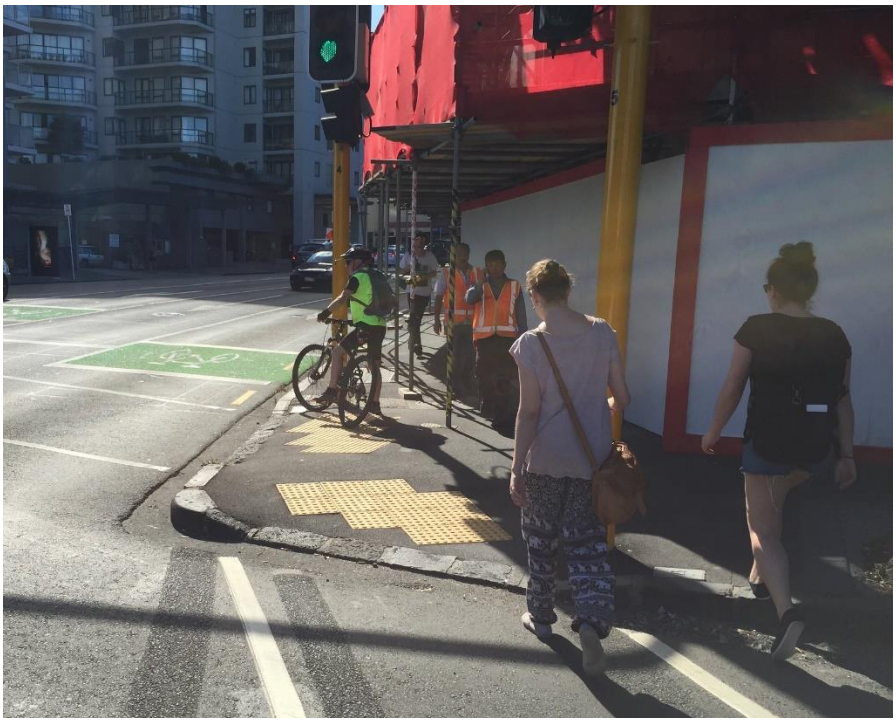
Transport Planning and Design
Level 1, 284 Kilmore Street
www.viastrada.nz

# Safety of people travelling outside vehicles

## Deep dive review



Report prepared for

Auckland Transport

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<tr><th colspan="3">Quality Assurance Statement</th></tr>
<tr><td rowspan="3">ViaStrada Ltd<br>Level 1,<br>284 Kilmore Street<br>PO Box 22 458<br>Christchurch 8140<br>New Zealand<br>Phone: (03) 366-7605<br>www.viastrada.nz<br>info@viastrada.nz</td><td>Project manager:</td><td>Glen Koorey, BE, ME (Civil), BSc, PhD<br>Director – Senior Transportation Engineer & Transportation Planner<br>027 739 6905<br>glen@viastrada.nz</td></tr>
<tr><td>Prepared by:</td><td>Gemma Dioni, MSc, BSc<br>Senior Transportation Engineer<br>021 400 599<br>gemma@viastrada.nz</td></tr>
<tr><td>Reviewed by:</td><td>Glen Koorey, BE, ME (Civil), BSc, PhD<br>Director – Senior Transportation Engineer & Transportation Planner<br>027 739 6905<br>glen@viastrada.nz</td></tr>
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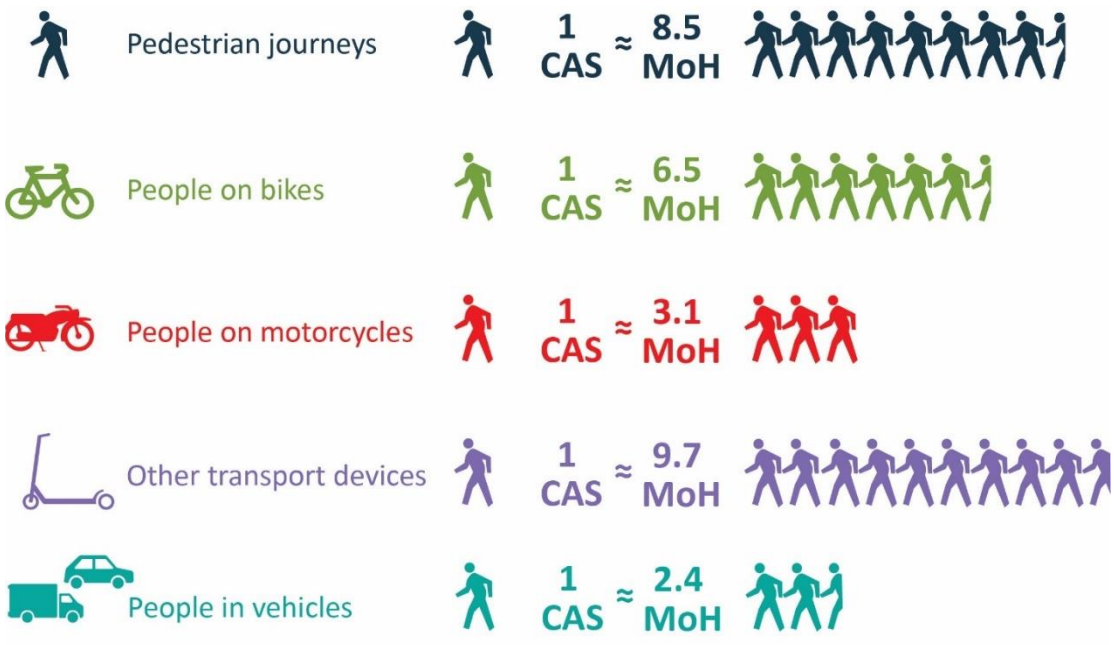
## Executive Summary

Strategic priority one in Vision Zero for Tāmaki Makaurau (Auckland) is reducing transport deaths and serious injuries, especially for vulnerable transport users (VTUs) outside of motor vehicles, i.e. people walking, biking, motorcycling and using other wheeled devices like skateboards and e-scooters. However, recent data monitoring suggests that these reductions are not happening as quickly as desired, and VTU deaths may even be trending upwards.

Whilst there appears to be one primary source that reports the fatalities on the transport network, the number of serious injuries depends on the data used. The purpose of this deep dive is to provide further insight into the extent, nature and causes of serious harm to people travelling outside vehicles in Auckland.

The Crash Analysis System does not generally report on incidents not involving a motor vehicle (e.g. trips, slips and falls) and, with only a proportion of non-fatal vehicle crashes being recorded in CAS (due to under-reporting to Police), it is clear that there is a big issue with under-reporting in the system. A review of CAS and data from fthe Ministry of Health also highlights that not only is VTU under-reporting a lot higher than motor vehicles but there are also fewer user-only incidents in CAS.

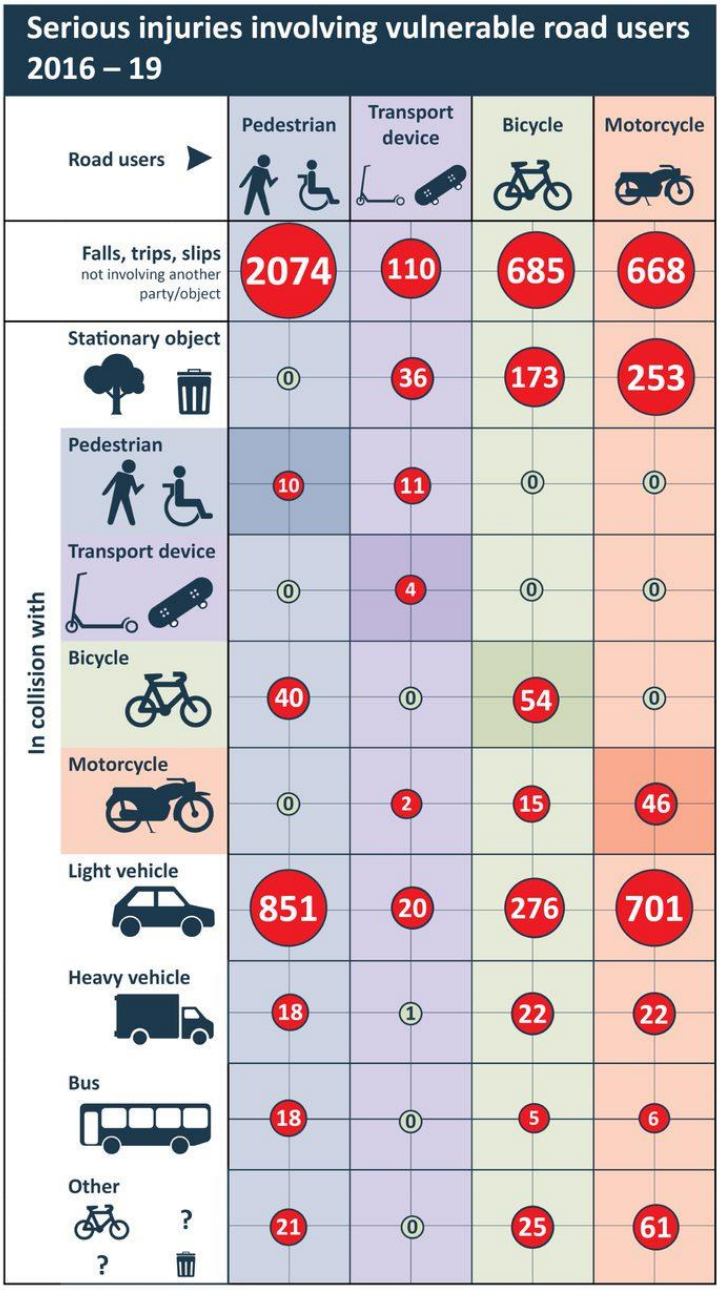



***Injury under-reporting – Crash Analysis System (CAS) v Ministry of Health (MoH)***

The following figure shows the relative splits of serious injuries involving VTUs (2016-19) in terms of other parties involved. This greatest numbers of injuries recorded are those that do not involve another party, such as the falls/trips/slips, collisions with stationary objects and lost control incidents for faster vehicles.

Motor vehicles also have a big involvement in VTU injuries, especially light vehicles (although there appears to be some coding anomaly with the way that transport device injuries with motor vehicles are captured in the data). Interestingly, relatively few serious injuries involve a heavy motor vehicle, such as truck or bus. There are relatively few crashes *between* VTUs.

VTU casualties are predominantly an urban problem, due to the greater level of activity there. However, motorcycle casualties involve a large number of rural incidents (often involving no other party) and rural crashes are also more likely to be fatal.




***Who is being injured in a collision and with whom?***

While speed is identified as a common factor in motorcycle crashes, it is systematically under-reported in crashes involving active travel modes. This may be because vehicle impact speeds are often at or below the current speed limit. However, a better focus would be identifying VTU crashes on the many roads with existing speed limits above the calculated safe and appropriate speeds.

In urban areas, the data would suggest that improving road and path quality and maintenance would greatly reduce the trauma from pedestrian-only injuries. A focus on improving urban arterial corridors (in terms of speed management, better crossing facilities, and better facilities along the routes) would also address many problems identified there.

With the expected (and encouraged) growth in numbers walking, cycling and using transport devices, it is possible that safety statistics for these modes may not necessarily fall in the short term. However, it may be more prudent to focus on broader health-related metrics instead, such as increases in physical activity and reduction in mortality due to vehicle emissions.

# Table of Contents

# 1 Introduction

Strategic priority one in Vision Zero for Tāmaki Makaurau (Auckland) is reducing transport deaths and serious injuries, especially for vulnerable transport users (VTUs) outside of motor vehicles, i.e. people walking, biking, motorcycling and using other wheeled devices like skateboards and e-scooters.

2020 Auckland road fatality results show a small decrease in deaths compared to recent years. However, this decrease has largely been in people travelling inside vehicles (drivers and passengers). Analysis shows in 2020 to December, compared to the five-year average, VTU deaths are trending upwards, particularly in people on foot and on bikes. The five-year average proportion of all road deaths inside vs outside a motor vehicle is 64% vs 36%; the 2020 proportions are 43% vs 57%. Interestingly, the Police-reported number of serious injuries sustained by VTUs in the 12-month period to Sep 2020 is 227 people, which is lower compared to the preceding 12-month period to Sep 2019.The AT safety team is also aware of additional fatalities where a motor vehicle was not involved and on the rail corridor.

The safety team at AT has shared high level information on the nature, extent and trends in harm to people travelling outside vehicles with the AT board of directors who have requested a deep dive into this issue.

The purpose of part I of this deep dive is to provide insight into the extent, nature and causes of serious harm to people travelling outside vehicles in Auckland[1]. This report aims to provide evidence to support leadership positions needed to make change on this important safety issue.

## 1.1 Questions to be addressed

Some key questions have been identified by AT for investigation:

1. **How big is the problem?** *How many people have been killed or seriously injured using Auckland's transport network in 2020? How does this compare with the previous five years?*

   Currently the Crash Analysis System (CAS) provides a limited view of harm and AT are seeking the combined analysis of CAS data with additional sources to fully answer this question, such as Ministry of Health (MoH) and Accident Compensation Corporation (ACC) data. This should include the extent of harm to VTUs where a motor vehicle was not involved, such as footpath falls, micro-mobility crashes, and level-crossing crashes.

   2020 has been a highly unusual year due to Covid-19 impacts. Some consideration of the impact of Covid on trends and patterns will be included and commentary on how trends may have been without this disruption.

   AT would also like to benchmark Auckland's safety performance for VTUs with other cities nationally and internationally, particularly leading global cities for safety performance for VTUs.

2. **What does the problem look like?** *Who is being harmed? Where is this occurring? What does the problem look like for different transport users?*

   A strategic priority in AT's Vision Zero strategy is ensuring safety is equitable regardless of age, ethnicity and socio-economic status. They also seek to meet Treaty of Waitangi obligations and ensure safety and equitable outcomes for Māori.

[1] For conciseness, where necessary in this report this group will be collectively referred to as "vulnerable transport users" or VTUs.

Where possible, further analysis of the data should provide insights into the nature of the problem, including analysis by local board area, age and ethnicity. If the data set is sufficient, further categories such as socio-economic status, work-related travel, being appropriately licensed and mobile phone use could also be considered.

3. **What are the causes of the problem?** *What critical risks are not being controlled that are exposing people to harm? What systemic factors contribute to this issue?*

   AT wish to take a systems view to understand the root causes of this harm; they are seeking insight into the causes of the problem. The includes transport infrastructure, speed environments, behaviour of users, vehicle technology, level of Police enforcement, road type, land use and any other relevant factors.

   AT are also interested in the systemic causes of fatal harm in recent years and how this may be different to serious injury causes. An observed pattern in Auckland over 2019 and 2020 is that numbers of road deaths has fallen while serious injury numbers have remained relatively similar. They would like to understand more about why this is occurring particularly in relation to VTUs.

   A Vision Zero approach means we would expect to see the worst harm (deaths) reduce first due to transformational projects – is this what is happening in Auckland?

   Also in relation to vulnerable transport users, this year we are seeing an increase in deaths for those modes, a drop in serious injuries for cycling and motorbikes and a rise in serious injuries for peds. What is behind these trends?

   AT also seek to understand risks relating to injuries on footpaths (including shared paths and walkways) as they would like to understand the level of current risk and how this can be quantified, e.g. the percentage of footpaths in acceptable condition in Auckland.

4. **If critical risks are not controlled, what is the extent of harm expected to occur?**

   If recent trends continue, how many VTUs do we expect to be killed or seriously injured in Auckland in the next ten years? What groups might we expect to bear more of this harm?

## 1.2 Report structure

Figure 1 summarises graphically the overall structure of the report. Part II of this investigation (commissioned separately) will help to develop an appropriate Action Plan.

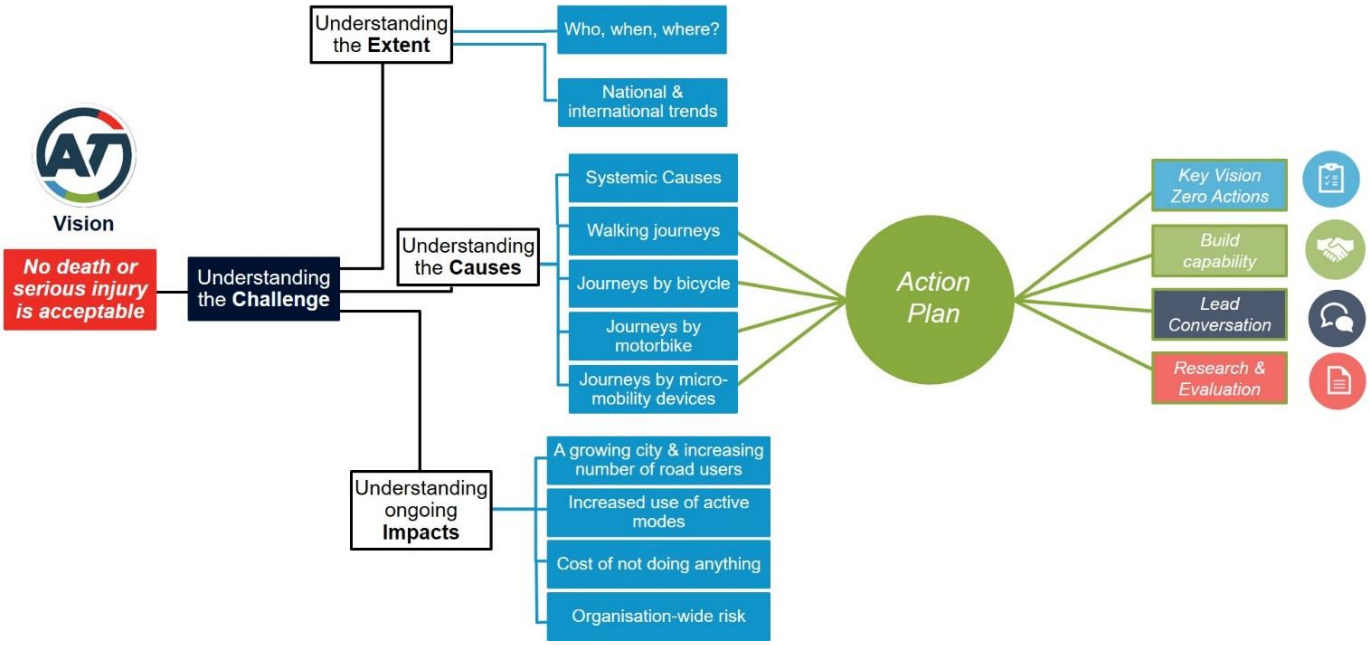



***Figure 1 Overall structure of report***

## 1.3 Method of investigation

To examine these questions, various data sources were reviewed, primarily to capture both road casualty information and user exposure figures. The main injury data sources examined were:

- Crash Analysis System (CAS) – Waka Kotahi NZ Transport Agency
- Hospital overnight stay data – Ministry of Health (MoH)
- Accident treatment data – Accident Compensation Corporation (ACC)

While typically at least five-year data was obtained (e.g. 2016-20 or 2015-19), there are some differences in timeliness of collation of the data, making it slightly difficult to always provide a direct comparison between data sources.

In addition, the investigation reviewed various relevant background agency documents, as well as other relevant literature and overseas data from comparison cities. These included:

- Auckland Vision Zero Plan
- Incident Reporting Information System – KiwiRail
- Types of User Killed & Injured, by Year - Ministry of Transport
- 2018 Census Place Summaries – Stats NZ

A number of meetings were held with Auckland Transport staff to understand data and work being undertaken on E-scooters, Red Light Running and Motorcycle volumes.

# 2 Understanding the Extent of the Problem

While we have presented some information on this issue for the collective cohort of all vulnerable transport users, for the most part we have undertaken separate analyses for four main groups:

- **Pedestrians**, including those using a mobility aid like a wheelchair or mobility scooter
- People on **cycles**, including e-bikes
- People on **motorcycles**, including mopeds

- People using other "micro-mobility" **transport devices**, such as skateboards scooters and e-scooters

## 2.1 Transport deaths in Tāmaki Makaurau

In general, the most reliable data for road fatalities is provided by the Ministry of Transport[2]. While there has been an overall long-term downward trend the data shows that, in recent times, there was a spike of road deaths in 2017. The Ministry of Transport data is the most relevant and accurate source of data for road deaths.

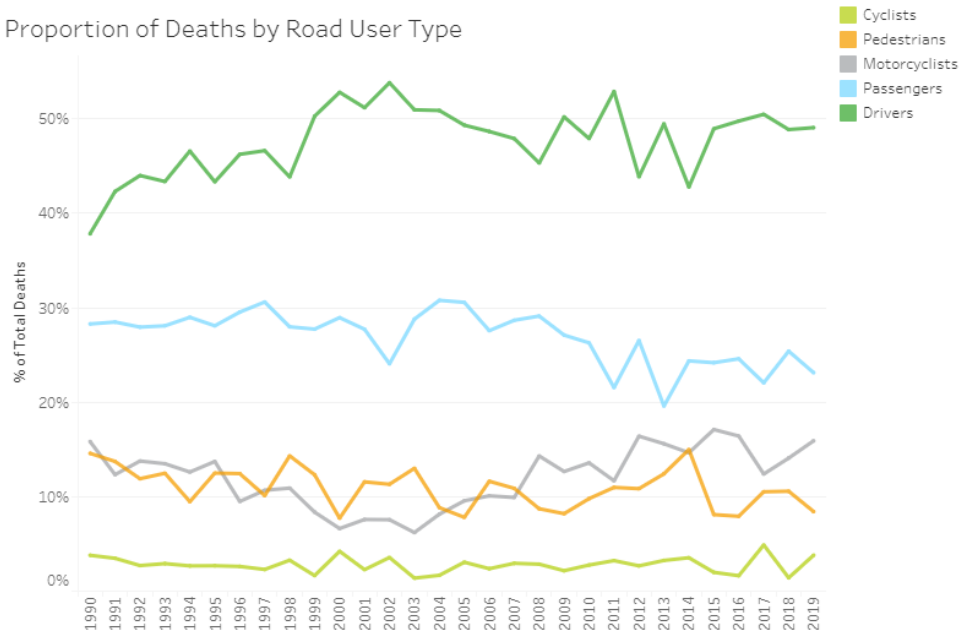



***Figure 2 Historic Fatal Casualties in Auckland - Percentages (Source: MoT)***

Figure 2 shows the proportion of deaths by road user type. Collectively the proportion of fatalities from VTUs is typically 25-30% but that has risen in 2020. While there are increases and decreases in VTU deaths from year to year, long-term there has been no real change in the proportion of pedestrian cycle fatalities and an increase in motorcycle fatalities.

It should be noted that, while CAS and the MoT are generally fairly reliable in capturing most land transport fatalities, it is possible that some fatal incidents that don't involve a motor vehicle may still "slip through the cracks" and not be captured by either CAS or Ministry of Health records (for example, if no hospitalisation ever happened). So some ongoing monitoring of separate fatal events may still be required by AT.

## 2.2 Serious crashes in Tāmaki Makaurau involving VTUs

Whilst there appears to be one reliable source that reports the fatalities on the transport network, the number of crashes that result in a serious injury depends on the data used.

Currently, a serious crash is defined by Waka Kotahi as,

*"fracture, concussion, severe cuts or other injury requiring medical treatment or removal to and retention in hospital"*

The detention in a hospital generally means an overnight stay in a hospital as a "rule of thumb".

[2] https://www.transport.govt.nz/statistics-and-insights/safety-annual-statistics/road-user/

In addition to extracting data from CAS, hospitalisation data from the MoH was used to understand the number of admissions from a collision that has occurred on the transport network that resulted in at least one night's stay at hospital (equates to a midnight spent in hospital). This is also included a review of the number of non-collisions that occur on the transport network involving vulnerable transport users.

CAS does not generally report on incidents not involving a motor vehicle (e.g. trips, slips and falls) and, with only a proportion of non-fatal vehicle crashes being recorded in CAS (due to under-reporting to Police), it is clear that there is a big issue with under-reporting in the system. Figure 3 shows that for every motorcyclist injury reported in CAS there are over three times (3.1) as many recorded within the hospital data. The differences are even more stark for other travel modes such as cycling (6.5 times more), walking (8.5 times more), and other transport devices (9.7 times more). By way of comparison, the equivalent level of under-reporting for serious injuries by motor vehicle occupants (not motorcycles) is only just over twice as much (2.2).

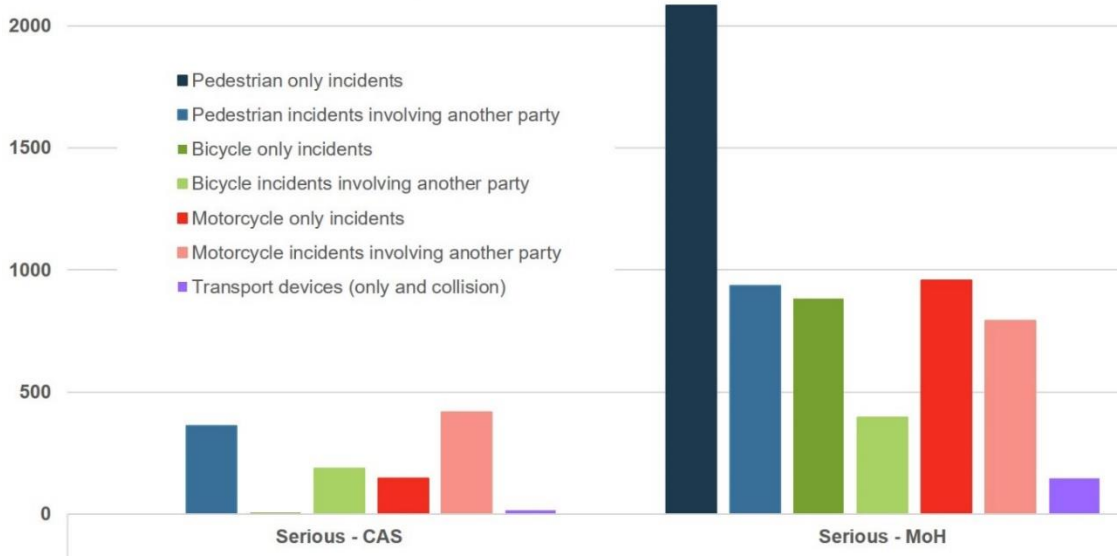



***Figure 3 Number of serious injuries recorded in CAS and by the MoH (2016-19 full year data)***

There is also an issue with CAS in that new micro-mobility transport devices do not have their own categories; there is also no current way to differentiate between powered and un-powered devices (e.g. e-scooters, e-bikes). Therefore, a user has to analyse the data in depth to find crashes involving these road users as they can often be found in other road user categories.

The difference in numbers captured between CAS and MoH is illustrated graphically in Figure 4 and Figure 5. The absolute numbers of casualties recorded is greatly increased in MoH (as illustrated by the respective size of the pie graphs) and the relative proportion of casualties from within motor vehicles is also greatly reduced.

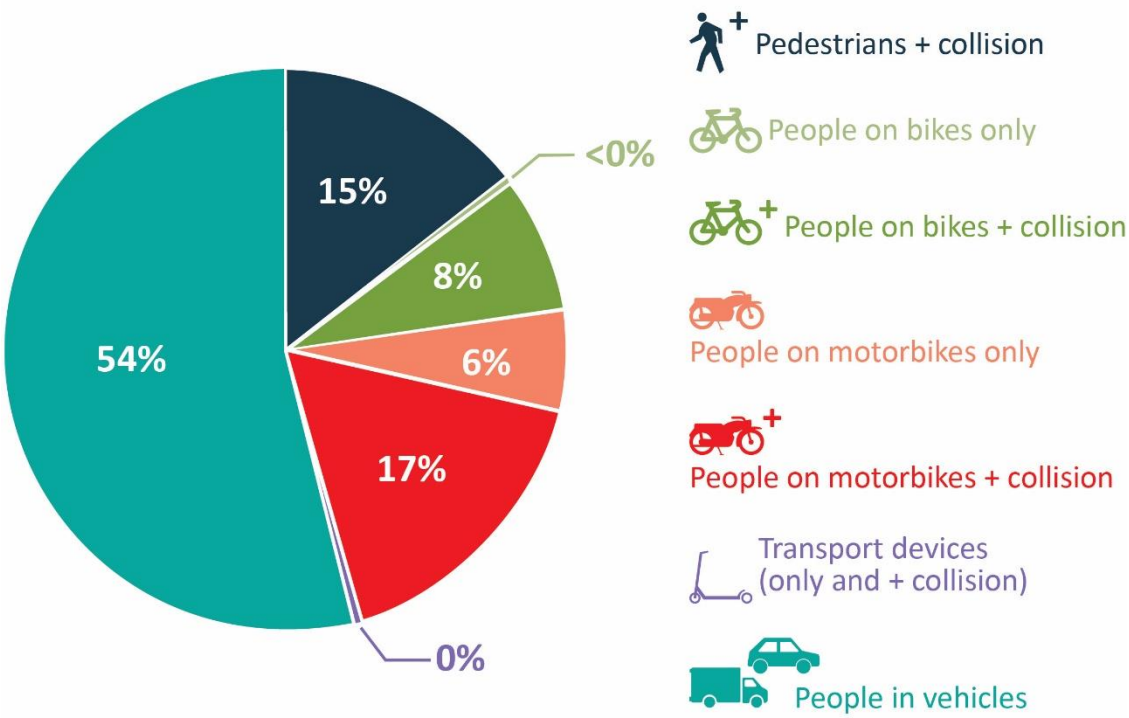



***Figure 4 Proportion of 2,457 serious injuries recorded in CAS over a four-year time period (2016-19)[3]***

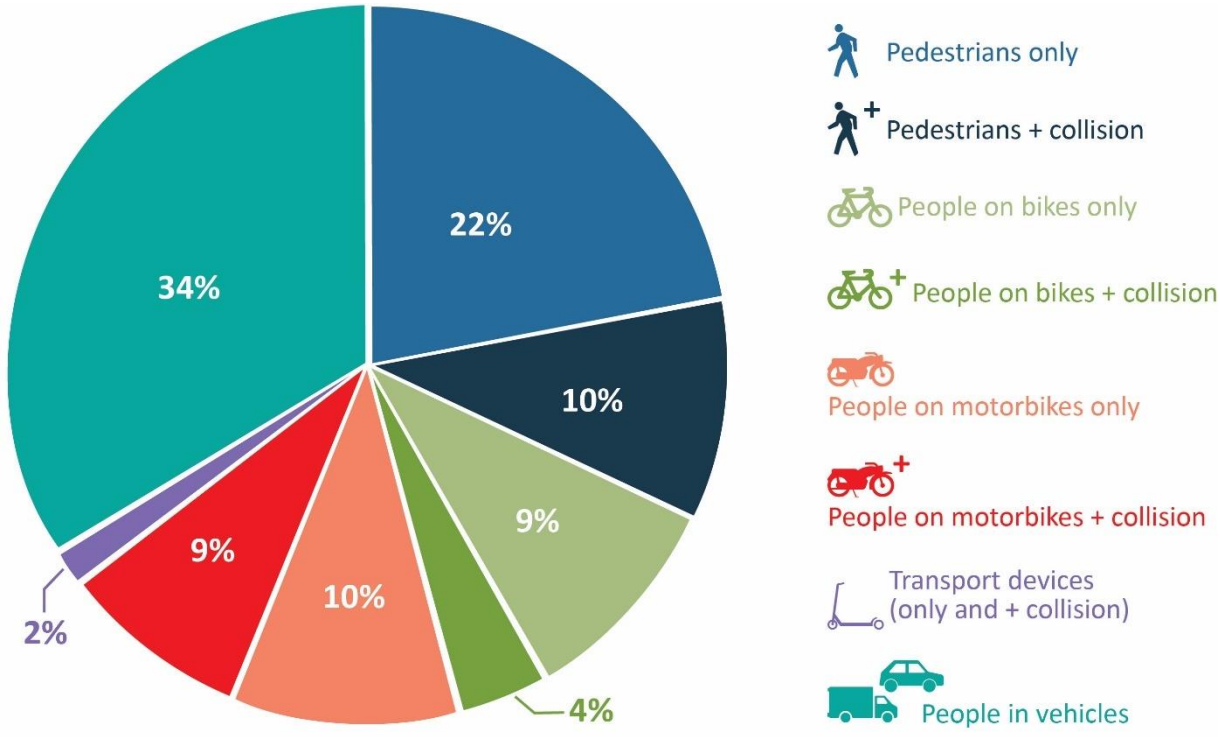



***Figure 5 Proportion of 9,370 serious injuries recorded by MoH for a four-year time period (2016-19)***

[3] Due to lags with data there is no full 2020 year of data in CAS or from the MoH

Figure 6 shows the relative splits of serious injuries involving VTUs (2016-19) in terms of other parties involved. The greatest numbers of injuries recorded are those that do not involve another party, such as the falls/trips/slips, collisions with stationary objects and lost control incidents for faster vehicles.

Motor vehicles also have a big involvement in VTU injuries, especially light vehicles (although there appears to be some coding anomaly with the way that transport device injuries with motor vehicles are captured in the data). Interestingly, relatively few serious injuries involve a heavy motor vehicle, such as truck or bus. There are relatively few crashes *between* VTUs.

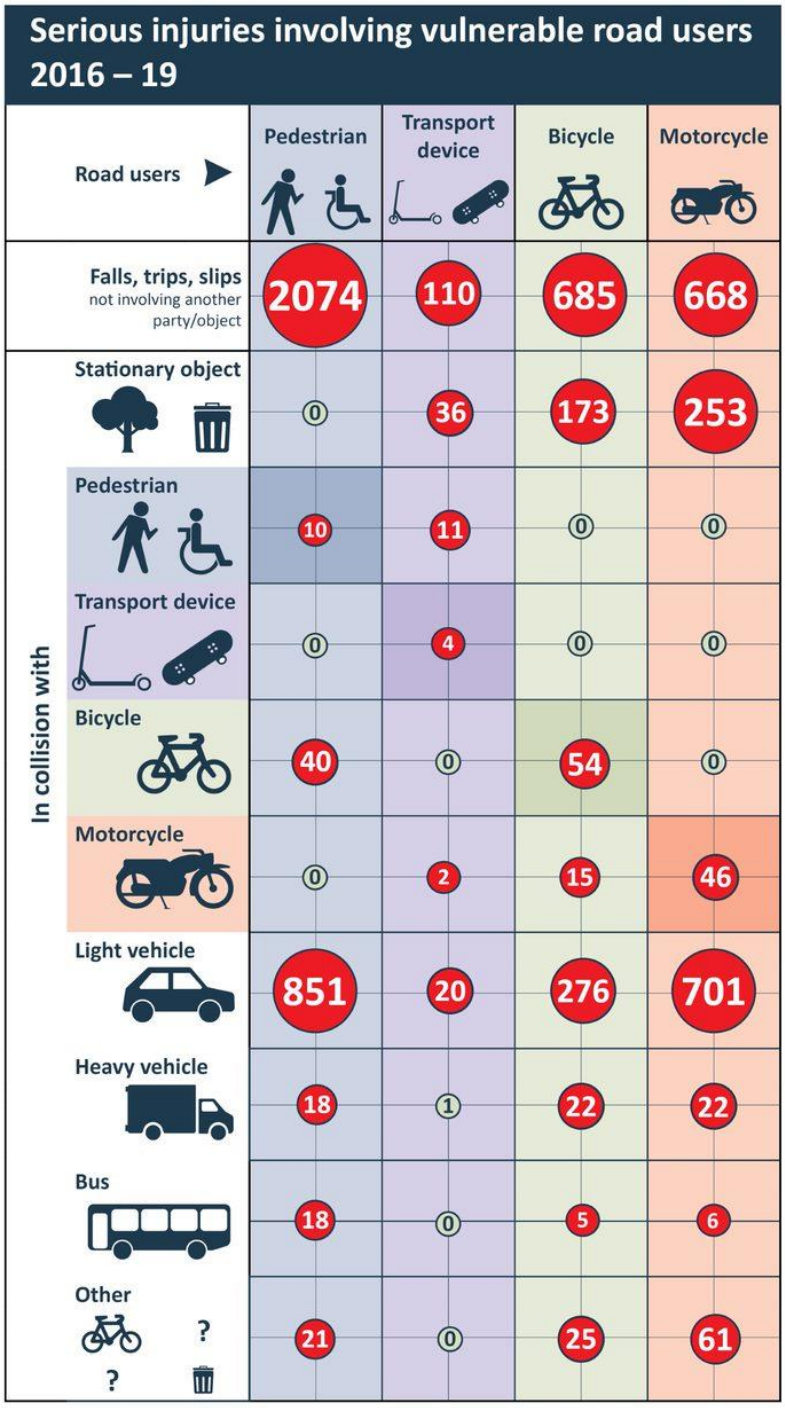



***Figure 6 Who is being injured in a collision for different crash types for four full years from 2016-19***

## 2.3 Walking journeys

Walking, as well as being a journey in itself, also forms part of the first and last leg of every trip made from a public transport or private vehicle journey (albeit sometimes for a very short distance). It is an easy and free way to move around for short trips. In seeking to make Auckland a liveable city, the pedestrian network needs to be attractive, accessible and safe.

Census data shows that the trip mode share for walking as a main means of travel to work in Auckland is stable (see Figure 7). However, as well as general population increase, it could be assumed that more walking is occurring due to the increase in the number of walking trips as part of a longer journey made by public transport given the proportional increases in those trip types.

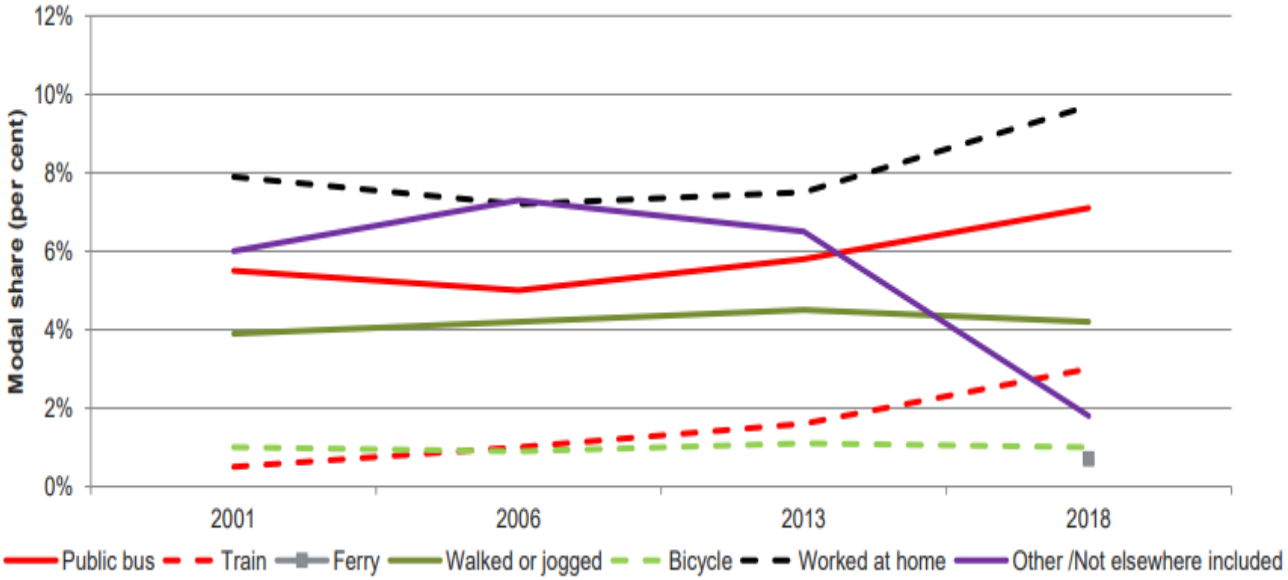



***Figure 7 Changes in Mode Share for Journey to Work in the Auckland area (Census data – Auckland Transport)***

For trips assessed by origin, the Auckland city centre has a high share of active mode trips. This is likely to be reflective of people living and working within the Central area and having access to high quality and frequent public transport services.

Furthermore, as the population continues to grow in Auckland, and with intensification in the central area, walking is a mode that should start to grow further particularly as a programme of transformational development continues to be delivered. Trips by active modes reduce as the trip origin moves further from the centre.

The challenge will be meeting the demands of more walking and at the same time reducing the number of pedestrians involved in collisions, but also trips, slips and falls, on the transport network. This is particularly so with an ageing population, as the risk of being seriously injured increases with age, with older pedestrians being less likely to recover from injury.

As shown in Figure 8 progress appears to have been made in reducing the number of reported fatal and serious injury collisions involving pedestrians, but with 2020 seeing a slight increase. Reducing these numbers is key to increasing walking as a mode and reducing casualties as walking needs to be, and feel, safe. A poor perception of safety can reduce the number of trips, particularly by those that are elderly, have a mobility or visual impairment.

For pedestrian incidents involving vehicles, light motor vehicles (cars, Utes, SUVs and vans) are the primary vehicle involved in both fatal and serious crashes.

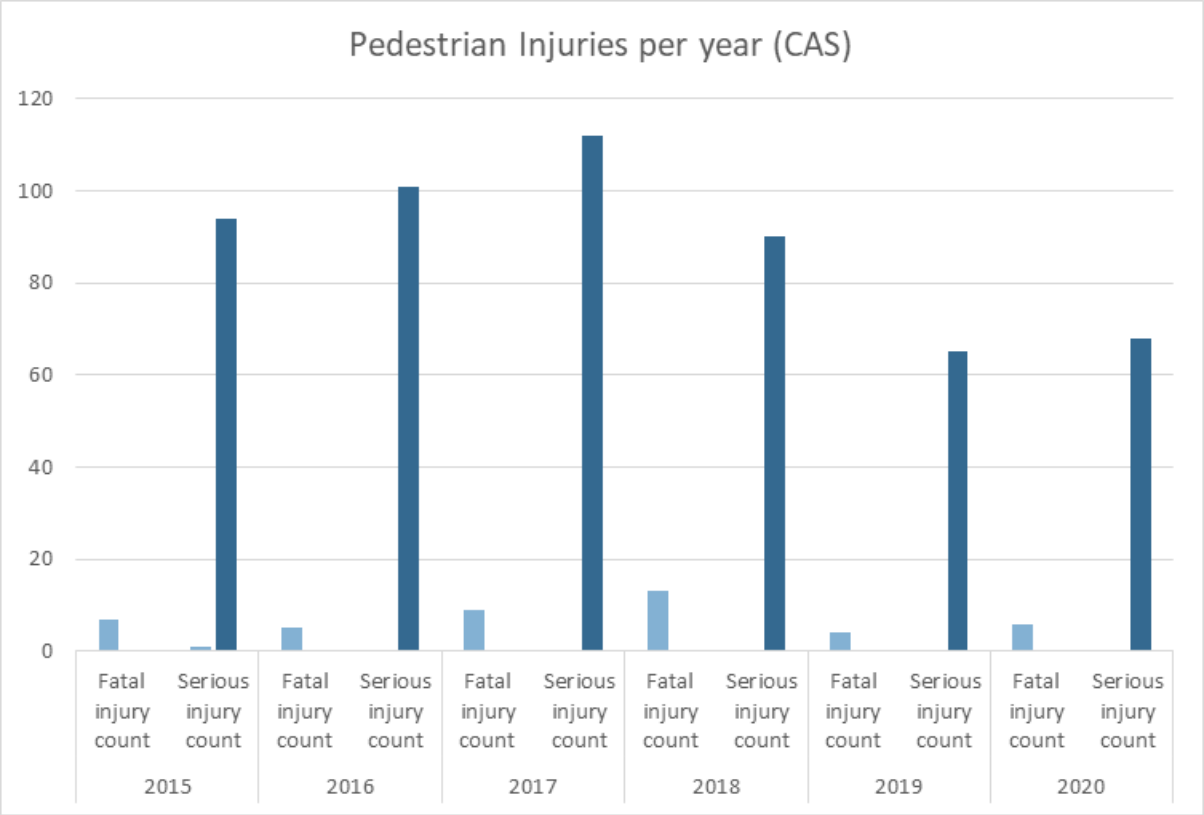



***Figure 8 Number of fatal and serious injuries per year for pedestrians (CAS data 2015-20)***

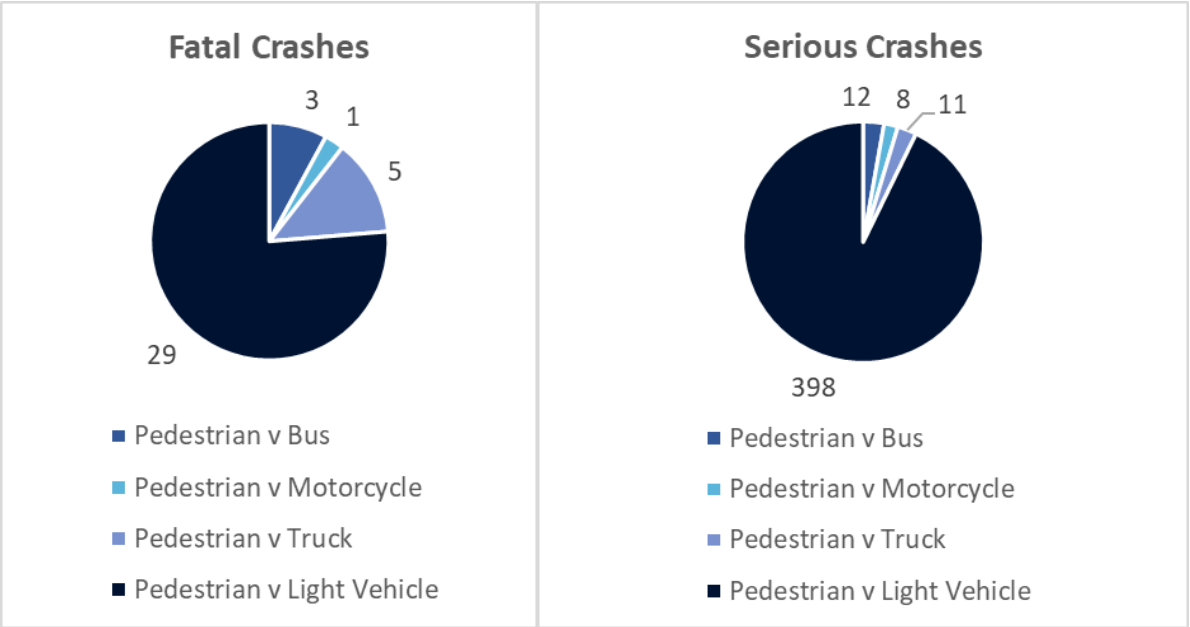



***Figure 9 Pedestrian type collisions (CAS data - 2015-20)***

As noted earlier, in addition to fatal and serious injuries involving people walking and vehicles, there are also injuries sustained from people slipping, tripping or falling. Figure 10 shows the breakdown of these types of hospitalised incidents within the transport network (i.e. roads and paths), based on MoH data. Tripping over some surface hazard (e.g. tree root, raised concrete block edge) is by far the most common issue, with slipping (e.g. on a gravel or wet surface) the next most likely.

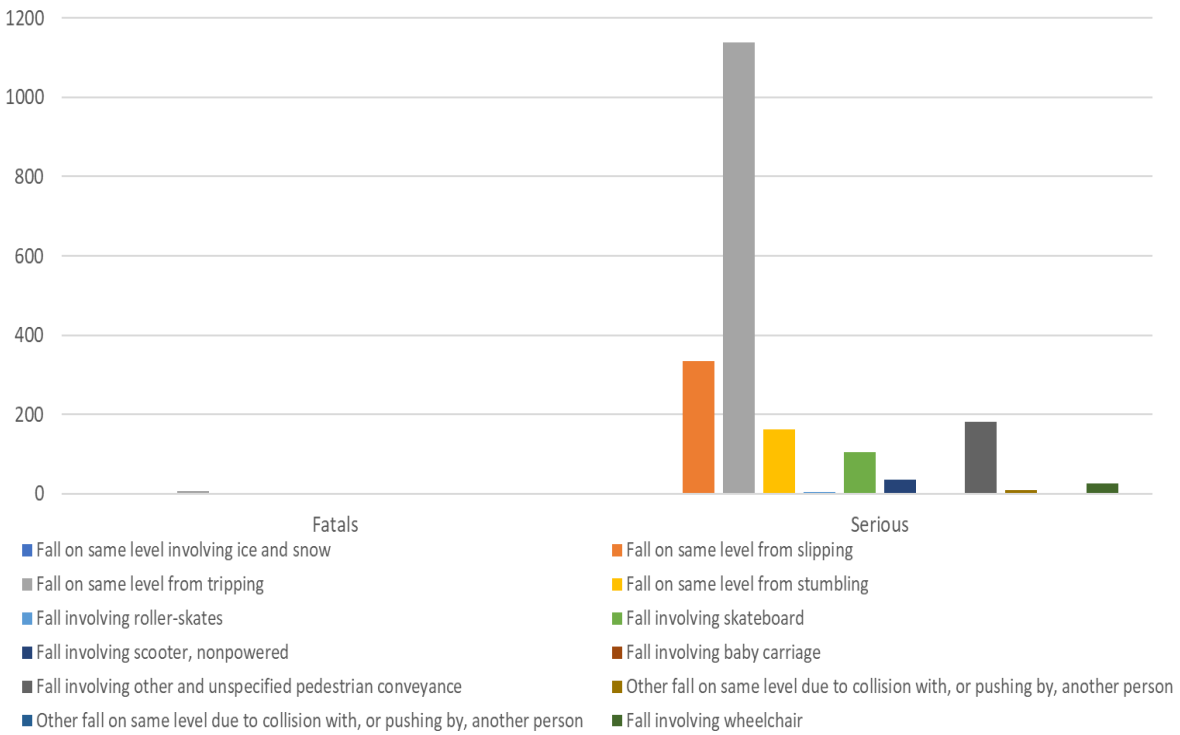



***Figure 10 Trips, slips and falls (2016-2019)***

The data from the Ministry of Health also shows that typically those involved in a trip or slip requiring hospital treatment are in the higher age groups; Figure 11 summarises the breakdown by age group. This highlights the relative fragility of the older population, where a simple fall can lead to quite serious injuries (including broken bones) that would not affect a younger person as badly.

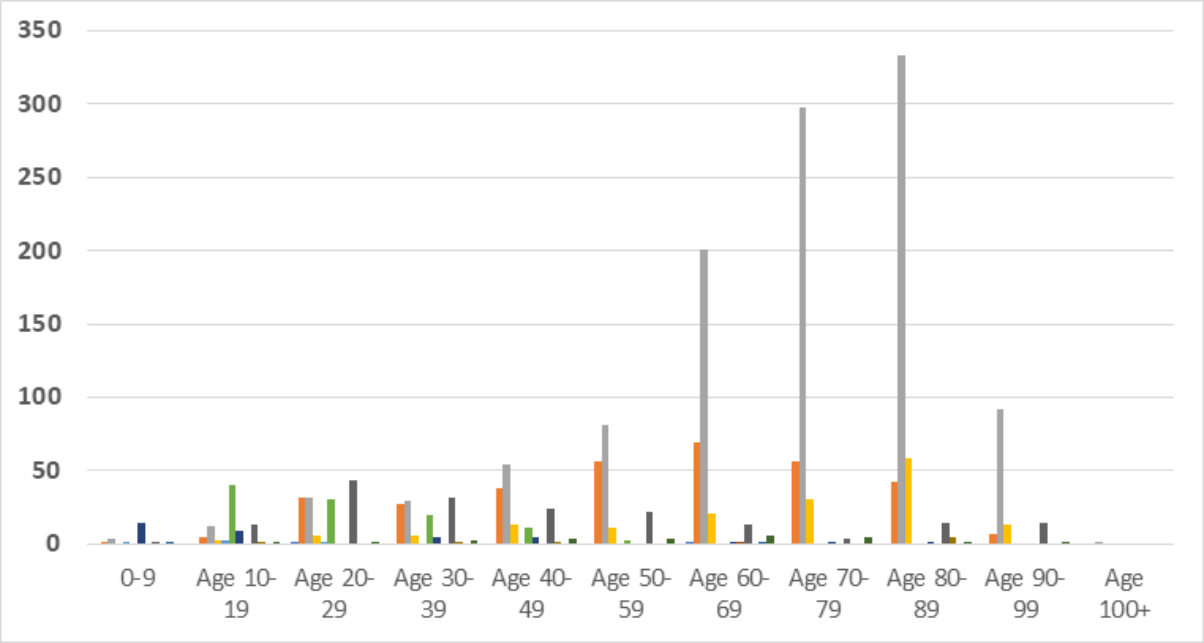



***Figure 11 Trips, slips and falls by age (2016-2019)***

Figure 12 summarises where in the transport network these incidents are occurring. While the greatest proportion of these non-motor vehicle injuries occur on footpaths (or "sidewalk"), a large

proportion of the remainder occur in the roadway itself although this is likely to include tripping over kerbs at the edges of the roadway.

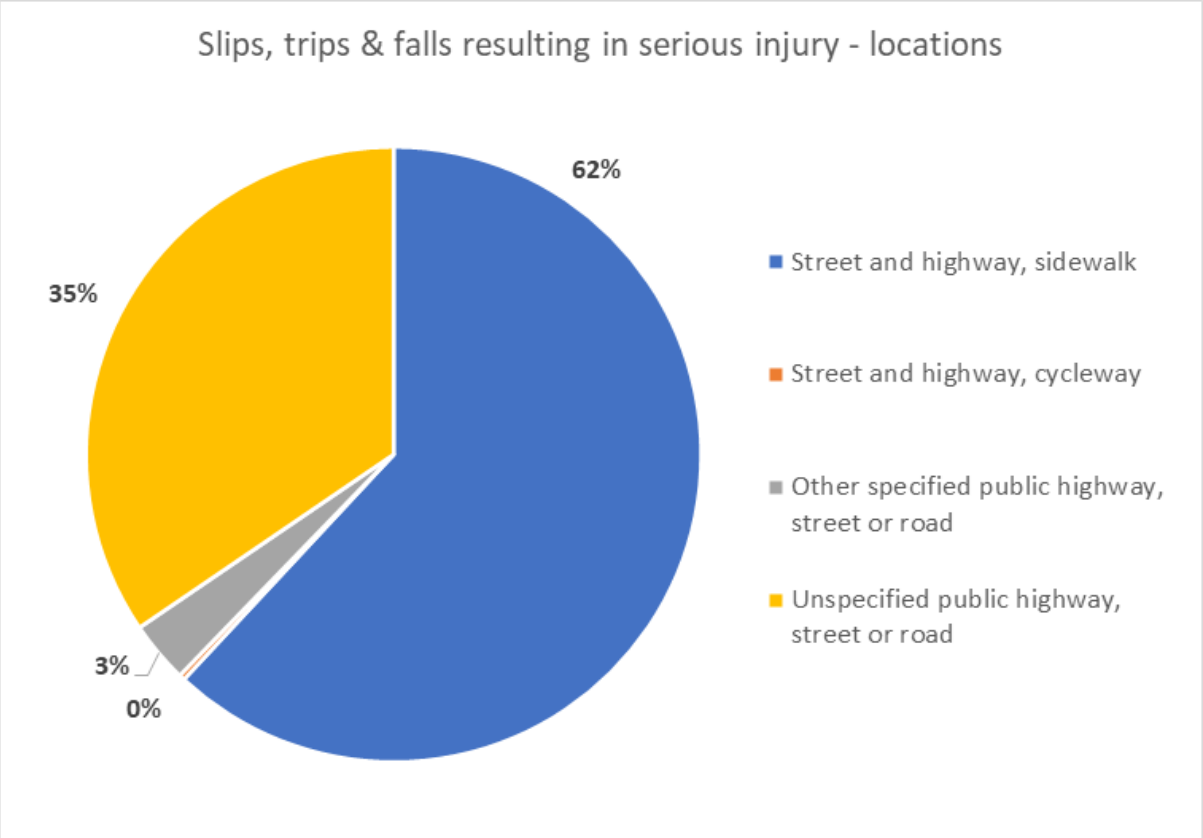



***Figure 12 Trips, slips and falls by location (2016-2019)***

## 2.4 Journeys by Transport Devices

The way people travel on Auckland's streets has changed over the last few years with the introduction of new ways of mobility. E-scooters, kick scooters, skateboards and other forms of micro-mobility have increased but, due to the way they are coded in the Crash Analysis System and that injuries resulting from a user-only crash are not typically reported in the system, there appears to only be a low number of crashes involving this type of road user.

However, the ACC data for the number of new claims for given transport types in Auckland registered between 1 January 2015 and 31 December 2020 is a lot higher – see Figure 13. Due to the way these are coded by ACC it is not possible to narrow down which of the scooter claims are strictly transport-related claims (for example, some may have occurred at recreational locations like skateparks). The same applies for skateboard injuries. It should also be noted that the scooter field is also populated with kick / non-powered scooters, but it is not clear if there are no motorised or moped scooters included in this field. Regarding e-scooters, it is not clear yet whether the drop in numbers in 2020 reflects the impacts of Covid-19 on travel behaviour, any slight lag in reported cases, or a settling down of injury patterns after the "novelty" effect of the initial public e-scooter launches in 2018-19 – all three possibilities may be contributing to the figures shown.

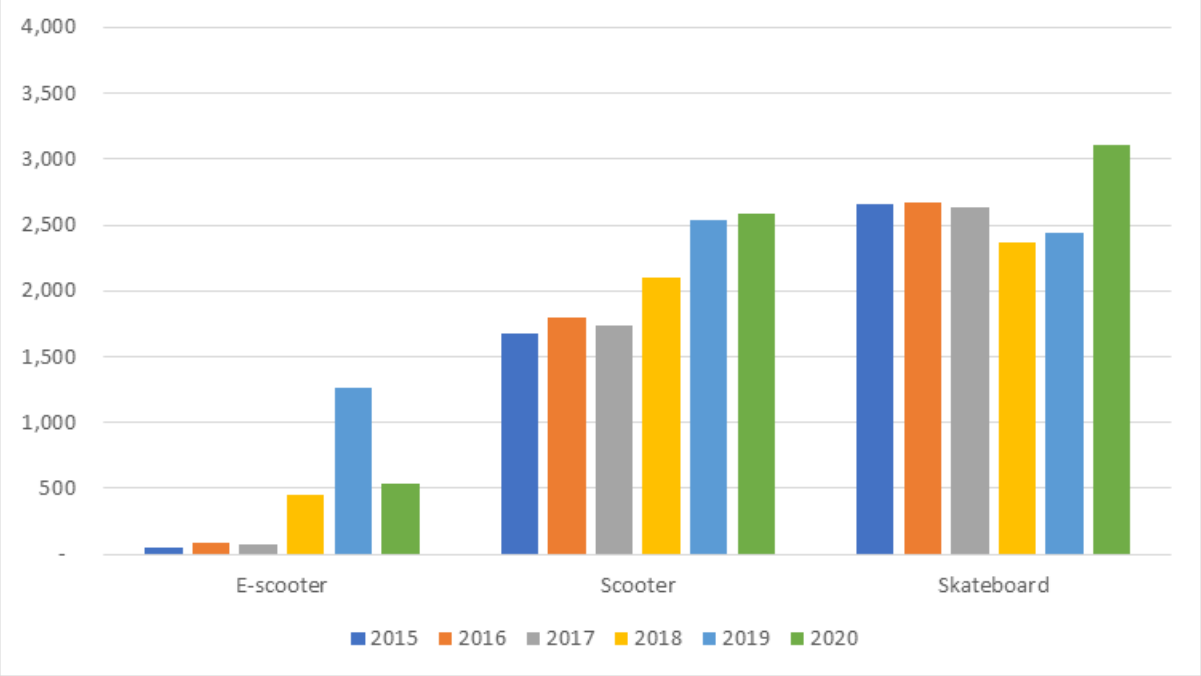



***Figure 13 New ACC claims involving scooters, skateboards and e-scooters***

Whilst the ACC data should therefore be used with caution, anecdotally the numbers of these types of devices has been increasing over the years as a mode of transport.

The CAS system when reviewed in detail does include some serious injury data of crashes involving these devices but the numbers are very small, as can be seen in Figure 14. In most cases, they involved a collision with a light motor vehicle (see Figure 14).

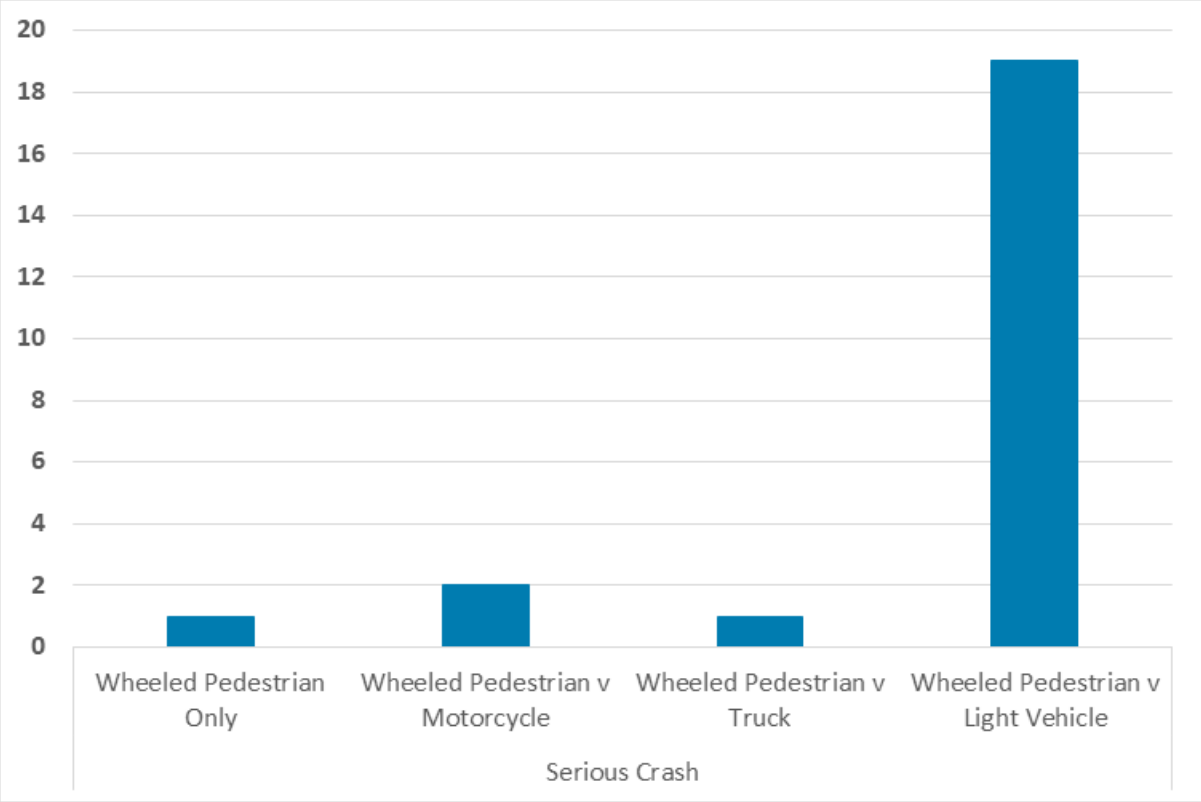



***Figure 14 Different transport devices involved in a serious crash (CAS)***

## 2.5 Cycling journeys

The improvements made for cycling in Auckland over recent times has seen an increase in users over the network. The Programme Business Case identified that improvements in safety and the perception of safety was needed to get Aucklanders to consider trying this mode of transport. There is some anecdotal evidence that more recreational cycling happened during the 2020 lockdowns in Auckland[4], albeit at the same time that commuter cycling was down. Figure 15 shows the trends in CAS-reported serious and fatal cycling injuries since 2015; although 2019 saw a notable drop in serious injuries that was countered by slightly more fatalities.

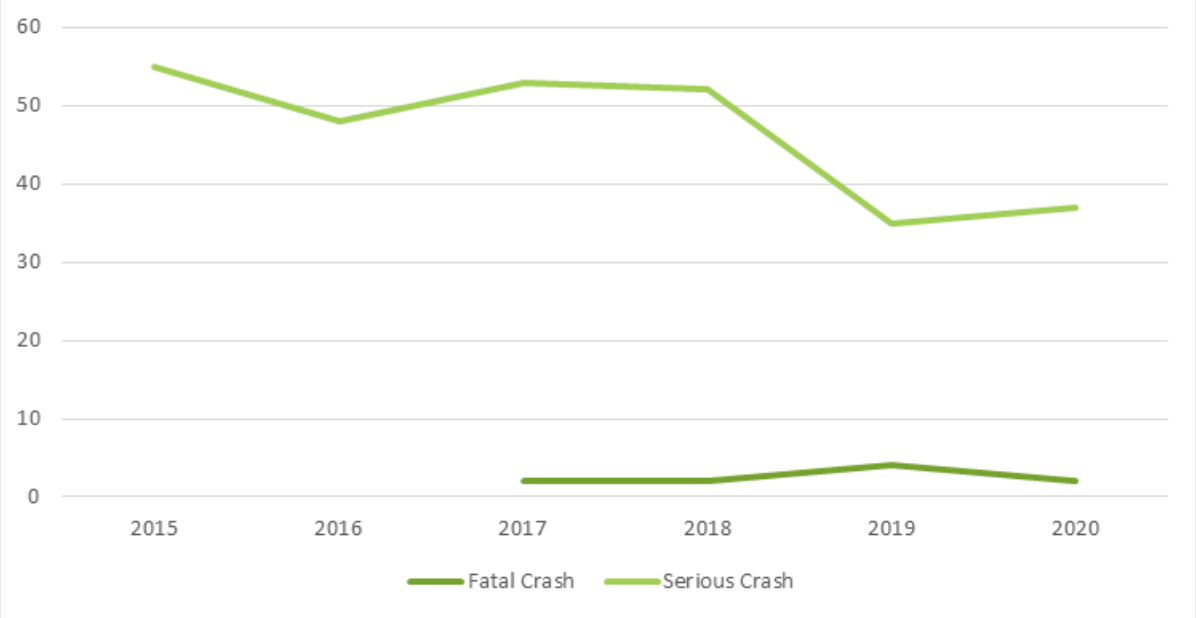



***Figure 15 Number of cycle crashes per year (CAS 2015-20)***

Crashes captured in CAS are dominated by light vehicles (over 80% of serious injuries as seen in Figure 16). However, albeit from a small sample but reflective of the trends nationwide, a greater proportion of fatalities involve heavy vehicles (especially trucks) or are cycle-only crashes.

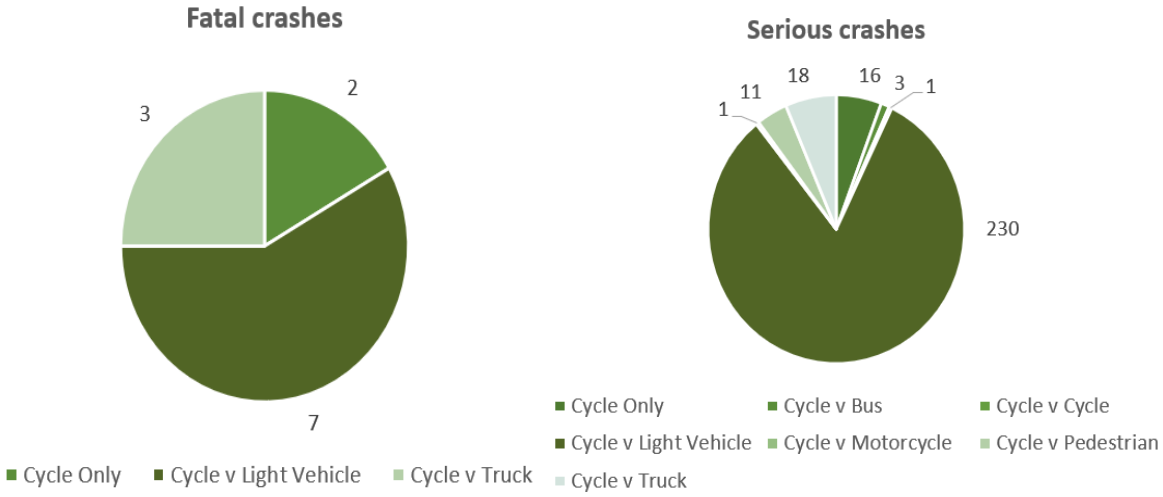



***Figure 16 Vehicle crash involvement for cyclists***

[4] See https://www.bikeauckland.org.nz/the-big-backyard-bike-count-report-local-revolutions-in-lockdown/

As noted previously, CAS under-reports a large number of cycle crashes, especially those not involving a motor vehicle. Analysis of the MoH hospitalisation data reveals less changing trends across this larger set of casualties, as shown in Figure 17. It is notable that there appears to be less obvious change in overall casualty numbers throughout this period.

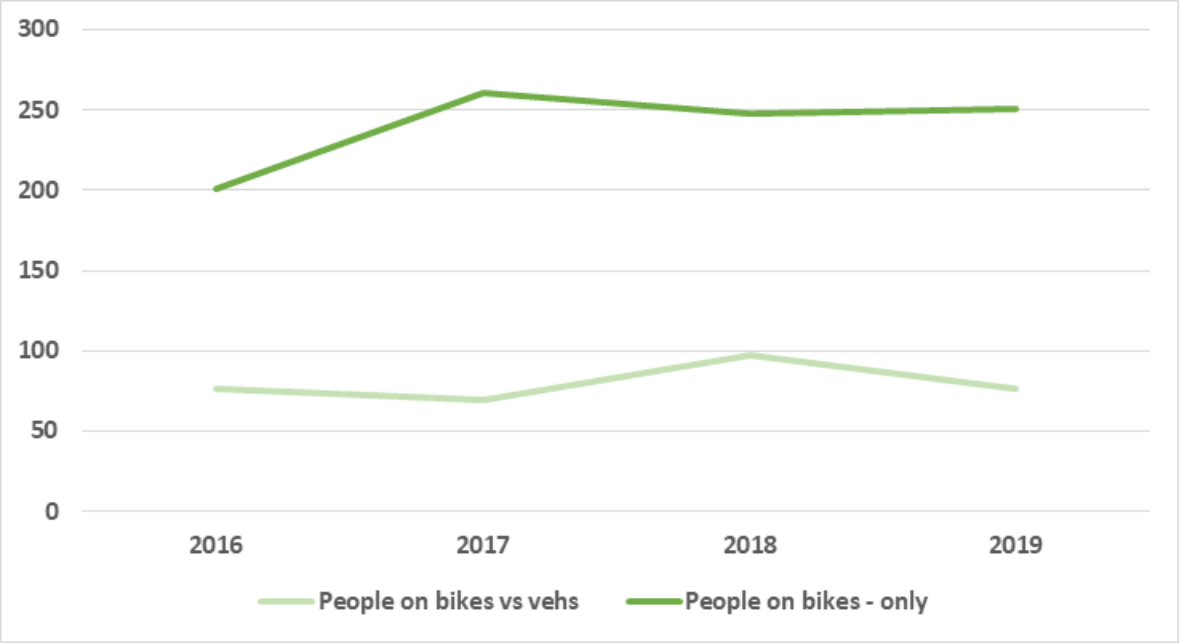



***Figure 17 Number of overnight cycling hospitalisations as recorded by MoH (2016-19)***

## 2.6 Motorcycle Journeys

The number of crashes involving motorcycle journeys has actually been declining when looking at the data from CAS. However, when looking at the MoH information, the trend is less clear about a notable decline.

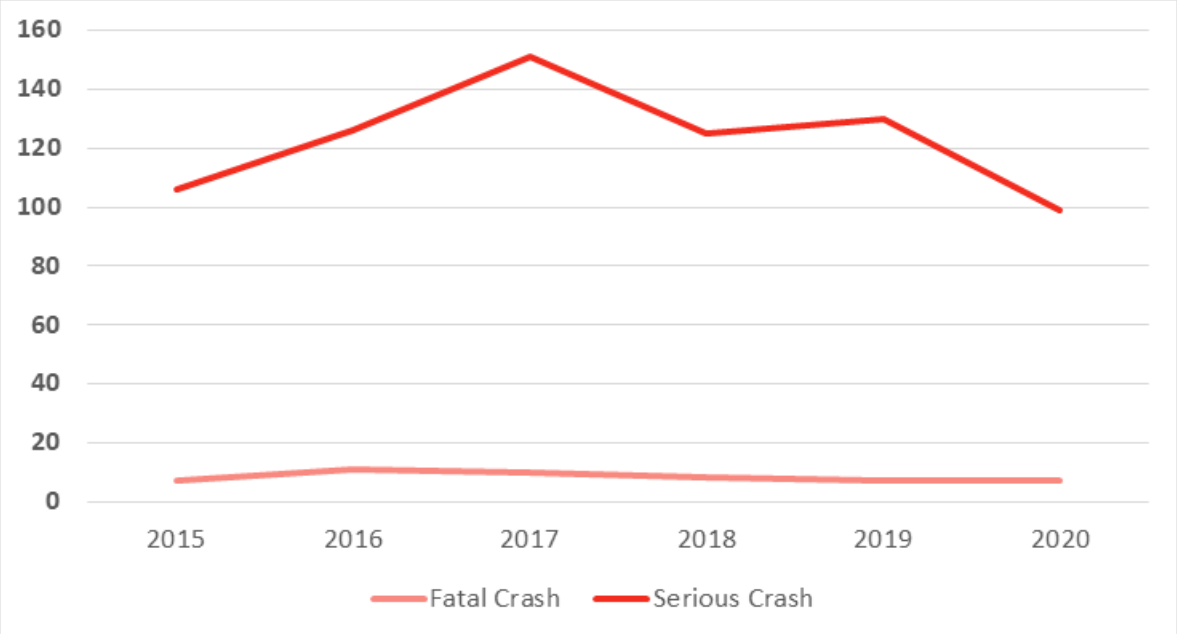



***Figure 18 Number of crashes per year involving motorcycles (CAS)***

A key difference with motorcycle crashes over other VTU crashes is that motorcycle-only crashes are more likely to be captured in CAS because they involve a motor vehicle (i.e. the motorcycle). Therefore, although there is still under-reporting in CAS, approximately one-quarter of recorded serious and fatal motorcycle crashes involve no other vehicle (e.g. motorcyclist lost control on a curve) – see Figure 19.

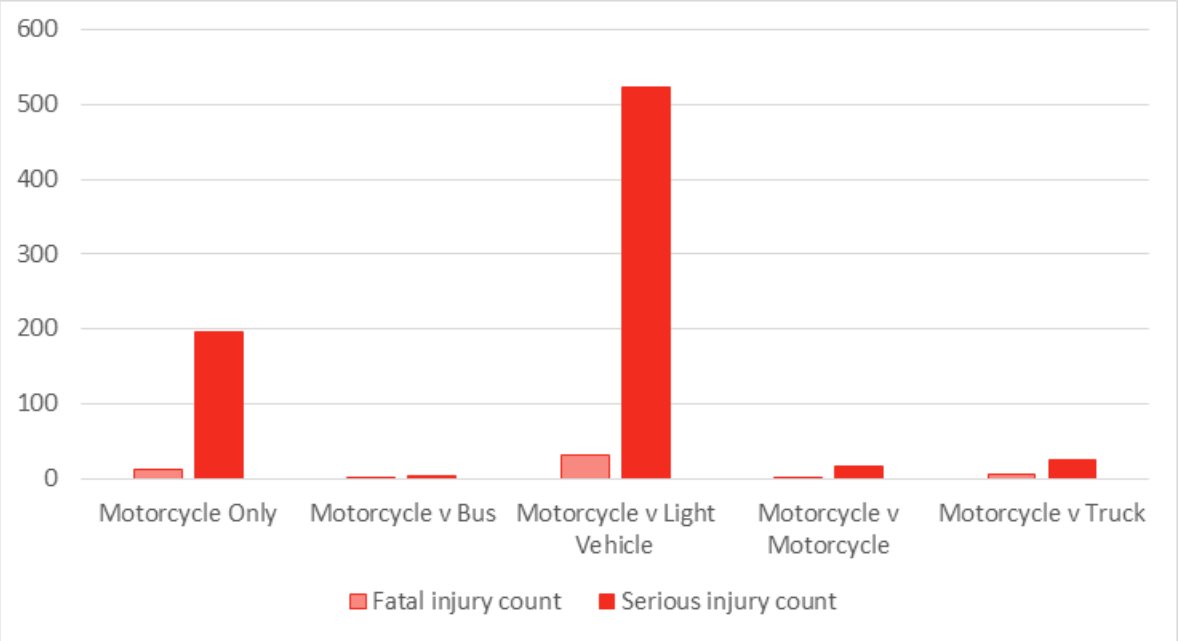



***Figure 19 Motorcycle injuries by crash with vehicle type (CAS 2015-20)***

Again, MoH hospitalisation data paints a somewhat different story, with relatively little change in casualty numbers over time, as shown in Figure 20. The MoH data also highlights a much greater proportion of motorcycle crashes not involving another motor vehicle.

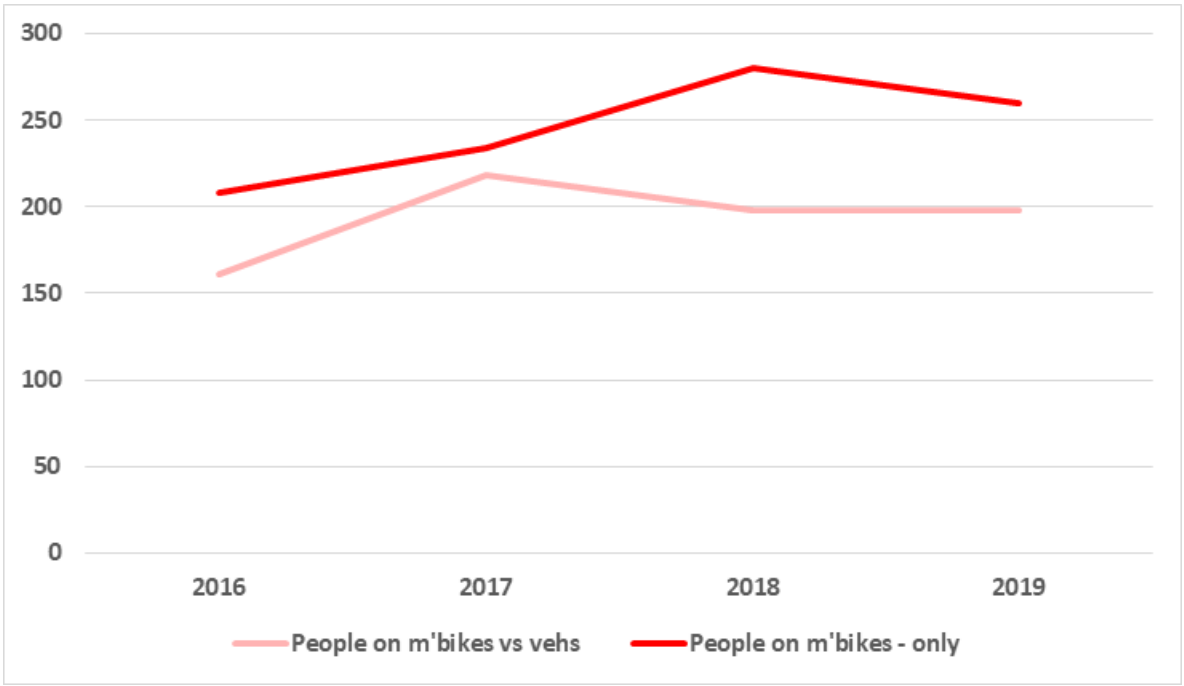



***Figure 20 Number of overnight motorcycling hospitalisations as recorded by MoH (2016-19)***

## 2.7 Effects of COVID-19 lockdowns

One complicating factor for the 2020 safety data was the presence of two Level 3-4 lockdown periods in Auckland during the year (Level 4: 25 Mar – 27 Apr; Level 3: 28 Apr – 13 May, 12 Aug – 30 Aug). These had the effect of significantly reducing overall traffic volumes around the city, with evidently a flow-on effect to crash patterns. Public transport usage in Auckland was also down during these periods, which would have also affected "first/last mile" journeys on foot or other wheeled devices. Interestingly, while walking and cycling journeys to major generators such as the central city and other town centres and learning institutions were generally down, the reduced traffic in suburban areas and enforced periods of lockdown at home saw large increases in the use of active modes in these areas.

Some analysis of travel patterns during the COVID-19 lockdowns[5] noted a fall in typical Auckland weekday traffic volumes of 80%. Public transport patronage fell even more during full lockdown and even returning to Level 1 has seen an ongoing reduction of 20-30% using PT. The analysis that the initial lockdown period last March-May may have been a factor in saving up to seven deaths and approximately 80 serious injuries in the district. However, the lack of traffic may have increased travel speeds and as a result also the fatality rate for VTUs. Some analysis suggests that the DSIs per veh-km travelled in Auckland was over twice the normal rate during the initial lockdown.

COVID aside, it should be noted that another complicating factor when considering 2020 safety data in this analysis is the relative lag in reporting of the relevant information through official channels such as the Police and hospitals. Certainly, it is not expected that the data provided through the likes of CAS, ACC and the Ministry of Health contains a complete set of all incidents towards the latter part of the year. For this reason, some of the following analyses only consider the years 2015-19 in their analysis.

## 2.8 Comparison with other cities

The *Safer City Streets: Global Benchmarking for Urban Road Safety*[6] document aims to support cities in setting road safety targets and to monitor progress in improving urban road safety. It places a particular attention on measuring the risk of fatality per unit distance travelled.

The document states that in most cities:

*"…the proportion of vulnerable road users (VRUs) in the total number of fatalities is high* {Figure 21 of this report}*. The median is close to 80% and figures range from 36% to more than 90%. Vulnerable road users make up 85% of fatalities in high-density cities, those with over 10 000 inhabitants per square kilometre. In cities where the population density is lower than 5 000 inhabitants per square kilometre, VRUs still make up two thirds of road fatalities. It is remarkable that much of the difference can be attributed to the lower share of powered-2-wheeler fatalities in low-density cities. Pedestrians and cyclists together still make up 50% of fatalities in low density-cities."*

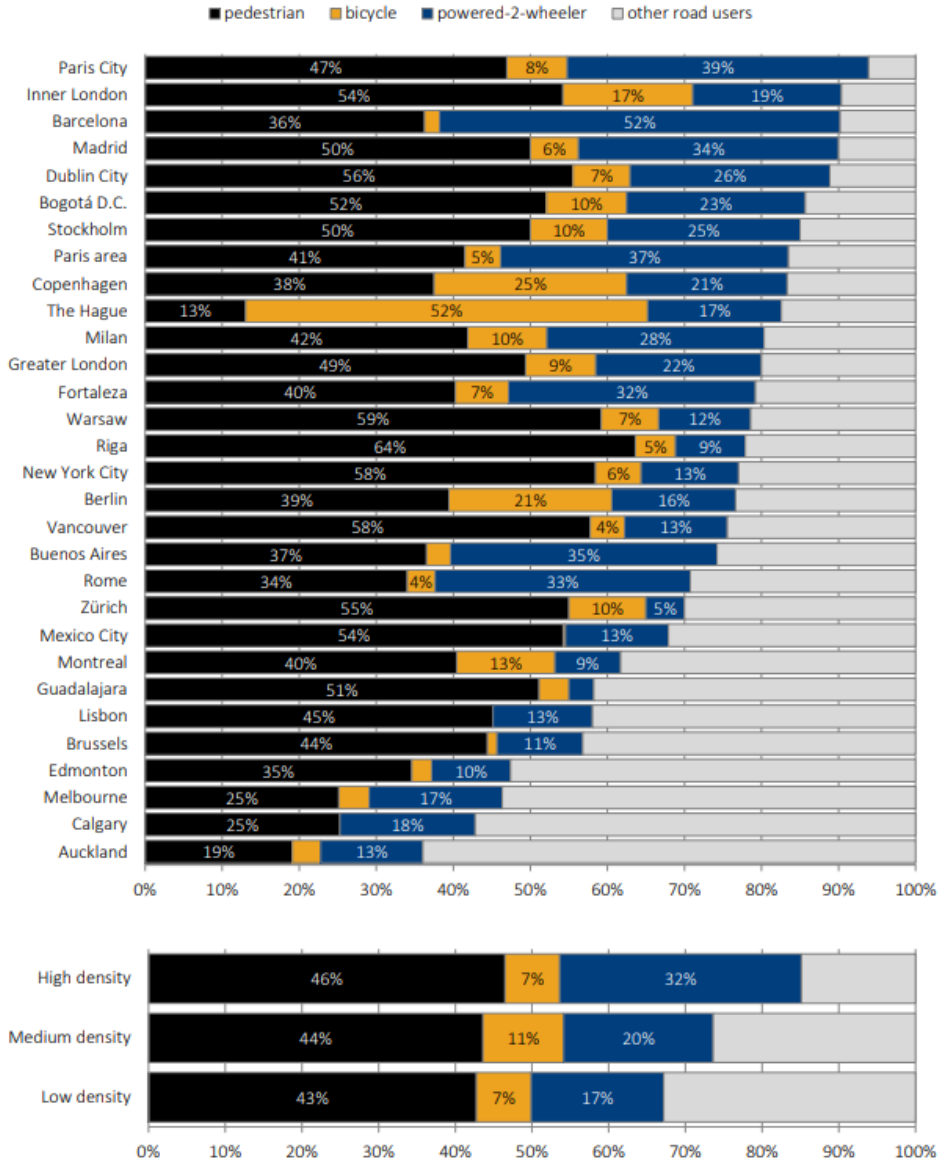
The differences in fatalities across various global cities can be seen in Figure 21; it is quite notable how low the relative proportion of VTU deaths is in Auckland, although that is likely to reflect relative modal usage rather than relative safety of these modes.

To compare the fatality risk across modes of transport, the authors assembled a comprehensive dataset covering five modes of transport in five cities: Auckland, Barcelona, Berlin, London and Paris. Figures for each city and each mode are provided in Table 1, along with the median risk across all five

[5] Colin Brodie Consulting (2020), "What does Covid-19 mean for Transport Safety?", report for Auckland Transport, 29/5/20

[6] https://www.itf-oecd.org/safer-city-streets-global-benchmarking-urban-road-safety

cities. The risk of fatality is four times higher when riding a powered-two-wheeler than when riding a pedal cycle over the same distance. The risk of fatality is ten times higher on foot than in a passenger car travelling the same distance. Travelling on board a bus is an order of magnitude safer than all other modes of travel.




Note: low population density (n=12) is less than 5 000 inhabitants per square kilometre, medium (n=13) is less than 10 000, high (n=5) is 10 000 and above. Where cities are grouped, we represent the unweighted average across n cities in the group

***Figure 21 Modal shares of road fatalities 2013-15 (Figure 6 from Safer City Streets)***

***Table 1 Number of fatalities per billion passenger-kilometres (Table 3 from Safer City Streets)***

| City | Bus | Passenger car | Pedal cycle | Pedestrian | Powered-2-wheeler |
|---|---|---|---|---|---|
| **Auckland** | 0.4 | 1.9 | 24 | 35 | 161 |
| **Barcelona** | 0.0 | 0.7 | 10 | 14 | 22 |
| **Berlin** | 0.0 | 0.5 | 6 | 13 | 28 |
| **Greater London** | 0.2 | 1.4 | 15 | 17 | 97 |
| **Paris area** | NA | 1.4 | 11 | 12 | 45 |
| **Median** | 0.1 | 1.4 | 11 | 14 | 45 |

# 3 Understanding the Causes behind the Problem

## 3.1 Walking journeys

People walking are most commonly hit when crossing the road, as this is when they are generally exposed to conflict. This is the case here in Auckland with the most common crash type being N-Pedestrian Crossing with some P-Pedestrians Other also featuring in the most common conflict types as shown in Figure 22.

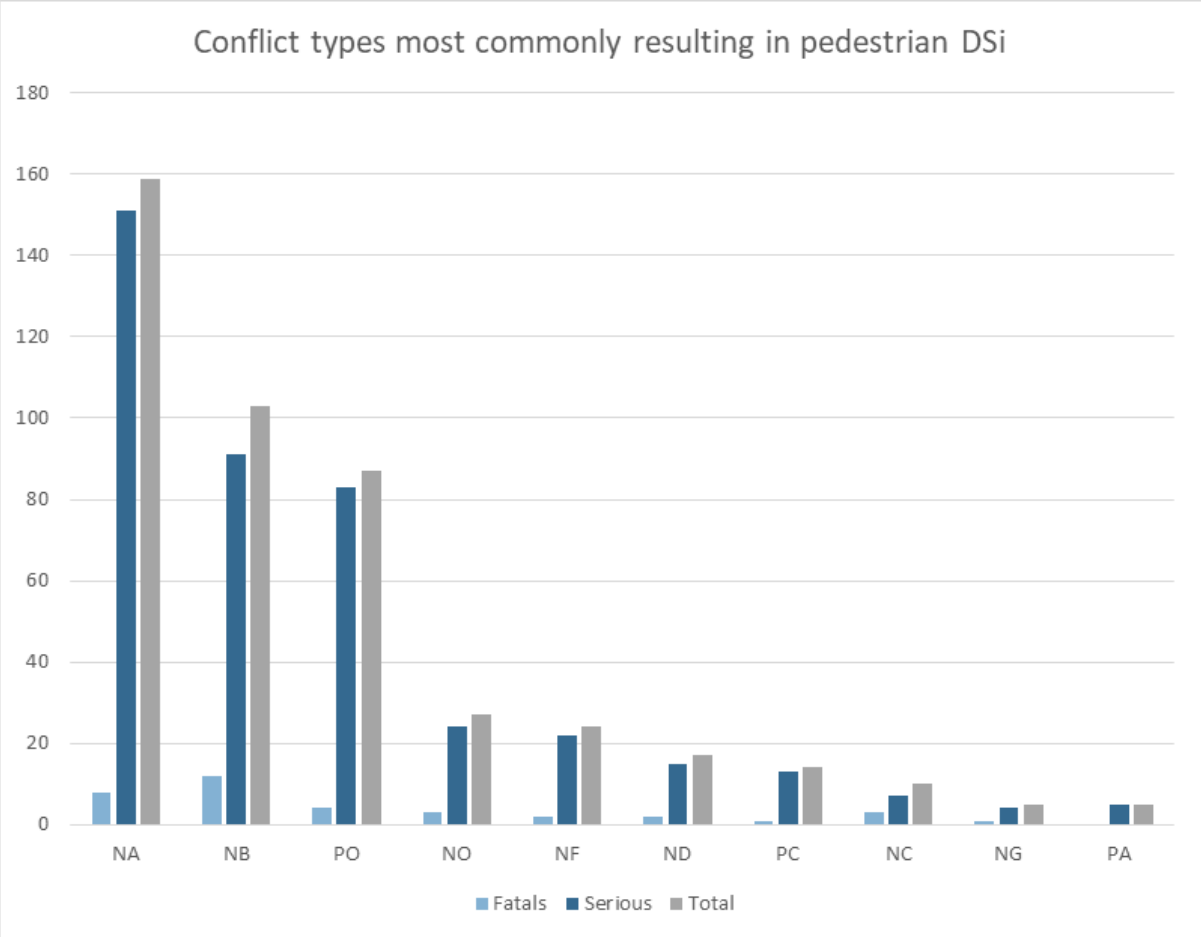



***Figure 22 Conflict types most commonly resulting in pedestrian DSi (CAS 2015-20)***

***Table 2 Details of different crash movement codes***

| | TYPE | A | B | C | D | E | F | G | O |
|---|---|---|---|---|---|---|---|---|---|
| N | PEDESTRIANS CROSSING ROAD | LEFT SIDE | RIGHT SIDE | LEFT TURN LEFT SIDE | RIGHT TURN RIGHT SIDE | LEFT TURN RIGHT SIDE | RIGHT TURN LEFT SIDE | MANOEUVRING VEHICLE | OTHER |
| P | PEDESTRIANS OTHER | WALKING WITH TRAFFIC | WALKING FACING TRAFFIC | WALKING ON FOOTPATH | CHILD PLAYING (INCLUDING TRICYCLE) | ATTENDING TO VEHICLE | ENTERING OR LEAVING VEHICLE | | OTHER |

It is also clear that the majority of crashes are occurring on the 50 km/h streets (see Figure 23), predominantly as this speed limit operates on a large proportion of the network. The higher number of serious crashes occur at intersections for both serious and fatal injury crashes.

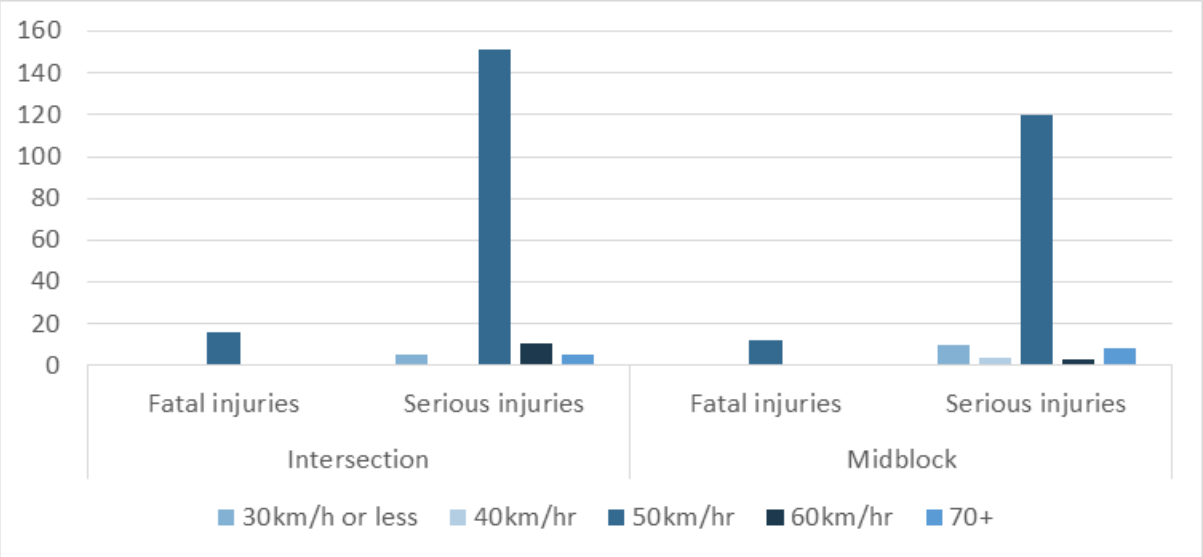



***Figure 23 Location and speed of conflict locations (CAS data 2015-20)***

In mid-block locations the main crash type is pedestrians being hit by a vehicle when crossing the road followed by 'other' type crashes (see Figure 24). A further data dive would be required to fully understand the 'other' category.

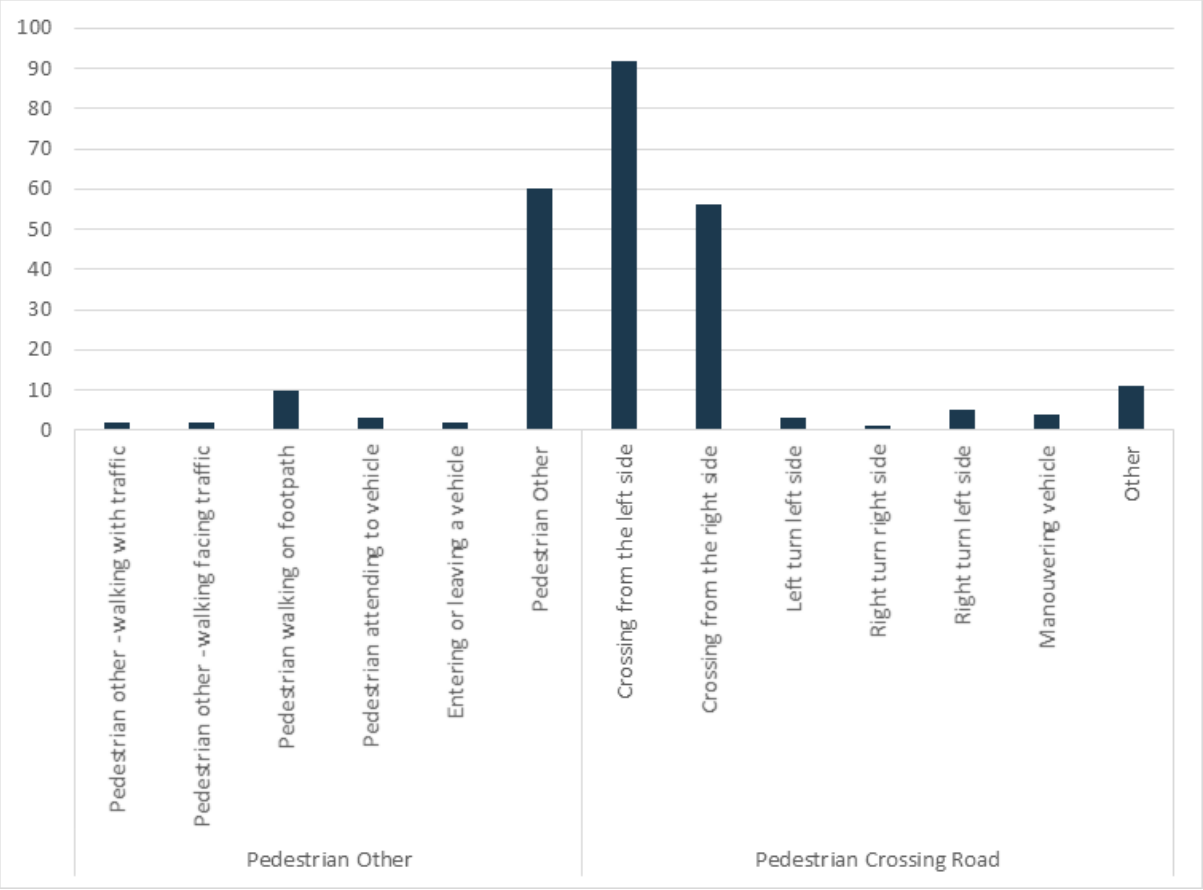



***Figure 24 Pedestrian crash types at mid-block locations***

Crashes involving pedestrians crossing the road can be broken down further using the different types of road marking recorded in CAS (see Figure 25):

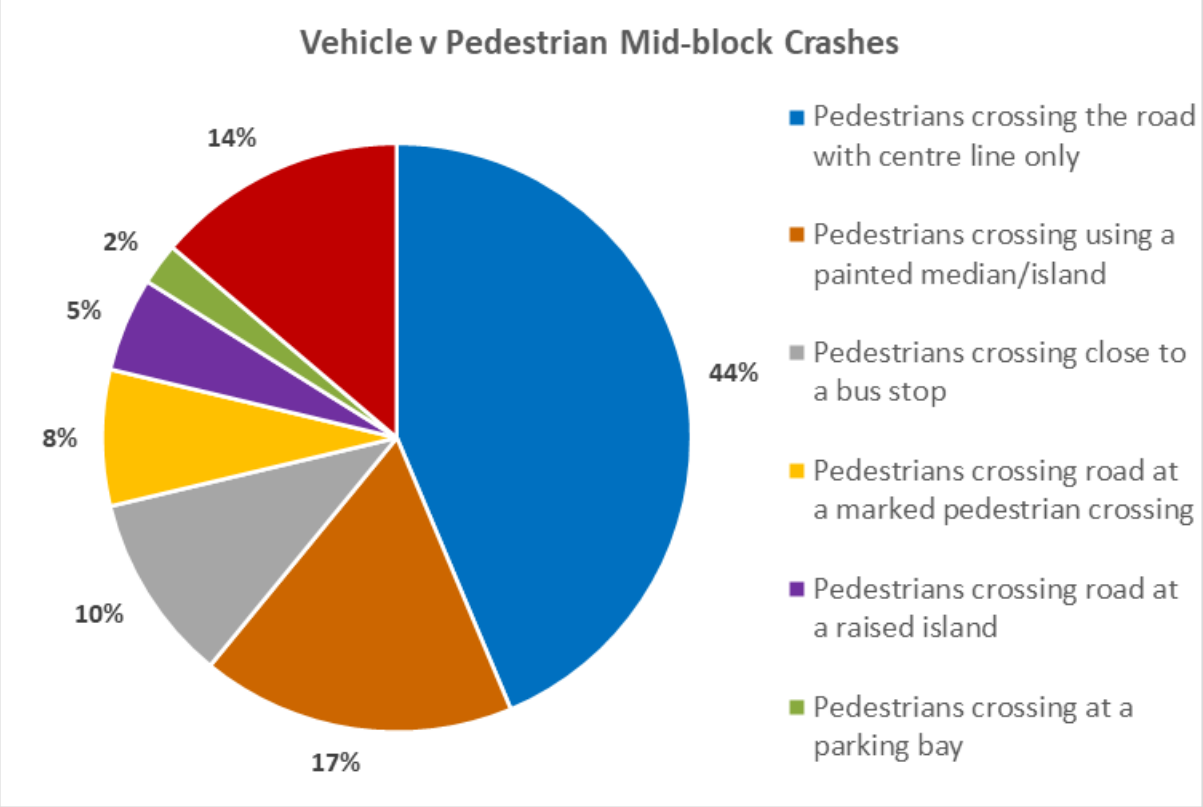



***Figure 25 Pedestrian crashes occurring at mid-block locations when crossing the road (CAS 2015-20)***

When looking at the above figure and after a brief look into the crash descriptions the reasons for the collisions could be associated with the following:

- Lack of pedestrian crossings or not in locations where pedestrians want to cross.
- People waiting on centre lines and medians to cross being hit by turning vehicles or drivers using the lane in congested conditions.
- Pedestrians crossing mid-block multi-lane roads (sometimes running across) when traffic in a lane is stationary, but traffic is moving in adjacent lane.
- Walking out into the road after getting off a bus.
- Crossing with limited visibility if crossing from between parked vehicles or stopped buses.
- At pedestrian crossings
    - Impatient drivers at congested times
    - Lack of good lighting
- Visibility - Sun strike, lack of street lighting.

To fully understand the causes behind the 250 crashes (approx.), a further deep dive would be required.

In terms of intersection locations, the greatest number of crashes have occurred at give-way controlled intersections (see Figure 26).

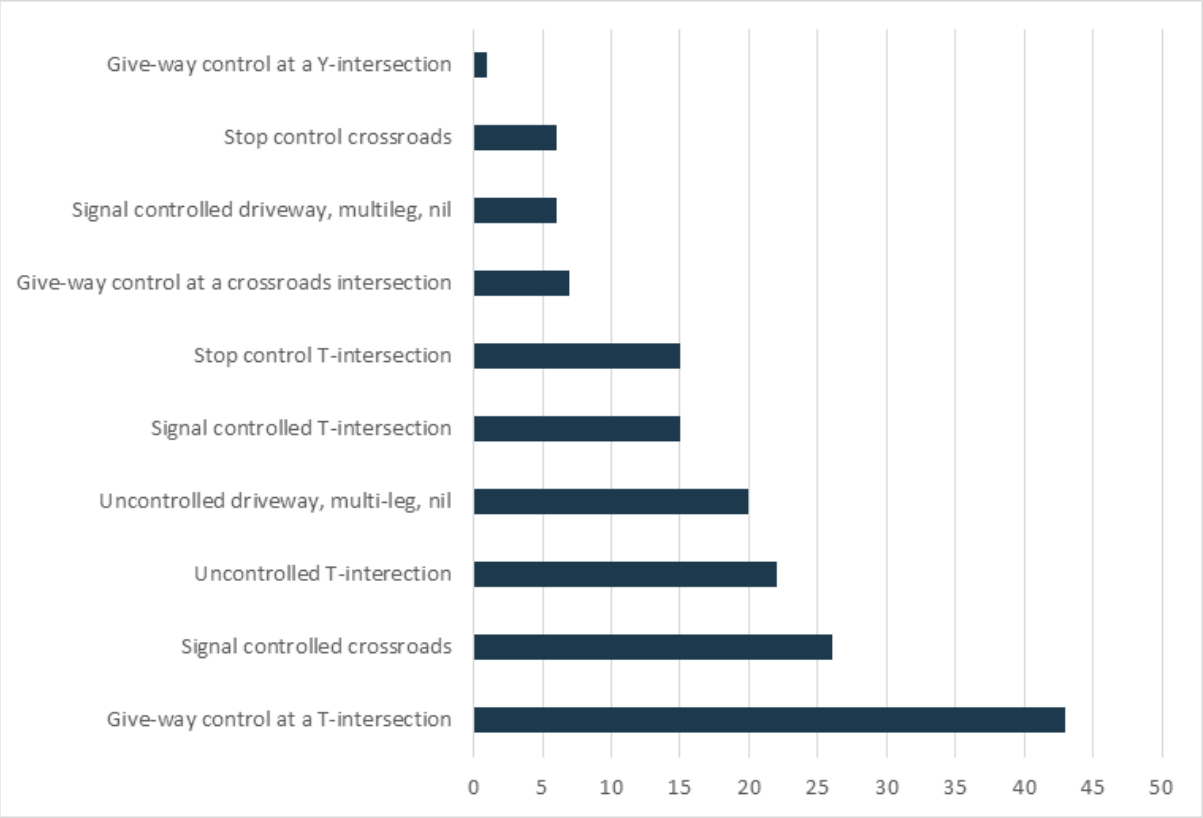



***Figure 26 Pedestrian crashes occurring at different types of intersection with different controls (CAS 2015-20)***

When looking at intersections that are controlled by traffic signals some of the following causes/factors were identified:

- Pedestrians crossing on green man and being hit on crossing
  - Turned on red arrow
  - Didn't see pedestrian
  - Pedestrian still crossing when green arrow has lit
- Pedestrians crossing against red signal
- Children running into the road, Pedestrians running at crossings
- Crossing between waiting vehicles close to signals or just away from the lights and being hit by vehicles exiting the intersection.

Figure 27 summarises the distribution of pedestrian crashes by AT board area. It is likely that, with the higher proportion of walking trips, there is a higher proportion of fatal and serious crashes involving pedestrians in the Waitematā Board with other higher proportions of crashes occurring in more southern areas of Ōtara-Papatoetoe and Manurewa, and the inner suburb of Albert-Eden.

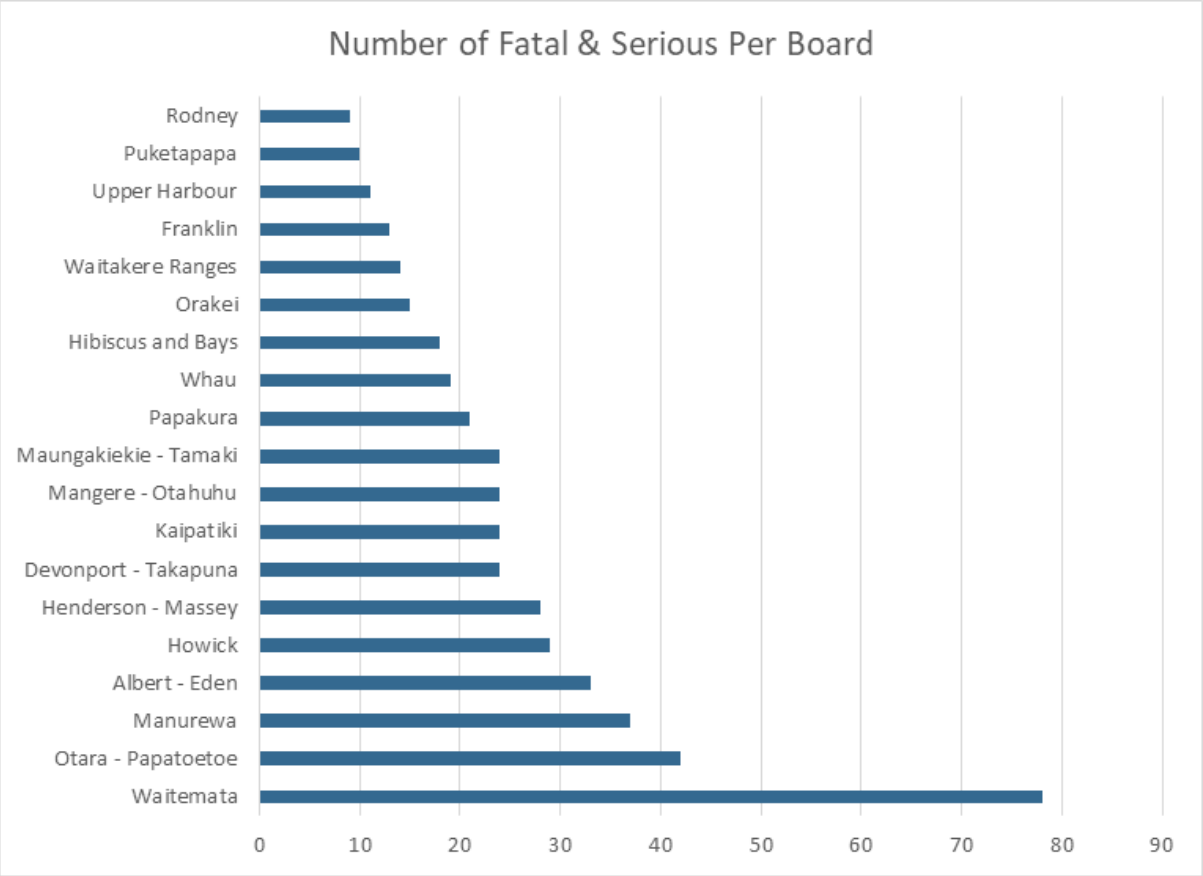



***Figure 27 Number of pedestrian crashes across Auckland boards (CAS 2015-20)***

## 3.2 Micro-mobility journeys

There is insufficient evidence in the CAS crash information to really understand the issues around collisions involving transport devices. We understand that a separate micro-mobility safety study is underway that may help to address this question.

## 3.3 Cycling journeys

With the greatest number of trips by active mode being within Waitematā it is not unexpected that this is where most collisions have occurred over the past five years (see Figure 28). Given the proximity of inner board areas such as Albert-Eden, Devonport-Takapuna, and Ōrākei, and being within an acceptable range for a bicycle commute (perhaps involving an additional mode such as a ferry) to central city again it is not unexpected that these areas have also seen higher numbers of cycle collisions.

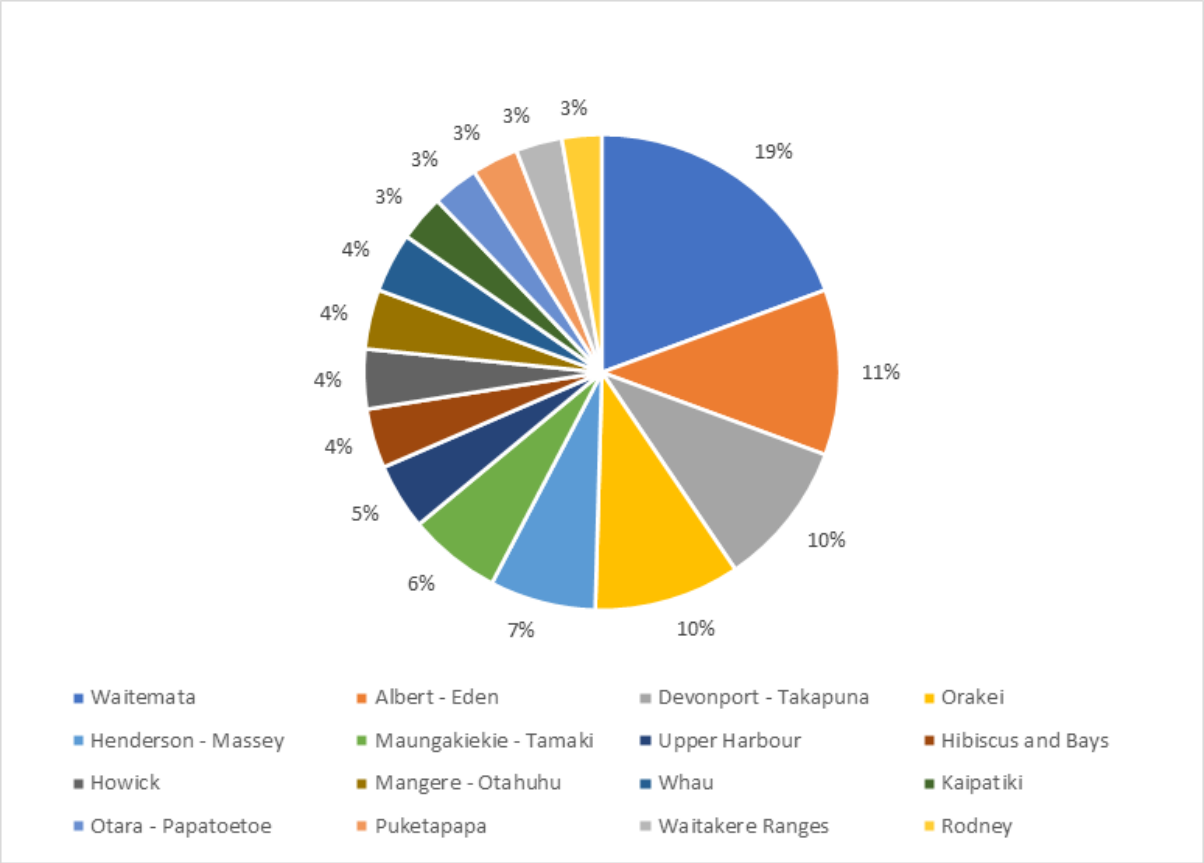



***Figure 28 Proportion of cycle crashes across Auckland boards (CAS 2015-20)***

In reviewing the data, there were a high proportion of cycle-only crashes. On further review:

- 18 crashes
  - 3 fatal (alcohol/drugs & possible medical) and 15 serious
- All loss of control
  - 7 on a bend and 11 on straight road
- Gradient
  - 13 on hill road, 4 on the flat, 1 not specified

Factors contributing to the crash involved:

- Alcohol or drug impaired (4)
- Speed
- Lost control downhill hit object
- Lost control downhill rider distracted

Not wearing helmet

- E-bike rider with pillion

Not wearing helmet

- Medical event

Interestingly, the MoH data also suggests that collisions with heavy vehicles do not make up a large proportion of the cycle crash numbers, with only 9% of captured collisions with motor vehicles involving a heavy vehicle. Nevertheless, heavy vehicles are invariably undertaking commercial activities, and workplace safety is a growing focus in New Zealand; section 4.2 discusses this further.

## 3.4 Motorcycling journeys

With motorcycles it is important to understand the locality of the crash and the nature of the speed environment as the outcomes of a collision involving a motorcycle are likely to be very different in an urban environment and rural environment.

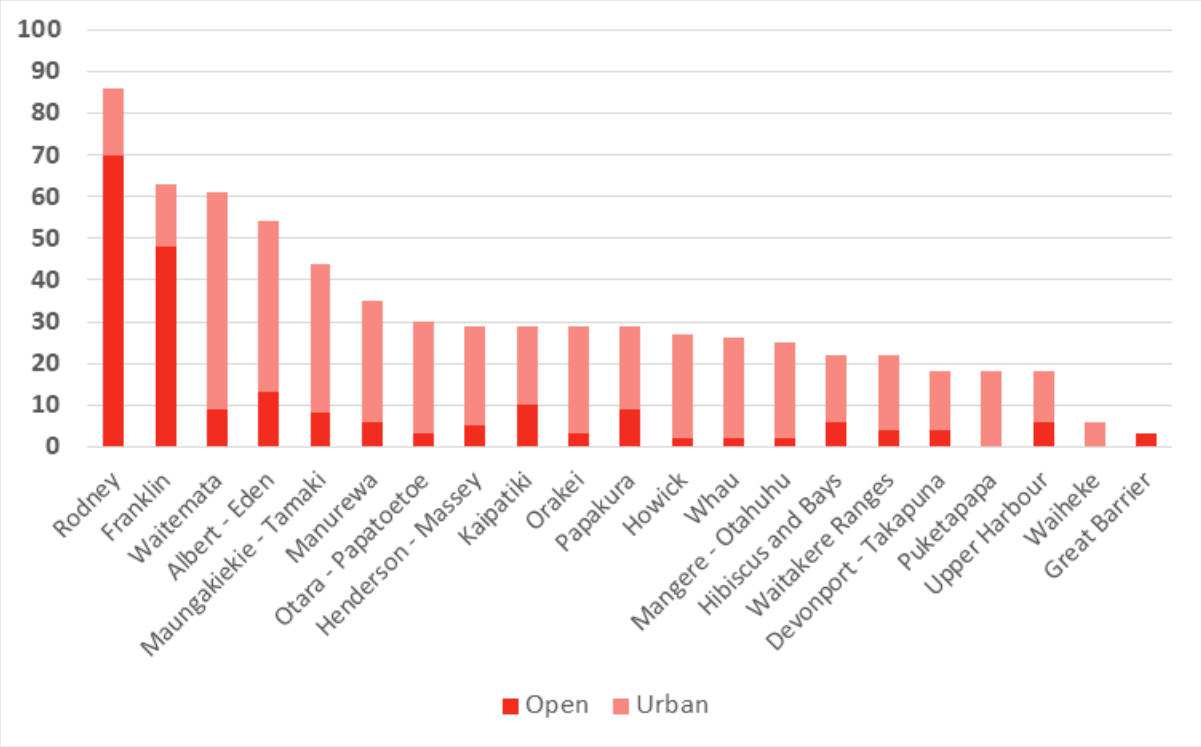



***Figure 29 Number of motorcycle crashes across Auckland boards (CAS 2015-20)***

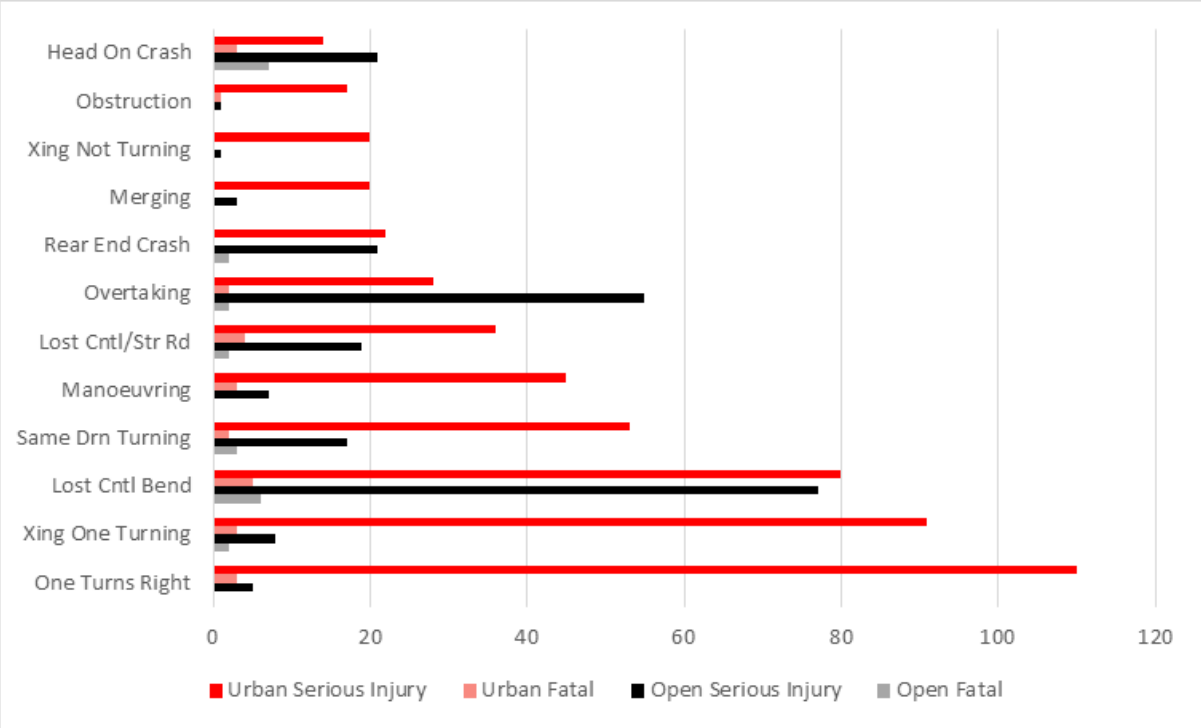



***Figure 30 Motorcycle crash types at different locations (CAS 2015-20)***

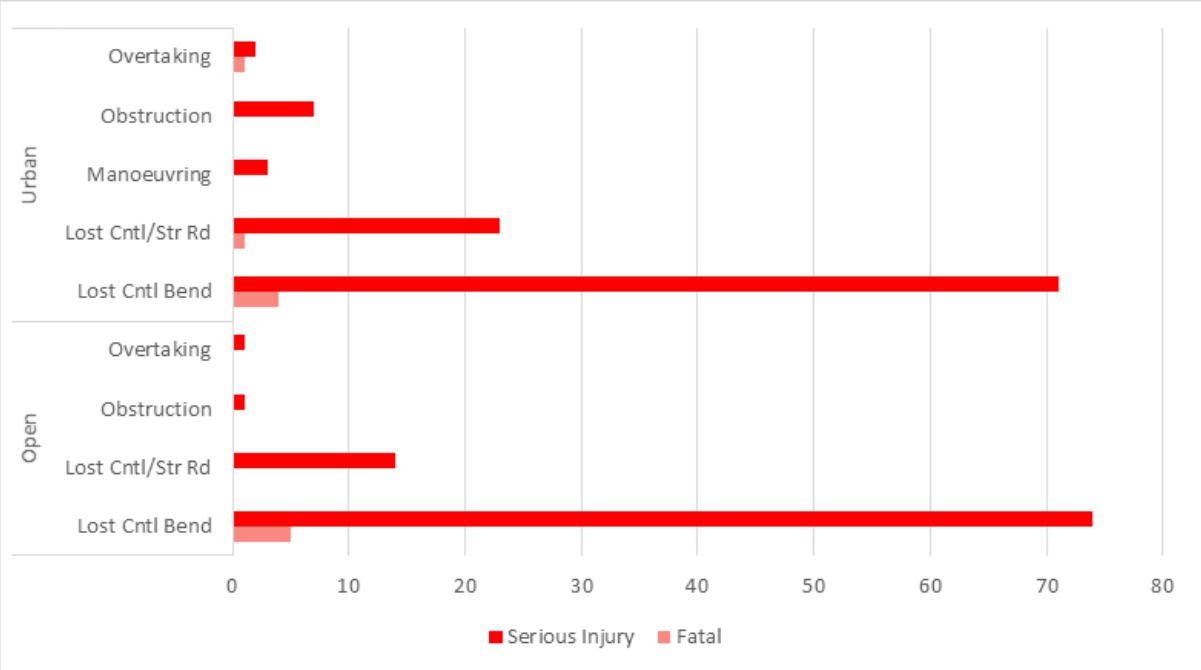



***Figure 31 Types and location of motorcycle only crashes (CAS 2015-20)***

It is not unexpected that a large number of crashes involving motorcycles occur in boards that have large rural networks that are well used by motorcycle riders (see Figure 29); likewise it is not unexpected to see Waitematā high on the list but this is likely to be more due to the increased number of conflict risk in a dense urban area. Although speeding isn't an issue in these rural areas in terms of exceeding the posted speed limit, it could be more accepted that the rider is approaching a bend at an inappropriate speed (or advisory signage missing etc).

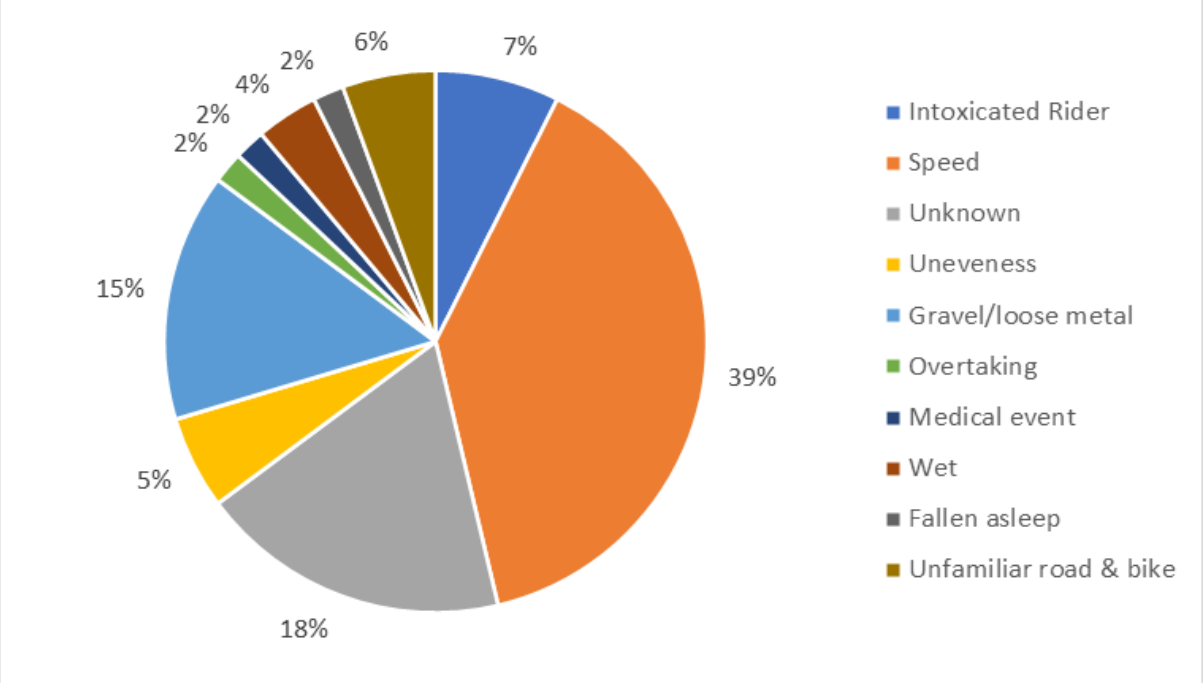



***Figure 32 Contributing factors to open road loss of control motorcycle crashes (CAS 2015-20)***

## 3.5 Systemic causes

Whilst not necessarily always the cause of a collision, the impact of a higher-speed crash is more likely to create serious injury or fatality. Interestingly, relatively few crashes involving active travel modes have "speed" cited as a contributing factor (typically less than 5% of pedestrian/cycle crashes, compared with over 20% for serious/fatal motor vehicle crashes). Although part of that could be explained by the relative urban/rural mix of each group of crashes, there appears to be a systematic bias in recording speed against walking and cycling crashes. In many cases, while the actual impact speed may technically not be exceeding the current speed limit it is often too fast for a safe interaction with a VTU.

When analysing posted speed limits against calculated "safe and appropriate speeds" from Waka Kotahi's MegaMaps tool, it is clear that existing speeds are still too high for much of the road network, even after the first tranche of speed limit changes in 2020. Table 3 summarises the respective breakdowns of the appropriateness of current speed limits within Auckland. This is particularly an issue on more minor parts of the road network (i.e. collector and local streets) where the proportion of road length with existing posted limits too high is often over 90%.

***Table 3 Proportion of Auckland road network (km) that has inappropriate speed limits***

| Speed limit is… | …Correct | …Too High | …Too Low | Total |
|---|---|---|---|---|
| High-speed roads | 423.1 km (14.2%) | 2435.5 km (81.8%) | 117.3 km (3.9%) | **2975.9 km** |
| Urban roads | 1808.5 km (37.3%) | 2871.6 km (59.2%) | 172.7 km (3.6%) | **4852.7 km** |
| Total network | 2231.5 km (28.5%) | 5307.0 km (67.8%) | 290.0 km (3.7%) | **7828.6 km** |

If the current speeds are maintained, it is likely to result in more deaths and serious injuries on the network for VTUs and likely to continue to be a barrier for people to want to try using active modes as transport environments will continue to remain hostile and inaccessible. Therefore it would be useful to identify when a road where a VTU crash has occurred is currently posted with too high a speed limit.

# 4 Understanding the ongoing impacts

## 4.1 Changes in user numbers

Currently Auckland Transport has some objectives to reduce DSIs by ~60-70% between 2018 and 2028. Although not entirely clear from the PBC, it is assumed that VTU casualty numbers are expected to reduce (in absolute terms) by a similar proportion. However, at the same time there is a considerable push to increase the use of active modes within Auckland; external factors have also seen a considerable rise in use of transport devices like e-scooters (both public and privately owned). A similar planned growth in patronage across the city's public transport network is also likely to see accompanying growth in "first/last mile" journeys to and from transport stops.

While this growth in sustainable transport modes is to be welcomed, there is a very real likelihood that it will be accompanied by a growth in casualty numbers for these modes, even if efforts are made to improve the environment for travelling using these means. As a comparison, the Netherlands (generally agreed as the safest place internationally to cycle on a per-km basis) still see approximately 200 cycling deaths a year[7] (compared with the NZ average of 10 a year). Therefore if, hypothetically, the amount of cycling in Auckland doubled and the number of DSIs increased by only 50%, the resulting 25% reduction in per-km casualty rate may not be considered a "success" due to the absolute increase in casualty numbers. This is despite the fact that the additional people cycling are likely to be gaining considerable improvements to their personal health.

This dilemma suggests that Auckland Transport may need to consider other performance metrics to better reflect the overall "life mortality costs" of any intervention. For example, a 2011 paper[8] found that shifting 5% of short urban vehicle-kilometre trips in New Zealand to cycling would result in about 116 deaths avoided annually as a result of increased physical activity, six fewer deaths due to local air pollution from vehicle emissions, but an additional five cyclist fatalities from road crashes.

## 4.2 The cost of "business as usual"

The current concern is that the numbers of serious and fatal casualties from VTUs have not dramatically reduced in the past five years, and have also increased as a proportion of the overall Auckland road safety picture (due to greater improvements in motor vehicle safety). Currently that seems to translate to roughly 20 fatalities (MoT data) and 1600 serious injuries (MoH data) a year for VTUs (including the user-only and un-reported injuries not accounted for in CAS). As well as the social cost of this ongoing trauma (conservatively estimated as at least $790 million annually), there is also the flow-on impacts on the poor perception of safety of these modes and their relative take-up. This

[7] See https://bicycledutch.wordpress.com/2020/07/28/road-fatalities-declined-in-the-netherlands-but-less-for-cycling/

[8] Lindsay G., Macmillan A., Woodward A. (2011). Moving urban trips from cars to bicycles: impact on health and emissions, *Aust NZ Jnl Public Health*, Feb 2011; 35(1), pp.54-60. doi:10.1111/j.1753-6405.2010.00621.x.

has major implications for the health of communities who feel constrained to continue using motor vehicles for transport needs.

Figure 33 illustrates the timeline trends in serious injuries between 2016 – 2019 for the different travel modes in Auckland. While the CAS data suggests some slight improvements over time (and the 2020 data improves on this further), the hospitalisation data from MoH paints a less positive story when it comes to VTUs. The MoH data also highlights the proportion of serious injuries missed in CAS, particularly those incurred without involving a motor vehicle. While only 46% of CAS-recorded serious injuries during 2016-19 involve VTUs (44% in the most recent 2020 year), that figure is 66% of MoH-recorded casualties.

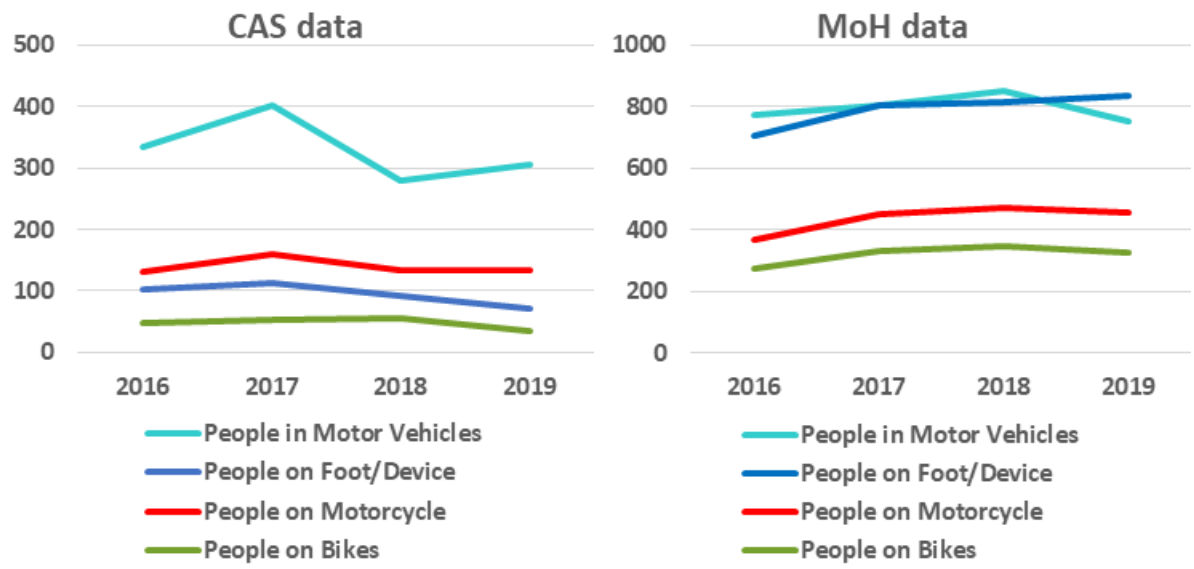



***Figure 33 Timeline trends in serious injuries (2016-19) from CAS (LHS) and MoH (RHS)***

Transport-related workplace safety is also a growing concern, particularly by larger organisations, and is now recognised as one of the focus areas in the 2020 Road to Zero national road safety strategy. At present, it is difficult to completely determine the number of serious injuries and deaths on Auckland's transport networks that are related to workplace activities such as commercial freight movements, courier deliveries, and travel to work/site meetings. CAS now has a data field for capturing the trip purpose of vehicles involved in a crash, but it doesn't appear to be used yet. WorkSafe NZ maintain data on various workplace-related injuries; from this it appears that between 2016-19 there were 118 "serious harm incidents" in Auckland from activities categorised as "road transport" or "postal courier pickup and delivery services", roughly 30 a year. One suspects that this greatly undercounts work-related trips for other purposes.

## 4.3 Organisation-wide risk

One of the growing concerns for Auckland Transport is its obligations as a responsible entity for health and safety, to its employees and contractors (including ancillary services like public transport) and to the general public at large as well. Any serious injury or death, particularly if it is multi-casualty or high-profile for some other reason, could reflect poorly on AT if there were clear steps they could have taken to prevent or mitigate its impact. The recent revelation of many thousands of speeding tickets by AT service bus drivers is an example of a situation that not only incurs reputational harm but has the very real possibility of causing actual serious physical harm to VTUs.

# 5 Recommendations

## 5.1 For Auckland Transport

**Safe Systems and Movement and Place**

Roads and streets represent a large portion of public space in Auckland/Tāmaki Makaurau. Transport links perform two functions, the movement of people and goods and serving as a place or a destination in it's own right.

Auckland Transport produced the Roads and Streets Framework (RASF), which is a guiding document providing a systematic and consistent methodology for identifying the different functions of roads and streets in Auckland.

Vision Zero puts people first and is based on the principle that it isn't acceptable for people to be killed or seriously injured while using the transport network and that human life should be protected.

The RASF however does not appear to connect movement and place thinking with safe systems thinking. There are some references to the Vision Zero strategy and users of the guide are encouraged in the process to identify and consider safety issues but it misses some opportunities that could give more effect to the Safe System approach:

- Change the language so when collating movement information the team consider 'exposure' and add in (understanding it is not an exhaustive list) to the list
    - pedestrian counts (including understanding the people walking such as ages, genders and abilities)
    - widen scooter counts to consider all forms of transport devices and micro-mobility/skateboards etc
    - Bus routes and stops including crossing infrastructure for people using public transport.
- That likelihood and severity are considered as part of assessing the modal priority.

The Urban Street and Road Design states that Safe System Assessment Framework must be used in design and refers designers to Austroads documents. It is recommended that Auckland Transport produce their own guidance on guidelines which specify when a Safe System Assessment should be conducted and to provide guidance on the assessment process. It could be suggested further that a AT lead in this space and create a Register of Recommended Safe System Assessors so that there is confidence in assessments being carried out to a high standard.

**Active centres and neighbourhoods**

The areas of high risk for vulnerable transport users are likely to be areas that have a high place function and be located on movement corridors, which would include many of the bigger centres.

Building strong urban centres and neighbourhoods is a key objective of the Auckland Plan 2050. The plan recognises that:

*Centres are at the heart of neighbourhoods and are focal points for the surrounding community. They include a mix of activities and functions, such as retail, commercial and social services, as well as housing, recreation and community facilities. Auckland's centres are supported by a surrounding (typically residential) area that is within an easy walking distance, usually thought of as 10 minutes.*

The overall objective is identified also in other precinct plans, centre plans and area plans.

In making sure the centres are walkable and accessible for the surrounding community by active modes, it is recommended that through low cost measures all centres have a consistent speed

environment and are provided with signage and a gateway threshold to inform drivers of the change (30km/h for centres). Whilst additional measures are encouraged to support the change, having a self-explaining system where a driver enters a centre and is required to adapt their speed to the environment should enable a positive result in terms of impact on the outcomes of crashes. Additional infrastructure could follow with input from stakeholders.

Having safe, attractive and vibrant centres would contribute to many other outcomes for Auckland in terms of health, equity and economic success.

Following on from centres, neighbourhoods should then be assessed for lower speed limits on an area wide basis. The following principles are recommended for the active neighbourhoods:

- Lower speed limits to:
  - reduce both the likelihood of a crash occurring and the severity of the outcome.
  - enable people to choose to walk and cycle more to school and college, work and shops.
  - provide more people-focused and healthy streets where people and families feel safer.
- Deliver area-wide changes rather than individual streets so it is easy to understand for users of the street network. Consistency in treatments and application help to create a street network that is easy to understand and for users to navigate their way and helps users to understand how they should behave when using the network. Having design solutions for different street classifications will help support this.

**Safe and Smart Arterials Programme**

A large number of collisions involving VTUs occur on 50km/h arterial corridors. It is recommended that instead of addressing hot spot areas across Auckland in a staggered way, corridor safety plans are created for these routes that look to address the risk.

These do not need to result in transformational projects but seek to review the current issues and identify the ongoing risks to the corridor to address ways of keeping people moving safely along and across.

These types of street should have a look and feel that is consistent to help road users understand how to use these major traffic routes. The first round could include the current Regional routes (Megamaps) in the central area and southern area where the numbers of pedestrian collisions occurred for example.

A holistic programme of measures along routes that considers all users could incorporate point to point speed cameras, new crossing points following desire line surveys and public transport connections, parallel routes for users, movement restrictions and signals optimisations, and clear messaging for clearways and restrictions if required. These would be supported by enforcement programmes.

**Recognising transport devices and not treating them as pedestrians**

That reporting to the Board provides numbers for walking, cycling, motorcycling and transport devices. The recommendation to separate out Transport Devices from Pedestrian journeys is because they are likely to require a different response to journeys made on foot or with an aid that is needs for the purpose of the walking trip.

**Walking journeys**

Prepare a Walking Action Plan based on a Programme Business Case looking at all areas of the Safe System. In addition to the Auckland wide approach, this could include further localised improvements:

- Station & Stop Audit and Action

  - Continue to pursue an increase in public transport journeys for improvements in safety for all road users. To do this it is important to ensure that people feel safe in accessing stops and stations.
  - Audits of stations and bus-based transport corridors should assess the infrastructure at the stop including lighting, crossings, speeds, and visibility.
  - For an inclusive programme, users should be asked also as part of an interactive discussion as to what are the issues or barriers, they identify that would prohibit or reduce the attractiveness for them to use Public Transport. This could help restore some confidence between road users and Auckland Transport as a low-cost improvement programme.
- Safe and comfortable crossings and intersections using physical infrastructure such as raised safety platforms in addition to signal technology (pedestrian priority, countdown timers etc).
- Safer speeds programme
  - Continue to roll out School Zones but also provide more appropriate speed limits close to Aged Care Facilities to reduce the likelihood of a serious injury should a collision occur and to increase walkability for older members of the community.
- Road Safety Campaigns
  - Create a programme of pedestrian safety messaging. Particularly around boarding and alighting buses and accessing the bus stop.
- Asset maintenance review
  - Ensure that areas identified as a hazard (for trips, slips and falls) are addressed when identified through the Customer Response Management Database but to create a proactive programme of asset maintenance to ensure footpaths are well maintained.
- Procurement Practices
  - Requiring vehicles that are used by Auckland Transport have a minimum level of safety equipment and that drivers are trained to be more aware of vulnerable transport users.
- Casualties and collisions
  - Continue to monitor casualties and collisions with further analysis and research into the causes of pedestrian death and serious injury crashes. This should include interviews with those hospitalised as a result of a collision.
  - Undertake research examining pedestrian behaviour at different types of crossings to understand what is happening and look at the length of time pedestrians are waiting at the crossing.

**Transport Devices journeys**

- Prepare a Transport Devices Action Plan based on a Programme Business Case looking at all areas of the Safe System.
- It is understood a survey is currently being undertaken to understand the use of micro-mobility in Auckland.

**Cycling journeys**

- Much is underway to improve cycle safety and as Auckland continues to require mode-shift on to this mode for health, climate change and efficiency, it is recommended that that:
  - Continue to develop more routes and connections to Central Auckland and to large employment centres.
  - Increase the number Active Neighbourhood Schemes (or Low Traffic Neighbourhoods) (30km/h) to increase local cycle journeys for the community so residents can bike to and from school. To the local shop and community facilities etc.
  - Continue to develop innovative designs for infrastructure, traffic signals.

    - Upgrade cycleways that have become successful so that users can continue to use these routes comfortably. Particularly people walking that may be sharing spaces.
- in-depth research into all cyclist fatalities to understand all the factors leading to a collision resulting in a cycle fatality or a serious injury.

**Motorcycling journeys**

- In-depth research into all motorcyclist fatalities to understand all the factors leading to a collision resulting in a motorcycle fatality or a serious injury.
- Creating design guidance for designers who are unfamiliar with riding motorcycles.
- Education programmes with a focus on failing to look properly, vulnerability of motorcyclists.
- Enforcement programmes to reduce illegal and anti-social riding such as speeding, careless riding, unregistered drivers and traffic violations.

**Data collection and monitoring**

- Determine a clear programme of what data is being collected, what is it for and what is being measured. This should include user surveys as well as quantitative data to understand how users feel travel around the network.

## 5.2 For Auckland road safety partners

That Auckland Transport leads the conversation with their strategic road safety partners to ensure:

- Collective agreement on outcomes for transport safety and that the safe system is being discussed amongst the groups so there is a clear expectation.
- Clear understanding of each parties' roles and responsibilities (enforcement, driver behaviour programmes, delivering additional infrastructure in terms of cameras)
- Public promotion and safety campaigns by different organisations are consistent.
- Open conversation around innovation and trialling new methods.
- A greater focus on the role of speed when reporting active mode crashes (particularly relative to the calculated "Safe and Appropriate Speeds")
- Agreed consistent categorising of "wheeled devices" of all types

## 5.3 For Government transport agencies

That Auckland Transport leads the conversation with Government agencies to investigate:

- Further improvements to the CAS database to recognise the different and new alternative transport devices in the system so that they are not coded as pedestrians, other, null etc and to recognise motorcycle riders and cyclists as such and not as drivers. This would help in reporting data more accurately and more efficiently.
- Promote regulatory change to require improved vehicle design that considers the safety impact of the vehicle and that commercial vehicles are designed to give the driver maximum direct visibility around their vehicle.
- That penalties for red light running, speeding, driving under the influence and distraction are increased to a level that would deter a driver from continuing to pursue with their behaviour.
- Changes to the Monetised Benefits and Costs Manual to more explicitly separate out the relative crash under-reporting factors of different transport modes
- Further changes to relevant Rules/Regulations (eg the current Accessible Streets package)
- Further changes to the CAS reporting processes (particularly in terms of categorisation of serious vs minor crashes, and data that is made available about non-vehicle participants such as pedestrians)