

KiwiRAP Risk Maps 2012 and Performance Tracking Q&As

1. What is KiwiRAP?

KiwiRAP is part of an international family of Road Assessment Programmes (RAP), under the umbrella of the international Road Assessment Programme (iRAP). The RAP programme is a sister programme to the international New Car Assessment Programme (NCAP), known as ANCAP in New Zealand (the Australasian New Car Assessment Programme). Both programmes aim to improve road safety.

KiwiRAP is a partnership, formed in 2006, between the NZ Transport Agency (NZTA), NZ Automobile Association (NZAA), Ministry of Transport, Accident Compensation Corporation (ACC), and NZ Police. KiwiRAP was the first RAP model worldwide to have participation from the road network operator in its development.

KiwiRAP consists of three 'protocols':

1. **Risk Mapping** - uses historical traffic and crash data to produce colour-coded maps illustrating the relative level of 'personal' and 'collective' risk on sections of the state highway network. The first risk maps were released in 2008 and have now been updated in this 2012 version.
2. **Performance Tracking** - involves a comparison of crash rates over time to establish whether fewer - or more - people are being killed or injured on sections of the state highway network; and to determine how effective countermeasures have been. This 2012 report contains the first performance tracking results.
3. **Star Rating** - road inspections look at the engineering features of a road (such as lane and shoulder width or presence of safety barriers) with a rating of one to five stars awarded to road links, depending on the level of safety 'built-in' to the road (the higher the star rating, the safer the road). The first Star Rating report was released in 2010.

2. Why was KiwiRAP established?

The objectives of KiwiRAP are to:

- reduce deaths and injuries on New Zealand's roads by systematically assessing risk and identifying safety shortcomings that can be addressed with practical road improvement measures
- have risk assessment as a key factor in strategic decisions on road improvements, crash protection and standards of road management
- provide meaningful information on where the greatest levels of risk are faced, and in turn, to influence driver and rider behaviour

The Risk Maps and Star Ratings provide the NZTA (as the state highway operator) with vital information to show how particular roads perform compared with others. This is used (along with other tools) to inform decisions on road improvements based on risk and needs.

By assessing state highways across New Zealand in this way, it is also hoped that KiwiRAP will make the risk of death and serious injury on different roads understood and stimulate public discussion — and action. All roads are not equal. Drivers and riders need to be aware that the risks on some roads are greater than others, so they can drive or ride to the conditions and take extra care on higher risk roads.

Roads and roadsides is one of the five areas of high concern in the government's *Safer Journeys road safety strategy to 2020*. One of the key priorities is a focus on improving the safety on high risk rural roads. KiwiRAP is a key tool to help inform investment in accordance with Safer Journeys.

3. What data is being released now?

The KiwiRAP Risk Maps for 2007-2011 are being released which show the Personal Risk and Collective Risk on most of New Zealand's state highway network.

At the same time we're also releasing the related Performance Tracking results. This is where crash data from the new Risk Maps is compared to crash data from the previous Risk Maps (2002-2006).

This comparison will help establish whether fewer – or more – people have been killed or seriously injured; and to help determine if countermeasures have been effective.

This is New Zealand's first opportunity to track the safety performance of the state highway network using KiwiRAP methods.

4. How were the road 'links' determined?

The New Zealand state highway network consists of approximately 11,000 kilometres of rural and urban roads. This is around 12% of all New Zealand roads, but accounts for about half of the vehicle kilometres travelled every year and over half of all road fatalities.

The Risk Maps focus on state highway links that are typically outside the urban area between major town centres beginning and ending at the major urban area speed limit changes – that is, state highway links that have speed limits of 80km/h or more. Approximately 29% of all fatal and serious injury crashes in 2011 occurred on the parts of the state highway network that KiwiRAP reports on.

The length of road shown is the total length between the major town centre boundaries and hence includes the length of road through small urban areas/townships along that length. However, these small urban lengths and the urban crashes within them have been excluded from the analysis to calculate these rural road risk ratings.

For the initial risk mapping exercise in 2008, the state highway network was divided into 172 links typically between major town centres, roads that are reasonably similar in nature and traffic volume. The links needed to have a minimum number of crashes for the results to be statistically reliable and meaningful so some of the links are very long. To allow for performance tracking we have retained these same links wherever possible. Due to changes in the network, these Risk Maps contains crash analysis of 168 links compared to 172 when the last Risk Maps were released.

5. What is the difference between 'personal' and 'collective' risk?

Collective Risk is a measure of the total number of fatal and serious injury crashes per kilometre over a section of road. Collective Risk can also be described as the crash density. On average, the higher the traffic volumes, the higher the collective risk.

Collective Risk is often of greatest interest to road controlling authorities and NZ Police as it is where the greatest numbers of crash reductions can be achieved through infrastructure improvement and enforcement.

Some regions, such as the Waikato, Canterbury and Bay of Plenty carry the highest traffic volumes on undivided rural highways and hence have relatively high crash numbers and roads with high collective risk. On average, the actual crash rates in terms of vehicle kilometres travelled (Personal Risk) across these regions are often lower than other lower trafficked regions but the sheer volume of traffic generates higher crash numbers.

Personal risk is a measure of the risk to each individual using the state highway being assessed. Unlike Collective Risk, Personal Risk takes into account the traffic volumes on each section of state highway.

Personal risk is often highest on lower volume, lower standard, mountainous roads. In many cases infrastructure improvements would not be cost effective and improving safety by strengthening other safe system elements such as safer speeds, safer vehicles and safer road use may be required.

6. What do the overall performance tracking results show?

The total number of fatal and serious crashes occurring on the 168 links that now make up the assessed State Highway network has reduced by 15.5% from 3,874 between 2002-06 to 3,274 from 2007-11.

The greatest reduction in fatal and serious crash numbers has occurred in the high and to a lesser extent the medium-high and medium risk bands. The number of crashes on the lower risk links has largely remained unchanged.

The results indicate that the risk targeting being done by road safety partner agencies is working. This includes interventions across the Safe System such as road and roadside improvements, regulatory changes, campaign messaging for road users, speed management, and investment in targeted enforcement.

Following the release of the KiwiRAP Risk Maps in 2008 the NZTA directed many roading improvements to key risk areas identified. This includes prioritising safety retrofit programmes to the higher risk lengths. This has contributed to the safety improvement shown in the performance tracking of the higher risk routes.

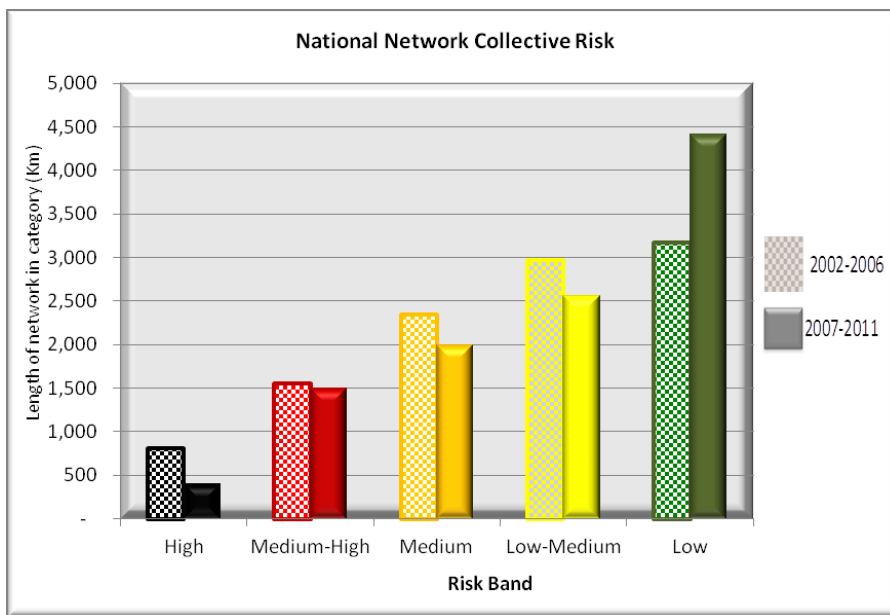
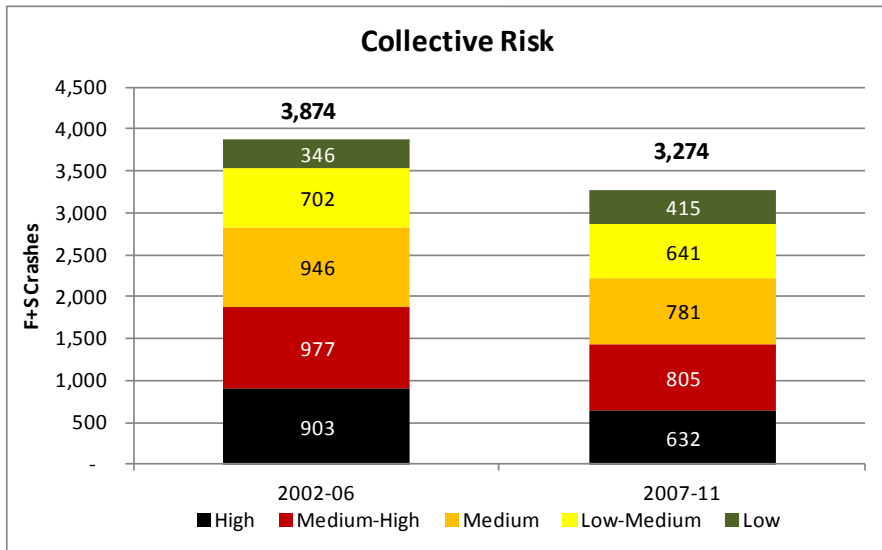
7. What are the changes to Collective Risk across the state highway network?

The overall amount of the state highway network with either high or medium-high collective risk has reduced by 20% since the previous time period (2365km to 1893km).

The total number of fatal and serious crashes on the original (2002-06) high collective risk links have reduced by 30% (903 to 632), while the number of crashes on medium-high and medium risk links have both reduced by more than 17% (977 to 805 and 946 to 781, respectively).

The crash numbers on the low-medium risk links have not changed significantly while the crashes on low risk links have increased by 20% (346 to 415). This is because interventions have typically been targeted to the highest risk areas.

As a result of these reductions, the number of high collective risk links has now reduced from an original 30 links to 11 links with 14 moving down to medium-high, three moving to medium, and two to low risk. The number of medium-high links has increased from 35 to 38 as a result. With the general downward trends in crashes and crash densities the number of low risk links has increased from 32 to 46 (up by 43.8%).

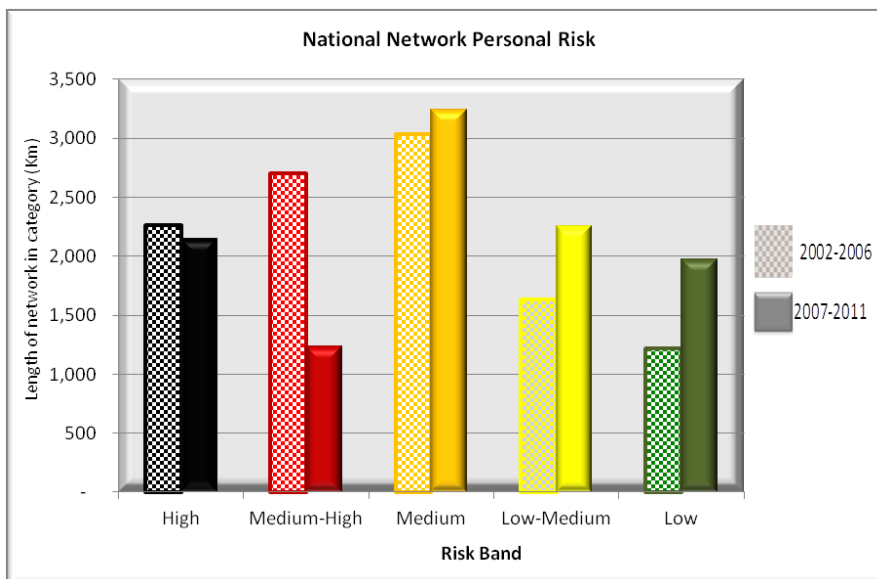
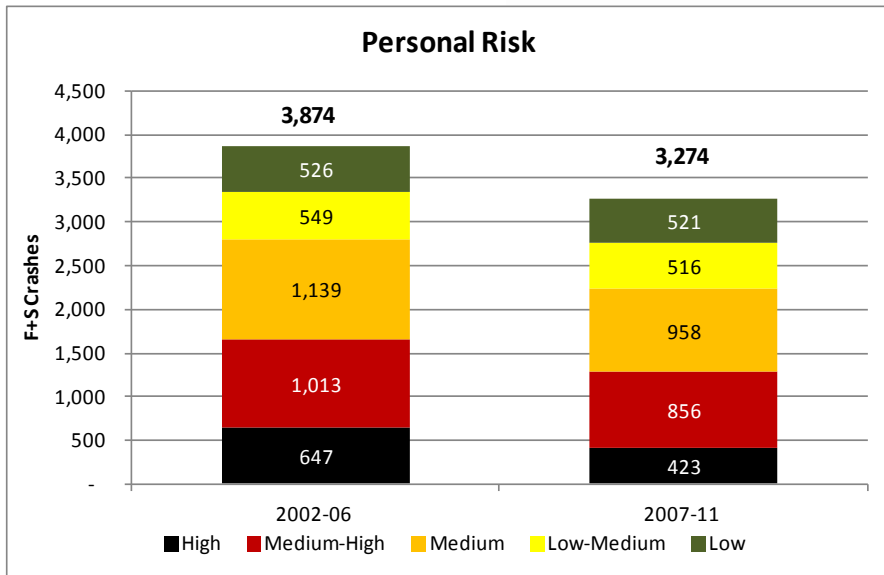


8. What are the changes to Personal Risk across the state highway network?

The overall amount of the state highway network with high or medium-high personal risk has reduced by 32% since the previous time period – from 4965km to 3381km.

The total number of fatal and serious crashes on the high personal risk links has reduced by 34.6% (647 to 423) whilst the number of crashes on both the medium-high and medium risk links reduced by more than 15%. The number of crashes on the low-medium and low risk routes has reduced by 6% and 1% respectively.

Based on the 2007-11 data, the number of high personal risk links has now actually decreased from 26 to 24. Whilst 19 of the original links have now moved to lower risk categories, 17 links have moved from lower risk categories into high risk. However, in general the crash densities and traffic flows associated with the higher personal risk links are typically quite low and hence the statistical reliability of these risk ratings is not as great as with the higher collective risk bands that have greater crash numbers.



9. How will the Risk Maps be used to improve road safety?

The Risk Maps are an information tool for both the general public and road safety organisations. Drivers and riders need to be aware that some roads are safer than others, so they can drive to the conditions and take extra care on higher risk roads.

The Risk Maps, combined with the KiwiRAP Star Ratings, help the NZTA manage the state highway network by understanding the high risk sections of rural state highways so safety efforts and safety investment can be better targeted to risk.

KiwiRAP provides a systematic and internationally recognised way of measuring the actual and predicted safety performance of roads. The risk ratings provide road planners, engineers and investors with vital benchmarking information to show how well, or how poorly, a particular road performs in comparison to other roads. This is a vital input to decision making. This information can also be used to help target Police efforts and speed management approaches.

We need to keep in mind that there is no single measure that makes a road safe.

The Government's *Safer Journeys* strategy introduced the Safe System approach to New Zealand.

Under the Safe System approach we will continue to work to strengthen all elements of the system:

- SAFE ROADS AND ROADSIDES should be predictable (self-explaining) and forgiving of mistakes – their design should encourage appropriate road user behaviour and speeds
- SAFE SPEEDS should suit the function and level of safety of the road – road users should understand and comply with speed limits and drive to the conditions
- SAFE VEHICLES should help prevent crashes and protect road users from crash forces that cause death and serious injury
- SAFE ROAD USE should ensure road users are skilled, competent, alert and unimpaired, and that people comply with road rules, choose safer vehicles, take steps to improve safety and demand safety improvements

10. What is the NZTA going to do to improve the safety of those roads that KiwiRAP identifies as high personal risk?

The NZTA will continue to implement safety initiatives on these roads. Our efforts are targeted at treating particular hazards on identified routes and continuing with low cost road engineering solutions such as better road marking and signage. For some of these roads, modifying driver and rider behaviour through informing them of the risk and encouraging or mandating lower speeds can make the biggest difference.

11. What is the NZTA going to do to improve the safety of those roads that KiwiRAP identified as high collective risk?

Many of the high collective risk routes are already a priority for our safety investment under the current National Land Transport Programme.

It is the roads with high collective risk that all road safety partners, including the NZTA, can have the greatest impact on as our measures benefit the highest number of road users.

12. What do the Risk Maps tell us about Roads of National Significance (RoNS)?

A number of the rural RoNS will bypass sections of 2-3 star roads carrying high volumes of traffic that have a high or medium-high Collective Risk.

These include:

- Tauranga Eastern Link – SH 2 from Mount Maunganui (SH 29) to Paengaroa (SH 33) has a high collective risk
- Wellington Northern Corridor – the Paraparaumu to Levin link has a medium-high collective risk
- Puhoi (Twin Tunnels) to Warkworth – this has a medium-high collective risk
- Waikato Expressway – this will bypass most of SH1 from Hamilton to Cambridge which has a medium-high collective risk and SH1 from Huntly to Hamilton which has a high collective risk.

As well as providing much needed efficiency improvements to assist New Zealand's economic growth, the RoNS also address high-risk sections of the highway with high fatal and serious crash numbers.

13. What has happened on the roads that show a statistically significant increase in fatal and serious crashes between the two time periods?

Initial analysis of these road links shows that some have had an increase in the vehicle kilometres travelled which means there's more traffic on the road and therefore greater safety risk. Others show

an increase in motorcycle crashes which could also be due to an increase of motorcyclists on that route between the two crash monitoring periods.

Motorcycling in New Zealand increased during the last decade, with new registrations nearly quadrupling between 2002 and 2008, and total numbers of motorcycles and mopeds reaching a peak in 2009. Motorcycle fatalities also rose during the same period, peaking in 2009. Since 2009, both new registrations and motorcycle fatalities have fallen back but remain above earlier levels.

The Safer Journeys strategy identified that the safety of motorcyclists was an increasing concern and made it one of the priority areas for action. Addressing the safety of motorcyclists now takes a whole-of-system approach which looks to strengthen road use, speed management, roads and roadsides, and vehicles – including motorcycles. Ensuring all relevant parties share responsibility for improving motorcycle safety is also very important - riders, retailers, engineers, maintenance crews, land owners, and drivers all have a role to play.

The guide for *Safer Journeys for Motorcycling on New Zealand Roads* (developed in 2012) aims to provide practitioners and policy makers with best practice guidance to identify, target and address key road safety issues on high-risk motorcycle routes.

14. Why are some roads classed as persistently high risk?

As crashes are primarily a function of exposure (ie, traffic volume), roads carrying very high traffic volumes are likely to continue to have relatively high crash numbers and therefore will remain high or medium-high collective risk. Examples of this are the Auckland and Wellington motorways.

Similarly on roads with very low volumes even a low number of isolated crashes can result in a high personal risk. It can be difficult to affect either of these. However on some persistently high risk roads there has been a reduction in crash numbers but not enough to move its rating to a lower band.

Background information

15. Why does KiwiRAP not include the urban lengths of state highways?

This decision was made by the KiwiRAP working group in line with international RAP practice. Overseas risk mapping exercises typically focus on rural roads because it is there where the speed limit is higher and as a result fatal and serious injury crashes are more likely to happen.

16. Why does KiwiRAP not include local roads?

The Decade of Action calls for a focus on high risk roads. The state highway network is 12% of New Zealand's roading network but accounts for approximately half of overall travel and half of the road fatalities. As such it was initially decided that focusing KiwiRAP efforts on the state highway network appeared sensible and in line with international RAP models.

The High Risk Rural Roads Guide now provides a methodology for local road controlling authorities to assess risk on local roads. However, we are currently working on some Urban KiwiRAP trials with Auckland Transport and Dunedin City Council.

17. Are the risk ratings a list of the worst roads in the country?

No. KiwiRAP risk maps show the number of crashes occurring on different stretches of rural state highway and are not an assessment of the physical condition and engineering features of the road (this is done via KiwiRAP Star Ratings). Road condition is just one of a number of possible factors in crashes.

A high collective risk rating shows where a large number of fatal and serious injury crashes are occurring. This doesn't necessarily mean it is because of the road condition. The high collective risk state highways are often relatively high standard roads but can still have high crash numbers due to the high traffic volumes. Examples of these include the Inner Auckland and Wellington motorway systems.

However, there is a strong relationship between personal crash risk and star rating (which measures the physical safety standards of the road) and therefore many of the highest personal risk roads also have a low star rating. Examples include State Highway 31, which is predominantly a 2 star road and has a high personal risk, and SH94 Te Anau to Milford which is a 2-3 star road, also has a high personal risk.

18. What types of improvements can make roads and roadsides safer?

The NZTA is always looking at improving the safety of state highways and is committed to implementing innovative and comprehensive safety solutions.

Examples of infrastructure safety measures undertaken include:

- improved markings, signage and lighting
- greater use of rumble strips
- roadside hazard removal or protection
- greater median space or median barriers on high volume roads
- improved overtaking opportunities
- intersection improvements where possible.

Speed management combined with safer road use can be one of the most effective countermeasures.

19. Aren't most crashes caused by bad drivers?

Human error is a factor in the majority of road crashes. However these errors are generally not made on purpose and many crashes happen when drivers and riders make simple mistakes such as driving when tired or misjudging a corner. Sober and responsible drivers and riders obeying all the road rules still die on New Zealand roads every week.

Under a Safe System we need to create a more forgiving road system that reduces the price we pay for human error. Safer roads and roadsides, speeds, use and vehicles should help minimise the chances of a crash, or if a crash does occur help minimise the severity of the crash. The aim is to ensure crashes are survivable.

20. Why not just reduce the speed limit to improve safety?

Travel speed influences the severity of a crash and the risk of a crash occurring. However, safe speeds are just one part of a Safe System.

Speed and safety need not be mutually exclusive. However, there may be some instances where lowering the speed limit on a high risk road may be an appropriate method of managing road safety outcomes, at least until infrastructure improvements are made.

Roads in New Zealand such as the outer reaches of the Auckland Motorway system, the Waikato Expressway and other Roads of National Significance are examples of good standard roads, with typically 4 to 5 star sections, where relatively high speeds can be accommodated with a reasonable level of safety.



21. How do our state highways compare with the ones overseas, eg Australia and UK?

These risk ratings of the state highway network are not comparable with risk ratings of highways overseas as almost all countries have different ways of recording and measuring crashes and different crash reporting rates. For example, the definition of a serious injury changes from country to country and the criteria determining the different risk bands vary.

22. Where can I get a copy of the latest Risk Maps and Performance Tracking?

For more information and downloadable resources visit the KiwiRAP website www.kiwirap.org.nz