 0.6975 | 1.124 | | | 0.0002 | 5.9356 | 0.2977 | -1.4075 | | | 0.1616 | 1.3163 |
| 9 | 0.705 | -0.6528 | | | | | 0.011 | 7.2474 | | | <.0001 | 7.0397 | 0.4966 | -0.9881 | | | 0.0078 | 2.6168 |
| 10 | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | |
| **All** | <.0001 | -4.0978 | <.0001 | 4.0406 | 0.0007 | 2.9652 | 0.6915 | -0.4055 | 0.0039 | -3.1015 | <.0001 | 5.4587 | 0.1256 | -0.8116 | 0.0344 | -1.4049 | <.0001 | 1.6609 |
| **Long Term** | | | | | | | | | | | | | | | | | | |
| 1 | | | 0.0572 | 1.8632 | | | | | 0.753 | -0.7064 | | | | | | | 0.0764 | 1.3574 |
| 2 | | | 0.0416 | 1.9347 | | | | | 0.6006 | 1.1629 | | | | | 0.2183 | -1.947 | 0.0554 | 1.3165 |
| 3 | 0.0389 | -4.4763 | 0.0101 | 2.3377 | 0.4738 | -1.1887 | | | 0.6592 | 0.9967 | 0.8538 | 0.3332 | | | 0.0546 | -2.9746 | 0.4244 | 0.4714 |
| 4 | 0.0029 | -4.8183 | 0.0479 | 1.7958 | 0.8926 | 0.2255 | 0.376 | 4.2557 | 0.2001 | 3.5852 | 0.4347 | -1.3706 | 0.7453 | 0.4204 | 0.3864 | -1.3281 | 0.8216 | 0.121 |
| 5 | <.0001 | -6.5971 | 0.0566 | 1.7689 | 0.0421 | 3.5721 | 0.6807 | 1.6103 | 0.2183 | 3.6248 | 0.247 | -2.0329 | 0.9737 | 0.0427 | 0.0609 | -2.8934 | 0.7386 | -0.182 |
| 6 | 0.1698 | -2.3242 | | | | | 0.1259 | 5.6406 | | | 0.2072 | -2.2094 | 0.9186 | 0.132 | 0.2356 | -1.8683 | 0.1274 | -1.1256 |
| 7 | 0.0365 | 5.1744 | | | | | 0.3115 | 3.5341 | | | 0.3306 | -1.6829 | 0.8767 | 0.1993 | | | 0.4264 | 0.7254 |
| 8 | | | | | | | 0.1043 | 5.3039 | | | 0.2252 | -2.0706 | 0.7982 | -0.3311 | | | 0.9435 | -0.0675 |
| 9 | | | | | | | 0.1188 | 5.1147 | | | 0.2354 | -2.2116 | 0.9473 | -0.0952 | | | 0.6741 | 0.4323 |
| 10 | | | | | | | 0.3766 | 3.0946 | | | | | | | | | 0.3786 | 3.0946 |
| 11 | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | |
| **All** | <.0001 | -3.587 | <.0001 | 1.9384 | 0.2955 | 0.9594 | 0.0222 | 3.0069 | 0.2803 | 1.1703 | 0.0077 | -1.7377 | 0.7307 | 0.1767 | 0.0008 | -2.2903 | 0.189 | 0.3035 |

**NB: There was insufficient data to analyse those cells in the table with no results quoted**

**Negative estimated reductions indicate and estimated mean speed increase**

## Summary of Net Average Speed Reductions Associated With Intersection PCM Treatments

| Road | Bittern Rd | | Myers Rd | | Bellarto Rd (Night) | | The Driftwood | | Old Stock Rd | | Smith Rd | | All Sites | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. | Sig. | Redn. |
| After | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | 0.4018 | -10.1644 | 0.2898 | -11.172 | 0.1788 | -10.7376 |
| 4 | | | | | | | | | 0.6275 | -1.7145 | 0.2737 | -2.3027 | 0.272 | -1.9318 |
| 5 | | | | | | | 0.3617 | 1.9172 | 0.002 | -7.3805 | 0.2733 | -2.2434 | 0.1756 | -1.6734 |
| 6 | | | | | | | 0.1435 | 3.0625 | 0.0623 | -3.8794 | 0.1576 | -2.8824 | 0.4572 | -0.88 |
| 7 | 0.0011 | 7.6291 | | | | | 0.1175 | 3.2483 | 0.0499 | -4.0905 | 0.1738 | -2.7719 | 0.2827 | 1.1316 |
| 8 | 0.0185 | 4.3298 | 0.0176 | -7.1373 | | | 0.1599 | 2.897 | 0.0603 | -3.9408 | 0.3053 | -2.0646 | 0.8379 | 0.1921 |
| 9 | 0.1631 | 2.5517 | 0.0029 | -7.6329 | | | 0.1502 | 2.947 | 0.0061 | -11.2263 | 0.3749 | -1.7912 | 0.6726 | -0.4127 |
| 10 | 0.3765 | -1.6009 | 0.0007 | -8.456 | | | 0.1145 | 3.2795 | 0.8314 | -0.454 | 0.2332 | 2.724 | 0.8144 | -0.2379 |
| 11 | 0.0011 | -6.0811 | 0.0001 | -9.4749 | | | 0.2415 | 2.5141 | 0.6374 | -1.0307 | 0.1931 | -2.6562 | 0.0046 | -3.1937 |
| 12 | 0.0512 | -4.993 | | | | | 0.2563 | 3.9438 | 0.8513 | 1.989 | 0.2873 | -2.186 | 0.7091 | -0.5928 |
| 13 | | | | | | | 0.0499 | 4.0182 | | | 0.6086 | -1.1121 | 0.0934 | 3.4361 |
| 14 | | | | | | | | | | | 0.214 | 15.4375 | 0.187 | 16.5532 |
| 15 | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | |
| All | 0.5883 | 0.4228 | <.0001 | -8.0525 | | | 0.0002 | 2.7887 | <.0001 | -4.4921 | 0.0109 | -1.9258 | 0.0799 | -0.6403 |

| L-T | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 3 | | | | | | | 0.8318 | 3.35 | | | | | 0.8324 | 3.35 |
| 4 | | | | | 0.335 | 3.7517 | 0.2479 | -2.7484 | | | 0.3493 | -2.8136 | 0.3584 | -1.5425 |
| 5 | | | | | 0.1646 | 5.0412 | 0.214 | -2.8041 | 0.8908 | -0.3274 | 0.5659 | -1.2854 | 0.4666 | -0.9071 |
| 6 | | | | | 0.1667 | 4.8519 | 0.2245 | -2.6875 | 0.1739 | -2.9558 | 0.6437 | -1.0044 | 0.227 | -1.4392 |
| 7 | 0.3342 | -10.2739 | | | 0.0082 | 8.7939 | 0.1296 | -3.3302 | 0.1725 | -2.968 | 0.5394 | -1.3282 | 0.6671 | -0.4954 |
| 8 | 0.0513 | 3.9068 | | | 0.003 | 9.2671 | 0.4017 | -1.7867 | 0.1982 | -2.7741 | 0.6643 | -0.9292 | 0.738 | 0.331 |
| 9 | 0.0096 | 5.192 | | | 0.0206 | 6.7672 | 0.3755 | -1.8512 | 0.016 | -9.9309 | 0.6567 | -0.929 | 0.5785 | 0.5713 |
| 10 | 0.0714 | 3.532 | 0.0625 | -4.1578 | 0.0077 | 7.7728 | 0.6488 | -0.9601 | | | 0.1277 | 3.564 | 0.2219 | 1.204 |
| 11 | 0.1408 | 2.8785 | 0.2821 | -2.2735 | 0.0674 | 6.0995 | 0.4463 | -1.6428 | | | | | 0.9909 | -0.0122 |
| 12 | 0.1023 | 3.1738 | 0.389 | -1.7902 | | | 0.8643 | -0.5933 | | | | | 0.9329 | 0.1081 |
| 13 | 0.0121 | 4.8592 | 0.4766 | -1.432 | | | | | | | | | 0.1898 | 1.8348 |
| 14 | 0.0243 | 4.3995 | 0.2377 | -2.3785 | | | | | | | | | 0.4278 | 1.1157 |
| 15 | | | 0.2132 | -2.4782 | | | | | | | | | 0.2148 | -2.4782 |
| 16 | | | 0.6257 | -0.9813 | | | | | | | | | 0.6268 | -0.9813 |
| 17 | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |
| All | <.0001 | 4.2513 | 0.0062 | -2.112 | <.0001 | 6.7834 | 0.0059 | -2.0332 | 0.0027 | -2.9745 | 0.4861 | -0.5607 | 0.8795 | 0.0514 |

**NB: There was insufficient data to analyse Bellarto Rd (Day) as well as those cells in the table with no results quoted**

**Negative estimated reductions indicate and estimated mean speed increase**