Long-term speed and safety outcomes from New Zealand's Rural Intersection Active Warning System

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Abstract

The Rural Intersection Active Warning System (RIAWS) has the aim of reducing fatal and serious crashes at high risk intersections by reducing traffic speed on major road intersection approaches when potential for a collision exists. This study builds on the initial evaluation by taking a longer-term view of RIAWS performance. Speed and crash data were analysed for up to three years since the first RIAWS pilot sites started operating. Compliance with the 70 km/h speed limit when RIAWS is active is still very high and fatal and serious crashes have almost been eliminated at the ten RIAWS intersections since commissioning up to three years ago.

Background

The development, implementation and evaluation of RIAWS is part of a wider programme to address safety at high-risk intersections as part of the government's Safer Journeys road safety strategy and associated action plans.

The RIAWS has the potential to reduce fatal and serious casualties at rural intersections by:

- Slowing motorists on major road intersection approaches and thus reducing crash likelihood (effectively increasing available stopping distance) and severity (less energy on impact)
- Increasing driver state awareness and therefore preparing motorists for a possible event (effectively reducing reaction time)
- Increasing the gaps between potentially colliding vehicles.

The development of RIAWS (Mackie 2010, 2011) has been described earlier and the initial assessment of the system was positive (Mackie et al., 2014; Mackie and Scott, 2015). The purpose of this study is to assess the longer-term performance of RIAWS.

Methods

To date, ten RIAWS systems are functioning as part of the trial. Speed data (measured using induction loops at the intersection in both directions) was collected from all ten sites so that the baseline, short-term and longer-term average and modal speed could calculated. All speed data were from 'collision risk' situations, that is, when side road vehicles were present. Crash data was collected from each of the sites using the Crash Analysis System (CAS). At each site, fatal, serious, injury and non-injury crashes were measured for the five-year period prior to RIAWS installation, and was compared with the same data in the period following RIAWS installation to the present (up to three years). To account for the different time periods, a common unit of crashes per month was calculated for each site.

Results

Traffic speed

Example speed distributions for the Himatangi site are shown in Figure 1 below. Since the RIAWS was installed, at almost all locations it has been effective in maintaining lower traffic speeds, near the target speed of 70 km/h, over the medium to long-term.

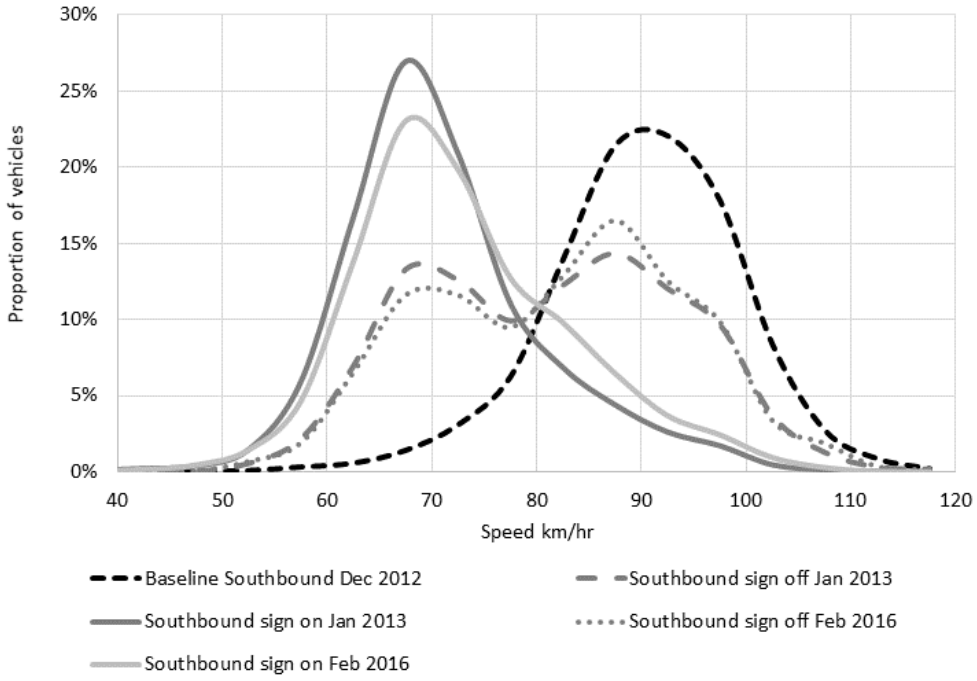

Figure 1. Typical speed distributions for baseline, and with RIAWS active and not active.

For all ten sites, the speed reductions have generally been sustained, as shown in Figure 2 below. Compliance appears to be optimal for sites where there is plenty of site distance on approach to at 70 km/h variable speed limit. The average modal 'collision risk' baseline speed was 88 km/h across all sites, 72 km/h immediately after installation and 73 km/h 2-3 years following installation.

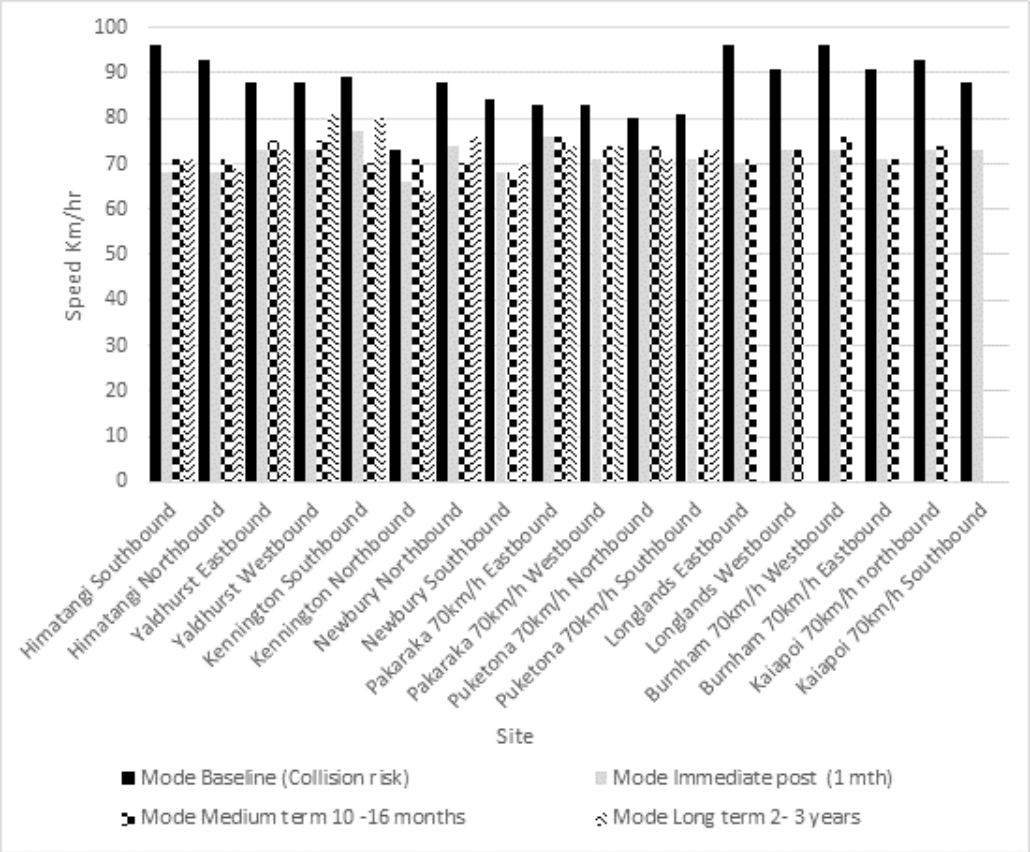

Figure 2. Modal traffic speed for each RIAWS site (both directions) for 'collision risk' situations

Casualties

The RIAWS were all installed at high risk intersections and across ten sites have been active for a total of 223 months. In the five years prior to the installation of each RIAWS there were a total of 1 fatal, 19 serious injury and 44 minor injury crashes across the sites (total 0.35 F&S crashes/month). In the 223 months following RIAWS installation there were a total of 0 fatal, 1 serious and 5 minor injury crashes across the sites (total 0.04 F&S crashes/month). The one serious injury crash that has happened was unrelated to the system as a motorcycle was hit from behind while waiting at a side road.

Discussion

The longer-term analysis of speed and casualties for RIAWS suggests that the system remains effective and that positive safety benefits are beginning to emerge. A longer period still (5 years) is needed before more certainty about the crash performance can be achieved. There is some variability in speed performance across the sites

References

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