



***nti* NTARC**

MAJOR CRASH INVESTIGATION 2023 REPORT



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FOREWORD

Now in its 12th edition, the Major Crash Investigation Report produced by the National Truck Accident Research Centre (NTARC) provides unique insights into serious heavy vehicle crashes which are critical in raising industry awareness about the causes of these incidents – as well as underpinning solutions.

Wholly funded by NTI, Australia's leading provider of transport insurance, NTARC is a not-for-profit initiative fuelled by NTI's desire to help reduce serious heavy vehicle crashes and improve safety outcomes for both the industry and the wider community.

Over the past 20 years, NTARC has refined its accident database to present data in a meaningful way to highlight critical areas of interest such as driver deaths as a result of crashes and causes of serious crashes such as fatigue, driver error and other factors.

NTARC doesn't just share its data, it proactively engages with customers to establish additional detail and helps them implement prevention strategies to reduce future occurrences.

Critically, the data has been used to educate and influence key stakeholders in government into targeted action on heavy vehicle safety, including as evidence of the need to mandate landmark new safety technologies in Australian Design Rules (ADR) such as advanced braking and vehicle stability controls.

NTARC is also beginning to drill down and expand on its data based on industry segment, targeting some of the highest-risk sectors such as tankers, through its "Spilt Milk" program, which has developed a range of tools to reduce the high incidence of tanker rollovers in the dairy industry.

As the saying goes, 'you can't manage what you don't measure' and NTARC is out there measuring and has, no doubt, already saved many lives with the data and education it has pro-actively shared with industry.

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INTRODUCTION

This year marks the 20th anniversary of the landmark National Truck Accident Research Centre (NTARC) Major Crash Investigation Report.

Since the first report was published in 2003, 12 editions have been produced, starting with biennial releases until 2019 and then a shift to annual publication in 2020.

In those two decades, the Australian road freight task has increased by more than 60% and the size of NTI's insured portfolio of trucks has tripled in number.

With a fixed threshold for inclusion of claims exceeding \$50,000, the number of incidents in-scope for this report has grown consistently year-on-year due to a combination of growth in freight task, growth in NTI's insured portfolio, and the effect of inflation on the cost of claims.

The 2023 report includes and examines the NTARC's data from 1282 incidents in 2022, up from 1001 in 2021 – and just 404 back in 2005.

Once adjusted for inflation, 2022 witnessed a small but significant increase in incident frequency – but a slight decline after removing the impact of the catastrophic February-March floods event in Northern New South Wales and South-east Queensland.

As a result of those devastating floods – the costliest insured event ever recorded in Australia, natural peril losses jumped from around 1% of all losses previously to 14.5% of all losses in 2022.

While NTARC has historically focussed on crashes and other events related to heavy vehicles, the 2022 east coast floods is one we cannot ignore in this year's report for two reasons: firstly, its unprecedented economic and social impact (insured losses of more than \$6 billion); and, secondly, the fact Australia is now living in a world where high-cost insurance events should be expected almost yearly – a trend which has major implications for the transport industry.

Looking beyond the impact of the floods, 2022 saw increases in mechanical failure and fire losses, both of which may have causal links to the same high rainfall events responsible for the heightened natural peril losses.

Once floods related losses are removed, the year witnessed a positive improvement in incidents linked to driver error and fatigue-related incidents remained in line with 2021's historically low level. Conversely, incidents related to inappropriate speed were up slightly.

And within the driver error category, inattention/distraction remains the key issue, accounting for two out of five driver error losses.

Another positive trend evident in this year's report is the partial reversal in the increase in fatal truck and car crashes where the truck was at fault seen in 2001's data; in 2022, the truck was not at fault in 77.4% of accidents.





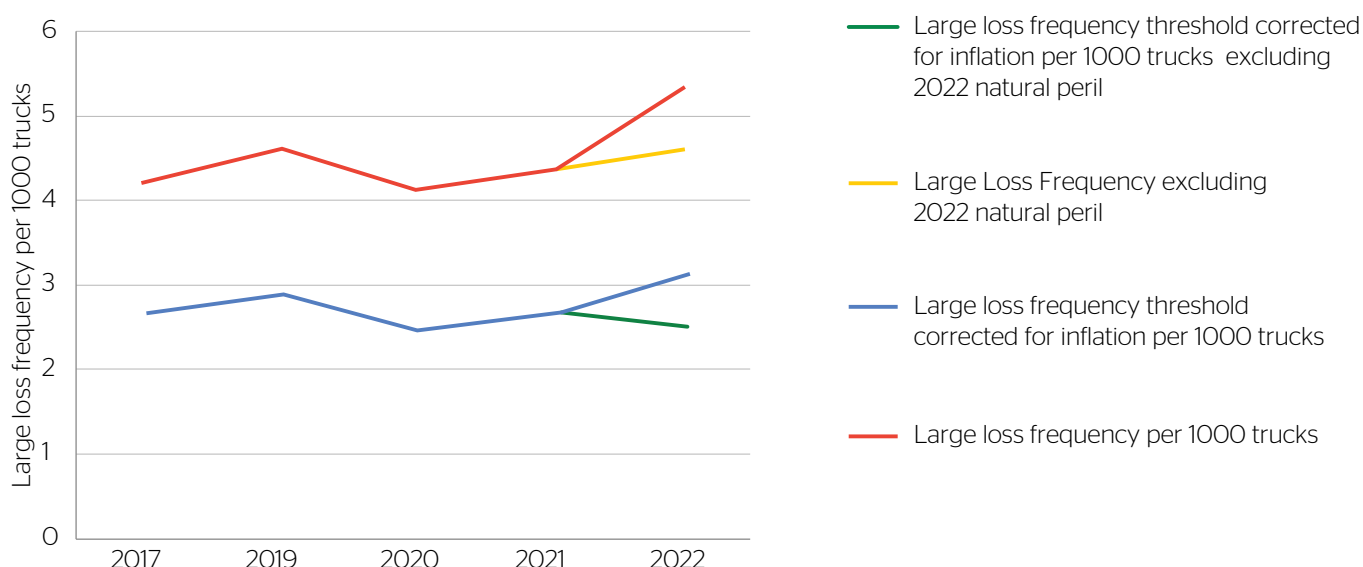
SUMMARY OF FINDINGS

Reviewing the numbers from calendar year 2022, the number of in-scope incidents increased to 1282 incidents in 2022 up from 1001 in 2021. The majority of this increase is accounted for by the ongoing growth in NTI's insured portfolio, with some resulting from the effect of inflation on the fixed \$50,000 incident cost threshold for inclusion in this report.

Corrected for inflation – which would see the incident cost threshold for inclusion move to \$80,500 – and excluding natural peril events, to remove the impact of major flooding experienced on Australia's eastern seaboard in February and March 2022, there was a very slight decline in the overall frequency of losses, to 2.52 incidents per 1000 insured units, down from 2.63 in 2021.

If natural peril events are included, there is a small but significant increase to 3.06 incidents per 1000 insured units, reflecting the unprecedented scale of the 2022 flood event.

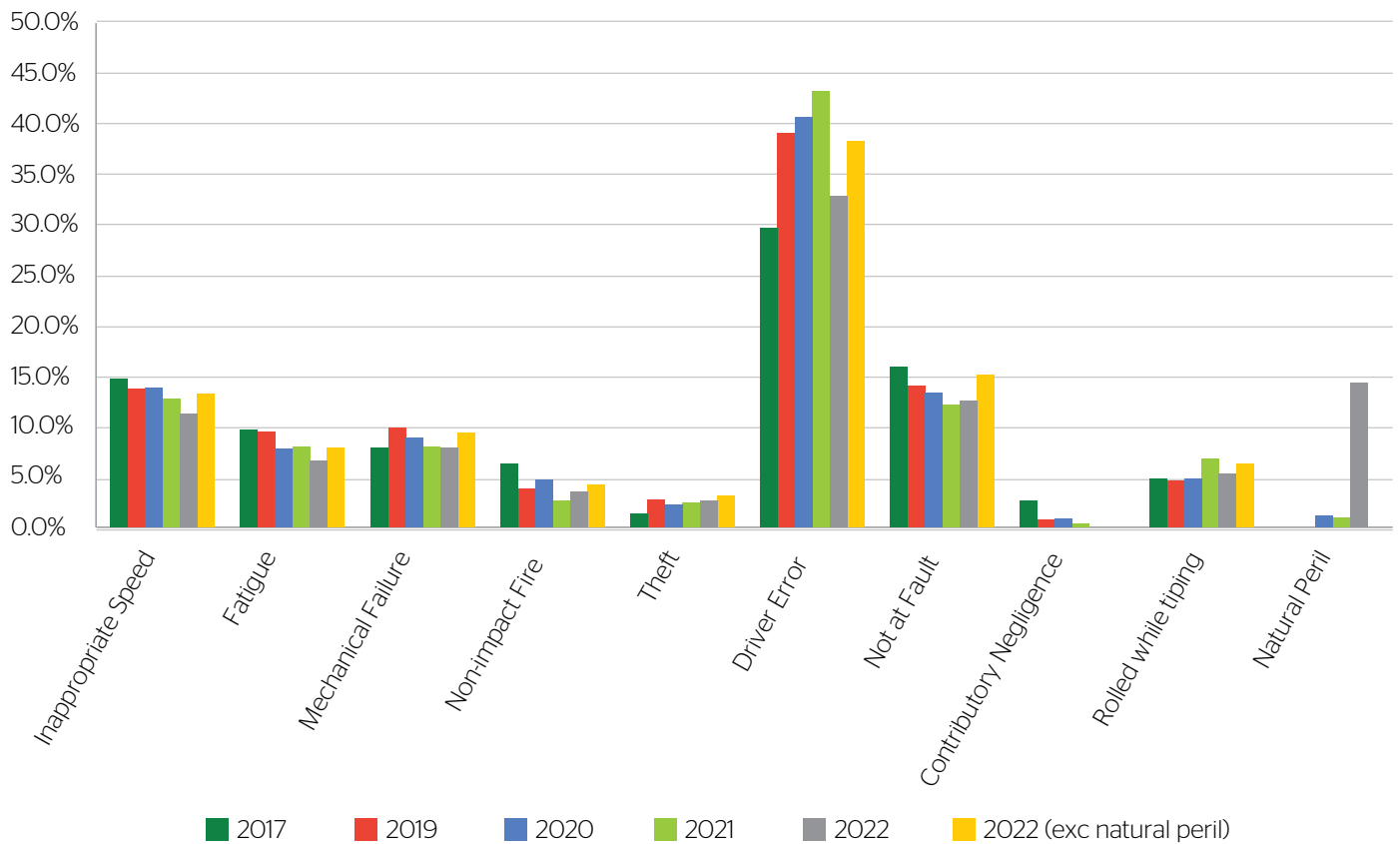
Large loss frequency corrected for inflation



As a result of these extensive flood events, Natural Peril losses jumped from being a near irrelevancy (~1%) to being 14.5% of all heavy motor large losses (>\$50k). This actually risks making the events not look as significant as they were, with many of the in-scope claims involving multiple items, at times nearly entire fleets.

Looking beyond that, we saw increases in mechanical failure and fire losses, both of which but particularly the latter, may have causal links to the same high rainfall events responsible for the natural peril losses.

Incident cause

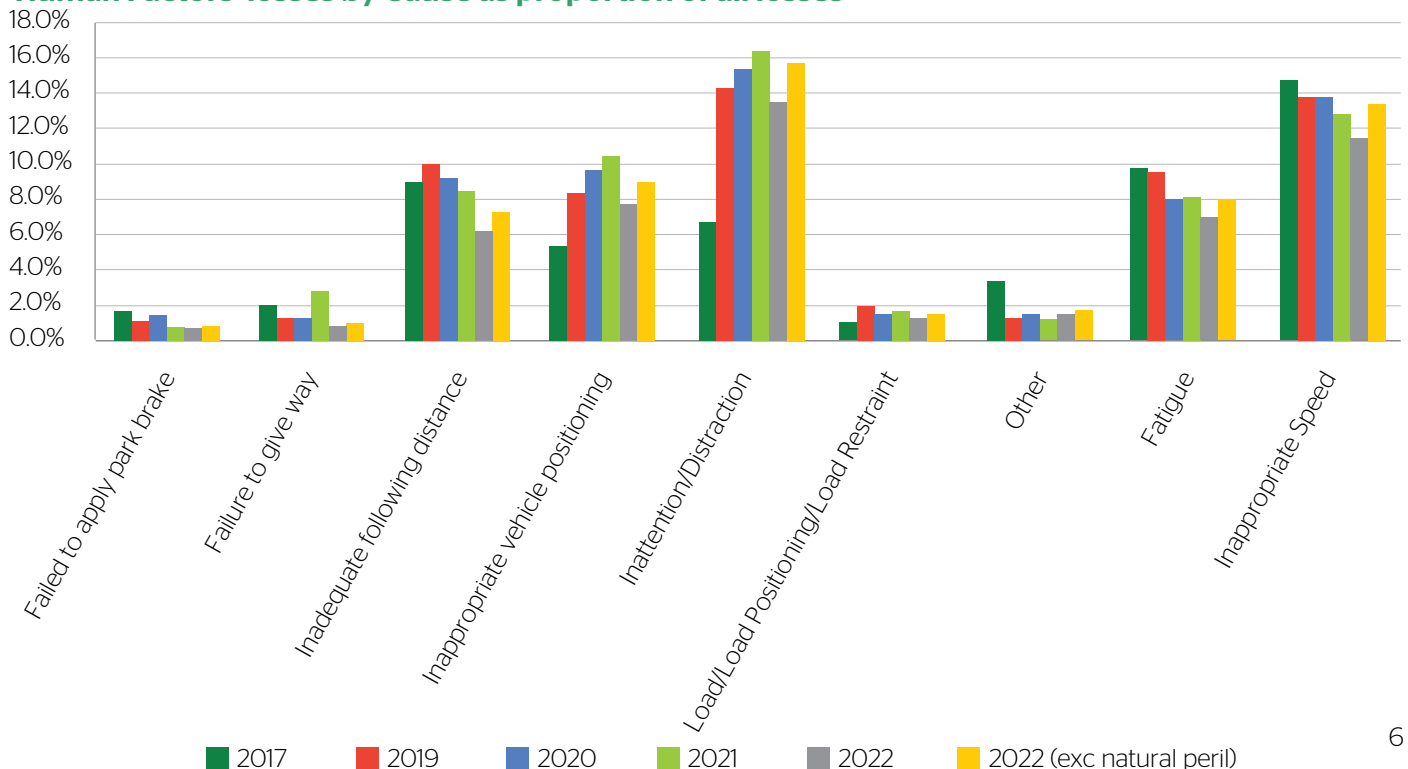


Once flooding losses are removed, the proportion of crashes due to Fatigue is stable with prior years but Inappropriate Speed crashes are have increased.

While crashes due to driver error have decreased, the combination of Driver Error, Fatigue and Inappropriate Speed which are considered to be primarily 'human factor' crashes still accounts for three out of every five (60%) losses in the dataset (with natural peril excluded) and as such, ensuring we have well-trained, healthy and empowered drivers needs to remain a key industry focus.

Within driver error, inattention/distraction remains the key issue, with 2 out of 5 driver error losses having this sub-coding. The truck and car fatal at-fault proportion has partly reversed the decline seen in 2021's data, with the truck not at fault in fatal truck and car crashes in 77.4% of incidents.

'Human Factors' losses by Cause as proportion of all losses



SPECIAL REVIEW – CAT 221

The NTARC Report has historically focussed on crashes and other events primarily related to heavy vehicles, however, the 2022 east coast floods is one that we cannot ignore for several reasons.

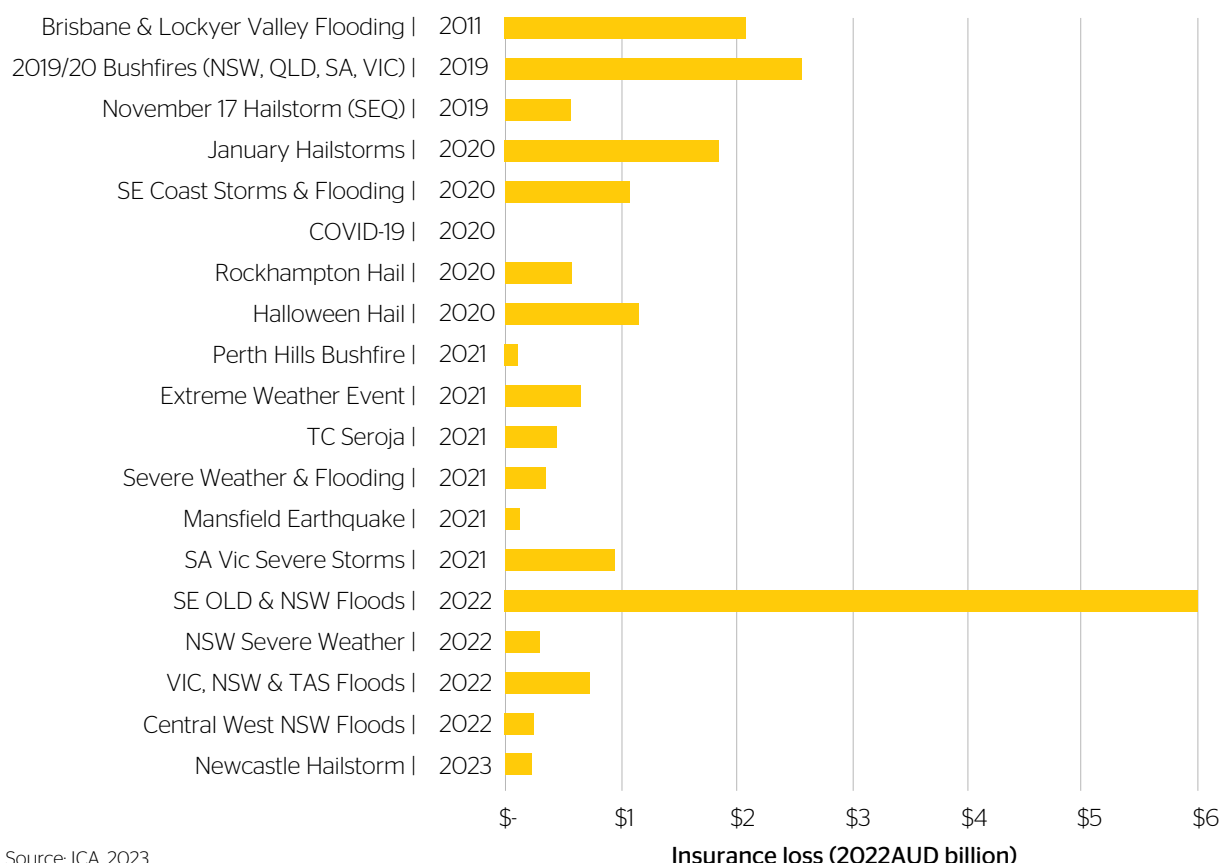
Economic and social costs

Firstly, its economic and social impact was unprecedented, ranking as the second-costliest insured event in the world last year and the costliest insured event ever recorded in Australia.¹

Between February 22 and March 9, record-breaking rainfall caused widespread flooding in South East Queensland and New South Wales, resulting in extensive insured losses across thousands of households and businesses.

In that relatively short period, the region experienced an estimated 2.5 to 5 times the normal average monthly rainfall, resulting in 23 lives lost, 14,000 people in need of emergency accommodation, and 5,000 uninhabitable homes.²

Chart 2.2: Comparison of CAT221 with recent insurance events



Source: ICA, 2023

The event, known by the Insurance Council of Australia as Catastrophe 221 (CAT221), was responsible for an estimated loss of more than \$6 billion across 242,000 claims (as of August 2023) – more than six times higher than the average received for catastrophes declared since 2016 and 1.7 times higher than the next largest catastrophe, a hailstorm that impacted Sydney, the Central Coast and surrounds in 2018 (CAT185).³

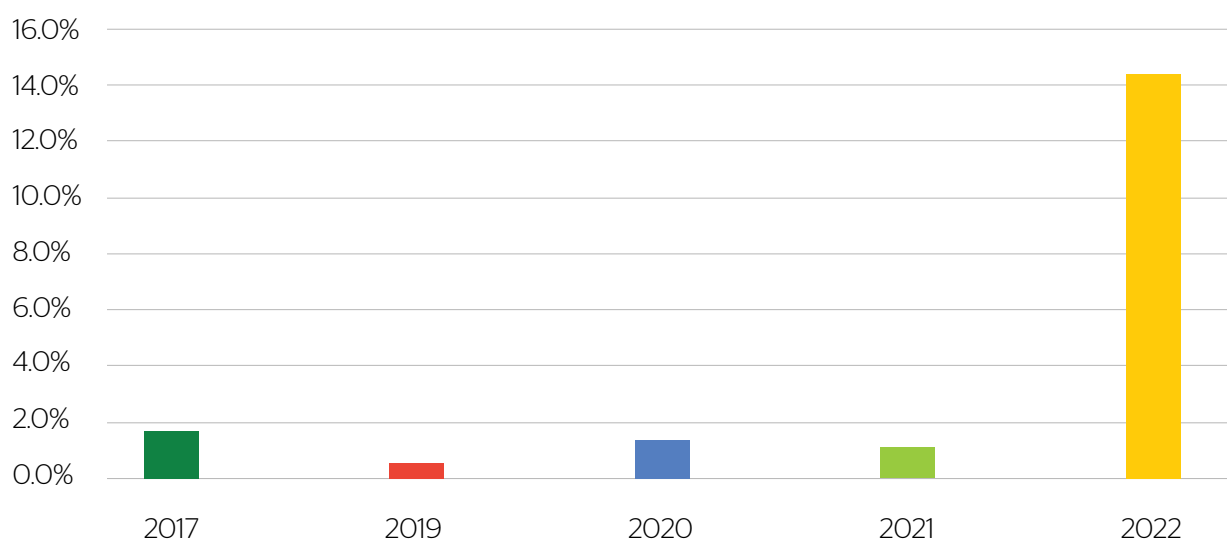
1. Insurance Council of Australia, 2023, p. 4.

2. Deloitte, 2023, p. 10.

3. Deloitte, 2023, p. 23.

While small in comparison to the wider devastation, CAT221 also had a dramatic impact on NTI's heavy motor insurance claims related to natural peril.

Natural Peril losses by year



NTI data shows incidents related to the 2022 flood event, accounted for 89.2% of all natural peril loss incidents by number and 94.1% of all natural peril loss incident costs in the full year.

Further highlighting the significance of the catastrophe, CAT221 incidents represented 12.9% of all NTI's loss incidents in 2022 – and an even higher 21.6% of all incident costs for the year. By contrast Natural Peril losses average 1.1% of in-scope incidents in the prior four years.

For further comparison, natural peril losses in 2011 related to that year's South-East Queensland flood event made up 4.6% of all in-scope incidents that year, with an additional 1.5% of losses in 2011 resulting from other natural peril events.

Queensland recorded the largest number of loss incidents related to the CAT221 event, with 52% of incidents, but only 39% of CAT 221-related incident costs. NSW, on the other hand, experienced 48% of incidents, but accounted for 61% of costs.

Long-term implications

The second reason CAT 221 cannot be ignored is that it's not a one-off event.

As a report prepared by Deloitte for the Insurance Council of Australia (ICA) notes that, since the 1960s, 20 extreme weather events in Australia have exceeded \$1 billion in insured damages (indexed to 2022 values). Of these, 15 have occurred since January 1, 2010. ⁴

In 2022 alone, there were more than 302,000 disaster-related claims from four declared insurance events across the country, costing \$7.28 billion in insured losses - \$6 billion of which were from the northern New South Wales and south-east Queensland floods in early 2022. ⁵

The Deloitte report stresses that under a high-emissions scenario, the size and impact of extreme weather events are not expected to moderate and may get worse, with the environmental, economic and social consequences of climate change an ever-present challenge.

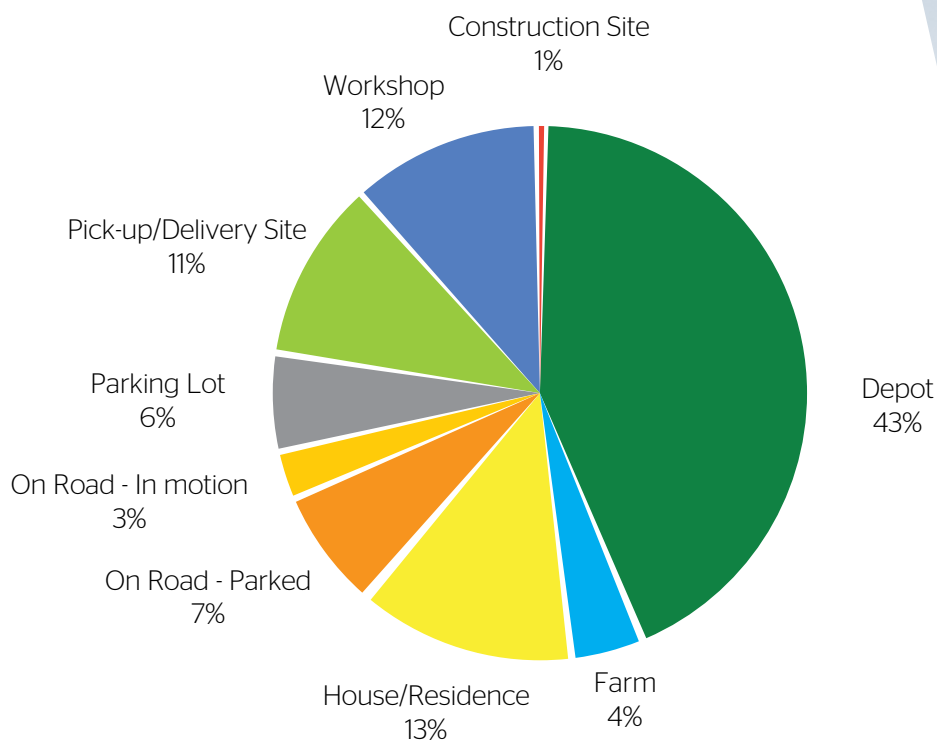
4. Deloitte, 2023, p. 20

5. Insurance Council of Australia, 2023, p. 4

NTI data related to CAT 221 highlights the critical importance of better land-use planning. Just 3% of CAT221-related losses were for vehicles on the road, with the vast majority of vehicles in a stationary position such as depot (43%), house/residence (13%), workshop (12%), pick-up/delivery site (11%), parking lot (6%), parked on road (7%), on farm (4%), and on construction site (1%).

These findings aren't surprising considering transport businesses – and related product and service providers – tend to be located in industrial estates built on flood-plains in the inner and outer western suburbs of key capital cities.

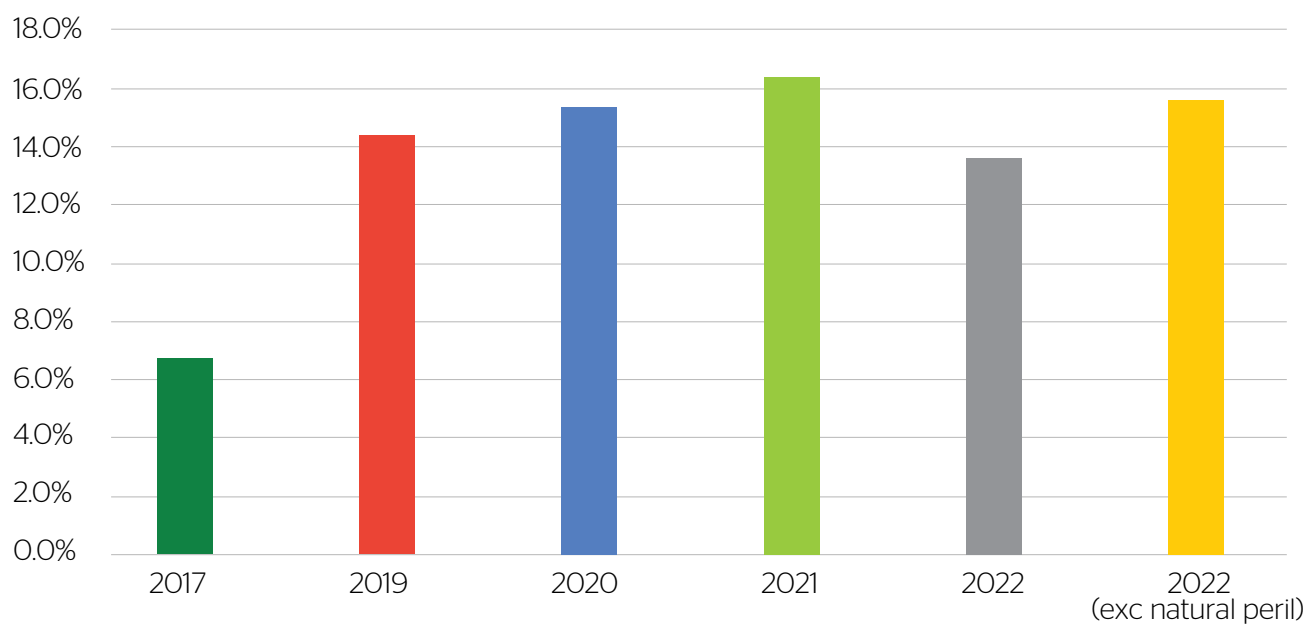
CAT 221 Losses by Incident Location Type



INATTENTION / DISTRACTION

The leading cause of incidents in 2022 was Inattention / Distraction, which was the proximate cause of 15.7% of in-scope incidents once the impact of CAT221 is removed. This represents a small decline on the figures seen in 2021 (16.4%) and also a reversal of the previous year-on-year increases.

Proportion of crashes due to Inattention / Distraction by year

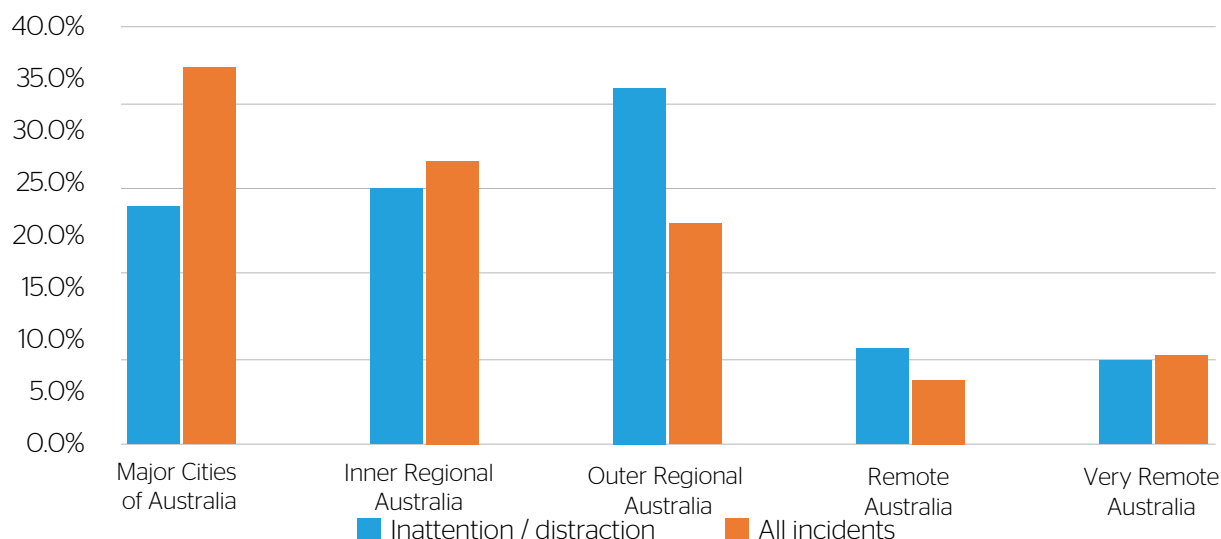


Examining the mechanism and location of these crashes provides interesting insight into the risk profile of these incidents. Almost half (47.7%) of these incidents involving vehicles crashing on straight sections of road, just over one-fifth involve ran-into-rear crashes and one eighth involve crashes on curves.

DCA Code	Proportion of Inattention / Distraction crashes	
17# Off path on straight	47.7%	
13# Vehicles from same direction	22.7%	
18# Off path on curve	12.8%	

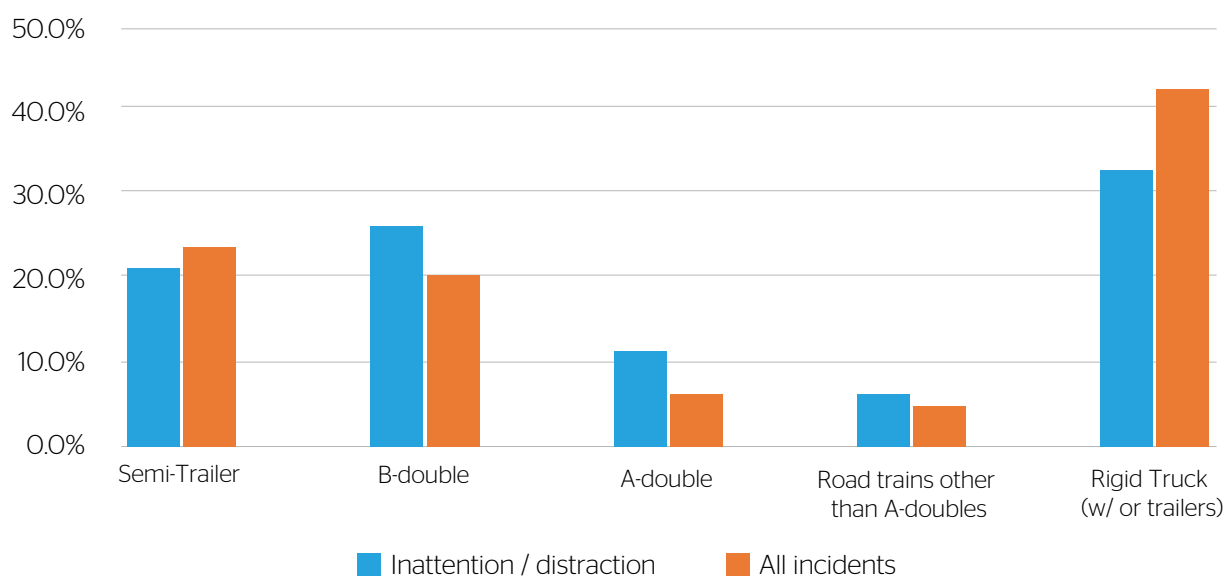
Examining the remoteness index of Inattention / Distraction crashes and using the location of all incidents as a general control, Outer Regional Australia is over-represented in Inattention / Distraction crashes (34.3%) compared to all losses (21.5%), as is Remote Australia (9.3% vs 6.8%). By contrast Major Cities sees a smaller proportion of Inattention / Distraction crashes.

Comparison of Inattention / Distraction Losses vs All Incidents by Remoteness Index



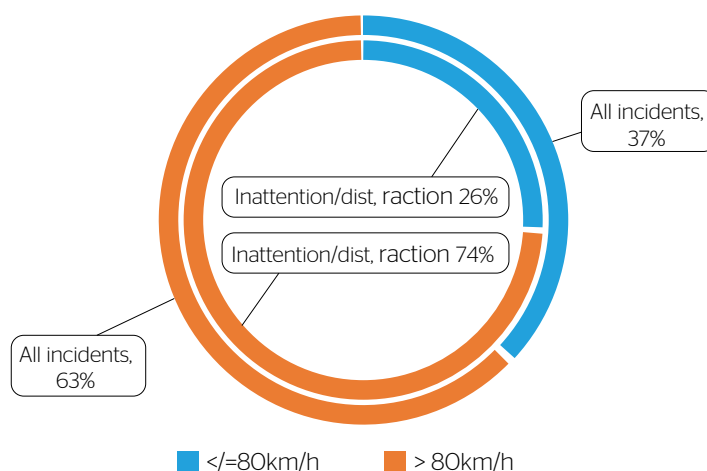
This is generally consistent with the distribution of combination type, where B-doubles and A-doubles (more typically used in longer distance freight tasks) are over-represented and more 'urban' combinations under-represented. Similarly a review of the speed zones shows that these incidents are more likely in higher speed zones.

Comparison of Inattention / Distraction Losses vs All Incidents by Combination Type



These trends suggest that drivers are more likely to become distracted in less-complex, longer-duration and potentially lower 'apparent' risk routes outside of built-up areas.

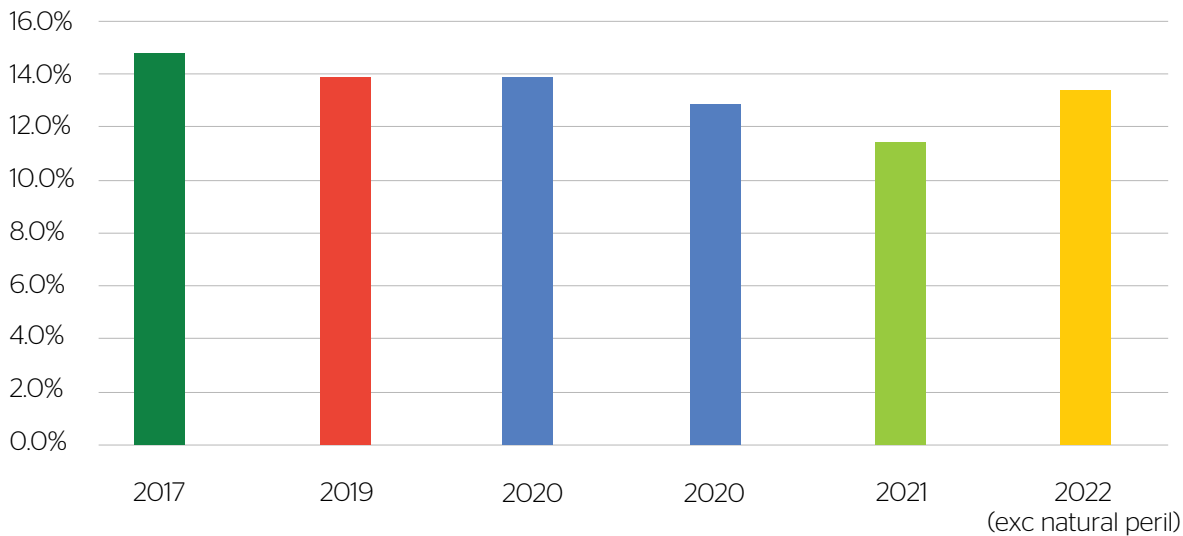
On the one hand this appears reasonably intuitive, however the frequency of these incidents suggests that it is difficult for drivers' to predict and manage the risk of these incidents. It is possible there is a disconnect between perceived and actual risk levels which results in drivers being more willing to become disengaged from the driving task.



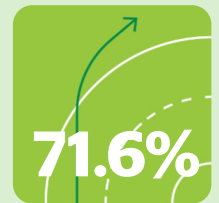
INAPPROPRIATE SPEED

Once Natural Peril losses are excluded, the second largest cause of incidents is Inappropriate Speed which was the proximate cause of 13.4% of crashes in 2022. This is generally consistent with prior years.

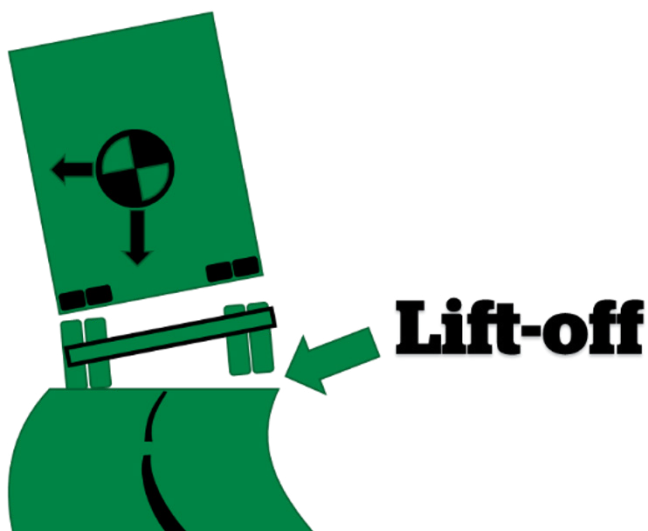
Proportion of Crashes due to Inappropriate Speed by year



Examining the mechanism of the incidents via the DCA codes, we see that the overwhelming majority (71.6%) of these incidents are 'Off path on curve' events. In most cases these incidents take the form of 'single vehicle untripped rollovers' where due to the combination of the dynamics of the vehicle, its load, the geometry of the road and - critically - its speed, the vehicle overturns on the roadway.



18# Off path on curve

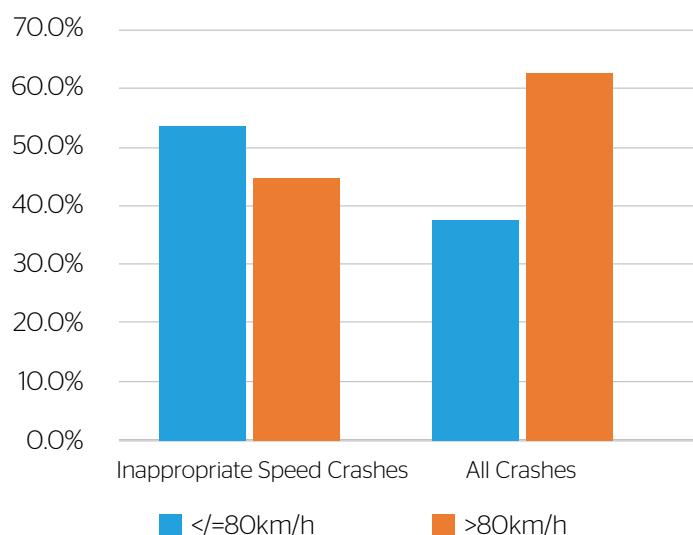


Digging further into the data reveals some insight into what operating environments are likely to be higher risk of these roll-over events. 54.2% occur in 80km/h or lower speed zones, compared to 37.2% for all loss types, suggesting 'B-roads' are higher risk than highways and freeways.

Examining the operating radius of inappropriate speed crashes shows that 46.0% within 200km of their base of operations, compared to 37.6% for all incident causes.

This suggests that local, short- and medium-haul operations are more likely to experience these events than long-haul operations, although does not rule out long-haul operators having these events occur as they depart or approach their depots.

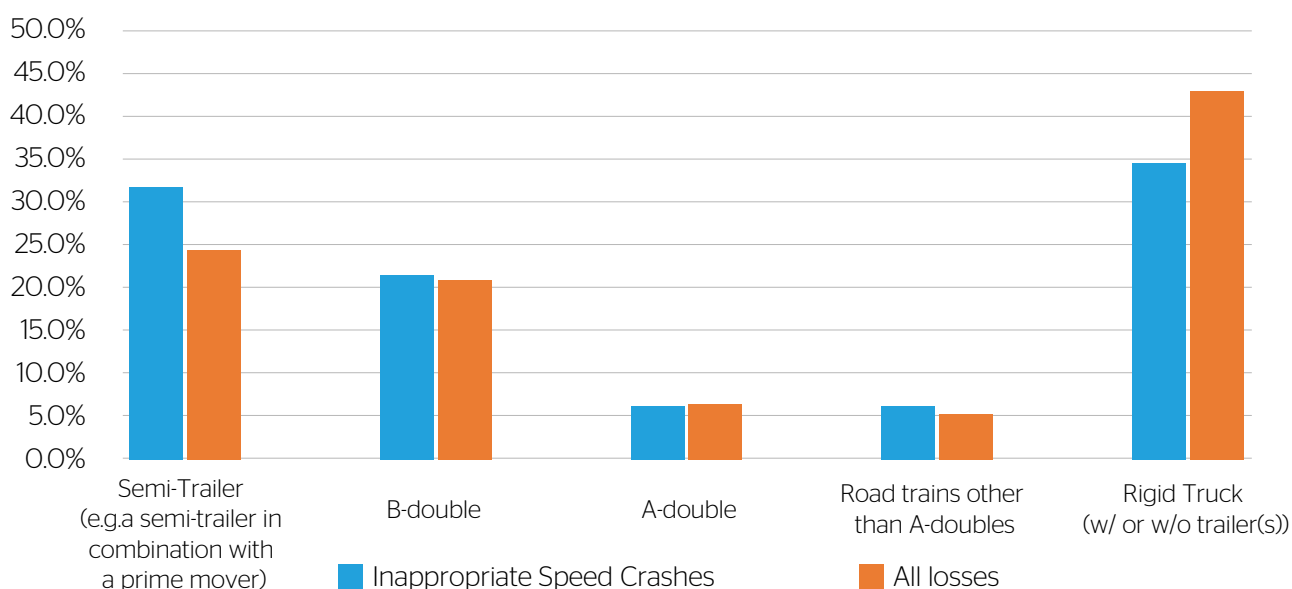
Comparison of Inappropriate Speed and All Crashes by Speed zone



Examining the combination types involved in Inappropriate Speed crashes, Semi-trailers are over-represented in crashes when compared to all loss types. This may relate to their use in time-critical short-to-medium haul freight, which further supports the position that this is a short- and medium-haul issue and may relate to a combination of supply-chain pressure and drivers under-assessing risk due to a high degree of familiarity with the route.

It is however interesting to note that rigid trucks are under-represented, despite sharing many of the same operating pressures and road environment. It is worth considering here that the minimum \$50,000 criteria to be in-scope for this report may create a skew here by excluding older and smaller trucks such as those in the light-rigid space.

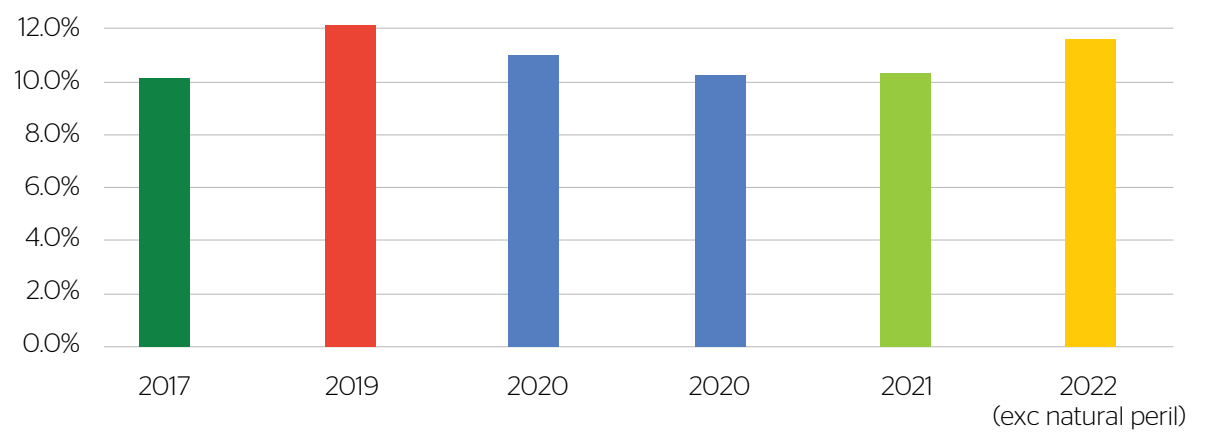
Comparison of Inappropriate Speed vs All Losses by Combination Type



NON-IMPACT FIRE

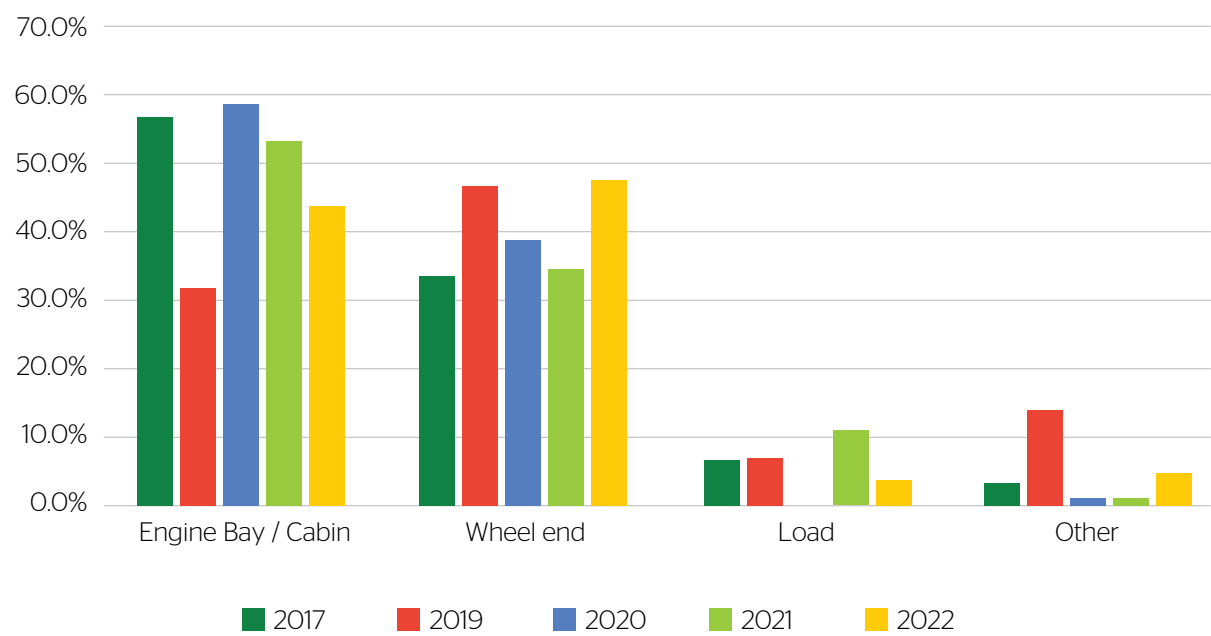
Increase to some of the highest levels seen in recent years (9.9% vs 10% in 2019). This was particularly driven by an increase in bearing-related fires in wheel ends.

Non-Impact fire losses



Overall, the mix between engine bay / cabin fires and wheel end fires is reasonably even, at 43.8% and 47.6% in 2022, which represents a significant shift from prior years when fires were more likely to originate in the engine bay / cabin.

Sub-causes of non-impact fires by year

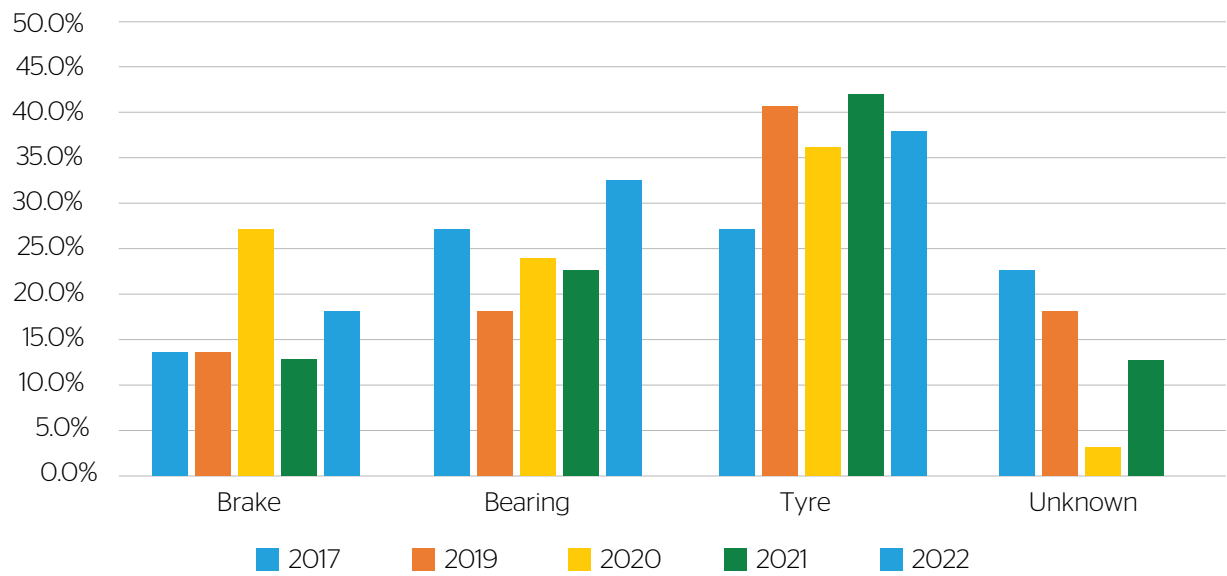


The most common cause of wheel end fires in 2022, consistent with prior years, were tyre related fires (42%). These tyre fires generally related to a loss of proper inflation (for any one of a number of reasons), which then sees the tyre overheat as it is driven along the road, in many instances this will just result in the tyre disintegrating, however in some instances it retains structural integrity and the result is not only a fire, but one which is extremely resistant to being extinguished.

While tyre fires remained the most common cause, there was sharp increase in 2022 in wheel end fires from bearing failure. With 36% of wheel-end fires having this cause, compared to an average of 25.4% for the four preceding years. To keep this in relative perspective to other issues, this means that in 2022 1.7% of all in-scope losses resulted from bearing related non-impact fires.

One factor which may have contributed to this, is in fact the severe rain east-coast rain events discussed earlier in this report, with the potential that water ingress could cause bearing failure which in turn may result in a fire. Initially this may have appeared to be supported when compared to data in 2011 (previous SEQ flooding), as there was also an uptick in fires in 2011 (12.1% of losses that year), however examining the data further reveals that most of that increase related to engine bay / cabin electrical fires.

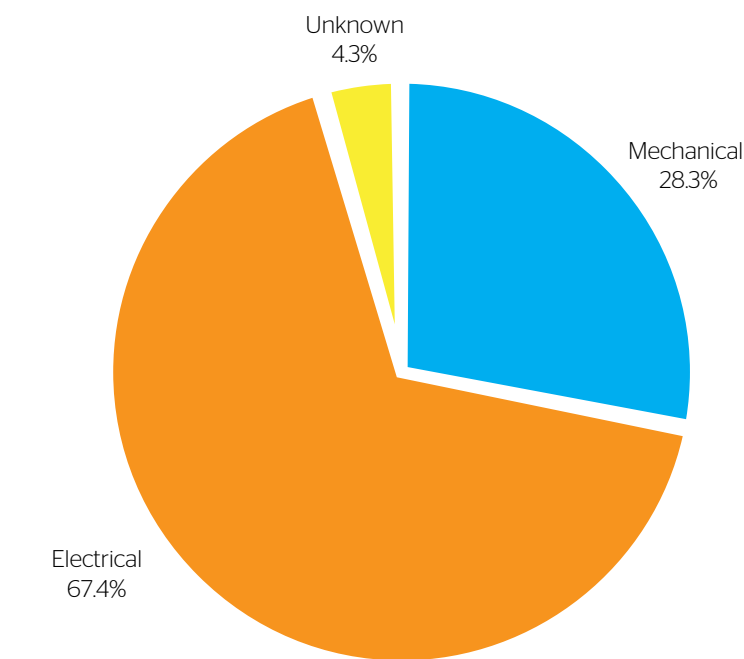
Wheel end fires by sub-sub-cause



For Engine Bay / Cabin fires in 2022, electrical issues remain the leading cause, consistent with prior years. When looking down to individual claims, this is overwhelmingly related to issues around the high-current, generally unfused cables which run between batteries, starter motors and alternators.

These fires become generally more prevalent as vehicles become older and often correspond with maintenance work around the aforementioned components, suggesting there could be strategies in increasing awareness around the importance of careful cable routing, restraint and inspection

Engine Bay Cabin Fires by sub-sub-cause

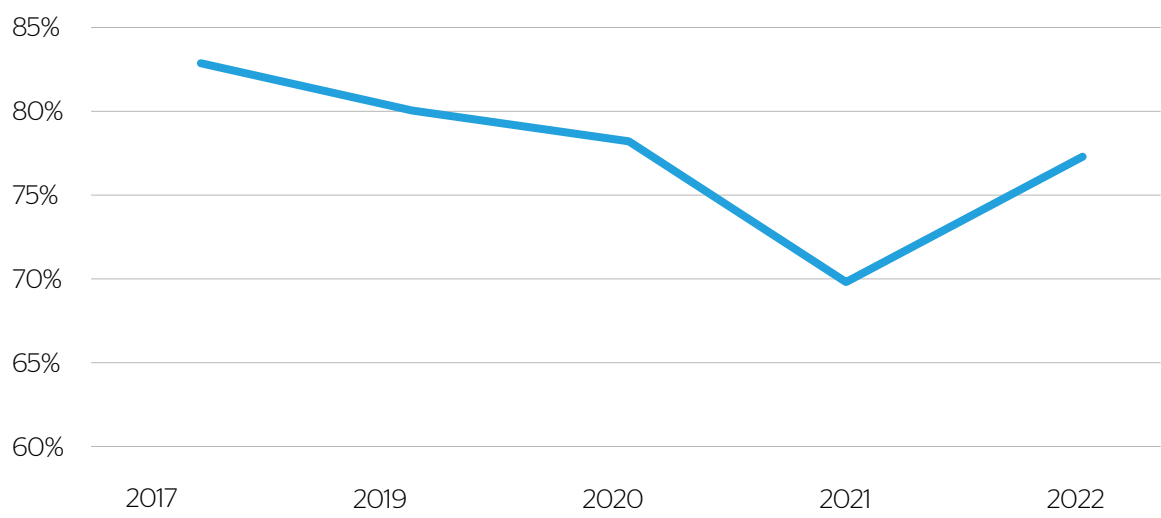


CAR AND TRUCK CRASHES

The proportion of fatal truck and car crashes where the truck driver was not at fault hit the lowest level in history in 2021, dropping to 70% compared with 83% in 2017.

2022 saw some recovery in this number, with not-at-fault fatal truck and car crashes rising seven percentage points to 77%.

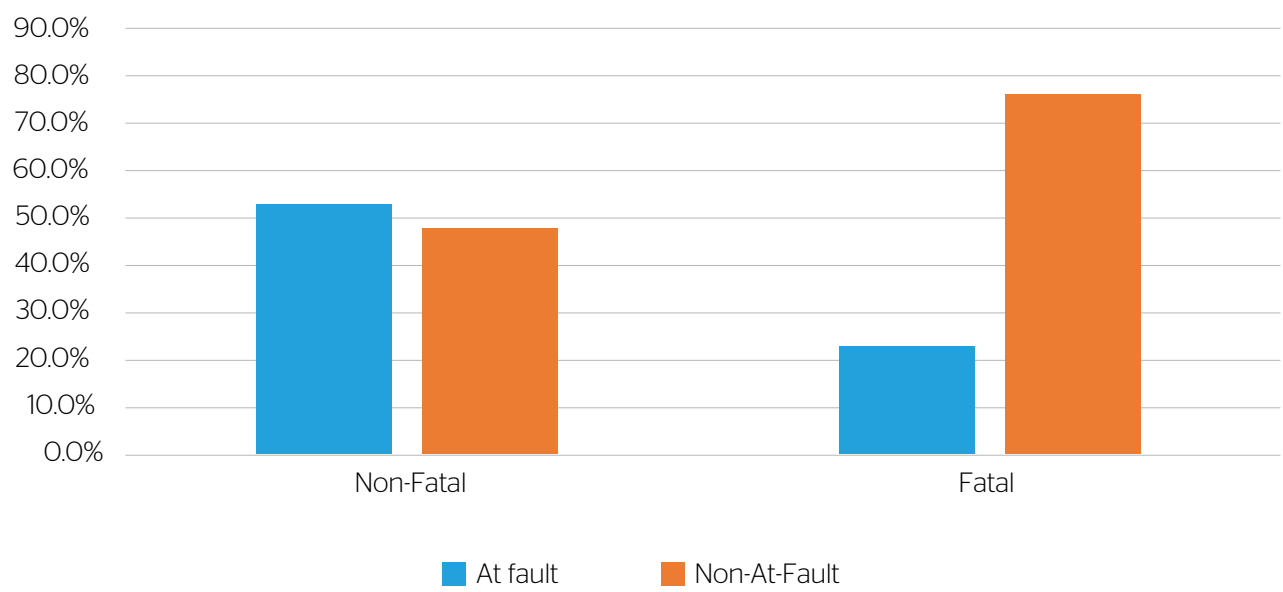
Proportion of fatal truck and car crashes where the truck is not-at-fault



2022 witnessed a significant shift in the proportion of non-fatal truck and car crashes where the car was at fault.

In the latest period under review cars were at fault in 48.8% of non-fatal crashes, up considerably on the previous year when 34.7% of non-fatal accidents were the car's fault.

Truck and Car Crashes, Truck-at-fault proportion by fatality status



NTI's crash mechanism coding reveals that for not-at-fault truck and car incidents, where the incident was fatal, 75% of the vehicles were travelling from opposing directions.



Regarding the indication of intent by the third party, the data shows the proportion of fatal truck and car crashes indicated (16.1%) or strongly-indicated (19.4%) to be intentional decreased slightly in 2022, down from 37.5% in 2021 to 35.5% in the most recent year.

Where the incident was not fatal, the largest proportion of crashes were vehicles travelling from adjacent directions (38.5%), followed by vehicles coming from same direction (25.6%), and vehicles from adjacent directions (24.4%).

Comparing to the previous years' data, the largest increase has been in vehicles from adjacent direction crashes.

DCA Code

Proportion of non-fatal car and truck crashes.

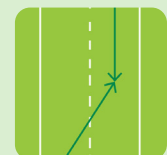
**11# Vehicles from adjacent directions
(intersections only)**

24.4%



12# Vehicles from opposing direction

38.5%



13# Vehicles from same direction

25.6%



DEFINITIONS

Inadequate following distance

Where the driver of the vehicle has not maintained sufficient following distance to traffic in front and due to the lack of manoeuvring time/space an incident has occurred when something has disrupted traffic, such as vehicles ahead unexpectedly slowing

Inappropriate Speed

Where the proximate cause of the crash was that the speed of the vehicle was incompatible with the vehicle dynamics, road geometry and/or prevailing weather and road conditions. IMPORTANT NOTE: This is not about trucks exceeding the posted speed limit.

Inappropriate vehicle positioning

Where the driver of the vehicle has active control of the vehicle and causes the vehicle to interact with a hazard which is either known to the driver or readily apparent.

Inattention/Distraction

Inattention and Distraction crashes are a grouped pairing of crash causes where the incident is determined to be as the result of the driver becoming disengaged from the driving task as the result of either a specific non-driving related stimulus (Distraction) or due to a loss of task focus (Inattention).

Fatigue

Where the driver involuntarily disengages from the driving task due to impairment from lack of sufficient quantity and/or quality of rest. IMPORTANT NOTE: This is not about driver compliance with work hour limits.

Non-Impact Fire

These events are where the proximate cause of the event is a fire, as distinct from fires which are a consequential result of another cause.

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ABOUT THE AUTHOR

Starting his career in the transport and logistics industry as a heavy vehicle consulting engineer, Adam developed a deep interest in not just the how of heavy vehicle regulation, but also the why.

This led to Adam leading the NHVR's Roadworthiness Program which was one of the responses resulting from a spate of serious truck accidents. He then returned to the commercial world taking a role as an Engineer with Penske Commercial vehicles before joining the team at NTI.

Adam is a passionate advocate for the safety and efficiency of the Australian road transport industry and is driven by a belief that everyone should make it home safe from their workplace.

In 2022 and 2023 Adam was an integral part of NTI's Spilt Milk Program, a joint NTI - NHVR Heavy Vehicle Safety Initiative funded project which sought to draw on the existing knowledge and expertise within a transport supply chain and to assist the parties in that chain to build safety resources which were fit-for-purpose and delivered in their industry's own voices.





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