

# Social cost of road crashes and injuries June 2021 update

February 2022

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## For more information

For more information about this project and associated report, please contact:

[info@transport.govt.nz](mailto:info@transport.govt.nz)

## Domain Strategy, Economics and Evaluation

The Domain Strategy, Economics and Evaluation team operates within the System Performance and Governance Group of Te Manatū Waka. The team supports its policy teams by providing the evidence base at each stage of the policy development.

The team is responsible for:

- Developing the Transport Evidence Base (see below) and the Transport Knowledge Hub which connects people from across the wider transport sector and promotes the sharing of transport data, evidence, knowledge, research, information, capabilities, and ideas.
- Providing economic input on business cases, funding requests, competition issues and specific projects such as value capture, natural disasters, and the social impacts on environment and health.
- Providing the evaluation function for the Ministry, including designing evaluation frameworks, developing performance metrics and indicators, and designing, conducting, and procuring evaluations.

## The Transport Evidence Base

The Transport Evidence Base Strategy creates an environment to ensure data, information, research, and evaluation play a key role in shaping the policy landscape. Good, evidence-based decisions also enhance the delivery of services provided by both the public and private sectors to support the delivery of transport outcomes and improve wellbeing and liveability in New Zealand.

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- Kevin Reynolds, Accident Compensation Corporation (ACC)
- David Lee, Ministry of Justice

## Executive Summary

### Purpose

Road crashes impose intangible, financial, and economic costs to society. These costs include reduced quality of life for survivors, reduced economic productivity, and medical and other resource costs. Te Manatū Waka updates the social cost of road crashes and injuries annually to allow comparison of the costs and benefits of any road safety actions in current dollars.

This report provides estimates of average social costs after accounting for:

- any inflationary effects that affect different cost components
- any changes in the number of crashes by area and severity
- any changes in the average number of injuries involved in a crash by area and severity

### Updated estimates

- Over 90 percent of the total social cost is made up of loss of life and life quality. This is calculated using a willingness-to-pay valuation technique, which puts a dollar value on pain and suffering from loss of life and life quality.
- The resulting estimate is referred as the willingness-to-pay based value of statistical life or VOSL. The VOSL was established at \$2 million in 1991 and is regularly indexed to the average hourly earnings to express the value in today's dollars.
- The updated VOSL is \$4.88 million per fatality, at June 2021 prices. Work is underway to revise the methodology used to estimate VOSL along with other non-market transport impacts over the coming year, with an intention to replace the 1991 methodology.
- The updated average social cost is \$4,934,900 per fatality, \$516,300 per serious injury, and \$27,700 per minor injury.
- Crashes can involve multiple fatal, serious, and minor injuries. In per-crash terms, the average social cost is then estimated at \$5,842,300 per fatal crash, \$591,800 per serious injury crash, and \$33,500 per minor injury crash.
- These estimates include the updated VOSL (for fatalities) or loss of life quality (for serious and minor injuries), reduced economic productivity, and medical and other resource costs.
- Unlike fatal crashes, many injury crashes are not reported to the New Zealand Police. As a result, only some of the serious and minor injury crashes are recorded in the official Traffic Crash Reports (TCRs) maintained by New Zealand Police. Hospitalisation data and ACC's motor vehicle claims data are used in conjunction with TCRs to obtain the best estimates of the total numbers of road crashes and injuries.
- The total social cost of motor vehicle injury crashes in 2020 is estimated at \$4.4 billion, at June 2021 prices. This represents a decrease of about \$200 million (or 4 percent) compared to the previous year (from \$4.6 billion in 2019), due to a fall in the estimated total number of crashes (13 percent), which was largely driven by the reduced road travel during the COVID-19 lockdowns, offset by an increase in the value of the cost components.

## Contents

Disclaimer .....	2
Copyright .....	2
Citation .....	2
For more information.....	2
Domain Strategy, Economics and Evaluation.....	3
The Transport Evidence Base.....	3
Acknowledgements.....	3
Executive Summary .....	4
1 The 2021 update.....	7
1.1 Introduction.....	7
1.2 Estimation of injuries and costs.....	7
1.3 Average social cost per injury and per crash.....	8
1.4 Total social cost of road injury crashes in 2021.....	8
2 Social cost estimates .....	12
2.1 Average social cost by component.....	12
2.2 Average social cost per incident.....	13
2.3 Average social cost by vehicle movement.....	14
2.4 Average social cost by region .....	14
2.4.1 Average social cost per crash severity, by region and area.....	15
2.4.2 Average social cost per injury by region and area.....	16
2.5 Crash statistics and cost indices .....	18
3 Appendix.....	19
3.1 Methodology .....	19
3.1.1 Loss of life and life quality .....	19
3.1.2 Loss of output due to temporary disability .....	19
3.1.3 Medical costs .....	19
3.1.4 Legal and court costs.....	20
3.1.5 Vehicle damage cost.....	20

## List of tables

Table 1: Change in fatal, serious, and minor crash numbers, 2019-2020 .....	8
Table 2. Average social cost per crash by component (June 2021 prices \$) .....	12
Table 3. Average social cost per injury by cost component (June 2021 prices \$).....	12
Table 4. Average social cost per non-injury crash (June 2021 prices \$).....	13
Table 5. Average social cost per crash by severity (June 2021 prices \$).....	13
Table 6. Average social cost per injury by severity (June 2021 prices \$).....	13
Table 7. Average social cost per injury, excluding vehicle damage costs by severity (June 2021 prices \$) .....	14
Table 8. Average social cost per reported injury crash by vehicle movement.....	14
Table 9. Average social cost per reported injury crash by region for all roads (June 2021 prices \$).....	15
Table 10. Average social cost per reported injury crash by region for open roads (June 2021 prices \$).....	15
Table 11. Average social cost per reported injury crash by region for urban roads (June 2021 prices \$).....	16
Table 12. Average social cost per reported injury by region for all roads (June 2021 prices \$) .....	16
Table 13. Average social cost per reported injury by region for open roads (June 2021 prices \$) .....	17
Table 14. Average social cost per reported injury by region for urban roads (June 2021 prices \$).....	17
Table 15. Reported and estimated number of crashes and injuries from 2018-2020 .....	18
Table 16. Cost indices for updating unit costs .....	18

## List of figures

Figure 1. Share of the total cost of fatal injury crashes in 2020 (June 2021 prices) .....	9
Figure 2. Estimated annual total social cost of fatal and injury crashes, by crash severity (\$ billion, at June 2021 prices).....	10
Figure 3. Total social cost of fatal and injury crashes on open roads by region (\$ million, at June 2021 prices) .....	11
Figure 4. Total social cost of fatal and injury crashes on urban roads, by region (\$ million, at June 2021 prices) .....	11

# 1 The 2021 update

## 1.1 Introduction

This is an annual update of the Social Cost of Road Crashes and Injuries statistics published by the Ministry of Transport. This update provides estimates of the average social cost per injury and per crash at June 2021 prices. The update accounts for any changes in the numbers of crashes by area and severity and is based on crash and injury data from 2018 to 2020.

To ensure we target our road safety resources most effectively, the cost of any safety interventions should be evaluated against the resulting benefit expressed in terms of social cost. When there are a number of potential solutions to a transport problem, using social cost information allows us to make consistent comparisons between solutions, especially when these solutions have different impacts on the risks of crashes and the injuries that may be sustained in them. Updated social cost estimates are incorporated into Waka Kotahi NZ Transport Agency's Crash Analysis System (CAS) to facilitate this.

## 1.2 Estimation of injuries and costs

The social cost of a road crash or a road injury is defined as the total cost incurred because of the road crash or injury. Its value depends on the number of cost components we include and the methods we adopt to estimate them. For a description of the methodology, please refer to the Appendix.

In New Zealand, the social cost of a road crash or a road injury includes the following components:

- loss of life and life quality
- loss of output due to temporary incapacitation
- medical costs
- legal costs
- vehicle damage costs

These social cost components are either measurable or can be estimated in dollar terms. A willingness-to-pay valuation technique is used to express pain and suffering from loss of life or life quality in dollar terms (that is, the willingness-to-pay based value of statistical life or VOSL). Various methodologies have been developed to estimate the value of other social cost components.

Estimating the social cost of road crashes and injuries requires two stages of analysis. The first stage involves estimating the total number of crashes and injuries. While all fatal crashes are recorded by New Zealand Police in the official TCRs, only some of the serious and minor injury crashes are. Hospitalisation data and ACC's motor vehicle claims data are used in conjunction with TCRs to obtain the best estimates of the total numbers of road crashes and injuries. The estimated total numbers of crashes and injuries for the years 2018 to 2020 are given in Table 1. For the three years to 2020, only 57 percent of all serious injuries and 32 percent of all minor injuries are recorded in TCRs.

The second stage involves calculating the impacts in monetary terms. Individual social cost components are updated to current prices using the price indices tabulated in Table 16. Adding all the social cost components gives the average social cost per incident (that is, crash or injury).

To account for unreported incidents, Waka Kotahi matches its CAS data against hospital admissions (from road crashes), which provides an estimate for the number of unreported

incidents. From this we estimate a multiplier to scale up the average social cost estimate to include the costs of unreported incidents. The average social cost obtained after such as adjustment is referred to as the average social cost per reported crash (or injury).

### 1.3 Average social cost per injury and per crash

The updated value of statistical life is \$4.88 million per fatality, at June 2021 prices. Adding the other social cost components gives an updated average social cost per fatality of \$4,934,900. For non-fatal injuries, the updated average social cost is estimated at \$516,300 per serious injury and \$27,700 per minor injury.

These per-injury estimates are useful for establishing the social cost of a specific crash considering the number of injuries sustained in that crash. After scaling up the estimates to account for non-reported cases, the average social cost estimates increase to \$898,900 per reported serious injury and \$83,700 per reported minor injury.

This report also provides social cost estimates in per-crash terms. The updated average social cost is estimated at \$5,842,300 per fatal crash, \$591,800 per serious injury crash and \$33,500 per minor injury crash. This is adjusted to \$1,053,300 per reported serious injury crash and \$105,200 per reported minor injury crash, after scaling up the estimates to account for non-reported cases.

### 1.4 Total social cost of road injury crashes in 2021

The total social cost of motor vehicle fatal and injury crashes in 2020 is estimated at approximately \$4.4 billion, a \$200 million decrease compared to 2019. The changes in fatal, serious, and minor injuries this represents are summarised in Table 1.

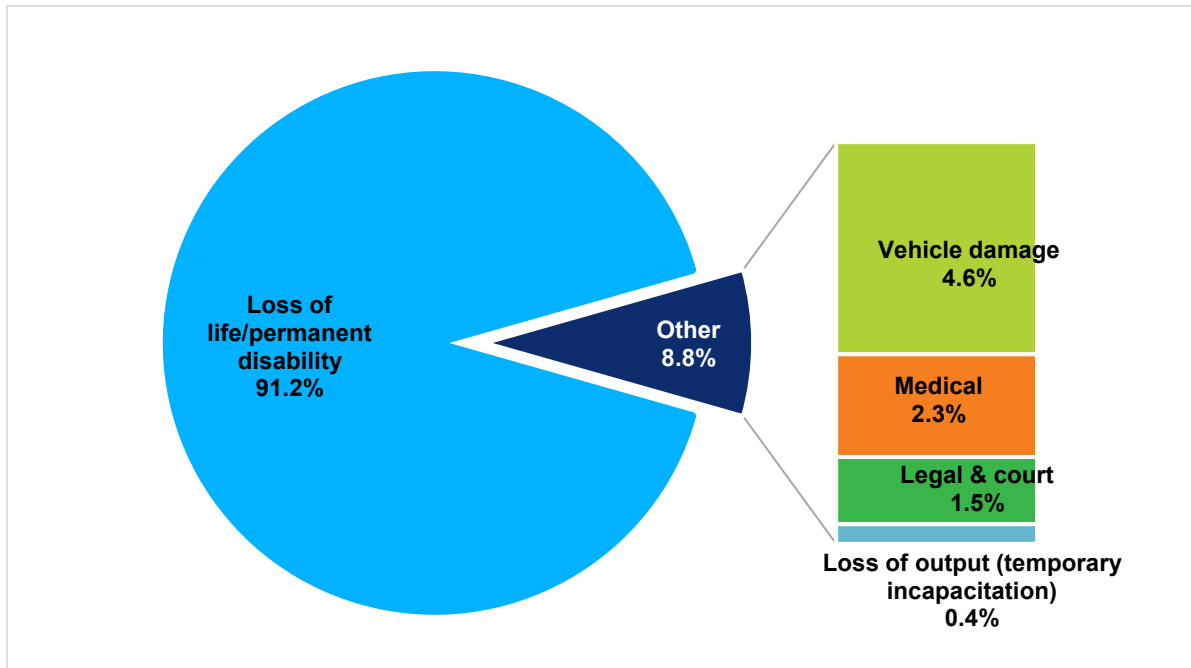
Table 1: Change in fatal, serious, and minor crash numbers, 2019-2020

	2019	2020	Change
Fatal	300	291	-3%
Serious	3,921	3,390	-14%
Minor	30,298	26,481	-13%

Figure 1 shows loss of life and/or life quality due to permanent impairment accounted for approximately 91 percent of the total social cost of injury crashes. Vehicle damage accounted for around 5 percent, and other cost components made up the remaining proportion.



Figure 1. Share of the total cost of fatal injury crashes in 2020 (June 2021 prices)

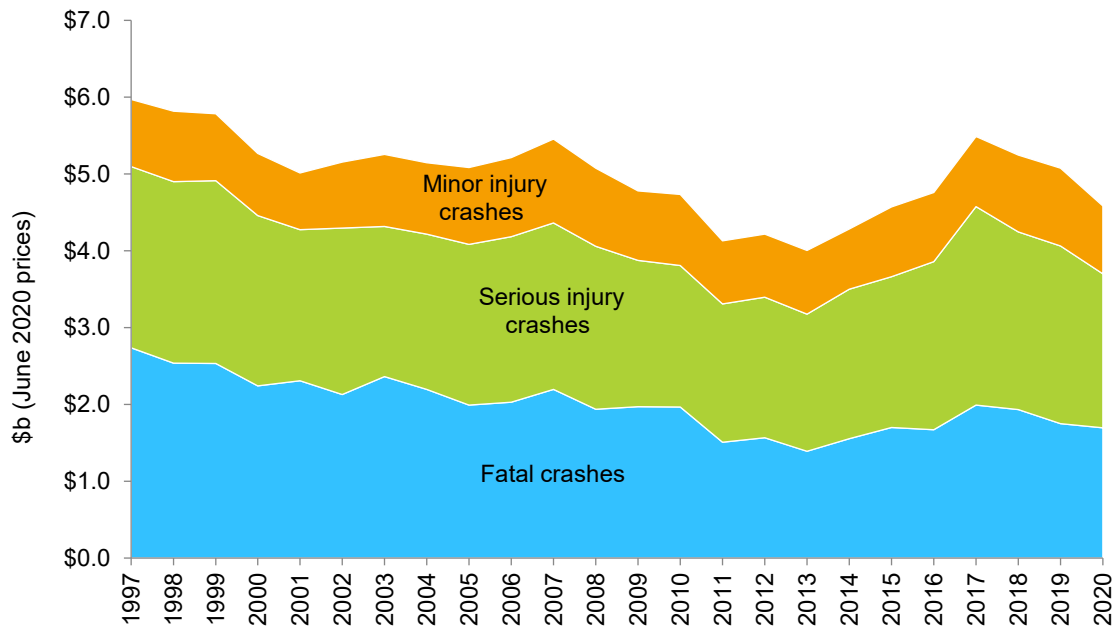


In addition, there are an estimated 242,949 non-injury crashes<sup>1</sup>, valued at a further \$0.7 billion. This gives a total social cost of all motor vehicle crashes in 2020 of \$5.1 billion (decrease from \$5.5 billion in 2019). These estimates include the costs associated with both reported and non-reported cases.

Figure 2 shows the trend of the estimated annual total social cost of injury crashes from 1997 to 2020.

<sup>1</sup> Guria (1995) estimated that the number of non-injury crashes is 8.4 times the number of minor injury crashes. This analysis assumes this relativity remains the same. [Guria (1995), "Estimates of vehicle damage costs", Wellington, Land Transport Safety Authority.]

Figure 2. Estimated annual total social cost of fatal and injury crashes, by crash severity (\$ billion, at June 2021 prices)



On average, around 58 percent of the total social cost of road injury crashes relates to crashes that occurred on open roads<sup>2</sup>. The regional distributions by area are plotted in Figure 3 and Figure 4.

<sup>2</sup> In this report, open roads are defined as roads with a legal speed limit of over 70 kilometres per hour (km/h). Urban roads are defined as roads with a legal speed limit of 70 km/h or less.

Figure 3. Total social cost of fatal and injury crashes on open roads by region (\$ million, at June 2021 prices)

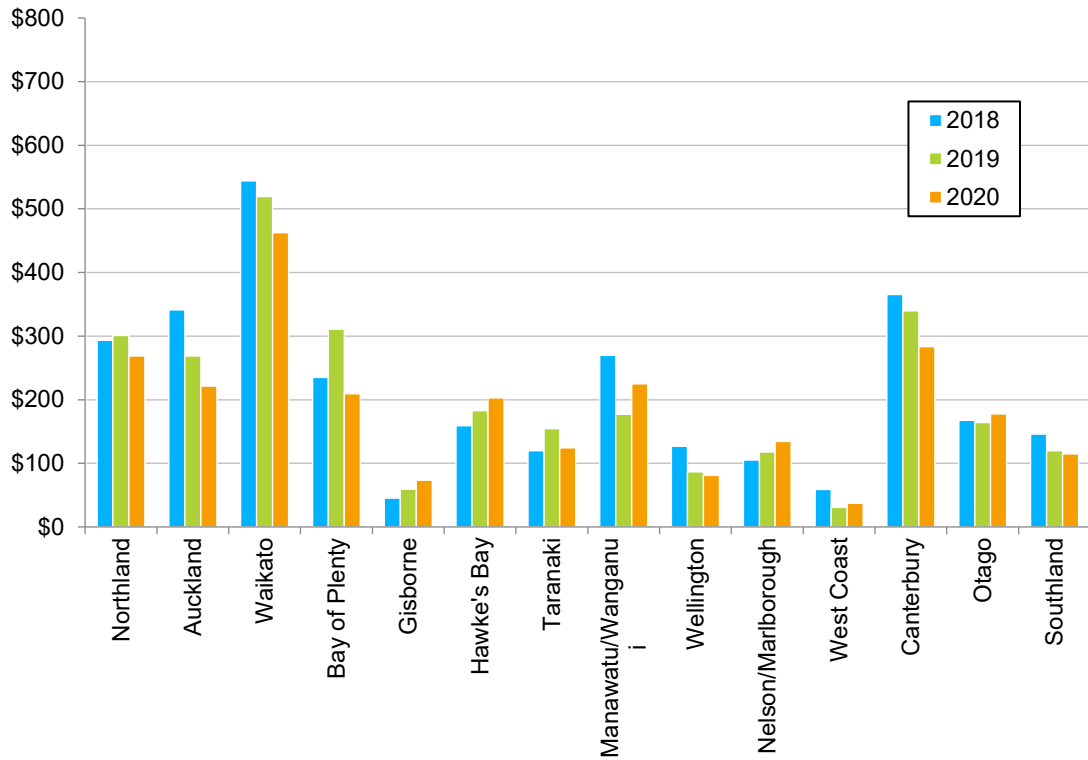
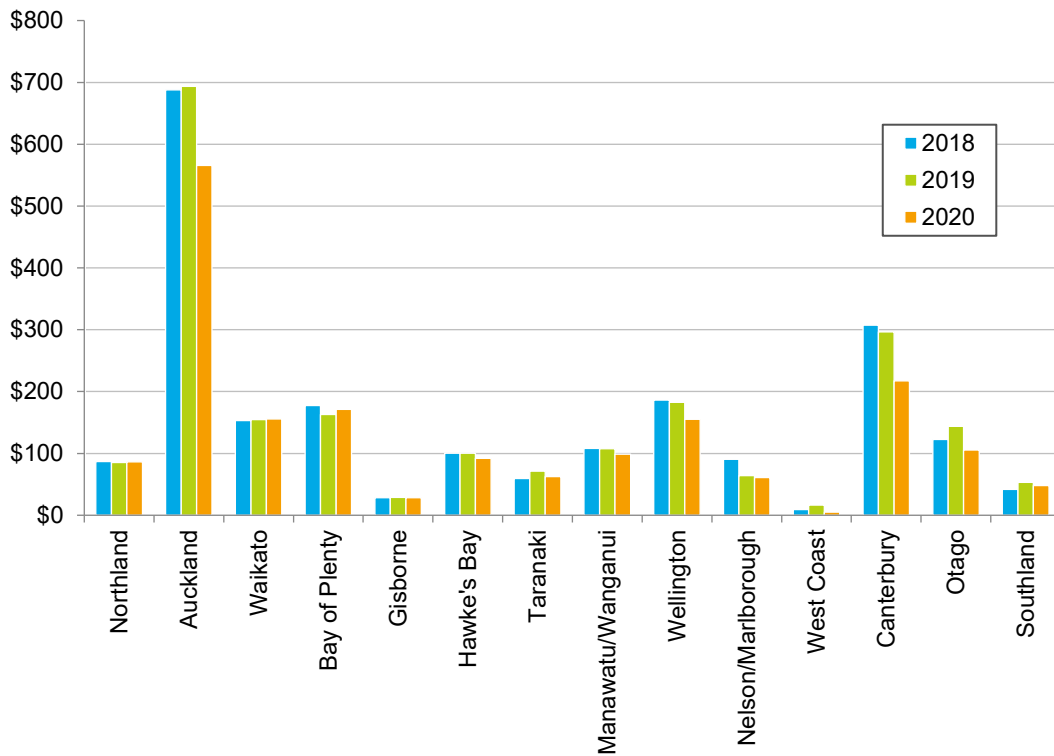


Figure 4. Total social cost of fatal and injury crashes on urban roads, by region (\$ million, at June 2021 prices)



## 2 Social cost estimates

### 2.1 Average social cost by component

Table 2 and Table 3 provide the estimates of average social costs per crash and per injury, including breakdowns by cost component. Table 4 provides the estimates of average social costs per non-injury crash by area. These estimates do not include adjustment for under-reporting and are suitable only for cases where the total number of crashes and injuries are known.

Table 2. Average social cost per crash by component (June 2021 prices \$)

Cost components	Severity		
	Fatal	Serious	Minor
Loss of life/permanent disability	5,774,000	557,800	23,700
Loss of output (temporary disability)	1,000	2,400	400
Medical:	15,900	18,700	1,200
• Hospital/medical	9,100	11,500	200
• Emergency/pre-hospital	4,600	1,600	900
• Follow-on	2,200	5,600	100
Legal and court	38,200	4,600	1,500
Vehicle damage	13,100	8,300	6,600
<b>Total</b>	<b>5,842,300</b>	<b>591,800</b>	<b>33,500</b>

Notes:

1. Figures may not add to totals due to rounding.
2. These estimates have not been adjusted for the level of non-reporting

Table 3. Average social cost per injury by cost component (June 2021 prices \$)

Cost components	Severity		
	Fatal	Minor	Fatal
Loss of life/permanent disability	4,888,900	488,900	19,600
Loss of output (temporary disability)	0	2,000	400
Medical:	7,400	16,300	1,000
• Hospital/medical	4,100	10,100	100
• Emergency/pre-hospital	3,300	1,200	700
• Follow-on	0	5,000	100
Legal and court	31,700	3,700	1,300
Vehicle damage	6,900	5,500	5,500
<b>Total</b>	<b>4,934,900</b>	<b>516,300</b>	<b>27,700</b>

Notes:

1. Figures may not add to totals due to rounding.
2. These estimates have not been adjusted for the level of non-reporting

Table 4. Average social cost per non-injury crash (June 2021 prices \$)

Per non-injury crash	Area		
	All	Open road	Urban road
Non-injury crash (vehicle and legal costs)	3,400	3,700	3,200

## 2.2 Average social cost per incident

Table 5, Table 6, and Table 7 provide the estimates of the average social cost per reported crash and per reported injury, after adjusting for the level of non-reporting. The estimates for a combination of crash or injury types (fatal and serious, serious and minor, and all three) are useful for assessing safety risks that could cause severe injury to road users but have a low probability of occurrence (for example, in situations where the crash or injury numbers are small). If a programme is expected to reduce the number of injuries, but not the number of crashes, use the estimates from Table 7. Otherwise, use the estimates from Table 5 and Table 6, depending on data availability and the purpose of the analysis.

Table 5. Average social cost per crash by severity (June 2021 prices \$)

Crash severity	Area		
	All	Open road	Urban road
Fatal	5,842,300	6,033,600	5,371,200
Serious	1,053,300	1,127,500	983,900
Minor	105,200	110,300	101,400
Serious and minor	282,000	336,700	244,200
Fatal and serious	1,681,600	2,017,400	1,326,300
Fatal, serious, and minor	434,300	604,500	313,400

Table 6. Average social cost per injury by severity (June 2021 prices \$)

Injury severity	Area		
	All	Open road	Urban road
Fatal	4,934,900	4,934,900	4,934,900
Serious	898,900	900,900	897,000
Minor	83,700	83,200	83,700
Serious and minor	224,000	251,800	201,900
Fatal and serious	1,407,600	1,574,200	1,203,100
Fatal, serious, and minor	338,000	437,700	257,700

Table 7. Average social cost per injury, excluding vehicle damage costs by severity (June 2021 prices \$)

Injury severity	Area		
	All	Open road	Urban road
Fatal	4,928,000	4,928,000	4,928,000
Serious	889,500	890,700	887,900
Minor	67,100	65,400	68,100
Serious and minor	208,600	235,600	187,300
Fatal and serious	1,398,500	1,564,600	1,194,200
Fatal, serious, and minor	322,900	421,900	243,100

### 2.3 Average social cost by vehicle movement

Table 8 provides estimates of the average social cost per reported crash by vehicle movement using crash data from 2016 to 2020. These estimates have been adjusted for the level of non-reporting and are suitable for analysing policies or programmes that focus on specific vehicle movement classifications (for example, head-on crashes).

Table 8. Average social cost per reported injury crash by vehicle movement

Injury severity	Area		
	All	Open road	Urban road
Overtaking or lane change	577,300	712,000	373,000
Head-on, not overtaking	1,272,000	1,749,400	542,900
Lost control, straight roads	417,600	436,500	391,100
Cornering	473,900	508,800	405,700
Collision with obstruction	282,000	483,900	231,800
Rear-end collision	210,300	255,900	169,300
Turning versus same direction	357,700	546,900	256,400
Crossing, no turns	369,800	969,600	284,200
Crossing, vehicle turning	361,000	687,200	266,200
Vehicles merging	265,100	506,300	222,900
Right turn against	334,000	700,000	272,800
Vehicle manoeuvring	300,800	534,500	256,600
Pedestrian crossing road	453,200	1,577,100	417,900
Pedestrian other	571,900	1,584,500	450,300
Miscellaneous	758,500	906,100	625,900

### 2.4 Average social cost by region

Due to differences in physical locations, sizes of regions, road safety infrastructure, response, hospital facilities, and for other reasons, the proportions of injury crashes that are reported to New Zealand Police differ across regions. The mix of open roads and urban roads crashes also differs across regions. These result in different average costs per injury and crash for each region. These estimates are useful for the evaluation of regional programmes or policies for or between specific regions.

## 2.4.1 Average social cost per crash severity, by region and area

Table 9. Average social cost per reported injury crash by region for all roads (June 2021 prices \$)

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious, and minor
Northland	5,956,600	1,385,700	110,100	378,300	2,234,900	633,700
Auckland	5,341,400	858,000	105,000	219,300	1,200,200	282,800
Waikato	6,290,400	685,000	106,600	223,900	1,606,300	456,600
Bay of Plenty	5,614,300	1,394,100	102,400	361,300	2,169,800	588,100
Gisborne	5,263,700	1,243,300	107,900	372,400	1,785,800	543,800
Hawke's Bay	6,147,000	1,722,100	106,700	415,300	2,398,300	606,200
Taranaki	6,361,700	1,416,200	109,100	432,100	2,119,800	665,500
Manawatu-Whanganui	5,726,200	755,400	108,100	246,000	1,588,700	471,400
Wellington	5,082,400	763,900	102,300	218,100	1,067,200	281,500
Nelson-Marlborough	5,553,400	1,390,000	103,400	353,000	1,946,300	504,100
West Coast	5,077,800	834,600	101,900	269,300	1,376,300	424,800
Canterbury	6,073,100	1,172,100	102,700	318,500	1,876,600	507,100
Otago	5,633,500	1,416,100	104,500	345,100	1,930,700	476,600
Southland	6,405,000	1,563,700	108,200	432,300	2,225,000	635,500
<b>New Zealand</b>	<b>5,842,300</b>	<b>1,053,300</b>	<b>105,200</b>	<b>282,000</b>	<b>1,681,600</b>	<b>434,300</b>

Table 10. Average social cost per reported injury crash by region for open roads (June 2021 prices \$)

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious, and minor
Northland	6,103,000	1,384,700	113,300	418,100	2,371,900	757,200
Auckland	5,610,400	895,200	109,200	222,800	1,385,700	311,800
Waikato	6,428,600	707,800	110,700	247,400	1,821,800	571,800
Bay of Plenty	5,848,800	1,462,100	104,800	433,100	2,452,600	790,000
Gisborne	5,359,600	1,290,200	114,700	455,500	1,935,400	709,500
Hawke's Bay	6,478,000	1,742,000	115,400	508,800	2,668,600	840,400
Taranaki	6,484,700	1,477,200	117,400	525,600	2,399,600	904,000
Manawatu-Whanganui	5,780,600	780,700	116,600	291,300	1,786,800	632,500
Wellington	5,111,000	816,400	109,300	260,200	1,368,900	408,400
Nelson-Marlborough	5,655,200	1,445,800	109,800	418,500	2,216,500	676,400
West Coast	5,102,900	854,200	100,700	284,200	1,420,700	458,100
Canterbury	6,101,700	1,260,900	108,100	407,600	2,271,000	772,700
Otago	5,649,000	1,478,900	106,900	383,700	2,212,400	601,000
Southland	6,687,500	1,691,400	111,800	541,600	2,482,100	840,700
<b>New Zealand</b>	<b>6,033,600</b>	<b>1,127,500</b>	<b>110,300</b>	<b>336,700</b>	<b>2,017,400</b>	<b>604,500</b>

Table 11. Average social cost per reported injury crash by region for urban roads (June 2021 prices \$)

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious, and minor
Northland	5,189,000	1,390,100	105,900	310,200	1,835,000	411,100
Auckland	5,192,300	845,100	102,500	217,300	1,133,600	271,300
Waikato	5,572,400	636,500	101,700	188,700	1,085,200	274,900
Bay of Plenty	5,123,600	1,320,300	100,400	306,100	1,822,900	426,800
Gisborne	4,951,800	1,163,100	101,900	286,400	1,507,500	366,200
Hawke's Bay	4,954,500	1,695,300	99,900	336,000	1,973,900	399,000
Taranaki	5,868,700	1,330,300	102,300	344,500	1,668,300	430,800
Manawatu-Whanganui	5,547,500	715,800	100,700	201,300	1,238,100	305,200
Wellington	5,045,100	741,900	99,200	203,700	927,900	239,100
Nelson-Marlborough	5,175,000	1,324,600	98,200	298,200	1,581,300	354,300
West Coast	4,951,800	760,900	107,400	228,100	1,202,000	328,600
Canterbury	6,007,500	1,100,800	99,500	270,700	1,508,700	358,300
Otago	5,584,700	1,354,900	102,200	313,300	1,616,200	371,200
Southland	5,368,400	1,316,200	104,600	303,800	1,684,600	385,700
<b>New Zealand</b>	<b>5,371,200</b>	<b>983,900</b>	<b>101,400</b>	<b>244,200</b>	<b>1,326,300</b>	<b>313,400</b>

## 2.4.2 Average social cost per injury by region and area

Table 12. Average social cost per reported injury by region for all roads (June 2021 prices \$)

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious, and minor
Northland	4,934,900	1,076,400	83,200	279,800	1,705,800	452,800
Auckland	4,934,900	772,600	84,400	177,300	1,071,400	226,500
Waikato	4,934,900	570,700	81,400	175,500	1,260,700	341,500
Bay of Plenty	4,934,900	1,177,300	84,200	290,600	1,818,200	464,200
Gisborne	4,934,900	1,065,400	84,400	287,700	1,549,100	421,300
Hawke's Bay	4,934,900	1,422,700	85,600	323,300	1,950,500	463,800
Taranaki	4,934,900	1,220,200	84,300	328,200	1,785,700	499,300
Manawatu-Whanganui	4,934,900	654,300	80,900	188,300	1,333,500	350,100
Wellington	4,934,900	686,900	84,300	180,800	956,800	231,900
Nelson-Marlborough	4,934,900	1,163,700	84,500	281,300	1,628,600	397,600
West Coast	4,934,900	743,900	83,200	221,600	1,222,900	345,600
Canterbury	4,934,900	996,700	83,700	256,700	1,555,800	398,900
Otago	4,934,900	1,199,400	84,700	273,200	1,631,400	374,100
Southland	4,934,900	1,188,800	84,600	325,300	1,657,100	464,500
<b>New Zealand</b>	<b>4,934,900</b>	<b>898,900</b>	<b>83,700</b>	<b>224,000</b>	<b>1,407,600</b>	<b>338,000</b>



Table 13. Average social cost per reported injury by region for open roads (June 2021 prices \$)

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious, and minor
Northland	4,934,900	1,062,400	83,300	299,400	1,777,000	520,000
Auckland	4,934,900	763,800	84,900	174,500	1,155,800	238,800
Waikato	4,934,900	569,200	81,000	187,800	1,359,000	406,700
Bay of Plenty	4,934,900	1,143,300	83,200	327,800	1,899,300	578,300
Gisborne	4,934,900	1,063,900	84,900	333,400	1,622,500	522,300
Hawke's Bay	4,934,900	1,381,600	86,400	370,800	2,058,900	595,200
Taranaki	4,934,900	1,215,300	83,700	360,600	1,935,000	614,300
Manawatu-Whanganui	4,934,900	651,000	79,600	206,700	1,435,500	431,400
Wellington	4,934,900	682,800	83,100	198,600	1,145,800	307,600
Nelson-Marlborough	4,934,900	1,157,400	84,500	309,300	1,786,900	495,300
West Coast	4,934,900	740,600	83,400	234,300	1,228,200	372,100
Canterbury	4,934,900	980,300	82,700	303,200	1,732,200	555,800
Otago	4,934,900	1,193,100	84,700	291,300	1,795,900	451,800
Southland	4,934,900	1,183,800	84,600	379,700	1,711,400	571,400
<b>New Zealand</b>	<b>4,934,900</b>	<b>900,900</b>	<b>83,200</b>	<b>251,800</b>	<b>1,574,200</b>	<b>437,700</b>

Table 14. Average social cost per reported injury by region for urban roads (June 2021 prices \$)

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious, and minor
Northland	4,934,900	1,116,600	83,900	242,000	1,481,800	316,900
Auckland	4,934,900	776,000	83,400	177,800	1,038,400	221,000
Waikato	4,934,900	575,200	82,700	154,600	974,300	223,900
Bay of Plenty	4,934,900	1,223,500	84,700	257,300	1,699,300	359,300
Gisborne	4,934,900	1,068,600	84,000	234,600	1,397,900	300,700
Hawke's Bay	4,934,900	1,488,700	84,800	276,200	1,754,000	328,600
Taranaki	4,934,900	1,228,300	85,100	290,700	1,516,400	360,100
Manawatu-Whanganui	4,934,900	660,500	82,500	166,200	1,128,700	249,600
Wellington	4,934,900	688,900	83,900	173,600	860,500	203,200
Nelson-Marlborough	4,934,900	1,172,100	84,400	254,000	1,395,500	299,600
West Coast	4,934,900	759,300	84,500	186,000	1,199,100	268,600
Canterbury	4,934,900	1,013,000	83,700	227,500	1,361,300	297,400
Otago	4,934,900	1,206,500	84,500	256,900	1,431,600	302,600
Southland	4,934,900	1,202,100	84,900	249,400	1,509,200	310,400
<b>New Zealand</b>	<b>4,934,900</b>	<b>897,000</b>	<b>83,700</b>	<b>201,900</b>	<b>1,203,100</b>	<b>257,700</b>

## 2.5 Crash statistics and cost indices

Table 15. Reported and estimated number of crashes and injuries from 2018-2020

All areas								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	921	1,046	400	435	921	1,046	400	435
Serious	6,099	N/A	6,853	2,247	10,857	N/A	12,228	4,004
Minor	26,606	N/A	N/A	32,217	86,744	N/A	N/A	105,037
<b>Total</b>	<b>33,626</b>	<b>1,046</b>	<b>7,253</b>	<b>34,899</b>	<b>98,522</b>	<b>1,046</b>	<b>12,628</b>	<b>109,476</b>
Open roads								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	655	764	335	338	655	764	335	338
Serious	2,956	N/A	3,477	1,404	5,364	N/A	6,315	2,553
Minor	10,324	N/A	N/A	12,929	33,659	N/A	N/A	42,151
<b>Total</b>	<b>13,935</b>	<b>764</b>	<b>3,812</b>	<b>14,671</b>	<b>39,678</b>	<b>764</b>	<b>6,650</b>	<b>45,042</b>
Urban roads								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	266	282	65	97	266	282	65	97
Serious	3,143	N/A	3,376	843	5,493	N/A	5,913	1,451
Minor	16,282	N/A	N/A	19,288	53,085	N/A	N/A	62,886
<b>Total</b>	<b>19,691</b>	<b>282</b>	<b>3,441</b>	<b>20,228</b>	<b>58,844</b>	<b>282</b>	<b>5,978</b>	<b>64,434</b>

Table 16. Cost indices for updating unit costs

Cost component	Indices	Infoshare reference	Quarter	Values	Change compared to previous year
Loss of life and life quality Loss of output	Average hourly earnings (ordinary time)	QEX001AA	June 2021	\$34.76	4.0%
			June 2020	\$33.42	3.0%
			June 2019	\$32.46	4.0%
Medical cost	Producers price input index – Health and community services	PPI020AA	June 2021	1188	4.5%
			June 2020	1137	0.8%
			June 2019	1128	2.4%
Legal and court cost	Producers price input index – Legal services: Personal and Corporate	PPI027AA	June 2021	1224	1.1%
			June 2020	1211	2.3%
			June 2019	1184	3.2%
Vehicle damage cost	Consumers price index – Vehicle servicing & repairs	CPI013AA	June 2021	1097	2.4%
			June 2020	1071	2.9%
			June 2019	1041	1.8%

Source: [Infoshare, Stats NZ](#)

## 3 Appendix

### 3.1 Methodology

The following section describes the methods used to update various social cost components

#### 3.1.1 Loss of life and life quality

The loss of life and life quality component represents an estimated value of pain and suffering to the injured and to their family. For non-fatal injuries, it also includes the loss of output due to permanent disability. These values were established through a Value of Safety survey (conducted in 1991). The survey was conducted to understand how respondents trade off between safety and wealth. Trade-offs covered in the survey involved asking how much respondents would pay to reduce road accident risks for themselves, their families, and other people. Specific questions included:

- Driving on a safer road with a toll
- Taking a course in road safety
- Adding safety features to a car
- Living in a neighbourhood that has a lower chance of being involved in a motor vehicle accident
- Funding road and pedestrian safety improvements via higher taxes
- Reducing fatal vs non-fatal risks

This information was used to determine the willingness-to-pay value for avoiding one premature death (known as the willingness-to-pay value of statistical life) and one serious or minor injury. This willingness-to-pay approach has been widely used by many countries and is considered the most appropriate approach for use in safety intervention analysis.

The value of statistical life (VOSL) was established at \$2 million in 1991. It is regularly indexed to the average hourly earnings to express the value in current dollars. The updated value in 2020 prices is \$4.42 million per fatality. The loss of life and life quality component represents over 90 percent of the total social cost of injury crashes.

#### 3.1.2 Loss of output due to temporary disability

Many injuries result in workers taking time off work. While the lost earnings are either met by employers or by ACC, such disruption affects gross output. Estimates of loss of output per injury are determined using average length of hospital stay (as a proxy for the average time lost per injury) and average daily earnings (as a proxy of loss of output), based on the latest income statistics collected as part of the Household Labour Force Survey published by Statistics New Zealand.

For a serious injury, the average time lost per injury and the average daily earnings per person (considering the age and gender profiles of 2018-2020 crash data) are used to estimate an average loss of output per serious injury. A similar estimate is also derived for minor injuries. In aggregate terms, loss of output due to temporary disability accounts for less than 1 percent of the total social cost of injury crashes.

#### 3.1.3 Medical costs

The methodology for estimating medical costs was developed in the mid-1990s. It uses injury and cost data obtained from hospitals in Dunedin and Waikato to determine the average cost of emergency treatment, hospital in-patient treatment and follow-on treatment by injury severity. Estimates for these average costs are updated annually to current dollars using the producers' input price index for health and community services. In aggregate terms, medical costs account for just over 2 percent of the total social cost of injury crashes.

### **3.1.4 Legal and court costs**

Legal and court costs include three components: the justice system costs, the cost to New Zealand Police of crash attendance and investigation and the cost of imprisonment. These are based on actual administrative data obtained from New Zealand Police's Road Policing Programme and from the Ministry of Justice. In aggregate terms, legal and court costs account for just over 1 percent of the total social cost of injury crashes.

### **3.1.5 Vehicle damage cost**

Estimates of vehicle damage costs were established in the mid-1990s based on insurance claims data. They are updated annually for price changes using the consumer price index under the vehicle servicing and repairs category. In aggregate terms, property damage costs account for about 5 percent of the total social cost.