NZ TRANSPORT AGENCY
WAKA KOTAHI

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Authorisation	Glenn Bunting, Network Manager
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Safe System approach rural speed management - information

1. Purpose

The purpose of this traffic note is to:

- report on the 2010 speed zoning project in the context of the Safe System approach; and
- introduce rural safer speed areas to deliver Safe System demonstration areas under the *Safer Journeys Action Plan 2011-12*, which will inform the review of New Zealand's speed management framework.

The Safe System approach to traffic management was introduced in *Safer Journeys, New Zealand's road safety strategy 2010–2020*[1]. A Safe System approach focuses on minimising death and serious injury by providing safe roads, safe vehicles and safe operating speeds for all road users. It will take many years to fully implement a safe road system, but we need to start the process now. *Safer Journeys* states that 'Safety would be improved if we could reduce operating speeds to match the standard of the existing network.' Road controlling authorities (RCAs) should examine their rural road networks and consider what safer operating speeds are on roads where the standard 100km/h rural speed limit does not match the operating risks and affordable road safety infrastructure.

The information presented in this traffic note will assist with that process.

2. Background

Land Transport Rule: Setting of Speed Limits 2003 (the Speed Limits Rule) sets out legal, technical and administrative procedures for RCAs to set speed limits based on urban development. However, it does not directly address issues of safe speed management, such as setting safer speed limits according to the operating characteristics of the road in rural areas.

Under the Road Safety 2010 Strategy[2], a project was undertaken to examine rural speed zoning as a method of managing rural speeds (the 2010 speed zoning project). Rural speed zoning meant setting open road speed limits based on characteristics of the road environment. Speed limits were set to complement and reinforce the surrounding speed environment, ensuring willing compliance from road users.

During the 2010 speed zoning project, draft policy and guidelines were produced, selected roads were assessed and lower speed limits were set according to the draft guidelines. These roads were subsequently monitored and the data gathered was analysed to assess the effect of the speed limits.

Based on the experience and information gathered during the 2010 speed zoning project, this traffic note has been produced to facilitate a transition to a Safe System, harm minimisation approach to setting rural speed limits.

3. Objectives of rural speed management

Rural speed management has the following objectives:

- reduce the number and severity of crashes
- match the speed limit to the risk and environment
- increase public awareness of safe operating speeds.

Speed is a major problem contributing to the high number of casualties occurring on our roads and has been identified as a factor in about 30 percent of fatal crashes. Within the safe system approach, speed management is one of the key areas where significant road safety improvements can be made. International research indicates a one percent reduction in mean speeds reduces road deaths by around four percent and road injuries by two percent. *Safer Journeys* translates this to a saving of 60 lives per year for a 5km/h reduction in open road speeds.

Lower operating speeds result in fewer deaths and serious injuries for two reasons. Firstly, fewer crashes occur because vehicles are easier to control at lower speeds and drivers have more time to react in an emergency and therefore have a better chance of avoiding a crash. Secondly, if a crash does occur, the severity is significantly reduced if speeds are low prior to the emergency arising. These two factors result in fewer deaths and serious injuries and large savings in social costs ($4,204,200 per fatal and $446,100 per serious injury crash at June 2010 prices[3]). Along with speed management, crash severity can also be mitigated by modern vehicle technologies and road and roadside infrastructure investment where economically justified.

4. The 2010 speed zoning project

During the 2010 speed zoning project, more than 20 rural roads were assessed in accordance with the criteria in the draft rural speed zoning policy produced by Land Transport NZ (now NZTA). All roads were assessed by consultants contracted to Land Transport New Zealand. Sixteen of these roads were suitable for the road controlling authority to set reduced speed limits. Operating speeds were monitored before and after the speed limits were reduced. The results have been analysed by ARRB Group Ltd and included in a draft report[4], which will be published on the NZTA website in due course.

The overall results for the 13 speed zones with sufficient data showed a reduction in mean speed of 1.4km/h and a reduction of 1.0km/h in the 85 percentile speed. Mean open road speeds, measured in the national speed surveys conducted by the Ministry of Transport, reduced by 0.9km/h in the same period. There was no change in national rural 85 percentile speed.

At sites near the speed zones, where the speed limit was not changed, mean speed reduced by 2.5km/h and the 85 percentile speed reduced by 3km/h. However, most of the sites where the speed limit remained the same were in areas with a speed limit based on urban development. These sites are not directly comparable with the rural speed zone sites, but the speed reduction might be due to the halo effect of the reduced operating speeds in the speed zones.

The relatively small overall reduction in operating speeds might be explained by the fact that the new speed limits were generally selected to match the existing 85 percentile speed profile of the roads in the study. On this basis, even a small reduction in speed is encouraging.

Crash data is being collected and will be reported in the final report on this project.

Speed targeting

While the overall results showed small reductions in operating speeds, there was also some evidence of speed targeting. Speed targeting is a term used to explain an increase in operating speeds after a speed limit has been reduced. In the context of rural speed zones, this phenomenon is believed to be due to the perception

the new speed limit is more realistic than the standard rural speed limit and drivers are more inclined to attempt to drive at the new limit, ie they target the new speed limit. One theory suggests that speed targeting is likely to occur if the new speed limit is higher than the 85 percentile speed prior to changing the speed limit.

In the 2010 speed zoning project there was some evidence of speed targeting on three roads but no support for the 85 percentile theory. There was no clear pattern and no critical differences between sites on the three roads where some speeds increased and sites on the other 10 roads where there was no evidence of speed targeting.

Method used to select the speed limit

All of the roads were assessed in two different ways. One method established the 85 percentile operating speed profile for the road while the second method measured various risk factors. The speed limit recommendations made by Land Transport New Zealand, which were implemented by the RCAs, were predominantly determined by the 85 percentile speed profile. There were two reasons for this:

- setting realistic speed limits that most people would comply with was considered an essential element of the project; and
- on roads with operating speeds below 70km/h the speed limit calculated according to the risk assessment didn't reflect the effect of very tight horizontal alignment.

On faster roads, the risk assessment was used to determine the most appropriate limit when the results of the speed profile were variable.

Problems experienced during assessment

The main problem that showed up during assessment of the roads was the complexity of the process. There was some misinterpretation of the process for determining the speed profile and for measuring the risk factors. Although these errors were corrected, it signalled potential problems for wider application of the methods trialled for determining the speed limit. A further problem for wider application of the assessment process was the cost of assessing each road.

Some roads were assessed, but the speed limit was not changed for reasons that were beyond the scope of the project. One reason was because the characteristics of the roads were too variable and it wasn't possible to set a consistent speed limit for any reasonable length of road. Another reason was because the network of side roads was too extensive and speed zoning the main road only would have left lower standard side roads with a higher speed limit.

Experience with the rural speed zoning project suggests that wider application of the draft policy and guidelines is too complicated and too expensive. Further, the preferred method of determining the speed limit for the 2010 speed zoning project (the 85 percentile operating speed) is problematic. Drivers are generally not aware of actual risk levels and the consequences of a crash. For this reason, 85 percentile speeds are too high for the level of risk on many New Zealand roads.

Traditional arguments for setting the speed limit at the 85 percentile operating speed rely on an assumption that most people act responsibly and are able to judge a safe speed for a given road. Other traditional arguments are that the 85 percentile speed minimises the variance in the speed distribution and therefore minimises crashes, and finally, it represents a fair benchmark for enforcement. However, the traditional arguments have now been widely discredited. Drivers' subjective assessment of risk and the relationship between speed and risk are likely to be inaccurate. Serious crashes are rare in the experience of individual drivers, yet they are an everyday occurrence. The perceived benefits of travelling at higher speeds accrue to the driver, but the negative consequences are borne by other road users and the community as a whole. [5]

There is now ample evidence that speed limits aligned to harm minimisation and risk management principles lead to significant crash reductions and safety improvements. Therefore the challenge in setting safe speed limits is to improve drivers' subjective assessment of the relationship between speed and risk for different road environments, and in effect move the 85 percentile speed for those road environments down over time so operating speeds better reflect harm minimisation principles.

Meanwhile the concept of rural speed zoning is not fundamentally flawed, and the process remains available to RCAs to implement rural speed zones.

5. Rural safer speed areas

The Safe System approach focuses on reducing risk and minimising harm. In the context of rural speed management, this means that on roads, or in areas, where the infrastructure doesn't provide for safe travel at high speed, and the investment is not available to improve the infrastructure, then operating speeds must be revised to mitigate death and serious injury resulting from a crash. This suggests that a risk assessment process is the appropriate way to determine what speed limit is suitable for a road or an area.

Clause 3.2(5) of the Speed Limits Rule enables a RCA to set a speed limit that differs from the calculated limit, provided the RCA can demonstrate that the speed limit would be safe and appropriate considering the function and use of the road and its surrounding environment. A risk assessment of the network is the best way to obtain information to satisfy this requirement of the Rule.

Risk assessment methodology

Applying a risk assessment programme such as KiwiRAP offers advantages over developing a separate system specifically for speed limits. The KiwiRAP road protection score that sits behind the star rating will provide information to assist road controlling authorities manage the crash risk on their network and in line with the Safe System approach. Roads with a high traffic volume, high crash risk and a low star rating may justify infrastructural improvements to make them safe, but on low volume roads with a low crash risk and a low star rating, speed management, minor safety improvements and changing road user behaviour by alerting drivers to the risk, is the most effective way to improve safety.

However, KiwiRAP risk assessment is only available for the State Highway network. As an alternative for local roads, a crash risk assessment can be done. The crash risk assessment is a preliminary stage of the KiwiRAP process and will help identify which roads should be prioritised for treatment, which may include changing the speed limit. Both the personal risk (crashes per 100 million vehicle kilometres) and the collective risk (crashes per kilometre) need to be examined.

A road infrastructure safety assessment (RISA) may also assist in providing another process of assessment.

The *High risk rural road guide* (HRRRG)[6] provides a robust methodology and consistent framework for RCAs to assess their network and select the most appropriate interventions according to risk. It must be noted that KiwiRAP road protection score, crash risk assessment, RISA or other risk assessment methodology will not directly determine speed limits, but inform RCAs decisions on the most appropriate safety interventions, which may include speed management, to address safety risk.

Application to a road or an area?

There will be some circumstances where a road has no intersections and is sufficiently separated from other roads that it can be treated on its own. However, this is not typical of rural New Zealand, and more often a different speed limit on a road creates inconsistencies with other roads connected to it. In most circumstances it will make more sense to the public using the roads if a whole area is considered for a safer rural speed limit. The boundaries of such an area need to be defined by clear geographical changes or substantial changes in the characteristics of the roads so drivers understand the changes in speed limits.

To make the assessment task manageable, there should be a hierarchical structure of roads in the area. Main roads need to be assessed to satisfy 3.2(5) of the Rule, but intersecting roads of a similar standard could inherit the same rating as the main road. If connecting roads are of a lower standard, a sample of such roads should also be assessed to determine the appropriate speed limit, which could then apply to all similar roads in the area. This procedure relies on having a classification system so that roads of similar standard can be identified.

Demonstration rural safer speed areas

Under the Safer Journeys Action Plan 2011-2012, NZTA and local government are responsible for delivering the following action: 'Ensure the uptake of effective safe speed limits in high-risk ... rural areas, including implementation of demonstration areas as part of Safe System demonstration projects.'

'Demonstration' rural safer speed areas will provide information and experience to help establish how effective safer speed limits can best be implemented, what problems may occur and how to effectively communicate with road users. Safer speed area demonstration projects will be appropriate to the many areas in New Zealand where it is not possible to economically justify improved infrastructure to enable safe 'high' travel speeds.

RCAs must meet the requirements of the Speed Limits Rule for all speed limit changes for demonstration areas, including consultation, and before and after safety and compliance monitoring. An essential element of demonstration projects will be effective promotion and communication with road users to ensure there is a clear understanding of what is expected of the driver in these areas, and why. Integral with this will be clear physical entrances into the safer speed areas, and regular reminders for drivers throughout the areas.

To ensure national consistency, all demonstration projects will be considered by the national Safe System Speed Management Steering Group. Findings from the demonstration areas will help identify what changes to the Speed Limits Rule may be required in the future. Enquiries should be directed to a Programme Advisor, Engineering at the nearest regional NZTA office.

6. Implementing rural speed limits – current requirements

Bylaw

Rural speed limits other than 100km/h must be set by making a bylaw. In the case of speed limits of 50km/h or more that are not the calculated speed limit, a RCA must comply with clauses 3.2(5) and 7.1(6) of the Speed Limits Rule. Those clauses require the RCA to provide evidence to the NZTA that the speed limit will be safe and appropriate having regard for the function, nature and use of the road, its environment, land use patterns and whether the road is in an urban or rural area. A risk assessment process, together with operational data (speed, volume, crashes, etc), should provide sufficient evidence to show that a rural speed limit is safe and appropriate. The evidence to support a safer rural speed limit should be made available to everyone the RCA consults regarding changes to speed limits. The consultation process will provide an opportunity for the public and specified stakeholders to express their views on proposals to change the speed limit on rural roads.

Signs

A basic principle of the Speed Limits Rule is that the standard urban (50km/h) and rural (100km/h) speed limits require signs only to mark the beginning or end of those limits. This is because the standard urban and rural environments are clearly distinguishable and drivers are expected to know what the standard speed limits are. All other speed limits over 50km/h require repeater signs to remind road users what the speed limit is. NZTA is considering whether other options may be available.

Other areas of concern

Some RCAs have expressed concern about their responsibility to set safer speed limits on their rural roads and their potential liability if they don't. This is a particular concern if some roads have been treated with safety improvements, including safer speed limits, but other similar roads under the jurisdiction of the same RCA have been left untreated. In the context of a Safe System approach, this is a real issue. However, RCAs are responsible for managing their roads safely and this responsibility exists whether the RCA has set any safer rural speed limits or not. Rural safer speed areas should be seen as a tool to help RCAs fulfil their responsibilities under both the Speed Limits Rule and the *Safer Journeys* strategy.

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[1] Ministry of Transport *Safer Journeys, New Zealand's road safety strategy 2010-2020*

[2] Ministry of Transport *Road Safety 2010 Strategy*

[3] Ministry of Transport *The Social Cost of Road Crashes and Injuries June 2010 update*

[4] Victoria Pyta and Blair Turner, *NZ Speed Surveys – preliminary results*, Contract Report, ARRB Group Ltd, Melbourne

[5] Austroads Guide to Road Safety, Part 3: Speed Limits and Speed Management, Appendix C

[6] NZTA, High Risk Rural Road Guide, September 2011