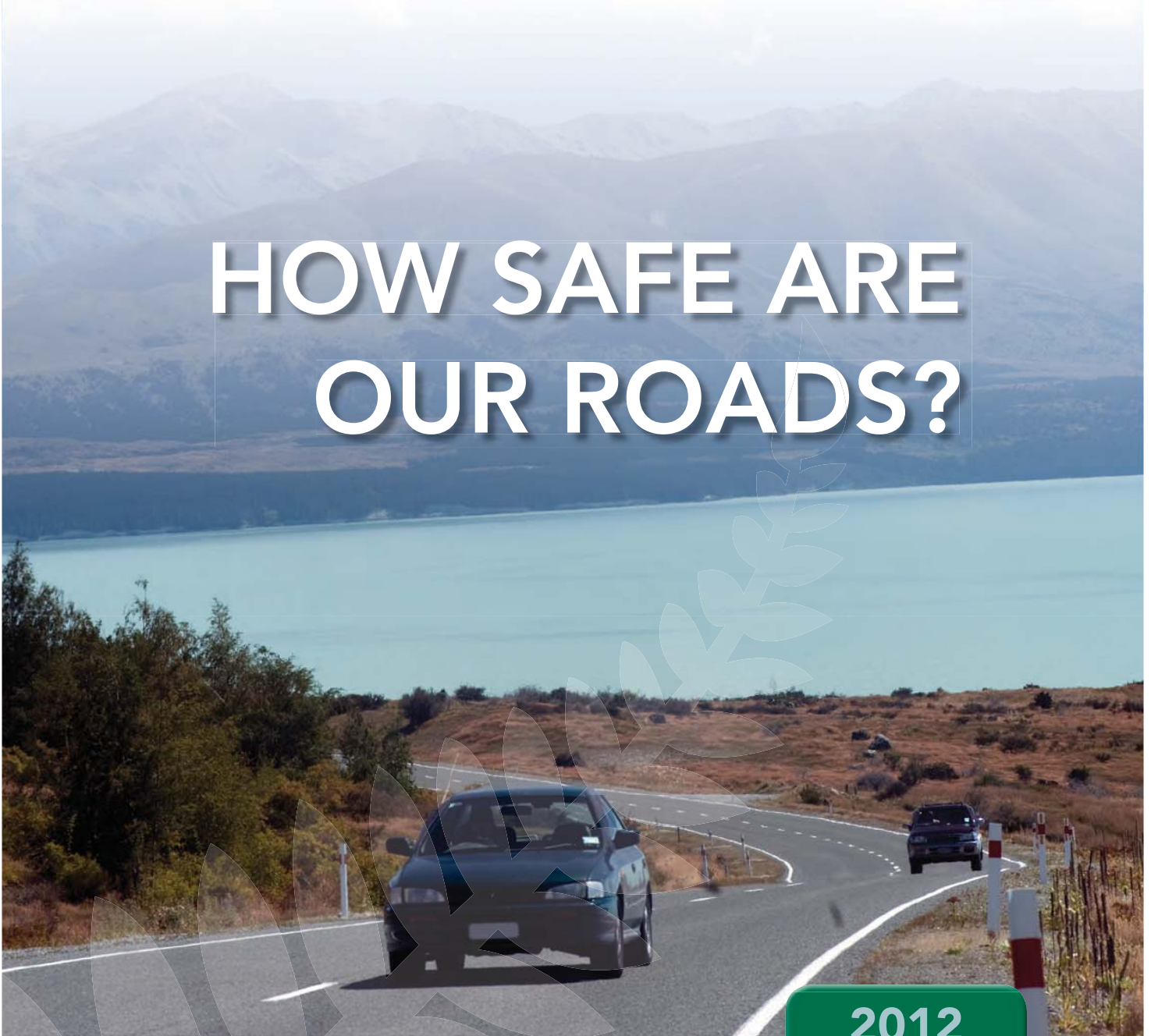




# KiwiRAP

NEW ZEALAND ROAD ASSESSMENT PROGRAMME

# HOW SAFE ARE OUR ROADS?



2012

Tracking the safety performance of  
New Zealand's state highway network



  
Safer Journeys

The New Zealand Road Assessment Programme (KiwiRAP) has been initiated in New Zealand as a partnership between government agencies and the New Zealand Automobile Association.

These organisations are committed to improving road safety and achieving the aims of Safer Journeys: New Zealand's Road Safety Strategy to 2020. This strategy aims to reduce the number of deaths and serious injuries on our roads. In 2011, 284 people died and around 2080 were seriously injured on New Zealand's roads.

The following organisations are partners in KiwiRAP.

> **NEW ZEALAND AUTOMOBILE ASSOCIATION (NZAA)**

The New Zealand Automobile Association represents over 1.3 million Members and has a strong interest in road safety. Overseas automobile clubs have pioneered the development of road assessment programmes globally and the NZAA has been able to link into that network to enable the expertise to be available to New Zealand.

> **MINISTRY OF TRANSPORT**

As the government's principal transport policy adviser, the Ministry leads and generates policy. The Ministry is the lead agency in the development and implementation of Safer Journeys: New Zealand's Road Safety Strategy to 2020.

> **NZ TRANSPORT AGENCY (NZTA)**

The NZ Transport Agency creates transport solutions for a thriving New Zealand. It achieves this through four core business functions: planning land transport networks, investing in land transport, managing the state highway network, and providing safe access to and use of the land transport system. All of these functions contribute to delivering Safer Journeys.

> **ACCIDENT COMPENSATION CORPORATION (ACC)**

The Accident Compensation Corporation (ACC) administers New Zealand's accident compensation scheme, which provides personal injury cover for all New Zealand citizens, residents and temporary visitors to New Zealand. ACC also aims to reduce the incidence and severity of injuries, and works with partners to improve road safety.

> **NEW ZEALAND POLICE**

New Zealand Police is responsible for the enforcement of the majority of road safety rules and regulations. Police is a key partner in the implementation of Safer Journeys.

**Exclusion of Liability**

The material in this report is not intended to be relied upon as advice, and in particular the authors and publishers accept no responsibility for loss or injury suffered by any person as a consequence, direct or indirect, of anything contained in this report.



# Contents

## Introduction

- 6 > What is KiwiRAP?
- 7 > Safer Journeys and the Safe System approach

## Performance Tracking

- 11 > Executive summary
- 13 > National results
- 14 > Most improved links
- 16 > Links with a significant increase in fatal and serious crashes
- 18 > Persistently high risk links
- 20 > Case studies
- 26 > Regional results

## Risk Maps 2007-2011

- 46 > Summary of results
- 48 > National ranking
- 50 > National maps
- 54 > Northland and Auckland Region
- 58 > Waikato and Bay of Plenty Region
- 64 > Gisborne and Hawke's Bay Region
- 68 > Taranaki, Manawatu-Whanganui and Wellington Region
- 72 > Tasman, Nelson, Marlborough, West Coast and Canterbury Region
- 76 > Otago and Southland Region

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# Foreword



The Automobile Association wants New Zealand to have the safest roads possible.

Four years ago the first KiwiRAP risk maps were published, highlighting where fatal and serious injury crashes were happening across our entire rural state highway network. Now, with the publication of these results, we are able to see how things have changed since then and how well efforts to improve the safety of our highways are working.

The results are encouraging. The number of crashes on our rural highways has reduced and many lengths of road have lower risk levels than they did before. However, we still had 3274 fatal or serious injury crashes on rural state highways over the last five years and that is far too many.

The first step to making something better is to know how well it is currently working and where and how it can be improved, and this is what KiwiRAP enables us to do. These latest results show us the lengths of highway which have had significant reductions in crashes and the locations we need to target with more safety improvements. One of the most valuable aspects of this book is the case studies, which look at six highways that have had significant crash reductions and the range of measures that have contributed to that.

Just as importantly KiwiRAP can help motorists and motorcyclists become more aware that all roads are not the same and driving or riding to the conditions is about much more than whether the road surface is wet or dry. One of the keys to achieving the goals of the Safer Journeys strategy is creating greater public conversation about road safety and the AA ultimately wants every road user in New Zealand to have more information, understanding and skills to keep themselves and everyone else safe. Two separate roads may have the same speed limit but they may have very different levels of risk. A motorist or rider who knows they are on a higher risk section of road can adjust their driving or riding to reflect this.

The Safe System approach to road safety recognises that it is about more than just the driver or the rider. Real change needs us to have safer drivers, travelling at safer speeds in safer vehicles on safer roads, and requires all of us to work together. From the Government, to local councils, to road designers, to employers, to drivers – road safety is everyone's responsibility.

The partnership approach of KiwiRAP epitomises this, with the AA, NZ Transport Agency, Ministry of Transport, NZ Police and ACC all working together to improve the safety of the state highway network. Making our roads and roadsides more forgiving of momentary lapses or errors in judgment by drivers and motorcyclists can not only prevent crashes but be the difference between life and death when one does occur. The AA sincerely hopes that this report will continue New Zealand's progress in reducing the number of people killed and hurt on our roads.

**Mike Noon**

The New Zealand Automobile Association Inc.



We all agree New Zealand needs to do better when it comes to road safety. In 2010 the Government launched Safer Journeys: New Zealand's Road Safety Strategy 2010-2020. The strategy sets out the vision of creating a road system increasingly free of death and serious injury. Safer Journeys outlines a range of actions to improve all parts of the road system by creating safer roads and roadsides, safer speeds, safer vehicles and safer road use.

Roads and roadsides is one of the five areas of high concern identified in Safer Journeys and one of the key actions is a focus on improving safety on high risk rural roads.

KiwiRAP is a major road safety tool that helps us measure and understand the levels of risk on the rural state highway network and helps us target our efforts to where we'll save the most lives. It can also help raise public awareness of the levels of risk on the roads we use. Drivers and motorcyclists need to be aware that some roads are safer than others, so they can drive or ride to the conditions and take care, particularly on the roads with higher personal risk.

Since the release of the first KiwiRAP Risk Maps in 2008 road safety agencies have been able to better understand where the high risk routes are and have worked to address them. The total number of fatal and serious crashes occurring on the assessed state highway network has reduced by more than 15 percent between the 2002-06 period used to develop the 2008 risk maps and the 2007-11 period now being analysed and reported in this booklet.

The results show that ongoing risk targeting being done by road safety agencies is working. This includes interventions such as road and roadside improvements, regulatory changes, campaign messaging for road users, speed management, and investment in targeted enforcement. It is only by continuing to work together that we can make a significant impact on New Zealand's rate of road death and injury.

While we're making good progress on improving road safety, the work is ongoing. The latest Risk Map data will continue to feed into decision making, and is an important step towards creating safer journeys for everyone.

**Hon Simon Bridges**  
Associate Minister of Transport

# Introduction

## 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). iRAP's vision is a World Free of High Risk Roads, and the programme plays a leading role in the United Nations Road Safety Collaboration. KiwiRAP is a sister programme to ANCAP, the Australasian New Car Assessment Programme that assigns Star Ratings to vehicles based upon the protection they provide to occupants in the event of a crash.

A registered charity, iRAP now works in partnership with government and non-government organisations in 70 countries to investigate and risk rate road networks. From its findings, iRAP recommends design improvements that need to be implemented in order to ultimately save lives and reduce the number of serious injuries on the world's roads.

Similar programmes have been implemented in Europe (EuroRAP), Australia (AusRAP), the United States of America (usRAP), South Africa, Malaysia and elsewhere.

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
- To have risk assessment as a key factor in strategic decisions on road improvements, crash protection and standards of road management
- To provide meaningful information on where the greatest levels of risk are faced, and in turn, to influence driver and rider behaviour



# Safer Journeys and the Safe System approach

The New Zealand government released its Safer Journeys – Road Safety Strategy in March 2010. Safer Journeys is a national strategy to guide improvements in road safety over the period 2010–2020. It addresses many of the actions called for in the Decade of Action for Road Safety campaign.

The strategy sets out a long-term vision for New Zealand of ‘a safe road system increasingly free of death and serious injury’. To support the vision, Safer Journeys introduced, for the first time in New Zealand, the world-leading Safe System approach to improving road safety.

A Safe System approach represents a fundamental shift in the way New Zealanders think about road safety and is based on the four principles below. The big idea is to create a more forgiving road system that reduces the price we pay for human error.

## **Human beings make mistakes and crashes are inevitable**

However, the current consequences of those mistakes and crashes are not acceptable. A Safe System aims to reduce the likelihood of crashes with a focus on removing the potential for death or serious injury.

## **The human body has a limited ability to withstand crash forces**

A Safe System aims to manage the magnitude of crash forces on the human body to remove the potential for death or serious injury.

## **System designers and road users must all share responsibility for managing crash forces to levels that don't result in death or serious injury**

The aim of all system designers working together is to deliver a road transport system that is forgiving of mistakes. System designers include planners, engineers, policy makers, educators, enforcement officers, vehicle importers, suppliers, utility providers, insurers, etc.

## **It will take a whole-of-system approach to implement the Safe System in New Zealand**

All parts of the system need to be strengthened: safe roads and roadsides, safe speeds, safe vehicles and safe road use.

In a truly Safe System we will not accept death or serious injury as inevitable. We will view every crash as a system failure and every casualty as preventable. The four key elements of the system will be able to be described as follows:

**SAFE ROADS AND ROADSIDES** are predictable (self-explaining) and forgiving of mistakes – their design should encourage appropriate road user behaviour and speeds

**SAFE SPEEDS** suit the function and level of in-built safety of the road – road users understand and comply with speed limits and drive to the conditions

**SAFE VEHICLES** help prevent crashes and protect road users from crash forces that cause death and serious injury

**SAFE ROAD USE** ensures road users are skilled, competent, alert and unimpaired, and people comply with road rules, choose safer vehicles, take steps to improve safety and demand safety improvements



### Safer Journeys and KiwiRAP

Roads and roadsides is one of the five areas of high concern in Safer Journeys. One of the key priorities in this area is a focus on improving the safety on high risk rural roads. The KiwiRAP Risk Maps and Star Ratings help the sector better understand 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. KiwiRAP Risk Ratings provide NZ Police, 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.

By giving New Zealand's state highways a Risk Rating, KiwiRAP can also help drivers and riders understand how risk can vary according to changes in the road environment. A risk-aware driver or rider will be more likely to adapt their driving/riding based on the condition of the road, which can help reduce their risk of being involved in a serious crash.

More information on what drivers and riders should do when on a stretch of road with a higher risk rating can be found at [www.kiwirap.org.nz](http://www.kiwirap.org.nz)



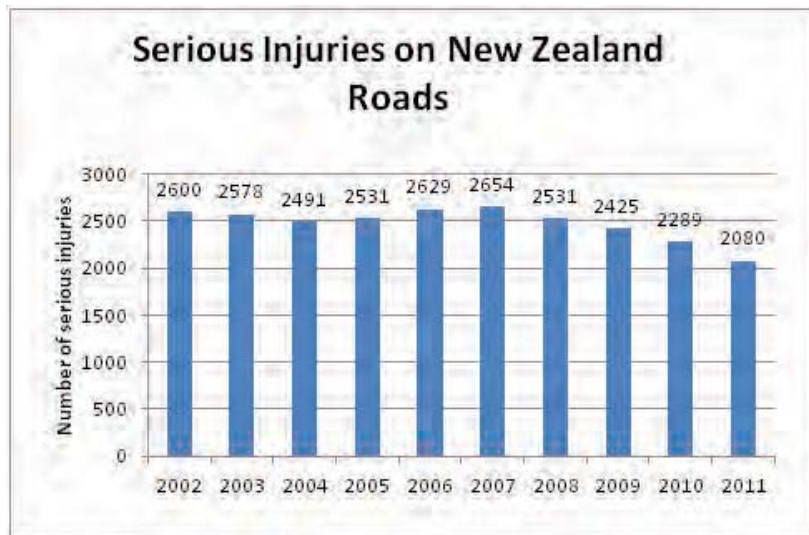
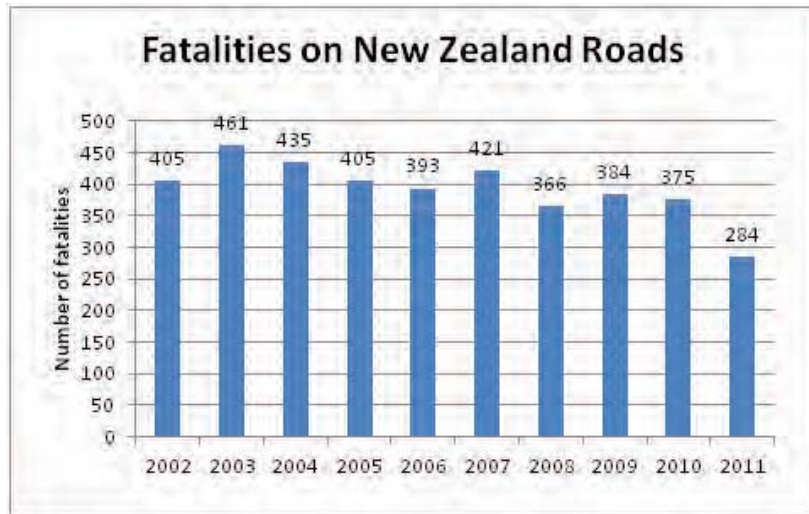
Every year on the world's roads there are nearly 1.3 million people killed and up to 50 million injured.

On 11 May 2011, the United Nations and World Health Organisation announced the start of a Decade of Action for Road Safety. New Zealand is one of many countries that has committed to the Decade of Action Global Plan aimed at saving 5 million lives and 50 million injuries around the world between 2011 and 2020.

The Global Plan for the Decade of Action for Road Safety 2011-2020 highlights that safer road infrastructure will be crucial in achieving the goals of the Decade of Action for Road Safety.

### New Zealand Context

In 2011, 284 people died on New Zealand roads and around 2,080 were seriously injured. While there is no room for complacency, this is a significant improvement on previous years.



Source: Ministry of Transport.

## How does a Road Assessment Programme Work?

Road Assessment Programmes internationally consist of three 'protocols':

1. **Risk Mapping** – uses historical traffic and crash data to produce colour-coded maps illustrating the relative level of risk on sections of the road network
2. **Performance Tracking** – involves a comparison of crash rates over time to establish whether fewer – or more – people are being killed or seriously injured; and to determine if countermeasures have been effective
3. **Star Rating** – road inspections look at the engineering features of a road (such as lane and shoulder width or presence of safety barriers). Between 1 and 5 Stars are awarded to road links, depending on the level of safety 'built-in' to the road (the higher the star rating, the better the road).

### KiwiRAP reports



The first KiwiRAP Risk Maps were published in 2008 and used crash data from 2002-2006. In 2010 the first KiwiRAP Star Ratings were published. Both of these results and reports are available at [www.kiwirap.org.nz](http://www.kiwirap.org.nz).

This report contains risk maps and performance tracking for the New Zealand (80+km/h) state highway network, comparing crash data for 2007-2011 to that from 2002-2006. It is the first time performance tracking has been done.

The New Zealand state highway network consists of approximately 11,000 kilometres of rural and urban roads. This equates to about 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. Approximately 29% of all fatal and serious injury crashes in 2011 occurred on the parts of the state highway network that KiwiRAP reports on.

### Does KiwiRAP report on the entire state highway network?

This report focuses 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. 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 the rural road risk ratings.

# Performance Tracking

## What is performance tracking?

Performance tracking is the comparison of crash rates over time to establish whether fewer – or more – people are being killed or seriously injured on various road sections; and to determine how effective any countermeasures have been.

Performance tracking in this report compares 2007-2011 data to 2002-2006 data and is New Zealand's first opportunity to track the safety performance of the state highway network using KiwiRAP methods. This portion of the report is split up into the following sections:

- National performance tracking results
- Most improved links
- Links with a significant increase in fatal and serious crashes
- Persistently high risk links
- Case studies
- Regional results

See Appendix 1 (page 80) for technical information on the links that have changed between the two reporting periods.

## Executive summary of results

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 between 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 (Refer Figures 1 & 2). The results indicate that the risk targeting being done by the 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.

Collective risk is a measure of the total number of fatal and serious injury crashes per kilometre over a section of road.

Personal risk is a measure of the fatal and serious crashes per vehicle kilometre travelled.

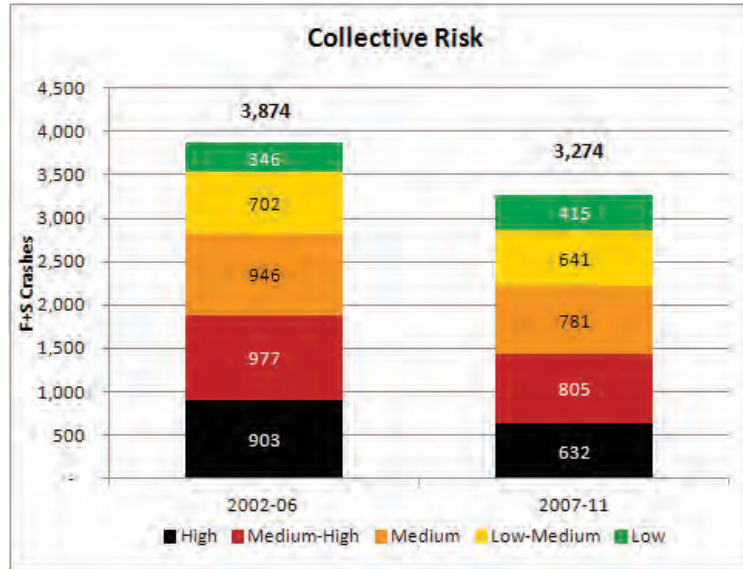
## Collective risk

The total number of fatal and serious crashes in the original (2002-06) high collective risk links have reduced by 30% (903 to 632), with the medium-high and medium links both reducing 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). (Refer Figure 1).

The average crash density (fatal and serious crashes/km) on the original high collective risk links has reduced from 0.25 fatal and serious crashes/km in 2002-06 to an average of 0.17 in 2007-11. Over the entire assessed network the average rate has dropped from 0.083 to 0.071.

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%).

Figure 1: Comparison of total crashes between 2002-06 and 2007-11 on the original (2002-06) highway lengths ranked by collective risk.



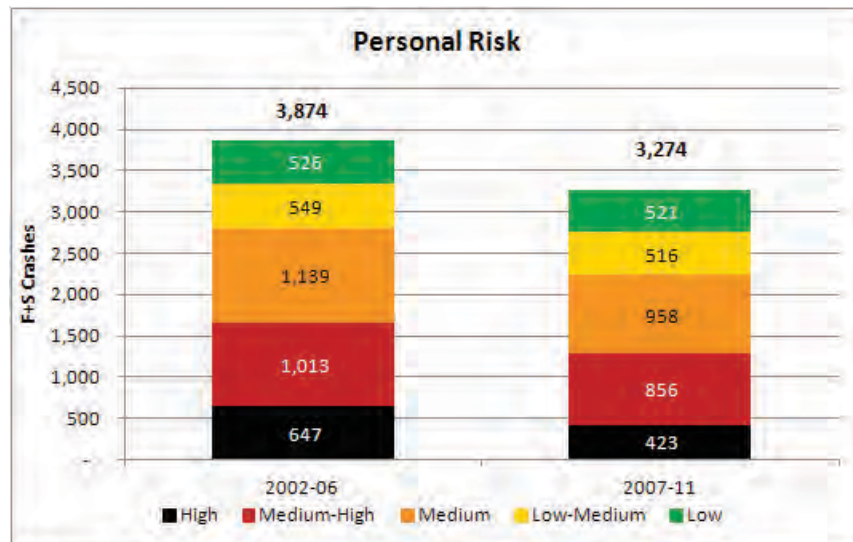
## Personal risk

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%. If we consider the original (2002-06) combined 64 high or medium-high personal risk links the total crash numbers have reduced from 1,660 (647 + 1,013) to 1,279 (423 + 856). (Refer Figure 2)

The average crash rates [fatal and serious crashes/vehicle kilometres travelled] on the high and medium-high links have reduced from 12.12 to 8.08 and 7.78 to 7.05 fatal and serious crashes per 100Mvkt, respectively. Over the entire assessed network the average rate has dropped from 5.34 to 4.21 fatal and serious crashes per 100 mvkt.

Based on the 2007-11 data, the number of high personal risk links has 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, the crash densities and traffic flows associated with the higher personal risk links are typically quite low and hence the statistical reliability of these is not as great as with the higher collective risk bands that have greater crash numbers.

Figure 2: Comparison of total crashes between 2002-06 and 2007-11 on the original (2002-06) highway lengths ranked by personal risk.



# National Performance Tracking Results

## 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. More detail on how Collective Risk is calculated is on Page 44 of this report.

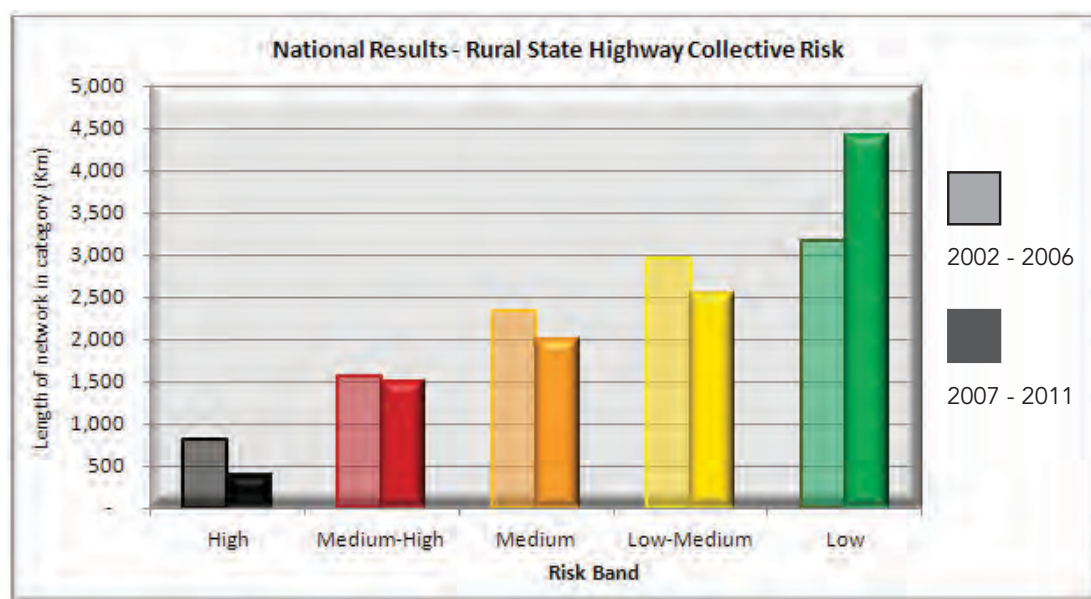
Collective Risk is typically highest on higher volume roads. It is often of greatest interest to road controlling authorities and NZ Police as it is where the greatest numbers of crash reductions can be achieved through infrastructure improvement and enforcement.

Some regions, such as the Waikato, Canterbury and Bay of Plenty carry the highest traffic volumes on undivided rural highways (refer KiwiRAP Star Rating results: 2010) and hence have relatively high crash numbers and roads with high collective risk. On average, the actual crash rates and personal risk in terms of vehicle kilometres travelled across these regions are often lower than other lower trafficked regions but the sheer volume of traffic generates higher crash numbers.

Figure 3 below shows how the level of Collective Risk has changed over the assessed State Highway network over the two time periods (2002-2006 and 2007-2011).

The number of kilometres of state highway network in the high collective risk band has more than halved over the two time periods from 806 km in the 2002-2006 five year period to 393 km in 2007-2011 period – a drop from 7% of the national network down to 4%. The percentage of state highway in the combined low-medium and low collective risk bands have increased from 56% in 2002-2006 to 65% in the latest time period.

Figure 3: National changes in Collective Risk (comparing 2002-06 data with 2007-11).



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	7%	14%	22%	27%	29%	100%
	Length (km)	806	1,559	2,342	2,970	3,169	10,845
2007-2011	Percentage	4%	14%	18%	24%	41%	100%
	Length (km)	393	1,500	1,996	2,553	4,409	10,851

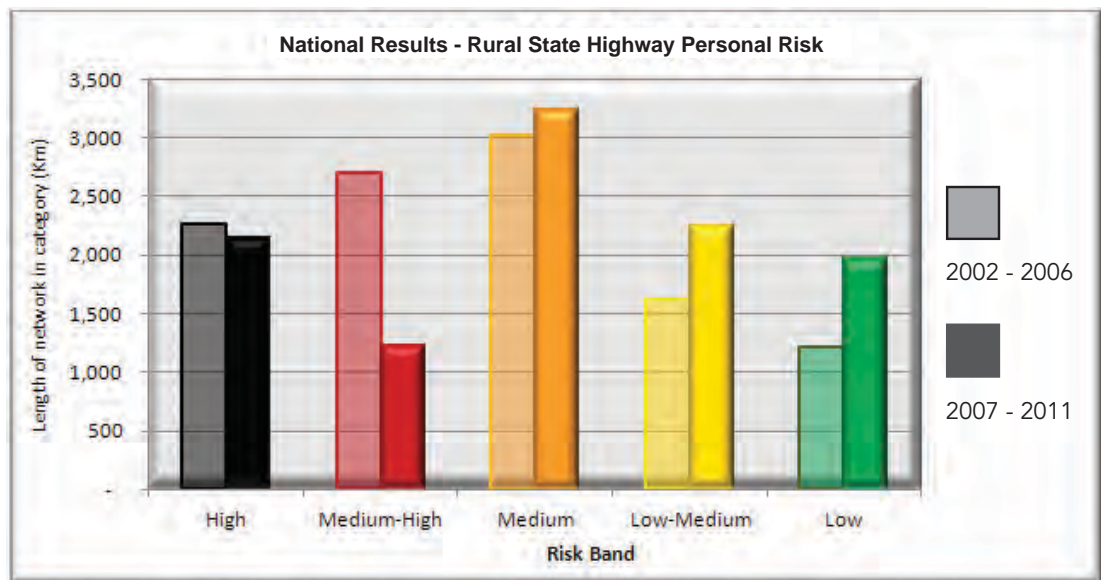
## Personal Risk

Personal Risk is a measure of the danger 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. More detail on how Personal Risk is calculated is on page 45 of this report.

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

The percentage of the assessed state highway network in the high and medium-high personal risk band has dropped from 46% in the 2002-2006 five year period to 31% in 2007-2011. The percentage of state highway network in the medium, low-medium and low personal risk bands have all increased as a result.

Figure 4: National changes in Personal Risk (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	21%	25%	28%	15%	11%	100%
	Length (km)	2,260	2,705	3,031	1,629	1,220	10,845
2007-2011	Percentage	20%	11%	30%	21%	18%	100%
	Length (km)	2,149	1,232	3,239	2,256	1,975	10,851

## Links with Significant Changes

Between the two time periods there are a number of links that have had a significant change in the number of fatal and serious crashes that have occurred on them – either a significant reduction in crashes, or a significant increase. These links are discussed below.

### Most Improved Links

As part of tracking the safety performance of the state highway network, the road links that improved the most over the two time periods have been determined. The 'most improved' sections of state highway are those where there has been a significant reduction in fatal and serious crashes over time.

In order for a link to be classed as 'most improved' over the two time periods, it needed to show a statistically significant reduction in the number of fatal and serious injury crashes from the first time period (2002-2006) to the second time period (2007-2011) at the 95% confidence level.

Many other road links also showed an improvement through a reduction of fatal and serious crashes (sometimes even a greater reduction in crash numbers) and reduction in the collective and personal risk rates. However the reduction in crash numbers would not have met the 95% confidence level.

The following table outlines the 14 links that were most improved. Case studies (starting page 20) on five of these links have been prepared to help share learnings.

SITE NAME	REGION	02 - 06 CRASHES					07 - 11 CRASHES					DIFFERENCE IN F+S
		FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND	FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND	
SH 1 from Oamaru to Dunedin*	Otago	7	73	80	Medium-High	High	5	34	39	Medium	Low-Medium	-41
SH 8 from Alexandra to Milton	Otago	6	56	62	Medium	High	8	16	24	Low	Medium	-38
SH 2 from Pokeno (SH 1) to Mangatarata (SH 25)*	Waikato	18	37	55	High	Medium-High	12	16	28	High	Low-Medium	-27
SH 1 from Pukerua bay to Paraparaumu*	Wellington	11	22	33	High	Low	1	11	12	Medium	Low	-21
SH 6 from Cromwell to Queenstown	Otago	2	29	31	Medium-High	Medium-High	2	9	11	Low-Medium	Low	-20
SH 1 from Meremere to Rangiriri	Waikato	9	13	22	High	Low-Medium	1	2	3	Low	Low	-19
SH 50 from Napier to Takapau	Hawkes Bay	7	21	28	Medium	High	4	6	10	Low	Low-Medium	-18
SH 5 from Tirau to Rotorua	Bay of Plenty	12	23	35	Medium-High	Medium-High	2	16	18	Medium	Low	-17
SH 4 from Raetihi to Wanganui	Manawatu/ Wanganui	7	22	29	Low-Medium	High	3	9	12	Low	Medium	-17
SH 8 from Oamaru to Cromwell and SH 8A	Otago	1	30	31	Low-Medium	High	2	13	15	Low	Low-Medium	-16
SH 2 from Napier to Hastings*	Hawkes Bay	6	22	28	High	Medium-High	3	11	14	High	Low-Medium	-14
SH 60 from Richmond to Motueka*	Nelson Marlborough	6	17	23	Medium-High	Medium	4	5	9	Low-Medium	Low	-14
SH 2 from SH 33 to Matata	Bay of Plenty	5	9	14	Medium	Low-Medium	1	2	3	Low	Low	-11
SH 2 from SH 5 to Napier	Hawkes Bay	4	10	14	High	High	1	4	5	Medium	Low	-9

\*See case studies, starting page 20



## Links with a significant increase in fatal and serious crashes

There are several links where there has been a significant increase in fatal and serious crashes between the two time periods. These are listed in the next table.

In order for a link to be classed as having a significant increase in fatal and serious crashes over the two time periods, it needed to show a significant increase in fatal and serious injury crashes from the first time period (2002-2006) to the second time period (2007-2011) at the 90%\* confidence level.

(\* Note that the confidence interval threshold here is 90% as compared to the 95% threshold used for the most improved links as there were only two links (SH43 & SH77) that had increases at the 95%ile level. It is worthy of note that some of these lengths still have reasonably low crash numbers).

Commentary on each link is below:

**SH77 from Ashburton to Darfield:** Crash numbers increased from 7 to 27. The most obvious change over this length of road appears to be the number of motorcycle crashes increasing from one in 2002-06 to 12 in 2007-11. This change accounts for over half of the total increase, with motorcycle crashes now accounting for 44% of the fatal and serious crashes on this link.

**SH1 from Huntly to Hamilton:** Crash numbers increased from 27 to 41. This section appears to have had a large increase in vehicle kilometres travelled on the route. This busy highway now carries a high traffic flow (>17,000 vpd) on an undivided carriageway, with a particular concern being the number of head on crashes. The Waikato Expressway will ultimately bypass this section of road.

**SH2 from Featherston to Upper Hutt:** Crash numbers increased from 20 to 34. The main change over this length of road appears to be in the number of motorcycle crashes increasing from 8 in 2002-06 to 18 in 2007-11. This change accounts for the majority of the total increase with motorcycle crashes now accounting for 53% of the fatal and serious crashes.

**SH25 from Whitianga to Waihi:** Crash numbers increased from 20 to 32. The main change over this length of road appears to be in the number of motorcycle crashes increasing from 9 in 2002-06 to 18 in 2007-11. This change accounts for the majority of the total increase with motorcycle crashes now accounting for 56% of the fatal and serious crashes.

**SH1 from Kaitiāia to Ohaeawai:** Crash numbers increased from 13 to 23. There are no obvious key factors for this increase other than there were 9 crashes in 2007 with no real commonality. There were a total of 9 crashes in the last 3 years (2009-11).

**SH43 from Stratford to Taumarunui:** Crash numbers increased from 7 to 15. The most obvious change over this length of road appears to be in the number of weekend motorcycle crashes increasing from 3 in 2002-06 to 9 in 2007-11. This change accounts for the majority of the total increase with motorcycle crashes now accounting for 60% of the fatal and serious crashes. However it is worth noting that this is a very long, low volume highway and the crash density (collective risk) remains very low.

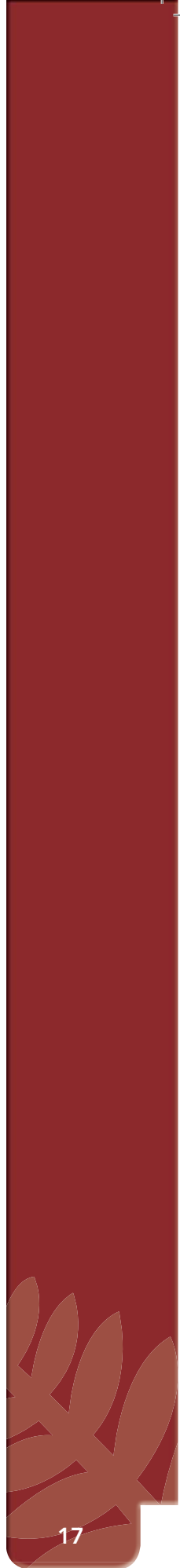
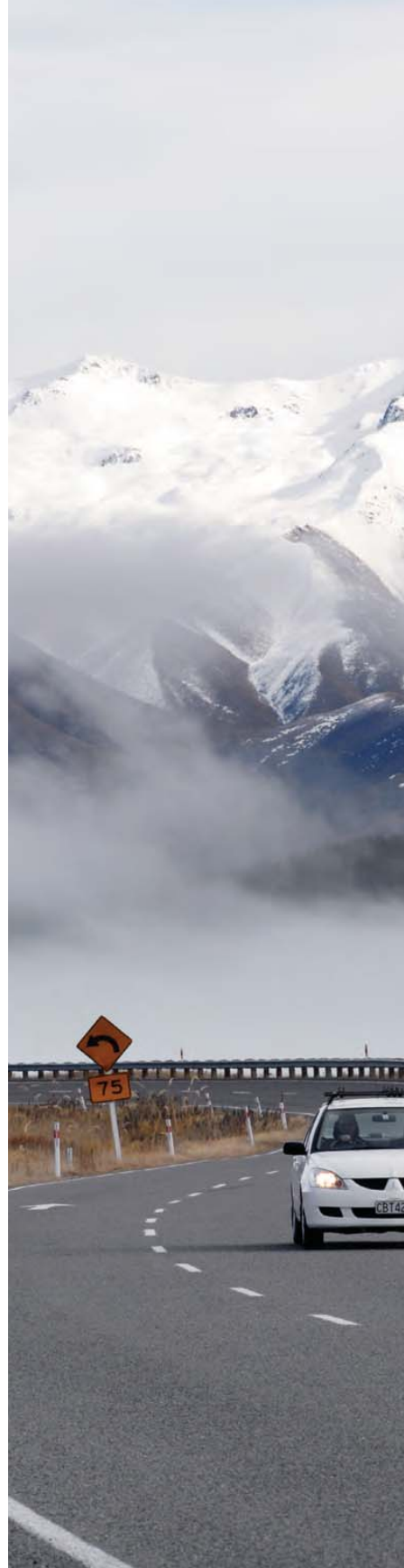
**SH82 from Kurow to SH15:** Crash numbers increased from 2 to 8. The most obvious change over this length of road appears to be in the number of weekend motorcycle crashes increasing from 0 in 2002-06 to 5 in 2007-11. This change accounts for almost all of the increase with motorcycle crashes now accounting for 63% of the fatal and serious crashes. However it is worth noting that this is a long, low volume highway and the crash density (collective risk) remains very low.

**Note:** The Safer Journeys strategy identified that the safety of motorcyclists was an increasing concern and so this was identified as one of the strategy's priority areas. Addressing motorcyclist safety takes a whole-of-system approach which looks to strengthen road use, speed, roads and roadsides, and vehicle safety/motorcycle safety. 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 '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.



SITE NAME	REGION	02 - 06 CRASHES						07 - 11 CRASHES						DIFFERENCE IN F+S
		FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND	FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND			
SH 77 from Ashburton to Darfield	Canterbury	1	6	7	Low	Low	6	21	27	Low-Medium	High			+20
SH 1 from Huntly to Hamilton	Waikato	9	18	27	High	Low	11	30	41	High	Low-Medium			+14
SH 2 from Featherston to Upper Hutt	Wellington	2	18	20	Medium-High	Medium-High	2	32	34	High	High			+14
SH 25 from Whitianga to Waihi	Waikato	3	17	20	Low-Medium	Medium	3	29	32	Low-Medium	Medium			+12
SH 1 from Kaitaia to Ohaeawai	Northland	2	11	13	Low	Medium	2	21	23	Low-Medium	High			+10
SH 43 from Stratford to Taumarunui	Manawatu/ Whanganui	2	5	7	Low	Medium	5	10	15	Low	High			+8
SH 82 from Kurow to SH 15	Canterbury	0	2	2	Low	Low	0	8	8	Low	High			+6



## Persistently High Risk Links

Persistently high risk roads are those rated high risk in both the 2002-2006 and 2007-2011 data periods. The following tables show links that have high collective risk in both time periods; and links that have high personal risk in both time periods.

### Links with High Collective Risk in both time periods

SITE NAME	REGION	02 - 06 CRASHES					07 - 11 CRASHES				
		FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND	FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND
SH 2 from Pokeno (SH 1) to Mangatarata (SH 25)*	Waikato	18	37	55	High	Medium-High	12	16	28	High	Low-Medium
SH 1 from Huntly to Hamilton	Waikato	9	18	27	High	Low	11	30	41	High	Low-Medium
SH 2 from Katikati to Tauranga	Bay of Plenty	9	19	28	High	Low-Medium	5	27	32	High	Low-Medium
SH 2 from SH 29 to SH 33	Bay of Plenty	12	22	34	High	Medium	8	15	23	High	Low
SH 22 from Drury to Pukekohe	Auckland	4	17	21	High	Medium	5	7	12	High	Low
SH 17 (revoked in 2012 SH status)	Auckland	3	15	18	High	Medium	6	24	30	High	Medium
SH 1 from Warkworth to Wellsford	Auckland	10	18	28	High	Medium-High	9	17	26	High	Medium-High
SH 2 from Napier to Hastings	Hawkes Bay	6	22	28	High	Medium-High	3	11	14	High	Low-Medium
SH 1 from Paraparaumu to Levin	Wellington	15	44	59	High	Medium	9	31	40	High	Low
SH 58 from Porirua to SH 2	Wellington	5	15	20	High	Medium	2	12	14	High	Low-Medium
SH 1 from Auckland to Takanini	Auckland	14	54	68	High	Low	8	46	54	High	Low

\* The collective risk for this link remains high but it is also one of the most improved links due to a significant reduction in fatal and serious crashes. See case study on page 21

## Links with High Personal Risk in both time periods

SITE NAME	REGION	02 - 06 CRASHES					07 - 11 CRASHES				
		FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND	FATAL	SERIOUS	F+S	COLLECTIVE RISK BAND	PERSONAL RISK BAND
SH 31 from Kawhia to SH 39	Waikato	1	5	6	Low	High	0	10	10	Low-Medium	High
SH 37 from SH 3 to Waitomo Caves	Waikato	1	5	6	Medium-High	High	0	3	3	Medium	High
SH 12 from Dargaville to Ohaeawai	Northland	8	25	33	Low-Medium	High	8	21	29	Low-Medium	High
SH 30 from Te Kuiti to Atiamuri	Waikato	3	18	21	Low-Medium	High	6	12	18	Low	High
SH 7 from Hammer Springs to Reefton	Canterbury	5	16	21	Low	High	3	20	23	Low	High
SH 6 from Haast to Wanaka	Otago/ West Coast	3	17	20	Low	High	3	19	22	Low	High
SH 94 from Te Anau to Milford	Southland	0	25	25	Low-Medium	High	3	18	21	Low	High



## CASE STUDIES

A very useful outcome of performance tracking is that it allows us to identify those road links that have improved significantly in terms of crash risk, and to look at the interventions that have been made during that time to contribute to the improvement. Sharing these learnings is critical to improving road safety.

### Region: **Auckland**

Case study: **SH1N: Albany to Twin Tunnels and Warkworth to Tunnels**  
(previously SH1 & 1A Albany to Orewa & SH1 Orewa to Warkworth).

- Reduction in fatal and serious crashes from 38 to 20



#### **Gateway to road safety**

Over the last few years the NZ Transport Agency (NZTA) has made substantial investment in changes to State Highway 1 (SH1) north of Auckland (between Albany and Warkworth). These have had a dramatic impact on reducing crashes in a region that used to be known for having very poor road crash statistics.

The Albany to Twin Tunnels stretch of SH1 includes the Northern Gateway which opened in January 2009 and has a Four Star KiwiRAP rating. It bypasses 9.1 kilometres of former State Highway 1 through Orewa, including a mountainous section of road with many tight curves.

The route it bypassed left very little room for driver and rider error with bad handling, speed and poor observation the major reported factors in crashes. The Northern Gateway, which is wide and straight by comparison, goes a long way to address these factors and also shortens the journey for motorists.

The Twin Tunnels to Warkworth link was also upgraded by the NZTA to manage the risks of the faster motorway northbound traffic as it entered the tighter highway alignment to the north. This included minor realignment, lighting, sealed shoulder widening, extension of roadside barriers and signage upgrades. This change in driving behaviour was supported by NZ Police through targeted campaigns involving high intensity speed enforcement, the use of alcohol checkpoints and random stopping campaigns to ensure vehicle safety.

As a result of these works, the total fatal and serious crashes on the combined links has reduced from 38 in 2002-06 to 20 in 2007-11. The risks of the highway north of Orewa have reduced from a high collective risk and medium personal risk to medium-high collective and low personal risk respectively.

## Region: Waikato

Case study: **SH 2 from Pokeno (SH 1) to Mangatarata (SH 25):**

- Reduction in fatal and serious crash numbers from 55 to 28
- Collective Risk – remained at high
- Personal Risk – reduced from medium-high to low-medium



### Reducing the risk

The state highways of the Waikato and Bay of Plenty weave around rolling hillsides, between dairy farms and through tight-knit communities. The region's roads have also borne some of the country's worst road crash statistics. In terms of KiwiRAP collective risk, this length was the worst section in the Waikato region and the eighth worst in New Zealand based on the 2002-06 data.

In recent years, the NZ Transport Agency and partners targeted this high-risk length with a coordinated safety campaign including improved road features, targeted enforcement, and road user information that created simple and clear messages for motorists. Volumes on this length can double during holiday periods reaching up to 26,000 vehicles per day.

Removal of roadside hazards such as power poles, upgraded signage, installation of rumble strips, intersection improvements, road reshaping on specific parts together with the completion of the more forgiving 6.2km Mangatawhiri Deviation all contributed to improving the road safety outcomes over this length. A wire rope median barrier was also installed on one short section of the highway in conjunction with a new passing lane.

There have been ongoing media campaigns focusing on user behaviour on State Highway 2 including the tongue-in-cheek and effective 'Jafa' billboards. While the campaign attracted a great deal of attention from its Auckland neighbours, it stood for 'Just Another Fatal Accident' and 'Just Another Fatigue Accident'. It helped create a lot of road safety discussions.

In the last couple of years, the Waikato advertising campaign took a different approach, with a 'Reduce the Risk' region-wide media campaign which included billboards and other media channels targeting factors such as speed and fatigue.

From crash data we know 25 percent of the fatal and serious crashes between 2006 and 2010 had speed identified as a contributing factor. So after extensive consultation with the community, emergency services and road user groups, in December 2011 the NZTA reduced some rural speed limits in this area from 100km/h to 90km/h in an effort to make further road safety gains.

As speed was a contributing factor in many of the crashes there is a continued NZ Police commitment to speed enforcement in the new 90 km/h zone area via highway patrol and increased speed camera operations.

These ongoing efforts have seen a significant reduction in fatal and serious crashes. However with the high traffic flows, and ongoing crashes, this section remains as a high collective risk and as such efforts to further improve this highway will continue taking a 'whole of system' approach.

## Region: Hawke's Bay

### Case study: SH2 Napier to Hastings

- Reduction in fatal and serious crashes from 28 to 14.
- Collective risk - remained high
- Personal risk - reduced from medium-high to low-medium



### Making improvements

The twin cities of Napier and Hastings are at the heart of sunny Hawke's Bay. The State Highway 2 (SH2) link covering both these cities stretches for 14.3 kilometres.

This section of road had a history of fatal and serious crashes and so in 2009 the NZ Transport Agency (NZTA) carried out a crash reduction study to determine what interventions were needed to improve safety on this road.

The Hastings end of SH2 is suburban in nature and has deep drains along both sides, power poles adjacent to the road and many entrances. One of the first actions in 2009 was to make changes to signage and pavement markings so that motorists were aware of the requirements at various parts of the route.

The NZTA's approach on this section of the network has focused on a number of minor interventions that collectively have changed the safety environment. These include minor works to ensure road users had clearer views of other traffic at intersections and in particular, reviewing the location and height of the signage. Site distance improvements were also made at a number of intersections with channelisation at one of the high-risk intersections. Some electronic cycle warning signs and electronic school signs were installed, and some minor seal widening and guard railing around curves was undertaken in critical locations.

In addition, the speed limit on the southern section of the road between Clive and Hastings which was most affected by entranceways and intersections was reduced from 100km/h to 80km/h to help reduce the incidence and severity of crashes. This speed zone has only been in place for twelve months so the long term impact on the crash rate will not yet be reflected in the results.

At the other end of this road link, towards Napier, the road is generally rural with a good alignment but there are a number of obstacles on the roadsides. Some minor works have been carried out in this area but investigations are still ongoing to determine how best to continue to improve the roads and roadsides as some crashes continue to occur but at a slightly lower rate. The sections on the approaches to Napier are tree lined, and urban design solutions that will not detract from the aesthetic presentation of the roadside are being carefully reviewed. A proposed next stage of improving the safety of the coastal Napier to Hastings link involves addressing the risk associated with the iconic trees along this section.

In the five year period between 2007 and 2011, the number of fatal and serious injury crashes on the link between Napier and Hastings stretch of road was 14 – half the number from 2002-2006 of 28. However with the high traffic flows and number of crashes the highway retains a high collective risk rating and the NZTA remains committed to implementing further incentives to create a more forgiving stretch of road.

## Region: Wellington

### Case study: SH1 Pukerua Bay to Paraparaumu:

(Previously SH1 Pukerua Bay to MacKays Crossing & MacKays crossing to Paraparaumu sections)

- Reduction in fatal and serious crashes from 33 to 12
- Collective risk – reduced from high to medium
- Personal risk – remained low



### Making crashes survivable

Centennial Highway (State Highway 1) along the Kapiti Coast has always been famous for its stunning views and beautiful coastline. The narrow stretch of road wedged between the steep hills and rugged seaside has in recent decades become equally infamous for severe road crashes, particularly head-on collisions.

Between 2002 and 2006, there were 33 fatal and serious crashes between Pukerua Bay and Paraparaumu. Many of these crashes were head-on collisions along the stretch of coastal road between Pukerua Bay and Paekakariki. After a high number of severe crashes on the route in 2004, the NZ Transport Agency (NZTA) – then Transit - moved quickly to review Centennial Highway's safety.

As part of this, the NZTA installed a wire median barrier in November 2004 to prevent collisions between the opposing lanes of traffic, introduced an effective series of safety billboards and reduced the speed limit from 100km/h to 80km/h. The median barrier in particular had a notable impact on reducing crashes so by September 2006, it was considerably extended. As at October 2012, at least 81 vehicles had hit the median barrier. Each of these had the potential to result in a serious head on crash.

Further north of Centennial Highway, the NZTA has reduced the speed limit to 70km/h and installed electronic speed warning signs at the Paekakariki/SH1 intersection. The railway level crossing at MacKays Crossing was removed, which allowed for the installation of a median barrier along this section of highway.

Between 2007 and 2011, the number of fatal and serious injury crashes between Pukerua Bay and Paraparaumu was 12. This is a reduction of more than half from the previous five year period despite traffic volume levels staying the same.

## Region: **Tasman**

### Case study: **SH60 Richmond to Motueka**

- Reduction in fatal and serious crashes from 23 to 9
- Collective risk – reduced from medium-high to low-medium
- Personal risk – reduced from medium to low



### **Small steps, big improvements**

State Highway 60, which skirts Tasman Bay between Nelson and Motueka at the top of the South Island, was once famous locally for its dangerous intersections, sharp corners and serious crashes.

Work by the NZ Transport Agency (NZTA) on the 30 kilometre stretch between Richmond and Motueka has shown how combining a range of safety initiatives can significantly improve road safety.

The NZTA made many of the intersections safer by installing more visible warning signs for motorists and motorcyclists, removing unsafe overtaking lanes at intersections and building the Ruby Bay Bypass, which removed 150 access ways to the highway. Some of the sharp and dangerous corners have also been made safer.

The speed limit along 1.5 kilometres of SH60 outside Richmond was also reduced from 100 to 80 km/h in 2007.

The public have been exposed to targeted education and enforcement campaigns on a range of road safety issues.

The impact of these sometimes small but significant steps has been that between 2007 and 2011 there was a reduction of more than half of the fatal or serious crashes along the highway compared to the previous five years (from 23 to 9).



## Region: Otago

### Case study: SH1 Oamaru to Dunedin:

- Reduction in fatal and serious crashes from 80 to 39
- Collective risk – reduced from medium-high to medium
- Personal risk – reduced from high to low-medium



### No need for speed

A range of interventions on State Highway 1 from Oamaru to Dunedin over the last five years have helped significantly reduce serious road crashes in the region.

Engineering changes on this stretch of road were designed to make the roads more self-explaining and intuitive for drivers and riders but also more forgiving in the event of a crash. Work included the Tumai and Jefferies Road realignment and installing safety barriers, rumble strip edgelines and additional curve signage.

Reducing the speed limits from 100 to 80 kilometres an hour along four kilometre stretches of road at both Alma and the Caversham Bypass played a key part in halving the number of fatal and serious injury crashes.

Another speed initiative was to introduce electronic speed feedback signs in Maheno and Palmerston so drivers and riders are reminded of the speed they're going and can adjust their speed accordingly. These sites were chosen after community concerns were raised about vehicle speeds which the NZ Transport Agency then further assessed through surveys.

Other factors in reducing crashes throughout the region included targeted NZ Police and vehicle enforcement. This included focusing on speed, fatigue, loss of control, driving to the conditions and vehicle safety. This enforcement was undertaken to help ensure drivers and riders are safe and compliant road users.

Educational campaigns were run on roadside billboards to raise awareness of the dangers of excessive speed and fatigue. Example messages included: 'Slow down before bends', 'Drive to the conditions', and 'If you're tired take a rest'.

This whole of system approach has resulted in a reduction of more than half the number of fatal and serious crashes from 80 (2002 - 2006) to 39 (2007 - 2011).

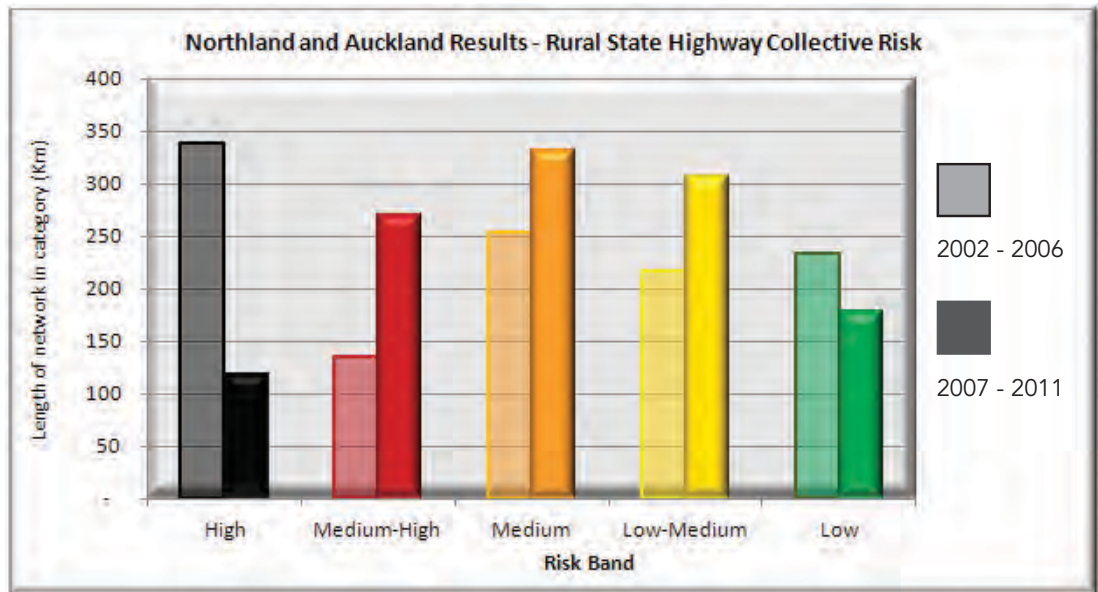
# Regional Results

## Northland/Auckland Region

### Collective Risk

There has been a substantial drop in the percentage of kilometres of state highway in the high collective risk category in the Northland/Auckland region between the two time periods (from 29% to 10%). The percentage of the network in medium-high, medium and low-medium collective risk bands have all increased while the percentage of network in the low risk band has decreased from 20 to 15%.

Figure 5: Changes in Collective Risk in Northland/Auckland Region (comparing 2002-2006 data with 2007-2011)



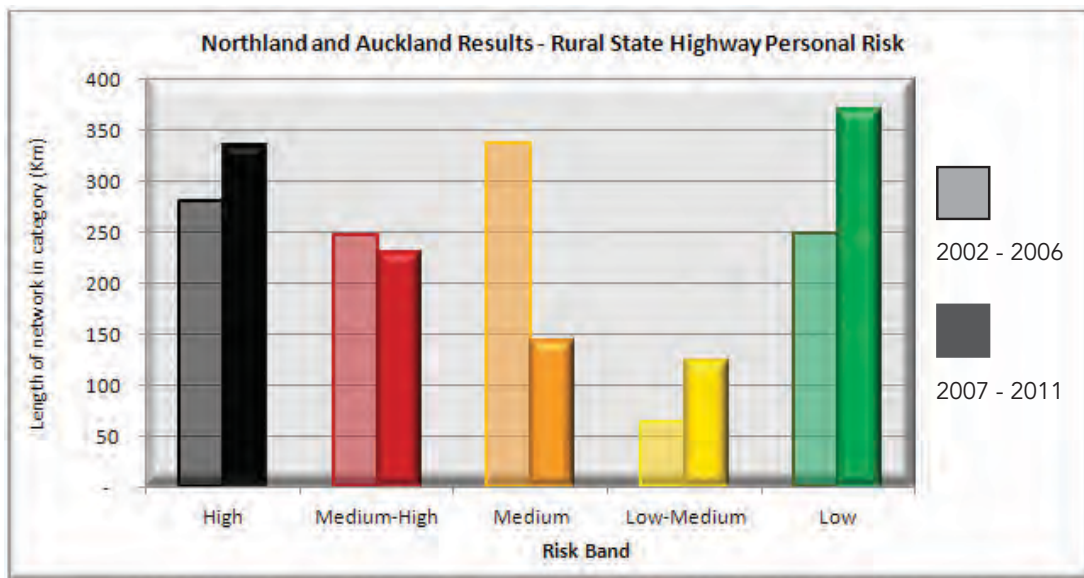
Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	29%	12%	22%	18%	20%	100%
	Length (km)	339	136	254	217	233	1,179
2007-2011	Percentage	10%	22%	28%	25%	15%	100%
	Length (km)	118	270	332	306	178	1,204

Note: percentages may not add to 100% due to rounding

## Personal Risk

The percentage of state highway network in the high personal risk category in the Northland/Auckland Region has increased from 24% to 28%. The percentage of network in the combined low-medium and low collective risk categories has increased by 15%.

Figure 6: Changes in Personal Risk in Northland/Auckland Region (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	24%	21%	29%	5%	21%	100%
	Length (km)	281	248	337	64	249	1,179
2007-2011	Percentage	28%	19%	12%	10%	31%	100%
	Length (km)	335	230	144	125	370	1,204

Note: percentages may not add to 100% due to rounding

The table below details how the risk categories of the links in the Northland/Auckland region have changed between the two time periods.

CHANGES IN COLLECTIVE RISK		LINK	CHANGES IN PERSONAL RISK	
2002-2006 DATA	2007-2011 DATA		2002-2006 DATA	2007-2011 DATA
Medium-High	Medium-High	SH 1 Northern Motorway (Auckland to Albany)	Low	Low
High	High	SH 1 from Auckland to Takanini	Low	Low
Low	Low	SH 1 from Cape Reinga to Kaitaia	Medium-High	Medium
Low	Low-Medium	SH 1 from Kaitaia to Ohaeawai	Medium	High
High	Medium-High	SH 1 from Ruakaka to Wellsford	Medium	Low-Medium
High	Medium-High	SH 1 from Marsden Point (SH 15A) to Whangarei	Low-Medium	Low
Medium	Medium	SH 1 from Takanini to Pokeno*	Low	Low
High	High	SH 1 from Warkworth to Wellsford	Medium-High	Medium-High
Medium-High	Medium-High	SH 1 from Whangarei to Ohaeawai	Medium	Low-Medium
Medium	Medium	SH 10 from Awanui to SH 1 South (Pakaraka)	High	Medium-High
Medium-High	Medium	SH 11 from Kawakawa to Puketona (SH 10)	High	Medium-High
Low-Medium	Low-Medium	SH 12 from Dargaville to Ohaeawai	High	High
Low-Medium	Low-Medium	SH 12 from Dargaville to SH 1	Medium-High	Medium-High
Medium	Medium	SH 14 from Whangarei to Dargaville	Medium-High	High
Low	Low-Medium	SH 15A Marsden Point	Low-Medium	Medium-High
High	Medium-High	SH 16 from Helensville to West Harbour (SH 18)	Low-Medium	Low
High	Medium-High	SH 16 from Parnell to Hobsonville	Low	Low
Medium	Medium	SH 16 from Wellsford to Helensville	Medium	High
High	High	SH 17 Albany to Silverdale	Medium	Medium
High	Low	SH 18 Upper Harbour Highway	Medium	Low
High	Medium	SH 20 and SH 20A and SH 20B	Low	Low
High	High	SH 22 from Drury to Pukekohe	Medium	Low

\*This link has changed significantly between the two time periods

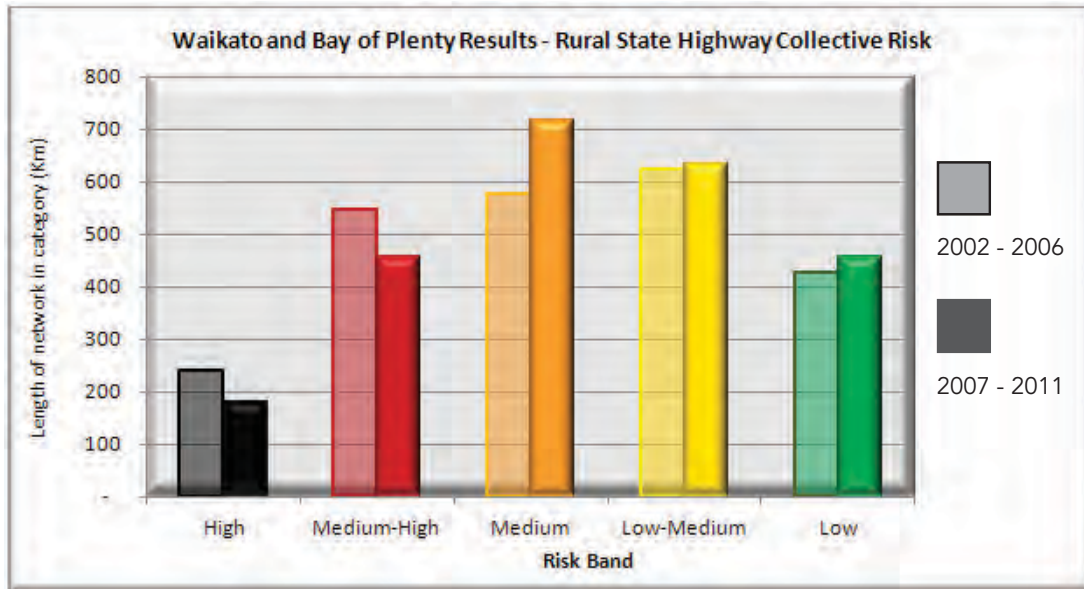
Boxes highlighted green depict a decrease in risk between the 2002-2006 and 2007-2011 time periods; red depicts an increase in risk; no colour is no change in risk.

## Waikato and Bay of Plenty Region

### Collective Risk

There has been a drop in the percentage of state highway network in both the high and medium-high collective risk categories in the Waikato and Bay of Plenty region. There has been a subsequent increase in the medium and low collective risk categories as a result.

Figure 7: Changes in Collective Risk in the Waikato and Bay of Plenty Region (comparing 2002-2006 data with 2007-2011)



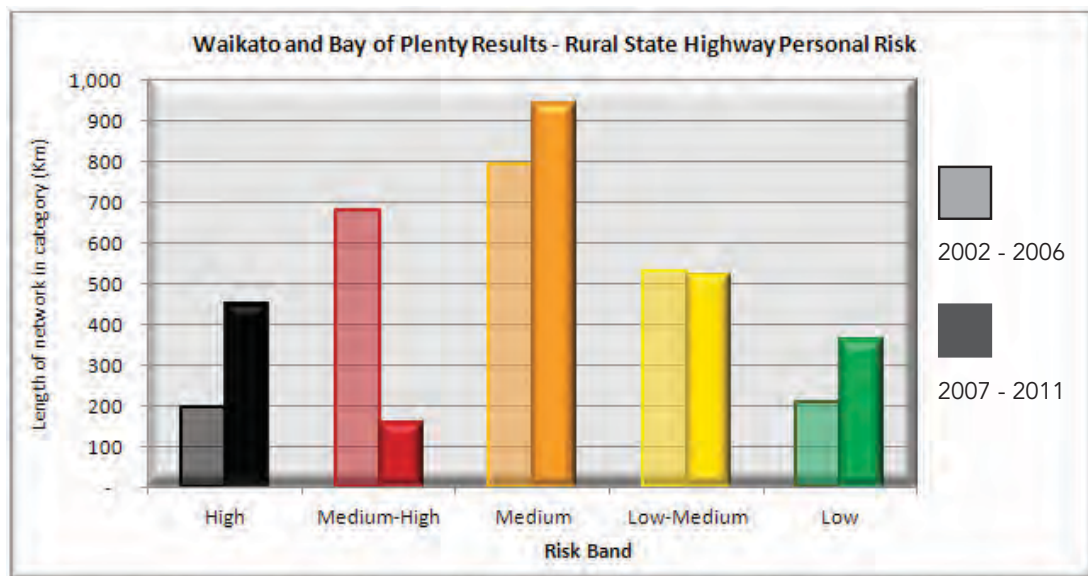
Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	10%	23%	24%	26%	18%	100%
	Length (km)	241	546	577	624	426	2,414
2007-2011	Percentage	7%	19%	29%	26%	19%	100%
	Length (km)	179	455	717	632	458	2,442

Note: percentages may not add to 100% due to rounding

## Personal Risk

The percentage of kilometres of state highway in the Waikato and Bay of Plenty region in the high personal risk band has increased from 8% to 18% over the two time periods while the percentage of network in the medium-high band has dropped from 28% to 7% over the same time period. The percentage of network in the low risk band has increased from 9% to 15%.

Figure 8: Changes in Personal Risk in the Waikato and Bay of Plenty Region (comparing 2002-2006 data with 2007-2011)



Period	High	Medium-High	Medium	Low-Medium	Low	Total
<b>2002-2006</b>	8%	28%	33%	22%	9%	100%
<b>Length (km)</b>	<b>199</b>	<b>683</b>	<b>793</b>	<b>530</b>	<b>210</b>	<b>2,414</b>
<b>2007-2011</b>	18%	7%	39%	21%	15%	100%
<b>Length (km)</b>	<b>452</b>	<b>159</b>	<b>943</b>	<b>524</b>	<b>364</b>	<b>2,442</b>

Note: percentages may not add to 100% due to rounding

The table below details how the risk categories of the links in the Waikato and Bay of Plenty region have changed between the two time periods.

CHANGES IN COLLECTIVE RISK		LINK	CHANGES IN PERSONAL RISK	
2002-2006 DATA	2007-2011 DATA		2002-2006 DATA	2007-2011 DATA
High	Medium-High	SH 1 from Cambridge to Piarere (SH 29)	Low	Low
High	Medium-High	SH 1 from Hamilton to Cambridge	Low	Low
High	High	SH 1 from Huntly to Hamilton	Low	Low-Medium
High	Low	SH 1 from Meremere to Rangiriri	Low-Medium	Low
Medium-High	High	SH 1 from Piarere to Putaruru	Low-Medium	Medium
Medium	Low-Medium	SH 1 from Pokeno to Meremere	Low	Low
Medium-High	Medium-High	SH 1 from Putaruru to Tokoroa	Low	Medium
Medium	Low-Medium	SH 1 from Rangiriri to Huntly	Low	Low
Medium	Medium	SH 1 from Takanini to Pokeno*	Low	Low
Low-Medium	Medium	SH 1 B from Taupiri to Cambridge	Low-Medium	Low-Medium
Medium-High	Medium-High	SH 1 from Taupo to Turangi	Low-Medium	Low-Medium
Medium-High	Medium-High	SH 1 from Tokoroa to Taupo	Medium	Low-Medium
Low-Medium	Medium	SH 1 from Turangi to Waiouru*	Low-Medium	Medium

CHANGES IN COLLECTIVE RISK		LINK	CHANGES IN PERSONAL RISK	
2002-2006 DATA	2007-2011 DATA		2002-2006 DATA	2007-2011 DATA
High	High	SH 2 from Katikati to Tauranga	Low-Medium	Low-Medium
Medium-High	Medium	SH 2 from Mangatarata (SH 25) to Paeroa	Medium	Low
Low-Medium	Medium	SH 2 from Matata to Opotiki	Medium	High
Low-Medium	Low	SH 2 from Opotiki to Gisborne via Waioeka Gorge*	High	Medium-High
High	Medium-High	SH 2 from Paeroa to Katikati	Medium-High	Medium
High	High	SH 2 from Pokeno (SH 1) to Mangatarata (SH 25)	Medium-High	Low-Medium
High	High	SH 2 from Mount Maunganui (SH 29) to Paengaroa (SH 33)	Medium	Low
Medium	Low	SH 2 from SH 33 to Matata	Low-Medium	Low
Medium-High	Medium-High	SH 3 from Hamilton to Te Awamutu and SH 21	Low-Medium	Low
Medium-High	Medium	SH 3 from Te Awamutu to Te Kuiti	Medium	Low-Medium
Medium	Medium	SH 3 from Te Kuiti to New Plymouth*	Medium-High	Medium
Low-Medium	Low-Medium	SH 4 from Eight Mile Junction (Sth of Te Kuiti) to Taumarunui*	Medium-High	Medium
Medium	Medium	SH 5 from Rotorua to Wairakei	Low-Medium	Low-Medium
Medium	Low-Medium	SH 5 from Taupo to Tarawera*	Medium	Low-Medium
Medium-High	Medium	SH 5 from Tirau to Rotorua	Medium-High	Low
Medium-High	Medium-High	SH 23 from Hamilton to Raglan	Medium	Medium
Low-Medium	Low-Medium	SH 24 and SH 28 from Matamata to Putaruru	Medium	Medium
Medium-High	Low-Medium	SH 25 from Mangatarata (SH 2) to Thames	Medium	Low
Low	Low-Medium	SH 25 from Thames to Whitianga via Coromandel	Medium	Medium
Low-Medium	Low-Medium	SH 25 from Whitianga to Waihi	Medium	Medium
Medium	Low-Medium	SH 25A from Kopu to Hikuai	Medium	Medium
Medium	Medium-High	SH 26 from Hamilton to Morrinsville	Low	Medium
Low-Medium	Medium	SH 26 from Morrinsville to Kopu	Low-Medium	Medium
Medium	Medium	SH 27 from Mangatarata (SH 2) to Tirau	Medium	Low-Medium
High	Medium-High	SH 29 and SH2 within Tauranga	Low-Medium	Low
Medium-High	High	SH 29 from Kaimai Ranges to Tauranga	Medium	Medium
Medium	Medium	SH 29 from Piarere to the Kaimai Ranges	Low-Medium	Low
Low-Medium	Low-Medium	SH 30 from Rotorua to Atiamuri	Medium	Medium-High
Medium-High	Medium	SH 30 from Rotorua (Te Ngae) to Whakatane	Medium-High	Medium
Low-Medium	Low	SH 30 from Te Kuiti to Atiamuri	High	High
Low	Low-Medium	SH 31 from Kawhia to SH 39	High	High
Low	Low	SH 32 from Tokoroa to Kuratau	Low-Medium	Medium
Medium-High	Medium-High	SH 30 and SH 33 from Rotorua to Paengaroa	Medium-High	Medium
Medium	Medium-High	SH 34 from Edgecumbe (SH 2) to Kawerau (SH 30)	Medium-High	High
Medium	Medium-High	SH 36 Tauranga to Ngongotaha	Medium-High	High
Medium-High	Medium	SH 37 from SH 3 to Waitomo Caves	High	High
Low-Medium	Low-Medium	SH 38 from Rainbow Mountain to Murupara	Medium-High	Medium-High
Medium	Low-Medium	SH 39 and SH 31 from Ngaruawahia to Otorohanga	Medium-High	Medium
Low	Low-Medium	SH 41 from Taumarunui to Turangi*	Medium-High	High
Low	Low	SH 46 SH 47 SH 48 from National Park to Turangi*	Low	Medium-High

Boxes highlighted green depict a decrease in risk between the 2002-2006 and 2007-2011 time periods; red depicts an increase in risk; no colour is no change in risk.

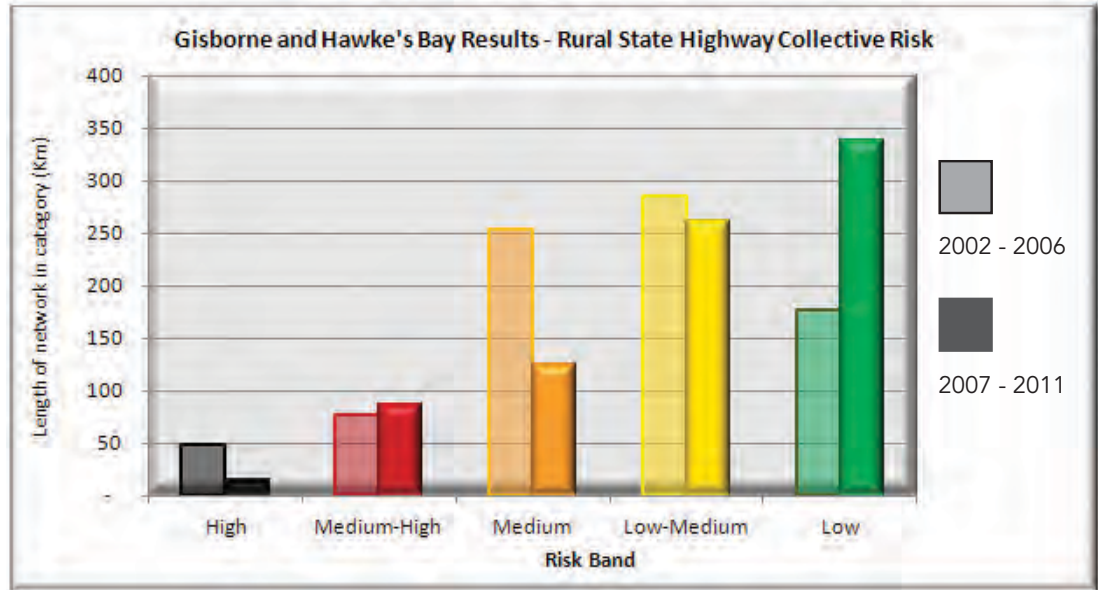
\*These links cross map boundaries, so will appear in more than one regional list.

## Gisborne and Hawke's Bay Region

### Collective Risk

The percentage of kilometres of state highway in the Gisborne and Hawke's Bay region in the high collective risk band has decreased from 6% to 2% over the two time periods while the percentage in the medium-high category has increased from 9% to 11%. The low risk band has almost doubled from 21% of the network in 2002-2006 through to 41% in the 2007-2011 time period.

Figure 9: Changes in Collective Risk in the Gisborne and Hawke's Bay Region (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	6%	9%	30%	34%	21%	100%
	Length (km)	48	77	254	285	177	840
2007-2011	Percentage	2%	11%	15%	32%	41%	100%
	Length (km)	14	87	125	262	339	828

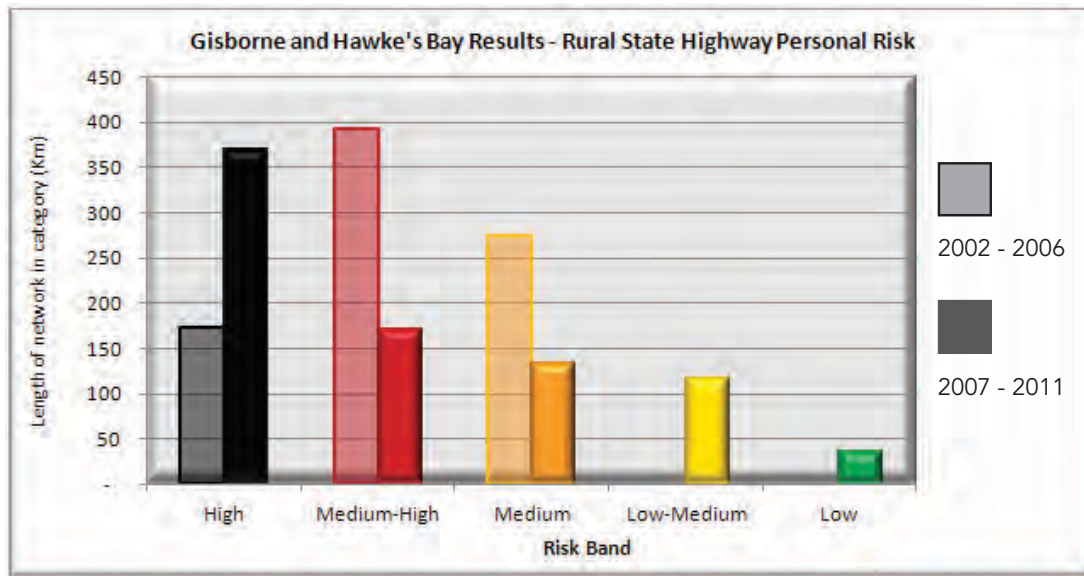
Note: percentages may not add to 100% due to rounding



## Personal Risk

The percentage of the state highway network in the Gisborne and Hawke's Bay region in the high personal risk band more than doubled from 21% in the 2002-2006 period to 45% in 2007-2011. The percentage of network in the medium-high band fell by more than half from 47% to 21% over the same time period. The percentage of network in the low-medium and low risk bands increased.

Figure 10: Changes in Personal Risk in the Gisborne and Hawke's Bay Region (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	21%	47%	33%	0%	0%	100%
	Length (km)	174	392	274	-	-	840
2007-2011	Percentage	45%	21%	16%	14%	4%	100%
	Length (km)	370	171	133	117	37	828

Note: percentages may not add to 100% due to rounding

The table below details how the risk categories of the links in the Gisborne and Hawke's Bay region have changed between the two time periods.

CHANGES IN COLLECTIVE RISK		LINK	CHANGES IN PERSONAL RISK	
2002-2006 DATA	2007-2011 DATA		2002-2006 DATA	2007-2011 DATA
Medium	Low-Medium	SH 2 from Gisborne to Wairoa	Medium-High	High
High	High	SH 2 from Napier to Hastings	Medium-High	Low-Medium
Low-Medium	Low	SH 2 from Opotiki to Gisborne via Waioeka Gorge*	High	Medium-High
Medium-High	Medium-High	SH 2 from Takapau to Hastings	Medium	Medium
Medium-High	Medium	SH 2 from Takapau to Woodville*	Medium-High	Medium
Low-Medium	Medium	SH 2 from Wairoa to SH 5 Napier	Medium-High	High
Medium	Low-Medium	SH 5 from Tarawera to SH 2 Bay View (North of Napier)	Medium-High	Medium
Medium	Low-Medium	SH 5 from Taupo to Tarawera*	Medium	Low-Medium
Low	Low	SH 35 from Opotiki to Tokomaru Bay	Medium-High	High
Low-Medium	Low-Medium	SH 35 from Tokomaru Bay to Gisborne	Medium	Medium-High
Low	Low	SH 38 from Wairoa to Waikaremoana	Medium	High
High	Medium-High	SH 50 and SH 50A Taradale Rd to Pakipaki	Medium	Low
Medium	Low	SH 50 from Napier to Takapau	High	Low-Medium

Boxes highlighted green depict a decrease in risk between the 2002-2006 and 2007-2011 time periods; red depicts an increase in risk; no colour is no change in risk.

\*These links cross map boundaries, so will appear in more than one regional list.

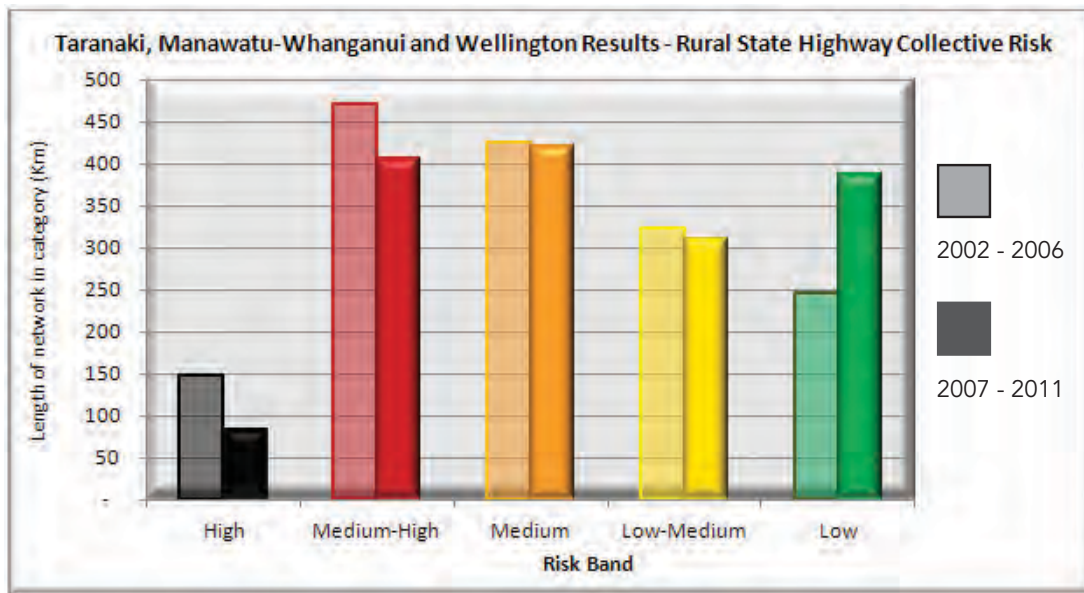


## Taranaki, Manawatu-Whanganui and Wellington Region

### Collective Risk

The percentage of state highway in the Taranaki, Manawatu-Whanganui and Wellington region in the high collective risk band has decreased from 9% to 5% over the two time periods. The percentage of the network in the medium-high and low-medium collective risk bands has also decreased. The low collective risk band has increased from 15% to 24% of the network.

Figure 11: Changes in Collective Risk in the Taranaki, Manawatu-Whanganui and Wellington Region (comparing 2002-2006 data with 2007-2011)



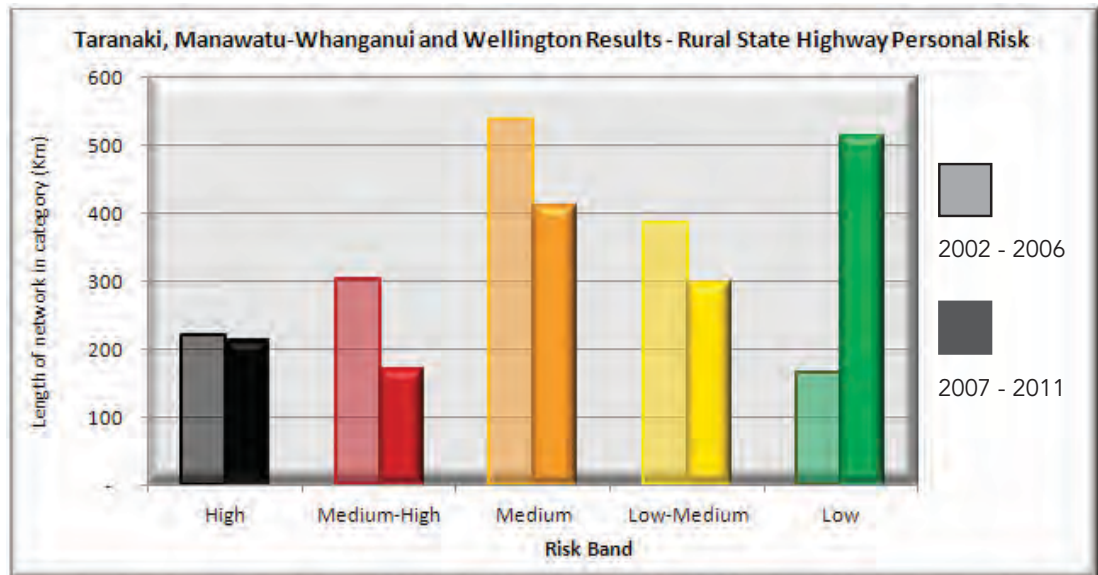
Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	9%	29%	26%	20%	15%	100%
	Length (km)	149	472	426	324	245	1,616
2007-2011	Percentage	5%	25%	26%	19%	24%	100%
	Length (km)	83	406	420	310	388	1,607

Note: percentages may not add to 100% due to rounding

## Personal Risk

The percentage of state highway network in the high, medium-high, medium and low-medium personal risk bands all decreased in the Taranaki, Manawatu-Whanganui and Wellington region whereas the percentage of network in the low risk band increased from 10% to 32% between the 2002-2006 and 2007-2011 time periods.

Figure 12: Changes in Personal Risk in the Taranaki, Manawatu-Whanganui and Wellington Region (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	14%	19%	33%	24%	10%	100%
	Length (km)	222	304	537	385	167	1,615
2007-2011	Percentage	13%	11%	26%	19%	32%	100%
	Length (km)	212	171	412	298	515	1,607

Note: percentages may not add to 100% due to rounding

The table below details how the risk categories of the links in the Taranaki, Manawatu-Whanganui and Wellington region have changed between the two time periods.

CHANGES IN COLLECTIVE RISK		LINK	CHANGES IN PERSONAL RISK	
2002-2006 DATA	2007-2011 DATA		2002-2006 DATA	2007-2011 DATA
High	High	SH 1 from Paraparaumu to Levin	Medium	Low
Medium-High	Medium	SH 1 from Sanson to Levin	Low-Medium	Low
Low-Medium	Medium	SH 1 from Turangi to Waiouru*	Low-Medium	Medium
Medium	Medium	SH 1 from Waiouru to Bulls	Low-Medium	Low
Medium-High	Medium-High	SH 1 from Wellington to Paremata Roundabout	Low	Low
Medium-High	Medium-High	SH 2 from Featherston to Masterton	Medium	Low
Medium-High	High	SH 2 from Featherston to Upper Hutt	Medium-High	High
Medium-High	Medium	SH 2 from Takapau to Woodville*	Medium-High	Medium
High	Medium-High	SH 2 from Wellington to Upper Hutt	Low	Low
Medium	Medium	SH 2 from Woodville to Masterton	Medium	Medium
Medium-High	Medium-High	SH 3 and 3A from New Plymouth and Waitara to Hawera	Low-Medium	Low-Medium
Medium-High	Medium-High	SH 3 and SH 1 from Wanganui to Palmerston North	Medium	Low
Medium	Low-Medium	SH 3 from Hawera to Whanganui	Medium	Low-Medium
Medium-High	Medium-High	SH 3 from Palmerston North to Woodville	Low-Medium	Medium
Medium	Medium	SH 3 from Te Kuiti to New Plymouth*	Medium-High	Medium
Low-Medium	Low-Medium	SH 4 from Eight Mile Junction (Sth of Te Kuiti) to Taumarunui*	Medium-High	Medium
Low-Medium	Low	SH 4 from Raetihi to Whanganui	High	Medium
Medium	Low-Medium	SH 4 from Taumarunui to Raetihi	High	Medium-High
Low	Low-Medium	SH 41 from Taumarunui to Turangi*	Medium-High	High
Low	Low	SH 43 from Stratford to Taumarunui	Medium	High
Low-Medium	Low-Medium	SH 45 from New Plymouth to Hawera	Low-Medium	Low-Medium
Low	Low	SH 46 SH 47 SH 48 from National Park to Turangi*	Low	Medium-High
Low	Low	SH 49 from SH 4 to Waiouru	Medium	Low
Low-Medium	Low	SH 53 from Featherston to Martinborough	Medium-High	Low-Medium
High	Medium-High	SH 54 from Feilding to SH 3 Palmerston North	Medium-High	Medium
Low-Medium	Low	SH 54 from Vinegar Hill (SH 1) to Feilding	High	Low
Medium-High	Medium-High	SH 56 from Makerua (SH 57) to Palmerston North	Medium	Medium
Medium-High	Medium-High	SH 57 from Levin to Ashhurst	Medium-High	Medium-High
High	High	SH 58 from Porirua to SH 2 Upper Hutt	Medium	Low-Medium

Boxes highlighted green depict a decrease in risk between the 2002-2006 and 2007-2011 time periods; red depicts an increase in risk; no colour is no change in risk.

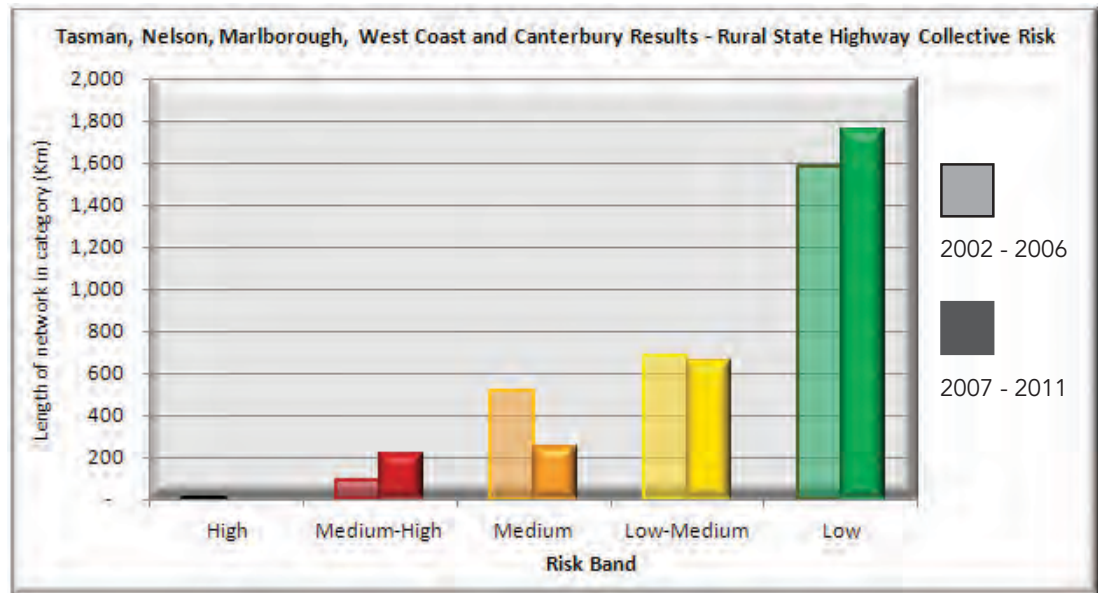
\*These links cross map boundaries, so will appear in more than one regional list.

## Tasman, Nelson, Marlborough, West Coast and Canterbury Region

### Collective Risk

There are no high collective risk sections of state highway in the Tasman, Nelson, Marlborough, West Coast and Canterbury region in the 2001-2011 time period. The percentage of state highway network in the medium-high collective risk category went from 3% to 8% of the network. The percentage of state highway in the medium and low-medium collective risk bands decreased, while the percentage of network in the low collective risk band increased from 55% to 61%.

Figure 13: Changes in Collective Risk in the Tasman, Nelson, Marlborough, West Coast and Canterbury Region (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	0%	3%	18%	24%	55%	100%
	Length (km)	10	95	520	686	1,588	2,899
2007-2011	Percentage	0%	8%	9%	23%	61%	100%
	Length (km)	-	217	252	660	1,755	2,884

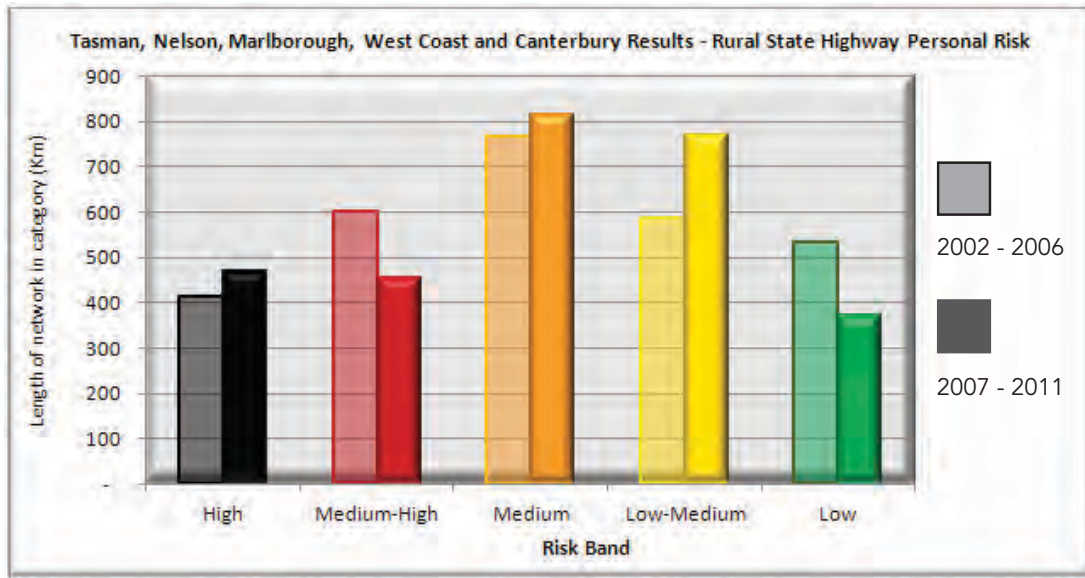
Note: percentages may not add to 100% due to rounding



## Personal Risk

The percentage of the network in the Tasman, Nelson, Marlborough, West Coast and Canterbury region in the high personal risk band increased from 14% to 16% over the two time periods while the percentage in the medium-high personal risk band decreased from 21% to 16%.

Figure 14: Changes in Personal Risk in the Tasman, Nelson, Marlborough, West Coast and Canterbury Region (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	14%	21%	26%	20%	18%	100%
	Length (km)	413	600	767	586	533	2,884
2007-2011	Percentage	16%	16%	28%	27%	13%	100%
	Length (km)	470	457	815	769	373	2,884

Note: percentages may not add to 100% due to rounding



The table below details how the risk categories of the links in the Tasman, Nelson, Marlborough, West Coast and Canterbury region have changed between the two time periods.

CHANGES IN COLLECTIVE RISK		LINK	CHANGES IN PERSONAL RISK	
2002-2006 DATA	2007-2011 DATA		2002-2006 DATA	2007-2011 DATA
Low-Medium	Low-Medium	SH 1 Christchurch Northern Motorway	Low	Low
Low-Medium	Medium	SH 1 from Ashburton to Timaru	Low	Low
Medium	Low-Medium	SH 1 from Blenheim to Kaikoura	Medium-High	Medium
Medium	Medium-High	SH 1 from Christchurch to Ashburton	Low	Low
Medium	Medium	SH 1 from Kaikoura to Waipara	Medium-High	Medium-High
Medium-High	Medium-High	SH 1 from Picton to Blenheim	Medium	Medium
High	Medium-High	SH 1 from SH 74 to SH 73 Christchurch	Low	Low
Medium	Medium	SH 1 from Timaru to Oamaru*	Low-Medium	Low-Medium
Medium-High	Medium-High	SH 1 from Waipara to Kaiapoi	Low-Medium	Low-Medium
Low-Medium	Low	SH 6 and SH 67 from Murchison to Westport	High	Medium-High
Medium	Low-Medium	SH 6 from Blenheim to Havelock	Medium	Low
Low	Low	SH 6 from Greymouth to Haast	Low-Medium	Medium
Low	Low	SH 6 from Haast to Wanaka*	High	High
Medium	Medium-High	SH 6 from Havelock to Nelson	Medium-High	Medium-High
Low-Medium	Low-Medium	SH 6 from Richmond to Murchison	Medium	Medium
Low-Medium	Low	SH 6 from Westport to Greymouth	Medium-High	Medium-High
Low-Medium	Low-Medium	SH 7 and SH 7A from Waipara to Hanmer Springs	Low-Medium	Low-Medium
Low	Low	SH 7 from Hanmer Springs to Reefton	High	High
Low	Low	SH 8 from Fairlie to Omarama*	Medium	Low-Medium
Low	Low-Medium	SH 8 from Timaru to Fairlie	Low	Medium
Low-Medium	Low	SH 60 from Motueka to Collingwood	High	Low-Medium
Medium-High	Low-Medium	SH 60 from Richmond to Motueka	Medium	Low
Medium	Low	SH 62 from Spring Creek (SH 1) to Renwick (SH 6)	High	Low
Low	Low	SH 63 from Renwick to Kawatiri	Medium	High
Low	Low	SH 65 from Ariki (SH 6) to Springs Junction	Medium-High	Medium-High
Low	Low	SH 67 from Westport to Karamea	Low	Medium
Low	Low	SH 69 and SH 7 from Inangahua Junction (SH 6) to Greymouth	Medium-High	Low-Medium
Low-Medium	Low-Medium	SH 73 from Christchurch to Darfield	Low	Low
Low	Low	SH 73 from Darfield to Kumara	Medium	Low-Medium
Low-Medium	Low-Medium	SH 75 from Christchurch to Akaroa	Medium	Medium
Low	Low-Medium	SH 77 from Ashburton to Darfield	Low	High
Low	Low	SH 79 from Fairlie to Rangitata	Low	Low-Medium
Low	Low	SH 80 from Twizel to Mt Cook	Medium	Medium
Low	Low	SH 82 from Kurow to SH 1	Low	High
Low	Low	SH 83 from Omarama to SH 1*	Low-Medium	Low

Boxes highlighted green depict a decrease in risk between the 2002-2006 and 2007-2011 time periods; red depicts an increase in risk; no colour is no change in risk.

\*These links cross boundaries, so will appear in more than one regional list.

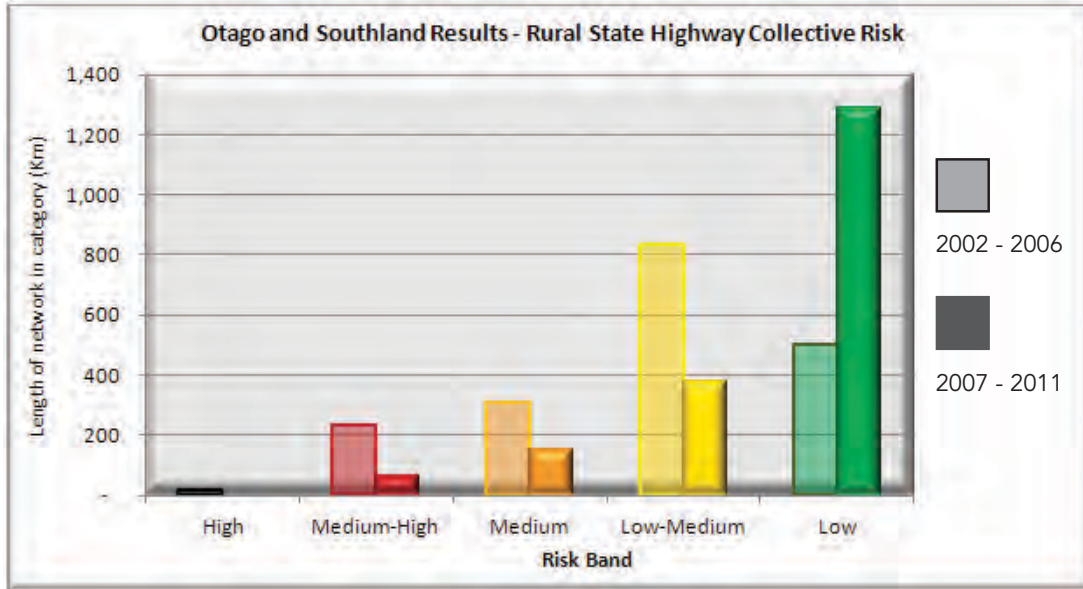


# Otago and Southland Region

## Collective Risk

The percentage of state highway in all collective risk bands in the Otago and Southland region have decreased except the low-risk category which has increased from 26% to 68% over the two time periods.

Figure 15: Changes in Collective Risk in the Otago and Southland Region (comparing 2002-2006 data with 2007-2011)



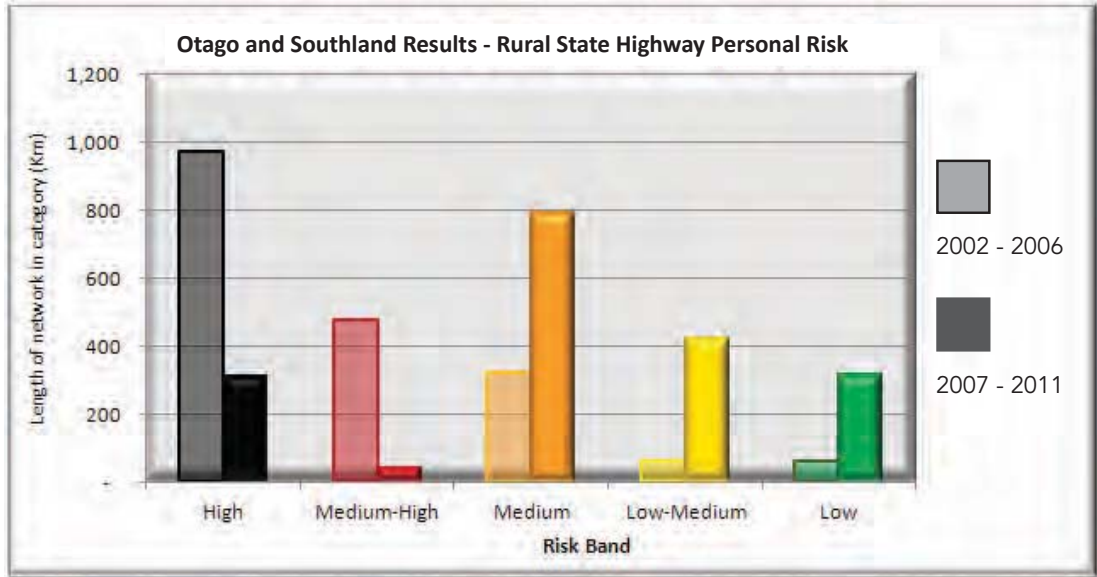
Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	1%	12%	16%	44%	26%	100%
	Length (km)	20	234	310	834	499	1,897
2007-2011	Percentage	0%	3%	8%	20%	68%	100%
	Length (km)	-	64	149	382	1,291	1,886

Note: percentages may not add to 100% due to rounding

## Personal Risk

The percentage of state highway in the Otago and Southland region in the high and medium-high personal risk bands have collectively decreased 58% over the two time periods while the percentages in the medium, low-medium and low risk bands have all increased.

Figure 16: Changes in Personal Risk in the Otago and Southland Region (comparing 2002-2006 data with 2007-2011)



Period		High	Medium-High	Medium	Low-Medium	Low	Total
2002-2006	Percentage	51%	25%	17%	3%	3%	100%
	Length (km)	971	478	322	64	61	1,897
2007-2011	Percentage	16%	2%	42%	22%	17%	100%
	Length (km)	311	43	792	424	316	1,886

Note: percentages may not add to 100% due to rounding

The table below details how the risk categories of the links in the Otago and Southland region have changed between the two time periods.

CHANGES IN COLLECTIVE RISK		LINK	CHANGES IN PERSONAL RISK	
2002-2006 DATA	2007-2011 DATA		2002-2006 DATA	2007-2011 DATA
High	Medium-High	SH 1 from Dunedin to Mosgiel (SH 87)	Low-Medium	Low
Medium	Low-Medium	SH 1 from Gore to Invercargill	Medium	Low
Medium-High	Medium	SH 1 from Invercargill to Bluff	High	Medium
Medium	Low-Medium	SH 1 from Milton to Gore	Medium-High	Medium
Medium-High	Medium-High	SH 1 from Mosgiel to Milton	Medium-High	Low-Medium
Medium-High	Medium	SH 1 from Oamaru to Dunedin	High	Low-Medium
Medium	Medium	SH 1 from Timaru to Oamaru*	Low-Medium	Low-Medium
Low-Medium	Low	SH 6 SH 8B and SH 8 from Wanaka to Alexandra	Medium	Low
Medium-High	Low-Medium	SH 6 from Cromwell to Queenstown	Medium-High	Low
Low	Low	SH 6 from Haast to Wanaka*	High	High
Low-Medium	Low-Medium	SH 6 from Lumsden to Invercargill	Medium	Low
Low-Medium	Low-Medium	SH 6 from Queenstown to Lumsden	Medium	Low-Medium
Medium	Low	SH 8 from Alexandra to Milton	High	Medium
Low	Low	SH 8 from Alexandra to Palmerston	High	Medium
Low-Medium	Low	SH 8 from Omarama to Cromwell and SH 8A	High	Low-Medium
Low	Low	SH 83 from Omarama to SH 1*	Low-Medium	Low
Low	Low	SH 87 from Kyeburn to Mosgiel	Medium-High	High
Low	Low	SH 90 from Rays Junction to Gore	Medium-High	Medium
Low-Medium	Low	SH 93 from Clinton to Matura	High	Medium -High
Low	Low	SH 94 from Gore to Lumsden	Low	Low-Medium
Low-Medium	Low	SH 94 from Te Anau to Manapouri	High	High
Low-Medium	Low	SH 94, 95, 97 from Lumsden to Manapouri	High	Medium
Low-Medium	Low	SH 96 from Matura to Ohai	High	Medium
Low-Medium	Low	SH 98 and SH 99 from Dacre (SH 1) to Clifden	Medium-High	Medium

Boxes highlighted green depict a decrease in risk between the 2002-2006 and 2007-2011 time periods; red depicts an increase in risk; no colour is no change in risk.

\*These links cross boundaries, so will appear in more than one regional list.