Identifying optimal sites for static speed cameras in New Zealand – a geospatial approach

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Abstract

In an effort to reduce speed-related crashes, the New Zealand Police is expanding its network of static speed cameras. To help identify optimum sites for speed camera placement, Abley Transportation Consultants undertook an independent, evidence-based assessment using geographic information systems.

Using historic crash data, corridors with relatively high numbers of speed-related or high severity crashes were identified and ranked. Potential social cost reductions were then used to identify optimal camera locations on high risk corridors. The results of the analysis were presented in a web viewer to enable the Police to undertake further desktop scoping of potential camera sites.

Introduction

In 2015 the New Zealand Police (the Police) approached Abley Transportation Consultants to develop a methodology for identifying 600 sites for their speed camera expansion programme. This methodology developed in collaboration with the Police and the NZ Transport Agency.

Methodology

Ten years of injury crash data was extracted from the NZ Transport Agency's Crash Analysis System. For each crash, the estimated death and serious injury crash equivalents (DSi) were calculated (NZ Transport Agency, 2013). The DSi of crashes within the last five years were double-weighted to highlight locations with worsening crash trends.

Using GIS, a New Zealand road dataset was split into 100m segments and crashes within a specified catchment distance of each segment were identified: 500m for rural roads and 250m for urban roads. For each catchment area, the total DSi, number of fatal or serious crashes and number of speed-related crashes were summed. A segment score (SS) was then calculated, which prioritised roads with a high number of speed-related and high severity crashes:

SS = (total speed-related crashes * 0.4) + (sum DSi * 0.4) + (total fatal/serious crashes * 0.2)

Additional criteria were also identified to filter potential sites:

- Sites had to be at least 300m long to provide enough room for camera placement.
- Sites could not have a 'tortuous' alignment where drivers were likely to exceed the speed limit.
- At least 25% of crashes had to be speed-related.
- Less than 75% of crashes could be intersection-related (to discount sites where other enforcement measures are more appropriate).

To identify a final list of 600 high-risk corridors, an iterative process was undertaken testing different Segment Scores, dissolving contiguous sections of high-risk segments into high-risk corridors, and removing corridors that did not meet the additional criteria listed above.

The optimal camera location within each high-risk corridor was determined by finding the site that offered the greatest potential social cost reduction. To do this, 'virtual' camera sites (points) were created at 100m intervals on each corridor. The total social cost of crashes with each virtual site catchment area was then calculated using social cost estimates (Ministry of Transport, 2014).

Existing research suggests that crash reductions due to speed cameras installation range between 20% (Mara, Davies and Frith, 1996) and 42% (Transport for NSW, 2015). Using this variance, a range of potential crash reductions were calculated: 100% (full reduction); 42% (optimistic) and 20% (conservative). These potential crash reduction factors were used to calculated potential social cost reduction (SCR) at each virtual site. The virtual site with the highest SCR was identified as the 'site optimum location' – the location where a camera would have the most effect for reducing fatal or serious injury crashes.

The outputs from the assessment were provided to the NZ Police on a webmap viewer (figure 1).

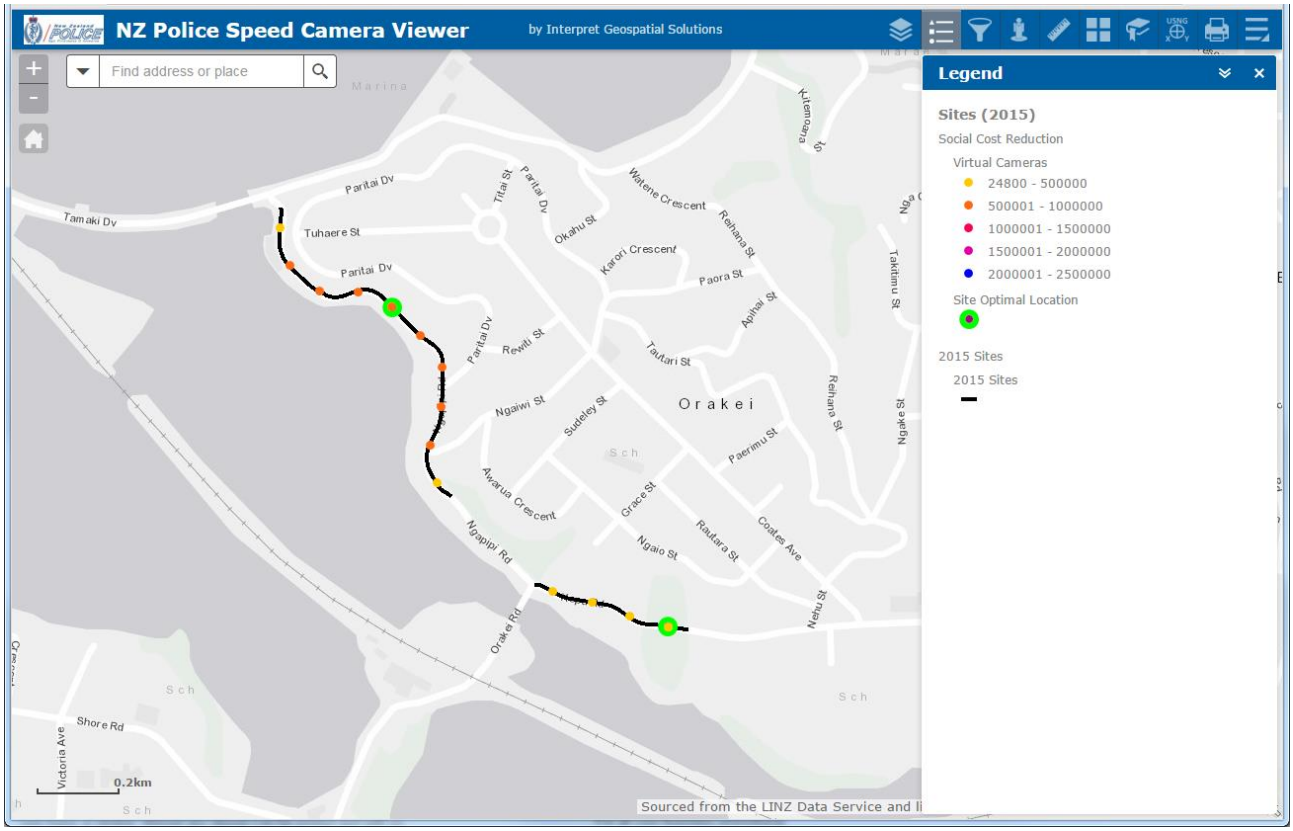

Figure 1. Screenshot of webviewer identifying optimal speed camera sites

Each optimal site is identified along with the key statistics and crash locations. This site is now being used by the Police to undertake further desktop scoping of potential camera sites.

References

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