

WHAT IS KIWIRAP?

KiwiRAP analyses the road safety ratings of New Zealand's (80+km/h) rural state highway network.

KiwiRAP is part of an international family of Road Assessment Programmes (RAP) under the umbrella of the International Road Assessment Programme (iRAP). iRAP now works in partnership with government and non-government organisations in 70 countries. From its findings, iRAP recommends design improvements that need to be implemented in order to save lives and reduce the number of serious injuries on the world's roads.

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

HOW DOES A ROAD ASSESSMENT PROGRAMME WORK?

KiwiRAP consists of three 'protocols':

- **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
- **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
- **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, the better the road).

The first KiwiRAP Risk Maps were produced in 2008, followed by Star Ratings in 2010. This brochure shows results for Risk Mapping and Performance Tracking, comparing crash data for 2007-2011 to that from 2002-2006.

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.

For the purpose of comparing the level of risk of crashes between different parts of the network, KiwiRAP has broken the 10,849km of the assessed state highway network into 168 road sections (known as 'links').

The same links that were developed and used for the first Risk Maps (released in 2008) have been used, where possible, in these results.

2012 RISK MAPS

For the purposes of displaying the safety risk of the state highway network, KiwiRAP looks at two different measures of risk: Collective Risk and Personal Risk. The focus of both is on crashes where people have been killed or seriously injured. The crash statistics used for the calculations are for the five-year period between 2007-2011.

The roads highlighted as being of higher risk than others are likely to have specific reasons why. The road, the vehicle, the speed and the driver/rider each contribute to risk.

Collective Risk (or Crash Density)

Collective Risk is a measure of the total number of fatal and serious injury crashes per kilometre over a section of road. Because Collective Risk is measured in terms of the number of crashes per kilometre of state highway, you would generally

HOW SAFE ARE OUR ROADS?

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

expect that those with higher traffic volumes would have a higher Collective Risk.

Personal Risk

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.

RISK RATING	COLLECTIVE RISK Average annual fatal and serious injury crashes per km	PERSONAL RISK Average annual fatal and serious injury crashes per 100 million vehicle-km	COLOUR
Low	≤ 0.039	< 4	Green
Low-medium	$0.04 \leq 0.069$	$4 \leq 4.9$	Yellow
Medium	$0.07 \leq 0.10$	$5 \leq 6.9$	Orange
Medium-high	$0.11 \leq 0.189$	$7 \leq 8.9$	Red
High	$0.19+$	$9+$	Black

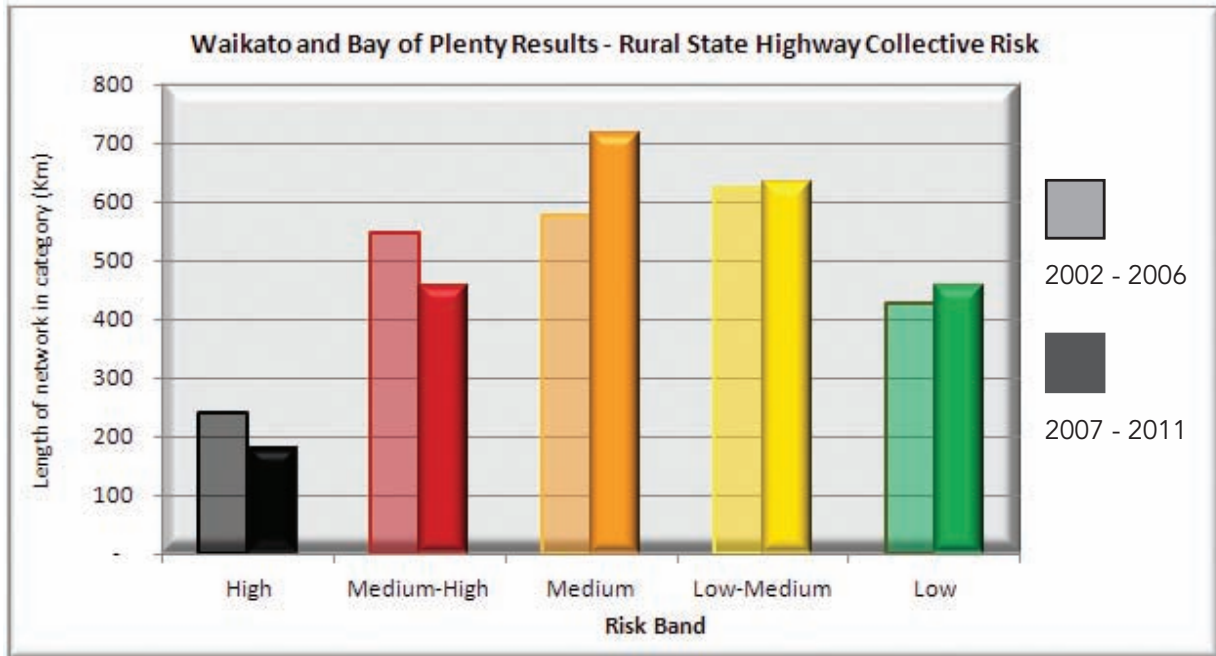
The risk thresholds for the bands have remained the same in order for comparisons to be made between the 2008 Risk Maps (covering crashes in the 2002-2006 period) and the Risk Maps in this report for the 2007-2011 period.

PERFORMANCE TRACKING FOR 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.

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

HOW SAFE ARE OUR ROADS?

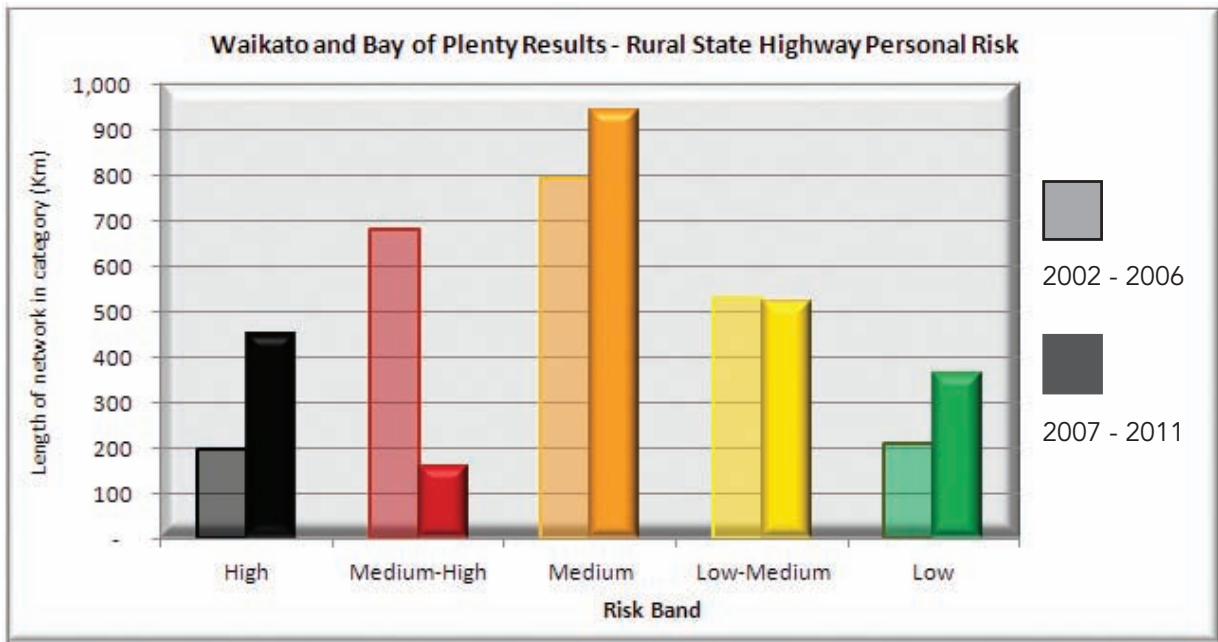
Tracking the safety performance of New Zealand's state highway network

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.

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%.

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
2002-2006	Percentage	8%	28%	33%	22%	9%	100%
	Length (km)	199	683	793	530	210	2,414
2007-2011	Percentage	18%	7%	39%	21%	15%	100%
	Length (km)	452	159	943	524	364	2,442

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

HOW SAFE ARE OUR ROADS?

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

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.

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

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

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.

HOW SAFE ARE OUR ROADS?

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

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.

2012 RISK MAPS FOR WAIKATO AND BAY OF PLENTY REGION

Link	Length ⁽¹⁾ (km)	Serious Injury Crashes 2007 to 2011	Fatal Crashes 2007 to 2011	Collective Risk Annual average fatal and serious injury crashes per km	Collective Risk Band	Personal Risk Annual average fatal and serious injury crashes per 100 million vehicle-km	Personal Risk Band
SH 1B from Taupiri to Cambridge	45.1	10	7	0.08	Medium	4.9	Low-Medium
SH 1 from Cambridge to Piarere (SH 29)	20.9	12	6	0.19	Medium-High	3.7	Low
SH 1 from Hamilton to Cambridge	19.6	11	2	0.14	Medium-High	2.6	Low
SH 1 from Huntly to Hamilton	36.8	30	11	0.31	High	4.0	Low-Medium
SH 1 from Meremere to Rangiriri ⁽⁵⁾	22.6	2	1	0.03	Low	0.5	Low
SH 1 from Piarere to Putaruru	18.9	11	6	0.20	High	6.7	Medium
SH 1 from Pokeno to Meremere ⁽⁵⁾	20.6	5	1	0.06	Low-Medium	1.6	Low
SH 1 from Putaruru to Tokoroa	25.8	9	10	0.18	Medium-High	5.6	Medium
SH 1 from Rangiriri to Huntly	24.2	3	2	0.05	Low-Medium	1.2	Low
SH 1 from Takanini to Pokeno ⁽²⁾	48.3	14	3	0.07	Medium	0.8	Low
SH 1 from Taupo to Turangi	45.8	14	7	0.10	Medium-High	4.2	Low-Medium
SH 1 from Tokoroa to Taupo	64.5	25	7	0.10	Medium-High	4.1	Low-Medium
SH 1 from Turangi to Waitouru ⁽²⁾	61.6	17	9	0.09	Medium	6.8	Medium
SH 2 from Katikati to Tauranga	35.0	27	5	0.19	High	4.5	Low-Medium
SH 2 from Mangatarata (SH 25) to Paeroa	38.1	10	3	0.08	Medium	3.8	Low
SH 2 from Matata to Opotiki	78.4	21	10	0.09	Medium	9.5	High
SH 2 from Opotiki to Gisborne via Waioeka Gorge ⁽²⁾	138.1	15	10	0.04	Low	7.3	Medium-High
SH 2 from Paeroa to Katikati	44.9	23	8	0.15	Medium-High	5.4	Medium
SH 2 from Pokeno (SH 1) to Mangatarata (SH 25)	32.4	16	12	0.21	High	4.8	Low-Medium
SH 2 from Mount Maunganui (SH29) to Paengaroa (SH 33)	25.0	15	8	0.23	High	3.5	Low
SH 2 from SH 33 to Matata	33.7	2	1	0.02	Low	0.8	Low
SH 3 from Hamilton to Te Awamutu and SH 21	30.2	14	3	0.14	Medium-High	3.8	Low
SH 3 from Te Awamutu to Te Kuiti	60.3	18	3	0.09	Medium	4.0	Low-Medium
SH 3 from Te Kuiti to New Plymouth ⁽²⁾	145.8	37	15	0.07	Medium	5.9	Medium
SH 4 from 8 Mile Junction (South of Te Kuiti) to Taumarunui ⁽²⁾	69.6	13	2	0.04	Low-Medium	5.5	Medium

(Table continues next page)

HOW SAFE ARE OUR ROADS?

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

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.

Link	Length ⁽¹⁾ (km)	Serious Injury Crashes 2007 to 2011	Fatal Crashes 2007 to 2011	Collective Risk Annual average fatal and serious injury crashes per km	Collective Risk Band	Personal Risk Annual average fatal and serious injury crashes per 100 million vehicle-km	Personal Risk Band
SH 5 from Rotorua to Wairakei	69.8	19	10	0.08	Medium	4.2	Low-Medium
SH 5 from Taupo to Tarawera ⁽²⁾	63.0	14	6	0.06	Low-Medium	4.8	Low-Medium
SH 5 from Tirau to Rotorua	45.8	16	2	0.08	Medium	3.6	Low
SH 23 from Hamilton to Raglan	40.1	23	1	0.12	Medium-High	6.1	Medium
SH 24 and SH 28 from Matamata to Putaruru	34.3	8	1	0.06	Low-Medium	6.4	Medium
SH 25 from Mangatarata (SH 2) to Thames	29.9	7	-	0.06	Low-Medium	2.5	Low
SH 25 from Thames to Whitianga via Coromandel	95.8	12	4	0.04	Low-Medium	6.7	Medium
SH 25 from Whitianga to Waihi	105.5	29	3	0.06	Low-Medium	7.0	Medium
SH 25A from Kopu to Hikuai	28.3	7	2	0.06	Low-Medium	5.3	Medium
SH 26 from Hamilton to Morrinsville	27.5	10	3	0.11	Medium-High	5.3	Medium
SH 26 from Morrinsville to Kopu	68.1	13	6	0.07	Medium	5.2	Medium
SH 27 from Mangatarata (SH 2) to Tirau	92.4	20	13	0.08	Medium	4.1	Low-Medium
SH 29 and SH2 Tauranga Urban ⁽⁴⁾	24.1	9	4	0.13	Medium-High	2.5	Low
SH 29 from Kaimai Ranges to Tauranga	30.5	29	4	0.22	High	6.4	Medium
SH 29 from Piarere to the Kaimai Ranges	23.7	4	4	0.07	Medium	3.9	Low
SH 30 from Rotorua to Atiamuri	31.8	6	5	0.07	Low-Medium	7.9	Medium-High
SH 30 from Rotorua (Te Ngae) to Whakatane	70.1	25	7	0.10	Medium	5.5	Medium
SH 30 from Te Kuiti to Atiamuri ⁽³⁾	104.9	12	6	0.04	Low	11.6	High
SH 31 from Kawhia to SH 39	42.6	10	-	0.05	Low-Medium	23.8	High
SH 32 from Tokoroa to Kuratau	94.7	8	3	0.02	Low	6.5	Medium
SH 30 and SH 33 from Rotorua to Paengaroa	40.2	15	9	0.13	Medium-High	6.8	Medium
SH 34 from Edgecumbe (SH 2) to Kawerau (SH 30)	25.2	11	2	0.11	Medium-High	11.5	High

(Table continues next page)

HOW SAFE ARE OUR ROADS?

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

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.

Link	Length ⁽¹⁾ (km)	Serious Injury Crashes 2007 to 2011	Fatal Crashes 2007 to 2011	Collective Risk Annual average fatal and serious injury crashes per km	Collective Risk Band	Personal Risk Annual average fatal and serious injury crashes per 100 million vehicle-km	Personal Risk Band
SH 35 from Opotiki to Tokomaru Bay ⁽²⁾	236.4	24	8	0.03	Low	9.7	High
SH 36 Tauranga to Ngongotaha	46.7	21	1	0.10	Medium-High	9.2	High
SH 37 from SH 3 to Waitomo Caves	7.3	3	-	0.08	Medium	15.9	High
SH 38 from Rainbow Mountain to Murupara	36.4	10	-	0.06	Low-Medium	8.0	Medium-High
SH 39 and SH 31 from Ngaruawahia to Otorohanga	70.5	13	9	0.07	Low-Medium	5.3	Medium
SH 41 from Taumarunui to Turangi ⁽²⁾	58.4	10	5	0.05	Low-Medium	13.0	High
SH 46 SH 47 SH 48 from National Park to Turangi ⁽²⁾	72.4	8	2	0.03	Low	7.9	Medium-High

Note: (Table above)

¹The link length includes urban sections. However, the urban lengths and urban crashes have been excluded from the crash risk analysis.

²These links cross map boundaries, so will appear in more than one regional list.

³This link has been altered within the analysis period.

⁴The published length of this link has changed significantly from the 2008 Risk Map report due to rerouting and renumbering of state highways within Tauranga.

⁵The published length of these links have changed from the 2008 Risk Map report due to matching beginning and end points with the extension of the Waikato Expressway and also due to the kilometres taking into account the dual carriageway nature of the route. Dual carriageway routes have each carriageway rated separately.

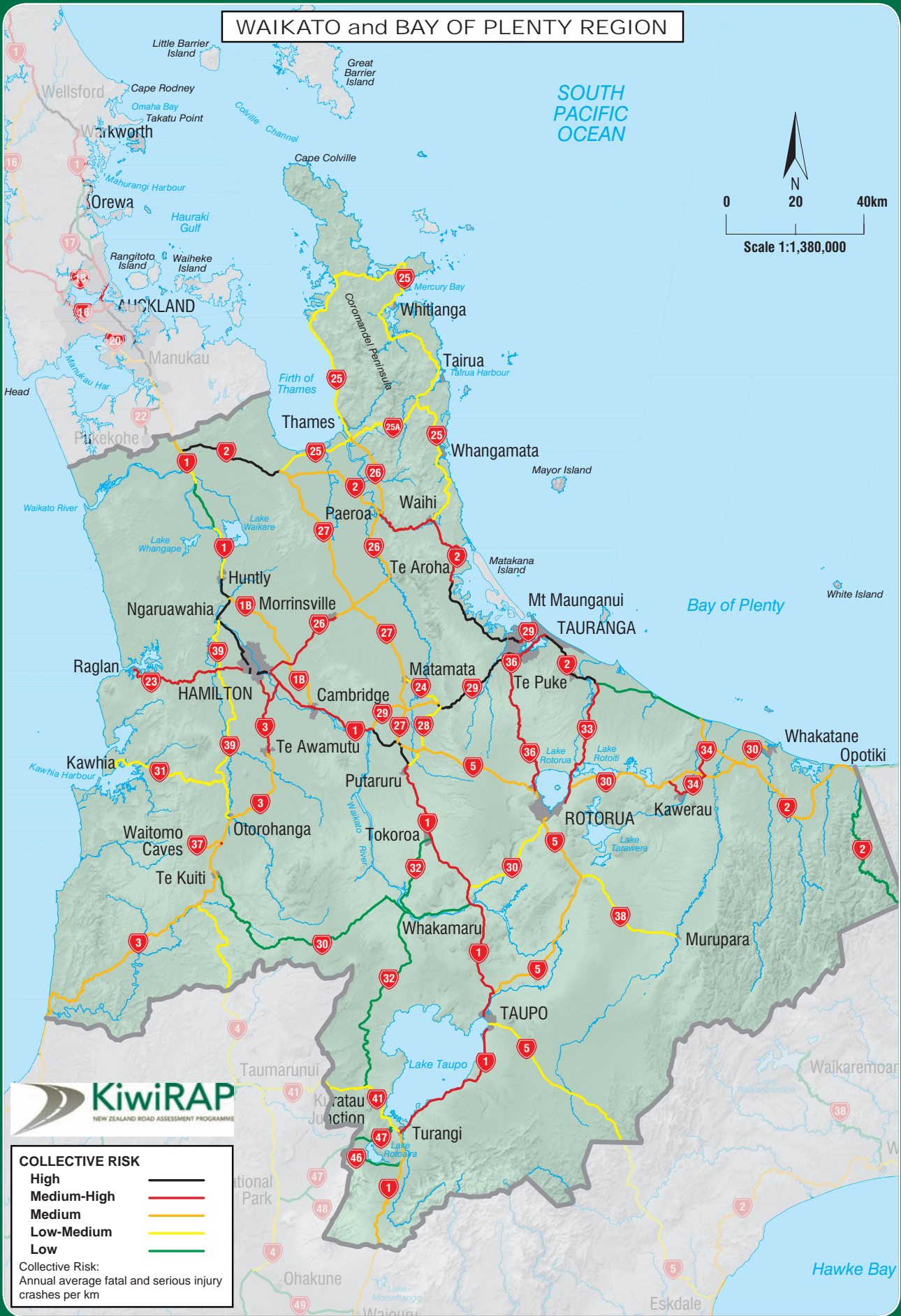
Symbol – : no data.

HOW SAFE ARE OUR ROADS?

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

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.

WAIKATO and BAY OF PLENTY REGION



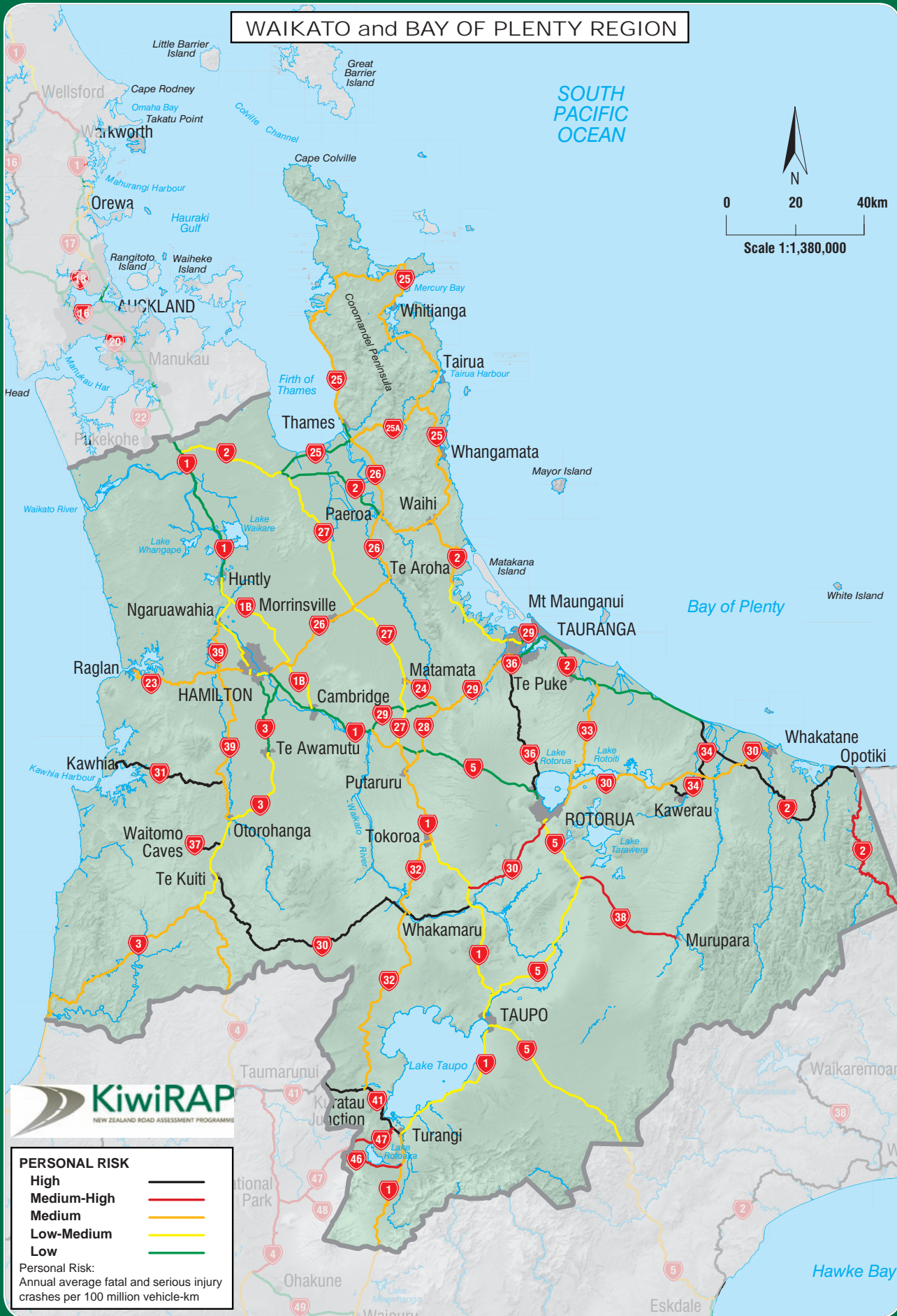
COLLECTIVE RISK MAP

HOW SAFE ARE OUR ROADS?

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

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.

WAIKATO and BAY OF PLENTY REGION



PERSONAL RISK MAP

HOW SAFE ARE OUR ROADS?

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

KiwiRAP is a road safety partnership between the NZ Automobile Association, the NZ Transport Agency, the Ministry of Transport, ACC and NZ Police.