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## An examination of offences at South Australian safety camera sites

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## TITLE

An examination of offences at South Australian safety camera sites

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## ABSTRACT

Fixed safety cameras that detect speeding (and in some cases red light running) are known to be a generally effective method of controlling driver behaviour and producing road safety benefits. They were first introduced in South Australia in 1988 and are now in operation at more than 150 locations around the State. Data on the speeding and red light running offences recorded at each of the sites are now publicly available. If the number of offences declines over time, this is an indication that the safety cameras are becoming increasingly effective in preventing speeding or red light running behaviour. The offence rates of the five types of safety cameras in use in South Australia were examined on a site by site basis. Safety cameras located in South Australian 50-90 km/h speed limit zones in built-up areas showed a similar overall trend in offence rates: speeding offence rates decreased rapidly during the first two to three years of operation; continued declines in speeding offence rates occurred for many years after that; and red light running offences showed general declines over time but not as consistently or to the same extent as speeding offences. Making the cameras more conspicuous from the time of installation may accelerate their positive effects. Safety cameras may also prevent vehicle speeding on high speed rural roads upon installation (this could not be measured here) but there appears to be little change in offence rates after this time. This is possibly due to the more conspicuous nature of these cameras. The tolerances applied to point to point average speed measurements appear to be the same as applied to spot speed measurements and could reasonably be reduced.

## KEYWORDS

Speed, speeding, red light running, safety cameras

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## Summary

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Fixed safety cameras that detect speeding (and in some cases red light running) are known to be a generally effective method of controlling driver behaviour and producing road safety benefits. They were first introduced in South Australia in 1988 and are now in operation at more than 150 locations around the State.

Data on the speeding and red light running offences recorded at each of the sites are now publicly available. If the number of offences declines over time, this is an indication that the safety cameras are becoming increasingly effective in preventing speeding or red light running behaviour.

The offence rates of the five types of safety cameras in use in South Australia were examined on a site by site basis.

Safety cameras located in South Australian 50-90 km/h speed limit zones in built-up areas showed a similar overall trend in offence rates:

- Speeding offence rates decreased rapidly during the first two to three years of operation
- Continued declines in speeding offence rates occurred for many years after that
- Red light running offences showed general declines over time but not as consistently or to the same extent as speeding offences

Making the cameras more conspicuous from the time of installation may accelerate their positive effects.

Safety cameras may also prevent vehicle speeding on high speed rural roads upon installation (this could not be measured here) but there appears to be little change in offence rates after this time. This is possibly due to the more conspicuous nature of these cameras.

The tolerances applied to point to point average speed measurements appear to be the same as applied to spot speed measurements and could reasonably be reduced.

# Contents

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- 1 Introduction.....1
- 2 Methodology.....2
- 3 Speeding offences .....5
  - 3.1 Intersection cameras .....5
  - 3.2 Pedestrian crossing cameras ..... 11
  - 3.3 Railway crossing cameras.....14
  - 3.4 Mid-block cameras.....16
  - 3.5 Point to point cameras .....17
- 4 Red light running offences .....22
  - 4.1 Intersection cameras .....22
  - 4.2 Pedestrian crossing cameras .....28
  - 4.3 Railway crossing cameras.....31
- 5 Discussion .....33
  - 5.1 Urban safety cameras .....33
  - 5.2 Rural safety cameras.....33
  - 5.3 Conclusions .....34
- Acknowledgements .....35
- References .....36
- Appendix A – Safety camera site details.....37

# 1 Introduction

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Fixed safety cameras that detect speeding (and in some cases red light running) are known to be a generally effective method of controlling driver behaviour and producing road safety benefits (Wilson et al, 2010). They were first introduced in South Australia in 1988 and are now in operation at more than 150 locations around the State.

Data on the speeding and red light running offences recorded at each of the sites are now publicly available. If the number of offences declines over time, this is an indication that the safety cameras are becoming increasingly effective in preventing speeding or red light running behaviour.

A previous study of offences at South Australian safety camera sites during their first year of operation (Mackenzie, Kloeden and Hutchinson, 2013) found an overall reduction in both red light running and speeding offences during their first year of operation indicating that the cameras were becoming increasingly effective.

The purpose of this report is to examine the available offence data collected by all the cameras (including new camera types) for an extended period of time to look for evidence of their effectiveness in reducing speeding and red light running.

## 2 Methodology

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A list of all safety cameras that have been installed in South Australia was supplied by the Department of Planning, Transport and Infrastructure (DPTI). Details on each site included: site ID number; location of the site; direction of traffic covered; type of camera; commissioning date; and, where applicable, decommissioning date.

Data on all the offences recorded from South Australian safety cameras was obtained from South Australia Police (SAPOL) via DPTI for the period 1 July 2000 to 31 December 2017. The data was the same as that publicly available on the Data SA website (<https://data.sa.gov.au/data/dataset/expiation-notice-system-data>) but extended further back in time than that available at the website.

The offence data was matched to individual safety cameras using the site ID number which was common between the site list data and the offence data. Only offences that resulted in an expiation notice being issued were considered - where an offence was withdrawn it was excluded from the analysis.

Sites were selected using the following criteria:

- The site was commissioned on a date after the start of the available offence data - this ensured that offence data from the moment of commissioning was available and excluded some of the earliest sites (installed in 1988 and 1997) for which offence data was not available
- The site was not first a red light site and later a speed and red light site - this confounds the effects of the two methods of detection (this effectively excludes the 26 sites installed in 2001 and 2002)
- The site had not previously been a safety camera site - 15 early sites were decommissioned and then recommissioned under a different site number and so were excluded due to possible carry over effects
- The site had a consistent speed limit - three sites had different speed limits over the time period considered which would have affected offence rates and so were excluded
- The site has undergone no known major structural change since it was commissioned which may have affected offence rates (one site had a pedestrian crossing added)
- The site had to be in operation for at least one year - this ensured that a reasonable amount of offence data was available and excluded one sites that was only in operation for 2 months
- An additional three sites were excluded due to uncertainties about their start date and a large gap in the offence data
- This left 155 sites that were installed between 2004 and 2016
- Note that some locations had multiple cameras (covering different directions) or different means of measuring speeds (spot and average speeds) - each direction or method is treated as a separate site for analysis

For each of the selected sites, the number of speeding and red light (where applicable) offences recorded on each date was examined. The date of the first recorded offence at each of the selected sites was determined. Since this may have been a partial day or may have been biased due to requiring at least one offence, the following day was used as the reference date for tracking offences forward in time. For a small number of sites, there were a few obviously errant offences recorded before the main body of offences - in these cases the earlier offences were excluded. Details on each of the sites examined are presented in Appendix A.

Since it is likely that offences will vary during the week and sites generally had very few offences per day, the number of offences per week after the reference date for each site was used as the primary measure. The reference date and the following six days comprised week 1 for each site.

Periods when the cameras were not in operation were not known directly. They could be inferred from long periods where no offences were recorded for a particular camera but for cameras with a very low number of offences during a particular period the inferred non-operation was not definitive.

Each camera site was classified into one of five types:

- **Intersection camera** - a camera monitoring traffic through a leg of a signalised intersection for both speeding and red light running (or at one site only red light running)
- **Pedestrian crossing camera** - a camera monitoring traffic in one direction through a signalised pedestrian crossing on a mid-block section of road for both speeding and red light running
- **Railway crossing camera** - a camera monitoring traffic in one direction through a signalised railway crossing for both speeding and red light running
- **Mid-block camera** - a camera monitoring traffic in one direction at a mid-block location for speeding
- **Point to point camera** - a group of four cameras that measure spot speeds in both directions at two points along a road section and that also allow average speeds of vehicles in both directions between the cameras to be calculated

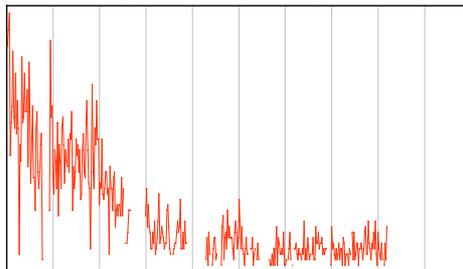
The measures examined were:

- The number of **speeding offences** recorded per week starting from the reference date
- The number of **red light running offences** recorded per week starting from the reference date

The results for each site and offence type were plotted in a standard format graph as shown in Figure 2.1. Things to note about the graph:

- The vertical axis is the number of offences recorded in a given week (with a scale from zero to the maximum value for each site)
- The horizontal axis is the number of the week of operation
- Each of the vertical grey lines represent one year (the number of years shown is the same for all sites of the same camera type)
- The maximum value given is the maximum number of offences recorded in any of the weeks considered
- Each point of the graph represents the number of offences in a given week of a particular type that were issued at that site
- Weeks with zero offences are not plotted
- Adjacent weeks with non-zero offences are joined by a line so gaps represent weeks with zero recorded offences

Figure 2.1  
Example standard format graph of offences  
Site 103 (maximum = 47)



A combined analysis for the sites was considered but the following issues were identified:

- The number of offences varied widely between sites
- There were extended periods of non-operation at many sites
- Non-operation could not be reliably detected at low offence rate sites
- There were clearly spurious effects at many sites

For these reasons, it was decided to just present the standard plots for each site and to visually examine them for general patterns.

## 3 Speeding offences

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All of the safety camera types monitored speeds and recorded speeding offences for vehicle speeds sufficiently above the speed limit. Examination of the data showed that the general tolerance varied by speed limit but was consistent over the time period examined (with a very small number of exceptions probably due to data errors or particular driver circumstances).

The following sections examine individual site speeding offences over time for each safety camera type in turn.

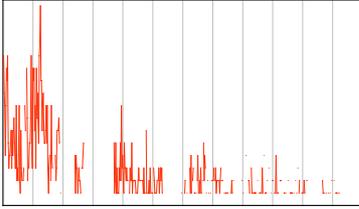
### 3.1 Intersection cameras

There were 75 intersection safety cameras that met the criteria for analysis that detected speeding (see Appendix A for site details). The following graphs show how the number of speeding offences changed over time for each of these safety cameras.

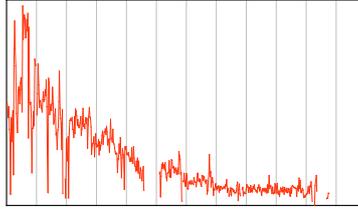
Observations from the graphs:

- The maximum number of speeding offences per week observed varied widely among the sites ranging from 3 to 532
- Even among the high offence rate sites there was considerable week to week variation
- Some sites showed extended periods of zero offences per week among generally high weekly offence rates indicating extended periods of downtime
- The high offence rate sites generally showed rapid reductions in the number of offences over the first few years and continued reductions over many years
- There were some indications among the low offence sites that offences decreased over time but this was less clear
- There were a small number of sites that showed anomalous high or low offence rates during certain periods of time

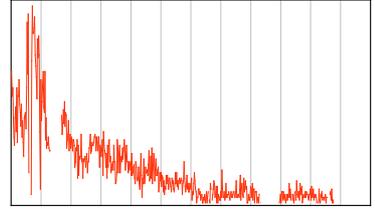
Site 48 (maximum = 16)



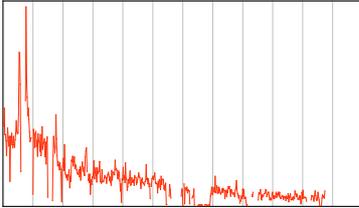
Site 49 (maximum = 532)



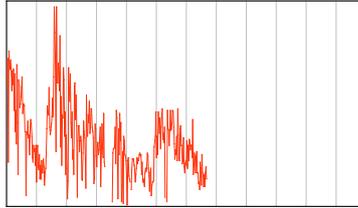
Site 50 (maximum = 73)



Site 51 (maximum = 311)



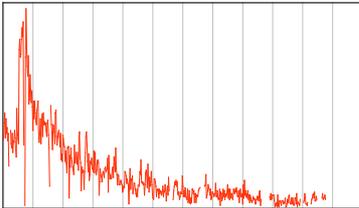
Site 52 (maximum = 131)



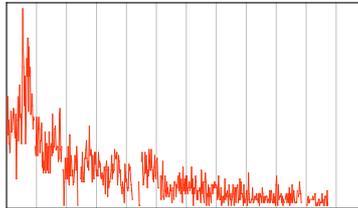
Site 54 (maximum = 356)



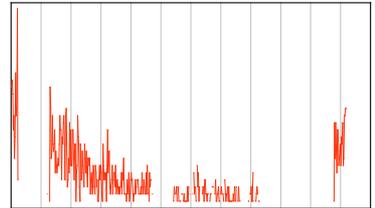
Site 56 (maximum = 136)



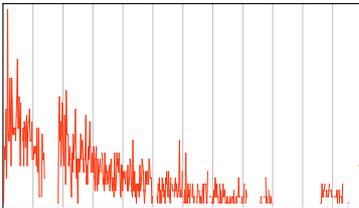
Site 57 (maximum = 68)



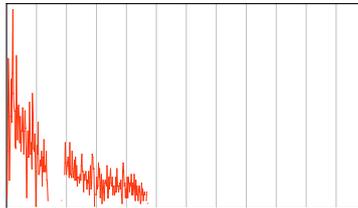
Site 58 (maximum = 28)



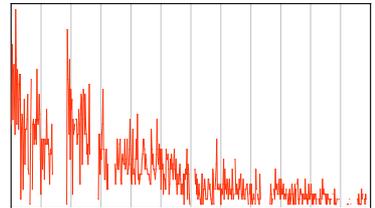
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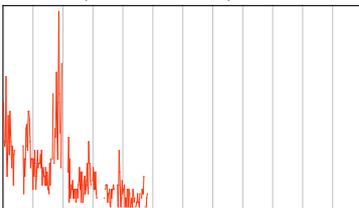
Site 60 (maximum = 69)



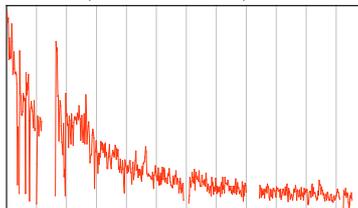
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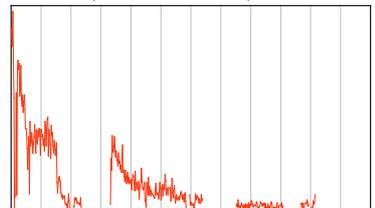
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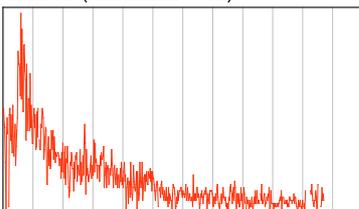
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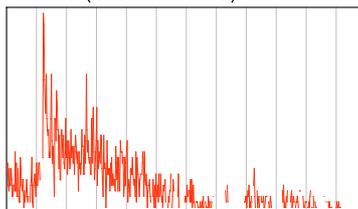
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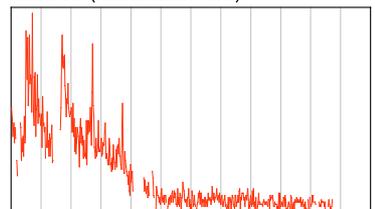
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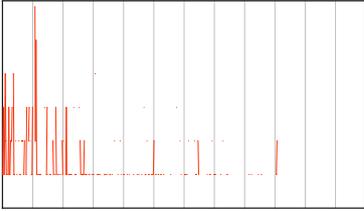
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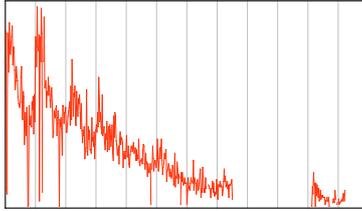
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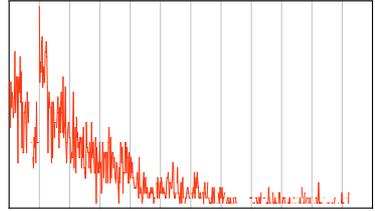
Site 69 (maximum = 6)



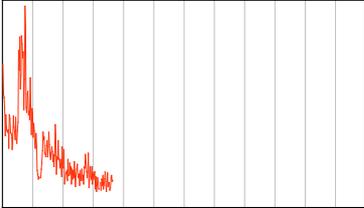
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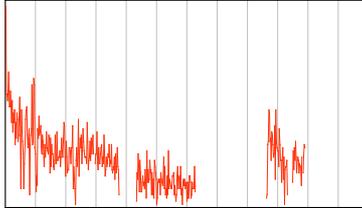
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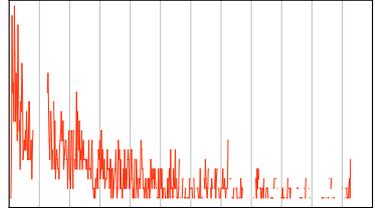
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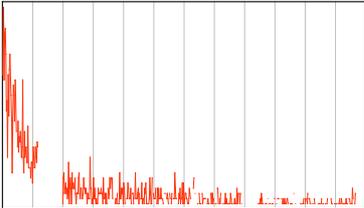
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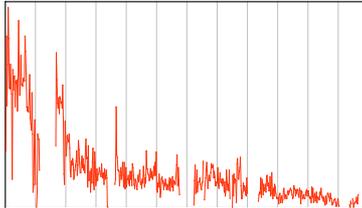
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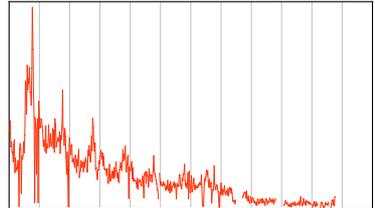
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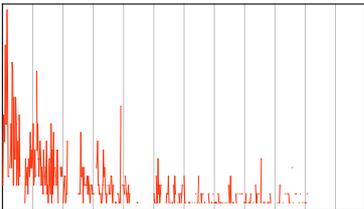
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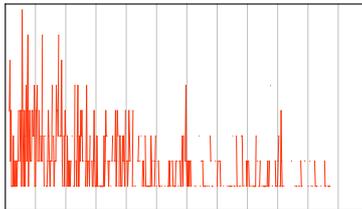
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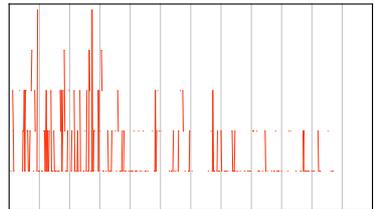
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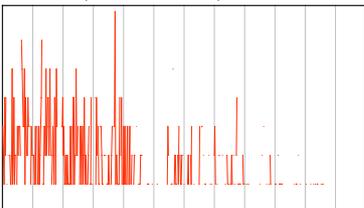
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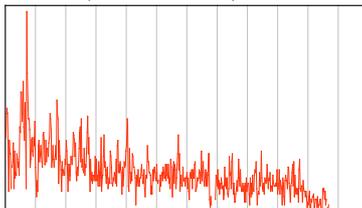
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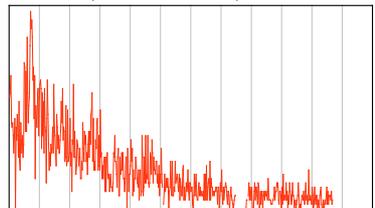
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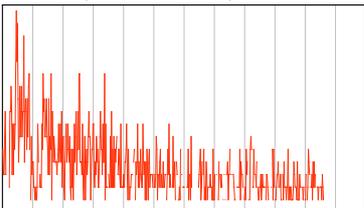
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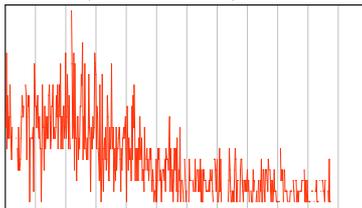
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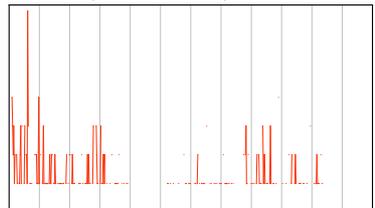
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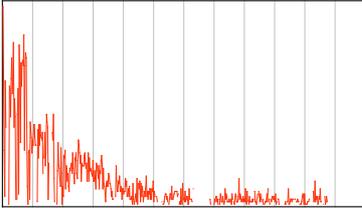
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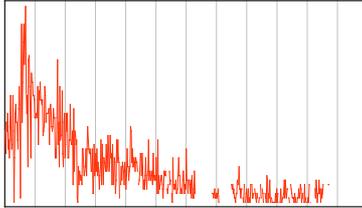
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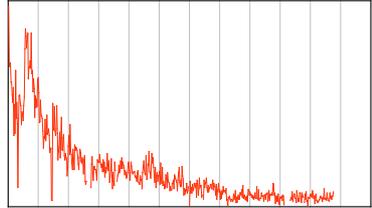
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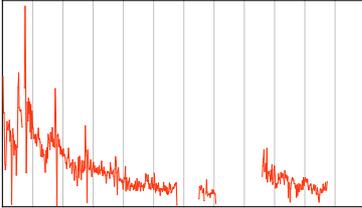
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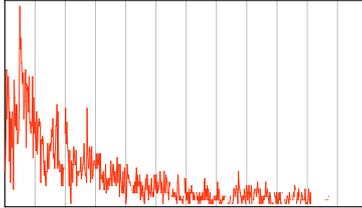
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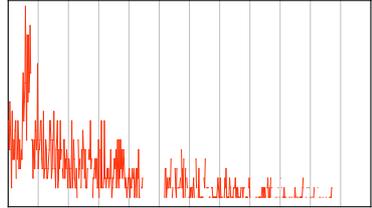
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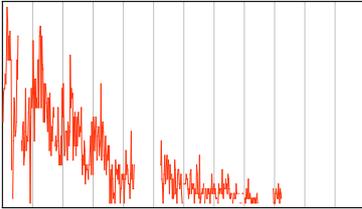
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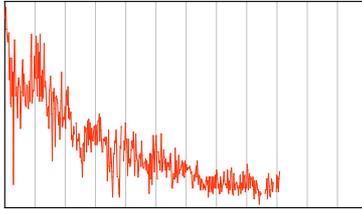
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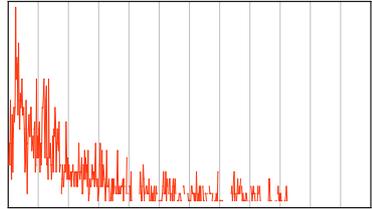
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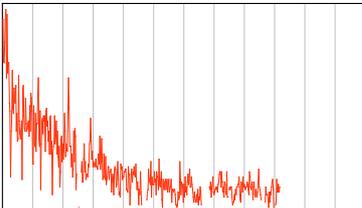
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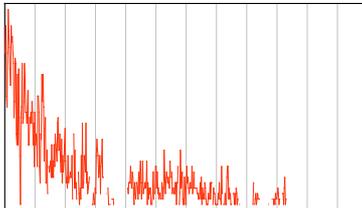
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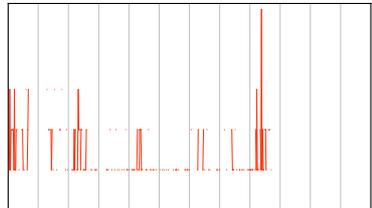
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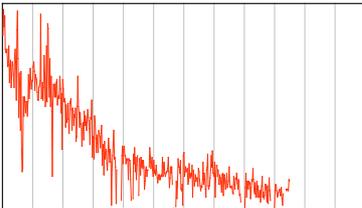
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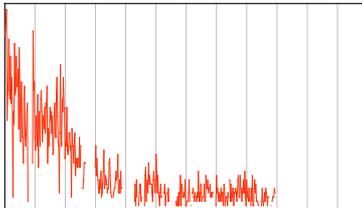
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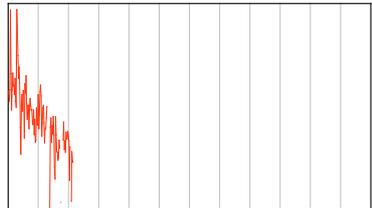
Site 102 (maximum = 126)



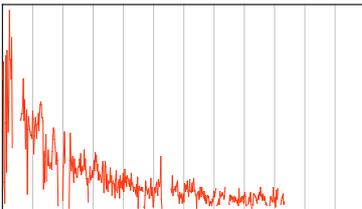
Site 103 (maximum = 47)



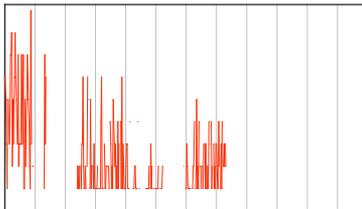
Site 104 (maximum = 299)



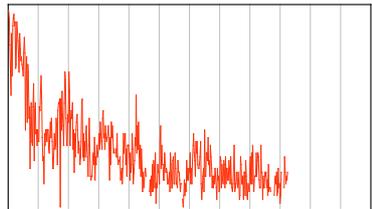
Site 105 (maximum = 155)



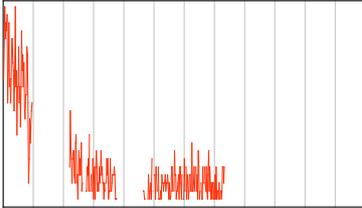
Site 106 (maximum = 9)



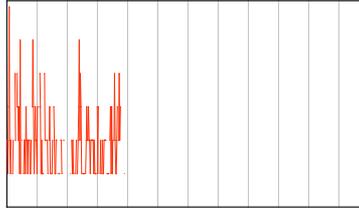
Site 107 (maximum = 52)



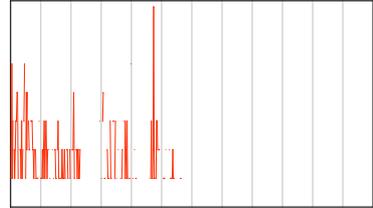
Site 110 (maximum = 25)



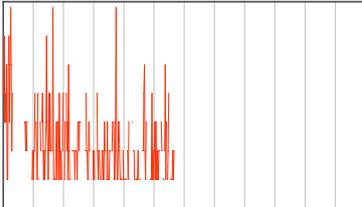
Site 113 (maximum = 6)



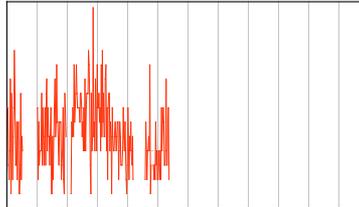
Site 114 (maximum = 7)



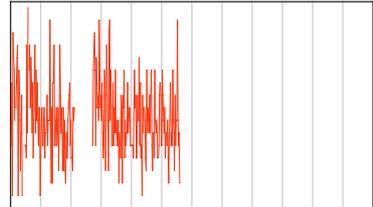
Site 115 (maximum = 7)



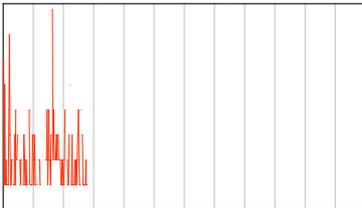
Site 116 (maximum = 14)



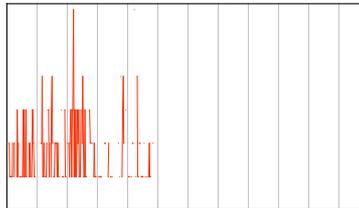
Site 117 (maximum = 16)



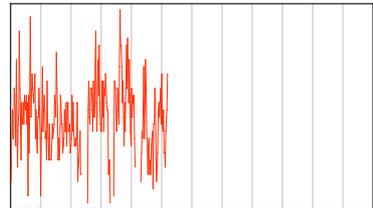
Site 123 (maximum = 8)



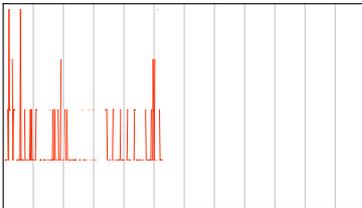
Site 124 (maximum = 6)



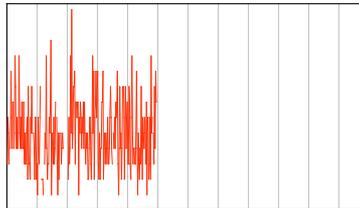
Site 125 (maximum = 28)



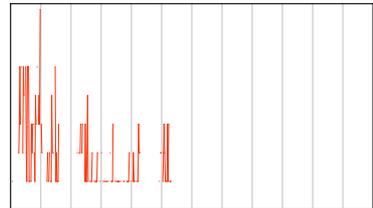
Site 126 (maximum = 4)



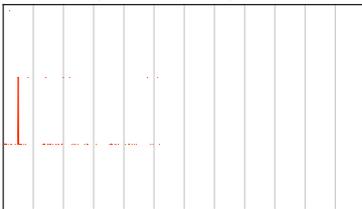
Site 127 (maximum = 13)



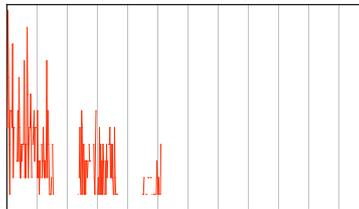
Site 128 (maximum = 7)



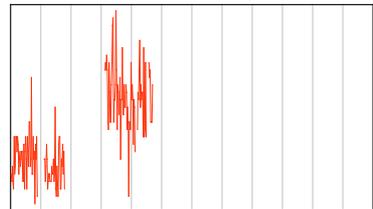
Site 137 (maximum = 3)



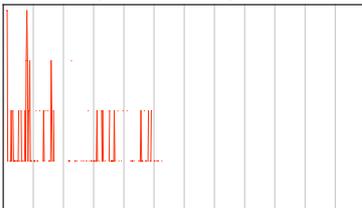
Site 138 (maximum = 12)



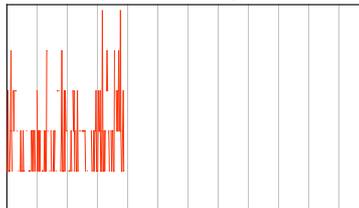
Site 139 (maximum = 27)



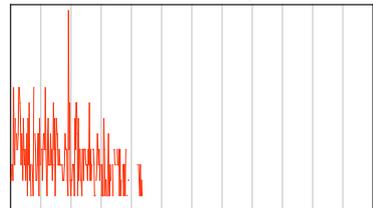
Site 140 (maximum = 4)



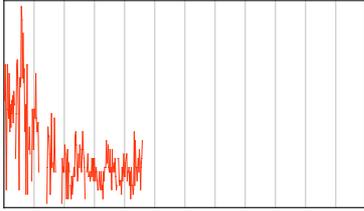
Site 159 (maximum = 5)



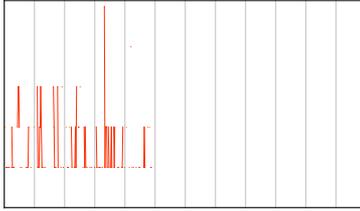
Site 161 (maximum = 13)



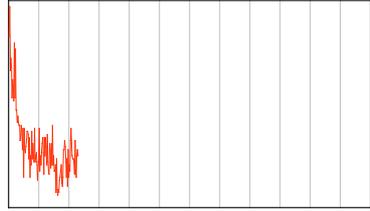
Site 162 (maximum = 45)



Site 163 (maximum = 5)



Site 185 (maximum = 66)



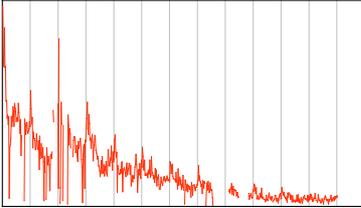
## 3.2 Pedestrian crossing cameras

There were 21 pedestrian crossing safety cameras that met the criteria for analysis (see Appendix A for site details). The following graphs show how the number of speeding offences changed over time for each of these safety cameras.

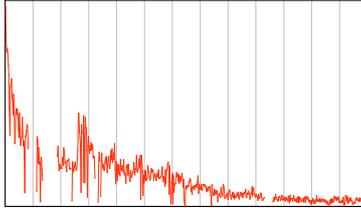
Observations from the graphs:

- The maximum number of speeding offences per week observed varied widely among the sites ranging from 24 to 380
- There was considerable week to week variation in speeding offence numbers
- Some sites showed extended periods of zero offences per week indicating extended periods of downtime
- The sites generally showed rapid reductions in the number of offences over the first few years and continued ongoing reductions

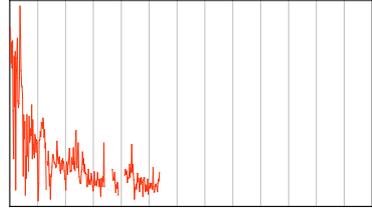
Site 53 (maximum = 342)



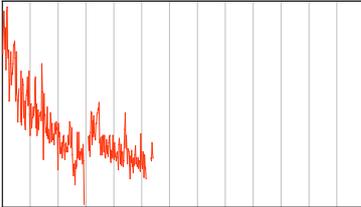
Site 55 (maximum = 380)



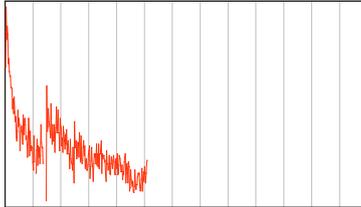
Site 153 (maximum = 243)



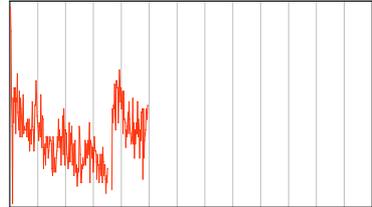
Site 154 (maximum = 134)



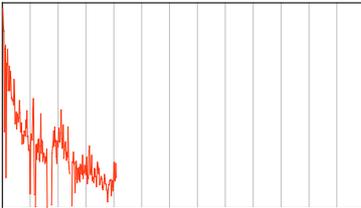
Site 166 (maximum = 124)



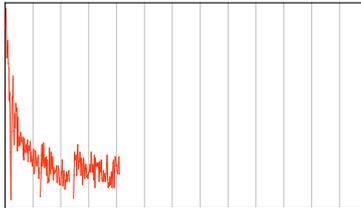
Site 167 (maximum = 57)



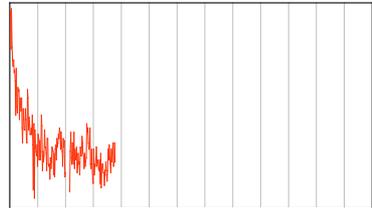
Site 170 (maximum = 198)



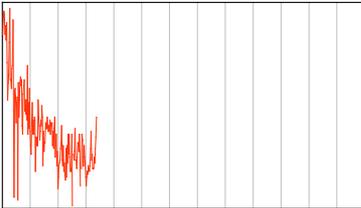
Site 171 (maximum = 131)



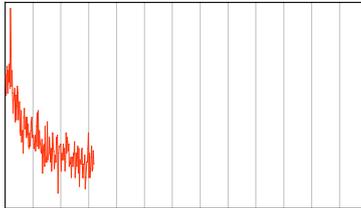
Site 172 (maximum = 94)



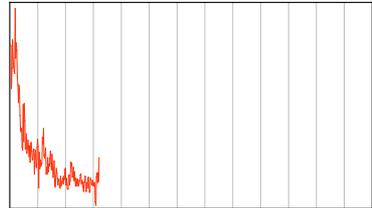
Site 175 (maximum = 70)



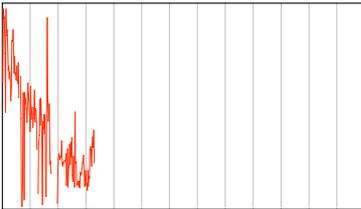
Site 176 (maximum = 90)



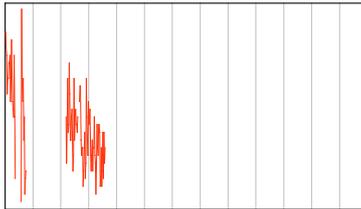
Site 177 (maximum = 185)



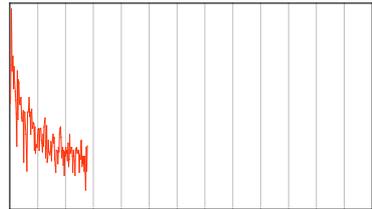
Site 178 (maximum = 249)



Site 179 (maximum = 26)



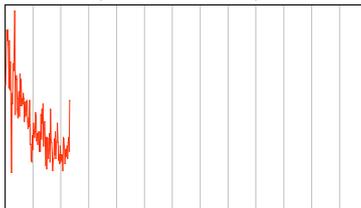
Site 180 (maximum = 136)



Site 181 (maximum = 63)



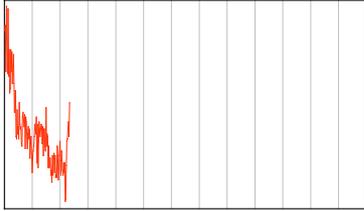
Site 182 (maximum = 114)



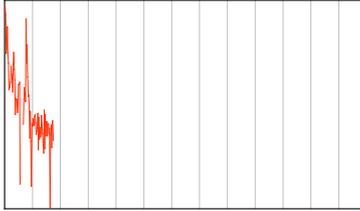
Site 183 (maximum = 56)



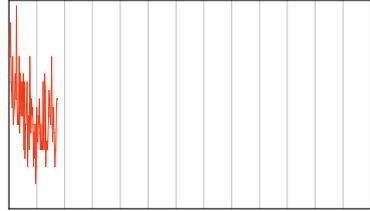
Site 184 (maximum = 84)



Site 186 (maximum = 189)



Site 187 (maximum = 24)



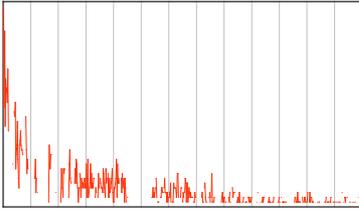
### 3.3 Railway crossing cameras

There were 14 railway crossing safety cameras that met the criteria for analysis (see Appendix A for site details). Note that all these cameras were installed in pairs covering each direction at 7 actual railway crossings. The following graphs show how the number of speeding offences changed over time for each of these safety cameras.

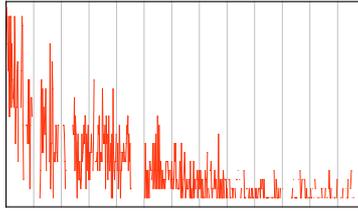
Observations from the graphs:

- The maximum number of speeding offences per week observed varied widely among the sites ranging from 1 to 136
- Even among the high offence rate sites there was considerable week to week variation
- Some sites showed extended periods of zero offences per week among generally high weekly offence rates indicating extended periods of downtime
- The high offence rate sites generally showed rapid reductions in the number of offences over the first few years and continued reductions over many years
- There were some indications among the low offence sites that offences decreased over time but this was less clear
- There were a small number of sites that showed anomalous high or low offence rates during certain periods of time

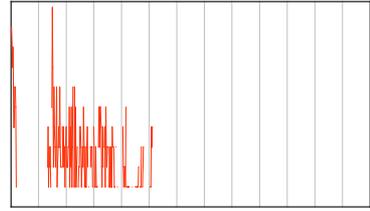
Site 46 (maximum = 42)



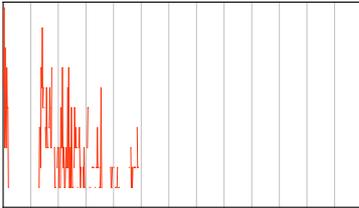
Site 47 (maximum = 22)



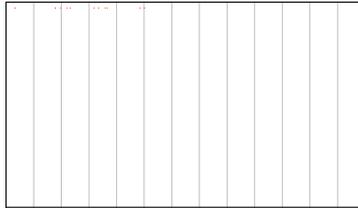
Site 141 (maximum = 10)



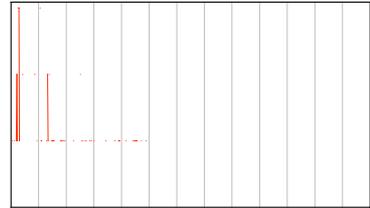
Site 142 (maximum = 10)



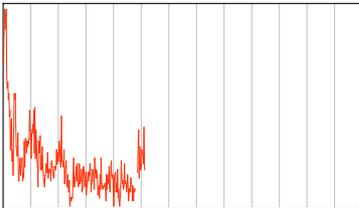
Site 143 (maximum = 1)



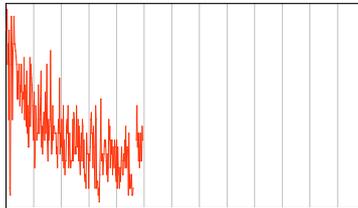
Site 144 (maximum = 3)



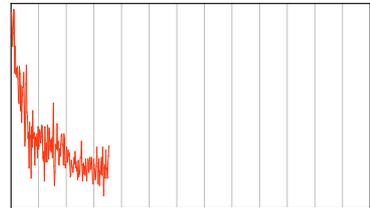
Site 145 (maximum = 71)



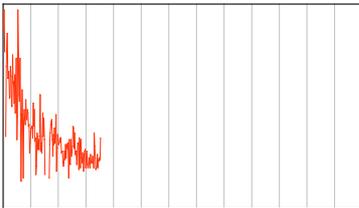
Site 146 (maximum = 29)



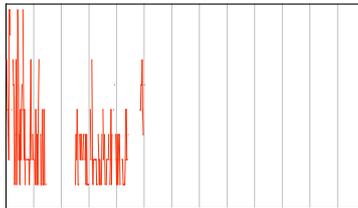
Site 147 (maximum = 136)



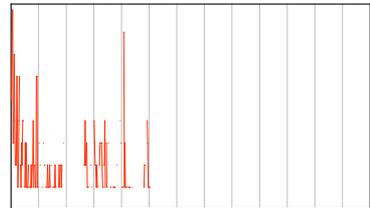
Site 148 (maximum = 120)



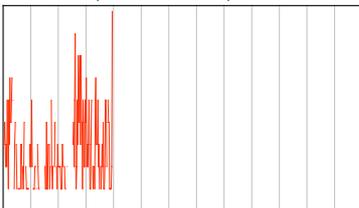
Site 149 (maximum = 8)



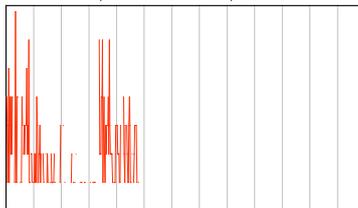
Site 150 (maximum = 9)



Site 151 (maximum = 9)



Site 152 (maximum = 7)



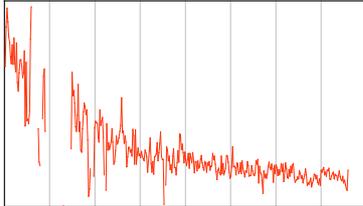
### 3.4 Mid-block cameras

There were 8 mid-block safety cameras that met the criteria for analysis (see Appendix A for site details). The following graphs show how the number of speeding offences changed over time for each of these safety cameras.

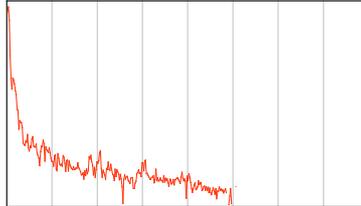
Observations from the graphs:

- The maximum number of speeding offences per week observed varied widely among the sites ranging from 28 to 777
- There was considerable week to week variation in speeding offence numbers
- Some sites showed extended periods of zero offences per week indicating extended periods of downtime
- The sites generally showed rapid reductions in the number of offences over the first few years and continued ongoing reductions
- There were some anomalous high or low offence rates during certain periods of time

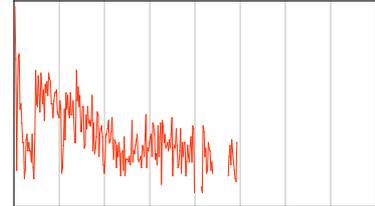
Site 99 (maximum = 298)



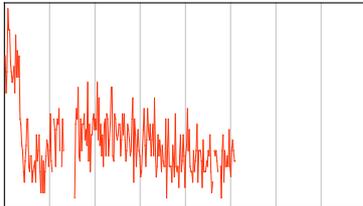
Site 157 (maximum = 777)



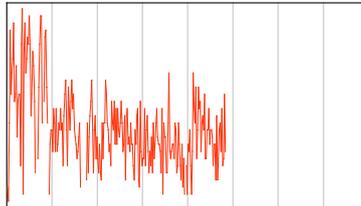
Site 158 (maximum = 72)



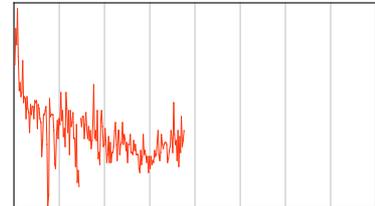
Site 164 (maximum = 38)



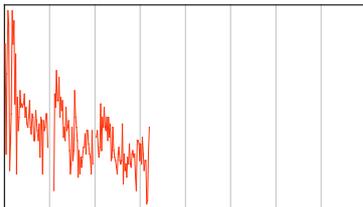
Site 165 (maximum = 28)



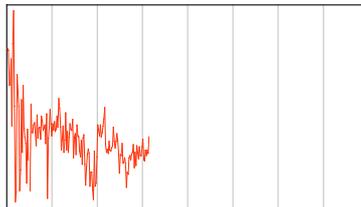
Site 169 (maximum = 100)



Site 173 (maximum = 60)



Site 174 (maximum = 182)



## 3.5 Point to point cameras

Point to point cameras measure speeds both at the locations of the cameras and by calculating the average speed between cameras. There were six sections of road covered by point to point cameras (see Appendix A for site details).

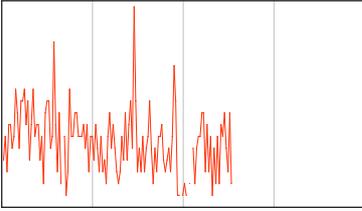
### Spot speed measurements

Each of the six sections had two cameras at each end point that measured the speeds of passing vehicles in both directions. This gives a total of 24 spot speed measurements for the point to point cameras. The following graphs show how the number of spot speeding offences changed over time for each of the safety cameras.

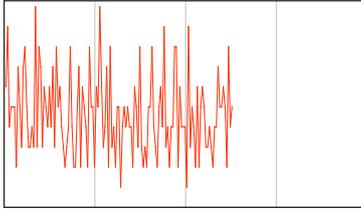
Observations from the graphs:

- The maximum number of speeding offences per week observed varied widely among the sites ranging from 4 to 64
- There was considerable week to week variation in speeding offence numbers
- Some sites showed extended periods of zero offences per week among generally high weekly offence rates indicating extended periods of downtime
- Some sites showed reductions in the number of speed offences over time but there was no consistent pattern across the sites

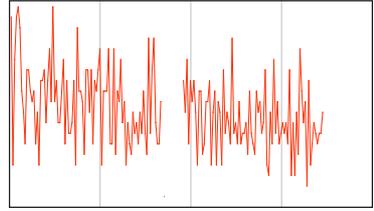
Site 600 (maximum = 17)



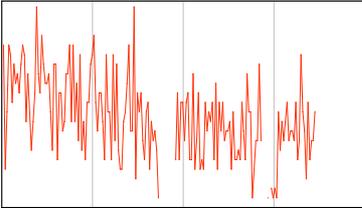
Site 601 (maximum = 10)



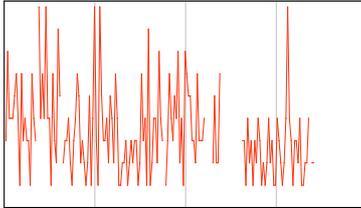
Site 603 (maximum = 19)



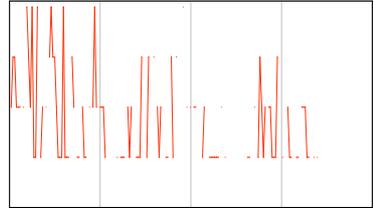
Site 604 (maximum = 21)



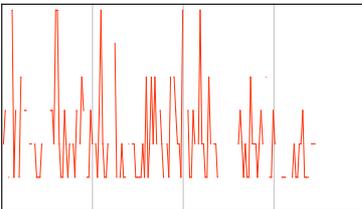
Site 606 (maximum = 9)



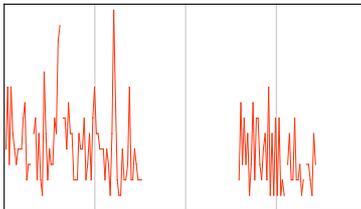
Site 607 (maximum = 4)



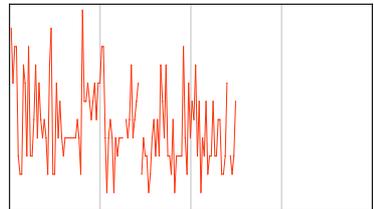
Site 609 (maximum = 6)



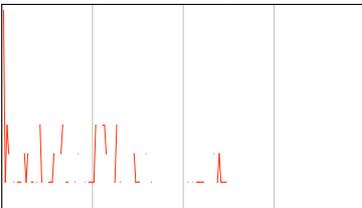
Site 610 (maximum = 13)



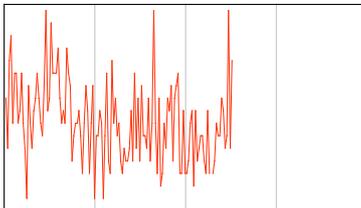
Site 612 (maximum = 11)



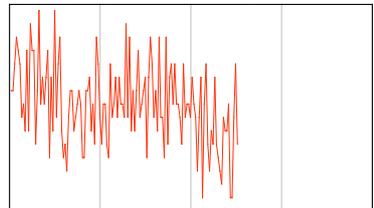
Site 613 (maximum = 7)



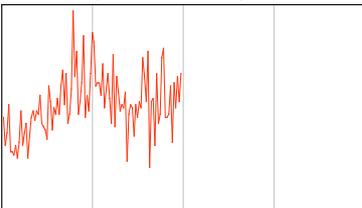
Site 615 (maximum = 16)



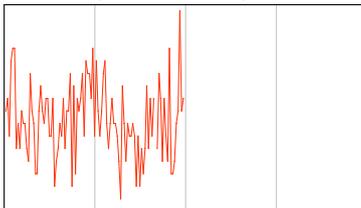
Site 616 (maximum = 15)



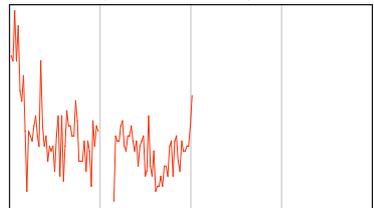
Site 618 (maximum = 64)



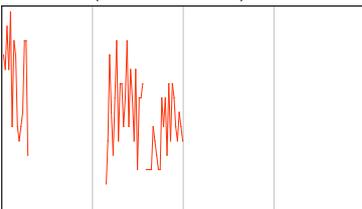
Site 619 (maximum = 16)



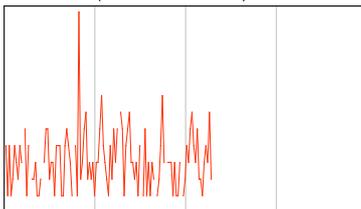
Site 621 (maximum = 40)



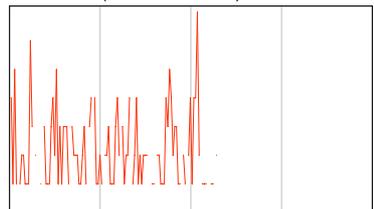
Site 622 (maximum = 14)



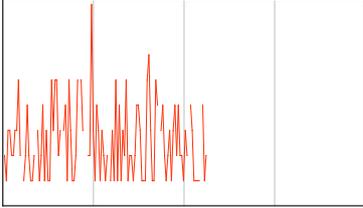
Site 624 (maximum = 12)



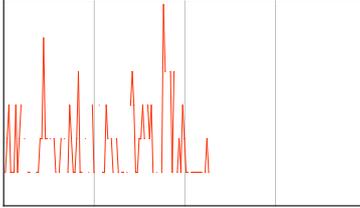
Site 625 (maximum = 7)



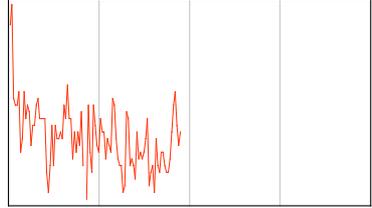
Site 627 (maximum = 8)



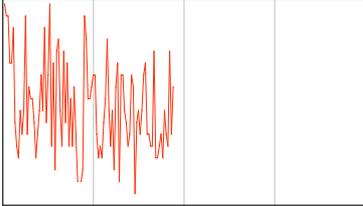
Site 628 (maximum = 6)



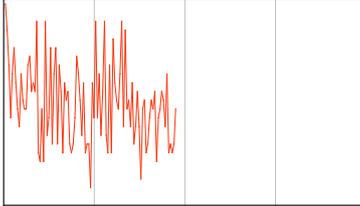
Site 630 (maximum = 30)



Site 631 (maximum = 17)



Site 633 (maximum = 23)



Site 634 (maximum = 46)



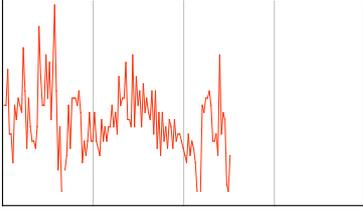
## Average speed measurements

Each of the six point to point sections used number plate recognition to accurately time vehicles proceeding from one set of cameras to the next. This time was used to calculate the average speed of vehicles between the two sets of cameras. Since vehicles were monitored in both directions, this gives a total of 12 average speed measurements for the point to point cameras. The following graphs show how the number of average speed offences changed over time.

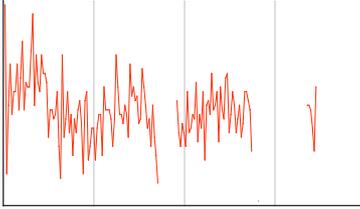
Observations from the graphs:

- The maximum number of speeding offences per week observed varied widely among the sites ranging from 7 to 65
- There was considerable week to week variation in speeding offence numbers
- Some sites showed extended periods of zero offences per week among generally high weekly offence rates indicating extended periods of downtime
- Some sites showed reductions in the number of speed offences over time but there was no consistent pattern across the sites

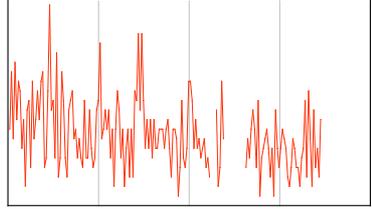
Site 602 (maximum = 28)



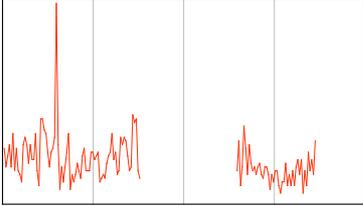
Site 605 (maximum = 44)



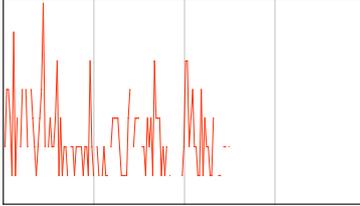
Site 608 (maximum = 21)



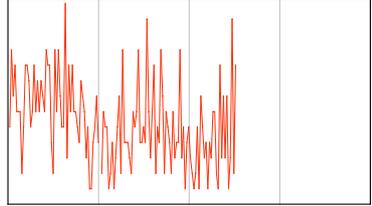
Site 611 (maximum = 54)



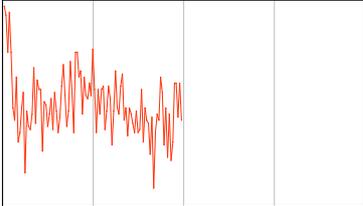
Site 614 (maximum = 7)



Site 617 (maximum = 13)



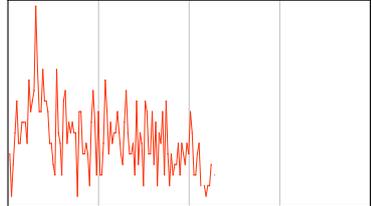
Site 620 (maximum = 65)



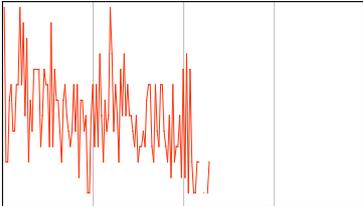
Site 623 (maximum = 51)



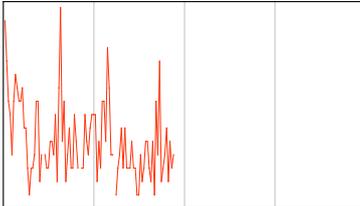
Site 626 (maximum = 19)



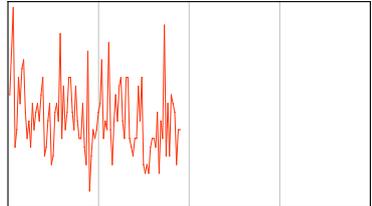
Site 629 (maximum = 13)



Site 632 (maximum = 15)



Site 635 (maximum = 23)



## 4 Red light running offences

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Three of the safety camera types also monitored red light running as well as vehicle speeds. The following sections examine individual site red light running offences for each safety camera type in turn.

### 4.1 Intersection cameras

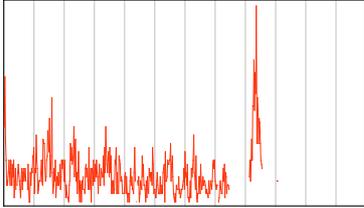
There were 76 intersection safety cameras that met the criteria for analysis (see Appendix A for site details). The following graphs show how the number of red light running offences changed over time for each of these safety cameras.

Observations from the graphs:

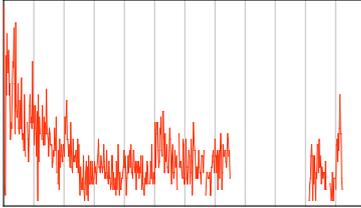
- The maximum number of offences per week varied widely among the sites ranging from 4 to 111
- Even among the high offence rate sites there was considerable week to week variation
- Some sites showed extended periods of zero offences per week among generally high weekly offence rates indicating extended periods of downtime
- A reduction in the number of offences over time can be observed in a majority of the sites but for many sites it is not clear and some sites show increases over time
- Some of sites showed anomalous high or low offence rates during certain periods of time



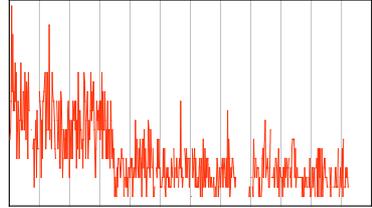
Site 69 (maximum = 48)



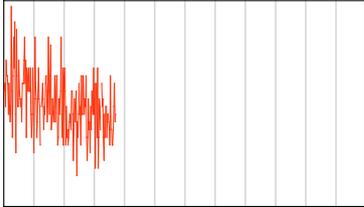
Site 70 (maximum = 36)



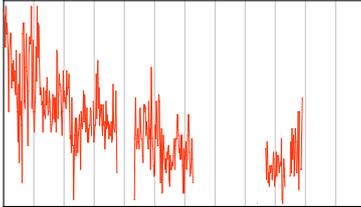
Site 71 (maximum = 21)



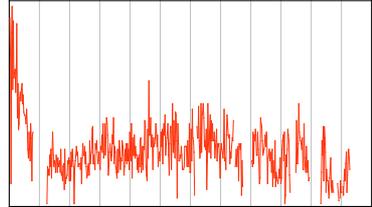
Site 72 (maximum = 26)



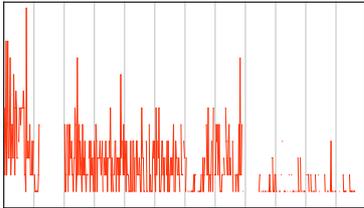
Site 73 (maximum = 59)



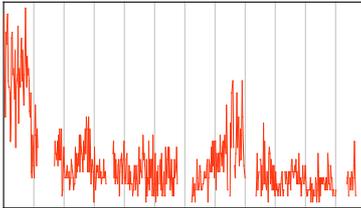
Site 74 (maximum = 70)



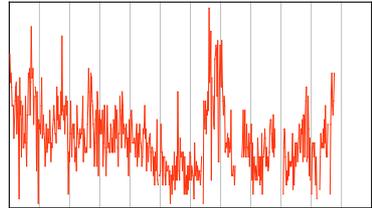
Site 75 (maximum = 12)



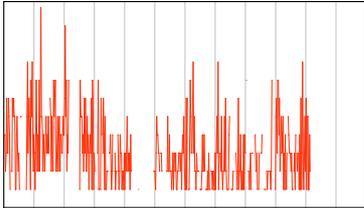
Site 76 (maximum = 33)



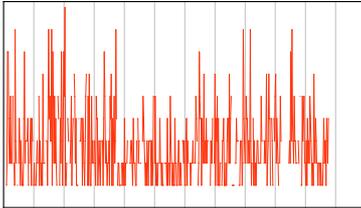
Site 77 (maximum = 43)



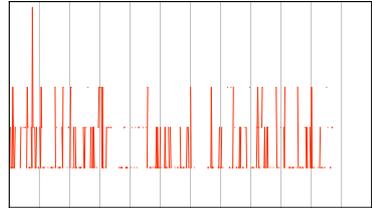
Site 78 (maximum = 11)



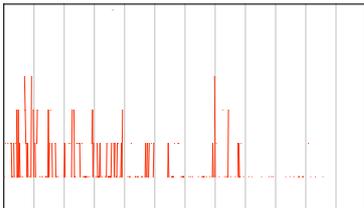
Site 79 (maximum = 9)



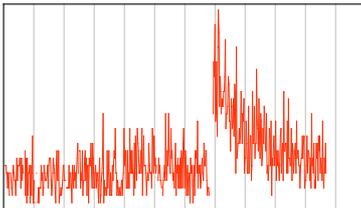
Site 80 (maximum = 5)



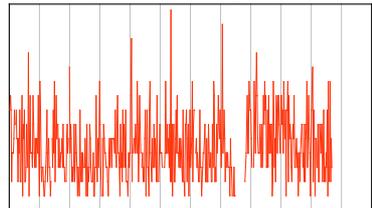
Site 81 (maximum = 6)



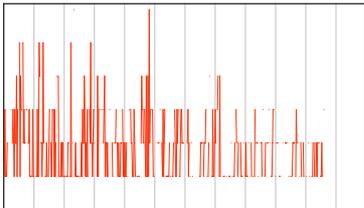
Site 82 (maximum = 27)



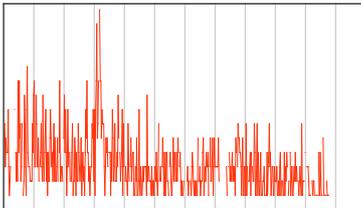
Site 83 (maximum = 14)



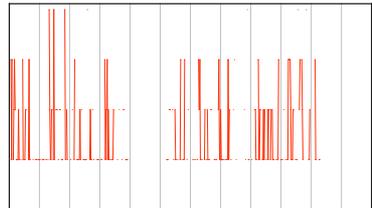
Site 84 (maximum = 6)



Site 85 (maximum = 14)

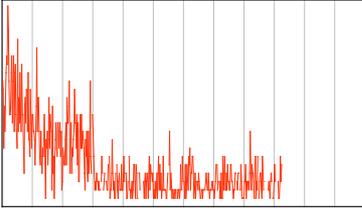


Site 86 (maximum = 4)

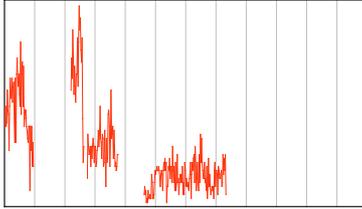




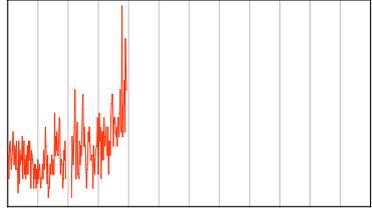
Site 107 (maximum = 24)



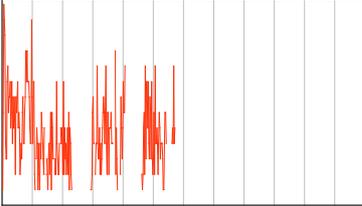
Site 110 (maximum = 50)



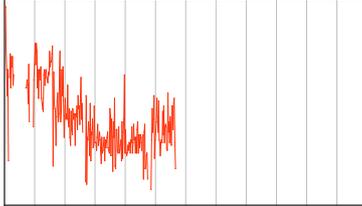
Site 113 (maximum = 43)



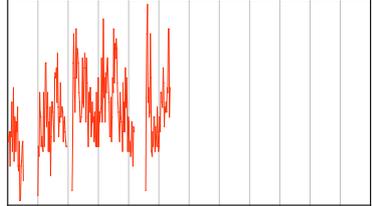
Site 114 (maximum = 13)



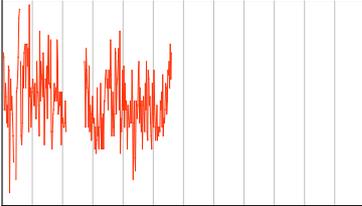
Site 115 (maximum = 77)



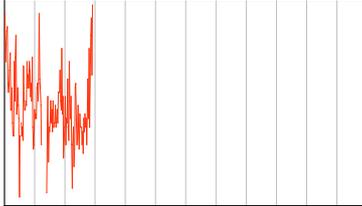
Site 116 (maximum = 41)



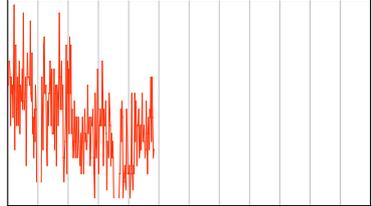
Site 117 (maximum = 46)



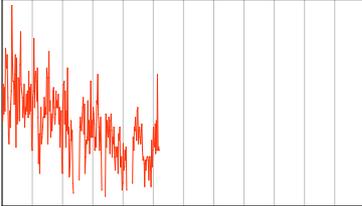
Site 123 (maximum = 46)



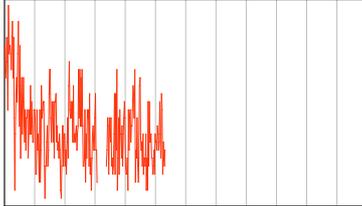
Site 124 (maximum = 25)



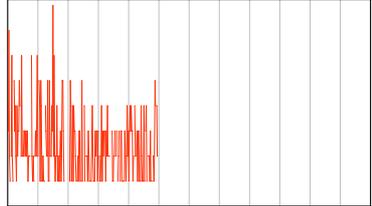
Site 125 (maximum = 61)



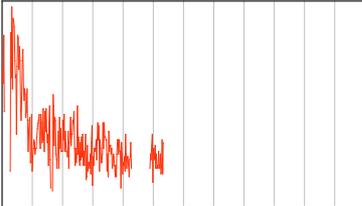
Site 126 (maximum = 25)



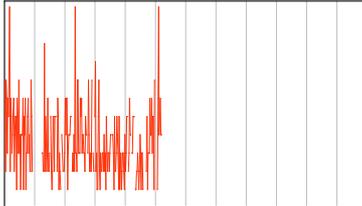
Site 127 (maximum = 8)



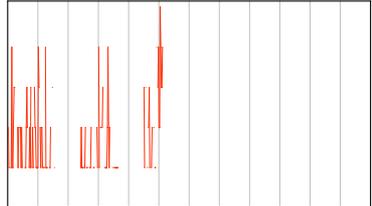
Site 128 (maximum = 71)



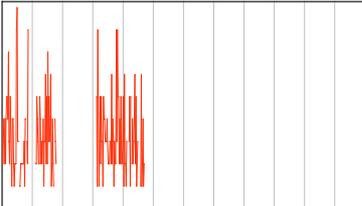
Site 137 (maximum = 11)



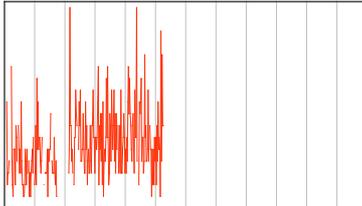
Site 138 (maximum = 5)



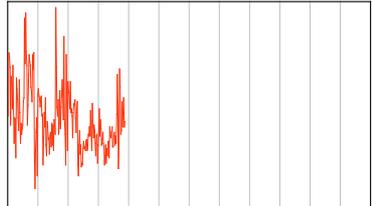
Site 139 (maximum = 9)



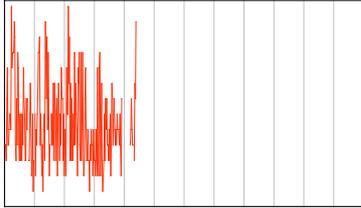
Site 140 (maximum = 17)



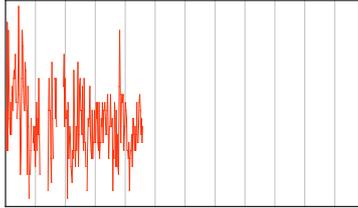
Site 159 (maximum = 111)



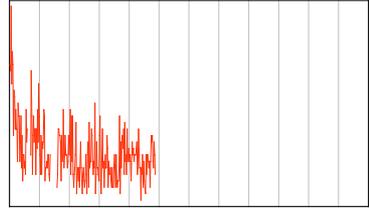
Site 161 (maximum = 13)



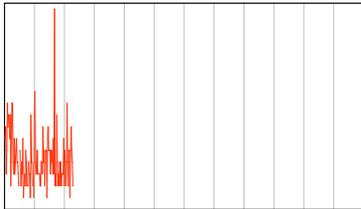
Site 162 (maximum = 25)



Site 163 (maximum = 31)



Site 185 (maximum = 17)



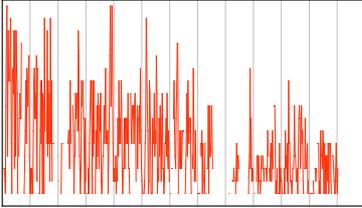
## 4.2 Pedestrian crossing cameras

There were 21 pedestrian crossing safety cameras that met the criteria for analysis (see Appendix A for site details). The following graphs show how the number of red light running offences changed over time for each of these safety cameras.

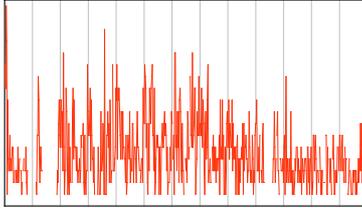
Observations from the graphs:

- The maximum number of offences per week varied widely among the sites ranging from 2 to 38
- There was considerable week to week variation in offence numbers
- Some sites showed extended periods of zero offences per week indicating extended periods of downtime
- A reduction in the number of offences over time can be observed in some of the sites but for many sites it is not clear

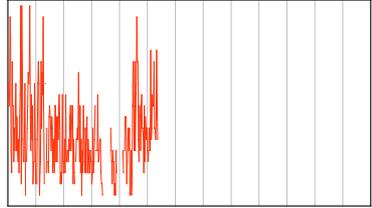
Site 53 (maximum = 16)



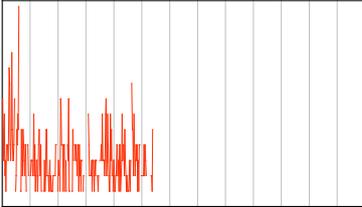
Site 55 (maximum = 17)



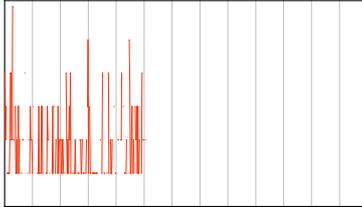
Site 153 (maximum = 18)



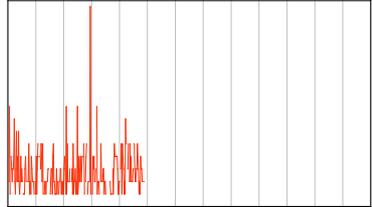
Site 154 (maximum = 13)



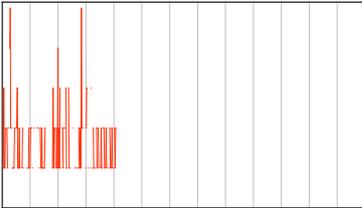
Site 166 (maximum = 6)



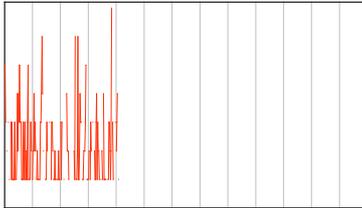
Site 167 (maximum = 16)



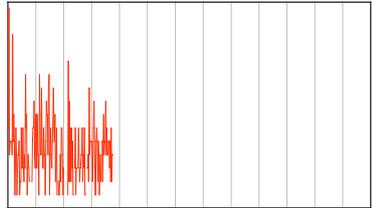
Site 170 (maximum = 5)



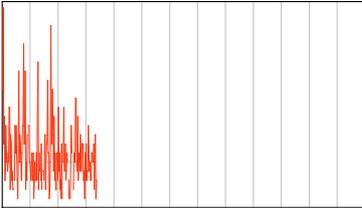
Site 171 (maximum = 7)



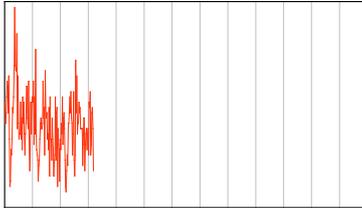
Site 172 (maximum = 15)



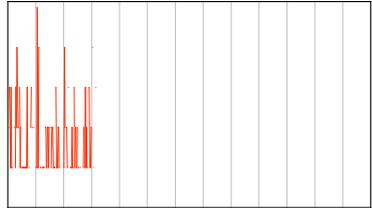
Site 175 (maximum = 22)



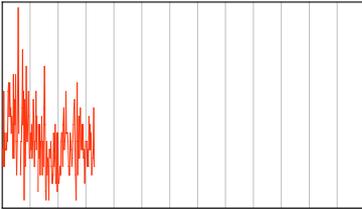
Site 176 (maximum = 38)



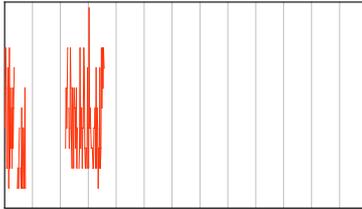
Site 177 (maximum = 5)



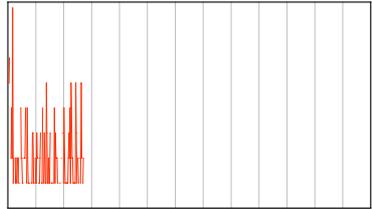
Site 178 (maximum = 24)



Site 179 (maximum = 10)



Site 180 (maximum = 8)



Site 181 (maximum = 2)



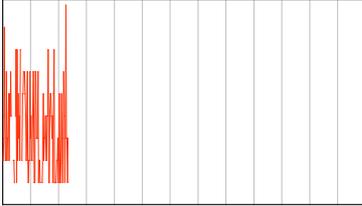
Site 182 (maximum = 8)



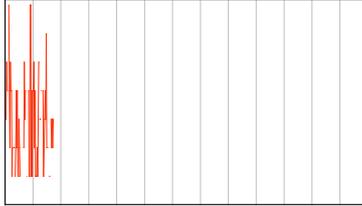
Site 183 (maximum = 12)



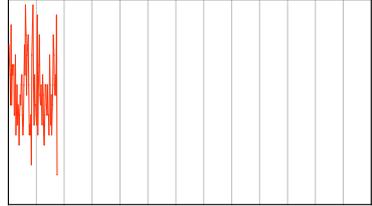
Site 184 (maximum = 9)



Site 186 (maximum = 7)



Site 187 (maximum = 20)



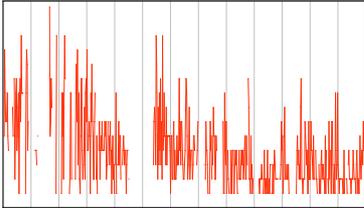
### 4.3 Railway crossing cameras

There were 14 railway crossing safety cameras that met the criteria for analysis (see Appendix A for site details). Note that all these cameras were installed in pairs covering each direction at 7 actual railway crossings. The following graphs show how the number of red light running offences changed over time for each of these safety cameras.

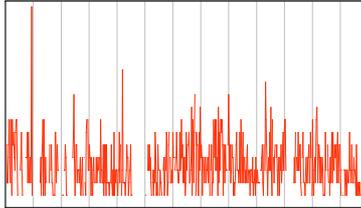
Observations from the graphs:

- The maximum number of offences per week observed varied widely among the sites ranging from 3 to 42
- There was considerable week to week variation in speeding offence numbers
- A general reduction in the number of offences over time can be observed in a majority of the sites but for many sites it is not clear
- Some of sites showed anomalous high or low offence rates during certain periods of time

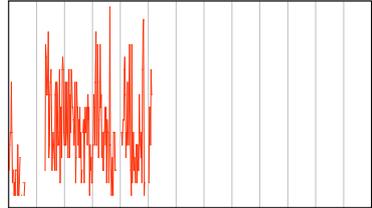
Site 46 (maximum = 14)



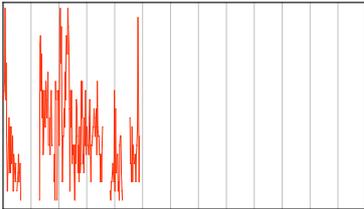
Site 47 (maximum = 16)



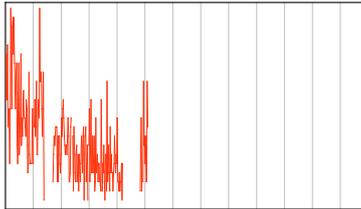
Site 141 (maximum = 16)



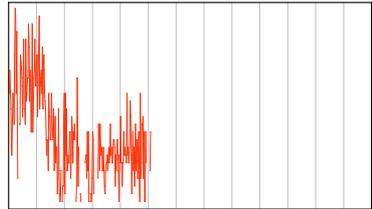
Site 142 (maximum = 22)



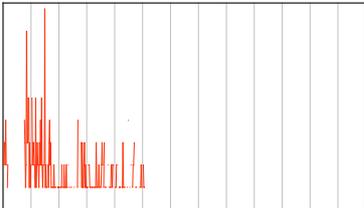
Site 143 (maximum = 22)



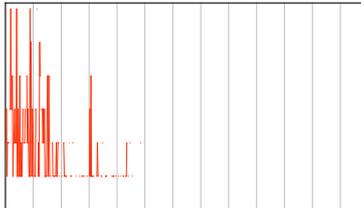
Site 144 (maximum = 26)



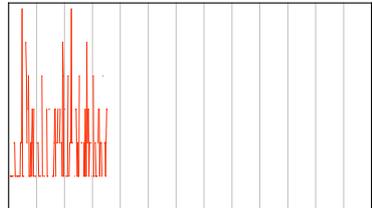
Site 145 (maximum = 9)



Site 146 (maximum = 6)



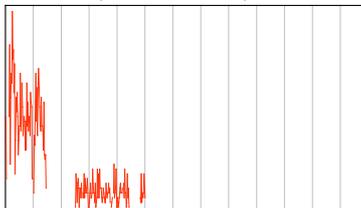
Site 147 (maximum = 6)



Site 148 (maximum = 3)



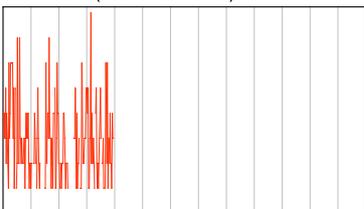
Site 149 (maximum = 42)



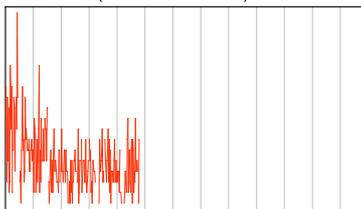
Site 150 (maximum = 27)



Site 151 (maximum = 8)



Site 152 (maximum = 19)



## 5 Discussion

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### 5.1 Urban safety cameras

Safety cameras located in South Australian 50-90 km/h speed limit zones in urban areas showed a similar overall trend in offence rates:

- Speeding offence rates decreased rapidly during the first two to three years of operation
- Continued declines in speeding offence rates occurred for many years after that
- Red light running offences showed general declines over time but not as consistently or to the same extent as speeding offences

This implies that the safety cameras are effective in changing driver behaviour with changes increasing over time. This is in addition to any immediate effect of the cameras being installed which could not be measured in this study.

The reasons for the observed reductions over time are not known for certain but are likely to include:

- More drivers becoming aware of a particular camera over time and modifying their behaviour around that camera
- Drivers who habitually offend around a camera site being detected and fined and then modifying their behaviour around that camera
- General reductions in speeding and red light running among the driving population over time being reflected in the reduced offence rates at camera sites (although this is likely to be only a minor effect given the large reductions observed at safety camera sites)

To the extent that the effect is from drivers becoming aware of the safety cameras there may be value in making the safety cameras more conspicuous from the time of installation to accelerate their positive effects.

### 5.2 Rural safety cameras

In contrast to the urban safety cameras, the rural safety cameras (which were all part of point to point camera networks) did not show a generally consistent pattern of changes in speeding offence rates over time either at the location of the cameras or through the average speed calculation. Note that this does not mean that these cameras are ineffective. They may well have reduced vehicle speeds from those before the cameras were installed.

The reasons for the difference may be related to:

- The higher speed limits
- The more remote location of these roads
- A different group of drivers using these roads
- The greater visibility of the cameras

The greater visibility of the cameras on rural roads seems like it would have the largest effect. The rural camera installations were large, well signed and not in the vicinity of any other visual distractions. This means that drivers would be fully aware of the cameras and the use of average speed measurements from when the cameras were installed.

It appears that the same speed tolerance used for spot speed measurements in high speed zones is also applied to average speed measurements. Since a high average speed implies a consistent level of speeding rather than a temporary creeping over the speed limit, a lower tolerance for average speeding could perhaps be justified.

### 5.3 Conclusions

Evidence was found that safety cameras do prevent vehicle speeding and to a lesser extent red light running in urban areas and that the effect increases over time. Making them more conspicuous from the time of installation may accelerate their positive effects.

Safety cameras may also prevent vehicle speeding in rural areas upon installation (this could not be measured here) but there appears to be little change in offence rates after this time. This is possibly due to the more conspicuous nature of the cameras.

The tolerances applied to point to point average speed measurements appear to be the same as applied to spot speed measurements and could reasonably be reduced.

A complete evaluation of the speeding and red light running effects of safety cameras would require speed and red light running measurements to be taken before and after installation of the cameras which is not possible at the current sites. Such measurements should be considered for future installations.

## Acknowledgements

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The views expressed in this report are those of the authors and do not necessarily represent those of the University of Adelaide or the funding organisations.

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## Appendix A – Safety camera site details

Tables A.1-A.5 give location and other details of the safety camera sites examined in this report. The “Direction” is the direction of the traffic flow that is monitored by a camera. The start date is the first known full day of detection also known as the reference date (see Section 2).

Table A.1  
Intersection safety cameras

Site ID	Road	Intersecting road	Suburb	Direction	Speed limit	Start date
48	Kensington Road	Portrush Road	Marryatville	W	60	06-10-2006
49	King William Road	Sir Edwin Smith Avenue	North Adelaide	S	50	27-03-2007
50	Tapleys Hill Road	West Lakes Boulevard	Seaton	N	60	30-03-2007
51	Greenhill Road	Hutt Road	Adelaide	E	60	27-03-2007
52	Grenfell Street	Frome Street	Adelaide	W	50	08-03-2006
54	Grote Street	West Terrace	Adelaide	W	50	26-03-2006
56	North East Road	Ascot Avenue	Vale Park	SW	60	27-03-2007
57	Anzac Highway	Marion Road	Plympton	NE	60	28-03-2007
58	North East Road	Sudholz Road	Gilles Plains	NE	60	13-10-2006
59	Sudholz Road	North East Road	Gilles Plains	SE	60	17-02-2006
60	Regency Road	South Road	Regency Park	E	60	19-02-2006
61	Lower North East Road	Darley Road	Paradise	NE	60	18-02-2006
62	South Road	Grand Junction Road	Wingfield	S	70	18-02-2006
64	The Grove Way	Atlantis Drive	Golden Grove	SE	60	06-05-2006
65	West Terrace	Hindley Street	Adelaide	N	60	06-11-2007
66	Grand Junction Road	Main North Road	Enfield	W	60	13-04-2007
67	Henley Beach Road	Holbrooks Road	Underdale	E	60	07-10-2006
68	Grand Junction Road	Hanson Road	Ottoway	E	60	13-04-2007
69	Glover Avenue	West Terrace	Adelaide	E	60	21-11-2008
70	Grand Junction Road	Addison Road	Pennington	W	60	13-10-2006
71	Goodwood Road	Cross Road	Cumberland Park	N	60	11-10-2006
72	South Road	Cormack Road	Wingfield	N	70	31-03-2007
73	South Road	Richmond Road	Mile End South	S	60	25-01-2008
74	Henley Beach Road	Tapleys Hill Road	Fulham	W	60	22-09-2006
75	Panalatinga Road	Pimpala Road	Woodcroft	S	80	03-05-2006
76	Main South Road	Bains Road	Morphett Vale	S	60	05-05-2006
77	Main South Road	Doctors Road	Morphett Vale	S	60	28-03-2007
78	Adelaide Road	Maurice Road	Murray Bridge	W	60	09-11-2007
79	Adelaide Road	Mannum Road	Murray Bridge	S	50	29-03-2007
80	Playford Avenue	Elliott Street	Whyalla	S	60	04-04-2007
81	Norrie Avenue	Nicolson Avenue	Whyalla	N	60	13-04-2007
82	Victoria Parade	Flinders Terrace	Port Augusta	S	60	14-04-2007
83	Victoria Parade	Carlton Parade	Port Augusta	NW	60	14-04-2007
84	Commercial Street West	Wehl Street South	Mount Gambier	NW	50	11-05-2007
85	Commercial Street East	Crouch Street South	Mount Gambier	E	50	28-03-2007
86	Sturt Street	Bay Road	Mount Gambier	W	50	31-08-2007
87	Main North Road (curb)	Yorktown Road	Elizabeth Park	S	80	31-03-2007
88	Main North Road (median)	Yorktown Road	Elizabeth Park	S	80	31-03-2007
89	Diagonal Road	Oaklands Road	Glengowrie	SE	60	04-04-2007
90	Adelaide Road	SE Freeway access ramp	Littlehampton	S	60	29-03-2007
91	South Road	Ashwin Parade	Torrensville	N	60	04-04-2007
92	Payneham Road	Nelson Street	Stepney	SW	60	10-04-2007
93	Payneham Road	Lower Portrush Road	Marden	NE	60	11-04-2007
94	Main South Road	Black Road	O'Halloran Hill	N	80	01-10-2008
95	Anzac Highway	Cross Road	Plympton	SW	60	25-11-2008
97	Waterloo Corner Road	Bagster Road	Salisbury North	SE	60	27-09-2008
98	Bridge Road	Montague Road	Ingle Farm	SW	60	29-10-2008
100	Churchill Road	Regency Road	Prospect	N	60	12-09-2008
101	Glyburn Road	Kensington Road	Kensington Gardens	S	60	27-03-2009
102	Sir Donald Bradman Drive	Brooker Terrace	Hilton	W	60	04-07-2008
103	Montefiore Road	War Memorial Drive	North Adelaide	S	60	21-01-2009
104	South Road	Regency Road	Regency Park	S	60	13-09-2008
105	Main North Road	Fairfield Road	Elizabeth Grove	S	80	03-09-2008
106	Sturt Road	Marion Road	Mitchell Park	W	60	03-09-2010
107	Commercial Road	Grand Junction Road	Port Adelaide	SE	60	03-10-2008
110	Grange Road	Findon Road	Findon	E	60	03-09-2010
113	Torrens Road	South Road	Renown Park	NW	60	31-08-2012
114	Yorktown Road	Main North Road	Elizabeth	W	60	18-02-2012
115	Grand Junction Road	Port Wakefield Road	Enfield	E	60	04-05-2012
116	Salisbury Highway	Kings Road	Salisbury Downs	N	60	17-08-2012
117	Anzac Highway	Morphett Road	Novar Gardens	W	60	16-05-2012
123	Dequetteville Terrace	Botanic Road	Adelaide	N	60	17-01-2013
124	Hampstead Road	Grand Junction Road	Clearview	N	60	26-02-2013

125	Port Road	Woodville Road	Woodville	SE	60	19-10-2012
126	Stephen Terrace	Payneham Road	St Peters	S/SE	60	31-08-2012
127	Main North Road	Frost Road	Salisbury South	NE	80	18-01-2013
128	West Terrace	Hindley Street	Adelaide	N	60	17-08-2012
137	Goodwood Road	Cross Road	Cumberland Park	S	60	20-10-2012
138	Morphett Road	Sturt Road	Dover Gardens	N	60	09-11-2012
139	North East Road	Sudholz Road	Gilles Plains	SW	60	19-04-2013
140	Magill Road	Portrush Road	Norwood	W	60	24-09-2012
159	Greenhill Road	Anzac Highway	Wayville	W	60	08-02-2014
161	Lower North East Road	Darley Road	Paradise	SW	60	03-07-2013
162	Regency Road	Prospect Road	Prospect	W	60	31-05-2013
163	Tapleys Hill Road	Grange Road	Seaton	S	60	14-02-2013
185	Salisbury Highway	Elder Smith Rd	Mawson Lakes	SW	70	11-09-2015

Table A.2  
Pedestrian crossing safety cameras

Site ID	Road	Suburb	Direction	Speed limit	Start date
53	Portrush Road	Toorak Gardens	N	60	22-12-2005
55	Portrush Road	Kensington	S	60	25-02-2005
153	South Road	Black Forrest	S	60	17-08-2012
154	Portrush Road	Trinity Gardens	S	60	31-07-2012
166	Regency Road	Kilkenny	W	60	22-11-2012
167	Philip Highway	Elizabeth	N	60	18-01-2013
170	South Road	Clovelly Park	N	60	21-11-2013
171	Shepherds Hill Road	Eden Hills	NE	60	21-11-2013
172	Torrens Road	Woodville North	SE	60	13-03-2014
175	Diagonal Road	Glenelg East	NW	60	14-08-2014
176	Portrush Road	Linden Park	S	60	23-10-2014
177	Seacombe Road	Seacombe Heights	W	60	16-10-2014
178	Goodwood Road	Goodwood	N	50	22-05-2014
179	South Road	Marleston	N	60	22-05-2014
180	Diagonal Road	Warradale	NW	60	19-03-2015
181	Hancock Road	St Agnes	N	60	31-10-2015
182	Marion Road	Marion	N	60	03-09-2015
183	Bains Road	Morphett Vale	W	60	03-09-2015
184	St Bernards Road	Magill	N	60	27-08-2015
186	Prospect Road	Prospect	S	50	22-03-2016
187	Kensington Road	Kensington Park	E	60	02-04-2016

Table A.3  
Railway crossing safety cameras

Site ID	Road	Suburb	Direction	Speed limit	Start date
46	Park Terrace	Salisbury	E	60	19-03-2004
47	Park Terrace	Salisbury	W	60	26-05-2004
141	Leader Street	Goodwood	W	50	13-11-2012
142	Leader Street	Forestville	E	50	13-11-2012
143	Cormack Road	Dry Creek	NW	60	14-11-2012
144	Cormack Road	Dry Creek	SE	60	24-11-2012
145	Commercial Road	Salisbury	NW	60	17-11-2012
146	Commercial Road	Edinburgh	SE	60	19-01-2013
147	Woodville Road	Woodville	SW	50	14-06-2014
148	Woodville Road	Woodville	NE	50	14-06-2014
149	David Terrace	Kilkenny	S	60	22-12-2012
150	Kilkenny Road	Woodville Park	N	60	22-12-2012
151	Womma Road	Elizabeth North	NW	60	09-01-2014
152	Womma Road	Daveron Park	SE	60	02-03-2013

Table A.4  
Mid-block safety cameras

Site ID	Road	Suburb	Direction	Speed limit	Start date
99	Glover Avenue	Adelaide	W	60	29-05-2010
157	Montague Road	Ingle Farm	E	60	04-12-2012
158	Frederick Road	West Lakes	S	60	26-01-2013
164	Tapleys Hill Road	West Beach	N	80	23-11-2012
165	Chandlers Hill Road	Happy Valley	SE & NW	70	20-02-2013
169	Grange Road	Kidman Park	W	60	26-03-2014
173	Port Wakefield Road	Paralowie	S	90	16-10-2014
174	West Lakes Boulevard	West Lakes	SE	60	31-10-2014

Point to point camera IDs occur in groups of six. For vehicles travelling in one direction, their speeds are measured at the spots of both cameras and also calculated from their travel time between the two cameras. The same occurs for vehicles travelling in the opposite direction. Note that in some cases the road splits two localities so endpoint cameras appear to be in different localities when in fact they are at the same location on the road.

Table A.5  
Point to point safety cameras

Site ID	Road	Locality	Type	Direction	Speed limit	Start date
600	Port Wakefield Road	Two Wells	Spot	N	110	20-06-2015
601	Port Wakefield Road	Port Wakefield	Spot	N	110	20-06-2015
602	Port Wakefield Road	Two Wells to Port Wakefield	Calculated	N	110	20-06-2015
603	Port Wakefield Road	Port Wakefield	Spot	S	110	15-07-2014
604	Port Wakefield Road	Two Wells	Spot	S	110	15-07-2014
605	Port Wakefield Road	Port Wakefield to Two Wells	Calculated	S	110	15-07-2014
606	Dukes Highway	Ki Ki	Spot	SE	110	16-07-2014
607	Dukes Highway	Coonalpyn	Spot	SE	110	16-07-2014
608	Dukes Highway	Ki Ki to Coonalpyn	Calculated	SE	110	16-07-2014
609	Dukes Highway	Coonalpyn	Spot	NW	110	19-07-2014
610	Dukes Highway	Ki Ki	Spot	NW	110	19-07-2014
611	Dukes Highway	Coonalpyn to Ki Ki	Calculated	NW	110	19-07-2014
612	Victor Harbor Road	McLaren Vale	Spot	S	100	01-07-2015
613	Victor Harbor Road	Willunga	Spot	S	100	01-07-2015
614	Victor Harbor Road	McLaren Vale to Willunga	Calculated	S	100	01-07-2015
615	Victor Harbor Road	Whites Valley	Spot	N	100	23-06-2015
616	Victor Harbor Road	Tatachilla	Spot	N	100	23-06-2015
617	Victor Harbor Road	Whites Valley to Tatachilla	Calculated	N	100	23-06-2015
618	South Eastern Freeway	Nairne	Spot	SE	110	24-12-2015
619	South Eastern Freeway	Callington	Spot	SE	110	24-12-2015
620	South Eastern Freeway	Nairne to Callington	Calculated	SE	110	24-12-2015
621	South Eastern Freeway	Callington	Spot	NW	110	24-12-2015
622	South Eastern Freeway	Mount Barker Summit	Spot	NW	110	24-12-2015
623	South Eastern Freeway	Callington to Mount Barker Summit	Calculated	NW	110	24-12-2015
624	Sturt Highway	Lowbank	Spot	E	110	15-09-2015
625	Sturt Highway	Wigley Flat	Spot	E	110	15-09-2015
626	Sturt Highway	Lowbank to Wigley Flat	Calculated	E	110	15-09-2015
627	Sturt Highway	Woolpunda	Spot	W	110	15-09-2015
628	Sturt Highway	Kanni	Spot	W	110	15-09-2015
629	Sturt Highway	Woolpunda to Kanni	Calculated	W	110	15-09-2015
630	Northern Expressway	Virginia	Spot	NE	110	06-02-2016
631	Northern Expressway	Ward Belt	Spot	NE	110	06-02-2016
632	Northern Expressway	Virginia to Ward Belt	Calculated	NE	110	06-02-2016
633	Northern Expressway	Buchfelde	Spot	SW	110	06-02-2016
634	Northern Expressway	Waterloo Corner	Spot	SW	110	06-02-2016
635	Northern Expressway	Buchfelde to Waterloo Corner	Calculated	SW	110	06-02-2016