

An aerial photograph of a multi-lane road with several cars driving. The road is flanked by trees and buildings. The image is partially obscured by a grey diagonal shape in the top left corner.

Social cost of  
road crashes and  
injuries 2020 update  
June 2020



Ministry of **Transport**

TE MANATŪ WAKA

New Zealand Government

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## 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. The Ministry of Transport 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; and
- 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 \$4.42 million per fatality, at June 2020 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 \$4,464,400 per fatality, \$467,700 per serious injury, and \$25,300 per minor injury. Often, a crash can involve multiple fatal, serious, and minor injuries. In per-crash terms, the average social cost is then estimated at \$5,301,800 per fatal crash, \$537,000 per serious injury crash, and \$30,600 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 Accident Compensation Corporation's (ACC) 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 2019 is estimated at \$4.6 billion, at June 2020 prices. This represents a decrease of \$300 million (or 6.1 percent) compared to the previous year (from \$4.9 billion in 2018), due to a fall in the estimated total number of fatal crashes (-9.4 percent)

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## Part 1 - The 2020 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 2020 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 2017 to 2019.

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 injury and crash costs

The social cost of a road crash or a road injury is defined as the total cost incurred as a result of the road crash or injury. Its value depends on the number of cost components<sup>1</sup> 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

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<sup>1</sup> The social cost estimates do not include transfer payments such as taxes or insurance premiums. Current estimates also exclude the costs associated with insurance administration, traffic delays due to road crashes and collateral damage (other than vehicle damage). While these costs can be very high in some specific cases, they are unlikely to materially affect the average cost estimates obtained at the aggregated level.

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 2017 to 2019 are given in Table 10. For the three years to 2019, only 56 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 11. 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 an 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 \$4.42 million per fatality, at June 2020 prices. Adding the other social cost components gives an updated average social cost per fatality of \$4,464,500. For non-fatal injuries, the updated average social cost is estimated at \$467,700 per serious injury and \$25,300 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 \$839,000 per reported serious injury and \$79,000 per reported minor injury.

This report also provides social cost estimates in per-crash terms. The updated average social cost is estimated at \$5,301,800 per fatal crash, \$537,000 per serious injury crash and \$30,600 per minor injury crash. This is adjusted to \$987,000 per reported serious injury crash and \$100,000 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 2020

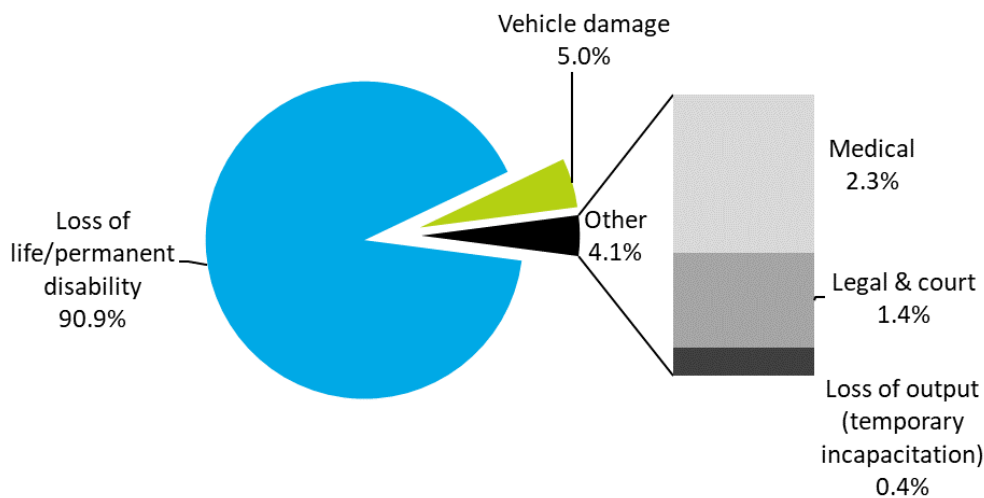
The total social cost of motor vehicle fatal and injury crashes in 2019 is estimated at approximately \$4.6 billion, a \$300 million decrease compared to 2018 (in June 2020 prices)<sup>2</sup>. The changes in fatal, serious and minor injuries this represents are summarised in [Table 1](#).

Table 1: Change in fatal, serious and minor crash numbers, 2018-2019

	2018	2019	Change
<b>Fatal</b>	331	300	-9%
<b>Serious</b>	3,917	3,921	+0%
<b>Minor</b>	30,060	30,298	+1%

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 total social cost of fatal and injury crashes in 2019



Total social cost of injury crashes in 2019 = \$4.2 billion (June 2020 prices)

In addition, there are an estimated 278,000 non-injury crashes<sup>3</sup>, valued at a further \$0.9 billion. This gives a total social cost of all motor vehicle crashes in 2019 of \$5.5 billion (decreased

<sup>2</sup> This report uses information recorded by NZ Police, hospitals and ACC to estimate the total numbers of serious and minor injuries that occurred on New Zealand roads. Estimates for previous years have been revised using the latest information obtained.

<sup>3</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.]

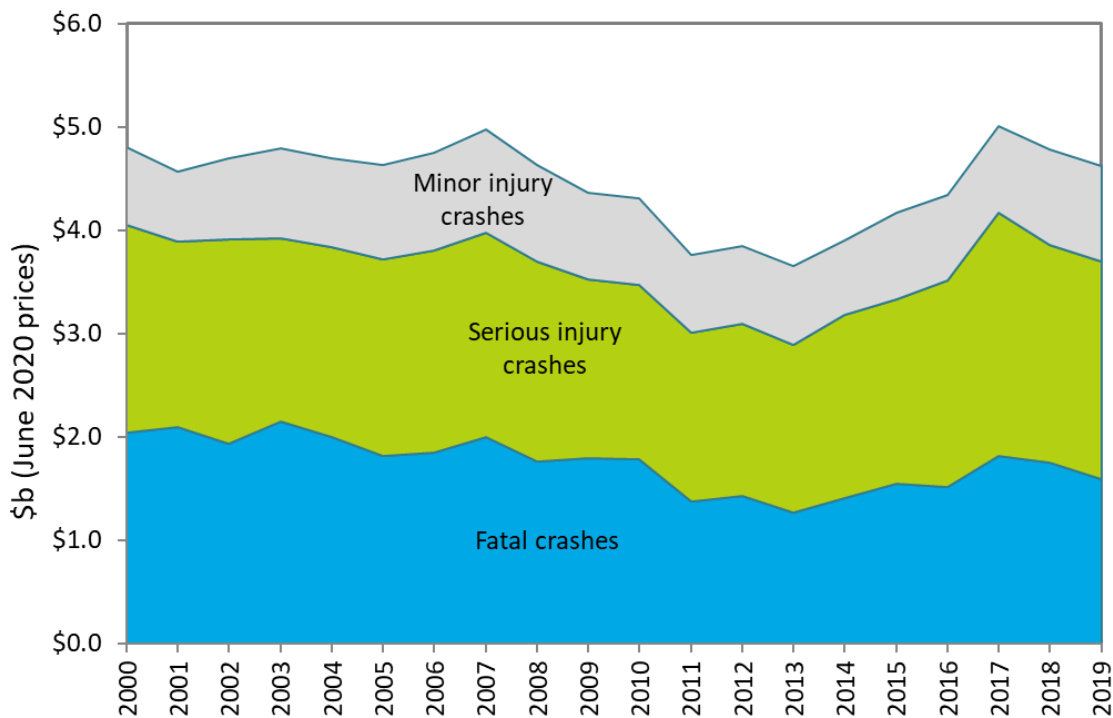


from \$5.7 billion in 2018). These estimates include the costs associated with both reported and non-reported cases.

### 1.5 Annual total social cost of road crashes (2000 – 2019)

Figure 1 shows the trend of the estimated annual total social cost of injury crashes for the years from 2000 to 2019.

Figure 2: Estimated annual total social cost of fatal and injury crashes, by crash severity (\$ billion, at June 2020 prices)



Note: This chart includes allowances for non-reported cases.

### 1.6 Social cost of fatal and injury crashes by area and region (2017 – 2019)

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

Figure 4.

<sup>4</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 2020 prices)

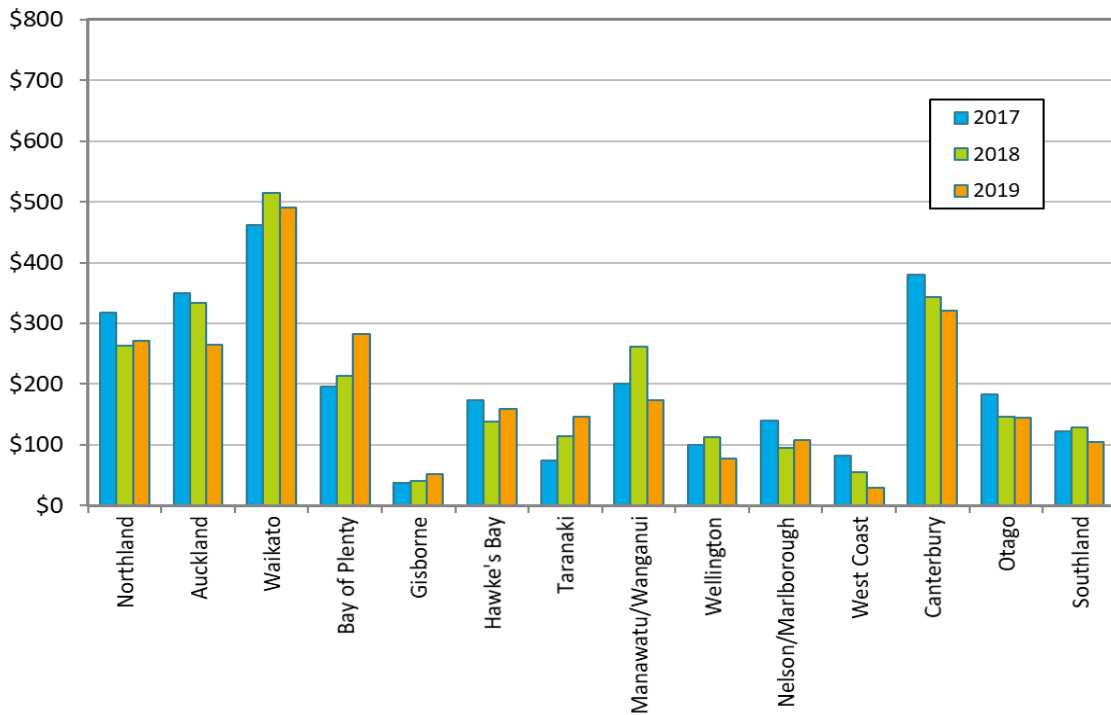
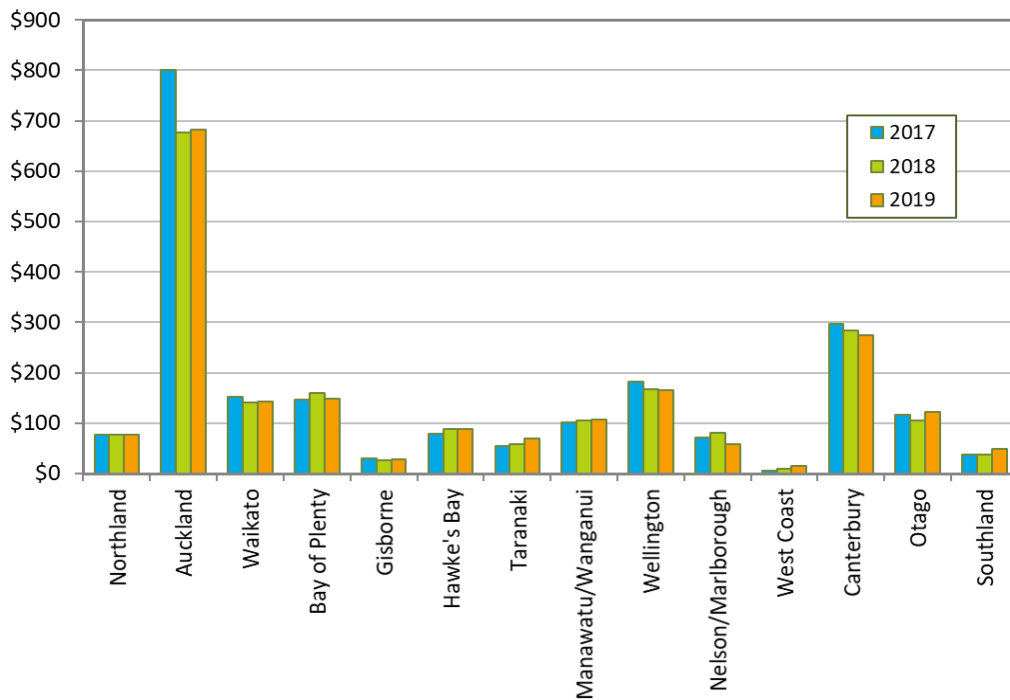


Figure 4: Total social cost of fatal and injury crashes on urban roads, by region (\$ million, at June 2020 prices)



## Part 2 - The social cost estimates

### 2.1 Average social cost by cost 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 cost component

Cost components	Severity		
	Fatal	Serious	Minor
	<b>June 2020 prices (\$)</b>		
Loss of life/permanent disability	5,240,300	505,600	21,400
Loss of output (temporary disability)	800	1,800	400
Medical –	15,200	17,600	1,100
Hospital/medical	8,700	10,800	200
Emergency/pre-hospital	4,400	1,500	800
Follow-on	2,200	5,300	100
Legal and court	32,700	3,900	1,300
Vehicle damage	12,800	8,000	6,500
<b>Total</b>	<b>5,301,800</b>	<b>537,000</b>	<b>30,600</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

Cost components	Injury type		
	Fatal	Serious	Minor
	June 2020 prices (\$)		
Loss of life/permanent disability	4,423,800	442,400	17,700
Loss of output (temporary disability)	0	1,500	300
Medical –	6,900	15,300	900
Hospital/medical	3,900	9,500	100
Emergency/pre-hospital	3,100	1,100	700
Follow-on	0	4,700	100
Legal and court	27,100	3,100	1,000
Vehicle damage	6,600	5,400	5,400
<b>Total</b>	<b>4,464,400</b>	<b>467,700</b>	<b>25,300</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

Per non-injury crash	June 2020 prices (\$)		
	All areas	Open roads	Urban roads
Non-injury crash – vehicle damage	3,300	3,600	3,200

Note: These estimates have not been adjusted for the level of non-reporting.

## 2.2 Average social cost per incident, by severity

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](#)

Crash severity	June 2020 prices (\$)		
	All	Open roads	Urban Roads
Fatal	5,302,000	5,487,000	4,844,000
Serious	987,000	1,050,000	930,000
Minor	100,000	105,000	97,000
Serious and minor	276,000	327,000	241,000
Fatal and serious	1,538,000	1,848,000	1,221,000
Fatal, serious and minor	417,000	580,000	304,000

[Table 6: Average social cost per injury by severity](#)

Injury severity	June 2020 prices (\$)		
	All	Open roads	Urban roads
Fatal	4,464,000	4,464,000	4,464,000
Serious	839,000	835,000	844,000
Minor	79,000	79,000	80,000
Serious and minor	219,000	244,000	199,000
Fatal and serious	1,283,000	1,435,000	1,103,000

Fatal, serious and minor

324,000

419,000

250,000

Table 7: Average social cost per injury, excluding associated vehicle damage costs, by severity

Injury severity	June 2020 prices (\$)		
	All	Open roads	Urban roads
Fatal	4,458,000	4,458,000	4,458,000
Serious	830,000	824,000	835,000
Minor	63,000	61,000	64,000
Serious and minor	203,000	227,000	184,000
Fatal and serious	1,274,000	1,426,000	1,094,000
Fatal, serious and minor	309,000	403,000	235,000



### 2.3 Average social cost per reported injury crash, by vehicle movement

Table 8 provides estimates of the average social cost per reported crash by vehicle movement using crash data from 2013 to 2019. 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

Vehicle movement classification	June 2020 prices (\$)		
	All	Open roads	Urban roads
Overtaking or lane change	489,000	630,000	298,000
Head-on, not overtaking	1,160,000	1,576,000	509,000
Lost control, straight roads	401,000	424,000	370,000
Cornering	450,000	477,000	395,000
Collision with obstruction	276,000	449,000	228,000
Rear-end collision	193,000	235,000	158,000
Turning versus same direction	325,000	504,000	235,000
Crossing, no turns	337,000	859,000	262,000
Crossing, vehicle turning	321,000	607,000	241,000
Vehicles merging	248,000	474,000	209,000
Right turn against	312,000	638,000	259,000
Vehicle manoeuvring	290,000	580,000	239,000
Pedestrian crossing road	422,000	1,559,000	381,000
Pedestrian other	551,000	1,522,000	431,000
Miscellaneous	692,000	805,000	591,000

## 2.4 Average social cost by local government 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.

Table 9: Average social cost per reported injury crash by local government region

Region	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious and minor
<b>All areas</b>	<b>June 2020 prices (\$)</b>					
Northland	5,233,000	1,263,000	102,000	366,000	2,072,000	635,000
Auckland	5,025,000	882,000	100,000	225,000	1,214,000	291,000
Waikato	5,811,000	655,000	101,000	219,000	1,484,000	439,000
Bay of Plenty	5,014,000	1,273,000	97,000	341,000	1,938,000	542,000
Gisborne	4,563,000	1,142,000	103,000	355,000	1,622,000	516,000
Hawke's Bay	5,201,000	1,509,000	101,000	391,000	2,054,000	557,000
Taranaki	5,901,000	1,393,000	100,000	425,000	1,928,000	605,000
Manawatu-Wanganui	5,415,000	782,000	104,000	252,000	1,526,000	460,000
Wellington	4,572,000	674,000	95,000	207,000	917,000	262,000
Nelson-Marlborough	5,309,000	1,201,000	98,000	326,000	1,720,000	470,000
West Coast	4,620,000	851,000	96,000	269,000	1,584,000	497,000
Canterbury	5,467,000	1,118,000	99,000	327,000	1,764,000	519,000
Otago	4,952,000	1,177,000	101,000	329,000	1,521,000	424,000
Southland	5,688,000	1,365,000	102,000	406,000	1,923,000	587,000
<b>New Zealand</b>	<b>5,302,000</b>	<b>987,000</b>	<b>100,000</b>	<b>276,000</b>	<b>1,538,000</b>	<b>417,000</b>

Table 9 continued

Region	Average social cost per reported crash June 2020 prices (\$)					
	Crash severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious and minor
<b>Open roads</b>						
Northland	5,325,000	1,272,000	107,000	401,000	2,241,000	763,000
Auckland	5,241,000	933,000	104,000	230,000	1,439,000	329,000
Waikato	6,069,000	668,000	106,000	243,000	1,676,000	553,000
Bay of Plenty	5,210,000	1,340,000	101,000	429,000	2,229,000	778,000
Gisborne	4,600,000	1,153,000	106,000	420,000	1,710,000	649,000
Hawke's Bay	5,383,000	1,547,000	108,000	481,000	2,293,000	770,000
Taranaki	5,956,000	1,460,000	107,000	513,000	2,204,000	819,000
Manawatu-Wanganui	5,495,000	803,000	111,000	295,000	1,690,000	599,000
Wellington	4,561,000	719,000	101,000	251,000	1,131,000	374,000
Nelson-Marlborough	5,508,000	1,238,000	105,000	369,000	1,969,000	605,000
West Coast	4,634,000	850,000	97,000	283,000	1,658,000	557,000
Canterbury	5,554,000	1,240,000	104,000	431,000	2,155,000	800,000
Otago	5,092,000	1,225,000	106,000	363,000	1,744,000	526,000
Southland	5,793,000	1,479,000	108,000	490,000	2,183,000	764,000
<b>New Zealand</b>	<b>5,487,000</b>	<b>1,050,000</b>	<b>105,000</b>	<b>327,000</b>	<b>1,848,000</b>	<b>580,000</b>
<b>Urban roads</b>						
Northland	4,890,000	865,000	98,000	223,000	1,133,000	277,000
Auckland	4,556,000	626,000	96,000	184,000	1,003,000	260,000
Waikato	4,525,000	1,201,000	94,000	282,000	1,579,000	371,000
Bay of Plenty	4,482,000	1,128,000	102,000	298,000	1,493,000	394,000
Gisborne	4,470,000	1,459,000	96,000	317,000	1,685,000	370,000
Hawke's Bay	5,647,000	1,310,000	96,000	349,000	1,533,000	409,000
Taranaki	5,180,000	749,000	98,000	209,000	1,241,000	314,000
Manawatu-Wanganui	4,588,000	653,000	93,000	192,000	813,000	224,000
Wellington	4,662,000	1,158,000	93,000	287,000	1,398,000	344,000
Nelson-Marlborough	4,480,000	860,000	99,000	232,000	1,241,000	318,000
West Coast	5,278,000	1,022,000	97,000	272,000	1,403,000	364,000
Canterbury	4,470,000	1,130,000	98,000	300,000	1,274,000	336,000
Otago	5,058,000	1,155,000	98,000	300,000	1,378,000	354,000
Southland	4,844,000	930,000	97,000	241,000	1,221,000	304,000
<b>New Zealand</b>	<b>4,599,000</b>	<b>1,242,000</b>	<b>96,000</b>	<b>307,000</b>	<b>1,584,000</b>	<b>394,000</b>

Table 10: Average social cost per reported injury by local government region

Region	Injury severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious and minor
<b>All areas</b>	<b>June 2020 prices (\$)</b>					
Northland	4,464,000	996,000	78,000	274,000	1,622,000	462,000
Auckland	4,464,000	781,000	80,000	182,000	1,061,000	232,000
Waikato	4,464,000	548,000	77,000	173,000	1,162,000	329,000
Bay of Plenty	4,464,000	1,074,000	80,000	275,000	1,623,000	428,000
Gisborne	4,464,000	985,000	80,000	277,000	1,413,000	401,000
Hawke's Bay	4,464,000	1,281,000	81,000	306,000	1,736,000	432,000
Taranaki	4,464,000	1,182,000	80,000	331,000	1,602,000	464,000
Manawatu-Wanganui	4,464,000	663,000	77,000	192,000	1,256,000	340,000
Wellington	4,464,000	607,000	80,000	173,000	825,000	218,000
Nelson-Marlborough	4,464,000	1,013,000	80,000	263,000	1,419,000	370,000
West Coast	4,464,000	708,000	77,000	214,000	1,324,000	387,000
Canterbury	4,464,000	931,000	79,000	258,000	1,439,000	400,000
Otago	4,464,000	1,005,000	80,000	253,000	1,298,000	325,000
Southland	4,464,000	1,055,000	79,000	301,000	1,467,000	428,000
<b>New Zealand</b>	<b>4,464,000</b>	<b>839,000</b>	<b>79,000</b>	<b>219,000</b>	<b>1,283,000</b>	<b>324,000</b>
<b>Open roads</b>						
Northland	4,464,000	981,000	79,000	289,000	1,710,000	531,000
Auckland	4,464,000	771,000	81,000	180,000	1,163,000	251,000
Waikato	4,464,000	545,000	77,000	185,000	1,254,000	392,000
Bay of Plenty	4,464,000	1,044,000	79,000	320,000	1,726,000	562,000
Gisborne	4,464,000	977,000	81,000	324,000	1,462,000	498,000
Hawke's Bay	4,464,000	1,257,000	82,000	355,000	1,850,000	561,000
Taranaki	4,464,000	1,178,000	80,000	365,000	1,747,000	577,000
Manawatu-Wanganui	4,464,000	657,000	76,000	209,000	1,333,000	408,000
Wellington	4,464,000	606,000	79,000	194,000	963,000	287,000
Nelson-Marlborough	4,464,000	990,000	81,000	283,000	1,527,000	446,000
West Coast	4,464,000	704,000	77,000	223,000	1,378,000	429,000
Canterbury	4,464,000	917,000	78,000	310,000	1,583,000	559,000
Otago	4,464,000	993,000	80,000	264,000	1,414,000	378,000
Southland	4,464,000	1,057,000	79,000	337,000	1,561,000	518,000
<b>New Zealand</b>	<b>4,464,000</b>	<b>835,000</b>	<b>79,000</b>	<b>244,000</b>	<b>1,435,000</b>	<b>419,000</b>

Table 10 continued

Urban roads Region	Average social cost per reported injury					
	Injury severity					
	Fatal	Serious	Minor	Serious and minor	Fatal and serious	Fatal, serious and minor
	June 2020 prices (\$)					
Northland	4,464,000	1,039,000	79,000	246,000	1,337,000	315,000
Auckland	4,464,000	785,000	80,000	182,000	1,021,000	225,000
Waikato	4,464,000	554,000	79,000	152,000	890,000	214,000
Bay of Plenty	4,464,000	1,113,000	81,000	239,000	1,471,000	315,000
Gisborne	4,464,000	996,000	80,000	234,000	1,337,000	310,000
Hawke's Bay	4,464,000	1,318,000	81,000	260,000	1,536,000	305,000
Taranaki	4,464,000	1,188,000	81,000	295,000	1,370,000	342,000
Manawatu-Wanganui	4,464,000	673,000	79,000	172,000	1,104,000	256,000
Wellington	4,464,000	607,000	80,000	165,000	753,000	192,000
Nelson-Marlborough	4,464,000	1,044,000	80,000	243,000	1,256,000	290,000
West Coast	4,464,000	725,000	80,000	186,000	1,065,000	256,000
Canterbury	4,464,000	946,000	80,000	225,000	1,276,000	297,000
Otago	4,464,000	1,019,000	80,000	243,000	1,156,000	273,000
Southland	4,464,000	1,049,000	80,000	247,000	1,224,000	286,000
<b>New Zealand</b>	<b>4,464,000</b>	<b>844,000</b>	<b>80,000</b>	<b>199,000</b>	<b>1,103,000</b>	<b>250,000</b>

## 2.5 Crash statistics and price indices

Table 11: Reported and estimated number of crashes and injuries from 2017-2019

All areas								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	973	1,107	437	473	973	1,107	437	473
Serious	6,646	0	7,494	2,352	12,219	0	13,792	4,353
Minor	26,907	0	0	32,531	87,727	0	0	106,061
<b>Total</b>	<b>34,526</b>	<b>1,107</b>	<b>7,931</b>	<b>35,356</b>	<b>100,919</b>	<b>1,107</b>	<b>14,229</b>	<b>110,887</b>
Open roads								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	693	812	360	374	693	812	360	374
Serious	3,161	0	3,735	1,472	5,867	0	6,946	2,742
Minor	10,288	0	0	12,831	33,543	0	0	41,833
<b>Total</b>	<b>14,142</b>	<b>812</b>	<b>4,095</b>	<b>14,677</b>	<b>40,103</b>	<b>812</b>	<b>7,306</b>	<b>44,949</b>
Urban roads								
	Reported crashes	Reported injuries			Estimated crashes	Estimated injuries		
		Fatal	Serious	Minor		Fatal	Serious	Minor
Fatal	280	295	77	99	280	295	77	99
Serious	3,485	0	3,759	880	6,352	0	6,846	1,611
Minor	16,619	0	0	19,700	54,184	0	0	64,228
<b>Total</b>	<b>20,384</b>	<b>295</b>	<b>3,836</b>	<b>20,679</b>	<b>60,816</b>	<b>295</b>	<b>6,923</b>	<b>65,938</b>



**Table 12: Price indices for updating unit costs**

Cost components	Indices/measures	Infoshare table references	Period	Indices/values	% change over the 12 months to June 2019
Loss of life and life quality	Average hourly earnings (ordinary time)	QEX001AA	June 2020	\$33.33	+3.0%
Loss of output			June 2019	\$32.37	
			June 2018	\$31.00	
Medical cost	Producers price input index – Health and community services	PPI020AA (Base: Dec 2010=1000)	June 2020 June 2019 June 2018	1137 1128 1102	+0.8%
Legal and court cost	Producers price input index – Legal services: Personal and Corporate	PPI027AA (Base: Dec 2010=1000)	June 2020 June 2019 June 2018	1211 1184 1147	+2.3%
Vehicle damage cost	Consumers price index – Vehicle servicing & repairs	CPI013AA (Base: June 2017 =1000)	June 2020 June 2019 June 2018	1071 1041 1023	+2.3%

Source: Infoshare, Statistics New Zealand.

## Appendix: Methodology

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

### *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.

### *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 Accident Compensation Corporation, 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 2017-2019 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.

#### *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.

#### *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.

#### *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.