Submission No 42

INQUIRY INTO HEAVY VEHICLE SAFETY AND USE OF TECHNOLOGY TO IMPROVE ROAD SAFETY

Organisation: Transport for NSW

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NSW Government Submission

Staysafe Inquiry into heavy vehicle safety and use of technology to improve road safety

PART I

SENSITIVE: NSW GOVERNMENT

Contents

Glossary and abbreviations

ACT	Australian Capital Territory
AEBS	Autonomous Emergency Braking System
ADR	Australian Design Rules
ANCAP	Australasian New Car Assessment Program
ANPR	Automated Number Plate Recognition
ATM	Aggregate Trailer Mass
AMVCB	Australian Motor Vehicle Certification Board
CARS	Compliance & Regulatory Services
CAVs	Connected and Automated Vehicles
CITI	Cooperative Intelligent Transport Initiative
CML	Concessional Mass Limits
COAG	Council of Australian Governments
CoR	Chain of Responsibility
CRS	Centre for Road Safety
C-ITS	Cooperative ITS
C-ACC	Connected Adaptive Cruise Control
DFSI	Department of Finance, Services and Innovation
DIRDC	Department of Infrastructure, Regional Development and Cities
DOJ	Department of Justice / Police
DPE	Department of Planning & Environment
DSRC	Dedicated Short Range Communications
DSS	Driver State Sensor
ECM	Electronic Control Module
EOI	Enforcement Operations Inspectors
EPA	Environment Protection Authority
ESC	Electronic Stability Control
EU	European Union
EU TPC	European Truck Platooning Challenge
EU WVTA	European Whole Vehicle Type-Approval System
EWD	Electronic Work Diary
FIB	Freight Industry Branch
FPP	Freight and Ports Plan
FTS 2056	Future Transport Strategy 2056
GAV	General Access Vehicles

GVM	Gross Vehicle Mass
HML	Higher Mass Limits
HVCBA	Heavy Vehicle Competency Based Assessment
HVIS	Heavy Vehicle Inspection Scheme
HVNL	Heavy Vehicle National Law
HVOSIP	Heavy Vehicle Operator Safety Information Program
HVSS	Heavy Vehicle Safety Station
IAP	Intelligent Access Program
IRR	Innovation Research & Reform
IVU	In-Vehicle Units
ITS	Intelligent Transport System
LDWS	Lane Departure Warning System
NCR	Non-Conformance Reports
NHVIM	National Heavy Vehicle Inspection Manual
NHVR	National Heavy Vehicle Regulator
NTC	National Transport Commission
NSW	New South Wales
OBM	On Board Mass
ORS	Operator Rating System
OSOM	Oversize and/or over mass
PBS	Performance-Based Standards
RAV	Restricted Access Vehicles
RFIC	Road Freight Industry Council
RIS	Regulation Impact Statement
ROR	Run-Off-Road (ROR
RSC	Roll Stability Control
RMS	Roads and Maritime Services
RTOs	Registered Training Organisations
RSP 2021	NSW Road Safety Plan 2021
NRSAP	National Road Safety Action Plan
NRSS	National Road Safety Strategy 2011–2020
SBAS	Satellite Based Augmentation System
SDP	Strategic Directions Plan 2016
SIC	Smart Innovation Centre
SIRA	State Insurance Regulatory Authority

SPV	Special Purpose Vehicle
SPECTS	Safety, Productivity & Environment Construction Transport Scheme
SVSEG	Strategic Vehicle Safety and Environment Group
TCA	Transport Certification Australia
TIC	Transport and Infrastructure Council
TISOC	Transport and Infrastructure Senior Officials' Committee
TIRTL	The Infra-Red Traffic Logger
TLG	Technical Liaison Group
TMPs	Transport Management Plans
TP	Transport Policy
UNECE	United Nations Economic Commission for Europe
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle

Executive Summary

The economic growth and prosperity of NSW depends on the safe, efficient and reliable movement of goods. The freight task is worth $66 billion to the NSW economy. In NSW, the movement of road freight is mainly undertaken on a shared transport network where the movement of freight and the movement of people compete for space.

The role of heavy vehicles in moving freight across NSW is substantial with the majority of all interstate freight – 92 per cent – being transported by road. The draft NSW Freight and Ports Plan estimates that the freight volume in Greater Sydney will double and in regional NSW will grow by 25 per cent over the next 40 years.

The significant level of construction activity underway in the State is expected to drive significant economic growth. It is also expected to generate increases in heavy truck movements and consequently increased risk of involvement of these vehicles in casualty crashes. The increases in heavy vehicle fatal crashes in recent years would appear to support this relationship.

Despite the rise in the road toll since 2015, there has been significant progress in saving lives on NSW roads, having achieved the lowest road toll of 307 in 2014 compared to a peak of 1,384 fatalities in 1978.

The 2017 provisional road toll was 392 fatalities, equivalent to a fatality rate of 4.99 per 100,000 population. This was 12 more fatalities than in 2016. The 2017 road toll is the third consecutive year that the road toll has increased; however, it also represents the fifth lowest on record. Of the 392 fatalities, 86 resulted from 73 fatal crashes involving heavy vehicles, a 32 per cent increase in fatalities when compared to 2016 crash data. The increase has largely occurred on country roads, up from 37 fatalities to 62, and in particular from articulated truck crashes on country rural roads, up from 16 fatalities to 37.

The number of heavy vehicles registered in NSW grew by 2.9 per cent between June 2016 and June 2017. However, while heavy vehicles make up only 2.5 per cent of NSW motor vehicle registrations and 9 per cent of kilometres travelled by all NSW vehicles, heavy vehicles are involved in about 22 per cent of all road fatalities (2017 provisional) and 7 per cent of serious injuries (2016). Crashes involving heavy vehicles are often serious because of their size and weight, regardless of who is at fault.

For all multi-vehicle heavy vehicle fatal crashes in NSW (2012 to June 2017), the heavy vehicle was deemed to be the key vehicle in 29 per cent of fatal crashes. This differs significantly from multi-vehicle casualty crashes over the same period, where the heavy vehicle is deemed to be the key vehicle in 63 per cent of casualty crashes.

Over the 18-day Christmas holiday period ending 1 January 2018, the road toll spiked, with 32 fatalities - an increase of 18 deaths, when compared to the same operational period in 2016. The contributing factors in this period were consistent with the overall 2017 trends including 72 per cent of fatalities occurring on country roads, 75 per cent of fatalities resulting from run off road or head on crashes, and speeding contributing to 44 per cent of fatalities.

As a first action, the Minister for Roads, Maritime and Freight wrote to the Staysafe Committee in January 2018 requesting that the terms of reference of the current Inquiry be amended so that the 2017/18 Christmas holiday road toll could be formally considered as part of the Inquiry.

The safety of trucks came under the spotlight again in mid-January 2018 when three heavy vehicles were involved in two separate incidents on NSW roads, resulting in five fatalities and more than 10 injured. The Minister for Roads, Maritime and Freight convened a meeting on 23 January 2018 with industry and government representatives to work in partnership to identify priority actions needed to address the increase in fatalities resulting from truck incidents.

Government and industry have made significant safety improvements over recent decades, including in-vehicle design, technology, infrastructure upgrades, driver qualifications and training, education and fatigue management, and enforcement. NSW has one of the more robust multi-faceted compliance and enforcement systems in Australia and has invested considerably in enforcement resources, infrastructure and technology.

The Safe System approach to road safety involves four elements namely, safer people, safer roads, safer speeds and safer vehicles that work together as a whole to reduce road trauma. In regard to heavy vehicle safety this involves driver behaviour and training, vehicle safety including technology and maintenance, road infrastructure, management systems and practices, and regulation including compliance and enforcement. It requires an integrated approach with multiple partners.

In responding to the Inquiry's terms of reference, this submission outlines the strategic context, heavy vehicle crash data, the regulatory and compliance framework in NSW, and regulatory and safety technologies including national and international experience. Consistent with the Safe System approach it also provides an overview of safer road infrastructure initiatives, safer people strategies including driver skills, road user behaviour and accreditation schemes.

Emerging heavy vehicle issues include:

- Encouraging greater industry uptake of telematics and proven vehicle safety technologies
- Accelerating the introduction of vehicle safety technologies by improving the vehicle standards and Australian Design Rules (ADR) process
- Accelerating use of technology to gather and apply information on patterns of behaviour that enable targeting compliance and enforcement resources on high-risk drivers and operators and supports industry flexibility where safety and compliance is demonstrated
- Effective strategies and incentives to support smaller operators to implement industry-wide safety changes. Over 70 per cent of the heavy vehicle fleet in Australia are operators with less than five trucks
- Continued investment in the national and state road network to provide the safest possible environment for heavy vehicles and other vehicles sharing the road.
- Improving research capability to investigate crashes to better understand the contributing factors in crashes involving heavy vehicles
- Improving driver skills and competency through accreditation
- Improving education and information for industry to support effective implementation of safety initiatives and for the general community to improve safe driving practices around heavy vehicles
- Delivery of a holistic approach to heavy vehicle rest areas that integrates infrastructure improvements with behavioural initiatives to reduce fatigue related crashes.

Building a safety culture and improving safety through partnerships are priorities identified in the NSW Government's Road Safety Plan 2021 (RSP 2021) released in February 2018. The RSP 2021 commits to the development of a new heavy vehicle safety strategy and partnerships with the heavy vehicle industry, including champions of change, to improve safety of the freight task across NSW.

Providing a safe system for the economically and socially essential task of transporting freight by road will not be achieved entirely by actions directed at the design, use and behaviour of the heavy vehicle fleet itself. Further improvements in heavy vehicle safety outcomes will be achieved through the delivery of road safety initiatives across the Safe System prioritised in the RSP 2021.

This includes a new Saving Lives on Country Roads infrastructure program, with an initial $125 million government commitment. Under this program targeted safety works such as life-saving flexible barriers and rumble strips will be installed to help prevent run-off-road and head-on crashes. Improved enforcement will also be achieved through the expansion of the heavy vehicle average speed camera program, including expanding to metropolitan areas, to address risks associated with greater truck movements across Sydney.

The development of a new heavy vehicle safety strategy for NSW in partnership with the heavy vehicle industry provides an effective platform for the NSW Government to continue to work to improve road safety outcomes for heavy vehicles and other road users. It will also provide an effective mechanism to address outcomes arising from this Inquiry.

1 Terms of reference

As a result of increasing road toll involving heavy vehicles, in October 2017, the Minister for Roads, Maritime and Freight, the Hon Melinda Pavey MP, requested the Parliamentary Joint Standing Committee on Road Safety (Staysafe) Committee inquire and report into heavy vehicle safety and the potential for technology to improve road safety.

Further to this, on 5 January 2018, the Minister requested the Staysafe Committee extend the terms of reference to investigate the increased road toll over the 2017/2018 Christmas holiday period.

The Terms of Reference for the Inquiry into heavy vehicle safety and the potential for technology to improve road safety include:

1. The management of heavy vehicle driver fatigue and other safety risks through in-vehicle technologies, including benefits, costs, availability and adoption by industry
2. The development of connected and automated vehicle technologies specific for the heavy vehicle industry and opportunities for further development in this space
3. The role of compliance and enforcement in maintaining the safety of heavy vehicles on our roads
4. Heavy vehicle safety strategies implemented in other jurisdictions, both domestically and internationally.
5. Report on the road toll during the period commencing 1 December 2017 through to the 31 January 2018.

Due to the data requirements for the additional term of reference, the Staysafe Committee agreed to the NSW Government's response being submitted in two parts:

- Part 1 - Heavy vehicle safety and the potential for technology to improve road safety.
- Part 2 - Road toll during the period commencing 1 December 2017 through to the 31 January 2018.

This submission is Part 1 of the NSW Government response to the Inquiry.

2 NSW Government submission

For the purpose of this submission, the term **"heavy vehicle[1]"** is a vehicle that has a Gross Vehicle Mass (GVM) or Aggregate Trailer Mass (ATM) of more than 4.5 tonnes and a combination that includes a vehicle with a GVM or ATM of more than 4.5 tonnes. As the focus of the Inquiry is on truck safety, buses are not included in the scope of the discussion in this submission. However, for the purposes of data integrity buses as a vehicle type were retained in crash data.

In preparing this submission a range of NSW Government agencies were consulted including:

- Transport for NSW
  - Centre for Road Safety
  - Transport Policy
  - Smart Innovation Centre
  - Freight Industry Branch
  - Innovation Research & Reform
- Roads and Maritime Services
  - Compliance & Regulatory Services
  - Regional & Freight
- Department of Justice
  - NSW Police Force
- Department of Finance, Services and Innovation
  - State Insurance Regulatory Authority
  - SafeWork NSW

[1] As defined by Heavy Vehicle National Law (the HVNL)

3 Strategic Context

3.1 NSW Context

3.1.1 Draft Future Transport 2056[2]

The draft Future Transport 2056 (FT 2056) provides the opportunity to update the NSW Long Term Transport Master Plan. It is a 40-year vision for mobility in NSW being developed with the Department of Planning and Environment, Infrastructure NSW and the Greater Sydney Commission.

The draft FT 2056 sets out a vision, strategic directions and customer outcomes, with infrastructure and services plans for Greater Sydney and Regional NSW to deliver these directions across the state.

The draft FT 2056 is the first strategy of its kind, to look at ways to harness the rapid advancement of technology and innovation across the transport system, to transform the customer experience, improve communities, ensure a safe network and boost economic performance.

3.1.2 NSW Road Safety Strategy 2012 – 2021

The NSW Government established the NSW Road Safety Strategy 2012-2021 to provide a 10 year direction for safer road travel in NSW, and also set the State Priority target of reducing fatalities by 30 per cent by 2021 (compared to 2008-2010).

As per the NSW Road Safety Progress Report 20163 the NSW Government has implemented a variety of initiatives to improve heavy vehicle safety and reaffirms NSW has the toughest and most active heavy vehicle enforcement regime in Australia.

Since the Strategy's release, key achievements include continued compliance operations through a specialised Compliance Investigation Unit to ensure breaches of heavy vehicle rules are investigated and offenders are prosecuted. RMS investigators are involved in joint operations with the NSW Police Force and police agencies in other states to target heavy vehicle speeding and breaches of fatigue laws.

The Chain of Responsibility Industry Education Program was implemented with presentations and information sessions delivered to key operators in the civil construction industry.

Programs were developed to help reduce truck rollovers in the forestry, livestock industry sectors and concrete and aggregate haulage sectors.

Two Heavy Vehicle Roadworthiness Surveys were conducted in 2012 and 2015 to assess compliance with required regulations including licence, registration, load restraint, mass and work and rest requirements.

The field stage of the Fleet CAT (Fleet Collision Avoidance Technology Trial) project was completed, with drivers in the project travelling 363,000 km and receiving 117,000 alerts from the collision avoidance system.

The Cooperative Intelligent Transport Initiative Project (CITI): Connected vehicles and infrastructure study – includes 38 trucks, 11 public buses, three light vehicles, a motorcycle and three signalised intersections all communicating with each other ten times per second. In January 2017, the project was expanded to cover more than 23,000 km of the NSW road network.

The Safety Technologies for Heavy Vehicles and Combinations guide was published in 2013, 2014 and 2017.

[2] https://future.transport.nsw.gov.au/

3 http://roadsafety.transport.nsw.gov.au/downloads/road-safety-progress-report-2016.pdf

3.1.3 NSW Road Safety Plan 2021[4]

Building on the NSW Road Safety Strategy 2012–2021, the NSW Government released the Road Safety Plan (RSP 2021) in February 2018. It resets priorities and sets out targeted and proven initiatives to be implemented over the next five years and help work towards the State Priority Target of reducing fatalities by 30 per cent by 2021 (compared to 2008-2010 levels). It also aligns the Towards Zero vision with the FTS 2056, which aims to have a NSW transport network with zero trauma by 2056.

The RSP 2021 was developed over a period of 15 months and is based on the internationally recognised Safe System approach to improving road safety supported by evidence and expert advice from across Australia and countries with the safest roads in the world. The Plan also takes on board feedback from across the community, gathered from forums and online engagement.

Priority areas for action include:

- Saving lives on country roads – improving road safety infrastructure, including targeting high-risk roads and behaviours, as the fatality rate on country roads is four times the rate on metropolitan roads.
- Safe urban places – addressing crashes in busy local areas, including pedestrian trauma.
- Using the roads safely – preventing risky road behaviour, such as drink and drug driving.
- Building a safer community culture – working in partnership with local and state road authorities, education providers, business and industry, vehicle manufacturers, community organisations and road safety advocates to build a safety culture.
- New and proven vehicle technology – leveraging advances in technology to prevent crashes and minimise human error which contributes to around 94 per cent of crashes.
- Building a safe future – ensuring that when we plan, develop, design, operate and maintain our roads, safety is at its core.

The RSP 2021 includes specific initiatives targeting heavy vehicle safety including:

- Working with the heavy vehicle industry to develop a new heavy vehicle strategy to improve operational safety and increase the uptake of safety technology.
- Increasing road treatments which separate vehicles through the Saving Lives on Country Roads infrastructure program.
- Expansion of the heavy vehicle average speed camera program to metropolitan areas to address risks associated with greater truck movements.
- Working with the Commonwealth Government to fast-track the adoption of new technologies into vehicle standards, including for commercial and heavy vehicles.
- Partnering with the heavy vehicle industry to increase safety features in the fleet, such as blind spot monitoring and under run protection, and enhance integration of fleet safety into heavy vehicle access policy.
- Development of new platforms and enhanced road safety content in driver testing, including safe interaction with heavy vehicles.

3.1.4 Draft NSW Freight and Ports Plan[5]

The draft NSW Freight and Ports Plan (FPP) was released in December 2017 to provide direction to business and industry for managing and investing in freight into the future.

[4] towardszero.nsw.gov.au
[5] https://future.transport.nsw.gov.au/wp-content/uploads/2018/plans/Freight-and-Ports-Plan.pdf

In developing the FPP, an integrated approach has been adopted, with close alignment with the State Infrastructure Strategy, FTS 2056, Regional and Greater Sydney Services and Infrastructure Plans and other support plans such as the RSP 2021.

The achievement of safe and efficient movement of goods is a key objective of the FPP and is integrated with the safety outcomes identified for heavy vehicle safety in the RSP 2021. Agreed safety outcomes will be identified and agreed as part of the finalisation of the FPP.

3.2 National Context

3.2.1 Draft National Road Safety Action Plan 2018-2020

The draft National Road Safety Action Plan 2018 – 2020 (NRSAP) is currently under development and is intended to support the implementation of the National Road Safety Strategy 2011–2020 (NRSS). It will address key road safety challenges identified in the 2017 review of the NRSS and propose a range of priority national actions to be taken by governments over the three years 2018 to 2020.

The NRSAP is being developed cooperatively by Commonwealth, state and territory transport agencies. It does not replace the broader 10-year agenda of the NRSS but will help to ensure that national efforts in the next three years are focused on strategically important initiatives. Improving heavy vehicle safety has been identified as a priority in the NRSAP.

An Inquiry into improving the effectiveness of the NRSS is currently underway. The Terms of Reference for the inquiry are:

- Identify the key factors involved in the road crash death and serious injury trends including recent increases in 2015 and 2016.
- Review the effectiveness of the NRSS and supporting 2015-17 NRSAP, with particular reference to the increase in deaths and serious injuries from road crashes over the last two years
- Identify issues and priorities for consideration in development of a post-2020 NRSS and 2018-2020 NRSAP, focusing on how Australia can recognise and move towards a safe road transport system, which minimises harm to all users.
- Advise on arrangements for the management of road safety and the NRSS, looking at best coordination and use of the capacity and contributions of all partners.

3.2.2 Heavy Vehicle National Law and the National Heavy Vehicle Regulator

As part of the national microeconomic reform agenda driven by the Council of Australian Governments (COAG), NSW has worked closely with the Commonwealth and other jurisdictions on the establishment of three national transport regulators including the National Heavy Vehicle Regulator (NHVR), to harmonise regulatory regimes, drive economic efficiencies and improve safety.

The NHVR administers one set of national laws for heavy vehicles under the Heavy Vehicle National Law (HVNL), delivering a range of services under a consistent regulatory framework.

The national law commenced on 10 February 2014 and applies in the Australian Capital Territory, New South Wales, Queensland, South Australia, Tasmania and Victoria, and replaces corresponding heavy vehicle law in each of the respective jurisdictions. The law establishes a national framework to facilitate and regulate the use of heavy vehicles in a way that promotes safety, manages the impact of heavy vehicles on the environment, road infrastructure and public amenity, promotes productivity and efficiencies, and encourages innovative and safe business practices.

The HVNL does not apply to:

- Driver licensing
- The regulation of dangerous goods vehicles and their drivers
- Vehicle registrations. Note: A National Heavy Vehicle Registration Scheme is planned to be implemented by mid-2018.
- Bus driver authorities and bus operator accreditation.

The NHVR is responsible for:

- National Heavy Vehicle Accreditation Scheme management and accreditations
- Performance-Based Standards Scheme vehicle design and access approvals
- heavy vehicle access permit applications
- heavy vehicle standards modifications and exemption permits
- a national driver work diary and risk classification system for advanced fatigue management
- one set of national notices
- one set of national fees for NHVR services
- one set of national penalties
- chain of responsibility (CoR)

The NHVR sets out its 10 year vision in the Strategic Directions Plan 2016 (SDP) based on the following key result areas:

- Safety – minimising harm to drivers and passengers, other road users and property associated with heavy vehicle incidents.
- Productivity – maximising the economic value of heavy vehicle activity by facilitating better, more efficient ways for the participants in the heavy vehicle industry to undertake their activities.
- Sustainability – minimising the adverse impacts of heavy vehicles on the road infrastructure, environment and the community.
- Regulatory Capability – ensuring the regulatory activities, which the NHVR undertakes, are proportionate, procedurally fair, evidence based and delivered in the most efficient and effective manner to achieve our vision and perform our role.

The SDP is underpinned by the:

- National Heavy Vehicle Safety Strategy
- National Heavy Vehicle Compliance and Assurance Strategy
- National Heavy Vehicle Productivity Strategy

The strategies are implemented through a series of rolling action SDP[6].

3.3 Key trends and challenges

3.3.1 Freight Task

The economic growth and prosperity of NSW depends on the safe, efficient and reliable movement of goods. In NSW, the freight movement task shares the use of the transport network with the movement of people.

The role of heavy vehicles in moving freight across NSW is substantial – approximately 92 per cent by road, excluding coal. The volume of all commodities demanding capacity on the freight network is expected to grow as population and economic activity increases across NSW. The Transport Performance and Analytics team within TfNSW estimates that the freight on key road corridors will increase by 33 per cent by 2036, compared to 2016.

The most frequently used road corridors in NSW are the Pacific (M1) and Hume (M31) Highways, which carry most of the 30 million tonnes of interstate freight between Melbourne, Sydney and Brisbane. Road corridors including the Newell (A39), Sturt (A20) and New England (A15) Highways support primary industries in western NSW. The increasing transport activities associated with a growing freight task directly translate into an increased safety risk. There is a challenge to manage the capacity of existing roads to support this traffic growth and deliver improved safety outcomes.

[6] The latest quarterly update is available at https://www.nhvr.gov.au/files/201711-0724-quarterly-snapshot-q1-2017-18.pdf

Service expectations

There is an increased consumer expectation of services being available 24/7, through on-line shopping and for product delivery to be quicker – such as through 'same day delivery' in the 'Business to the Customer' (B2C) space.

These service expectations are already having an impact and will continue to have an impact on demand for freight, particularly in the last mile delivery segment. The expansion of services to 'anywhere delivery' and more flexible options will place more pressure on the cost structures and competitiveness of service providers.

'Business to Business' (B2B) customer requirements include meeting delivery reliability, price and product specifications

Population growth and urbanisation

With a growing population and increasing freight task, there is a need to provide innovative solutions to the demands placed on the freight transport network to address issues such as congestion, journey and access times and safety risks.

Population growth in Greater Sydney and Regional NSW will mean there is increased consumer demand, which in turn will increase the freight task. The geographic locations of this growth will also influence the origin and destination of freight flows.

The need to operate on smaller congested networks within urban areas and the increasing demand for more innovative last mile delivery options poses potential road safety risks as well as opportunities. For example, positive safety consequences may arise as freight is transferred to smaller trucks, which can mix more safely with other road users and Connected and Automated Vehicles (CAVS) from restricted Higher Productivity Vehicles operating at distribution centres on urban fringes and at intermodal terminals.

Urban encroachment

Planned residential and commercial developments are encroaching on key industrial freight precincts and corridors. In addition to restricting access to key freight corridors, developments around key freight precincts can also change traffic patterns increasing congestion and safety risks.

Heavy vehicle regulation

There is increasing demand for the use of heavier and longer vehicle combinations and access to the road network. Restricted access for larger heavy vehicles on the network may limit productivity, result in longer journeys, and increase the number of vehicles being used on the network.

While new and emerging vehicle and regulatory technology may make these larger vehicles safer consideration of increased demand for these types of vehicles and increased access to the network needs to be balanced against safety risks and community expectations.

Growth in agriculture demand

The increase in export demand for NSW agricultural products is increasing the freight access required between regional centres and gateway ports although the larger commodity flows such as grains use bulk and containerised rail to supply shipping terminals.

3.3.2 Increase in fatalities from heavy vehicle crashes

In 2017, NSW experienced a 32 per cent increase in fatalities from heavy vehicle crashes (up from 65 in 2016 to 86 in 2017). Heavy vehicle fatal crashes increased by 22 per cent over the same period (up from 60 in 2016 to 73 in 2017). This increase was largely generated from fatal crashes involving articulated trucks.

The fatality increases in NSW were largely in the country areas (up from 37 in 2016 to 62 in 2017), particularly on country State and Regional roads (up from 31 in 2016 to 58 in 2017), and involved deaths amongst light vehicle occupants (up from 36 in 2016 to 51 in 2017), motorcyclists (up from 8 in 2016 to 9 in 2017) and pedestrians (up from 10 in 2016 to 12 in 2017).

In multi-vehicle fatal heavy vehicle crashes during the period 2012 to June 2017, heavy vehicles accounted for 29 per cent of the "key" vehicles involved in these crashes. The key vehicle is the vehicle identified as the vehicle movement largely contributing to the crash, though the key vehicle is not necessarily deemed to be at fault. In contrast, in multi-vehicle casualty heavy vehicle crashes over the same period, heavy vehicles accounted for 63 per cent of the "key" vehicles involved in these crashes.

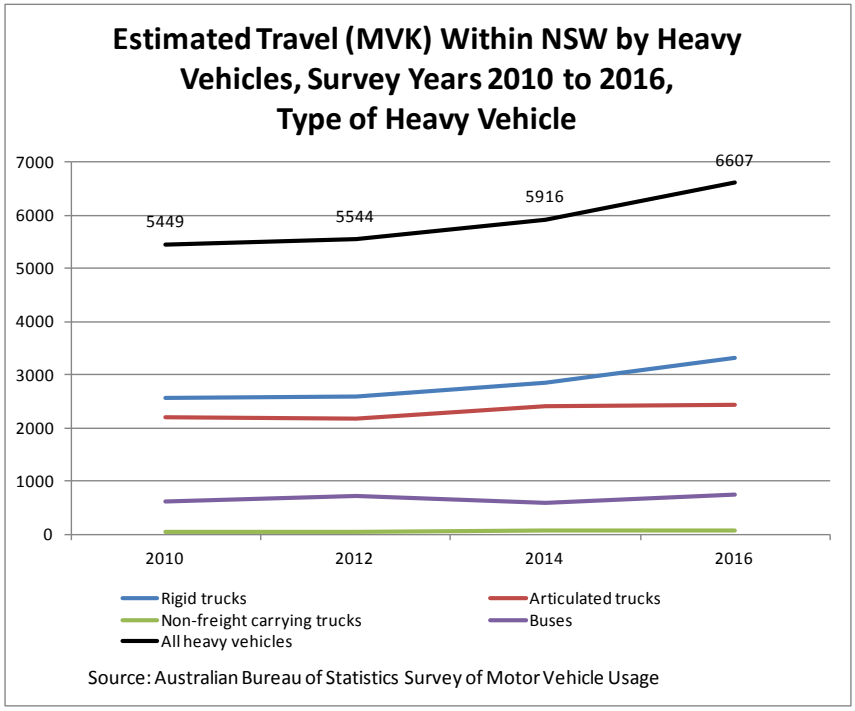
The disparity in these percentages of heavy vehicle deemed to be the key vehicle is explained by the differing nature of fatal and casualty crashes. Fatal crashes are more likely to involve head on crashes (generally where another vehicle has crossed the road and collided with the heavy vehicle). In contrast, casualty crashes involving a heavy vehicle are more likely to occur at intersections, involve turning side swipe, lane side swipe crashes and rear end crashes – all of these crashes have a tendency for the heavy vehicle to be deemed the key vehicle.

3.3.3 Growth in heavy vehicle travel on NSW roads

According to the Australian Bureau of Statistics (ABS) Surveys of Motor Vehicle Usage, there has been a strong growth in heavy vehicle travel since 2012, particularly generated by rigid trucks. Between the 2012 and 2016 surveys, heavy vehicle travel in NSW increased by 19 per cent with rigid truck travel increasing by 28 per cent over the same period.

However, it should be noted that the ABS vehicle categories do not necessarily align with those in the crash data and because the ABS travel estimates are based on samples, there are not insignificant standard errors associated with the point estimates.

The growth in articulated vehicle travel reflects growth in agricultural freight across NSW and interstate movements, including to the growing Australian Capital Territory (ACT).



3.3.4 Economic activity and crash rates

The freight task in NSW is large, with the majority of all interstate freight – 92 per cent – being by road. The draft Freight and Ports Plan estimates that the freight on key road corridors will increase by 60 to 88 per cent by 2031, compared to 2011.

The M7 Motorway operators have advised an eight per cent year-on-year growth of heavy vehicle traffic volumes on that motorway. Transport for NSW has undertaken analysis and anticipates there will be an average of 1,800 truck movements a day in the Sydney CBD alone as a consequence of increased construction activity. It is anticipated that 2018/2019 will see significant numbers of heavy vehicles in the CBD.

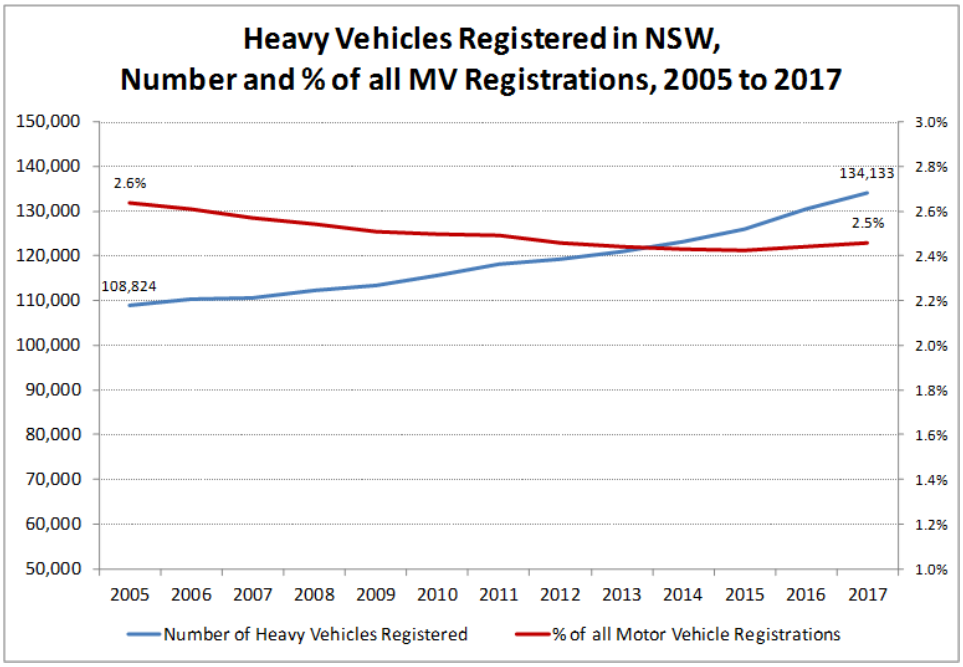
This would be expected to generate an increased risk of involvement of these vehicles in casualty crashes. The increases in heavy vehicle fatal crashes in recent years would appear to support this relationship; particularly given much of the increase from 2013 to 2015 was among heavy rigid trucks in the NSW Greater Conurbation.

3.3.5 Heavy vehicle registrations[7]

Over the period 2005 to 2016 there was modest growth in the number of heavy vehicles registered in NSW, up by 20 per cent from 108,824 in 2005 to 134,133 in 2017. However, the increases between June 2015 and June 2016 (up by 3.5 per cent) and June 2016 to June 2017 (up by 2.9 per cent) were the strongest annual increases since at least 2005.

Despite the 2016 increase in registrations, as a percentage of all motor vehicle registrations heavy vehicles have slightly decreased from 2.6 per cent in 2005 to 2.5 per cent in 2017.

However, it is important to note that a significant proportion of heavy vehicles operating on NSW roads, particularly articulated trucks, are registered in jurisdictions outside NSW. In the 12-month period ending 13 February 2018, 41 per cent of heavy vehicle involved in fatal crashes in NSW were registered interstate; of these, 17 were from Victoria and 10 from Queensland.



[7] Please note the variation between CRS data and RMS Compliance data (DRIVES) on page 23 regarding HV registration. CRS HV registration does not include the plants and trailers. Also CRS data it is reported as of 30 June 2017 whilst DRIVE data is reported as of 30 September 2017.

4 NSW road safety data[8]

4.1 Heavy vehicle data definitions

The data presented in this chapter uses the following definitions:

Crash and serious injury

- 'A crash' is a crash which is reported the Police, which occurs on a road (or within road reserve) which is open to the public, which involves at least one moving road vehicle and which involved at least one person killed or injured or at least one motor vehicle towed away.
- 'A fatal crash' is a crash in which there is at least one fatality.
- 'A fatality' is a person who dies within 30 days of a crash from injuries received in that crash.
- 'A serious injury crash' is a crash which involves at least one person seriously injured but no fatalities.
- 'A serious injury' is a person identified in a police report and matched to a health record indicating a hospital stay due to injuries sustained in a crash, or is identified as an icare (Lifetime Care) participant.
- 'Casualty' is considered any person killed or injured because of a crash
- 'A heavy truck crash' is a crash involving at least one heavy truck.
- 'A heavy rigid truck crash' is a crash involving at least one heavy rigid truck
- 'An articulated truck crash' is a crash involving at least one articulated truck

Heavy Vehicle Types

- A heavy truck comprises a heavy rigid truck or an articulated truck.
- A heavy rigid truck comprises a rigid lorry or a rigid tanker with a tare weight in excess of 4.5 tonnes. Note can also include those trucks with non-articulated trailers attached (e.g. truck and "dog" combinations).
- An articulated truck comprises an articulated tanker, semi-trailer, low loader, road train and B-doubles. Note articulated trucks are deemed to have a tare weight in excess of 4.5 tonnes. A semi-trailer prime mover without any trailers attached is considered a heavy rigid truck.

Definition of Key Vehicle Status

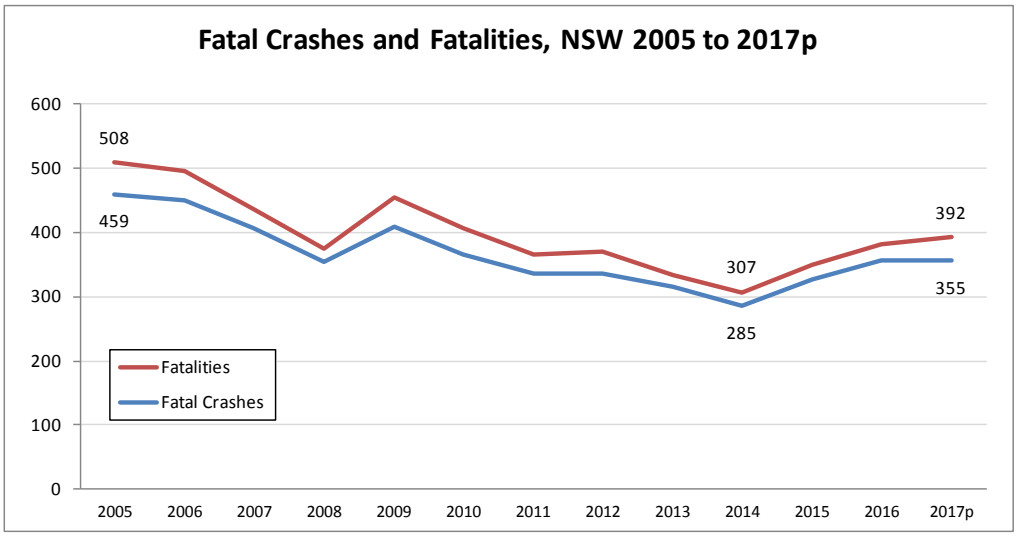
- Although crashes are multi-factorial in nature, and may involve multiple contributing factors for all parties involved, the "key vehicle status" is often used as a proxy for identifying the party at fault for a crash.
- For every crash there is a determination of the key vehicle involved in the crash on the basis of the road user movements for each traffic unit involved in the crash. The key vehicle is the traffic unit which performs the manoeuvre which largely precipitates the crash occurring. For example for a crash where a car crosses to the incorrect side of the road and collides with a truck, the car is deemed to be the key vehicle.
- The crash database does not specifically identify the party at fault in a crash. Instead, key vehicle status can be used as a proxy measure. The key vehicle is the vehicle with the road user movement that largely contributes to the crash occurring. The key vehicle is the vehicle identified as the vehicle movement largely contributing to the crash, though the key vehicle is not necessarily deemed to be at fault.
- For example, where a heavy truck turns right at a signalised intersection with a green turn signal and collides with an oncoming motorcycle travelling through a red light, the heavy vehicle is still deemed to be the key vehicle even though the motorcyclist was clearly "at fault".

[8] For the purpose of integrity data the buses where included

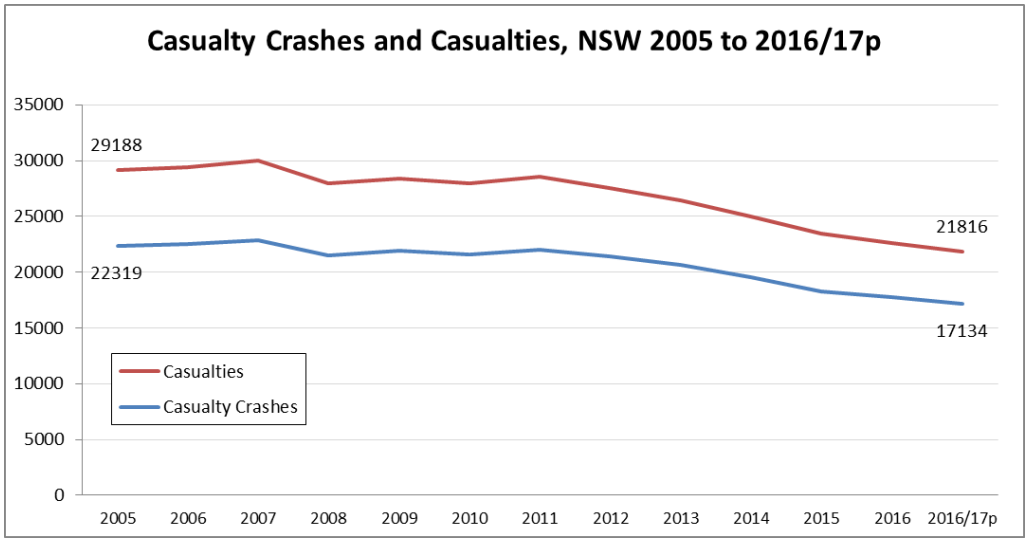
4.2 Heavy vehicles casualties and casualty crashes 2005-2016/17p

4.2.1 General trends

Between 2005 and 2017p there was a 23 per cent decrease in both fatalities and fatal crashes. However, disappointingly in recent years fatalities have increased by 28 per cent from the low point in 2014.



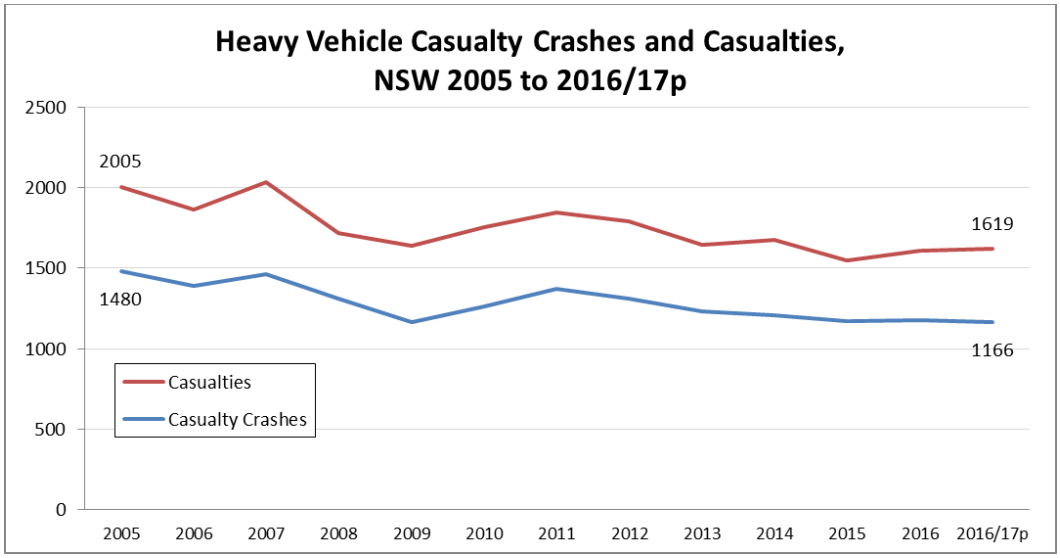
Casualty crash data are not available for the whole of 2017 at this time. Instead preliminary casualty crash data for the financial year 2016/17 are presented. The overall number of casualties and casualty crashes has been declining over the 2005 to 2016/17p, particularly since 2011. Between 2005 and 2016/17p casualties decreased by 25 per cent and casualty crashes decreased by 23 per cent. However, there has been an artificial decrease in overall casualties and casualty crashes associated with changes to Police procedures introduced in late 2014 for the reporting of lower severity crashes.



4.2.2 Road Trauma from Heavy Vehicle Crashes

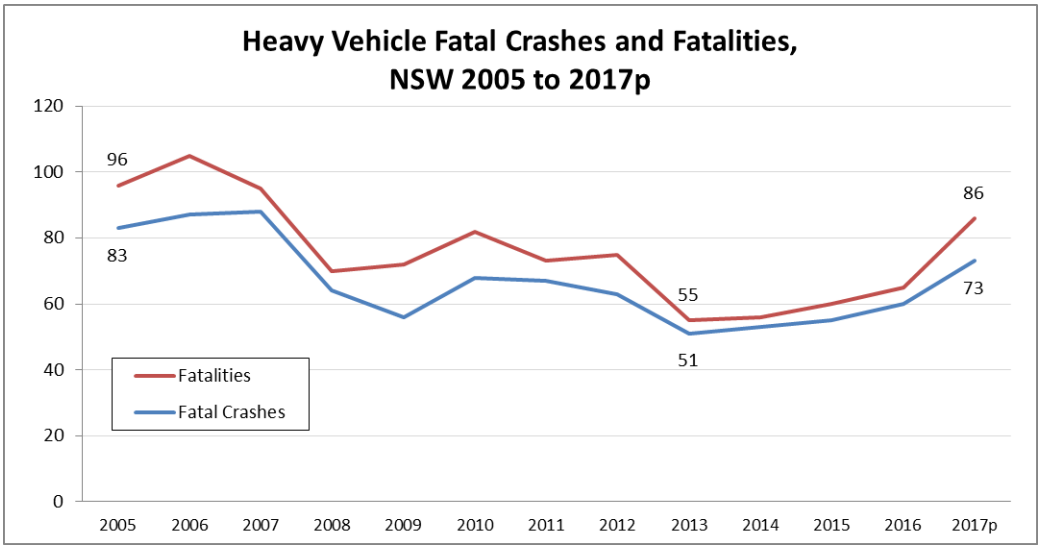
Over the past decade there has been a similar general downward trend in the number of heavy vehicle casualty crashes and the casualties from these crashes.

Since 2005, the number of heavy vehicle casualty crashes has fallen 21 per cent by 2016/17p, down from 1,480 to 1,166. Over the same period casualties from these crashes have also fallen by 19 per cent, from 2,005 to 1,619.



Reductions in heavy vehicle fatal crashes and fatalities have occurred despite the disappointing increases since 2013. Since 2005, the number of heavy vehicle fatal crashes has fallen 12 per cent by 2017p, down from 83 to 73. Over the same period, fatalities from these crashes have fallen by 10 per cent, from 96 to 86.

Fatalities from heavy vehicle crashes as a per cent of total fatalities rose from 19 per cent in 2005 to 22 per cent in 2017p.



4.2.3 Heavy Vehicle Casualty Crashes 2012 to June 2017

The following section details the characteristics of heavy vehicle casualty crashes over the most recent five-and-a-half year period 2012 to June 2017p.

There were a total of 6,675 heavy vehicle casualty crashes over the five year period 2012 to June 2017. Of these crashes, 321 (5 per cent) were fatal, 2,237 (34 per cent) were serious injury, 2,419 (36 per cent) were

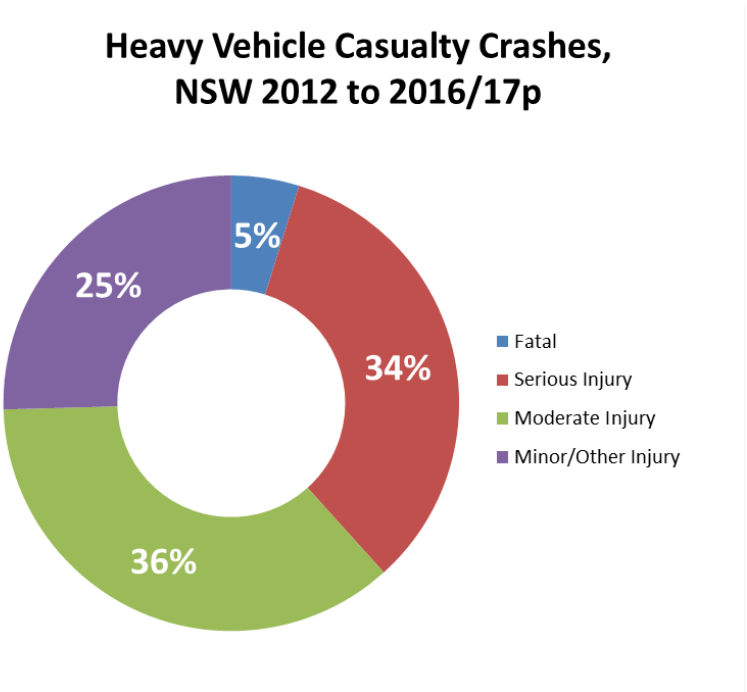
moderate injury and 1,698 (25 per cent) were minor / other injury crashes. A comparison of these crashes as a percentage of all casualty crashes for the same period is presented in the tables below.

Heavy Vehicle Casualty Crashes

	2012	2013	2014	2015	2016	2016/17p	2012-16/17p
Fatal	63	51	53	55	60	65	321
Serious Injury	390	413	401	421	409	414	2,237
Moderate Injury	524	484	467	378	372	377	2,419
Minor/Other Injury	332	287	284	315	337	310	1,698
Total	1,309	1,235	1,205	1,169	1,178	1,166	6,675

Heavy Vehicle Casualty Crashes as % of All Casualty Crashes

	2012	2013	2014	2015	2016	2016/17p	2012-16/17p
Fatal	19%	16%	19%	17%	17%	20%	18%
Serious Injury	6%	7%	7%	8%	7%	8%	7%
Moderate Injury	6%	5%	6%	6%	6%	7%	6%
Minor/Other Injury	6%	5%	6%	6%	6%	6%	6%
Total	6%	6%	6%	6%	7%	7%	6%



Of the 6,675 heavy vehicle casualty crashes during the period 2012 to June 2017, 3,161 (47 per cent) involved a heavy rigid truck, 2,638 (40 per cent) involved an articulated truck and 1,046 (16 per cent) involved a heavy bus. Note that a heavy vehicle casualty crashes may involve more than one type of heavy vehicle.

However, of the 321 heavy vehicle fatal crashes, 172 (54 per cent) involved an articulated truck, 132 (41 per cent) involved a heavy rigid truck and 31 (10 per cent) involved a heavy bus.

Heavy Rigid Truck Casualty Crashes

	2012	2013	2014	2015	2016	2016/17p	2012-16/17p
Fatal	22	22	21	22	30	27	132
Serious Injury	149	179	181	211	197	191	1,004
Moderate Injury	232	211	228	178	217	205	1,162
Minor/Other Injury	142	134	140	173	194	173	863
Total	545	546	570	584	638	596	3,161

Articulated Truck Casualty Crashes

	2012	2013	2014	2015	2016	2016/17p	2012-16/17p
Fatal	39	30	28	31	22	33	172
Serious Injury	190	182	156	168	160	167	941
Moderate Injury	207	198	186	152	110	118	921
Minor/Other Injury	144	120	102	97	98	100	604
Total	580	530	472	448	390	418	2,638

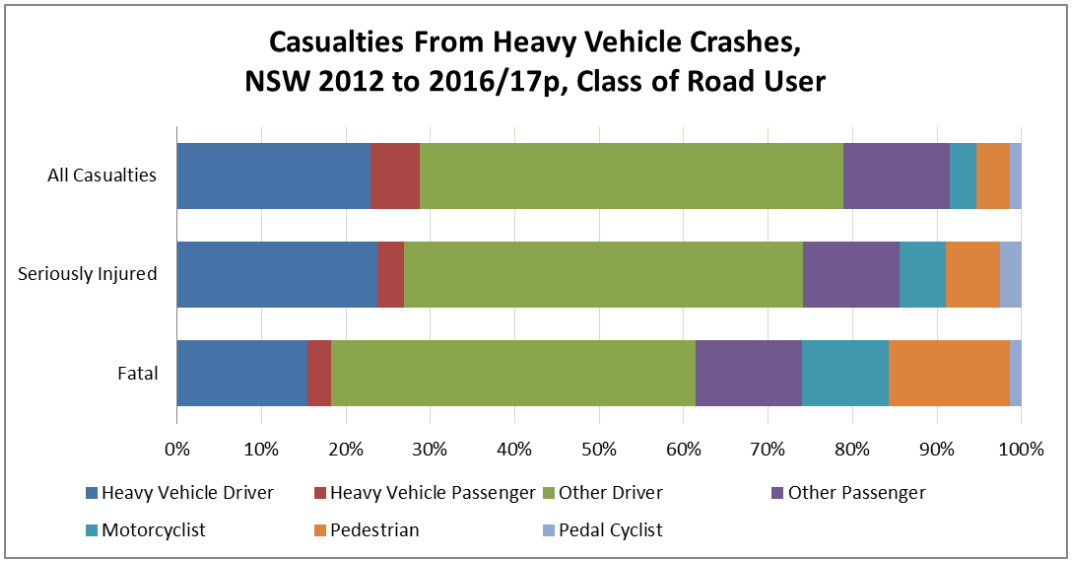
Heavy Bus Casualty Crashes

	2012	2013	2014	2015	2016	2016/17p	2012-16/17p
Fatal	6	2	5	4	9	9	31
Serious Injury	62	62	79	56	64	72	362
Moderate Injury	96	82	67	57	50	66	389
Minor/Other Injury	56	39	46	50	48	44	264
Total	220	185	197	167	171	191	1,046

In terms of the trends by crash type, it is notable that the incidence of articulated truck casualty crashes has decreased in recent years from 580 in 2012 to 418 in 2016/17p (28 per cent decrease) whilst the incidence of heavy rigid truck casualty crashes has increased from 545 in 2012 to 596 in 2016/17p (9 per cent increase).

4.2.4 Casualties From Heavy Vehicle Crashes - Class of road user

The largest proportion of fatalities from heavy vehicle crashes were drivers of non-heavy vehicles (43 per cent) followed by heavy vehicle drivers (15 per cent) and pedestrians (14 per cent). Less than 20 per cent of fatalities were occupants of the heavy vehicles. However, more than one quarter of fatalities were vulnerable road users (motorcyclists, pedestrians or pedal cyclists).

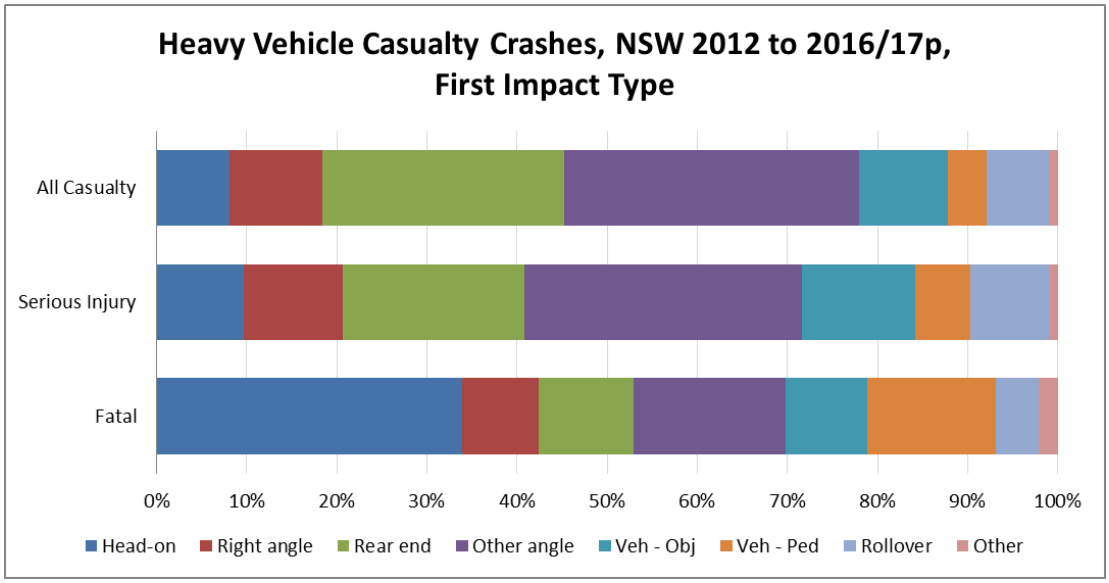


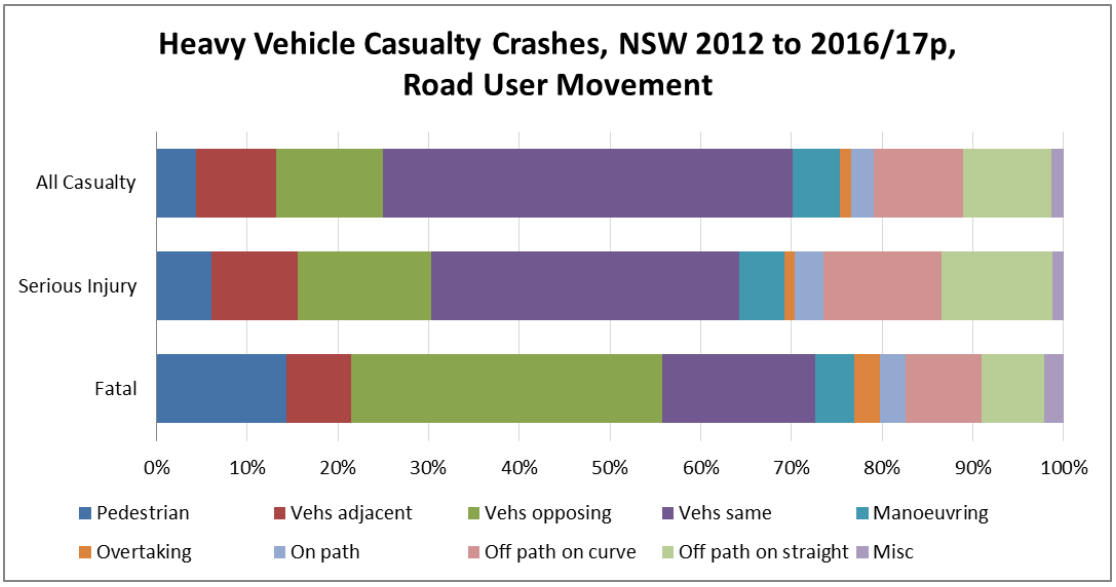
Similarly, half (50 per cent) of all casualties from heavy vehicle crashes were drivers of non-heavy vehicles; whilst almost one quarter (23 per cent) were heavy vehicle drivers. Less than one in 10 casualties from heavy vehicle casualty crashes were vulnerable road users.

4.2.5 Type of crash

In terms of first impact crash type, head on crashes accounted for the largest proportion (34 per cent) of heavy vehicle fatal crashes, followed by two vehicles other angle crashes (17 per cent) and vehicle pedestrian crashes (14 per cent).

In contrast, two vehicle other angle crashes accounted for one third (33 per cent) of all heavy vehicle casualty crashes whilst rear end crashes contributed another quarter (27 per cent). Two vehicles head on crashes accounted for only (8 per cent) of all heavy vehicle casualty crashes.

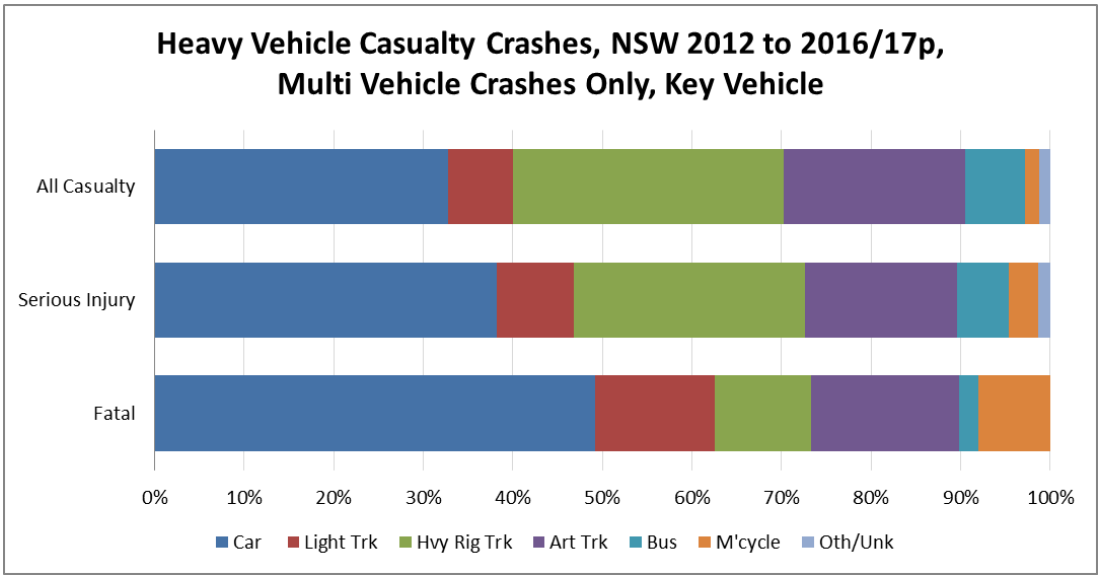




The crash database does not specifically identify the party at fault in a crash. Instead, key vehicle status can be used as a proxy measure. The key vehicle is the vehicle with the road user movement that largely contributes to the crash occurring.

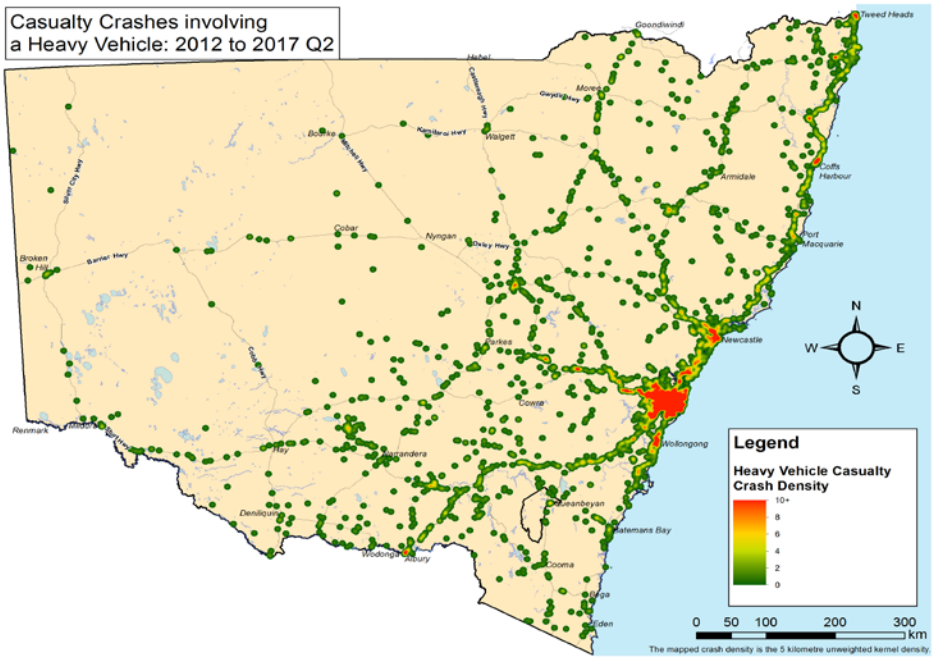
For those heavy vehicle fatal crashes which involve two-vehicle road user movements (two vehicle opposing, two vehicle adjacent and two vehicle same direction – classified as 'multi vehicle'), heavy vehicles accounted for only 29 per cent of the key vehicles involved in these crashes. The key vehicle is the vehicle identified as the vehicle movement largely contributing to the crash, though the key vehicle is not necessarily deemed to be at fault.

However, for all heavy vehicle casualty crashes, heavy vehicles accounted for the majority (57 per cent) of the key vehicles involved in the crash.

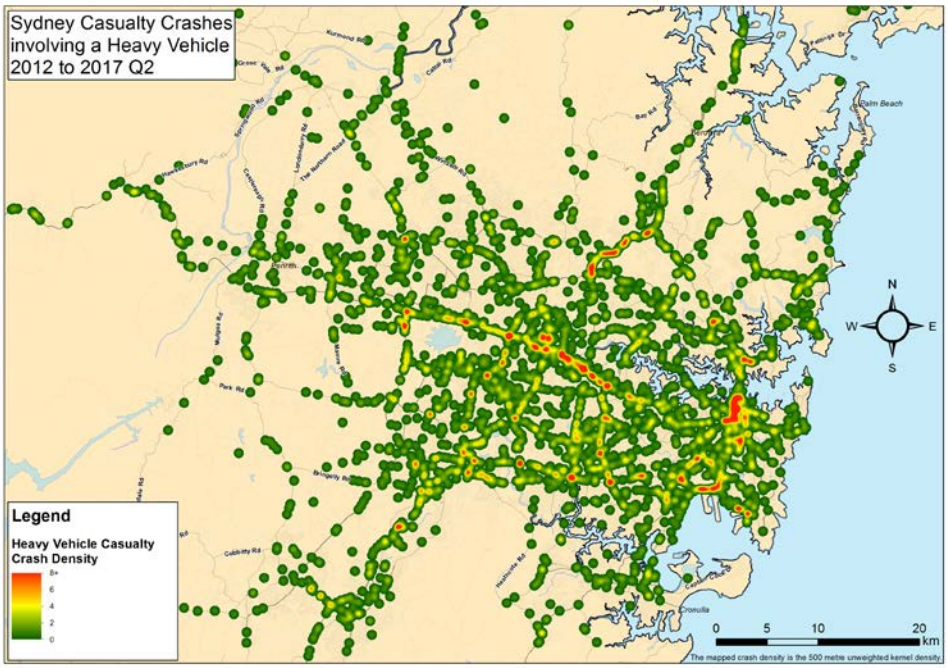


4.2.6 Locations of heavy vehicle casualty crashes

The following crash maps detail the locations of heavy vehicle casualty crashes over the five and a half year period 2012 to 2017p.

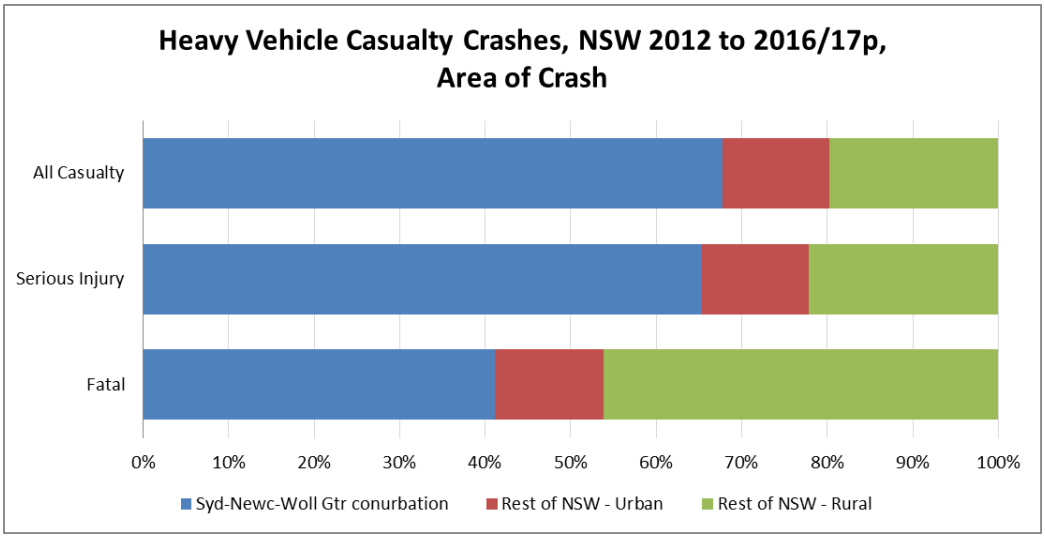


The NSW map depicts heavy vehicle crashes concentrated in the Sydney, Newcastle and Wollongong metropolitan areas and along the major freight routes through regional NSW.



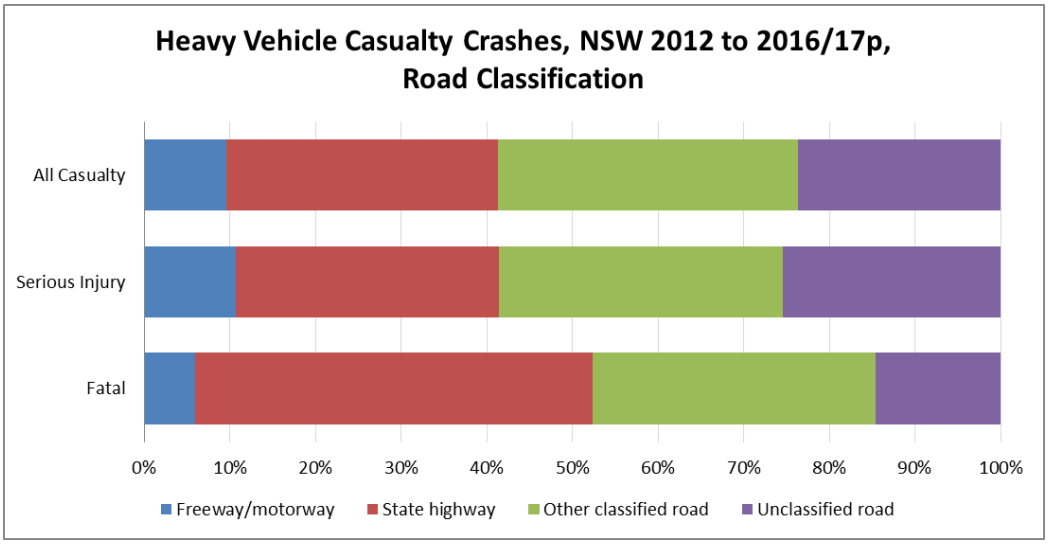
Similarly, in the Sydney metropolitan area heavy vehicle casualty crashes are prevalent in the Sydney CBD and along the major freight distribution routes along the western corridor, along the north / south corridor and the south west corridor.

The majority of heavy vehicle casualty crashes (68 per cent) occurred on roads within the Sydney-Newcastle-Wollongong Greater Conurbation. However, the majority of heavy vehicle fatal crashes occurred on roads outside the Sydney-Newcastle- Wollongong Greater Conurbation (59 per cent).



The majority of heavy vehicle casualty crashes occurred on classified roads, with the majority of heavy vehicle fatal crashes occurring on freeways / motorways or State Highways only.

SENSITIVE: NSW GOVERNMENT



Detailed below are the State Highways and Freeways/ Motorways with the highest numbers of heavy vehicle fatal and casualty crashes. These are split into the Sydney-Newcastle-Wollongong Greater Conurbation and the Rest of NSW. This is appropriate given the differing split of fatal versus casualty crashes and the variance in heavy vehicle tasks between the two areas.

Table: Heavy Vehicle Casualty Crashes, Top 10 by Major Routes and Region, NSW, 2012 – 2016/17p

Sydney-Newcastle-Wollongong Greater Conurbation

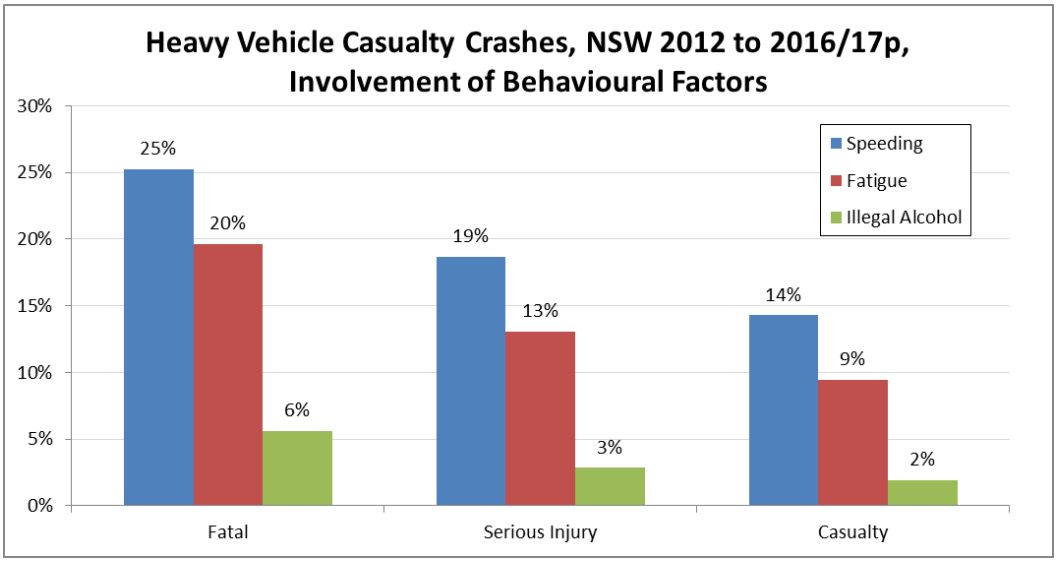
		Fatal	Serious Injury	All Casualty Crashes
1	Great Western Highway	5	83	234
2	M4	7	78	213
3	Cumberland Highway	2	52	203
4	Hume Highway	3	57	194
5	M1 (Sydney to Newcastle)	6	51	135
6	M5	1	34	121
7	Pacific Highway	4	23	104
8	Princes Highway	3	28	99
9	Eastern Distributor	2	46	99
10	M2	2	15	36

Rest of NSW

		Fatal	Serious Injury	All Casualty Crashes
1	Pacific Highway	34	132	360
2	Hume Highway	16	64	176
3	Newell Highway	17	40	130
4	New England Highway	9	46	125
5	Princes Highway	6	28	62
6	Sturt Highway	9	28	60
7	Great Western Highway	2	18	46
8	Mitchell Highway	5	9	39
9	Golden Highway	5	6	27
10	Bruxner Highway	2	5	25

4.2.7 Behavioural factors

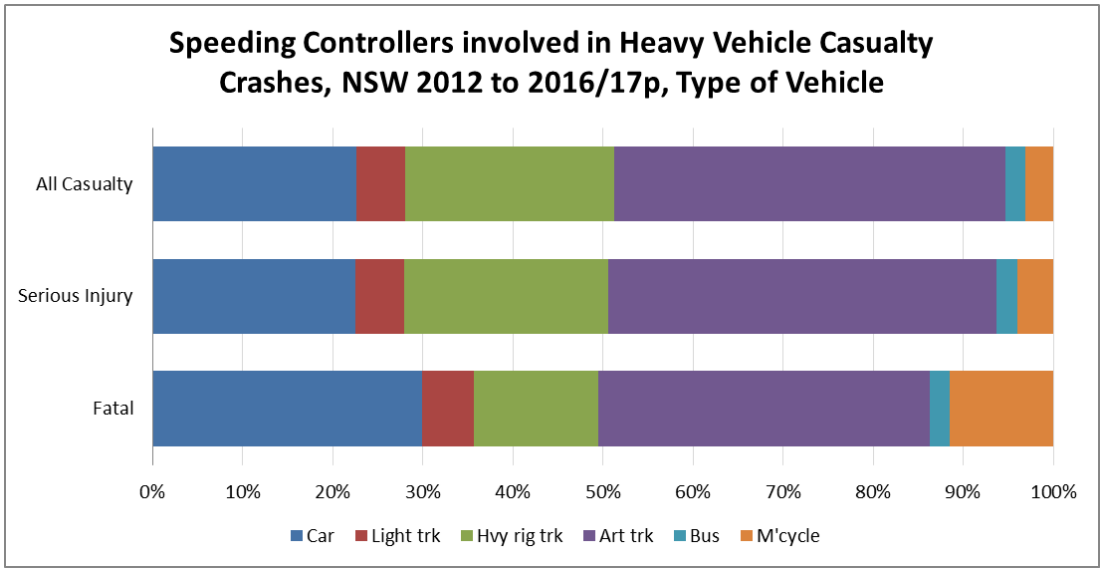
Excessive or inappropriate speed was a factor in 25 per cent of all heavy vehicle fatal crashes and 14 per cent of all heavy vehicle casualty crashes. Fatigue was a factor in 20 per cent of all heavy vehicle fatal crashes and 9 per cent of all heavy vehicle casualty crashes whilst illegal alcohol was a factor in only 6 per cent of all heavy vehicle fatal crashes and 2 per cent of all heavy vehicle casualty crashes.



However, these results are based on the presence of the behaviour factor for any motor vehicle driver involved in a heavy vehicle casualty crash, not necessarily for the heavy vehicle driver.

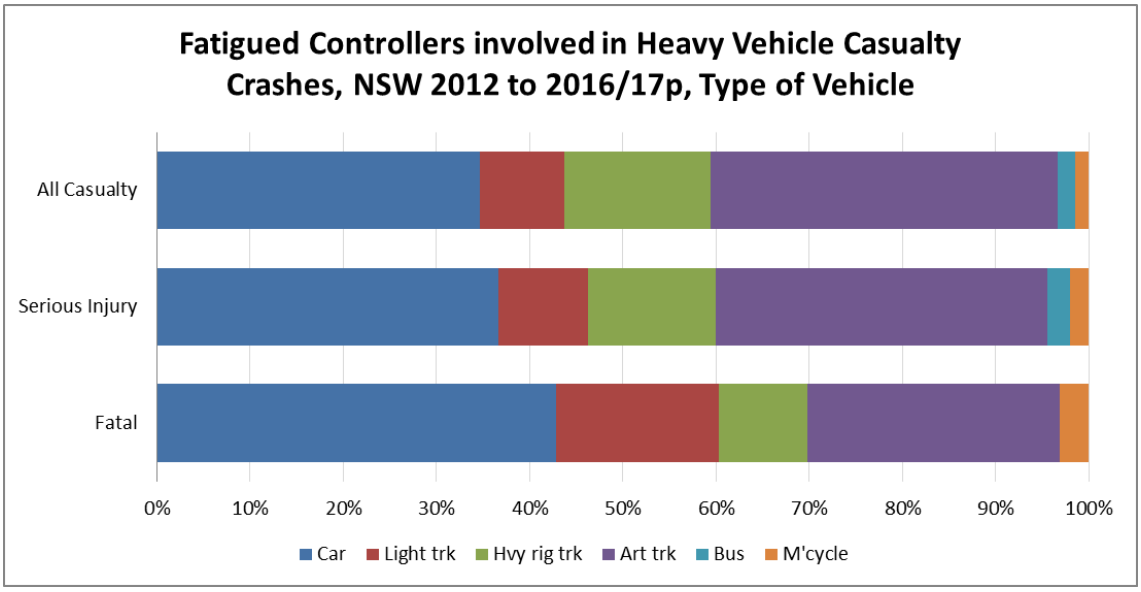
Speeding

Among speeding controllers involved in heavy vehicle fatal crashes just over a half (53 per cent) were heavy vehicle drivers whilst 69 per cent of speeding drivers involved in heavy vehicle casualty crashes were heavy vehicle drivers.



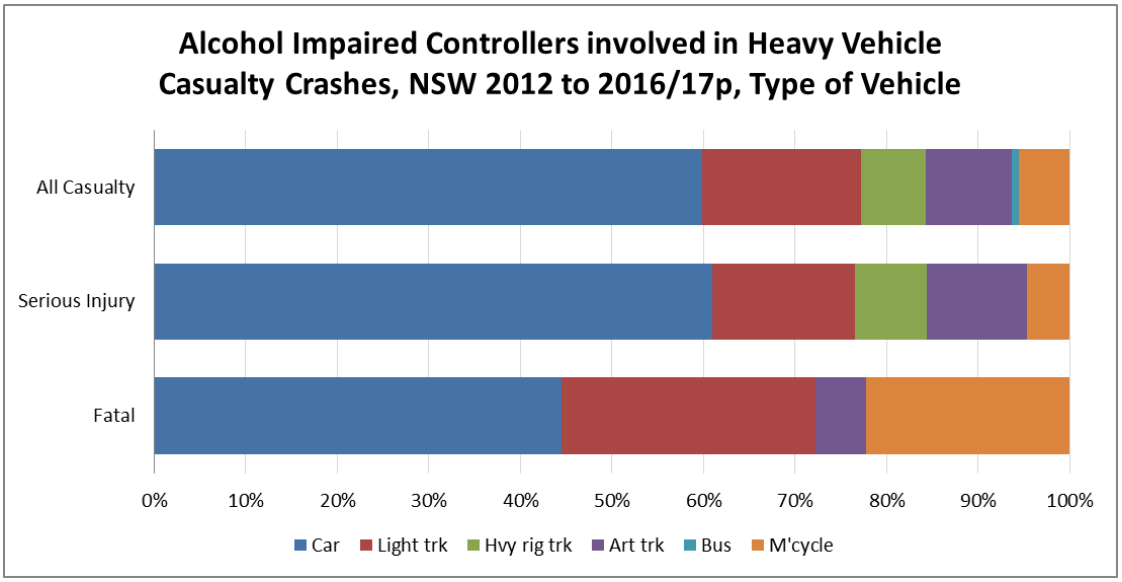
Fatigue

Among fatigued controllers involved in heavy vehicle fatal crashes 37 per cent were heavy vehicles whilst 43 per cent were car / car derivatives. However among fatigued controllers involved in heavy vehicle casualty crashes more than half (55 per cent) were heavy vehicle drivers.



Alcohol

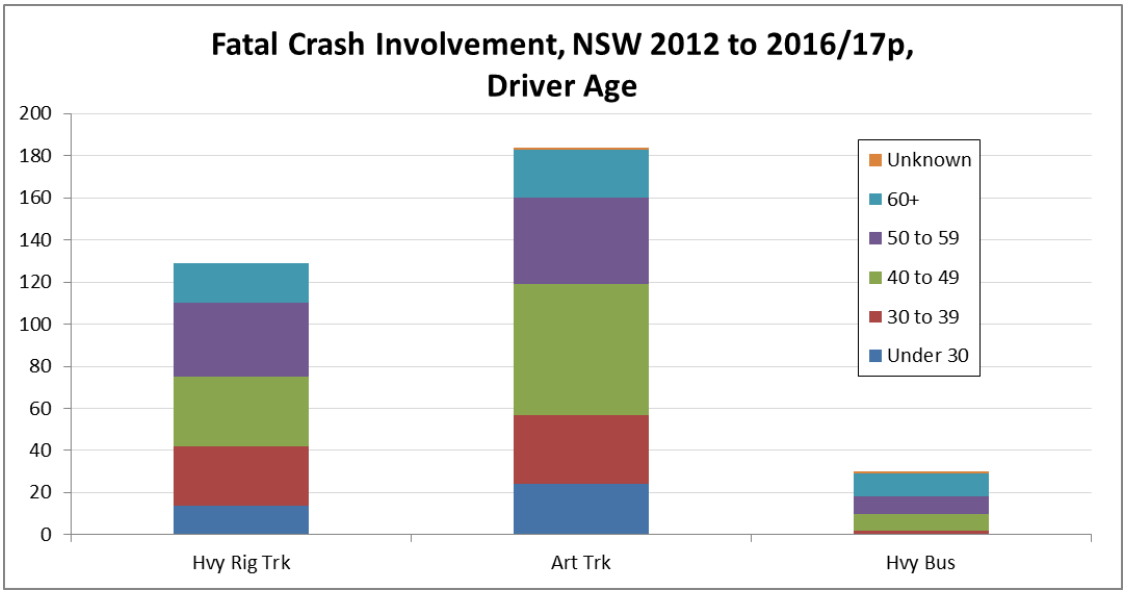
Among controllers with illegal alcohol involved in heavy vehicle fatal crashes only 6 per cent were heavy vehicles whilst 44 per cent were car / car derivatives and 28 per cent were light trucks. Less than 20 per cent of drink drivers in heavy vehicle casualty crashes were heavy vehicle drivers – car drivers accounted for nearly two-thirds of all drink drivers involved in heavy vehicle casualty crashes.

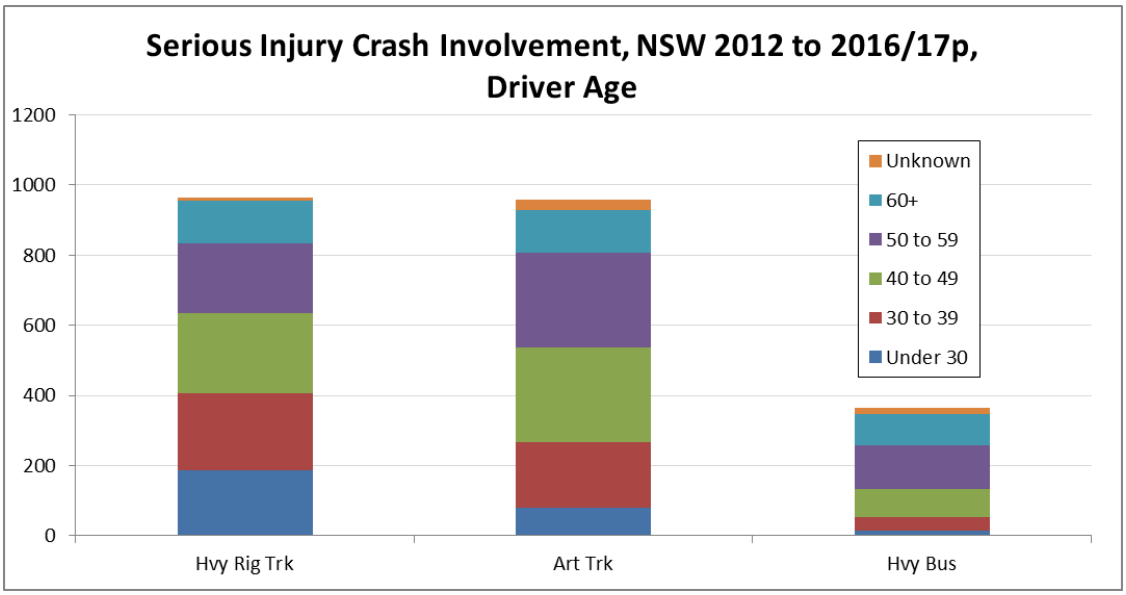


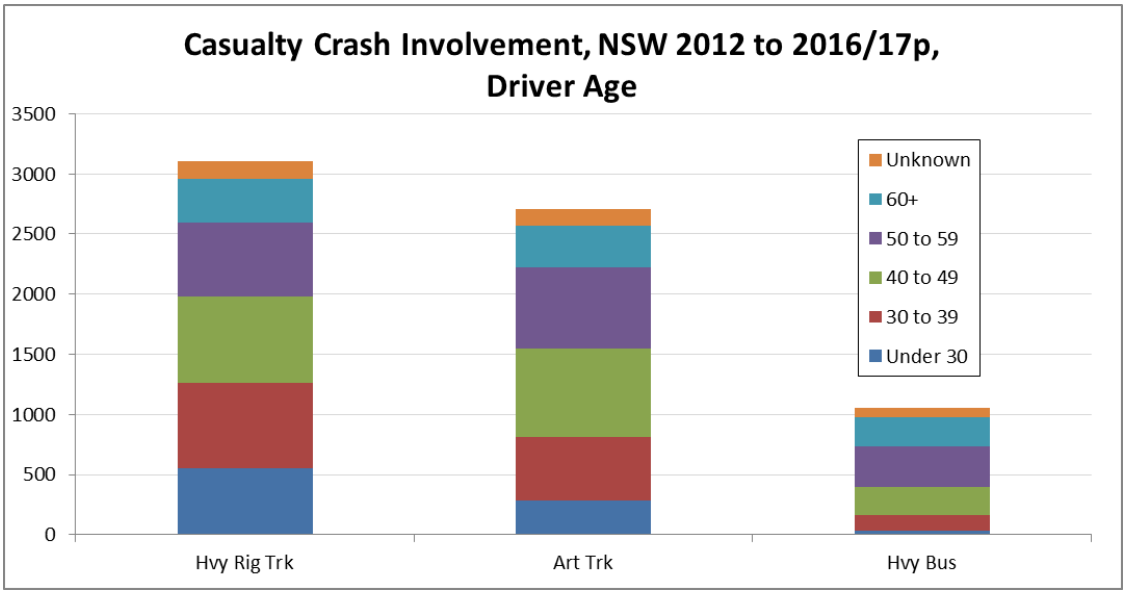
4.2.8 Characteristics of Heavy Vehicle Drivers Involved in Casualty Crashes

The overwhelming majority of heavy vehicle drivers involved in fatal and casualty crashes were males.

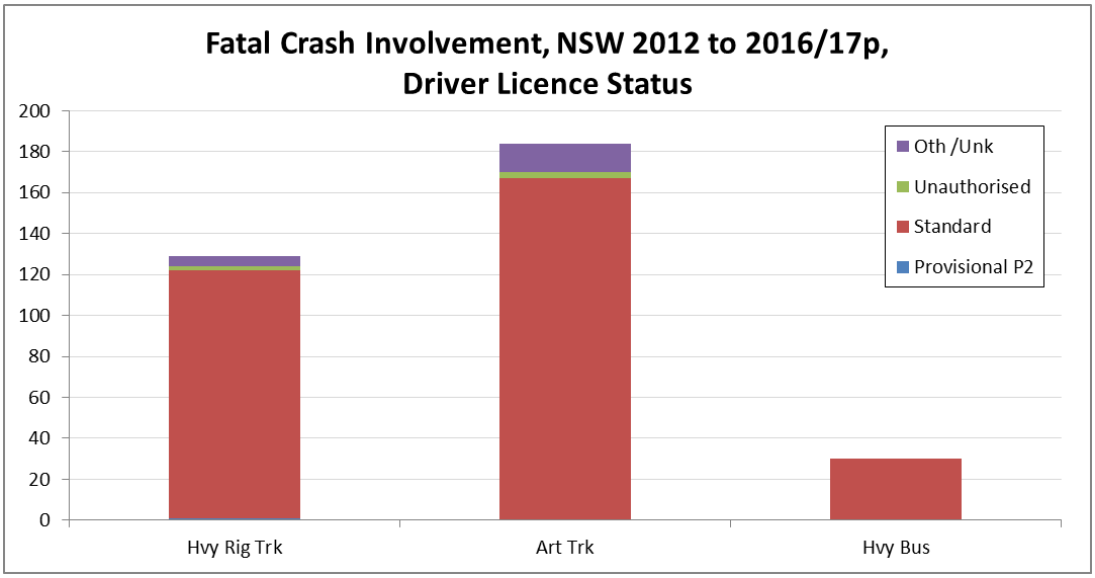
For heavy vehicle drivers involved casualty crashes at least 55 per cent of heavy bus drivers were aged 50 years or more, compared with 31 per cent of heavy rigid truck drivers and 38 per cent of articulated truck drivers.

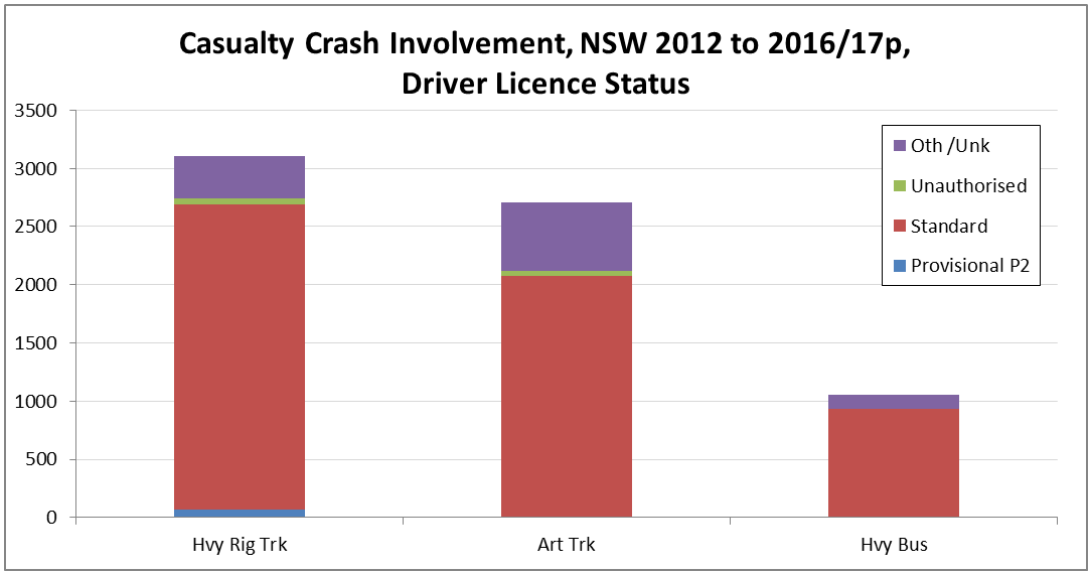






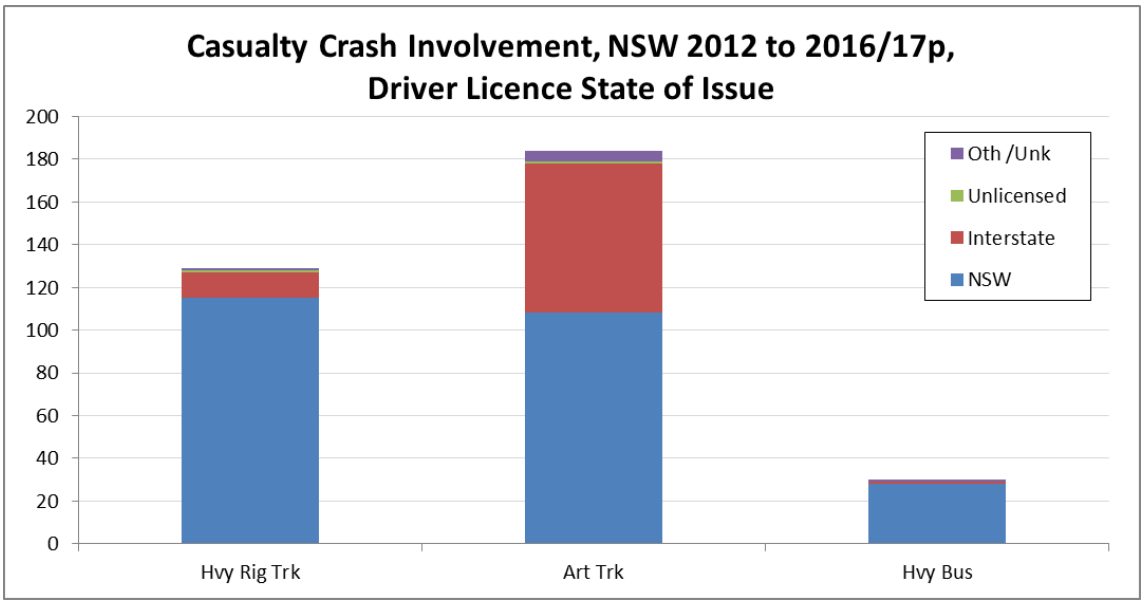
The overwhelming majority of heavy vehicle drivers involved in fatal crashes and casualty crashes were authorised and only a small proportion of these were provisional license holders. This result was consistent across the types of heavy vehicles.

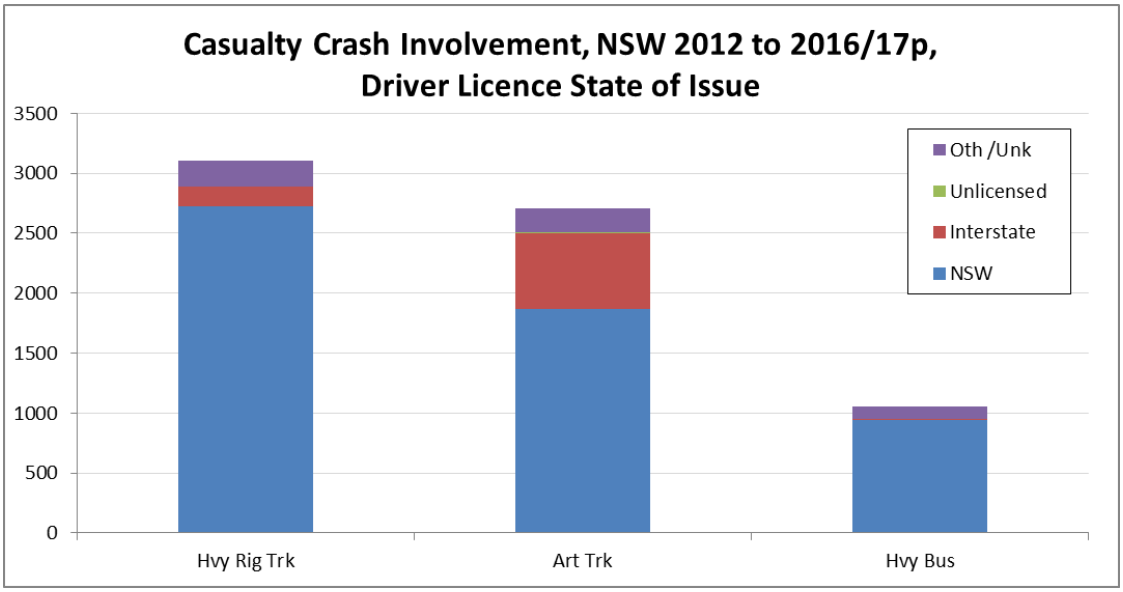




Interstate licence holders are more commonly represented in fatal crashes and among articulated truck drivers involved in heavy vehicle fatal and casualty crashes.

Almost 40 per cent of articulated truck drivers involved in fatal crashes and 23 per cent of articulated truck drivers involved in casualty crashes were interstate licence holders.

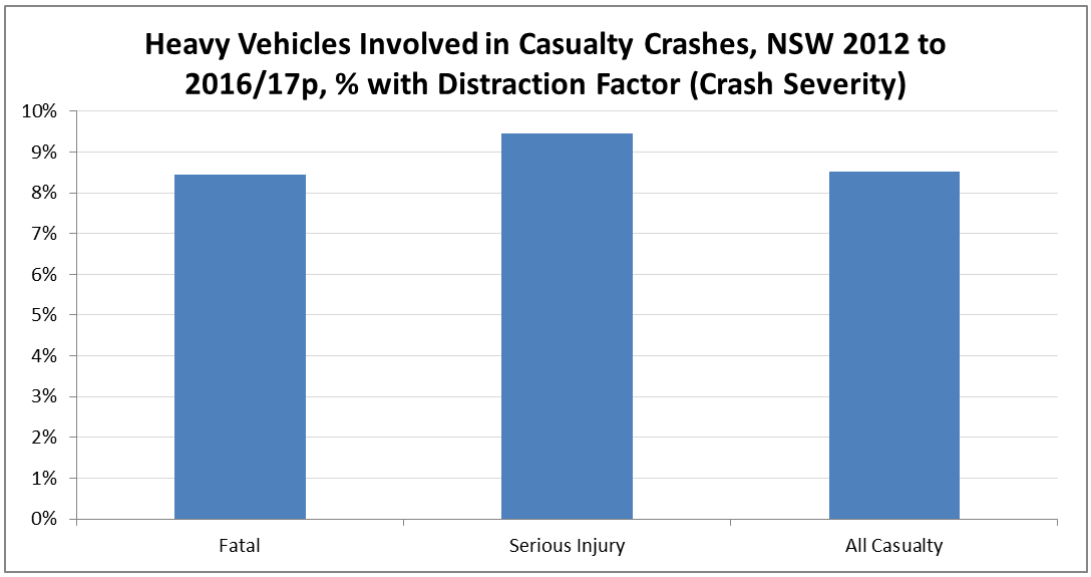


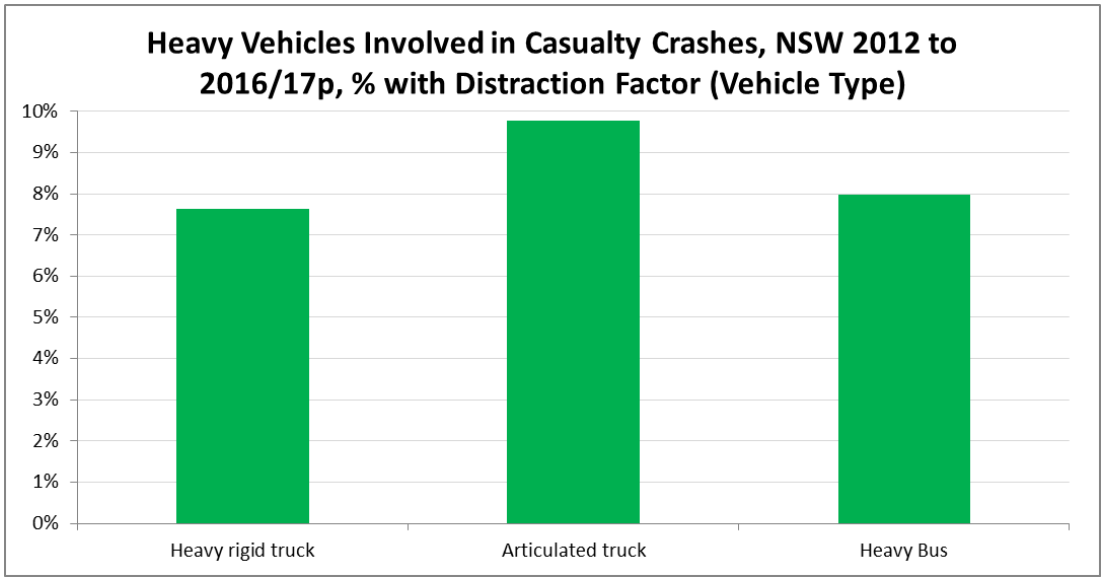


4.2.9 Other factors for heavy vehicle drivers in casualty crashes

Distraction Factors

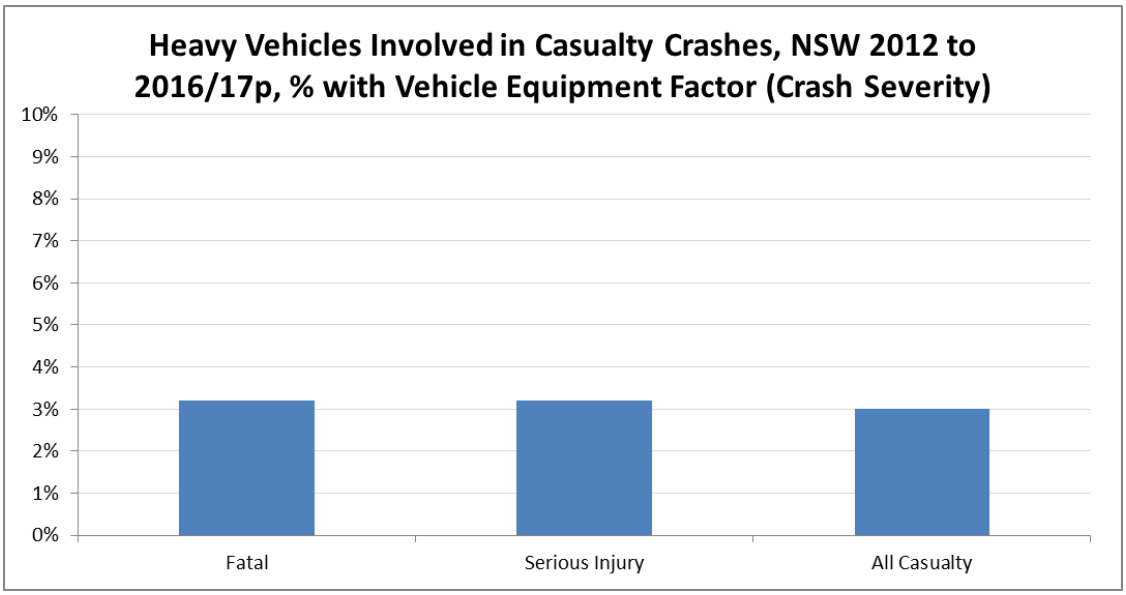
Less than one in 10 heavy vehicle drivers involved in a casualty crash had a distraction factor coded. This result was consistent across the crash severities but was slightly higher for articulated truck drivers involved in casualty crashes. The most common distraction factor for heavy vehicle drivers involved in casualty crashes was “distracted by something outside the vehicle” (48 per cent), followed by “asleep or drowsy” (18 per cent) and “distracted by something inside the vehicle” (16 per cent).

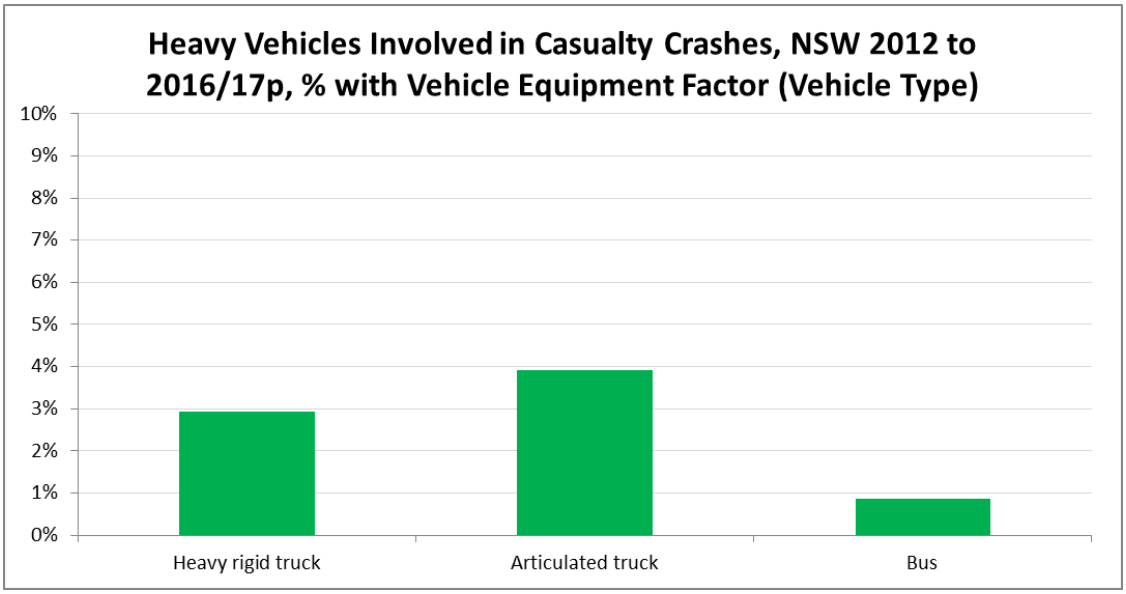




Vehicle Equipment Factors

Even smaller percentages of heavy vehicles involved in casualty crashes are coded with a vehicle equipment factor. Around 3 per cent of heavy vehicle crash involvements involve a vehicle equipment failure. This is reasonably consistent across crash severity but is slightly higher for articulated trucks involved in casualty crashes (almost 4 per cent) and lower for heavy buses (less than 1 per cent).





Economic activity and crash rates

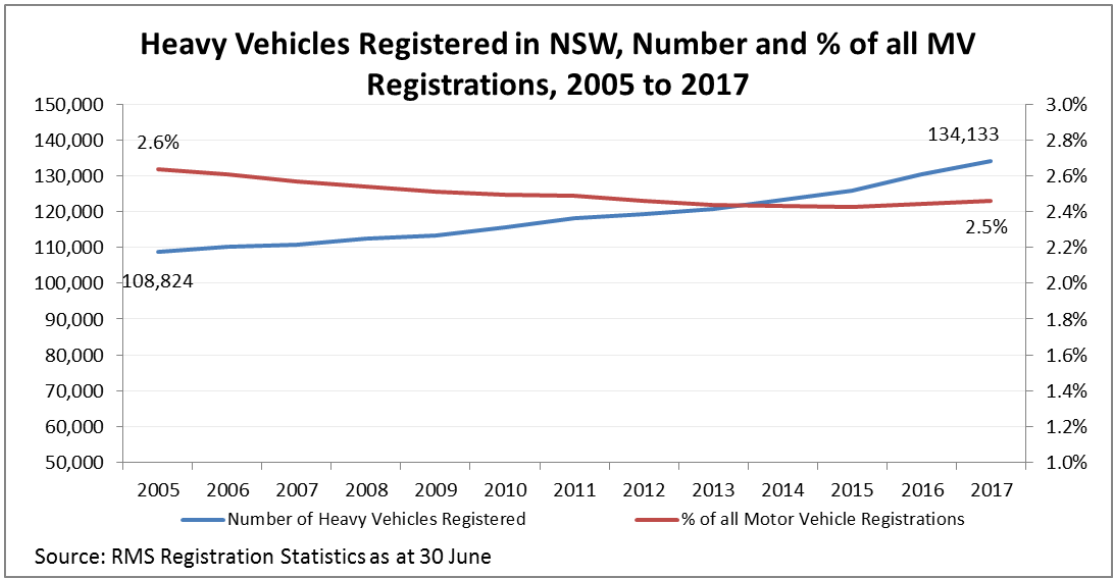
As indicated in section 4.3.4, NSW is currently experiencing strong economic growth as well as significant infrastructure spending on roads, public transport and housing developments. This would be expected to generate significant increases in heavy truck movements and consequently increased involvement of these vehicles in casualty crashes. The increases in heavy vehicle fatal crashes in recent years would appear to support this relationship; particularly given much of the increase from 2013 to 2016 was amongst heavy rigid trucks in the Sydney/Newcastle/Wollongong (SNW) Greater Conurbation.There has also been an increase in the number of articulated trucks involved in fatal crashes in 2017.

Heavy vehicle registrations

Over the period 2005 to 2017, there has been a modest growth in the number of heavy vehicles registered in NSW, up by (23 per cent) from 108,824 in 2005 to 134,133 in 2017. However, the increases between June 2015 and June 2016 (rose by 3.5 per cent) and June 2016 and June 2017 (rose by 2.9 per cent) were the strongest annual increases since at least 2005.

Despite the 2016 and 2017 increases in registrations, as a percentage of all motor vehicle registrations, heavy vehicles registrations have slightly decreased slightly from 2.6 per cent in 2005 to 2.5 per cent in 2017.

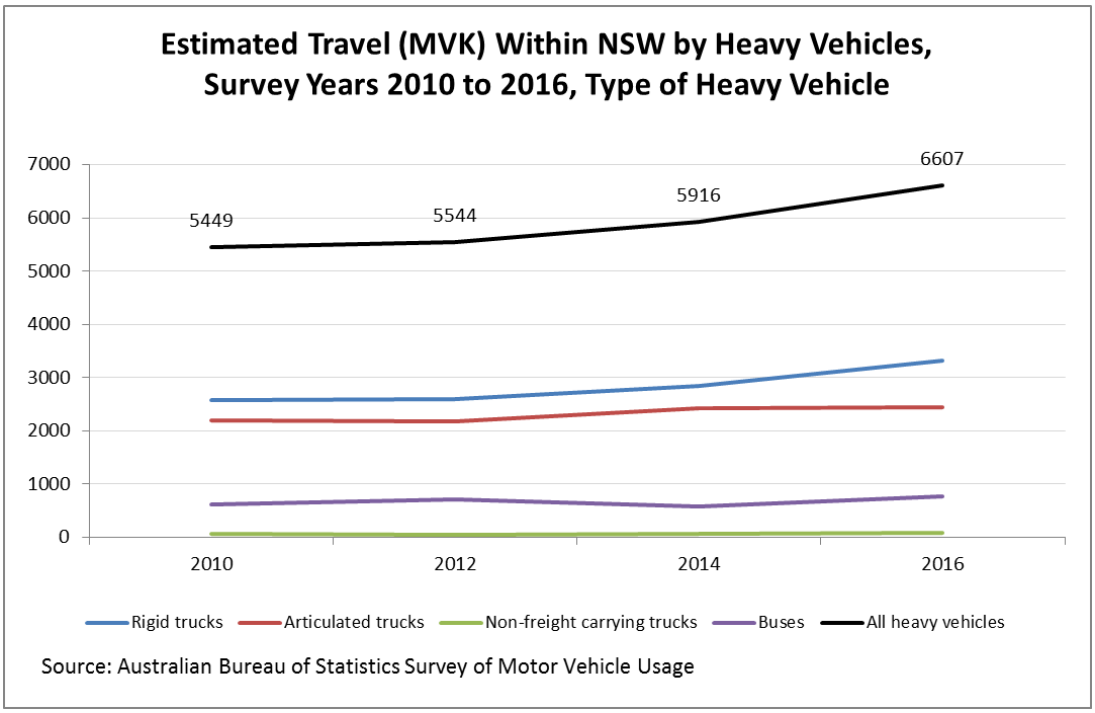
However, it is important to note that a significant proportion of heavy vehicles operating on NSW roads, particularly articulated trucks, are actually registered in jurisdictions outside NSW.



Heavy vehicle travel on NSW roads

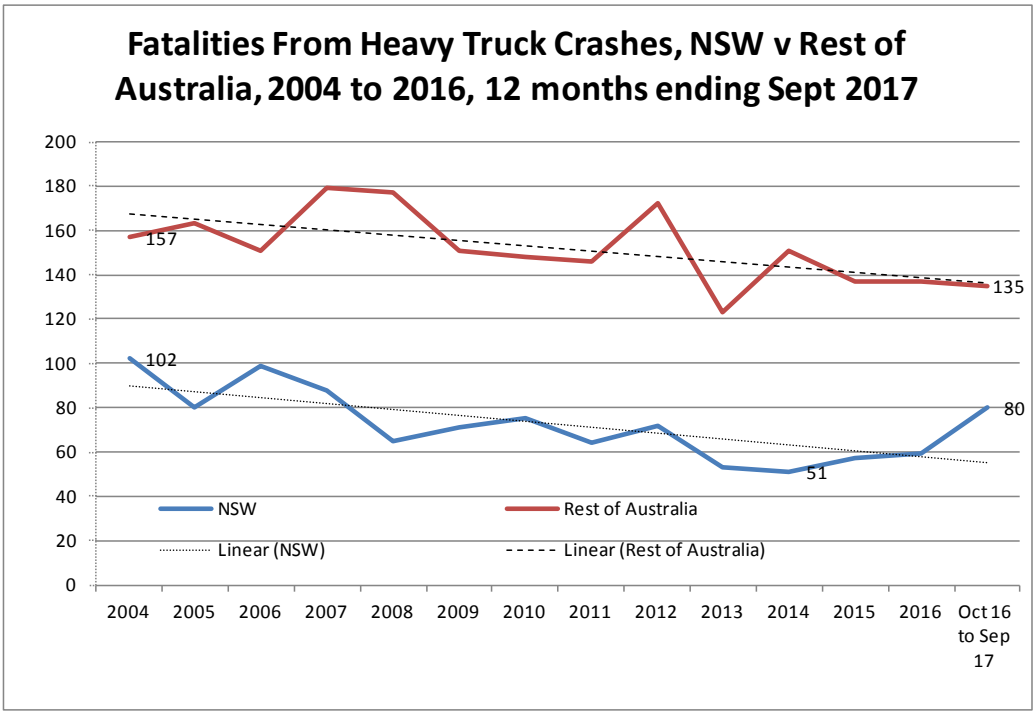
According to the Australian Bureau of Statistics (ABS) Surveys of Motor Vehicle Usage, there has been a strong growth in heavy vehicle travel since 2012, particularly generated by rigid trucks. Between 2012 and 2016, heavy vehicle travel in NSW increased by 19 per cent with rigid truck travel increasing by 28 per cent over the same period.

However, note that the ABS vehicle categories do not necessarily align with those in the crash data and because the ABS travel estimates are based on samples, there are not insignificant standard errors associated with the point estimates.

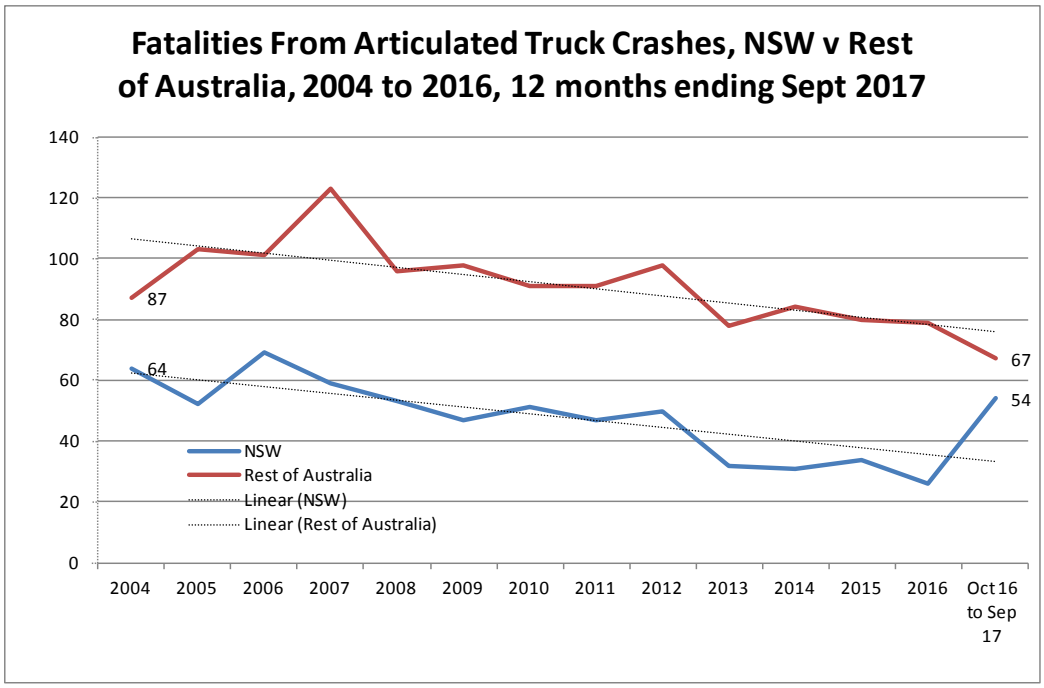


4.2.10 NSW and Australia

The NSW experience contrasts with that for fatalities from heavy truck crashes for the rest of Australia. The chart below shows the latest national results for the twelve months ending September 2017.

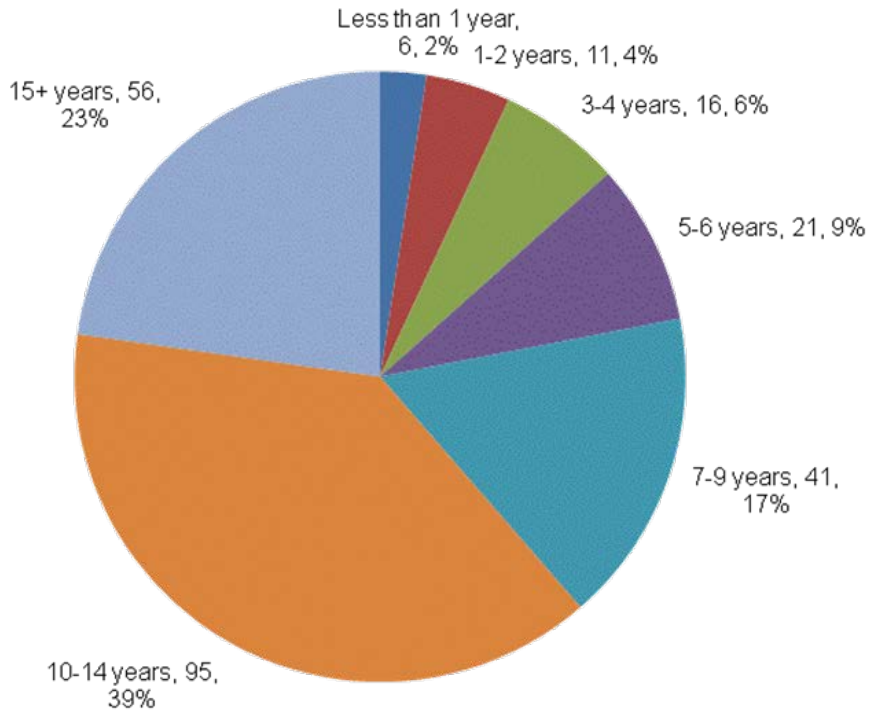


Similarly, the increase in fatalities from articulated trucks in NSW was not replicated for the rest of Australia.



4.2.11 Heavy truck drivers involved in fatal crashes (2012 to August 2017)

Heavy Truck Driver's Licence Tenure (at time of crash)



4.2.12 Age of vehicle

Of the 70 heavy truck drivers involved in fatal crashes in 2017, 39 per cent were driving vehicles that were 5 years old or younger, 21 per cent were 6 to 10 years old, 21 per cent were 11 to 15 years old and only 15 per cent were more than 15 years old.

The above results contrast with the age distribution of the NSW heavy vehicle fleet as at June 2017 – only 19 per cent were up to 5 years old, 20 per cent were 6 to 10 years old, 23 per cent were 11 to 15 years old but 37 per cent were more than 15 years old.

Further analysis of the comparison between vehicle age, per cent of fleet and per cent of kilometres travelled is critical to determinations as to the vehicles that are approved for access on the network. Details about heavy vehicle access requirements are provided in Section 6.4.2. Newer vehicles are typically associated with enhanced safety features and road safety outcomes. This is of importance, in terms of the road manager function as well as liaising with industry and community to promote the safest performing vehicle types.

5 Safety and compliance

The role of compliance and enforcement in maintaining the safety of heavy vehicles on our roads is critical for the safety of all road users. Where compliance fails, enforcement of the law is essential. The link between non-compliance with heavy vehicle laws and undesirable safety outcomes is well substantiated. A supplementary objective is to ensure that industry participants who breach legislative requirements do not achieve competitive advantage over those with higher levels of compliance.

The regulatory framework under Heavy Vehicle National Law (HVNL) prescribes requirements about:

- The standards heavy vehicles must meet before they can use the road.
- The maximum permissible mass and dimensions of heavy vehicles.
- Securing and restraining loads on heavy vehicles.
- Ensuring parties in the chain of responsibility are held responsible for ensuring the HVNL is complied with, including responsibilities to ensure drivers of heavy vehicles do not:
    - exceed speed limits
    - breach fatigue management requirements
    - breach mass, dimension or loading requirements.
- Preventing drivers of heavy vehicles from driving while impaired by fatigue.
- Nationally consistent penalties.

As at January 2018, the HVNL is supported by four national regulations:

- Heavy Vehicle (Fatigue Management) National Regulation
- Heavy Vehicle (General) National Regulation
- Heavy Vehicle (Mass, Dimension and Loading) National Regulation
- Heavy Vehicle (Vehicle Standards) National Regulation.

Heavy vehicle registration, inspections, driver licensing and all matters related to the carriage of dangerous goods are still the responsibility of the relevant state and territory authorities.

Under current arrangements, the NHVR deals exclusively with some regulatory programs such as accreditation under the National Heavy Vehicle Accreditation Scheme and Roads and Maritime Services (RMS) deals exclusively with matters such as registration and licencing. RMS also performs a range of services on behalf of the national regulator, across areas such as compliance and enforcement, vehicle standards, road access and permits.

5.1 Industry Status[9]

Registered Heavy Vehicles in NSW	185,227
HV Licence Holders in NSW	565,222
HV Operators/Owners in NSW	63,434

5.2 Licensing

In order to drive a heavy vehicle in NSW, a licence of the appropriate class is required. The National Driver Licensing Scheme includes the following five heavy vehicle licence classes:

- LR – Light Rigid – small buses and trucks with a GVM more than 4.5 tonnes but not more than 8 tonnes (buses can carry more than 12 adults including the driver).
- MR – Medium Rigid – medium rigid trucks or buses with 2 axles and a GVM more than 8 tonnes.
- HR – Heavy Rigid – heavy rigid trucks or buses (including articulated buses) with 3 or more axles and

[9] Source: DRIVES as of 30 September 2017

a GVM more than 8 tonnes. Any towed trailer must not weigh more than 9 tonnes.

- HC – Heavy Combination – heavy articulated vehicles with 3 or more axles and tow trailer combinations with a trailer that has a GVM more than 9 tonne plus any unladen converter dolly.
- MC – Multi Combination: for example B-double; prime mover with low loader dolly and low loader combination; road trains.

Number of Heavy Vehicle Licences by Class and Type at 30 September 2017

LICENCE TYPE	LICENCE CLASS LR	MR	HR	HC	MC	TOTAL
Provisional	146	1,285	1,270	-	-	2,701
Unrestricted	92,887	133,542	205,527	104,357	26,208	562,521
Total	93,033	134,827	206,797	104,357	26,208	565,222

5.3 Registration

As at 30 September 2017[10], 185,227 heavy vehicles were registered in NSW that were operated by 63,434 operators/owners. Since 1 July 2013, the number of registered heavy vehicles has been increasing by an average rate of 3 per cent every financial year.

Number of Registered Heavy Vehicles by Vehicle Type at 30 September 2017

BUSES	HEAVY TRUCKS	PRIME MOVERS	HEAVY PLANTS	HEAVY TRAILERS	TOTAL
13,735	100,013	21,173	4,165	46,141	185,227

Vehicles registered in other jurisdictions may operate in NSW providing that the vehicles spend at least 48 hours outside of NSW in each 90 days. This provision is applicable to the corporations only under the s.74 of the *Road Transport Act 2013*.

For non-corporations a vehicle is exempt from the NSW registration provisions if the vehicle is temporarily in NSW (so long as it is registered in another state or territory) [cl.9, Sch.1, Road Transport (Vehicle Registration) Regulation 2017]

5.3.1 Interstate registration

Currently, interstate registered vehicles that want to transfer their registration to NSW are required to undertake a safety inspection to be registered in NSW. Recently the heavy vehicle industry has requested RMS to exempt interstate registered vehicles from safety and identity inspections if they are part of the National Heavy Vehicle Accreditation Scheme (NHVAS), Maintenance Management. RMS recognises the NHVAS scheme for the purposes of renewing registration but not for the purposes of establishing a registration of interstate vehicles.

The Transport and Infrastructure Council (TIC) agreed in May 2017 to a range of reforms relating to vehicle registration, including the introduction of a national plate; seamless interstate plate transfer and removing the requirement for heavy vehicle registration stickers. In NSW, the National Heavy Vehicle Registration Scheme is expected to be implemented in mid-2018.

[10] Please note the variation between CRS data and RMS Compliance data (DRIVES) on page 15 regarding HV registration. CRS HV registration does not include the plants and trailers. Also CRS data it is reported as of 30 June 2017 whilst DRIVE data is reported as of 30 September 2017.

5.3.2 Written-Off Heavy Vehicles

The establishment of a Written-Off Heavy Vehicle Register was initiated by the NSW Minister for Roads, Maritime and Freight in mid-2017. This was expanded to a national project at the TIC. NSW is leading the way with legislation to support the introduction of a NSW Written-Off Heavy Vehicle Register passed by the NSW Parliament in November 2017. The Register will improve road safety by preventing poorly repaired and unsafe heavy vehicles from being used on NSW roads, and provide a framework to support a national scheme.

RMS is currently progressing the development of operational policies, procedures and related systems changes and is aiming to have these in place by end 2018.

5.3.3 Compulsory Third Party (CTP) insurance scheme

The State Insurance Regulatory Authority (SIRA) is a statutory authority established under the State Insurance and Care Governance Act 2015 to regulate Compulsory Third Party (CTP) insurance scheme for all NSW-registered motor vehicles and NSW's workers' compensation insurance scheme. SIRA's regulatory role includes ensuring insurers comply with legislation and guidelines; monitoring insurers' performance by data-gathering and analysis, and complaint and dispute monitoring and resolution.

SIRA is supportive of innovative technology, which aims to reduce injuries of heavy vehicle drivers and improve impact claim rates and return to work rates for truck drivers in NSW.

During 2017, SIRA developed and implemented the Government's CTP reforms including introducing the *Motor Accident Injuries Act 2017*, which established a new CTP scheme from 1 December 2017.

The new scheme aims to provide injured road users, including those injured by heavy vehicles, the support they need to recover. The scheme gives access to payments for up to six months after a crash regardless of who was at fault, including for the first time weekly income payments if time off work is needed. The scheme has a simpler online claims notification process and improvements to claims management; a faster and less adversarial dispute resolution process, and provides ongoing medical treatment and care benefits for those more seriously injured who are not at fault in the crash, for life if needed.

5.3.4 Insurance incentives and levers to improve driver safety in the heavy vehicle industry

SIRA's Motor Accidents Premiums Determination Guidelines provide a number of risk-rating factors that CTP insurers can use when setting CTP premiums, including the use of telematics and other innovative rating factors. The six licensed CTP insurers who underwrite the scheme, set premiums according to an assessment of industry data and claims experience within the framework set by the Guidelines. This framework allows CTP insurers to take account of an individual driver's profile and safety record when setting their CTP insurance premiums.

SIRA has established the injury advice centre to assist motorists who have been injured on NSW roads. The Centre gives general advice on how to get professional help; what services are available to an injured person, and what to expect during recovery time.

As claims history is a significant factor in the setting of CTP premiums, any potential initiatives and measures to improve road safety and reduce third party injuries incurred in crashes involving heavy vehicles may work to put downward pressure on CTP premium prices.

5.4 Heavy vehicles classes and access

5.4.1 Heavy vehicle classes[11]

Under the Heavy Vehicle National Law (the HVNL) a heavy vehicle is a vehicle that has a Gross Vehicle Mass (GVM) or Aggregate Trailer Mass (ATM) of more than 4.5 tonnes and a combination that includes a vehicle with a GVM or ATM of more than 4.5 tonnes.

- **General access vehicles:** Includes 19m semitrailers and most rigid trucks up to 12.5m in length. Vehicles that fall within prescribed mass and dimension limits, have unrestricted (general) access to the road system except where a road or bridge is sign posted otherwise.
- **Class 1 heavy vehicles**: Special purpose vehicles, Agricultural vehicles, Oversize Overmass vehicles
- **Class 2 heavy vehicles**: Freight-carrying vehicles (B-doubles, B-triples, Road Trains), Buses, Vehicle carriers, Livestock vehicles, Performance-Based Standards (PBS) vehicles.
- **Class 3 heavy vehicles**: Vehicles that, together with their load, do not comply with prescribed mass or dimension requirements.

5.4.2 Heavy vehicle access

Under the Heavy Vehicle National Law (HVNL), road managers have particular responsibilities regarding vehicle access to their road network. RMS is the road manager for the state road network in NSW. Councils are the road managers for the local and regional roads within their local government areas.

Road managers, both RMS and local government are accountable for ensuring that everyone using NSW roads does so safely, while still allowing the transport industry to operate as efficiently as possible. They also assist the National Heavy Vehicle Regulator (NHVR) in permitting access for heavy vehicles in NSW and national road freight.

There are two types of heavy vehicle access:

- General Access Vehicles (GAV) comply with mass and dimension standards and do not require a notice or permit to operate on the road network. These vehicles have general access to the road network unless the road is sign-posted otherwise.
- Restricted Access Vehicles (RAV) is a vehicle that is not a general access vehicle, including Class 1, 2 or 3 vehicles that operate under a notice or permit and vehicles operating under higher mass limits (HML) that can only access sections of the road network approved for that vehicle or vehicle classification. Common types of RAVs include semitrailers, B-doubles, road trains, Performance Based Standards (PBS) heavy vehicles and heavy vehicles operating at Concessional Mass Limits (CML) and HML. Over size and over mass vehicles are also RAV's.

The challenge for road managers is to get the right vehicles (in terms of freight productivity, vehicle performance and road safety) operating on the right roads (that is roads with suitable infrastructure that are best placed to meet key freight tasks). TfNSW and RMS works with Local Government, in strategic access planning to identify key freight networks and the vehicles best suited to operate on them.

In its role as road manager, RMS is responsible for approving access and the conditions of access, for restricted access vehicles that are found to be meet the road safety, amenity and infrastructure integrity requirements for the operation of the state road network.

RMS works with local government to support access decision-making that is consistent with improved road safety outcomes while also improving whole of network connectivity.

[11] https://www.nhvr.gov.au/files/201409-0155-classes-of-heavy-vehicles.pdf

5.4.2.1 Intelligent Access Program

The Intelligent Access Program (IAP) facilitates heavy vehicle access to certain areas of the road network where otherwise it would not have been possible. IAP uses satellite navigation and communications technology to track a vehicle's location. The program was initially developed by Austroads and has been in operation since 2009. The regulatory framework for the IAP is set out in the Heavy Vehicle National Law.

Under the HVNL, the NHVR is responsible for the administration of the IAP and the issuing of access permits. Roads and Maritime continues to administer all the IAP services (excluding the issue of Class 2 permits) in NSW under delegation from the NHVR.

The Intelligent Access Program (IAP) provides restricted access and over dimension/mass vehicles with improved access to NSW's road network. In return, their compliance with approved access conditions is monitored through a form of telematics using satellite-based tracking technology. This provides RMS and councils, as the road managers, and the community with greater assurance that the right heavy vehicles are operating on the right roads.

IAP maps and approved roads lists provide details on the roads approved for vehicles enrolled in IAP. The published maps and approved road lists are the legally enforceable network in NSW.

5.4.2.2 Oversize and/or over mass (OSOM) vehicles and loads

OSOM vehicles are defined as Class 1 and Class 3 vehicles under the HVNL. A vehicle or vehicle combination is considered to be OSOM if it exceeds any general access mass, Class 2 mass or dimension limits.

Typical examples include:

- Agricultural machines such as harvesters and grain augers
- Vehicle combinations carrying large indivisible items such as mining and construction vehicles, bridge components or building infrastructure
- Special purpose vehicles such as mobile cranes, concrete pump trucks and drilling rigs.

If the vehicles/combination exceeds the dimension or mass limits contained in a Class 1 Notice or Ministerial Order, will be required an access permit to operate on the NSW road network.

5.4.2.3 Transport Management Plans (TMPs)

A TMP is a comprehensive document that describes how an OSOM movement will be safely undertaken in NSW. A TMP is required prior to a permit being assessed for OSOM movements that are classified as “High Risk” (very wide, long, high and or heavy) or involve “Critical/Sensitive” (health or environmental risk) loads.

All OSOM movements that are required to be escorted must have a signed NSW Load Declaration in addition to a TMP. The NSW Load Declaration certifies the mass and dimensions of the loaded combination and indemnifies each Road Manager and NSW Police Force.

5.4.3 Performance Based Standards

Performance Based Standards (PBS) is a national heavy vehicle scheme designed to offer the heavy vehicle industry the potential to achieve higher productivity and safety through innovative and optimised vehicle design.

PBS vehicles are designed to perform their tasks as productively, safely and sustainably as possible, and to operate on networks that are appropriate for their level of performance. The basic principle of PBS is matching the right vehicles to the right tasks.

PBS vehicles are tested against 16 safety standards[12] and four infrastructure standards to ensure they fit the existing road network and are safe. The scheme has been in operation since October 2007.

The operation of PBS vehicles in NSW is by access permit and/or National PBS Notice depending on the type of PBS vehicle. These access permits and/or National Notices provide details on the conditions of operation and road network access permitted for a PBS vehicle in NSW.

The National Transport Commission (NTC) is due to finalise its Policy Paper *Reforming the Performance Based Standards Scheme* which will be presented to the Transport and Infrastructure Senior Officials Committee (TISOC) on 23 March 2018.

5.5 Enforcement

NSW has one of the most robust heavy vehicle compliance and enforcement systems in Australia. It includes:

- Approximately 250 Heavy vehicle inspectors/ investigators
- 8 Heavy Vehicle Safety Stations
- 24 Safe-T-Cam locations
- 25 point to point average speed lengths[13]
- 1,200 Police Highway Patrol officers.

Based on a 2015/16 analysis prepared by the NVHR, there are 41 on-road compliance personnel employed in Victoria, 17 in South Australia, four in Tasmania and eight in the Australian Capital Territory. The only other local jurisdiction with Safe-T-Cam locations is South Australia. Further, NSW's average speed camera program for heavy vehicles enforces approximately 726km, which is five times as many kilometres than any other state or territory.

5.5.1 Role of RMS

RMS is either authorised directly under NSW legislation or as delegated under the NHVL to regulate through engagement, education, enforcement and co-regulatory partnerships to achieve:

- Safer drivers through licensing and training
- Safer vehicles through registration, roadworthiness checks and vehicle standards
- Safer operators by authorising, educating and monitoring public passenger services and heavy vehicles
- Safer users by managing road safety cameras and supervising school crossings.

RMS applies a risk-based, outcomes-focused approach to deliver regulatory activities that motivate safe and compliant road user behaviour. This involves the development of an annual operation plan based on industry/load type sector based risk assessments, and analysis of current and historical compliance data to target high-risk industry sectors, specific areas/locations or vehicle types. Compliance data and intelligence is reviewed monthly to assess targets and outcomes and plan targeted campaigns.

5.5.2 Compliance and enforcement activities

RMS uses its regulatory powers for on-road enforcement to ensure the practices of drivers, vehicle operators and responsible parties in the road transport and logistics supply chain lead to improved compliance, asset protection and safer roads.

[12] https://www.nhvr.gov.au/road-access/performance-based-standards/pbs-vehicle-standards
[13] http://roadsafety.transport.nsw.gov.au/downloads/average-speed-map.html

Compliance and enforcement activities include:

- Inspections and targeted intercepts
- Joint operations with other government agencies including the NSW Police and Environment Protection Agency (EPA) to target heavy vehicle non-compliance.
- Administering a delegation from the NHVR to authorise local council enforcement officers to undertake compliance and enforcement activities for breaches of mass requirements on local roads.
- Conducting investigations into potential breaches of road laws related to Chain of Responsibility (CoR).

For the period 2012 to 2017, there were 63 prosecutions for breaches of road laws related to CoR. Of these, 32 related to mass/dimension breaches, 12 speed breaches, 12 fatigue breaches and seven load restraint breaches.

In the last 12 months, RMS continued to use risk based enforcements to target brake compliance on heavy vehicles, the construction sector with the increased construction boom in NSW and fatigue compliance in regional NSW with heavy vehicles traveling large distances within and through NSW.

5.5.2.1 Inspections

Approximately 250 RMS Compliance Operations Inspectors (COI) perform random and targeted, intercepts and inspections as part of on-road enforcement action, Heavy Vehicle Safety Station (HVSS) inspections, fixed or random roadside sites, Heavy Vehicle Inspection Scheme (HVIS) registration inspections and targeted operator fleet inspections.

COIs enforce heavy vehicle compliance with road transport laws including load restraint, mass limits, dimension limits, vehicle access, vehicle standards, speed limiter compliance, driver fatigue, vehicle roadworthiness, vehicle registration and driver licensing.

RMS records indicate that in 2016/17, over 542,000 units were inspected including:

- On-road enforcement: 67, 686 (112,263 units)
- Heavy Vehicle Safety Stations (HVSS): 115,652 (214,599 units)
- Inter-Agency: 65,063 (118,911 units)
- Heavy Vehicle Inspection Stations (HVIS): 95,278 units.

5.5.2.2 Heavy Vehicle Safety Stations

RMS uses HVSS to intercept and inspect heavy vehicles, which may be operating illegally, or in an unsafe manner on NSW roads and which therefore pose significant risk to road users, the road infrastructure and the environment.

There are eight HVSS located at:

- Mt Boyce (Great Western Highway)
- Mt White (northbound and southbound on the M1 Motorway)
- Marulan (northbound and southbound on the Hume Highway)
- Twelve Mile Creek (Pacific Highway)
- Chinderah (Pacific Highway)
- Pine Creek (Pacific Highway)
- Bell (Bells Line of Road)
- Kankool (New England Highway)

All heavy vehicles with a Gross Vehicle Mass (GVM) greater than eight tonnes are required to enter the screen lanes of a HVSS (except by direction at Chinderah and Pine Creek - 4.5 tonnes). These vehicles must

enter screen lanes to ensure the vehicle meets safety and roadworthiness standards and that their drivers are complying with road transport laws.

Four HVSS, Mount White, Marulan, Mount Boyce and 12 Mile Creek, are fully automated with screening lane technology. The screen lanes are operational 24 hours a day seven days a week to capture traffic and compliance information. The remainder are shift base operated.

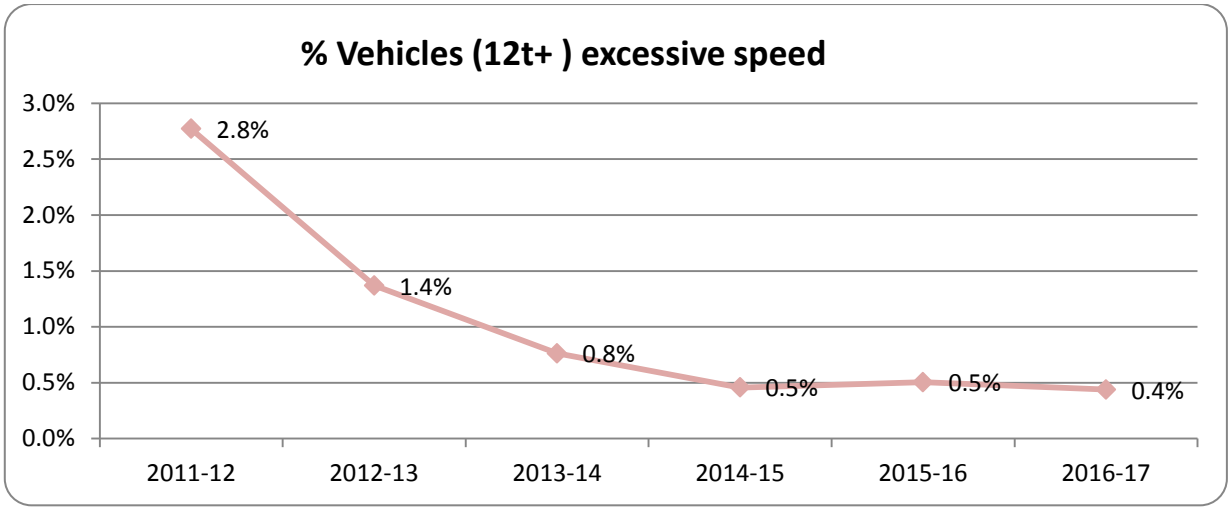
5.5.2.3 Safe-T-Cam

The Safe-T-Cam system is an automated monitoring system that uses digital camera technology to read heavy vehicles' number plates to enable RMS to monitor heavy vehicle movements. The network monitors heavy vehicle travel times, registration status, allows speed profiling and detects vehicles that fail to enter HVSS for compliance checks. The network of Safe-T-Cams provides a data source for compliance investigations – including obligations under chain of responsibility.

The Safe-T-Cam network consists of 24 Safe-T-Cam sites located on major routes throughout NSW and is linked to 13 Safe-T-Cams in South Australia. RMS is assisting the NHVR to build connectivity with jurisdictional data to enable effective networking of these cameras.

5.5.2.4 Safe-T-Cam – TIRTL[14]

This graph shows the trend in heavy vehicles registered as 12 tonnes and over detected for excessive speed at Safe-T-Cam sites installed with the Infra-Red Traffic Logger (TIRTL) technology. During 2011–16 financial years, approximately 91,000 12 tonne+ vehicles were detected per financial year for excessive speed.



5.5.2.5 Truck Scan

Truck Scan is current technology developed by RMS and used in HVSS and on road enforcement to obtain driver and registration information, non-compliance history, Safe-T-Cam sightings, workflow of offences and shift reporting. At the larger HVSS sites the screening lanes are incorporated into Truck Scan. This enables the detection and analysis of 26 different parameters against local benchmarks in a near immediate timeframe to enable an objective decision to be reached as to whether the heavy vehicle is directed in for an inspection or is allowed to return to the highway without stopping. The screening lanes at the four locations screen over 3.2 million heavy vehicle movements each year.

[14] CEOS (Supplier of the TIRTL devices) Data

5.5.2.6 RMS in-vehicle technology

Mobile Truck Scan is fitted to over 100 RMS enforcement vehicles to check intercepted vehicles registration and licencing information, notice workflow and STC sightings. To consult RMS compliance data please refer to ANNEX III.

RMS has access to the National Exchange of Vehicle Driver Information System (NEVDIS) – a national system established in 1998 owned by Austroads with the primary purpose of preventing fraud and theft by ensuring 'one vehicle, one VIN' and 'one person, one driver licence'. NEVDIS allows road agencies to interact across state borders.

5.5.3 Role of NSW Police Force

The NSW Police Force in its broad range of duties is actively involved in enforcing compliance with HVNL on the NSW network.

In addition to daily patrols and normal traffic operations, NSW Police Force undertakes a wide range of targeted inter-agency compliance operations with RMS through the Joint Traffic Task Force (JTTF). Joint campaigns have a compliance focus to ensure a level playing field for complying operators and assurance that high-risk operators are targeted and inspected.

A strong partnership has been established between the NSW Police Force and RMS, which is reflected in the long established JTTF. The JTTF holds monthly intelligence meetings to review compliance data and trends, other intelligence, industry changes and inform operational planning for further joint campaigns.

Key enforcement targets include:

- Vehicle roadworthiness
- Heavy vehicle speed
- Load restraint
- Vehicle mass (mass limits) including OSOM and RAVs
- Fatigue (working and rest hours)
- Heavy vehicle fleet inspections
- Sector specific (e.g. construction sector).

The JTTF was responsible for 27 per cent of all legal actions under the Heavy Vehicle National Law (HVNL) and its associated Regulations (1,492 of 5,569)[15]. The greater bulk of the remaining legal actions 71 per cent were undertaken by Highway patrol units other than the JTTF with the balance initiated by General Duties Police 2 per cent.

For calendar year 2017 the NSWPF commenced 96916 legal actions against drivers that had failed to comply with the maximum allowable work hours and/or the minimum allowable rest hours. This constitutes 17 per cent of all legal actions commenced under the HVNL. Of those 220, 23 per cent were for 'critical' risk breaches.

2,011 legal actions were commenced for drivers failing to keep the required records under the fatigue provisions of the HVNL. This amounts to 36 per cent of all legal actions commenced under the HVNL for 2017.

5.5.1 Speed enforcement

In NSW the maximum speed limit for a vehicle more than 4.5 tonnes Gross Vehicle Mass (GVM) is 100 km/h**.** For certain road conditions, such as sharp bends, steep descents and winding roads, special speed limit signs may be posted for trucks, road trains and buses.

[15] As at 09.02.2018
[16] As at 09.12.2018

Where no lower speed limit is applicable, the default speed limit on a road for a vehicle with a gross vehicle mass (GVM) or Gross Combination Mass (GCM) over 4.5 tonnes, is 100km/h. The maximum speed limit for road trains is 90km/h.

5.5.1.1 Speed limiters

Due to the proportions involved, low level speeding among heavy vehicles remains a significant safety issue *(Heavy vehicle road safety: Research scan (CASR, 2011)*[17]. Speed limiters and Intelligent Speed Adaptation (ISA) offer safety benefits with regard to the management of heavy vehicle speed, while police enforcement campaigns play an important role in affecting the behaviour of all road users.

Speed limiters are devices that limit a vehicle's maximum speed. Trucks with GVM exceeding 15 tonnes or heavy vehicles manufactured on or after 1 January 1991 with GVM exceeding 12 tonnes, must be speed limited to 100 km/h.

Speed limiters are mandated in NSW under the Road Transport Legislation[18] (Speed Limiters) Amendment Bill 2005.

5.5.1.2 Speed compliance regulation

The speed compliance component of the Road Transport (General) Regulation places duties on parties in the supply chain to take steps to ensure that their activities, schedules or arrangements do not cause heavy vehicle drivers to exceed the speed limits (over 100 km/h).

There is a specific duty in the HVNL on seven off-road parties to take all reasonable steps to ensure that their actions do not cause drivers to exceed speed limits. Please see section 6.7 for further information on CoR.

NTC's report, *'Reform Evaluation in the Road Transport Industry, 2012: Compliance and Enforcement, and Speed (2012)'*[19] examined the impact of the 2003 Road Transport Reform (Compliance and Enforcement) Bill, and the Speed Compliance of Heavy Vehicles Reform 2007.

The overall aim of the Compliance and Enforcement Bill and the Speed Compliance of Heavy Vehicles Reform is to improve road safety by improving compliance with requirements for vehicles, mass, loads and speed.

It complements existing chain of responsibility provisions for speed, mass, load restraint, vehicle dimension and fatigue management.

The speed compliance component applies to heavy vehicles with a GVM of more than 4.5 tonnes or a vehicle and trailer combination with a GCM over 4.5 tonnes.

The Regulation does not impose any obligations on employed drivers. Drivers of heavy vehicles are required to obey the speed limits. Penalties on drivers failing to comply with speed limits include demerit points, licence suspension, cancellation or disqualification and fines.

5.5.1.3 NSW Speed Camera Strategy

Speed cameras are speed enforcement tools that supplement enforcement conducted by the NSW Police Force. They have been proven to make roads safer by reducing speeding and in turn the number and severity of crashes. There are four types of speed cameras used in NSW to encourage drivers to comply with the speed limit.

- Fixed cameras – Introduced in 1997 and are location specific to address black spot/high risk.

[17] http://www.truck.net.au/system/files/industry-resources/CASR100v99.pdf
[18] Amendment of Road Transport (Safety and Traffic Management) Act 1999
[19] https://www.ntc.gov.au/Media/Reports/(2B3C0C37-2A76-4811-C815-02A229BDD24D).pdf

- Red-light speed cameras – Introduced in 2009 and are location specific to address high-risk intersections.
- Mobile cameras – First introduced in 1991. Ceased operation in December 2008 and re-introduced in 2010. Cameras are used for general network deterrence.
- Average speed cameras – Introduced in 2010 and are used for route enforcement for heavy vehicles only.

5.5.1.4 Average speed enforcement

Average speed enforcement promotes area-wide suppression of speeding, with speed enforcement sustained over a length of road. Average speed enforcement works by measuring the amount of time it takes a heavy vehicle to drive between two points and then calculates the average speed of the vehicle. Research from the National Transport Council has suggested that if all heavy vehicles complied with speed limits there would be a 29 per cent reduction in heavy vehicle crashes.

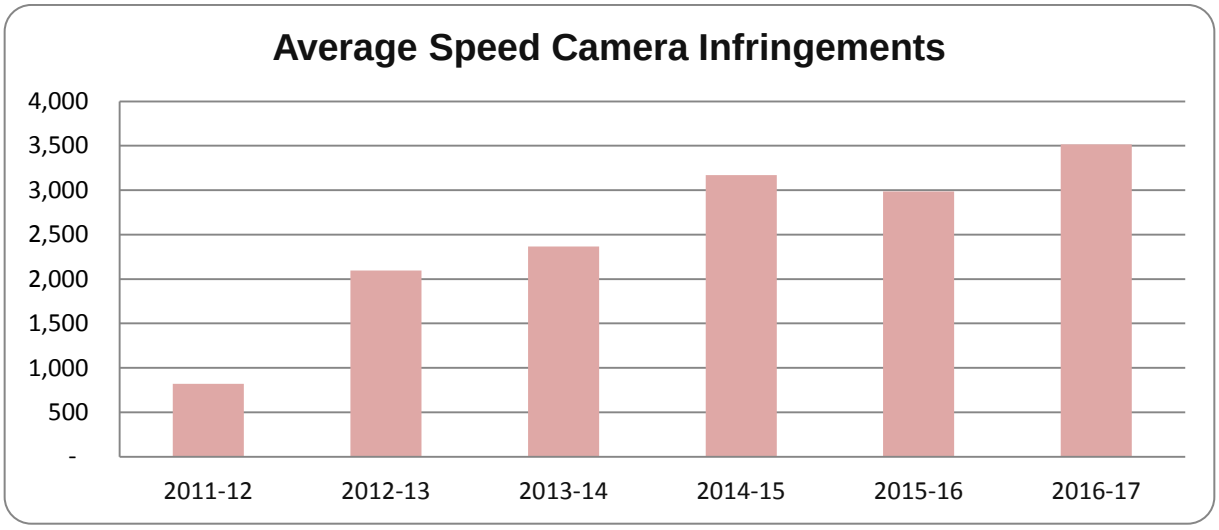
There are currently 25 average speed enforcement lengths, covering a total 726 kilometres, on routes that have an over representation of heavy vehicle crashes and non-compliance and are installed on known heavy vehicle routes, including the Pacific Highway, the New England Highway, the Hume Highway, the Newell Highway, Mount Ousley Road and Picton Road.

Average speed enforcement is used to enforce existing speeding laws; however, an additional demerit point will be incurred by heavy vehicle drivers detected speeding using average speed enforcement. This is because offences detected by average speed enforcement demonstrate a continued intention to speed.

Further details on the operation of these cameras can be found in the average speed camera fact sheet on the TfNSW website.[20].

Average Speed Camera Infringements[21]

Heavy vehicle speed compliance within enforcement lengths is high, with a relatively low number of infringements. Based on infringement data provided by Revenue NSW, an average of 279 infringements per month were issued during 2016–17 for speeding detected by average speed cameras across NSW.



[20] http://roadsafety.transport.nsw.gov.au/downloads/average-speed-factsheet.pdf
[21] Revenue NSW

5.6 National Compliance Information System (NCIS) [22]

A National Compliance Information System (NCIS) is currently being developed by the NHVR. Once established, the NCIS will provide a national set of heavy vehicle related compliance and monitoring data based on the amalgamation of compliance and camera data from states and territories. The NCIS is designed to leverage existing State and Territory investments in Automatic Number Plate Recognition (ANPR) cameras and systems for heavy vehicle monitoring. These investments include Safe-T-Cam in NSW and South Australia and ANPR cameras in Queensland, Victoria and other jurisdictions.

There are approximately 70 ANPR camera sites across jurisdictions that can be feasibly connected to a national data-sharing capability in the NCIS. Throughout 2017, the NHVR continued to test and validate the amalgamation of heavy vehicle related compliance and camera data and provide a national picture of the heavy vehicle fleet.

The NCIS will give the NHVR and partner agencies across Australia access to more complete and consistent information about heavy vehicles, their movements, drivers, operators and other parties in the CoR.

Existing compliance information sources do not provide national visibility of the heavy vehicle fleet particularly when heavy vehicles travel interstate. Having access to this information will enable identification and intervention, targeting those who represent the greatest safety risks. At the same time, it will reduce the operational impact on those safe and compliant operators.

The NCIS is central to the NHVR's delivery of regulatory compliance activities and outcomes and is critical for leading the implementation of heavy vehicle regulatory reform. When fully operational, it will improve safety for the public and heavy vehicle industry through:

- Improved road safety — safer roads resulting in the reduction of loss of human life and subsequent high cost damages by better understanding the major causes of heavy vehicle crashes such as fatigue and speed.
- Better data — timely and accurate information to make on-road enforcement stronger and better targeted at unsafe operators.
- Better efficiency — enforcement resources are focused on high-risk operators and noncompliant behaviours.
- Better for business — compliance activities are more targeted resulting in less delay and intervention for compliant operators and less time pressure on the road.

5.7 Chain of Responsibility (CoR)

Since 1997 the concept of CoR has been a feature of Commonwealth heavy vehicle legislation. CoR is designed to ensure that any party in a position to control and influence on-road behaviour is identified and held responsible. In practical terms, CoR recognises the on-road impacts of the actions and inactions of off-road parties involved in transport activities and provides for their accountability.

CoR was initially included in Heavy Vehicle Model Law and incorporated provisions particular to specific regulatory areas such as speed and fatigue. In 2012 the model laws were consolidated into the HVNL as separate chapters resulting in a number of differing constructions and approaches to CoR.

[22] https://www.nhvr.gov.au/files/201704-0496-ncis-introduction.pdf

In 2012 various industry groups requested the review of CoR and executive officer liability provisions in the HVNL based on affirmative duties, consistent with the Work Health and Safety approach. This review resulted in various CoR reforms that are expected to commence in mid-2018. Once commenced, the NVNL will make it clear that every party in the supply chain has a "duty" to ensure safe practices, rather than being deemed liable for breaches detected.

Currently all parties in the supply chain must take all reasonable steps to prevent breaches of the road transport mass, dimension, loading, speed compliance and work hours laws. Under the reforms, CoR requirements and legal responsibilities will also extend to heavy vehicle standards and maintenance, and the liability of executive officers will broaden to require due diligence for safety across the entire HVNL.

Parties in the chain must also make sure the terms of consignment or work/employment contracts will not result in, encourage, reward or provide an incentive for the driver or other party in the supply chain (e.g. a scheduler) to break the HVNL. Additionally, contracts that require a driver to break the law are illegal.

In a prosecution, the courts may consider the actions of each party in the supply chain. This includes what measures those parties have in place to prevent breaches of the HVNL occurring. Each party in the chain must demonstrate to the Court that they took all reasonable steps to prevent the contravention or show the court that there were no steps they could reasonably be expected to have taken to prevent the contravention.

The NHVR is leading industry engagement on these changes and held industry information sessions across Australia throughout 2017.

5.8 General Duties vs. Specified Roles

During the CoR review and reform process consideration was given to the role of general or primary duties vs. specified roles. Under Model Work Health and Safety Law a primary duty of care exists for a person conducting a business or undertaking to ensure, so far as is reasonably practicable, the health and safety of workers and activities. The WHS law also includes more specific duties under specific circumstances.

The CoR HVNL reforms will apply to specified roles or parties in the CoR. All of these parties must ensure, so far as is reasonably practicable, the safety of the party's transport activities. Additionally, various parties have specific roles under the HVNL. For example under section 186 the consignor of the goods must ensure, so far as is reasonably practicable, the consignment documentation is not false or misleading.

5.8.1 Codes of Practice

Part 13.2 of the HVNL provides for the development of industry codes of practice. A Registered Industry Code of Practice (RICP) is a set of standards and procedures that has been developed in accordance with specific guidelines. It must also be assessed by the NHVR as qualifying for registration by the NHVR under section 706 of the HVNL.

An individual, group or corporation can develop an RICP in accordance with the Guidelines for Preparing and Registering Industry Codes of Practice.

An RICP must require and assist operational compliance with all relevant provisions of the HVNL by each party in the chain of responsibility. As a document, an RICP outlines guidance, procedures and best practice principles to assist adopters of the code in undertaking reasonable steps to meet their chain of responsibility and driving obligations under the HVNL.

Adopting a RICP assists in proactively meeting chain of responsibility and driving obligations under the legislation and creating the standards under which their risk management process should operate.

By adopting an RICP and developing an effective risk management process, adopters may be offered protection from certain litigation, as they will be able to prove that they have complied with all relevant standards and procedures.

6 Safer vehicles and safety technology

The Safe System approach to road safety accepts that vehicle operators will make errors and consequently interventions to improve safety must recognise and accommodate this fact. Understanding the nature of the errors made by drivers and the reasons for those errors allows interventions that:

- reduce the frequency of errors
- identify errors and rectify before a crash occurs
- mitigate the effects of any crash that does occur.

These interventions may be through modifying driver behaviour, making changes to the road environment or by vehicle safety technology.

Design improvements to heavy vehicles and technological support for heavy vehicle drivers can contribute to reducing the incidence or severity of major crash types arising from factors such as lane departure, frontal collisions and pedestrian collisions. Crash scenarios for long-haul trucks include unintentional drifting from the intended travel lane, causing the truck to hit vehicles in opposite or neighbouring lanes, run off the road and rollover or collide with roadside obstacles, including barriers and bridge supports. Insufficient adaptation of speeds to driving conditions or habitual speeding are common crash causation factors in truck crashes.

Vehicle features such as front under-run protection, improvements to driver's field of view, pedestrian friendly frontal designs and lane departure and collision avoidance systems are effective measures to deal with these scenarios. Such measures can also effectively reduce the consequences of human error (by the truck drivers or other road users) that are responsible for the large majority of crashes. The effects of drug use and the effects of fatigue on cognition are contributing factor in cases where other errors are involved, such as hazard-recognition errors, inattention or decision-making error.

6.1 Vehicle Standards – the Australian Design Rules

The Australian Design Rules (ADRs) are national standards for vehicle safety, anti-theft and emissions. The current standards, the Third Edition ADRs, are administered by the Commonwealth Government under the *Motor Vehicle Standards Act 1989*. The Act requires all road vehicles, whether they are newly manufactured in Australia or are imported as new or second hand vehicles, to comply with the relevant ADRs at the time of manufacture and supply to the Commonwealth market.

The Commonwealth Department of Infrastructure and Regional Development and Cities (DIRDC) maintains jurisdiction over heavy vehicles up to the point of first supply to the Australian market. Once a heavy vehicle is supplied to the market it is classed as 'in-service' and the NHVR becomes responsible for regulating the vehicle standards for these vehicles.

The NHVR is responsible for the application of the Heavy Vehicle National Regulation and for granting exemptions across participating jurisdictions (ACT, NSW, Qld, SA, Tas, and Vic). Heavy vehicle operators, owners, and modifiers need to apply to the NHVR for:

- Exemption from compliance with a heavy vehicle standard
- Approval to modify a heavy vehicle
- Special Purpose Vehicle (SPV) in-principle support

The National Heavy Vehicle Inspection Manual (NHVIM) provides authorised officers and industry with consistent criteria for heavy vehicle inspections. The use of the NHVIM ensures a nationally consistent approach to improve vehicle standards compliance and help reduce vehicle downtime.

6.1.1 ADR Development and Review

Vehicle technical standards are mandated to improve safety and environmental performance by imposing specific requirements and/or by imposing consistency between vehicles. As the cost of development and

testing of standards has increased and the motor vehicle manufacturing industry has become more globalised, pressures for regional and international harmonisation of vehicle standards have increased.

In most parts of the world, technical safety standards are based on regulations of the United Nations Economic Commission for Europe (UNECE). UNECE regulations are increasingly based on EU Standards. Adoption of UNECE standards provides access to international standards and removes the need for local development of standards.

The Commonwealth Government's policy is to harmonise the national vehicle safety standards with international regulations where possible and consideration is given to the adoption of the international regulations of the UNECE. Australia is a signatory to the UNECE 1958 Agreement and the 1998 Agreement.

A comparison of Heavy Vehicle Safety Standards included in the UN Vehicle Regulations compared to the Australian Design Rules together with a summary of current safety technologies regulated in the EU can be found at ANNEX II. The information indicates considerable progress in introducing safety technologies in the EU and the potential for Australian Standards to align with the EU standards.

The development of the ADRs occurs as part of a continuous program of review and revision. The program includes monitoring international developments and involves regular consultation with key stakeholders. This identifies implementation issues or changes in factors affecting existing ADRs, as well as any need to introduce new ADRs. The ADRs are also subject to a full review where possible every ten years to ensure they remain relevant, cost effective, and do not become a barrier to importation of safer vehicles and vehicle components.

Public comment on draft ADR amendments, draft new ADRs and draft full reviews of existing ADRs is an important part of the process. Much of the consultation takes place within institutional arrangements established for this purpose. The analysis needed, and the bodies consulted, depend on the degree of impact the new or amended ADR is expected to have on industry or road users. Consultation may involve some or all of the following groups:

- Strategic Vehicle Safety and Environment Group (SVSEG) which includes the Safer Vehicle Theme Group (SVTG)"; this comprises road transport agencies and is responsible to develop vehicle strategies for the Austroads Road Safety Task Force
- Australian Motor Vehicle Certification Board (AMVCB) which includes the Technical Liaison Group (TLG)
- Transport and Infrastructure Senior Officials' Committee (TISOC)
- Transport and Infrastructure Council (TIC)

New ADRs, or significant changes that increase the stringency of existing ADRs, may be subject to a vote by TIC Ministers. Following this vote, the Minister for Infrastructure and Regional Development may then determine the new or amended standards.

Where a Regulation Impact Statement is prepared to examine proposed new or amended ADRs, it must meet the best practice regulatory impact analysis as required by the Commonwealth Government or the Council of Australian Governments and administered by the Office of Best Practice Regulation.

A number of changes to ADRs will be considered in the future including those detailed in the Safe Vehicles section of the NRSS.

Actions under the NRSS that have already been completed include antilock brake systems for motorcycles, protection of occupants in side impacts with narrow objects such as poles and trees, antilock or load proportioning brake systems for heavy vehicles, and electronic stability control for light commercial vehicles.

Increasing the uptake of safer vehicle technologies is a priority in the RSP 2021 and a key action to support this is to work with the Commonwealth Government to fast track the adoption of new technologies into vehicle standards, including for commercial and heavy vehicles. The RSP 2021 also commits to the development of a heavy vehicle safety strategy, which will provide the opportunity to partner with the heavy vehicle industry to look at ways to:

- increase safety features in the fleet, such as blind spot monitoring and under run protection, and
- enhance integration of fleet safety into heavy vehicle access policy

6.1.1.1 Improving the stability and control of heavy vehicles

DIRDC has prepared for consultation a Regulation Impact Statement (RIS) and related draft ADRs 35/06 and 38/05 which considers a range of policy options to increase the fitment of stability control systems to heavy vehicles, in order to reduce heavy vehicle related road crash trauma.

Through this RIS process, the Commonwealth Government is considering the case for mandating Electronic Stability Control (ESC) for heavy trucks and buses and Roll Stability Control (RSC) for heavy trailers, through the ADRs. The analysis indicates that increasing the adoption of these systems would lead to a substantial reduction in fatalities and serious injuries from crashes involving a heavy vehicle rollover or loss of control. The consultation period closed in February 2018.

It is important to note that the EU introduced Regulation (EC) No 661 in 2009 and mandated the following safety features:

- Electronic Stability Control Systems on all vehicles (from 1 Nov 2011 for new types of vehicle and 1 Nov 2014 for all new vehicles).
- Advanced Emergency Braking Systems and Lane Departure Warning Systems on heavy-duty vehicles (from 1 Nov 2013 for new types of vehicle and 1 Nov 2015 for all new vehicles).

6.2 Road worthiness

The TfNSW's Centre for Road Safety monitors the roadworthiness and compliance of heavy vehicles using NSW roads by conducting heavy vehicle compliance surveys. Eight compliance surveys have been undertaken, with the last completed in 2015. Future monitoring of heavy compliance using a similar methodology will be conducted in partnership with the NHVR.

For the 2015 Heavy Vehicle Compliance Survey, an overall target quota of 1,600 heavy motor vehicles was designed with specific quotas for vehicle types within each RMS region. Actual inspections have been greater than this, with RMS Officers inspecting 1,715 heavy motor vehicles at 30 locations within NSW. The 2015 survey had the following broad findings:

- The rate of major defects in heavy vehicle hauling units found (4.5 per cent) was similar to those found in 2012 (4.0 per cent), 2009 (4.6 per cent) and 2006 (3.9 per cent) surveys.
- The results for these four survey periods averaged lower than in the earlier surveys, indicating that an improvement in major defects has been maintained. The rate of major defects has been used as a key measure for vehicle compliance, and on this basis the result is a positive one.
- The rate of major defects increased significantly with the age of the hauling unit, from 1.5 per cent for hauling units under two years old to 9.6 per cent for hauling units of 13 years and older.
- The rate of major defects also increased significantly with age for trailers, from 2.5 per cent for trailers under five years old to 9.9 per cent for trailers aged 13 years and older.
- Brakes continued to be the main area of both major and minor defects, with 5.4 per cent of vehicle combinations having at least one major brake defect, 29.4 per cent in total having a defect.
- The rate of major brake defects has progressively increased from 3.6 per cent in 2006 to 5.4 per cent in 2015.
- Hauling units registered in NSW were marginally more likely to have a major defect (4.8 per cent compared to 3.3 per cent for interstate registration), and a defect overall (37.9 per cent compared to 32.8 per cent).
- The proportion of hauling units participating in the National Heavy Vehicle Accreditation Scheme (NHVAS) in 2015 (30.3 per cent) was similar to that in 2012 (29.9 per cent), following an increase in 2009 (16.1 per cent).
- The highest incidence of major defects among hauling units was for rigid trucks (7.4 per cent) and this was heights for truck and trailer combination (11.2 per cent) and relatively high for those without a

trailer (6.7 per cent).

Compliance surveys help evaluate and refine existing heavy vehicle enforcement programs to address trends where roadworthiness performance may have declined.

6.3 Accreditation schemes

The success of accreditation programs has been determined by studies that compare the crash rates of vehicles from accredited operations to those from non-accredited operations. Such studies have demonstrated positive safety benefits of accreditation schemes. Accreditation also offers a number of benefits for productivity although these are yet to be adequately quantified (Raftery, Grigo, & Wooley, 2010[23]).

6.3.1 National Heavy Vehicle Accreditation Scheme (NHVAS)

The National Heavy Vehicle Accreditation Scheme (NHVAS) was first offered to industry in 1999 as an alternative compliance scheme. It has since evolved as a formal process for recognising operators who have robust safety and other management systems in place. It is also increasingly being used to show compliance with general duty requirements under Road Transport Law.

Heavy vehicle operators can apply for accreditation under the following NHVAS modules:

- Mass Management - accredited operators in the Mass Management module can access additional mass concessions. These concessions allow a vehicle to operate at Concessional Mass Limits (CML) for general access to the road network. Operation at Higher Mass Limits (HML) for specific routes is available if operators meet additional operating conditions
- Maintenance Management - Operators accredited in the Maintenance Management module are provided an exemption to the requirement to have vehicles inspected annually for the purposes of registration. To be provided with the exemption, vehicles must be adequately maintained and comply with all applicable vehicle standards at all times.
- Fatigue Management: Basic Fatigue Management (BFM) - Basic Fatigue Management (BFM) option: this accreditation offers more flexible hours including the ability for drivers to work 14 hour shifts. Operators have a greater say over when drivers can work and rest, but the risks of working long hours or at night must be properly managed
- Fatigue Management: Advanced Fatigue Management (AFM) - Advanced Fatigue Management (AFM) option: Advanced Fatigue AFM brings a risk management approach to managing fatigue, rather than prescribing work and rest hours. It offers more flexible hours than Standard Hours or BFM in return for the operator demonstrating greater accountability for managing fatigue risks.

Previously administered by state and territory road transport authorities, the NHVAS is now managed on a national basis by the NHVR.

Any NHVAS accreditation that was granted under the state and territories' business rules is preserved for the life of that accreditation period.

In NSW, the Hire Trailer Maintenance Management Accreditation Scheme will be maintained in its present form until transitioned to the Regulator. The NSW Livestock Loading Scheme will be retained by RMS: determining the charging of fees, issuing of business rules, setting of conditions and requirements and issuing of forms and labels. A more harmonised national approach to local productivity schemes such as this one will be explored in the medium term between the Regulator and all jurisdictions, including NSW.

[23] Raftery, S. J., Grigo, J. A., & Wooley, J. E. (2010). *Heavy vehicle road safety: Research scan.*

A review[24] of accreditation in Australia found that vehicles accredited under either NHVAS or the industry scheme (TruckSafe) are significantly safer than vehicles, which are not accredited. Accredited vehicles were estimated to have between 50 per cent and 75 per cent fewer crashes than non-accredited vehicles. (Baas, P. and N. Taramoeroa)

In examining whether this was because better operators chose to accredit or the accreditation process improved safety, the study found that operators improve safety performance through the process of becoming accredited. This suggests that the process of systematically reviewing operating procedures leads to improved safety outcomes.

There appears to be support for accreditation schemes throughout the industry with a number of accredited operators indicating that the benefits of accreditation outweigh the costs. A number of reports indicate accreditation also benefits the productivity of the organisation however; the true nature and extent of these benefits have not been fully determined.

6.3.2 Safety, Productivity & Environment Construction Transport Scheme (SPECTS)

The Safety, Productivity & Environment Construction Transport Scheme (SPECTS) is a voluntary scheme designed to improve the safety, environmental performance and productivity of heavy vehicles used by the construction industry in NSW. SPECTS is administered and maintained by RMS.

It enables the efficient movement of construction materials to support the growth of the greater Newcastle-Sydney-Wollongong area by allowing enrolled trucks carrying more materials greater road access in return for meeting higher environmental, safety and compliance standards.

Enrolled vehicles are required to meet the following requirements in return for improved access:

- Performance Based Standards (PBS) approved
- Fitted with at least a Euro 5 engine
- Fitted with a range of safety features
- Enrolled and monitored in the Intelligent Access Program (IAP) in NSW and
- Equipped with On Board Mass (OBM) monitoring systems linked to the IAP in NSW.

Participation in SPECTS is also subject to the conditions contained in the SPECTS Business Rules. The SPECTS Business Rules set out the administrative framework and additional obligations for participants in the Scheme. Participants must comply with the SPECTS Business Rules as a condition of operating under the Notice.

Eligible vehicles must have the following safety and environmental features set out in the Scheme Business Rules:

- Electronic Stability Control (ESC) – on vehicles manufactured on or after 1 January 2017 as defined in the SPECTS Business Rules
- Roll-over control system on trailer – to be fitted to vehicles manufactured on or after 1 January 2017 in conjunction with ESC as defined in the SPECTS Business Rules
- Systems to improve visibility and detection of vulnerable road users, such as blind spot mirrors as defined in the SPECTS Business Rules
- Reversing lights on both truck and trailer as defined in the SPECTS Business Rules
- Enhanced vehicle visibility markings – using retro-reflective tape to provide a contour outline of the vehicle as defined in the SPECTS Business Rules
- “Smart” reversing alarm, which adjusts the noise level to be appropriate for the environment that the vehicle operates in, on both the truck and trailer as defined in the SPECTS Business Rules

[24] Analysis of the Safety Benefits of Heavy Vehicle Accreditation Schemes, Austroads Publication No. AP-R319/08, 2008

- At least Euro 5 diesel engine as defined in the SPECTS Business Rules.

Eligible vehicles must also:

- Be enrolled in the IAP and IAP-linked OBM in NSW
- Be currently registered in an Australian jurisdiction
- Be issued and comply with the PBS Vehicle Approval, which sets out the approved combination and the required national operating conditions
- Comply with all the conditions set out in the SPECTS Business Rules and the Notice.

To manage risk and maximise the benefits of the Scheme for industry and the community, RMS applies a comprehensive risk-based compliance strategy combining on-road enforcement and follow-up investigations.

All enrolled vehicles, including trailers, are issued with a SPECTS label which must be displayed on, or adjacent to, the driver's side door at eye level as well as on each trailer.

They must also be equipped with an IAP in-vehicle unit to enable satellite-based tracking, thereby providing RMS and the community with greater assurance that the right heavy vehicles are operating on the right roads.

In addition, the vehicles must be fitted with OBM measurement devices linked to IAP so RMS knows how much is being carried on the road and when crossing structures.

6.3.3 Other Productivity Schemes

As well as SPECTS other productivity schemes have been developed for Grain Harvest and Livestock Loading. These balance increased productivity with features that guarantee improved safety and also protect road infrastructure. For example, eligible drivers in the Livestock Loading Scheme must complete roll over training before they enter the scheme. All vehicles in the Grain Harvest Management scheme are weighed before they are unloaded to ensure they are compliant.

6.3.4 Dangerous Goods

Dangerous goods are items or substances which are a risk to health, safety, property or the environment. Transporting dangerous goods has particular safety issues especially in a crash or failure of the dangerous goods container. While the risk of a dangerous goods spills or fires in a tunnel is low, the outcome can be catastrophic. As a result, NSW prohibits dangerous goods in regulated quantities from being transported through road tunnels.

As the population grows, so does the demand for a range of dangerous goods. Alternative approaches to transporting dangerous goods are under consideration, including the requirements for dangerous goods vehicles and consideration of specified risk assessed dangerous goods routes.

6.4 Vehicle safety technologies

New technologies have the potential to significantly improve the safety of heavy vehicles. Examples include:

- object detection systems - using sophisticated radar and lidar technologies to warn the driver of potential frontal crashes;
- unintended lane departure warning systems - using smart-camera technology to warn the driver when the vehicle unexpectedly deviates from the lane;
- headway monitoring systems - providing the driver with sufficient time to react if the vehicle ahead unexpectedly stops or slows down (an advanced system called adaptive cruise control automatically maintains a safe distance from the vehicle ahead).

Other examples of road safety technologies include ISA, which warns the driver should the vehicle exceed the prevailing speed limit; and vehicle system monitoring technologies, which alert the driver.

Erratic driver behaviour, inadequate vehicle control as well as fatigue and drowsiness, are safety risk factors that can be mitigated by driver monitoring and warning systems that detect and alert against the onset of such conditions. Safety can be further enhanced by supporting the driver, operator and the customer to better plan and deliver the freight task through vehicle tracking and communication systems. If a crash does occur automatic crash notification systems can alert a fleet manager to an incident and in turn lead to a quicker response from emergency services especially in rural and remote areas of the state In the future these systems will automatically contact public safety answering points such as the triple zero call centre currently run by Telstra.

Raftery, Grigo, & Wooley (2010)[25] highlighted that ISA technologies can further reduce heavy vehicle risks associated with speed. They also suggest that another means for reducing the risks with road design features can be addressed by vehicle design and vehicle technologies. On-board warning systems can be used in conjunction with Intelligent Transport Systems to warn drivers of potential hazards allowing them to take proactive steps to reduce those risks.

Other technologies such as Electronic Speed Control, Vehicle Speed Sensors, Yaw Stability Control, and Electronic Braking Systems that improve the stability and control of the vehicle under every day or emergency driving conditions also have the potential to improve heavy vehicle safety. Dedicated short range communications (DSRC) systems also hold significant potential for improving the operational safety of all vehicles on the road network.

6.4.1 Crash Avoidance Technologies[26]

The Centre for Road Safety independently reviews every 18 to 24 months a wide range of heavy vehicle crash avoidance and harm minimising technologies currently available on the market. The latest publication is available at Safety Technologies for Heavy Vehicles and Combinations June 2017.

The following information outlines the Budd & Newstead (2014)[27] research on the estimates of the potential crash reduction effects of fitting various emerging safety technologies to heavy vehicles in Australia and New Zealand. Technologies considered included: Electronic Stability Control, Autonomous Emergency Braking Systems, Fatigue Warning Systems and Lane Departure Warning Systems. Benefits were estimated in terms of savings of fatal, serious and minor injuries, as well as for property damage only crashes.

6.4.1.1 Intelligent Speed Assistance (ISA)

ISA warns driver or slows vehicle when exceeding the speed limit. The technology uses maps or smart cameras or a combination and can be retrofitted to existing trucks – advisory & monitored systems only. Modelling based on NSW ISA trial estimates a 19 per cent reduction in fatal & serious injury crashes based on light vehicle data.

6.4.1.2 Autonomous Emergency Braking System (AEBS)

AEBS detects potential forward collisions and applies brakes. The technology uses smart cameras, radar or LIDAR detectors and cannot be retrofitted. AESBs were mandated in Europe on 26 January 2014.

It is estimated that up to one quarter of all heavy vehicles fatal crashes could be prevented from the mandating of AEBS systems. This translated to an annual saving of costs to Australian society of $187 million. It is also estimated that up to 17 per cent of Australian heavy vehicle serious injury crashes and up to 3 per cent of Australian property damage only crashes may be prevented by AEBS fitment.

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[25] Raftery, S. J., Grigo, J. A., & Wooley, J. E. (2010). Heavy vehicle road safety: Research scan.
[26] http://roadsafety.transport.nsw.gov.au/downloads/safety-technologies-heavy-vehicles.pdf
[27] Budd & Newstead, Monash University Accident Research Centre (2014) Potential Safety Benefits of Emerging Crash Avoidance Technologies in Australasian Heavy Vehicles

6.4.1.3 Lane Departure Warning System (LDWS)

LDWS detects unintended lane departures. The technology uses smart cameras and can be retrofitted (warning system only)

It is estimated that up to 6 per cent of all heavy vehicle fatal crashes from the mandating of LDWS systems could be prevented. This translated to an annual saving of costs to Australian society of $45 million. It is also estimated that up to 4 per cent of Australian heavy vehicle serious injury crashes, may be prevented by LDWS fitment.

6.4.1.4 Electronic Stability Control (ESC)

ESC applies brakes to selected wheels to correct deviations. The technology uses sensors to monitor driving inputs and vehicle performance and cannot be retrofitted cost effectively.

It is estimated that 4 per cent of all heavy vehicle fatal crashes could be prevented through the mandating of ESC system. This translated to an annual saving of costs to Australian society of $31 million. It was also estimated that 7 per cent of Australian heavy vehicle serious injury crashes may be prevented by ESC fitment.

ESC related crash reductions were up to three times higher for road trains and articulated trucks than for rigid trucks in Australia.

6.4.1.5 Driver Fatigue Detection or Prediction

These technologies uses systems that measure:

- Eyelid movement & blink rate
- Eyeball movement and gaze
- Head tilt and movement
- Brain wave monitoring

These systems can be retrofitted It is estimated that 4 per cent of all heavy vehicle fatal crashes could be prevented through the mandating of ESC system.

The Centre for Road Safety has been conducting field testing of driver fatigue detection devices in its dedicated research light vehicle for almost a decade. The following systems have been trialled by the Centre.

6.4.1.6 Optalert

This system uses a sensor incorporated in a pair of driving glasses to measure the wearer's left eye movement 500 times per second. Based on eyelid blinking speeds and frequency, the Australian manufacturer claims the product is the only system that can accurately measure the early onset of fatigue. The driver's fatigue score is constantly shown on a small dashboard-mounted display unit and the driver is alerted by audible and visual warnings when the score exceeds a predetermined threshold. The glasses must be calibrated to each driver's eye by the product manufacturer. Prescription lenses can be accommodated. Real-time monitoring of the driver's fatigue state can be undertaken by a fleet supervisor. The system costs approximately $3,000 plus daily reporting costs.

6.4.1.7 Driver State Sensor

This system uses a dashboard-mounted camera with face-tracking technology to measure a driver's eyelid closure and head position. Audible alerts and seat vibrations are generated when the device detects driver fatigue and/or distraction. The latest model, called Guardian, offers a forward facing dash-cam for incident recording. The benefits of this Australian product include its non-invasiveness (non-wearable) and it does not require individual driver calibration. There is no display unit nor calculated fatigue scores. A short video of the driver's face is available online for each detected fatigue and distraction event. Real-time event notices are able to be conveyed to a fleet supervisor. The system costs approximately $17,000 plus daily reporting costs.

6.4.1.8 SmartCap

This system uses electroencephalography (EEG) brain activity to monitor a driver's level of fatigue. A sensor embedded in a baseball cap (or head band or beanie) calculates the driver's level of drowsiness and wirelessly displays the value on a small dashboard-mounted display unit. The system emits visual and audible alerts to the driver when a fatigue threshold is exceeded.

6.4.1.9 Readiband

This device is worn on the driver's wrist and monitors the wearer's level of activity. An algorithm converts the wearer's movement information into sleep information. A calculated 'mental effectiveness score' can be viewed on the wearer's smartphone app (iOS and Android only) or on the manufacturer's website. The device's bio-mathematical model can also predict the wearer's mental effectiveness over the next 18 hours, which allows a fleet manager/supervisor to allocate work activities based on the level of fatigue experienced by the wearer/driver. Unlike most other driver fatigue detection systems, the Readiband does not generate real-time alerts. The Canadian product is not available for purchase, but can be hired for approximately $1,800 per unit per year.

The Centre for Road Safety is soon to complete a pilot of 25 drivers using the technology. Preliminary results suggest that despite the band being acceptable to most drivers, there was no substantial change in driver fatigue scores, and senior management of the trial's participating organisations did not support the implementation of the band due to its cost, employee privacy concerns and perceived value to the organisation.

6.4.1.10 Other Systems

The Centre for Road Safety has also evaluated a variety of other driver fatigue detection systems which are currently available to road users, such as inexpensive dash-mounted eye tracking devices, head-tilt monitoring devices worn behind the driver's ear and an 'electrodermal' ring which is worn on the driver's thumb, which the manufacturer claims can measure brain wave activity. However, all of these devices failed to accurately detect driver fatigue when assessed by the Centre for Road Safety's research team.

Ongoing evaluations of the above driver fatigue detection systems by the Centre for Road Safety have revealed that despite the promising results from Optalert, DSS and SmartCap, regular inconsistencies appear in the results when directly comparing the technologies. This finding confirms the research by other experts that there is currently no single technology which can accurately and reliably detect or predict driver fatigue.

Accuracy, user acceptance and high implementation costs continue to obstruct the adoption of these technologies. The Centre awaits the development of OEM systems which incorporate both physiological (human) and vehicle performance monitoring technologies to detect driver fatigue.

6.5 Telematics

Telematics systems are in-vehicle devices containing sensors and inputs linked to a back-office that capture, store and electronically analyse information. This data can be used by the vehicle and for 'remote' monitoring.

Telematics is a tool that offers significant benefits when integrated as part of management systems. The technology can be used by industry for different commercial purposes, such as collecting diagnostics about harsh braking, engine performance and as a tool for driver coaching, payroll and routing. Telematics can also be used for what can be termed 'regulatory purposes' – when telematics is used to meet a compliance or enforcement outcome. For example, an operator may use telematics to ensure that vehicle standards, or mass management requirements under chain of responsibility, are met. They can also use the information captured through the use of telematics to provide further feedback and training to the drivers.

Australian road freight and bus industries are already using in-vehicle telematics technologies to improve their safety, efficiency and business processes. There is significant opportunity to harness the potential of this technology to further improve road safety compliance and reduce unnecessary red tape for the broader

industry and; road safety outcomes community in general. Operators can use the information captured through the use of telematics to provide further feedback and training to the drivers.

6.5.1 National In-Vehicle Telematics Strategy

The National In-Vehicle Telematics Strategy: the road freight sector was released in 2011. The objective of the National In-Vehicle Telematics Strategy is to increase the potential for in-vehicle telematics to deliver new or greater benefits (better safety, productivity and environmental outcomes) to users and the community through a partnership between industry and government.

It established a set of principles in order to encourage wider adoption within industry and focused on three key outcomes: a safety focus, protecting the environment, and improving productivity.

To support the National In-Vehicle Telematics Strategy, the NTC developed the compliance and enforcement framework for heavy vehicle telematics. The compliance and enforcement framework establishes 10 principles that relate to privacy, compliance and enforcement, minimum standards, regulatory efficiencies and consistent application. The framework also explains the data dictionary that enables regulatory applications to be consistent with international standards and to be interoperable with other systems.

The Intelligent Access Program (IAP) and the electronic work diary (EWD) are two initiatives in the Heavy Vehicle National Law (HVNL) that rely on telematics.

6.5.2 Intelligent Access Program (IAP)

The Intelligent Access Program provides a means for Road Managers to use telematics to better manage road networks and infrastructure to its sustainable limits to improve the efficiency of road freight transport if data on mass, distance and location are provided.

The data collected from the IAP scheme, including from the on-board mass systems, has enabled RMS bridge engineers to better manage the prioritisation of infrastructure repairs and to re-assess the ratings given to bridges resulting in greater access being given to some bridges.

Transport Certification Australia (TCA) currently satisfies the regulatory requirements of ensuring that data provided through the IAP scheme, and other systems, is of an evidentiary standard. This is a crucial requirement to ensure the integrity of compliance and enforcement activity.

It is understood that there are over 30,000 TCA-certified Telematics In-Vehicle Units (IVU) installed in heavy vehicles at a national level with 2,000 operators enrolled in the IAP scheme. It is apparent that operators are currently investing in these systems for commercial reasons, and the challenge is to identify what the impediments are to their broader adoption for regulatory purposes.

Under the IAP scheme, RMS receives Non-Conformance Reports (NCRs) each month that subsequently require manual assessment before being referred to compliance investigations for appropriate action. In assessing NCRs, RMS examines patterns of behaviour and rates of recidivism of heavy vehicle operators as the data collected via the IAP scheme is of a consistent standard that meets appropriate evidentiary requirements.

It is worth noting that the NSWPF currently does not have access to the data from the IAP and therefore cannot use it for enforcement purposes. Improving access to and sharing of data has been identified as an area for improvement in compliance and enforcement at both state and national levels.

False positive NCRs do occur because IAP only focuses on a 1 kilometre radius of a vulnerable asset, and in built-up areas, this can include a lot of detail and a number of alternative routes. In addition, IAP does not identify altitude and height so it is difficult to assess, for instance, if a vehicle went under or over a bridge.

Given the false positive NCRs identified through the IAP scheme, the question arises whether the parameters for this system are too broad, or whether the most advanced technology and GPS systems are being used.

6.5.3 Electronic work diaries (EWDs)

Electronic work diaries (EWDs) are expected to be the next major use for regulatory telematics. EWDs are electronic devices or systems capable of monitoring and recording drivers' work and rest information as a voluntary alternative to the paper based National Driver Work Diary. EWDs need to be approved by the NHVR, with the first approval expected in 2018.

The NHVR released a draft EWD Policy Framework and Standards for public consultation in December 2017 until February 2018. The proposed EWD Policy Framework and performance-based EWD Standards establish the co-regulatory framework for administering the EWD provisions in the HVNL.

The EWD Policy Framework (when approved) is intended to allow the NHVR to commence approvals of electronic recording systems for use as part of an electronic work diary.

The aim is to improve road safety and significantly reduce the administrative burden for the heavy vehicle industry through:

- improved data accuracy and transparency to drivers, transport operators and authorised officers
- provision of real time data which enables transport operators to respond immediately to actual breaches and monitor performance over time
- in-vehicle driver information which enables drivers to plan their work and rest and take action when alerted to an imminent or actual breach.

NSW supports the development of EWD and the move to a safety assurance model; however, there is a need to ensure the capability for on-road detection, integrity of the data and minimum evidentiary standards. It is crucial that both the NSW Police Force and RMS roadside enforcement officers are able to interrogate the system effectively and efficiently at the time a driver is pulled over. For instance, if the breach is significant and there is a high fatigue risk, the officer needs to be able to direct the driver not to work for 24 hours.

6.5.4 Review of the National Telematics Strategy

The National Transport Commission (NTC) is currently reviewing the use of telematics for regulatory purposes across the transport sector in order to find ways to encourage further take-up and realise safety and productivity benefits, and recommend models or set minimum standards that models must meet – i.e. in terms of type of data captured.

There is much to be gained from this review if it is able to recommend options that promote their widespread use and uptake, meet operational needs, establish minimum standards across industry, incentivise greater use of telematics, especially among smaller operators, and are cost effective.

The onus should be on the operator of the vehicle to ensure that any such devices can produce the required data set in an appropriate and useable format as well as to meet the necessary regulatory evidentiary standards required by regulators.

As such, the NTC review should also consider alternative regulatory models that would encourage operators to use the information collected from their telematics systems to better manage their safety risks and support CoR requirements including investigations into breaches. Currently, it is understood that some operators, particularly small operators, are reluctant to use regulatory telematics because of a fear they will be prosecuted for minor breaches and not systematic breaches or patterns of behaviour.

In this regard, CoR legislation due for commencement in mid-2018 will provide opportunities for telematics to be used by parties in the chain to assist their compliance with these obligations. These provisions together with increased enforcement power will mean that governments will have an expanded source of information to draw on to prove an offence, or intelligence to initiate or conduct an investigation. This may also reduce the need for governments to oversee data collection and data integrity, such as in the case of the current IAP model.

Any regulatory model that gives operators greater responsibility to manage their safety outcomes would also assist to develop the maturity of the heavy vehicle industry.

To provide industry with greater certainty about how their data will be used, consideration should also be given to the development of a national compliance and enforcement policy. Specifically, the policy would outline the escalating compliance action that might be taken, such as warnings, improvements or prohibitions notices to indicate the circumstances under which investigations would be undertaken with a view to prosecution.

6.6 Connected and Automated Vehicles (CAVs)

While CAV technology shows potential to improve safety for heavy vehicles it is likely that any conclusive evidence of significant safety improvements will take some time to emerge. Internationally there have been developments in connected heavy vehicles, automation and platooning. Australia has many unique characteristics and challenges which may require these developing technology solutions to adapt before they can operate safely in the Australian environment.

Through the identification and development of heavy vehicle trials, NSW and Australia have the opportunity to show leadership in this space and develop a stronger vision for the use of CAVs technologies to better understand their opportunities, benefits and challenges of operating in Australian conditions. Further, enabling trials and developing strategic insights into the potential benefits of CAV technology will have strong value in determining longer term strategic positions related to the use and deployment of heavy vehicle technology to improve safety outcomes.

The NSW Government embraces technology and innovation, which has the potential to revolutionise the way we live and travel, and it is committed to ensuring the safety of the whole transport system.

The draft FTS 2056 embeds CAVs and other innovative technologies to achieve the dual objective of both improving performance and significantly improving safety. A key direction in the draft FTS 2056 is the need for a smart freight network that is supported by Intelligent Transport Systems (ITS), Cooperative ITS (C-ITS) technology and CAVs.

In April 2017, TfNSW published its Future Transport Technology Roadmap, designed to position the NSW Government at the forefront of adopting new and emerging transport technologies in order to transform transport services, better connect communities and enhance the experience to our customers.

To support the Technology Roadmap, TfNSW established the Smart Innovation Centre (SIC) as NSW's hub for collaborative research and development of safe and efficient emerging transport technology. The SIC will explore a range of technology trials and ideas from industry that aim to address key transport challenges including safety, mobility, congestion and improving productivity.

It is currently leading a trial of a highly automated shuttle in Sydney Olympic Park and is also facilitating an expression of interest to establish a number of automated vehicle trials in regional NSW.

TfNSW is also working with an Australian company, Cohda Wireless, on a Premier's Innovation Initiative using V2I technology to connect trucks with traffic signals. This will test prioritisation of freight vehicles at intersections on three Sydney corridors - Parramatta Road, Pennant Hills Road, and King Georges Road – and evaluate the benefits for those trucks and other traffic on the network.

TfNSW is also working closely with the NTC, Austroads and other states and territories to ensure appropriate laws, safety assurance, standards and policies can be put in place to support the future implementation of CAVs

The Centre for Road Safety is also currently trialling Vehicle-to-Infrastructure (V2I) and Vehicle-to-Vehicle (V2V) technologies in the Illawarra region as part of the Cooperative Intelligent Transport Initiative (CITI) project. The CITI project is assessing the safety benefits and challenges relating to connected vehicle and infrastructure technology. The CITI project involves sending safety messages to heavy vehicle drivers alerting them to upcoming hazards and providing them with speed limit information.

6.6.1 Key applications and benefits of CAVs for heavy vehicles

The freight sector is likely to be a prime candidate for early adoption of CAV technologies that offer direct benefits to freight operators in areas such as safety, productivity and efficiency.[28] Traditional heavy vehicle manufacturers, such as Daimler, have already demonstrated automated heavy vehicle freight vehicles on public roads in the US and Europe.

Safety is a key area of benefit of CAVs for the industry. For example, technologies such as automated emergency braking can reduce the risk or severity of collisions, while other CAV technologies can reduce driver error, monitor and reduce fatigue related risks – especially for long haul journeys – and provide drivers with information, assistance and hazard alerts to avoid incidents. Currently available automated technologies, such as adaptive cruise control, lane-departure warning and automated emergency braking already improve the safety performance of heavy vehicles. Adoption of these could be an early potential safety 'win'.

The use of CAV technology in the freight industry also provides an opportunity to reduce congestion. The safety measures above will reduce the incidence of crashes and therefore reduce congestion impacts resulting from crashes on other heavy vehicles and general traffic. Intersection prioritisation in congested urban corridors is a particularly important issue for the freight industry given the high costs of delays and stopping for heavy vehicles.

The data generated from CAVs can also provide a range of other opportunities for freight companies to improve productivity, including the ability to manage and maintain fleets more efficiently, and remotely monitor the condition of vehicle loads.

Heavy vehicle platooning on movement corridors is a key example of proven CAV technology, which could improve freight productivity and lower labour costs, reduce vehicle emissions, increase network throughput, and improve safety for all road users.[29] Heavy vehicle platooning uses a combination of CAV technologies to electronically link trucks together to allow them to run close together with a human driver in control of the lead truck. The technologies allow the vehicles to travel close together by braking and accelerating simultaneously, eliminating driver reaction times and reducing the potential for human error.

Heavy vehicle platooning is already being operated in industrial applications. In Australia, some mining companies, including Rio Tinto and Fortescue Metals, use large numbers of highly automated, driverless trucks to shift iron ore in mining sites in Western Australia, operating alongside other human-driven vehicles.

6.6.2 Issues and challenges CAVs

While there are significant safety and productivity benefits, there are also some challenges to be overcome. For example, only limited parts of the road network are currently suitable for the current truck platooning technology, which is focussed on motorways or multi-lane highways. This presents both a unique challenge and opportunity to develop the technology in NSW, where a large proportion of freight movement occurs on single carriageway rural highways.

There is some scope for freight automation on some urban and inner-city motorways because precise maps and accurate GPS is already available. Locations without ITS infrastructure, or with other infrastructure constraints such as poor road conditions and with low traffic volumes may not prove viable in the short- to medium-term.

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[28] Isaac, L. (2016), *Driving Towards Driverless: A Guide For Government Agencies*, WSP/Parsons Brinkerhoff, http://www.wsp-pb.com/Globaln/USA/Transportation%20and%20Infrastructure/driving-towards-driverless-WBP-Fellow-monograph-lauren-isaac-feb-24-2016.pdf, pp. 12-13

[29] In 2016, the 'EU Truck Platooning Challenge', headed by six auto makers and the Dutch Government, sent platoons to Rotterdam from across Europe. The group concluded that platooning has the potential (https://www.eutruckplatooning.com/)

The nature of heavy vehicles raises additional safety considerations as crashes involving heavy vehicles can be more serious because of their size and weight. Other considerations include heavy vehicles carrying commodity types such as livestock and dangerous.

Variations in uptake of CAV technologies across companies operating at different scales, may also have the potential to impact on the logistics market and business models in the future.

6.6.3 Cooperative Intelligent Transport Initiative (CITI) project

The Cooperative Intelligent Transport Initiative (CITI) is a project being undertaken by Transport for NSW to assess the potential safety benefits of Cooperative Intelligent Transport Systems (C-ITS), also known as connected vehicle technology

The C-ITS device sends and receives information to and from other equipped vehicles and infrastructure, such as traffic signals, 10 times a second. It uses that information to determine if a crash is likely, based on comparing its own location, direction and speed to those of the other vehicles. Drivers then receive alerts about upcoming hazards, or about an upcoming red light.

The devices communicate using a technology called Dedicated Short-Range Communications (DSRC), which can transmit information up to one kilometre away. The project is run on the 5.9GHz radio spectrum, internationally set aside for this type of technology in Europe and North America.

Sophisticated C-ITS applications have been developed that increase the "time horizon" as well as the quality and reliability of information available to the drivers about their immediate environment, other vehicles and road users. C-ITS systems can allow drivers and in the future “driverless” vehicles to “see” up to twice the distance ahead when compared to existing vehicle based sensor systems such as cameras, lidar and radar. C-ITS systems can also “see” in the dark, over the crests of hills and even between buildings.

The United States Department of Transportation in their white paper on C-ITS estimated that up to 82 per cent of all crashes by unimpaired drivers could potentially be addressed by vehicle-to-vehicle (V2V) technology. If V2V were in place, another 16 per cent of crashes could potentially be addressed by vehicle to infrastructure (V2I) technology.

In October 2017, Austroads published a study on the Safety Benefits of C-ITS and Automated Driving in Australia and New Zealand[30]. The report found that C-ITS has significant potential to reduce road crash risk and injury consequences. An analysis of Australian real-world crash types demonstrated reductions across a range of crash types. For example, Cooperative Forward Collision Warning could reduce same direction crashes by 20-30 per cent. A 2011 Austroads study found that the current total of approximately 29,000 annual serious casualties could be reduced to between 18,500 and 21,500, a reduction of 25-35 per cent.

The project aim

The original aim of CITI was to construct a 42km connected freight corridor testbed from Port Kembla Harbour to the Hume Highway. The testbed was modelled on the safety pilot deployment developed by the US Department of Transport in Ann Arbor, Michigan.

The project was focussed on the Illawarra region to capitalise on the high volumes of heavy vehicles travelling along the road network between Port Kembla and the Hume Highway. The diverse topography of the area allows researchers to test the technology across a wide range of road types and environments – from urban areas in the Wollongong CBD to the steep mountain passes on Mount Ousley.

Installation of equipment began in 2013 with the fitment of C-ITS devices to trucks, a small number of light vehicles, a motorcycle and traffic lights. Since then the project has been expanded to include public buses.

[30] https://www.onlinepublications.austroads.com.au/items/AP-R551-17

Project Successes

The CITI project has successfully delivered Australia's only fully operational test bed for C-ITS. Stage one of the project was completed in November 2016 and was focused on developing the test bed and demonstrating that it was possible to integrate C-ITS with traffic signal infrastructure and the SCATS software. Instead of covering the original 42 km route proposed the testbed was expanded at no additional cost to cover more than 2,300 km of road network.

A data acquisition and storage system was also developed that enables researchers to remotely collect data from vehicles as they load and unload freight at the port facility.

Analysis of the data collected in stage one of the projects has been conducted by the University of Sydney's Australian Centre for Field Robotics and the CSIRO's data61. These projects examined the accuracy of the positioning and how this affects C-ITS applications such as forward and intersection collision warnings.

The results of studies carried out on the CITI testbed have not just been of interest to the Australian Transport Industry, researchers involved with the CITI project have been invited to present on their work in the United States, United Arab Emirates, Qatar and Singapore. NSW is now recognised as a world leader in the research of C-ITS applications for heavy freight vehicles.

Findings from the CITI project are regularly reported at the Austroads Connected and Automated Vehicles Steering Committee and ITS Australia's Connected and Automated Vehicles Industry Reference Group. These groups also enable the CITI team to keep up to date with the latest technology trends in C-ITS such as the upcoming 5G mobile telephone and data service.

Current Status

Currently the testbed includes 38 trucks, 11 public buses, three light vehicles, a motorcycle and three signalised intersections all communicating with each other ten times per second. In January 2017 the project was expanded to cover more than 23,000 km of the NSW road network.

Industry Participation

Companies such as Siemens, Q-free and Telstra and Verizon (USA) have all expressed an interest in participating in the project. Siemens is currently developing a connected rail level crossing warning system for deployment at Port Kembla at no cost to TfNSW. The CSIRO's Data61 organisation is actively involved in the analysis of data from the project.

Major transport companies are also involved in CITI, including Toll Group, Bulktrans, and Premier Buses, who have installed the CITI system in a wide range of their heavy vehicle fleet.

Data Collected & Industry Attitudes

Over four billion safety messages have been generated by the C-ITS devices to date. Preliminary analysis of this data has confirmed that vehicles can successfully communicate with each other and with roadside infrastructure.

However, the data also revealed that the accuracy of the GPS-determined positions of the vehicles was insufficient to allow the development of many of the proposed road safety applications.

Feedback from heavy vehicle drivers participating in the initiative indicate that the poor accuracy of GPS was leading to a large number of false collision alerts which was undermining their confidence in the safety applications.

Fleet Managers agree that in the future as positioning accuracy improves so will the reliability of safety applications but this alone would be unlikely to convince them to install a C-ITS device. Fleet Managers would however consider installing C-ITS if efficiency applications such as traffic signal priority were added to the device.

EU Truck Platooning Challenge

In 2016 six truck platoons departed different locations in Europe to arrive on 06 April in the Port of Rotterdam. The truck platoons mainly drove at daytime in normal traffic conditions on public highways and motorways. During the Challenge, each European truck manufacturer had one truck platoon in operation: DAF, Daimler, IVECO, MAN, Scania and Volvo. The level of automation within the EU TPC was SAE level 1: Driver Assistance, where the execution of acceleration and deceleration was done by the system. Steering remained the drivers' task. The system used was C-ACC: Connected Adaptive Cruise Control. The platoons rode in a 'master-slave' construction, where the following truck(s) took over acceleration; speed and deceleration form the first truck via wireless communication. With no reaction time needed form human drivers, the trucks could follow on shorter distances. The OEMs agreed on a minimal following distance of 0.5 seconds, depending on the robustness of the system.

Road authorities assessed the applications in terms of the impact on infrastructure, traffic flow and safety. Some examples:

- Layout of motorways and position of the truck platoon on the road: Schleswig-Holstein did not allow truck platooning on two-lane motorways, and Baden-Württemberg only allowed truck platooning on motorways with an emergency lane. Belgium confined truck platooning to the right lane, while the Dutch had a general ban on overtaking.
- Complex traffic situations: the following traffic situations were viewed as potentially risky: motorway junctions, traffic density, traffic jams, (mobile) roadworks and weather conditions. Traffic density and weather conditions are not so easy to define. One of the German federal states restricted truck platooning to dry and clear weather conditions.
- Tunnels: there were a number of discussions around the robustness of the systems in tunnels. The main conclusion was that the tunnels on the route were too short to make system failures likely. Belgium was the only country requiring truck platoons to decouple 200 meters before the start of the tunnel.
- Maximum speed: The maximum speed for trucks in Sweden, Denmark, Germany and the Netherlands is 80 km/h, and in Belgium 90 km/h. The German federal state of Baden-Württemberg differed, allowing a maximum speed of 85 km/h so a broken up platoon had a chance to accelerate to re-form.

According to a report on the Challenge (Aarts & Feddes 2016[31]) with the following trucks braking immediately, with a theoretical zero reaction time, platooning could improve road safety for long haul freight vehicles on major highways and motorways. Platooning also has the potential to improve the efficiency of road based transport as the trucks drive close together at a constant speed. This means lower fuel consumption and less CO^2 emissions.

6.6.4 Cyber security

As more vehicles are connected to other vehicles, infrastructure or other applications, there will be an increasing need to provide protection for those communications, devices and the overall environment. The US and EU are currently leading work in the development of Cooperative Credential Management Systems that provides security for the C-ITS environment and for C-ITS devices.

The National Land Transport Technology Action Plan also includes a project to develop a nationally agreed deployment plan for the security management of connected and automated vehicles, and individual jurisdictions are commencing work to develop Security Credential Management Systems. It is understood that that these systems will involve the development of cryptographic technologies, standards, organisational and policy controls and procedures to provide security for exchanges of data.

There will also be a need to establish governance arrangements for the issuance of digital certificates to the various devices operating in the C-ITS environment as a safeguard to ensure that the rules that underpin its integrity are maintained. Devices that are identified as misbehaving, or as posing a safety or security threat to the C-ITS environment, are not supplied with new digital certificates, and are prevented from interacting with other systems in that environment.

[31] http://roadtransporttechnology.org/Proceedings/HVTT%2014/Aarts%20%20European%20truck%20platooning%20challenge.pdf

Given the proposed development of Security Credential Management Systems, the NTC should consider how any alternative model for telematics would interface with the future development and requirements of this security system.

Information security controls will need to be in place to ensure integrity, accuracy and reliability in the way information is collected, stored, analysed and disseminated to the CAV user or anyone interacting with the vehicle. Message spoofing, integrity attacks, denial of service, unauthorised access, impersonation, identity theft, and location tracking are some of the security risks that such controls are designed to manage. Equally though, the technology may also offer specific opportunities to reduce areas of risk, for example by building in fail-safes that make it impossible for terrorists to use vehicles for nefarious purposes, and even to remotely take control of vehicles to prevent those with criminal or terrorist intent from perpetrating an attack

TfNSW will continue to engage closely with national efforts to ensure the security of CAVs, particularly through actions set out in the National Policy Framework for Land Transport Technology.

6.7 Improving the implementation of vehicle technologies

There are a number of barriers that can prevent, or slow, the adoption of new technologies in the heavy vehicle industry. These include:

- High initial costs – particularly for smaller operators. For example, newer vehicles with in built safety technologies are typically more costly. Installing in-vehicle telematics may offer positive payback over several years but still require considerable initial investment.
- Driver acceptance – many new technologies rely on the driver using them correctly, and if the driver perceives disadvantages they may not do so.
- Benefits accruing to parties other than the driver/operator – for example, many safety systems are intended to be of benefit to other road users, so operators see the costs but not the benefits.
- Inconsistent or absent benchmarks/minimum standards, lack of clear guidance and support from regulators and road managers.
- The regulatory process and getting national consistency can be timely.
- Prescribing detailed technical requirements in regulation can also reduce the incentive for vehicle manufacturers and technology suppliers to develop alternative, or superior, means of achieving the intended safety outcome.

The benefits that can be gained from new technologies are strongly influenced by the rate at which they penetrate the vehicle fleet. However, operators are often slow to voluntarily adopt new technologies unless they can be confident of gaining tangible economic benefits from it. There are a number of ways in which increased uptake of new technology can be achieved, for example:

- Removal of regulatory barriers - sometimes new technology can be unintentionally prohibited by older regulation that did not foresee developments, and in other cases it can be discouraged by regulation.
- Harmonising the technical standards of voluntarily fitted technology. - creating a defined set of technical requirements and performance limits to be applied to certain technologies, if fitted, can reduce liability risks for manufacturers and provide consumers with more confidence that the system they are purchasing meets at least minimum standards of effectiveness.
- Retro-fitting - this requires all registered vehicles to be fitted with the technology within a defined (short) timeframe. This offers the quickest route to full implementation, but can also create a high cost burden for industry and is often, therefore, reserved for relatively simple changes − for example, requirement to retro-fit blind spot mirrors to certain categories of heavy vehicles.
- Information and education for operators and drivers can be effective in terms of directly influencing safety and productivity, and can also help to encourage “buy in” to other technological interventions. This can be voluntary or mandatory such as the European requirements for regular refresher training.

- Identifying “best practices[32]” among transport operators and promoting the wider spread of these practices can also be effective.
- Other financial and non-financial incentives for operators.

Each of these approaches will have advantages and disadvantages. A multi-faceted approach is likely to be most successful in achieving the goal of promoting the uptake of technologies in the heavy vehicle industry.

The NRSS requires the Commonwealth Government to review potential incentives to modernise the nation’s fleet (including tax based incentives, registration-based and insurance incentives) and promote options to encourage purchase of safer vehicles, greater turnover of the vehicle fleet and/or the inclusion of enhanced safety features.

Supporting the industry to increase the uptake of safety technology is a key priority of the RSP 2021. The RSP 2021 makes a commitment to working with the heavy vehicle industry to develop a new heavy vehicle strategy, which includes improving operational safety and increasing the use of safety technology. Options for appropriate and effective incentives will be considered in the development of the strategy.

[32] https://www.gov.uk/browse/driving

7 Safer Roads

7.1 Safer road network

Providing a safe system for the economically and socially essential task of transporting freight by road will not be achieved entirely by actions directed at the design, use and behaviour of the heavy vehicle fleet itself. The way that we plan, develop, design, operate and maintain roads plays a key role in reducing the risk of road trauma.

The NSW Government is investing a record $282 million[33] in road safety in 2017-18, including public education and awareness campaigns, road upgrades and improvements through the Safe Roads program as well as high visibility enforcement. In addition to our dedicated road safety funding, a record $10.8 billion is being invested on NSW roads this year alone.

In 2017, 272 people lost their lives on a country road. Roads are crucial to country life, linking people and goods to regional and economic centres and connecting NSW to the rest of Australia. On average, over 70 per cent of the lives lost on country roads are locals, country residents.

Almost 8 in 10 fatalities on country roads that have a speed limit of 100km/h or higher involve the vehicle crossing the centre line (54 per cent) or running off the road to the left (23 per cent). Many of these crashes can be prevented, or the harm reduced, with proven road infrastructure upgrades.

Audio tactile (rumble) line marking and wide centre lines reduce crashes like running off road by up to 35 per cent and can be implemented quickly and cost effectively on long stretches of the highest risk roads. Flexible barriers effectively separate oncoming traffic and protect vehicles from roadside hazards. These barriers can reduce key crash types on country roads by up to 85 per cent, and are especially important as a safety solution on key transport corridors.

7.2 NSW Safer Roads Program

The NSW Government is providing safer roads, including continued implementation of the Safer Roads Program – with $713 million committed investment between 2014/15 and 2022/23 through the Community Road Safety Fund which was established in 2012.

TfNSW works closely with RMS and local; councils to identify priority engineering treatments and safety improvements to help reduce the severity of crashes, as well as those that involve vulnerable road users. The 2016-2017 funding program invested $64.7 million in 151 projects which saw 109 projects completed in 2016-17 and the remaining 42 projects on schedule for completion in 2017-18 (as two-year projects).

In 2017/18, $70 million was allocated for priority safety upgrades to the state's road network. This includes nearly $54 million for upgrading high risk regional roads across 173 safety upgrade projects. The safety upgrades include re-engineering dangerous curves, installing rumble strips to alert tired drivers, widening shoulders and centre lines and installing flexible wire rope fencing to help prevent run-off-road and head on crashes.

7.3 Fixing Country Roads

The NSW Government has set aside more than $1 billion for regional road and rail projects under its Fixing Country Roads, Fixing Country Rail and Bridges for the Bush programs.

Fixing Country Roads provides targeted funding to local councils to repair and upgrade regional NSW roads. Its overall aim is to improve and build efficient and safe freight transport networks. The program helps to fund projects that better connect local and regional roads to state highways and key freight hubs; such as silos, saleyards, rail heads, supermarket distribution centres, industrial parks and depots.

[33] combined figure of state funding ($258m)plus additional $3.5M from restart funding) and federal funding ($20.9M)

On 12 December 2017 the NSW Government announced the successful projects for Round Three of Fixing Country Roads. The $92 million allocated in this round is part of a $500 million commitment for Fixing Country Roads in the Rebuilding NSW State Infrastructure Strategy 2014. The successful projects approved in this latest round include upgrades to roads, bridges and truck washes.

The NSW Government supports partnerships to enhance infrastructure improvements and Councils are encouraged to apply for co-funding under Federal Government initiatives such as the Bridges Renewal Program, Heavy Vehicle Safety and Productivity Program and the Building Better Regions Fund.

7.4 Saving Lives on Country Roads

The RSP 2021 includes a new Saving Lives on Country Roads infrastructure program, with an initial $125 million government commitment to address the challenge of more than two thirds of fatalities occurring on country roads.

This will roll out an estimated 1600 kilometres of rumble strips and up to 300 kilometres of flexible barriers and other targeted safety works to help prevent run-off- road and head-on crashes on high need state roads at an estimated cost of $85 million. The other $40 million will be invested on local government roads identified in partnership with local councils.

8 Safer People

8.1 Licensing

To obtain a NSW heavy vehicle driver licence, applicants must successfully undertake Heavy Vehicle Competency Based Assessment (HVCBA) delivered under the National Heavy Vehicle Driver Competency Framework.

Heavy vehicle licence applicants residing in areas not covered by HVCBA can also obtain a heavy vehicle driver licence by undertaking and passing a heavy vehicle driving test, administered by RMS or Service NSW testing officers.

Both the HVCBA and RMS heavy vehicle driving tests are conducted in loaded vehicles.

8.1.1 Vehicle Competency Based Assessment based on the National Framework

In 2013 NSW adopted the National Heavy Vehicle Competency Framework which was initiated and developed to deliver a consistent and common set of national competency and testing requirements applicable for issue of heavy vehicle driver licence. Currently NSW, Victoria and Tasmania have implemented the framework, with Northern Territory planning implementation during 2018.

As part of the national framework, licence applicants undertake and complete a set number of nationally developed and agreed units of competency relevant to their heavy vehicle class.

The training and assessment function is administered and delivered by Registered Training Organisations (RTOs) through accredited heavy vehicle driving instructors and assessors, with RMS maintaining a strong administrative and compliance role. There are currently 30 RTOs accredited by RMS to provide Heavy Vehicle Competency Based Assessment (HVCBA).

A comprehensive review of the national framework was recently conducted by Austroads. The scope of the review included all aspects of heavy vehicle driver training and assessment, evaluation of the framework's effectiveness, and assessment of the adequacy and value of competencies and qualifications required of heavy vehicle drivers and trainers/assessors. The Austroads report, including recommendations, is expected to be published during 2018.

TfNSW will assess the report's findings and recommendations and work with other jurisdictions to enhance the framework where required.

8.1.2 Heavy Vehicle Operator Safety Information Program (HVOSIP)

The Heavy Vehicle Operator Safety Information Program (HVOSIP) is a series of system improvements undertaken by RMS in order to assist heavy vehicle operators to meet their legal obligations.

HVOSIP is an online platform for the exchange of regulatory information between drivers, registered operators and organisations that have legal obligations (such as the CoR) under the HVNL.

The online service provides improved driver information for heavy vehicle operators and enhances the decision-making capability of the heavy vehicle industry, as well as increasing information sharing between RMS and the heavy vehicle industry.

8.1.3 Multiple Drivers Licence & Demerit Point Check

The Multiple Driver Licence and Demerit Point Enquiry has been developed by RMS for heavy vehicle operators and drivers to:

- Allow driver licence and demerit point information to be exchanged to ensure drivers are properly licenced and safe to drive a heavy vehicle.
- Facilitate the exchange of information between employees/drivers that is relatively simple and cost

effective.

- Heavy vehicle drivers can opt to provide their consent to operators for a period of 12 months or until employment cease if under 12 months.
- To apply to become an approved HVOSIP user, an applicant must:
  - Employ NSW licenced heavy vehicle drivers (i.e. drive a heavy vehicle in the transport of goods or require a heavy vehicle licence as part of their employment - mechanic).
  - Have an Australian Business Number (ABN) and/or Australian Company Number (ACN).

The system provides operators and their approved users with the capability to run a check for up to 1000 drivers at one time. As a result of the enquiry, the status of both the driver licence and the demerit points will be displayed for each driver.

Checks are conducted in real time and information is presented in order of importance. Heavy vehicle operators are able to easily see which records have changed since their last enquiry and what the most critical results are. Driver consent expiry can also be managed within the system.

Participation by drivers is voluntary; information about licence and demerit point status continues to be available through Service NSW centres and motor registries or a driver may request a copy of their Driving Record online.

8.2 Fatigue

Driver fatigue is associated with an increased risk of crashing and road trauma. Fatigue was a factor in 20 per cent of all heavy vehicle fatal crashes and 9 per cent of all heavy vehicle casualty crashes. Heavy vehicle drivers are at greater risk of fatigue-related crashes due to the nature of their work hours (e.g. night shifts), their work conditions, and their lifestyle and general health. The effect of fatigue on driving performance is well documented and has been compared to alcohol related impairment. Fatigue results in performance impairment, inattention and reduced reaction times. Vehicle control variables including lane and steering control are also likely to be impaired due to fatigue.

Fatigue is a concern particularly with regard to long haul drivers because on average, these vehicles travel much further distances than all other vehicle types. Fatigue-related crashes typically have little or no avoidance manoeuvres and due to the size of trucks involved the severity of fatigue-related heavy vehicle crashes is greater than for any other vehicle type.

One of the most significant findings of the Heavy vehicle road safety: Research scan (CASR, 2011) is the apparent discrepancy between drivers and managers with regard to the effectiveness with which fatigue is managed. The reality of real world pressures of scheduling and the drive for increased productivity appears to limit their effectiveness.

There are also a number of general and mental health issues associated with heavy vehicle safety that are at least as common among heavy vehicle drivers as amongst the wider Australian population.

NTC's report, *Reform Evaluation in the Road Transport Industry, 2012: Driver Fatigue Survey*[34] examined the impact of the 2006 Heavy Vehicle Driver Fatigue Reform. The overall aim of the reform was to improve road safety by reducing fatigue related heavy vehicle crashes and incidents through the implementation of company policies and practices to address the management of driver fatigue in the road transport supply chain. The reform survey found:

- There was a reduction in drivers reporting driving when fatigued on at least some trips, from 86 per cent in 2006 to 72 per cent in 2012.
- There were, however, increases in experience of fatigue-related incidents such as crossing over lane lines, having a near miss, running off the road, and colliding with something.

[34] National Transport Comission. (2012a). *Reform Evaluation in the Road Transport Industry, 2012: Driver Fatigue Survey*

- There were also increases in drivers experiencing some symptoms of fatigue: feeling exhausted at the end of the day, having heavy/tired eyes, and loss of concentration.
- Driving incidents and symptoms of fatigue were more likely to be reported particularly by the one fifth of drivers who experienced fatigue on most or all of their trips.
- Companies were more likely to consider that the regulations allowed them to manage driver fatigue effectively, improving from 73 per cent in 2006 to 80 per cent in 2012.
- Companies were also more likely to consider that driver fatigue was managed well in the industry, improving from 68 per cent in 2006 to 80 per cent in 2012.
- There was a decline in drivers considering as major contributors to their fatigue 'long driving hours' (down from 38 per cent in 2006 to 22 per cent) and 'insufficient rest breaks' (down from 29 per cent to 19 per cent), indicating an impact of the new working hours legislation in managing hours and rest breaks.
- There was, however, an increase in drivers nominating 'sticking to working hours regulations' as a major contributor to their fatigue, from 36 per cent in 2006 to 45 per cent in 2012. The majority (77 per cent) of companies considered 'sticking to working hours regulations' could be at least a minor contributor to fatigue. This issue is also reflected in recent feedback from industry leaders. Options for flexibility should be considered where safety and compliance is demonstrated. Opportunities can be explored to better use technology to gather and apply information on patterns of behaviour that enable targeting of compliance and enforcement resources on high-risk drivers and operators.
- A significant operational problem that companies and drivers associated with working hours was around pressure of deadlines and 'time slots', where delays negatively impact on work/rest times.
- The reality of real world pressures of scheduling and the drive for increased productivity appears to limit the effectiveness of fatigue management practices.

8.2.1 Fatigue management

National heavy vehicle driver fatigue laws apply to the following fatigue-regulated heavy vehicles:

- a vehicle with a Gross Vehicle Mass (GVM) of over 12t
- a combination when the total of the GVM is over 12t
- buses with a GVM over 4.5t fitted to carry more than 12 adults (including the driver)
- a truck, or a combination including a truck, with a GVM of over 12t with a machine or implement attached.

The laws cover all aspects of work and rest relating to heavy vehicles including:

- work and rest hours
- recording work and rest times
- fatigue management exemptions
- Chain of Responsibility obligations.

While adherence to prescribed work and rest times is important, the overarching obligation on the driver and all CoR parties is to ensure that the driver does not drive if they are impaired by fatigue. Parties in the CoR are under an obligation to take all reasonable steps to avoid a fatigue breach by a driver of a fatigue-regulated heavy vehicle.

Work and rest hours

The fatigue management provisions of the HVNL also prescribe work and rest times for drivers of fatigue – regulated heavy vehicles and provide for three different fatigue management options – Standard Hours, Basic Fatigue Management and Advanced Fatigue Management.

Standard hours

Standard hours are the work and rest hours allowed in the HVNL for all driver operators who are not operating under NHVAS accreditation or who do not have accreditation for fatigue management. They are the maximum

amount of work and minimum amount of rest possible that can be performed safely without additional safety countermeasures.

Basic Fatigue Management (BFM)

Those operating under NHVAS with BFM accreditation can operate under more flexible work and rest hours, allowing for work of up to 14 hours in a 24-hour period. BFM gives operators a greater say in when drivers can work and rest, as long as the risks of driver fatigue are properly managed.

Advanced Fatigue Management (AFM)

Those operating under NHVAS with AFM accreditation adopt a genuine risk management approach to managing heavy vehicle driver fatigue. Rather than prescribing work and rest hours, AFM offers more flexibility than standard hours or BFM in return for the operator demonstrating greater accountability for managing their drivers' fatigue risks.

The NHVR has developed a new Risk Classification System (RCS) approach to assessing entry into AFM accreditation. The approach will commence with a pilot, followed by a review of its effectiveness with reports at 12, 24 and 36 month intervals.

The **Fatigue Expert Reference Group (FERG)** is an advisory body that supports the NHVR with decisions related to AFM accreditation.

The **Livestock and Rural Transport Fatigue Management Scheme** provides a pre-approved template Advanced Fatigue Management (AFM) accreditation system designed to give livestock transporters the flexibility to respond to the dynamic, uncertain and complex livestock transport task.

8.2.2 Record keeping

Record keepers for drivers of fatigue-regulated heavy vehicles have very specific obligations under the Heavy Vehicle National Law (HVNL). These obligations are designed to ensure that driver's activities can be monitored to assist drivers in the execution of their obligations to manage driver fatigue and help parties in the chain of responsibility (e.g. schedulers) to meet their requirements.

8.2.3 Work diaries

The National Driver Work Diary is evidence that a driver's work and rest hours are compliant with the HVNL and that their fatigue is being managed. Drivers are not allowed to drive or work more than the maximum work hours or rest less than the minimum rest hours in a certain period set out by law.

All drivers of fatigue regulated heavy vehicles who drive 100km or more from their home base must carry and complete a work diary to record their work and rest times. If you have a work diary exemption notice or permit you must carry it in lieu of the work diary.

In NSW if you are a primary producer or drive for a primary producer you do not have to fill in a work diary when travelling within a 160km radius of your home bases.

EWDs are expected to provide a voluntary alternative to written work diaries. The NHVR is currently consulting on EWD Policy Framework and Standards in preparation for introduction (see further information above).

8.2.4 Rest Areas

Rest areas are used by heavy vehicle drivers to take long and short rest breaks, use amenities and, check loads and vehicles. Heavy vehicle drivers must conform to fatigue management legislation that specifies strict resting requirements. In order to fulfil these requirements drivers require suitable rest area facilities that are regularly spaced along key freight routes.

NSW provides improved amenities at rest areas to meet the needs of heavy vehicle drivers and support fatigue management. This includes sealed truck parking spaces, toilet facilities, suitable access, signage, shade, shelter, other facilities and infrastructure.

To continue delivery of rest areas, the NSW Government has sought part funding from the Federal Government's Heavy Vehicle Safety and Productivity Program. In rounds one to three, of this Federal program, a total of 110 NSW projects received funding, including new heavy vehicle rest areas, rest area upgrades, green reflector light upgrades, a bridge upgrade, the Smart Rest Area Trial, livestock loading facility upgrades and planning and concept development for rest areas and bridges.

The Smart Rest Area Trial tested the use of electronic devices to help heavy vehicle drivers find places to stop and rest. The Trial found it would not prove cost effective to implement in the existing network of rest areas, which are often in remote and isolated areas with unmarked parking bays. However, drivers found the information about the name, location, travel time and distance from their current position of different rest areas useful.

RMS provides an interactive rest area map tool to help plan rest breaks.

8.2.5 Review of Rest Area Operational Policy

RMS is developing a Rest Stop Framework to assist future decision making around the planning, provision and management of rest stops which is due by mid-2018.

The work streams include:

- A refresh of the 2010 Major Heavy Vehicle Rest Areas on Key Rural Freight Routes in NSW.
- A review of key operational policy gaps relating to rest stops.
- Development of guidance to manage the interface between Highway Service Centres, current and planned heavy vehicle rest areas and in-town facilities.

These work streams will clarify heavy vehicle customer requirements, rest stop gaps, key operational policy positions and support whole-of-network outcomes.

8.3 Work Health and Safety (WHS) in the road sector of the transport industry

SafeWork NSW is currently working on a Transport Sector Work Health and Safety Plan, which forms part of the NSW Government's deliverables commitment arising from the launch of the Work Health and Safety Roadmap for NSW 2022[35].

The transport sector was identified in the Roadmap as a key priority area due to the high rate of serious injuries and fatalities within the industry when compared with all NSW industries. The focus of the program of work is to identify the industry's high priority harms and in consultation with industry stakeholders, develop programs of work to reduce the frequency of fatalities and serious injuries within the sector. The scope includes those activities that occur while the vehicle is stopped, such as loading and unloading, being hit by mobile plant, musculoskeletal injuries, as well as driver health and wellbeing.

SafeWork are currently conducting a number of metro and regional workshops to seek industry advice on the work practices that are associated with the most significant risks as well as formulating action plans to eliminate and or reduce those risks. The aim of the consultation is to develop industry-designed solutions. Consultation with subject matter experts has already commenced to explore and understand how technology may assist with mental and physical health for transport workers.

As in previous SafeWork NSW programs of work there will be a focus on road freight transport, particularly for activities that occur in and around a vehicle when the vehicle is stopped.

[35] http://www.safework.nsw.gov.au/roadmap

The Industry Sector Plans resulting from the Roadmap will be developed in partnership with government, industry and other on road regulators.

8.4 Community education

Community education and training is an integral part of achieving behaviour change. Road users need to be made aware of the key issues and risks on the road and how to adopt safe behaviours. Road safety advertising campaigns are proven to play a role in educating the public on key road safety issues and changing behaviour to reduce trauma on our roads. In NSW, education is often combined with enforcement to help motivate road users to follow the rules and behave safely on and around the road.

Road safety is a shared responsibility and when addressing heavy vehicle safety it is important to educate all road users. The NSW Government is committed to building partnership and working with the heavy vehicle industry to build a safety culture. There are formal engagement mechanisms such as the Road Freight Industry Committee and the Road Safety Advisory Committee as well as many local initiatives with heavy vehicle operators through the state-wide Local Government Road Safety Program.

Ongoing education about heavy vehicle safety is achieved through road safety advertising and community engagement including:

- Be Truck Aware[36] – focus of trucks in Greater Metropolitan Sydney due to construction and infrastructure projects. The campaign launched in 2017 aims to create awareness among vulnerable road users of increased truck movements and promotes the safety of all road users including drivers, pedestrians, bicycle riders and motorcycle riders NSW Road Safety Facebook page organic and paid posts to raise awareness amongst all road users of specific heavy vehicle safety such as blind spots and increased stopping distances – and aims to foster a heightened sense of safety and responsibility within other road users who share the roads with trucks.
- Variable Message Signs – ongoing heavy vehicle messages programmed across the network from July 2017, covering a range of issues such as blind spots, stopping times, keeping safe distances, and height limits.
- Heavy vehicle safety information on the Centre for Road Safety website including: statistics, avoiding over height incidents, safety tips, technology, licence conditions.
- Partnered articles (online and print) highlighting the unique risks facing HV drivers around Level Crossings.
- Engaging with local heavy vehicle operators on educational initiatives through Road Safety Officers under the Local Government Road Safety Program. For example – the annual Central West NSW Heavy Vehicle Breakfast Forum.
- Delivering ongoing state-wide advertising campaigns focused on speeding, fatigue, drink and drug driving, and enforcement are aimed at all drivers, including those in heavy vehicles.
- Publication of Safety Technologies for Heavy Vehicles and Combinations.
- Consulting with Road Freight NSW on the development of heavy vehicle communications.
- Implementing a level crossings safety campaign targeted at heavy vehicle drivers.
- Producing and promoting videos for drivers on avoiding over height incidents and safely negotiating Mt Ousley Road.
- In 2012, an education program for the livestock industry was established to encourage workplace safety messages for operators and drivers. The program is ongoing and has been expanded to include other industry segments. In 2014, the program was delivered to the logging industry. In 2016, the program is being developed for the civil construction industry.
- This program provides presentations to industry associations, industry liaison (presentations to specific operators, site visits, and a call in line available to discuss issues); RMS led Leadership

[36] Campaign Website: http://BeTruckAware.com.au

Forums and material on the internet.

Be Truck Aware campaign outcomes

The Be Truck Aware campaign is planned from August 2017 through to June 2018 and may run longer pending performance in quantitative testing. Initial findings are:

- 67 per cent of customers recognised some element of the integrated 'Be Truck Aware' campaign (49 per cent recognition for paid advertising)
- Radio and VMS have performed particularly strongly, with 41 per cent and 48 per cent recognition respectively
- The broad, overarching message relating to heightened awareness around trucks is getting through, along with positively affecting consideration of a truck's blind spots and generating/influencing social advocacy
- There is an opportunity to amplify and further differentiate the more specific/targeted messages applicable to vulnerable road user groups.

9 Heavy vehicle safety strategies implemented in other jurisdictions

9.1 Heavy vehicle safety strategies in Australian jurisdictions

Consistent with the National Road Safety Strategy 2011–2020 (NRSS) all Australian jurisdictions have in place road safety strategies and action plans which include heavy vehicle safety. Queensland is the only jurisdiction that has developed a dedicated Heavy Vehicle Safety Action Plan 2016–2018 which was developed to complement Queensland's Road Safety Strategy 2015–21 and related Action Plan 2015–17. The Heavy Vehicle Safety Action Plan recognises significant safety improvements have been made in a number of areas including vehicle design, technology and condition, driver qualifications, education and fatigue management, and enforcement.

It acknowledges that a partnership between government, the heavy vehicle industry and the Queensland Police Service is required in order to build on those improvements and effectively improve safety outcomes for heavy vehicles and other road users involved in crashes with heavy vehicles.

The Queensland Government has also developed a Heavy Vehicle Telematics Strategy 2016. Based on the National In-Vehicle Telematics Strategy, the vision for the Heavy Vehicle Telematics Strategy is improved safety, productivity and network outcomes for the community, industry and government enabled by telematics.

The Heavy Vehicle Telematics Strategy uses a partnership approach to guide the development and implementation of telematics. It recognises the need for government and industries to be agile in their adoption of emerging technologies to maximise heavy vehicle safety, productivity and access outcomes.

The Queensland Heavy Vehicle Telematics Strategy sets out a high-level, nine-year plan to facilitate the adoption of telematics and aims to develop a best-practice policy and governance framework to support the implementation of emerging technologies.

The NSW Government recognises the need for a dedicated focus on heavy vehicle safety in the RSP 2021. The RSP 2021 includes a priority action to develop a heavy vehicle safety strategy in collaboration with industry to help drive improvements in operational safety and increased uptake of safety technology.

9.2 Heavy vehicle safety strategies - international experience

For the purpose of this submission the national road safety strategies and action plans of four international jurisdictions have been reviewed: New Zealand, European Union (EU), United States of America (USA) and Canada. Details of the review are available at ANNEX IV.

While trends differ from country to country overall, similar to trends in Australia there has been a significant increase in freight transport in recent decades with road transport accounting the major part of that growth. Because of its flexibility and timeliness, road transport is expected to account for continued growth in freight transport for the foreseeable future. Managing its impact is therefore critical to sustainable transport policy and the achievement of agreed national and international road safety outcomes.

Contemporary road safety policy, following safe system principles emphasises synergies between the full range of potential interventions – regulation of driver behaviour, road infrastructure design, vehicle technology, network management, fleet maintenance, personnel management and operator responsibilities. The challenge for governments is to have in place a regulatory framework that reduces the road safety risks of freight transport while allowing the trucking industry to provide efficient transport services.

Transportation and road safety strategies and plans across these jurisdictions demonstrate a range of Government interventions that include regulation of vehicle weights and dimensions, technical characteristics of vehicles, vehicle access to the road network, driver licensing and behaviour and the practices of transport operators.

While these approaches demonstrate varying alignment with safe systems and best practice in heavy vehicle regulation, international experience indicates that heavy vehicles continue to be over-represented in fatal crashes.

The increased use of proven vehicle safety technology including technological support for heavy vehicle drivers is consistently identified across all four jurisdictions as a key contributor to reducing the incidence or severity of major crash types arising from factors such as lane departure, frontal collisions and pedestrian collisions.

Consistent with Australian experience, other key priorities in managing heavy vehicle safety included improved fatigue management, use of accreditation and safety ratings schemes to encourage the application of safety management systems, training and education and leveraging industry partnerships. Further information about these key contributors to heavy vehicle safety is provided below:

Intelligent Transport Systems

In road transport, intelligent transport systems (ITS) have been in development for over 20 years. Some applications are now widespread and well-known.

In New Zealand, the Government is currently implementing the ITS Action Plan 2014 -2018[37].

The US Department of Transport (USDOT) Intelligent Transportation Systems (ITS) Strategic Plan 2015 - 2019[38] is built around two key ITS Program priorities— realizing connected vehicle implementation and advancing automation. The ITS plan presents the next set of priorities, strategic themes, and program categories under which ITS research, development, and adoption activities will take place. Key strategic themes include:

- enabling safer vehicles and roadways by developing better crash avoidance, performance measures, and other notification mechanisms; commercial motor vehicle safety considerations; and infrastructure-based and cooperative safety systems.
- supporting transportation connectivity through the development of standards and systems architectures, and the application of advanced wireless technologies that enable communication among and between vehicles of all types, the infrastructure, and portable devices.

In the EU a legal framework (Directive 2010/40/EU) was adopted in 2010 to accelerate the deployment of ITS technologies across Europe. Since then all Member States have harmonised their national legislation to align with the EU framework. This Directive is an important instrument for the coordinated implementation of ITS in Europe. It aims to establish interoperable and seamless ITS services while leaving Member States the freedom to decide which systems to invest in.

The ITS Action Plan[39] adopted in 2008 by the European Commission (EC) had a number of targeted measures and included the adoption of a legislative framework. The first priorities were addressing traffic and travel information, the e-Call emergency system and intelligent truck parking. Action Area no 3 of the ITS Plan focuses on Road safety and security.

Technical standards

Mandatory regulation at EU level has been limited to date and though technical standards exist they tend to be optional. However, discussion is underway to bring trucks and buses into EU Whole Vehicle Type Approval System alongside cars and motorcycles. Harmonisation in the EU is based on the Whole Vehicle Type-Approval System (EU WVTA) and enables manufacturers to benefit from the EU Single Market.

[37] http://www.transport.govt.nz/assets/Uploads/Our-Work/Documents/Intelligent-Transport-Systems-Technology-Action-plan-June-2014.pdf
[38] https://www.its.dot.gov/strategicplan.pdf
[39] https://ec.europa.eu/transport/themes/its/road/action_plan_en

Worldwide technical harmonisation under the United Nations Economic Commission for Europe (UNECE) offers easy access to global markets. The European Commission is responsible for EU legislation on motor vehicles, providing rules for safety and environmental protection, as well as the conditions under which vehicles can be put on the EU market.

Over the last decade actions were focused on implementing measures targeting commercial vehicles safety (also known as heavy goods vehicles (HGV) with masses exciding 3.5 t) and the mid-term review results are showing that they are paying off. One of the largest drops in the number of fatalities was among occupants of heavy goods vehicles (- 43.9 per cent).[40]

However, further measures are required to be implemented targeting light goods vehicles (up to 3.5 t maximum mass) which are accounted for three out of four goods vehicle fatalities (source: CARE data base). Some actions have been taken under the 'roadworthiness package'[41] amended in 2014 by European Commission, setting the grounds for an increasing frequency of technical inspections for high-mileage vehicles and of roadside technical inspections.

Roadworthiness package is composed by three Directives which create the minimum standards at EU level by mandating: periodic roadworthiness tests which are applicable to passenger cars, buses and coaches and heavy goods vehicles and their trailers, but not to scooters and motorbikes; technical roadside inspections of commercial vehicles (with masses exceeding 3.5t)[42]; and vehicle registration at EU level. The package also regulates the collection and information sharing among the Member States.

Fatigue management programs

Fatigue is a significant factor quantifying almost 20 per cent of crashes involving heavy commercial vehicles in EU. In dealing with fatigue, EU approach takes into consideration the following directions:

- Countermeasures directed at drivers, transport companies, roads, or vehicles
- Fatigue management programs
- Infrastructure measures
- Legislation (and enforcement) concerning driver fatigue will take time, but is a necessary part of the total solution. The current EU legislation does not take into account all factors relevant to fatigue and EU Member States legislations are highly variable in terms of legal rules for driving fitness for persons with a sleeping disorder.
- Publicity campaigns to help educate the general public about the problem of driver fatigue and possible countermeasures
- Continuous research (cost-benefit analysis of various countermeasures)

From a regulatory perspective, the regulation (EC) 1360/2002 sets the requirements and technical specifications on digital tachographs.

In New Zealand, a Driver fatigue strategy [43] has been developed by Land Transport NZ to oversee the rollout of the 'Commercial Drivers Fatigue Management Project' and is targeted at truck drivers and their employers.

[40] Detailed data available at: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tran_sf_roadve&lang=en
[41] https://ec.europa.eu/transport/road_safety/events-archive/2014_04_30_rwp_en
[42] The directive encourages Member States to include light commercial vehicles (under 3.5 tonnes) into their roadside inspections (RSI) as such vehicles are being used more frequently in road transport.
[43] http://www.transport.govt.nz/assets/Import/Documents/DriverStrategicFrameworkamend3.pdf

In Canada, where the fatigue has been found to be a factor in about 30 per cent of fatal collisions involving heavy vehicles the Government has implemented the North America Fatigue Management Program (NAFMP); a comprehensive approach for managing fatigue.

In NSW industry continues to seek increased flexibility in fatigue management. The current fatigue management regulations are based on decades of research; however, new technology, especially fatigue monitoring, may provide opportunities to increase flexibility. An evidence base needs to be gathered to guide any review of fatigue management regulation. Similarly, if technology does provide opportunities for increased fatigue management flexibility under what circumstances can it be achieved without compromising road safety outcomes.

Systematic approach to management systems

Accreditation schemes and a requirement to undertake 'reasonable steps' under Chain of Responsibility legislation are all means of encouraging or requiring transport operators to take a systematic approach to management systems in order to achieve high levels of safety.

Accreditation

Safety accreditation schemes provide an alternative means for ensuring heavy vehicle operator compliance with recognised safe operating standards including fitness to drive and driver health, training, vehicle maintenance, and the management of transport operations.

As outlined in section 7.3, the success of accreditation programs has been determined by studies, which compare the crash rates of vehicles from accredited operations to those from non-accredited operations. Such studies have demonstrated positive safety benefits of accreditation schemes.

There appears to be support for accreditation schemes throughout the industry with a number of accredited operators indicating that the benefits of accreditation outweigh the costs. A number of reports indicate accreditation also benefits the productivity of the organisation however; the true nature and extent of these benefits have not been fully determined.

Another development that may prove beneficial to the heavy vehicle industry is the promotion of road safety charters amongst organisations. Such charters encourage companies to become "good corporate citizens" and raise their standards in relation to road safety practices and culture. The European Road Safety Charter, an initiative of the European Commission, provides a good example of the potential for these schemes to involve a broad range of stakeholders (ERSC, 2011).

An organisation's 'safety culture' has an important effect on the crash liability of company drivers. A British study of company vehicle drivers in both small and large companies (using mainly company cars and heavy goods vehicles) has shown a relationship between safety culture, driver attitudes and crash liability[44].

An embedded 'safety culture', combined with increased use of safety technologies safer road infrastructures with a strong mandatory system for heavy vehicles and their drivers, backed by educational (targeting all road users) and enforcement programs can increase the level of safety.

[44] Safety Culture and Work-related Road Accidents, Road Safety Research Report No. 51 Author: BOMEL Ltd Publication date: 13/07/2004

Fleet Operator Recognition Scheme (FORS) and Constructions Logistics and Community Safety (CLOCS)

To improve road safety initially in London and now in the rest of the UK, Transport for London introduced two linked accreditation schemes. Contractors on significant projects such as the Cross rail project are required to be accredited under the schemes to tender for work.

Launched by Transport for London (TfL) in 2008, the Fleet Operator Recognition Scheme (FORS) is designed to improve commercial vehicle fleet standards, and safety is a fundamental aspect of the initiative. The Fleet Operator Recognition Scheme (FORS) is a voluntary accreditation scheme that promotes best practice for commercial vehicle operators. FORS encompasses all aspects of safety, efficiency, and environmental protection by encouraging and training fleet operators to measure, monitor and improve performance. FORS provides accreditation pathways for operators of any type, and for those organisations that award contracts and specify transport requirements. FORS accreditation drives best practice across the European fleet industry in terms of safety, efficiency and environmental protection. It also offers guidance and training to help operators attain the Standard.

Between 2008 and 2013, 55 per cent of cyclist fatalities in London involved a heavy goods vehicle. A disproportionate number of these were construction vehicles. In 2012 Transport for London commissioned an independent review of the construction sector's transport activities to understand the causes of these collisions and how they might be prevented.

In response to a report in to the fatalities the Constructions Logistics and Community Safety (CLOCS) scheme was developed. CLOCS brings the construction logistics industry together to revolutionise the management of work related road risk (WRRR) and ensure a road safety culture is embedded across the industry. By working together we can help protect pedestrians, cyclists, motorcycles and other users who share the roads with construction vehicles. CLOCS has developed the Standard for construction logistics: Managing work related road risk, a common standard for use by the construction logistics industry. Implemented by construction clients through contracts, this new Standard provides a framework enabling the management of road safety by the industry in a way that can be adhered to in a consistent way by fleet operators.

Under CLOCS the clients and or principal contractors on a project take ownership of road safety in their supply chains. Operators that are accredited under FORS demonstrate their compliance with the CLOCS requirements.

The infrastructure boom especially in Sydney and Melbourne is resulting in significant addition heavy vehicle movements and the resulting increase in road safety risk. Accreditation schemes may offer appropriate risk mitigation in the heavy vehicle industry.

Work has commenced in this space; the Safety, Productivity & Environment Construction Transport Scheme (SPECTS) has been launched in NSW and Victoria has signed a MoU with Transport for London to introduce an Australian version of the UK Construction Logistics and Community Safety (CLOCS) scheme. Especially with the introduction of general duties in Chain of Responsibility regulation, there will be an increasing need for strong safety based accreditation. The greatest benefits will be generated if an accreditation scheme is harmonised nationally. Adopting a well-developed scheme such as CLOCS to Australia may provide the most efficient and effective method of developing appropriate schemes.

Education, Training and Industry Partnerships

Effective driver education and training is consistently identified as a key influencer of safety and productivity and can also help to encourage "buy in" to other technological interventions.

Identifying industry "best practice" among operators and promoting the wider spread of these practices can also be effective.

Locally, the NHVR connects and engages with the heavy vehicle industry on all aspects of services and administration of the Heavy Vehicle National Law and seeks to promote and support continuous safety improvements in industry through information, education and joint safety initiatives.

To better understand and resolve industry issues, the NHVR has established a dedicated industry reference forum and five industry operator groups to generate practical, workable solutions and identify opportunities for improvement in our customer service operations and the heavy vehicle regulatory framework.

The establishment of an industry forum is replicated in NSW through the Road Freight Industry Council (RFIC). The NSW Government has recognised the importance of improving safety through partnerships. The RSP 2021 includes a priority action to develop a new heavy vehicle safety strategy and partnerships with the heavy vehicle industry, including champions of change, to improve safety of the freight task across NSW.

ANNEX I – Comparison of Heavy Vehicle Safety Standards included in the UN Vehicle Regulations compared to the Australian Design Rules

KEY

Green – current provisions in ADR and UN Regs are similar
Yellow – the application of the ADR is narrower than that for the UN Regs
Orange – the safety standards in the UN Regs are not included in the ADRs.

"Subject to RIS" means the regulatory impact statement *National Heavy Vehicle Braking Strategy Phase II – Improving the Stability and Control of Heavy Vehicles* released in December 2017.

Vehicles considered:

This comparison looks at heavy vehicles over 4.5 tonnes. ADR and UN Vehicle categories therefore considered are summarised in the following table:

UN ECE		ADR	
Category	Definition	Category	Definition
M2	Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass not exceeding 5 tonnes.	MD4	An omnibus with a Gross Vehicle Mass exceeding 4.5 tonnes but not exceeding 5.0 tonnes.
M3	Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass exceeding 5 tonnes.	ME	An omnibus with a Gross Vehicle Mass exceeding 5.0 tonnes.
N2	Vehicles used for the carriage of goods and having a maximum mass exceeding 3.5 tonnes but not exceeding 12 tonnes.	NB2	A goods vehicle with a Gross Vehicle Mass exceeding 4.5 tonnes but not exceeding 12.0 tonnes.
N3	Vehicles used for the carriage of goods and having a maximum mass exceeding 12 tonnes.	NC	A goods vehicle with a Gross Vehicle Mass exceeding 12.0 tonnes

UN ECE		ADR	
O3	Trailers with a maximum mass exceeding 3.5 tonnes, but not exceeding 10 tonnes.	TC	A trailer with a Gross Trailer Mass exceeding 3.5 tonnes but not exceeding 10 tonnes.
O4	Trailers with a maximum mass exceeding 10 tonnes.	TD	A trailer with a Gross Trailer Mass Exceeding 10 tonnes.

DIRDC strategy:
DIRDC has initiated a phased strategy for aligning with UNECE Regulations for heavy vehicle braking systems.
Stability control requirements (proposed in RIS released December 2017 as part of Phase II of the DRD strategy)

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
MD4/M2	UN ECE R13 – Except: Off-road or special purpose Class 1 and Class A buses Articulated buses	14 January 2008	ADR 35/06 – Optional	Subject to RIS New model: 1 November 2019 All vehicles: 1 November 2021	Not mandatory Coming into effect 11 years after UN Reg
ME/M3	UN ECE R13 – Except: Off-road or special purpose Class 1 and Class A buses Articulated buses	14 January 2008	ADR 3506 – Except: Articulated or route service buses Off-road use	Subject to RIS New model: 1 November 2019 All vehicles: 1 November 2021	Similar vehicle applicability Coming into effect 11 years after UN Reg

NB2/N2	UN ECE R13 – Except: Off-road or special purpose 3.5<GVM<7.5 tonnes, non-standard low frame chassis, more than 2 axles and hydraulic transmission Tractors for semi-trailer with 3.5<GVM<7.5 tonne	14 January 2008	ADR 35/06 – Optional	Subject to RIS New model: 1 November 2019 All vehicles: 1 November 2021	Not mandatory Coming into effect 11 years after UN Reg
NC/N3	UN ECE R13 – Except: 4 axles; GVM < 25t; and Wheel diameter code <19.5/	14 January 2008	ADR 35/06 – Only prime movers except: Prime movers with >4 axles Off-road use	Subject to RIS New model: 1 November 2019 All vehicles: 1 November 2021	Similar vehicle applicability Coming into effect 11 years after UN Reg
TC/O3	UN ECE R13 – Except: No more than 3 axles; and Air suspension	14 January 2008	No requirement	Not considered in the RIS	Not required by ADR
TD/O4	UN ECE R13 – Except: No more than 3 axles; and Air suspension	14 January 2008	ADR 38/05 – Except: Converter dolly Fitted with an axle group arrangement consisting of more than four tyres in a row of axles, or more than four axles in an axle group.	Subject to RIS 1 July2019	Similar vehicle applicability Coming into effect 11 years after UN Reg

Antilock braking system (ABS) (Items already adopted formed Phase I of the DIRDC Strategy)

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
MD4/M2	UN ECE R13 – Except: When vehicle has more than 4 axles	14 January 2008	ADR 35/04 – Except: When vehicle has more than 4 axles	New model: 1 July 2014 All vehicles: 1 January 2015	Similar vehicle applicability Came into effect 6 years after UN Reg
ME/M3	UN ECE R13 – Except: When vehicle has more than 4 axles	14 January 2008	ADR 35/04 – Except: When vehicle has more than 4 axles	New model: 1 July 2014 All vehicles: 1 January 2015	Similar vehicle applicability Came into effect 6 years after UN Reg
NB2/N2	UN ECE R13 – Except: When vehicle has more than 4 axles	14 January 2008	ADR 35/04 – Except: When vehicle has more than 4 axles	New model: 1 July 2014 All vehicles: 1 January 2015	Similar vehicle applicability Came into effect 6 years after UN Reg
NC/N3	UN ECE R13 – Except: When vehicle has more than 4 axles	14 January 2008	ADR 35/04 – Except: When vehicle has more than 4 axles	New model: 1 July 2014 All vehicles: 1 January 2015	Similar vehicle applicability Came into effect 6 years after UN Reg

TC/O3	UN ECE R13	14 January 2008	ADR 38/05 – >4.5t except: - a converter dolly - Fitted with an axle group arrangement consisting of more than four tyres in a row of axles, or more than four axles in an axle group.	Subject to RIS New model: 1 July 2019 All vehicles: 1 November 2019	Scope of applicability to trailers narrowed from UN Reg Coming into effect 11 years after UN Reg
TD/O4	UN ECE R13	14 January 2008	ADR 38/05/04 – >4.5t except: - a converter dolly - Fitted with an axle group arrangement consisting of more than four tyres in a row of axles, or more than four axles in an axle group.	Subject to RIS New model: 1 July 2019 All vehicles: 1 November 2019	Scope of applicability to trailers narrowed from UN Reg Came into effect 6 years after UN Reg

Advanced Emergency Brake Systems - collision warning and automatic braking systems for heavy vehicles (Effectively, unspecified phases of the DIRDC strategy)

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
MD4/M2	UN ECE R131	26 January 2014			
ME/M3	UN ECE R131	9 July 2013			
NB2/N2	UN ECE R131	> 8 tons 9 July 2013 ≦8 tons 26 January 2014			
NC/N3	UN ECE R131	9 July 2013	N/A		Not required by ADRs

Front underrun protection

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
MD4/M2	No regulation to date		-		Not required by UN Regs or ADRS
ME/M3	No regulation to date		-		
NB2/N2	UN ECE R93 – Except off-road vehicles	27 February 1994	ADR 84/00 (vehicles over 4.5t) – Except off-road vehicles	New model: 1 January 2011 All vehicles: 1 January 2012	Similar vehicle applicability Came into effect 17 years after UN Reg
NC/N3	UN ECE R93 – Except off-road vehicles	27 February 1994	ADR 84/00 – Except off-road vehicles	New model: 1 January 2011 All vehicles: 1 January 2012	Similar vehicle applicability Came into effect 17 years after UN Reg

Side underrun protection

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
MD4/M2	No regulation to date	-			Not required by UN Regs or ADRS
ME/M3	No regulation to date	-			
NB2/N2	UN ECE R73 – Except prime movers	9 December 2010	Considered but not adopted in Regulation Impact Statement for		Not required by ADRs
NC/N3	UN ECE R73 – Except prime movers	9 December 2010			

TC/O3	UN ECE R73	9 December 2010	Underrun Protection July 2009	
TD/O4	UN ECE R73	9 December 2010		

Rear underrun protection

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
MD4/M2	UN ECE R58-	26 July 2012	Considered but not adopted in Regulation Impact Statement for Underrun Protection July 2009		Not required by ADRs
ME/M3	UN ECE R58	26 July 2012			
NB2/N2	UN ECE R58	11 July 2008			
NC/N3	UN ECE R58	11 July 2008			
TC/O3	UN ECE R58 – except when designed for carriage of very long loads	11 July 2008			
TD/O4	UN ECE R58 – except when designed for carriage of very long loads	11 July 2008			

Lane departure warning

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
MD4/M2	UN ECE R130	9 July 2013	N/A		Not required by ADRs

ME/M3	UN ECE R130	9 July 2013		
NB2/N2	UN ECE R130	9 July 2013		
NC/N3	UN ECE R130	9 July 2013		

Protection of the occupants of the cab of commercial vehicles - Relates to the strength of the cabins of heavy trucks. Sets requirements for the survival space of the cabin; currently must be met under voluntary scheme for 26m B-doubles.

Vehicle category	UN ECE		ADR		Comparison
	Application	Date of entry into EU	Application	Date applies in Australia	
NB2/N2	UN ECE R29	30 January 2011			
NC/N3	UN ECE R29	30 January 2011	N/A		Not required by ADRs

ANNEX II – Example of safety technologies regulated in the EU

Year	Technology	Estimated Benefits	Regulatory framework	Observations
2011	Retro-reflective markings	Nearly 5 per cent of severe truck accidents can be traced back to the poor conspicuity of the truck	ECE-Regulation 104 (January 1998) 2007/35/EC	From 10 July 2011 it is mandatory to apply approved reflective contour marking to all registrations of commercial vehicles over 7.5 tonnes, more than 6-metres long and over 2.1-metres wide.
2009	Electronic Stability devices for trucks	According to eImpact (2020 high scenario) Electronic Stability Control (ESC) is expected to prevent by far the most fatalities and injuries: about 3,000 fatalities (-14 per cent), and about 50,000 injuries (-6 per cent) per year. Speed Alert (with active gas pedal) (-5 per cent), eCall (-4 per cent) and Lane Keeping Support (-3 per cent). In parallel these applications also have congestion reduction potential as about 15 per cent of all congestion in Europe is due to accidents.	Regulation (EC) No 661/2009	Foresees mandatory fitting of the following safety features: - Electronic Stability Control Systems on all vehicles (from 1 Nov 2011 for new types of vehicle and 1 Nov 2014 for all new vehicles) - Advanced Emergency Braking Systems and Lane Departure Warning Systems on heavy-duty vehicles (from 1 Nov 2013 for new types of vehicle and 1 Nov 2015 for all new vehicles)
2006	Seat belts for HV	N/A	EEC Directive 2003/20/EC amending 91/671/EEC	Mandates the use of safety belts where fitted by 2006 in all forward facing front and exposed rear seats in new HGVs. No mandatory EU-wide installation requirement exists for seat belts in heavy goods vehicles
2004	Digital tachographs Note: tachographs have been mandatory in the EU since July 1979 and	20-30 per cent of commercial road transport crashes in Europe and the United States	Regulation (EC) 1360/2002	The technical specifications for the digital tachograph have been laid down in Commission Regulation (EC) 1360/2002, to be mandatorily fitted in new vehicles from August 2004 See

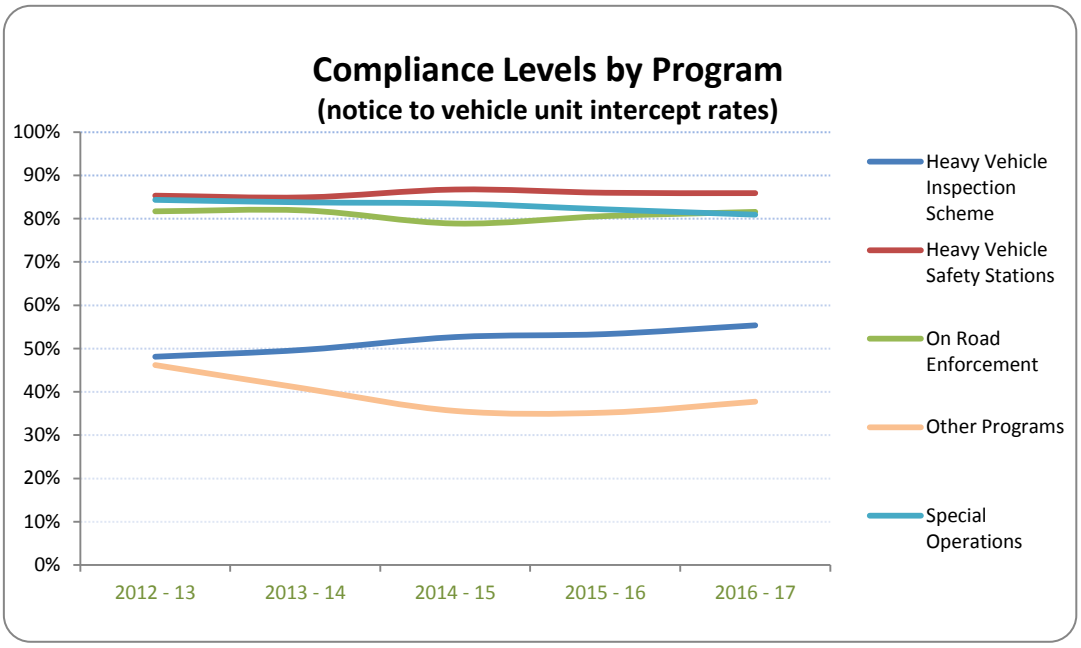
Year	Technology	Estimated Benefits	Regulatory framework	Observations
	they were called recording equipment			European Commission overview.
2003	Blind spot mirrors	N/A	Directive 2003/97/EC	On rear view mirrors and supplementary indirect vision systems for motor vehicles. The Directive was further amended Directive 2005/27/EC to extend the installation of wide angle mirrors to more vehicle types.
1999-2002	Alcohol interlocks	N/A	Trial using instalment of over 300 alcohol interlocks in commercial passenger and goods transport	From 2007 all trucks of 3.5 tons and over, which are contracted by the Swedish Road Administration (SRA) for more than 100 hours per year will have to be fitted with alcohol interlocks (procurement criteria). In Sweden rehabilitation programmes using alcohol interlocks are also used in commercial vehicles and the number of alcohol interlocks installed in such vehicles is higher than the number of interlocks installed in drink driving offenders' cars.
2000	In-vehicle speed limitation	N/A	EC Directive 2002/85	Since 2000, initially applying a 90 km/h limit to all commercial vehicles over 3.5 tonnes (by 1st January 2005 for all new vehicles and 1st January 2006 for existing vehicles)
2000	Front underrun protection	energy-absorbing front, rear and side under-run protection could reduce deaths in car to lorry impacts by about 12 per cent	Directive 2000/40/EEC based on ECE Regulation 93	Mandatory rigid front underrun protection defining a rigid front underrun protection system for trucks with a gross weight over 3.5 tonnes.
-	Driver cabin structure	Ongoing crash investigation indicates that the stiffness of the driver cabin,	ECE-Regulation 29	Currently in Europe two (optional) regulations exist relating to the stiffness of driver cabins

Year	Technology	Estimated Benefits	Regulatory framework	Observations
		especially for truck/truck collisions or single-truck collisions is not sufficient.		(ECE-Regulation 29, VVFS or "Sweden-Test"). Enhanced cabin structure together with restraint use would improve the survivability for HGV occupants in severe HGV crashes.
-	Rear underrun protection	N/A	Council Directive 70/221/EEC	Mandates a rear underrun protection system for trucks and trailers with a gross weight of more than 3.5 tonnes.
-	Side underrun protection	10 per cent (NL study)	Council Directive 89/297/EEC	Mandates side underrun protection on heavy goods vehicles to prevent pedestrians, bicycle riders and motorcyclists from falling under the wheels of the heavy good vehicle when it turns.
-	Type-approval requirements	Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 established by Directive 2007/46/EC concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units		

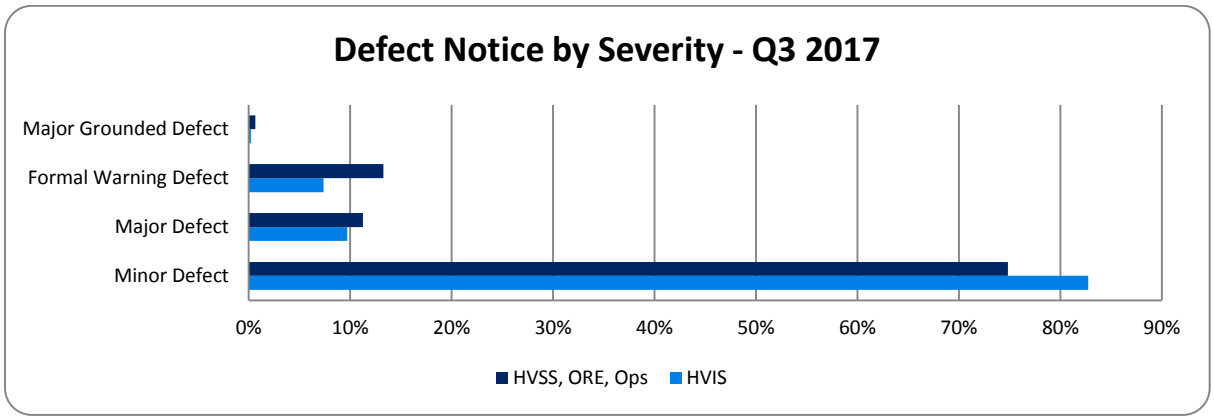
ANNEX III – RMS compliance data

Compliance levels[45]

The overall heavy vehicle compliance level is a representation of the proportion of vehicle units intercepted/inspected that result in no enforcement action being carried out. Since 1 July 2013, 340,000 intercepts were carried out on average each financial year by Roads and Maritime enforcement officers. These intercepts involved an average of 536,000 vehicle units resulting in approximately 117,000 enforcement notices being issued.



HVSS screening lane is controlled by a Vehicle Selection Matrix, which factors in previous performance of the vehicle and operator, infringement data, Safe-T-Cam data, Weigh-in-Motion data and HVSS capacity.

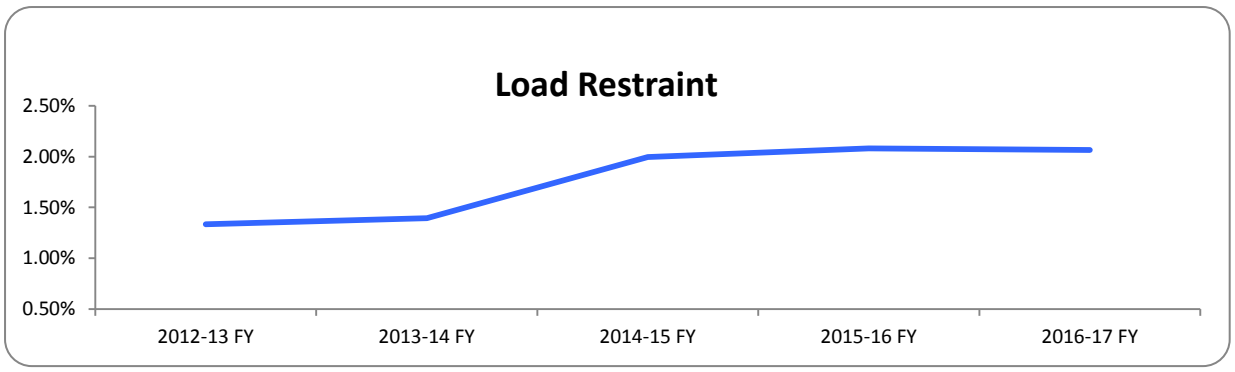


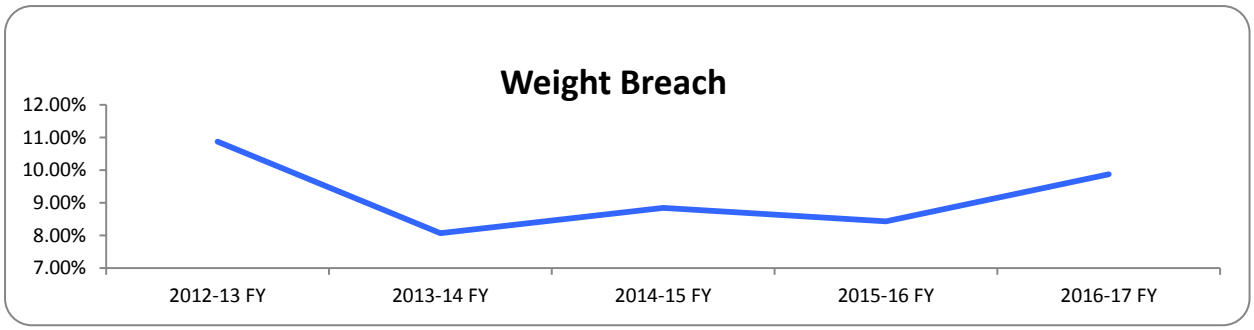
The graphs below show the trends for three types of Notices issued during intercepts over the past five financial years at Heavy Vehicle Safety Stations and during Special Operations and On Road Enforcement.

[45] Source: Vehicle Regulation Operation Database (VROP)

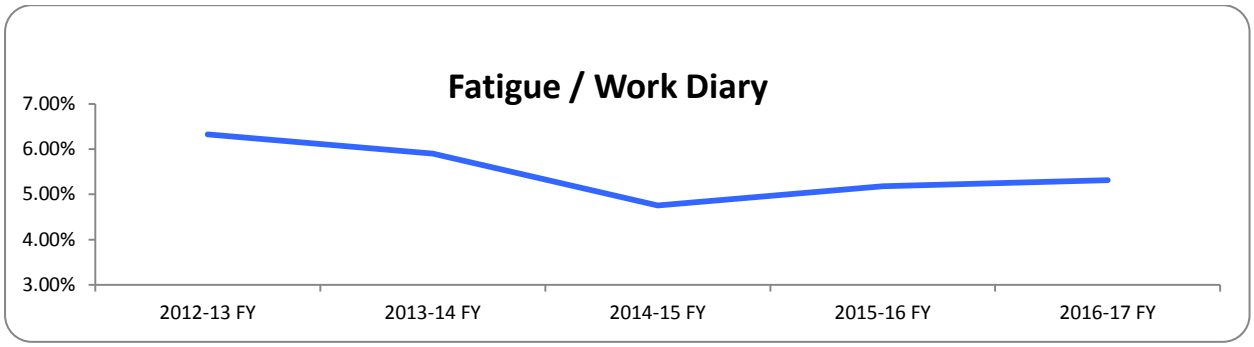
The incidence of non-compliance for Load Restraint and Weight Breach shows an overall increasing trend, with weight breaches significantly increasing from 2016 (8.70 per cent) to Q3 2017 (10.62 per cent).

As at 30 September 2017, ten Special Operations have been conducted which have targeted Mass and Load Restraint. In 2016, seven Special Operations targeting the same issues were conducted. The increased focus on heavy vehicles transporting spoil and excavated material reflects the increased activity associated with major road and infrastructure projects across New South Wales.



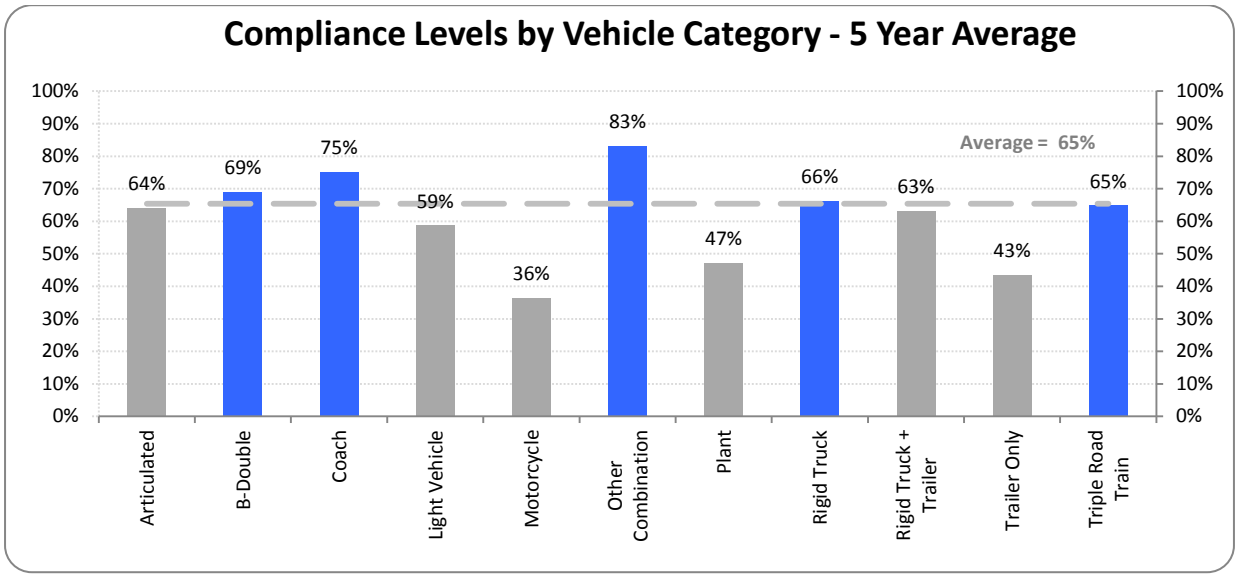


A decreasing trend has been identified in Work Diary notices issued between 2013 and Q3 2017. Fatigue / Work Diary Notices peaked in 2012–13 at 6.55 percent and have decreased to 5.21 percent of notices issued during quarter 3 2017.



Compliance by Vehicle Category

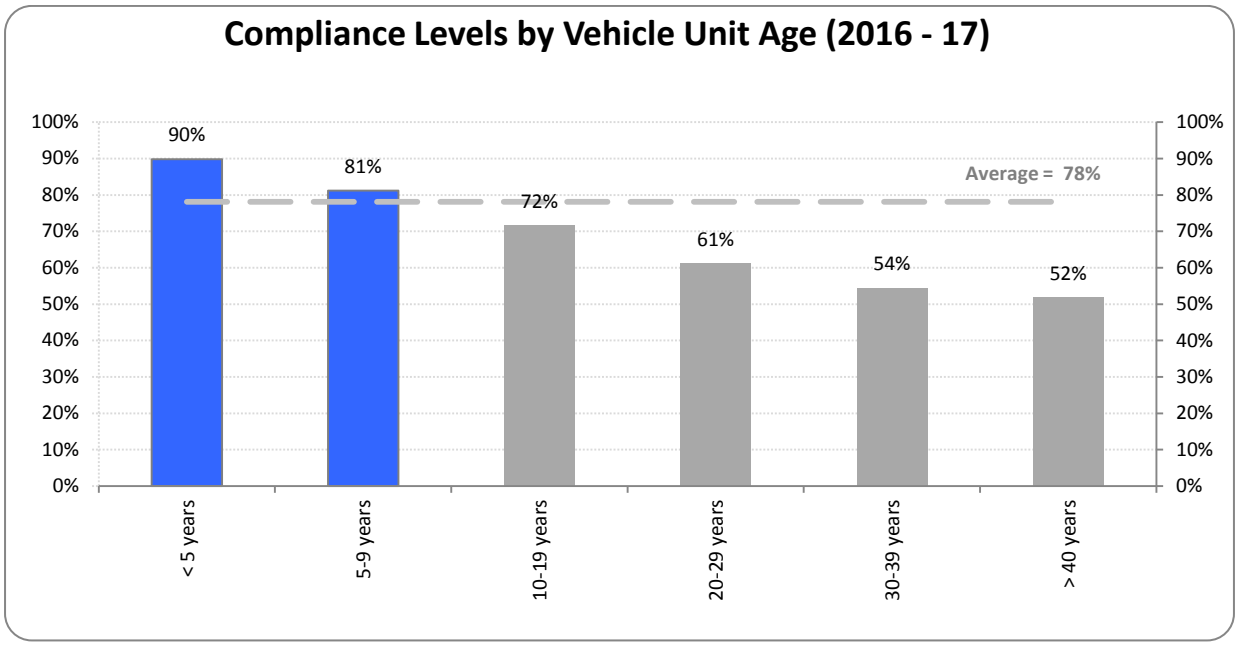
The analysis of vehicles intercepted and notices issued by vehicle category provides insights into the compliance of vehicle categories to assist with targeting education and operations.



'Other Combination' in the graph represents the vehicles that do not come under the pre-defined categories such as Cranes, Concrete Pump Trucks etc.

Compliance by Vehicle Age

Vehicle age is strongly associated with the incidence of non-compliance and roadworthiness. Analysis of vehicle compliance data for financial year 2016–17 is consistent with the finding of the National Roadworthiness Baseline Survey 2017.



Intercepts by State

Compliance of NSW-registered vehicles is relatively consistent for major and major grounded defects since 2014. Using Heavy Vehicle Safety Station data for comparison, NSW vehicles are overall more compliant than vehicles from Victoria and "Other" states, while also performing better than Queensland on the percentage of Major and Major Ground Defect notices issued.

Notice to Vehicle Unit Intercept Rates by State Registration - HVSS						
State		**2012-13 FY**	**2013-14 FY**	**2014-15 FY**	**2015-16 FY**	**2016-17 FY**
NSW	Vehicle Units Intercepted	164,809	161,246	145,451	148,923	143,389
	Notice to Vehicle Units	24,479	24,319	19,111	19,933	19,595
	Major & Major Grounded Defects Notice	1,387	1,712	1,131	1,313	1,224
	Major & Major Grounded Defect Notice %	0.8%	1.1%	0.8%	0.9%	0.9%
	Notice Issued %	14.9%	15.1%	13.1%	13.4%	13.7%
VIC	Vehicle Units Intercepted	56,465	50,700	40,179	37,232	37,653
	Notice to Vehicle Units	9,290	9,262	6,256	6,539	6,173
	Major & Major Grounded Defects Notice	580	766	411	432	369
	Major & Major Grounded Defect Notice %	1.0%	1.5%	1.0%	1.2%	1.0%
	Notice Issued %	16.5%	18.3%	15.6%	17.6%	16.4%
QLD	Vehicle Units Intercepted	40,526	37,481	29,886	32,048	33,362
	Notice to Vehicle Units	4,852	4,104	3,283	3,969	4,362
	Major & Major Grounded Defects Notice	337	324	294	397	422
	Major & Major Grounded Defect Notice %	0.8%	0.9%	1.0%	1.2%	1.3%
	Notice Issued %	12.0%	10.9%	11.0%	12.4%	13.1%
Other	Vehicle Units Intercepted	13,277	12,245	9,964	8,561	8,634
	Notice to Vehicle Units	1,811	1,798	1,290	1,365	1,348
	Major & Major Grounded Defects Notice	93	124	76	89	72
	Major & Major Grounded Defect Notice %	0.7%	1.0%	0.8%	1.0%	0.8%
	Notice Issued %	13.6%	14.7%	12.9%	15.9%	15.6%
State - Other includes: ACT, NT, SA, WA, TAS & Commonwealth plates.						
Notice Issued: All notice type including Breach report, Defect Notice & Penalty Notice						

ANNEX IV - Heavy vehicle safety strategies implemented in other jurisdictions

AREA	AUSTRALIA								NEW ZEALAND	EUROPEAN UNION (EU 28)	UNITED STATES	CANADA
	VIC	NSW	QLD	ACT	WA*	NT*	SA	TAS [46]				
	National Road Safety Strategy National Road Safety Plan NHVR: National Heavy Vehicle Safety Strategy National Heavy Vehicle Compliance and Assurance Strategy National Heavy Vehicle Productivity Strategy											
Road Safety Strategy & Action Plan reflecting heavy vehicles	Road Safety Strategy 2013-2022 Towards Zero 2016-2020 Road Safety Strategy and Action Plan[51]	NSW Road Safety Strategy 2012-2021 Road Safety Plan 2021	Safer Roads, Safer Queensland: Queensland's Road Safety Strategy 2015–2021 Safer Roads, Safer Queensland – Queensland's Road	ACT Road Safety Strategy 2011-2020 Road Safety Action Plan 2016-2020[52]	Towards Zero 2008-2020	Territory 2030 Strategic Plan National Road Safety Strategy 2011-2020 Road Safety Policy NT Road Safety Action Plan	South Australia's Road Safety Strategy 2020 *Towards Zero Together*	Towards Zero – Tasmanian Road Safety Strategy 2017-2026 Towards Zero Action Plan 2017-2019 Road Safety Work Program 2017-2019	Safer Journey 2010-2020 Safer Journeys Action Plan (for 2016-2020)[47]	EU Policy orientations on road safety 2011-2020[48] National road safety strategies and action plans - (all EU countries)[49]	"Toward Zero Deaths: a National Strategy on Highway Safety "(TZD) The DoT (Department of Transport) Roadway Safety Plan 2013-2017	Canada's RSS – *Towards Zero: The Safest Roads in the World*[50]

[46] Introduction of the Road Safety Levy from 1st of July 2017 - http://www.transport.tas.gov.au/roadsafety/towards_zero
[47] http://www.saferjourneys.govt.nz/action-plans/2016-2020-action-plan/
[48] https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/road_safety_citizen/road_safety_citizen_100924_en.pdf
[49] https://ec.europa.eu/transport/road_safety/useful-links/policy-orientation_en
[50] http://roadsafetystrategy.ca/files/RSS-2025-Report-January-2016-with%20cover.pdf
[51] https://www.towardszero.vic.gov.au/data/assets/pdf_file/0010/183556/STU_0206_RS_STRATEGY_2016_web.pdf
[52] http://cdn.justice.act.gov.au/resources/uploads/JACS/Road_Safety/PDFs/151571_ACT_Road_Safety_Action_Plan_FA_Web.pdf

			Safety Action Plan 2015–2017			(Under review)						
Heavy vehicles Action plan	N/A	N/A	Heavy Vehicle Safety Action Plan 2016 –2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Federal Motor Carrier Safety Administration (FMCSA) Strategic Plan 2015 – 2018 (for large trucks and buses)	N/A
Strategic paper - Telematics / (road safety) technology/ other technology systems	N/A	N/A	Transport and Main Roads Heavy Vehicle Telematics Strategy 2016[53]	N/A	N/A	N/A	N/A	N/A	ITS Action Plan 2014 - 2018 [54]	Integrated under Directive 2010/40/EU -Intelligent Transport Systems (ITS) Directive ITS – Action plan[55]	USDOT's Intelligent Transportation Systems (ITS) ITS Strategic Plan [56] 2015 - 2019	N/A

[53] https://www.tmr.qld.gov.au/business-industry/Heavy-vehicles/Transport-and-Main-Roads-Heavy-Vehicle-Telematics-Strategy-2016
[54] http://www.transport.govt.nz/assets/Uploads/Our-Work/Documents/Intelligent-Transport-Systems-Technology-Action-plan-June-2014.pdf
[55] https://ec.europa.eu/transport/themes/its/road/action_plan_en
[56] https://www.its.dot.gov/strategicplan.pdf