Application of Infrastructure Risk Rating (IRR) to Support Speed Limit Reduction in Western Australia

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Abstract

The Infrastructure Risk Rating (IRR) methodology developed in New Zealand assesses road safety risk based on infrastructure, roadside hazards and land use elements. The methodology was applied to 110km/h posted speed limit state roads in Western Australia (WA) to support speed limit review. After identifying medium to high-risk road sections based on IRR scores, stakeholders reviewed the results, considering route hierarchy, surrounding network and implementation issues. As a result, a number of road sections were identified as priority sections that warrant speed limit reduction.

Background

The Infrastructure Risk Rating (IRR) was first developed by the New Zealand Transport Agency to assess road safety risk based on infrastructure elements and interactions with surrounding land use (NZ Transport Agency, 2016) and later investigated by Austroads for application by State and Local Governments in Australia (Austroads, 2018). Main Roads WA has taken up the IRR methodology on an exploratory basis, in order to investigate how it may be incorporated into speed limit setting practices by helping to identify high-risk road sections on rural roads.

WA is currently the only State with a default speed limit of 110km/h on rural roads. Currently, 82.2% of state roads are either 110km/h speed limit posted or subject to the state default. These 110km/h roads account for 27.5% of all KSI crashes from 2013 to 2017. This study applies the IRR methodology on all 110km/h posted state roads to identify high-risk road sections that cannot be treated immediately and may warrant speed limit reduction.

Methodology

The first part of the methodology was to develop the IRR risk score and rating/risk bands for the road sections using the IRR equation. The equation requires the input of the following road and roadside attributes: road stereotype, land use, carriageway width, horizontal alignment, roadside hazards, intersection density, access density and traffic volume. These data are sourced from a variety of sources and state agencies in WA. Obtaining the most current and reliable data for roadside hazards and land use were particularly challenging.

The second stage of the study was to consider the results from the IRR model from a regional on-road perspective through discussions with stakeholders, that included the consideration of the hierarchy of the road (only non-highway state controlled roads, also known as M-Roads were considered), the presence of edge lines, the homogeneity of the road environment along the entire road, route hierarchy and interaction with the surrounding network. The review determined those road sections suitable for speed reduction and those requiring further analysis and consideration of speed reduction and/or other treatments.

Results

Overall, 3,522 road sections were identified as having 110km/h posted speed limit. The IRR methodology was applied to 2,781 road sections (13,199km), with 741 other sections omitted due to

incomplete data. Table 1 presents the resulting IRR risk band (based on the IRR scores) of the assessed sections.

Table 1. Result of IRR analysis on 110km/h posted speed limit state roads

IRR Risk Band	Road Sections	M-Road Sections*
High	6	2
Medium-High	40	19
Medium	689	372
Low-Medium	397	148
Low	1649	423
Total	**2781**	**964**

**M-Roads refers to non-highway state controlled roads*

The 393 M-Road sections identified through the IRR as of 'High', 'Medium- High' and 'Medium' risk make up 34 M-Roads (or 3,316km). Out of those, 37 M-Road sections (from 4 M-Roads), representing 142km, were recommended for a speed reduction from 110km/h to 100km/h; further 215 M-Road sections (making up 984km and 15 M-Roads) were identified for potential speed limit reduction and will be evaluated by regional staff. The remaining 141 M-Road sections that were not recommended for speed limit reduction were prioritised for other road engineering treatments.

Conclusion

Despite some challenges involved in data collection and manipulation for application of the IRR methodology, there are significant opportunities for improving road safety outcomes in WA by implementing speed reduction strategies on roads where crash risk was identified as medium to high. The use of the IRR for this project provides justification not only for speed limit reduction, but also for other safety treatments that will reduce crash risk. Future work will extend the analysis to state roads with speed limit below 110km/h.

References

NZ Transport Agency. (2016). NZ Speed Management Guide, First Edition. New Zealand Government.

Austroads. (2018). Speed Management - A Compendium of Effective Countermeasures and Strategies for Government and the Community (Draft Report). Austroads Ltd, Australia.