

Cycling Risk on Rural Roads

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Summary of Paper

There have been several high profile cyclist crashes on rural roads recently, igniting debate among the driving public about the suitability of our rural roads to safely accommodate cyclists mixing with high speed traffic. There is good guidance for road designers in the High Risk Rural Roads Guide, based on traffic volume and crash risk. There is also risk advice for drivers, with KiwiRAP risk maps showing relative risk for different routes. These maps are freely available online.

This paper sets out to provide similar design guidance, and public advice, for cyclists, based on analysis of traffic volume, traffic operating speed and sealed shoulder width. By communicating risk, the cycling public can make more informed choices about their use of different rural cycling routes. Where demand for cycling is high despite relatively high risk, the analysis can help local authorities to prioritise investment to improve safety for all road users.

This study is an example of an objective way to quantify risk for rural roads. For the methods to be widely applicable, we need:

- more robust data about shoulder width and quality on our rural road network; and
- much more data about what rural roads cyclists travel on, and why.

But motorists don't plan their trips using KiwiRAP... why would cyclists?

It is important to note that cycling trips, particularly rural cycling, are generally undertaken for exercise and recreation, that is, for the trip themselves, as opposed to motor vehicle trips which are generally undertaken to travel between an origin and a destination. Rural cycling trips often start and finish at the same place and the route is selected for reasons other than 'directness'. Therefore there is perhaps more potential to inform cycling route choice with risk mapping, than there is to inform motor vehicle trip choice.

Mapping can also help road controlling authorities to prioritise shoulder widening investment, particularly when used in conjunction with information about cyclist numbers on particular links.

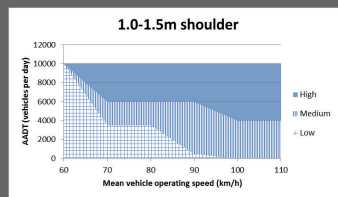
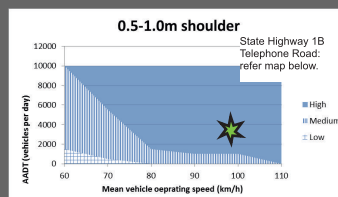
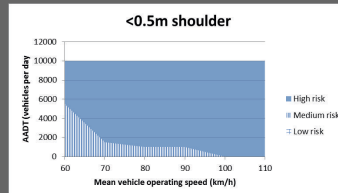
Risk Maps

The charts above were used to plot relative risk on a portion of Waikato District, popular with road cyclists due to its proximity to Hamilton and its flat to rolling terrain. Shoulder width, traffic volume and speed data were provided by Waikato District Council for all rural local authority roads. Data for State Highway 1B was found from the KiwiRAP Analysis Tool, KAT. In this example, none of the State Highway section has a sealed shoulder width greater than 1.2m. Combined with traffic volume and speed, all of the State Highway section is therefore 'high risk' in this example. The risk value for the high risk portion of State Highway 1B at Telephone Road in the map below is shown as a star in the '0.5m - 1.0m shoulder' risk chart above. In this case, if the shoulder width were increased to over 1.0m, the risk would drop from 'high' to 'medium'.

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I am a traffic engineer and researcher, based in TDG's Hamilton office. My professional interests include policy, planning and design for walking and cycling, and road safety applications of driver behaviour psychology.

I have been a cyclist since childhood, and regularly ride on both urban and rural Waikato roads, usually in the vicinity of good cafés.



Defining Levels of Risk

Considering a combination of safety literature and design guidance, the following principles informed development of the risk map criteria:

- Crash survivability decreases markedly as traffic speed increases above 40km/h, and decreases to practically zero at any impact speed above 70km/h;
- Cyclist exposure to crash risk increases linearly with traffic volume; and
- Sealed shoulder width at or above 1.2m is desirable for vehicles to pass cyclists safely.

Disclaimer and Recommendations

The data used to develop the risk charts is not considered reliable, particularly in terms of what might be defined as a 'usable shoulder'. Cyclists may choose to ride in a live lane when the shoulder is either variable in width, more rough than the adjacent lane, or covered in lichen (a particular hazard in the wet or in Winter). Therefore if maps such as these were to be developed to promote cycling routes, or to inform infrastructure investment, it is recommended that a minimum usable shoulder be defined for each link. For example, if the shoulder width is in good condition throughout and varies between 0.4m and 1.6m wide, the minimum usable shoulder for risk analysis for that link would be 0.4m.

It is also recommended that any prioritisation of investment for rural cycling considers the routes that cyclists actually use. Though rural cyclist volumes are not known to be counted in any routine way, increasingly it may be possible to use technology to establish the relative popularity of different cycling routes. Websites such as MapMyRide publicise cycling routes as mapped by cyclists. The increasing volume of mapped routes provides some indication as to the relative popularity of different road links, at least as used by the users of MapMyRide. If cyclist volumes were collected, data could be used in conjunction with risk maps to prioritise investment in shoulder widening.



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Cyclists in other countries demonstrate risky behaviour by cycling on the wrong side of rural roads

