Reforming the Performance-Based Standards scheme

Policy paper

May 2018

NTC AUSTRALIA

National Transport Commission

Report outline

Title	Reforming the Performance-Based Standards scheme
Type of report	Policy paper
Purpose	To recommend changes to the Performance-Based Standards scheme to deliver productivity, safety and environmental benefits to the Australian community.
Abstract	The NTC has assessed the effectiveness of the Performance-Based Standards (PBS) scheme, as well as the impacts of government intervention and blueprinting of PBS designs, to find new ways of improving the scheme. The NTC investigated: • whether the PBS scheme is meeting its original policy intent • whether the scheme itself contains barriers to operating as an effective marketplace for the development, sale and commercialisation of innovative vehicles • the productivity, safety and environmental impacts of the scheme, and • whether there are any worthwhile improvements to the system (including the potential removal of any unnecessary market barriers or administrative costs). This paper presents our findings and recommendations which have been developed as an outcome of that investigation.
Key words	heavy vehicle, productivity, safety, performance-based, road protection, bridge assessment, pavement loading, road access, freight networks, route assessment, logistics, Australian economy, road manager, road policy
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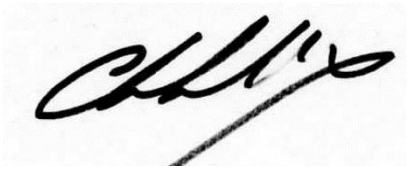
Foreword

For over 10 years, the world leading Performance-Based Standards (PBS) Scheme has provided a way of improving the safety and efficiency of Australia's freight task and encouraging innovation in the heavy vehicle sector. One of the National Transport Commission's (NTC) tasks is to monitor the effectiveness of policy reform. The NTC conducted a review of the PBS scheme during the 2017-2018 financial year to evaluate if the original objectives of the scheme - as approved by Ministers in 2007 - have been achieved. These objectives included limiting the number of vehicles on Australian roads, lowering carbon emissions, reducing operator costs, and improving road safety.

The NTC began this project by comprehensively reviewing the scheme in consultation with industry and government stakeholders. It became evident that while take up of the scheme is growing and genuine benefits have been realised, not all of the targets originally set out when the scheme was established in 2007 have been achieved, largely as a result of the lengthy and complex road access approval processes in place around the country. Industry has also reported a reluctance to participate because of the lack of PBS-approved road infrastructure, along with concerns about the currency of the compliance standards used in the scheme.

The recommendations set out in this report are designed to address these and other barriers to the wider take up of the PBS scheme identified during the review. The recommendations were approved by the Transport and Infrastructure Council in May 2018. The task is to now work closely with the National Heavy Vehicle Regulator, industry and all levels of government to implement these recommendations.

We would like to sincerely thank our stakeholders, including those in the transport industry, who took part in this review. With their ongoing interest and support we can ensure that the PBS scheme is enhanced to enable the original safety and productivity objectives to be realised for the benefit of all Australians.



Carolyn Walsh

NTC Chair and Commissioner

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Executive summary

The National Transport Commission (NTC) has evaluated the Performance-Based Standards (PBS) scheme to identify:

- whether the PBS scheme is meeting its original policy intent
- whether the PBS scheme's design and associated approval processes contain barriers to operating as an effective marketplace
- how access decisions affect the effectiveness of the PBS scheme
- whether there are modifications that could improve the effectiveness and efficiency of the PBS scheme.

The results of this evaluation have informed recommendations put forward to the Transport and Infrastructure Council.

Context

The PBS scheme is a proven way to increase efficiency in delivering Australia's freight task. It offers between 15 and 30 per cent more productivity than conventional vehicles, depending on the freight being carried. This means the same freight task can be delivered with fewer vehicles on our roads. It also delivers flow-on effects, including reductions in fuel consumption, CO_2 emissions, and congestion in our cities and around ports.

Australia was the first nation to introduce a PBS scheme for heavy vehicles, in 2007. To maximise its benefits, we need to remind ourselves of its original objectives, which were to reduce:

- the number of heavy vehicles on Australia's roads
- the kilometres travelled by heavy vehicles on Australia's roads
- fatalities on Australia's roads
- fuel usage
- CO_2 emissions
- operator costs.

The analysis presented in the NTC's August 2017 discussion paper, *Assessing the effectiveness of the PBS scheme*, shows that the take-up of the PBS scheme is growing and that it has led to increased innovation in the movement of freight by heavy vehicles (NTC 2017).

The main barriers identified to optimising the take-up of the PBS scheme were the complexity and cost of the approval process, and access uncertainty. Our recommendations throughout this paper are designed to address these barriers.

Issues

The aim of this project is to assess whether the PBS scheme is meeting its original aims, and to recommend reforms to improve its efficiency.

We found evidence to support substantial productivity, safety and environmental benefits resulting from the PBS scheme. For example, in our 2017 discussion paper, we demonstrated that the PBS scheme delivers:

- increased productivity by 15–30 per cent, depending on the freight being carried

- less impact on road assets compared with the equivalent use of prescriptive vehicles, with $65 million saved in road maintenance expenses in 2016
- fewer vehicles on the road
- savings of an estimated 94 million litres of fuel in 2016, which in turn reduced CO_2 emissions by about 250,000 tonnes.

The PBS scheme also encourages growth in the specialised vehicle manufacturing sector and continued investment in Australian freight and technological innovation. However, despite these benefits, we have not met the targets and estimates set out in the 2011 PBS regulatory impact statement. The single biggest barrier to take-up of the PBS is industry's uncertainty as to whether a vehicle will be approved by road managers to access the relevant route. This is preventing the full realisation of the scheme's benefits.

The evaluation also concluded that the level of customer satisfaction with the scheme is not satisfactory. Industry's reluctance to participate in the scheme is also contributing to the lower than expected take-up. We identified a number of specific barriers to innovation and take-up, including a complex and expensive approval process, network access limitations and uncertainty, and limitations of the Performance-Based Standards themselves. In addition, issues outside the scheme's jurisdiction, such as limitations with non-road infrastructure at the supply-chain level, created barriers to greater take-up of the scheme.

Conclusions

We identified a list of possible actions, which, if implemented, could help overcome the barriers to innovation and increase take-up of the scheme. They include:

- reviewing specific parts of the PBS framework (including the standards) that could be improved
- investigating development of a simplified PBS scheme for popular and mature PBS designs with greater access certainty
- publishing National Notices for all levels of the PBS network
- developing a nationally harmonised infrastructure capability assessment framework for use in all access decision-making
- engaging with non-road infrastructure owners and ancillary operators to remove specific barriers
- investigating a performance-based approach to medium to heavy-duty commercial vehicles with gross mass between 8 tonnes and 42.5 tonnes, and buses operating in urban areas.

We received 19 submissions to the discussion paper and the feedback is summarised at Section 2.2.4 of this paper. Based on this feedback and subsequent discussions with state and territory governments, we are proposing four recommendations, which are grouped into two changes.

Chapter 2 explains the findings of our evaluation and how we have formed our recommendations. Recommendations 1 and 2, discussed in Chapter 3, are designed to provide greater access certainty to the proponents of PBS vehicles. They are designed to address the single biggest barrier to take-up of the PBS scheme: industry's uncertainty as to whether a vehicle will be approved to access the relevant route. Access continues to be an issue for PBS vehicles, with 33 per cent of operators not obtaining the requested level of access for their vehicles (NTC, 2017).

The concept of access to PBS vehicles is possibly misunderstood among governments. The PBS network guidelines suggest restricting access only if there is evidence of increased damage to infrastructure. But in practice, most access applications for innovative vehicles are initially denied. It then takes significant effort to turn that around, resulting in jobs often being completed before the access is approved. In these cases, PBS vehicles carry reduced (general) payload, basically nullifying the purpose of PBS vehicles.

Recommendations 3 and 4, discussed in Chapter 4, are designed to improve the PBS scheme's processes and the understanding of the PBS scheme and its benefits. A summary of recommendations is also provided in Chapter 5.

1 Context

Key points

- The PBS scheme has been planned, developed and implemented for more than 20 years.
- It is allowing industry to develop innovative vehicles that provide more carrying capacity within specified safety and performance criteria, without compromising road infrastructure.
- The single biggest barrier to take-up of the PBS scheme is industry's uncertainty as to whether a vehicle will be approved to access the relevant route(s).

1.1 Objective

The aim of this policy paper, *Reforming the Performance-Based Standards scheme*, is to present the findings of the evaluation and to outline how we reached our final recommendations. These recommendations will be implemented across states and territories to improve the effectiveness and efficiency of the scheme.

1.2 Why the PBS scheme was established

Performance-Based Standards (PBS) were first considered in the 1990s as technology began to demonstrate how greater volumes of freight could be carried. In the early 2000s, the freight sector was growing faster than the time it took to build new infrastructure, or upgrade existing infrastructure, and the public's demand for faster deliveries and a greater choice of products was driving growth. Industry needed government support if it was to start making use of advances in technology to meet its customers' demands. During this period, in 2005 the NTC released a report called *'Twice the task'*. Its aim was to investigate the measures required to meet Australia's growing freight task. One of the key measures identified was to:

> *'Actively progress implementation of enhanced Performance-Based Standards and innovative vehicle design approaches. This needs to include both the technical issues relating to assessment of vehicle design, but also the social issues of ensuring broad community support for the initiative.' (NTC 2016a)*

The PBS scheme was identified as a 'very high priority' to unlock further productivity without delivering new infrastructure.

Before the PBS scheme, a transport operator wishing to pursue vehicle innovations would usually have to:

1. invest in the development of a design, and build a prototype vehicle
2. if necessary, commission research to back up the design assumptions
3. seek government support for the prototype to access certain roads without the support of agreed guidelines for approval.

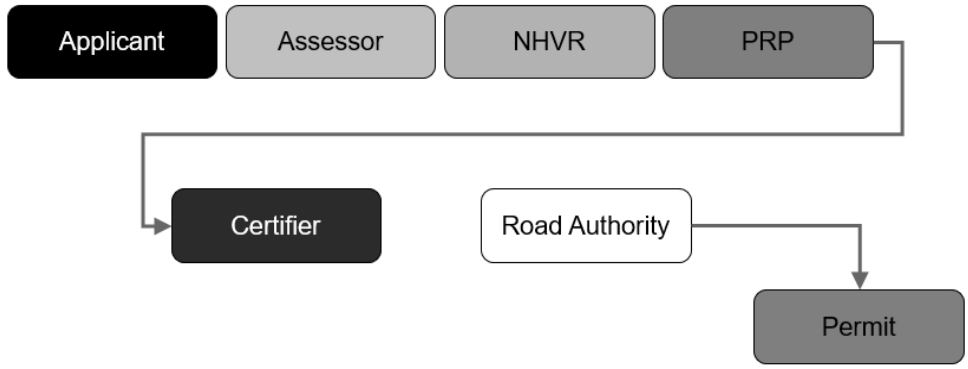
All risk was with the vehicle operator. It could take years and substantial dollars to get approval and pay for ongoing permit fees.

In May 2001 the Australian Transport Council (ATC) endorsed the policy framework for the development of a performance-based approach to heavy vehicle regulation and, in December 2003, voted to adopt the PBS (NTC 2011). After six years of negotiation, consultation and amendment of the standards, a scheme was implemented in October 2007. The prime minister and premiers (COAG) in approving the PBS scheme stated that its aim was to provide ‘continuous productivity gains and technological improvement, whilst meeting reasonable safety, road asset protection and environmental standards’.

1.3 Roles in the PBS scheme

Figure 1 outlines the roles involved in the assessment of a PBS application, from vehicle concept through to a vehicle operating on Australia's roads.

Figure 1. Roles in the PBS scheme



Applicant

- identifies the freight task they wish to meet
- engages a vehicle designer and manufacturer
- engages a PBS assessor to assess how the vehicle design meets the standards.

Assessor

- must be accredited by the NHVR (National Heavy Vehicle Regulator)
- performs the engineering assessment against the standards
- submits the vehicle design application to the NHVR on behalf of the applicant.

NHVR

- reviews applications
- issues design approvals
- issues final vehicle approvals
- takes advice from the PBS Review Panel.

PBS Review Panel

- represents eight road authorities, the Commonwealth and an independent chair and deputy chair
- advises the NHVR on vehicle applications and approval decisions
- advises on other operational policy issues that hinder heavy vehicle productivity.

Certifier

- must be accredited by the NHVR
- inspects the constructed vehicle against the approved design.

Road authority

- assesses access applications for routes not part of a national network (which, at the time of writing, is all routes except PBS levels 1 and 2A for trucks and dogs lighter than 50.5 tonnes).

1.4 The original intent of the scheme

The purpose of the PBS scheme was to deal with innovation in heavy vehicle technology in a nationally consistent and efficient manner. As outlined in the NRTC submission to ministers in 2001:

> *'This [proposal] is to develop a performance-based standards approach to dealing with heavy vehicle innovations, through a national and consistent system for the first time … It provides a better framework than the current prescriptive approach for much needed innovative solutions across the whole heavy vehicle fleet to meet future freight demands, which are predicted to double over the next fifteen years.*
>
> *'PBS will provide a more comprehensive approach to ensuring heavy vehicles operate safely and that road and bridge assets are protected. It will ensure that poorly performing vehicles are unable to slip through the approval process and build in systems to ensure a high standard of compliance* (NRTC 2001)*.'*

2 Evaluation findings

In 2017, the NTC compared vehicle numbers and current benefits of the PBS scheme with the targets and estimates developed as part of the 2001 and 2011 PBS regulatory impact statements. Our evaluation concluded that the scheme is effective against performance measures in innovation, productivity, safety and environmental impact. While the number of PBS vehicles did not fully meet initial expectations, we believe this can be attributed to the current network access arrangements and the Australian economic slowdown.

Our evaluation also concluded that the level of customer satisfaction with the scheme is low. Industry's reluctance to participate in the scheme also helps explain the lower than expected take-up. Supporting this, the evaluation identified a number of barriers to innovation and take-up, including:

- the complexity and cost of the PBS approval process
- network access limitations and uncertainty and the limitations of the Performance-Based Standards themselves
- issues outside the scheme's jurisdiction, such as limitations with non-road infrastructure at the supply-chain level.

We also identified improvement opportunities through the review and evaluation process, and directly through stakeholder feedback. These findings formed the basis of our suggested improvement areas and subsequently our recommendations, both of which are discussed in Section 2.2.2.

2.1 How well is the PBS scheme performing?

The PBS scheme has been running for more than 10 years. More than 5,000 vehicle combinations have now been approved. This means that we now have evidence to determine how the scheme is performing, and what we need to improve. The NTC's evaluation of the scheme has found that:

- PBS vehicles are more productive than comparable conventional vehicles. Productivity improvements range from 15 per cent for the transport of cars and groceries to over 30 per cent for the transport of general freight and containers.
- Use of PBS vehicles reduced road maintenance requirements by about $65 million in 2016. Use of PBS vehicles in 2014–16 reduced the distance travelled to deliver Australia's road freight task by 440 million kilometres.
- In 2016, use of PBS vehicles reduced the need for fuel to deliver Australia's road freight task by 94 million litres, and resultant CO_2 emissions by 250,000 tonnes (NTC, 2017).
- PBS vehicles appear safer than comparable conventional vehicles. Accident insurance data shows that the major-crash involvement rate of PBS vehicles is 46 per cent lower per kilometre travelled than for comparable freight vehicles. These safety statistics are based on the best available data we have: insurance data. However, this data does not include all fatalities (such as trucks hitting pedestrians or motorcycles) and may distort the reported benefits.

We recognise that comprehensive data specifically designed to demonstrate the benefits of the PBS scheme is not currently available in Australia.

As we reported in our August 2017 discussion paper, for most manufacturers, the scheme has led to increases in innovation, improved safety, and greater recognition in the transport sector and the supply chain.

Improved product take-up by operators has assured sustained demand for higher-productivity vehicles. For operators, the PBS scheme has improved business efficiency and competition by allowing them to carry more volume and mass. The scheme has improved fleet safety performance and reduced the number of vehicles that would otherwise have been on the road, saving on fuel and wages, reducing emissions and reducing supply-chain costs.

Operators reported that through the PBS Scheme, they could support a growth in the freight task without needing to buy additional vehicles. Most manufacturers and operators have about three to four PBS-approved designs. Costs for operating PBS vehicles include manufacturing and compliance costs are embedded in the price of PBS vehicles. These range from about $3,500 for simpler designs, to $7,000 for multi combinations and, in extreme cases, more than $120,000 for highly innovative vehicles.

However, many respondents to our industry survey reported that the PBS scheme is time-consuming, complex, expensive and resource-intensive. Having to deal with multiple government departments (local councils, state road agencies and the NHVR) is particularly time-consuming. In some instances, survey respondents reported taking several years to obtain permits. Some manufacturers reported that they had not fully recovered their investment costs. Respondents also reported that they can easily manage popular vehicle types through the PBS process, but truly innovative ideas are put in the ‘too-hard basket’.

Further, additional operating conditions can be expensive, and NHVR-issued in-principle approvals that do not convert to actual permits result in significant losses to industry. Delays in obtaining permits result in purchased PBS combinations not operating while waiting for all approvals to come through. For some operators, the initial costs and delays have exceeded the estimated benefit of using PBS vehicles.

Existing administrative barriers must be removed if the scheme is to allow for the development of more sustainable transport systems, increased innovation and more rapid adoption of new technologies nationally. The benefits of the PBS scheme are more fully detailed at Appendix A.1.

Table 1 provides an overview of the PBS scheme’s performance against its original objectives.

Table 1. PBS scheme performance against original objectives

Objective	Was it achieved?	Yes/No? If No, why not?
Development of more sustainable transport systems through improved road vehicle regulations controlling heavy vehicle safety and infrastructure impacts.	☑	Yes
Development of more flexible road transport regulations that provide for increased innovation and more rapid adoption of new technologies, while providing seamless operations nationally.	☒	The PBS isn't nationally consistent because individual road managers adopt different interpretations of the guidelines and some apply additional operating conditions to those specified by the NHVR. Adoption of technology could be processed faster and the PBS should encourage greater take-up of more productive technology.
Vehicles are designed and operated according to the agreed performance standards.	☑	Yes
There is confidence that the vehicles operating in accordance with PBS will operate safely and without causing undue damage to infrastructure.	☒	Road managers are unwilling to accept that the standards will adequately protect road assets in their jurisdiction. Consequently, applicants are being asked to apply for access permits, despite meeting the standards, and additional operating conditions are being sought by road managers in order for permits to be approved.
There will be high levels of compliance.	☑	Yes. However, there is replication of the compliance process, with design applications being developed by the PBS assessor, then checked by the NHVR, and, on some rare occasions, reviewed by the PBS Review Panel.
There is consistency of administration across jurisdictions.	☒	There is inconsistency in how access proposals are assessed by road managers, prior to permits being issued by the NHVR.

2.2 How we developed our recommendations

2.2.1 Suggested improvement areas

The PBS scheme effectiveness review revealed a number of improvement opportunities that could help increase vehicle take-up in future, and ensure the sustained success of the scheme.

We listed nine suggested areas for improvement in our August 2017 discussion paper. They included:

1. **Review the PBS technical standards to give flexibility to industry to use technology to comply with the safety standards**. The current PBS standards were originally developed in the late 1990s. Technology has improved to a level where a number of these standards can be complied with through alternative deemed-to-comply provisions. This includes fitting equipment such as anti-lock braking system (ABS)/ electronic braking system (EBS) and roll-over protection that demonstrates stability and braking requirements. This will in turn improve the safety performance of the PBS fleet.

   The safety performance of truck and four-axle dog combinations, for example, is slightly below the prescriptive reference vehicle (rigid vehicles). This is because some PBS standards, such as the braking requirements, can be demonstrated by calculations without the need to use modern technology such as ABS/EBS brakes.

   This resulted in older vehicles (more than 10 years old) entering the PBS scheme without modern braking technologies. Upgrading the braking standard to replace the current requirements with deemed-to-comply provisions such as ABS/EBS will eliminate this issue. Another example of using deemed-to-comply provisions is including roll-over protection as part of demonstrating a vehicle's static roll-over performance.

   This review could also include how technical results are presented in a new PBS design application for NHVR and PRP (PBS Review Panel) consideration. An improvement in this area would give road managers more accurate information that could improve access available to PBS vehicles.

2. **Develop a permanent pavement vertical-loading standard to replace current interim provisions built on prescriptive axle-group mass limits**. A recent Austroads project delivered a draft framework to develop a permanent pavement vertical-loading standard. The framework can be used to develop an instrument that eventually leads to calculating the optimal mass limits for an axle group (Austroads 2017a).

3. **Enable the NHVR to assess and approve popular and similar PBS design applications without consulting with the PRP**. This improvement will speed up the process, since about 90 per cent of PBS design applications received are for truck-and-trailer, semi-trailer, B-double and A-double combinations. By allowing the NHVR to decide PBS design applications for popular vehicle types, the PRP can focus on innovative vehicle design concepts and redirect its energies towards resolving access and other strategic issues that hinder heavy vehicle productivity. This process is already underway.

4. **For road managers: agree to allow as-of-right access for PBS vehicles within the declared networks**. Mapped and declared PBS networks should be regularly updated in the NHVR Journey Planner and Access Portal.

5. **Assess the suitability of PBS for:**
    a. medium-sized commercial vehicles (8 tonnes to 42.5 tonnes) to deliver freight to inner-urban areas (last mile), which would improve the overall supply-chain efficiency
    b. buses
    c. ancillary operators.
6. **Encourage other areas of the supply chain, such as intermodal logistics centres and warehouses, to build capacity to send and receive optimised PBS vehicle deliveries.**
7. **Accelerate the development of the strategic freight network suitable for use by PBS-approved higher-productivity vehicles.** This will simplify the task of managing heavy vehicle access for road managers.
8. **Include a provision in the PBS framework to allow a clear delineation between route-specific and network access vehicles.** The current PBS model operates on a one-size-fits-all model. This is a barrier to dedicated supply-chain transport tasks which can be best optimised by not constraining those vehicles to meet the generic criteria of a road network that is not relevant to their operation.
9. **Austroads has recently completed a number of research projects to improve the safety, productivity and efficiency of the heavy vehicle industry via the PBS scheme.** The NTC recommends that these research papers be considered for future implementation by the relevant authorities.

2.2.2 Recommendations

After reviewing the feedback we received to our discussion paper, and holding several follow-up discussions with states and territories, we have refined these areas for improvement into four recommendations:

Recommendation 1: That states and territories identify PBS networks for each access level, and the NHVR publish a National Notice for each by end of financial year 2020–21. This includes:

a. assessing priority freight routes in their jurisdiction for approval as a PBS network
b. identifying any infrastructure that falls within routes assessed under 1(a) that requires prescriptive limits (mass, dimension or other)
c. publishing approved routes, including the prescriptive limits applied to relevant sections, online on the National Key Freight Routes Map and NHVR Journey Planner
d. engaging with and assisting local governments within state and territory jurisdictions to assess and map their own access levels, to provide end-to-end key freight routes.

Recommendation 1 facilitates suggested improvement areas 4, 6, 7 and 8. The recommendation allows for the identified PBS networks to grow over time – with state and arterial networks being identified first, and local and first-and-last-mile connections to follow as work progresses.

Recommendation 2: That Austroads and the NHVR:

a. compare the methodologies used to assess infrastructure across Australia (including pavements and bridges)

b. engage with road managers to design a nationally consistent guideline to assess infrastructure by the end of 2019

c. transition to a nationally consistent methodology by end of financial year 2019–20

d. produce relevant training materials for road managers to use the guidelines

e. consider an online database that makes infrastructure mass limits or loading limits publicly available.

Recommendation 2 is designed to give effect to the suggested improvement area 2. At the moment, a vehicle must meet different specifications, depending on which state and/or territory it will be operating in. While Austroads has completed similar projects, we propose that each state and territory contribute to the process, and build in mechanisms that allow for assessment of local operating conditions.

Recommendation 3: That the NHVR review and revise the PBS standards by the end of financial year 2018–19 and every seven years thereafter. The initial review should include (but not be limited to) consideration of:

a. the effects of new technology, and catering to future technology

b. the management of tyres in PBS assessments and ongoing vehicle operations

c. whether there is a continued need for four PBS levels

d. the best way to assess a vehicle's impact on local amenity, public health and the environment, or whether these matters should be left to access guidelines.

Recommendation 3 is designed to give effect to the suggested improvement area 1. The recommendation includes issues that should be considered in the review, which have arisen during consultation for this project.

Recommendation 4: That the NHVR develop and lead a comprehensive and ongoing communications plan as soon as resources permit, with the support of the states and territories, that:

a. publicises the benefits of the PBS scheme

b. provides information about:

- the background to the Performance-Based Standards
- their relationship to prescriptive standards
- application and approval processes
- National Notices for PBS networks
- route assessment guidelines and tools.

Recommendation 4 is designed to support all nine of the identified areas for improvement. Throughout our consultation process, we have identified a distinct lack of awareness about the PBS scheme and its benefits to Australia. Industry and government submissions also recognised the need to educate decision-makers about the complexities and technicalities of the PBS scheme, to make their jobs easier and remove some of the fear around PBS vehicles.

The NHVR is already undertaking work to give effect to suggested improvement area 3, and the NTC will analyse the Austroads project findings referred to at suggested improvement area 9 in preparing our forward work program.

The only suggested area that has not been adopted by one of our recommendations is area 5. From our discussions with PBS operators and government representatives, we determined that there was more benefit in getting the process right for heavy vehicles first. That means the improved process can be considered for medium-sized commercial vehicles (8 tonnes to 42.5 tonnes), buses and ancillary operators in future.

2.2.3 Method

The NTC began reviewing the PBS scheme in July 2016. In October 2016, we analysed data collected by the NHVR on the numbers of applications and processing times. We also gathered feedback from stakeholders about their experience navigating the PBS application process.

In August 2017, this collated material was published in the NTC's discussion paper. The paper also highlighted barriers to the scheme's success and put forward options for consultation. Feedback on the paper was received up until the end of October 2017. The NTC further engaged with government stakeholders on options to deal with these barriers to success in December 2017.

2.2.4 Consultation

The NTC has consulted with a wide range of stakeholders from across industry and government players, such as:

- Australian Road Research Board (ARRB)
- Heavy Vehicle Industry Association
- Australian Trucking Association
- Truck Industry Council
- Victorian Transport Association
- Freight on Rail Group
- National Road Transport Association
- state and territory road managers
- South Australian Freight Council
- Port of Brisbane
- Goodyear and Dunlop Tyres

During the 2016 consultation, and in response to the 2017 discussion paper, some clear key themes emerged. All stakeholders generally believe the PBS scheme is a success and is operating well. However, most also agreed that there were still some barriers in place, preventing us from achieving the PBS scheme's full potential. The themes include:

Access

Industry feedback highlighted the disparity between the design approval and the access approval stages of the PBS process. They cited the risk to manufacturers and operators that their vehicles, which may be PBS-approved, may not necessarily be allowed to access the road network relevant to their task. Industry considered this too high a risk for some, who would otherwise have requested access for more innovative vehicles with new technology.

According to one respondent:

> *'this scheme has been a huge and costly disappointment for many operators because their requests for access are often delayed or simply refused outright by road managers.'*

In response to our 2017 discussion paper, the difficulty in obtaining access permits, and the time and cost involved, once again dominated the feedback. For example:

> *'An operator can spend thousands of dollars obtaining PBS approval only to find that road access is subsequently denied by a road manager because of unfounded or ill-informed concerns about safety or local amenity impacts.'*

Industry respondents stated that the access permit application process is highly inefficient and applied inconsistently across jurisdictions. Many respondents encouraged the states and territories to assess and publish approved PBS freight networks. However, there was also some concern that, if forced to do so, states and territories would take a conservative approach and limit the network access for each PBS level. Several respondents also commented on a perceived disparity of access approval, whereby prescriptive vehicles are allowed, but not PBS vehicles, even though the latter have an equivalent or reduced impact on road assets.

Application process

The two main criticisms of the application process were the time it took, and the duplication of process. Many industry respondents questioned the need for the PBS Review Panel (PRP) to review applications once they had already met the PBS standards. They noted that this step can add more than a month's delay. Industry suggests that this practice is hampering manufacturing efforts, which are already scheduled to tight timeframes. The PRP has pre-approved certain vehicle configurations, including three-axle truck and three-axle dog trailers, B-doubles and semi-trailers. This means applications conforming to these pre-approved specifications can be dealt with by the NHVR without reference to the PRP. More than 80 per cent of all applications are now dealt with in this manner, with a total turnaround time of 3.5 days or less, according to the NHVR.

Industry respondents were also critical of the inability to keep track of their application's status. Other suggestions included implementing pre-approvals, reducing the time allowed to process applications, and removing replication of approval steps. For example:

> *'A company invested in a second identical PBS vehicle and applied to the NHVR for an access permit to carry freight on the same route under the same conditions. RMS, as the road manager, denied access solely on the basis of Transport for NSW's unpublished "interim strategic plan" which favoured the use of rail to transport containers to and from the port. Even though moving freight between Port Botany and Wollongong is currently not a viable option … (the) decision was upheld by RMS despite NSW Ports informing RMS that denying access for PBS vehicles makes the current movement of freight less efficient. It cost 6 months of lost productivity from the time the original access application was made.'*

The PBS standards

Most respondents suggest the PBS standards are effective. However, they felt that they were overly prescriptive, and many suggested that there needed to be more scope for assessors and certifiers to apply flexibility in assessing innovative new designs.

All respondents supported revising the standards. There was clear support to make the standards more flexible, to deal with innovation and adoption of the latest technology. They also suggested including an assessment of the Standards' environmental impact and their impact on local amenity.

Transparency

Some government and industry respondents questioned whether more application process data on PBS vehicle performance could be shared. For example, Tasmania pointed out that road managers (state/territory and local) don't have access to a PBS assessor's assessment of a vehicle against the PBS standards. Therefore, at the access approval stage they currently 're-assess' a vehicle, using the NTC's *Performance-Based Standards scheme – network classification guidelines* of July 2007, which are much more detailed and consider the operating environment of the vehicle's proposed route.

Some industry submissions explained that they could learn from other assessment decisions, and there were also some concerns from industry about decisions not being made public.

Respondents saw transparency as a way to help encourage greater take-up and to make the process fairer. Having the NHVR publish all approved vehicle designs would help new applicants gain an insight into the designs likely to be approved. There would, however, need to be some protection of intellectual property.

In-principle approvals

Industry feedback suggests that 'in-principle' access approvals often do *not* translate to actual approvals. Several different sources have told us that they mistrust the in-principle approval process and that some road managers are discouraging applicants from applying for new vehicle types. They suggest the in-principle process is being used to coerce applicants into limiting their applications to more standard vehicles and combinations.

Popular models

Most respondents agreed with implementing a process for transitioning popular PBS models to prescriptive standards. Some suggested that this could also work for popular vehicle components. This work has already been commenced by the NHVR.

Auditing access decisions

Industry suggested that auditing access decisions could show an inconsistency of assessment methodologies used by road managers across Australia. It was suggested that auditing of these decisions could ensure the PBS scheme is being applied fairly and consistently across states and territories.

Australian Design Rules

Government and industry highlighted the Australian Design Rules as a barrier to innovation. Several respondents suggested making PBS applications exempt from the Australian Design Rules.

Infrastructure loading

Both governments and industry were dissatisfied with the time it takes to assess bridges and pavements. Generally, there was support for a consistent approach to assessing bridges; however, there was some concern about 'replacing quality with consistency', because local conditions wouldn't be allowed for, resulting in a greater safety risk.

Enforcement

Enforcement agencies currently have no way to identify a PBS vehicle. This has caused problems for enforcement officers and drivers alike. It was suggested that we consider a simple way to identify PBS vehicles.

Competition

A more efficient PBS scheme may move freight away from rail. This was a concern expressed in several submissions from rail representatives. In terms of environmental impact, it was suggested that shifting freight from rail to road would override any benefit.

3 Access

Key points

- Operators currently need to apply for access permits for all PBS vehicles, because PBS routes have not been assessed and published in all states and territories. This is not consistent with the original decision made by ministers in 2007.
- Industry has no certainty that an approved vehicle design will be granted access to the route it requires to meet its freight task.
- Road managers use different methodologies for assessing pavement and bridge loading, creating further uncertainty for industry.
- Assessing and publishing PBS routes will dramatically improve network access for PBS vehicles.

The biggest barrier to take-up of the PBS scheme is uncertainty about whether an approved vehicle design will be granted access to the route it requires to meet its freight task.

While many operators would like to take advantage of the PBS scheme, the investment is currently weighed negatively against long waiting times for approvals, uncertain levels of access, and inconsistent approvals.

3.1 Accessing the road network

The Heavy Vehicle National Law (HVNL) provides three main ways in which a heavy vehicle can obtain access to the road network: either 'as-of-right' access, restricted access managed by notices and/or permits. Despite demonstrating greater safety without adverse infrastructure impacts, most PBS vehicles require a permit to use the road network. Generally, the more productive a heavy vehicle, the more likely it is to be regulated under a permit regime (NTC, 2017).

A significant part of the total time needed to get a new PBS vehicle onto the road is the access permit process. NHVR data reveals that operators using PBS vehicles need to set aside a minimum of seven weeks (up to 35 business days) to obtain a permit. Complicated permit applications involving detailed infrastructure assessment can take significantly longer (up to two years) for access approval.

3.2 What was originally agreed?

To allow industry to achieve better road freight productivity without sacrificing road safety or increasing road asset damage, the Australian Transport Council (ATC) approved the PBS reform in October 2007.

The ATC supported the development of a performance-based approach to heavy vehicle regulation as an alternative regulatory system to the current prescriptive regulations.

All state and territory governments agreed to make best endeavours to determine access to their road networks by the end of 2007, and to publish network maps for PBS-approved vehicles. Road agencies also retained the discretion to exclude specific approved vehicles from their networks.

3.3 What has happened in practice?

In hindsight, the original deadline was an ambitious target. It was not until late in 2008 that the first network maps appeared, and then only for level 1 and in some cases level 2 access. Appendix A.4 shows the current complexity and fragmented nature of access approvals. At the time of writing, no jurisdiction has passed legislation or regulations, or gazetted approval, to as-of-right access, thus requiring every PBS-approved vehicle to seek a permit for its operation in each jurisdiction.

The NTC published the *Network classification guidelines 2007* to help road managers apply an accurate and consistent assessment of PBS levels. While feedback suggested that most states and territories use the guidelines, they apply the guidelines to assess an individual vehicle's use of the road network, rather than to assess broader PBS networks. One state pointed out that road managers (state/territory and local) don't have access to a PBS assessor's assessment of a vehicle against the PBS standards, which is contributing to the need to 're-assess' each PBS vehicle based on local operating conditions. Figure 2 demonstrates a comparison of the intended and actual PBS process.

Figure 2. How PBS was designed to work (2001) and how it currently works (2018)

Where an operator seeks access to a route that is not part of the PBS national network (which at the present time is all routes), they are required to submit an application through the NHVR to the relevant road manager(s) for access. However, in some cases they have also sought 'in-principle' agreement from road managers before submitting a PBS proposal to the NHVR. This in-principle approval has no formal status in the PBS scheme, and can cause dilemmas for applicants and road managers when the PBS vehicle as finally approved differs significantly from the original concept. Our advice from PBS experts suggests that any in-principle access approval has no standing in the PBS policy. It is not considered by the PRP or the NHVR in assessing vehicle design applications. Discussion with some staff indicates that in-principle approval is quite subjective and can be based on local freight policies. While these policies will be relevant to the area in which they apply, such as an individual jurisdiction where the government may have an aversion to – or even ban – 'road trains', they should not preclude a particular innovation from being assessed under the PBS scheme if the applicant so desires. The NHVR and the PRP have considered and approved cases that apparently did not receive in-principle approval by a jurisdiction, but that have resulted in local objections being reconsidered, or the relevant vehicles being used successfully in other parts of Australia.

The assertions by some road managers that small variations from an approved design are likely to have a significant adverse effect on infrastructure under the PBS scheme are completely unfounded. In fact, the process adopted by the NHVR to deal with variations ensures that the as-built vehicle (even with variations from the design dimensions and equipment) satisfies all of the performance standards for its prescribed access level, as did the approved design. The many hundreds of cases of variation dealt with in the past prove that this is the case.

The advice from PBS experts also suggests that any changes from the approved design associated with the construction of a vehicle are usually minor. The PRP rules – as approved under legislation by the NHVR board – require that, for any material change, an applicant must confirm that the vehicle still meets all of the standards relevant to the design application. These include the infrastructure standards for bridge loading and pavement loading (vertical and horizontal). Any variations between the approved design and the constructed vehicle therefore have no effect on bridges or pavements that would impact any in-principle approval.

We have considered various suggestions to deal with this issue, some of which propose that road managers get involved with assessing vehicle designs, as well as access. However, in order to avoid duplication of effort and confusing responsibilities, it is our judgement that in-principle advice from road managers to potential PBS applicants should be limited to, and based on, only official government or council freight policy issues. In the interests of improved safety and transport productivity, potential applicants should be encouraged to participate in the PBS scheme.

State and territory road agencies undertake a number of activities to support the PBS scheme. Except for bridge assessments and permits, these services are at their own cost. They continue to assess routes available to PBS vehicles with a view to expanding the current network. In addition, encouraged by the growth in PBS vehicles, several states are maintaining and strengthening their infrastructure to suit PBS vehicles. In general, most 'A' level networks for shorter vehicles have been mapped; 'B' level networks for longer vehicles have not (NTC, 2017). Initiatives include Victoria's heavy vehicle network maps, Northern Territory's open road train access, New South Wales' Safety, Productivity and Environment Construction Transport Scheme (SPECTS) policy, and Tasmania's class-3 truck-and-dog notice.

Local governments need to provide consent for access to the first-and-last-mile local roads that vehicles use to access pickup or delivery points. Generally, councils have not published PBS approved roads, due to their concerns regarding asset protection, lack of funding for road maintenance, perceived safety concerns, and the lack of resources to conduct road and bridge assessments. Some state and territory road authorities have been working with local governments to improve access for PBS vehicles. Austroads has developed guidelines to provide local governments with a set of nationally consistent guides on assessing the suitability of their road networks (Austroads, 2009). However, guidelines such as these can only be of use if local governments have sufficient resources, expertise and capacity to assess and map networks.

3.4 Options discussed in the 2017 discussion paper

- The NHVR should publish National Notices for all four levels of PBS network.
- Agree to allow as-of-right access for PBS vehicles within the declared networks.
- Accelerate the development of the strategic freight network suitable for use by PBS-approved higher-productivity vehicles.
- Include a provision in the PBS framework to allow a clear delineation between route-specific and network access vehicles.
- Replace existing in-principle assessments with permits that have a delayed start date.

3.5 Consultation and feedback

The concept of ‘as-of-right’ access to PBS-approved vehicle designs is generally supported, but in practice is not being adopted. The main concerns being raised by road managers are:

- the adverse impact of PBS vehicles on road maintenance
- the resources required to assess all roads
- the resources required to complete bridge assessments
- releasing control of state-managed assets.

In our discussion paper we highlighted that the use of PBS vehicles reduced road maintenance requirements by $65 million in 2016. This is largely due to a reduction in the distance travelled by PBS vehicles by 440 million kilometres, to deliver Australia’s road freight task in 2014–16. We know that PBS vehicles are more productive than comparable conventional vehicles. Productivity improvements range from 15 per cent for the transport of cars and groceries, to more than 30 per cent for the transport of general freight and containers. Therefore, the net impact of PBS vehicles on the road network is actually very positive.

Our recommendation requires completion of a once-off full assessment of each jurisdiction’s road network to determine PBS-approved networks for publication. By implementing this solution, road managers are retaining control over assessment of their networks and simultaneously relieving the reported resourcing strain for the long term. As networks are changed, added to or strengthened by investment in the future, there will be a need to update the published networks. Compared with the initial assessment effort, updating should require few resources.

We recognise that there is a need to cater for the local operating conditions in each state and territory and to ‘build’ networks over time. There is also a need to focus on key freight routes in the first instance. For example, some states and territories have told us that they could assess state and arterial networks as a first step, then work with local governments in their jurisdiction to grow the networks to cover first-and-last-mile connections as work progresses. National notices allow the flexibility for additional requirements specific to certain local conditions. For example, access could be limited on a subset of the network, for particular vehicle types if they are unsuitable.

States and territories reported that the job of assessing infrastructure, including bridges and pavements, is time-consuming and costly. They are also reticent to publish loading data for their bridges. One state has suggested that the focus should be on developing consistent assessment for Tier 1 PBS vehicles. Many industry stakeholders expressed their concern that introducing a national bridge assessment methodology could reduce access if road managers took a conservative, ‘lowest common denominator’ approach. That is, they were afraid that access would be reduced in favour of consistency.

One jurisdiction suggested that states and territories could assess networks to provide access for certain combination types. They suggest this should be recommended in place of identifying PBS networks for each access level. Identifying PBS networks for each access level will allow as-of-right access to any PBS vehicle that has been approved to use the corresponding network level. The suggestion deviates from the aim of the PBS scheme which is to assess a vehicle on its performance and to allow that vehicle to operate on networks that are appropriate for their level of performance.

The suggested approach requires a bespoke network assessment for each vehicle combination type. The approach this paper recommends requires a single, once-off network assessment to be completed, with every subsequent vehicle combination which meets the relevant network performance requirements having as-of-right access to that network.

In 2011, Austroads recommended that a nationally consistent bridge assessment tool be developed, after finding that the existing bridge standard (AS5100.7) was being applied differently in each jurisdiction. Local experts in bridge engineering believed the standard to be lacking and decided to use their own approach. In response, Austroads recommended that:

- a nationally uniform bridge assessment procedure be developed and implemented in Australia and New Zealand
- a national bridge database with nationally consistent fields be implemented
- software to assess the majority of bridges be developed.

Austroads' recommendations were based on having three tools for road managers:

- a bridge assessment tool (software and methodology)
- a bridge assessment manual
- a national database.

The NTC also published the *Performance-Based Standards scheme – network classification guidelines*, intended to provide consistent approaches to the assessment of access levels under the PBS scheme. There has never been an audit of the application of these documents by different road managers. However, the inconsistent access arrangements for similar vehicle types across jurisdictions would suggest that different methodologies or interpretations of the same methodology are used for assessing pavement wear. Austroads has in the past undertaken projects to extend the guidelines, and to provide online tools for local government to assist in assessing access for PBS vehicles wishing to use local roads.

The NTC is also aware of many other route assessment guidelines being used in Australia. Some of these include:

- *Route assessment guidelines for multi combination vehicles in Queensland* (2013) (Department of Transport and Main Roads 2013)
- *NSW route assessment guideline for restricted access vehicles* (2012) (Transport, Roads and Maritime Services, 2012)
- *Restricted access vehicles route assessment guidelines* – Main Roads WA (2017) (Main Roads WA 2017)
- *South Australia heavy vehicle access framework* (2011) (Department for Transport, Energy and Infrastructure, 2011)

Furthermore, in 2016, the Australian Standard AS 5100 was reviewed and now includes a method to assess the structural integrity and capacity of bridges for a wide range of conditions. The methodology includes several steps, beginning with data collection, and incorporates an assessment of local conditions (Austroads 2017b).

The revised standards cover more than just the assessment of a bridge's capacity. They provide a method for assessing how a bridge performs under a range of traffic configurations, and specify how to monitor its ongoing performance. The standards also cover load ratings for several combinations, such as B-doubles and road trains.

Access certainty is a major obstacle to the success of the PBS scheme. This will need to be addressed if there is to be greater take-up of the scheme. An online review shows that the state and territory road authorities use the Austroads *Guide to the structural design of pavements* for designing new pavement structures and for assessing existing pavements (Austroads 2017a). Most also provide a supplement to the *Guide* that deals with specific local issues and administrative requirements. These additions should not preclude consistent infrastructure assessments being made across borders, particularly as the *Guide* caters for all variations of traffic, environment (temperature and rainfall), local natural and manufactured materials, and maintenance practices. In other words, the design of pavements takes out variations and the end result (except perhaps for very old pavements exceeding 50 years) aims for uniformity of performance in service.

Some further work by Austroads would be useful to examine the exact methodologies being used by individuals to assess infrastructure. This must include how risk is evaluated and what level of risk is seen as acceptable. If a national level of acceptable risk is not agreed, then there will always be inconsistencies between road managers as far as access is concerned. This would be akin to jurisdictions adopting different limits on blood-alcohol content to regulate drink-driving, as used to be the case.

3.6 Recommendations

Recommendation 1: That states and territories identify PBS networks for each access level, and the NHVR publish a National Notice for each by end of financial year 2020–21. This includes:

a. assessing priority freight routes in their jurisdiction for approval as a PBS network

b. identifying any infrastructure that falls within routes assessed under 1(a) that requires prescriptive limits (mass, dimension or other)

c. publishing approved routes, including the prescriptive limits applied to relevant sections, online on the National Key Freight Routes Map and NHVR Journey Planner

d. engaging with and assisting local governments within state and territory jurisdictions to assess and map their own access levels, to provide end-to-end key freight routes.

Recommendation 2: That Austroads and the NHVR:

a. compare the methodologies used to assess infrastructure across Australia (including pavements and bridges)

b. engage with road managers to design a nationally consistent guideline to assess infrastructure by the end of 2019

c. transition to a nationally consistent methodology by end of financial year 2019–20

d. produce relevant training materials for road managers to use the guidelines

e. consider an online database that makes infrastructure mass limits or loading limits publicly available.

4 Process changes

Key points

- Our analysis of potential process improvements for safety, innovation and sustainability are designed to complement and maximise the effectiveness of the recommendations related to access set out in Chapter 3.
- The related recommendations are designed to ensure that the PBS scheme remains relevant into the future and fit for purpose.

Increased take-up of the PBS scheme brings with it a positive social and environmental impact. We believe there are ways that we can maximise those positive impacts, and this chapter explains those further.

4.1 How the process currently works

Under the PBS scheme, there are 16 safety standards and four infrastructure standards which a PBS design application is assessed against. These comprise four categories:

1. Powertrain – specifies engine and acceleration requirements
2. High speed – stability, roll-over and rearward amplification
3. Low speed – swept path, frontal and rear swing requirements
4. Infrastructure – bridge and pavement requirements; maximum axle-group mass limits.

The PBS standards replace use of the Australian Design Rules and Heavy Vehicle (Mass, Dimension and Loading) National Regulation (HV(MDL)NR) to regulate heavy vehicles. The Australian Design Rules and HV(MDL)NR cap the maximum length, width, height, drawbar length, overhangs, axle groups and tow-coupling locations for heavy vehicles. The PBS scheme allows vehicles outside these limits to be constructed, using a performance-based approach.

A vehicle's design is assessed against the PBS standards using simulation software. Maximum permissible mass limits and access level decisions are made, based on the assessment of performance results. One of the principles underpinning the PBS scheme's development was that performance standards would be at a level at least equivalent to corresponding prescriptive schemes. The ability to run vehicles that are more productive, on a more extensive road network, would offset the costs of achieving and demonstrating compliance with the performance standards. The NTC's 2016 comparison of PBS standards and prescriptive heavy vehicle standards is available on the NTC website (NTC 2016c).

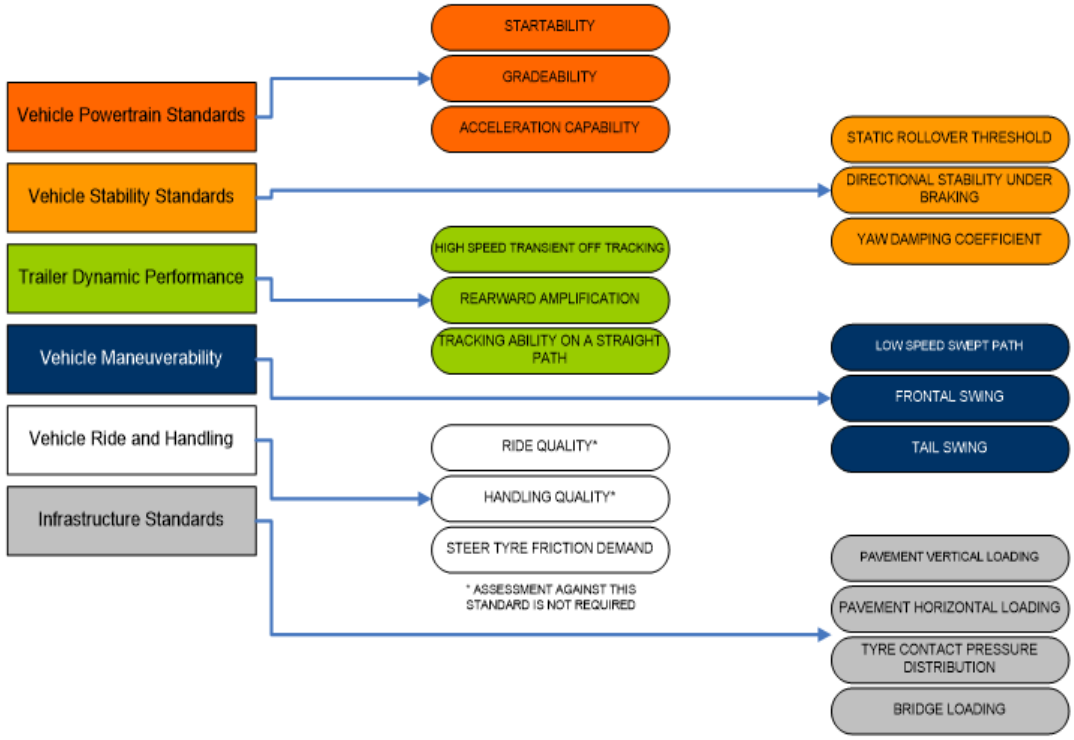
Industry and some government submissions to our 2017 discussion paper recognise both the need to update the PBS standards, and the need to educate decision-makers about the complexities and technicalities of the PBS scheme, to make their jobs easier and remove some of the fear around PBS vehicles.

4.2 Improvements identified

4.2.1 The Performance-Based Standards

It's now more than ten years since the Performance-Based Standards (the standards) were introduced. Over that time, technology has rapidly changed, and better features in safety and productivity have become readily available. Some of these innovations have been around for some years, like ABS, telematics, and electronic stability control and some are not yet proven such as automated vehicle guidance including light detection and ranging (LIDAR). The current standards are at Appendix A.3 and summarised in Figure 3:

Figure 3. The Performance-Based Standards in summary

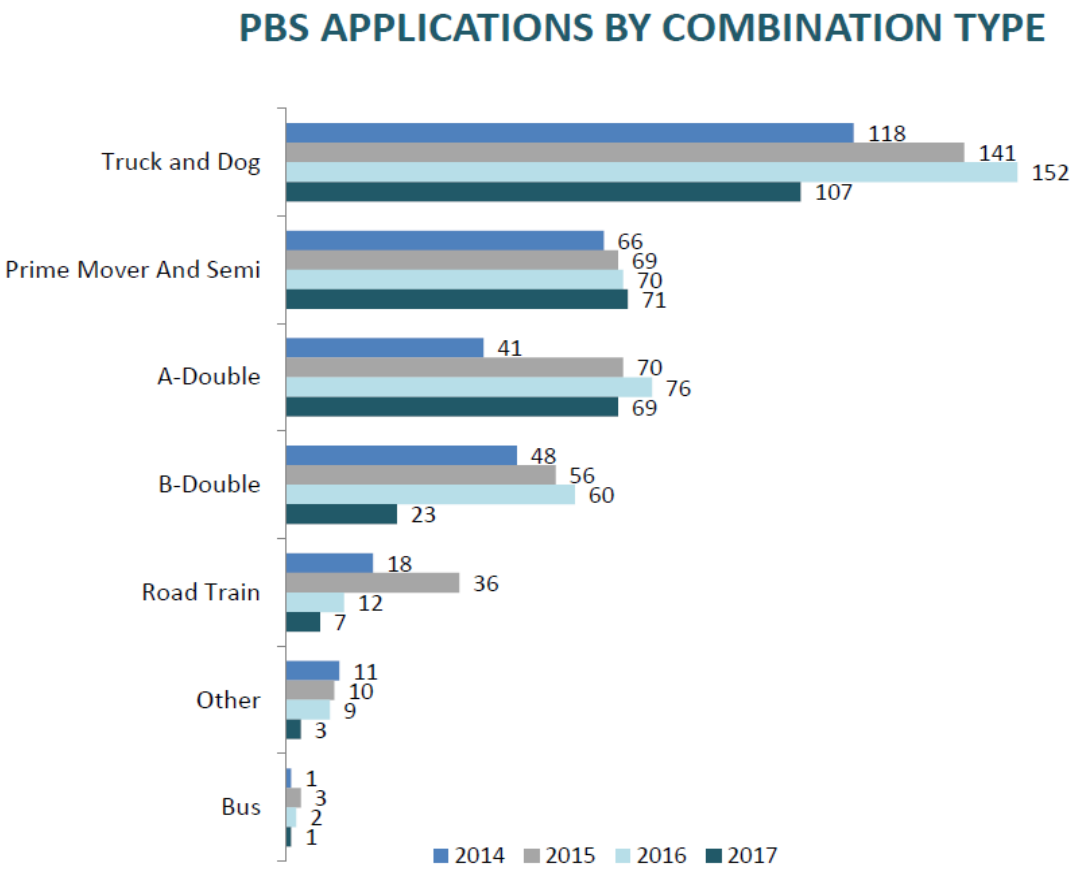


4.2.2 Transitioning popular models into prescriptive standards

This process is already underway. The NHVR published a PBS truck-and-dog Class 3 National Notice in 2016 that provides automatic access to complying PBS truck-and-dog combinations to the networks specified in the notice. The notice removed the need to obtain access permits, reducing the lead-time to obtain access to the road network.

Further, in March 2017, the NHVR developed a set of truck-and-dog trailer design specifications that the PRP deemed acceptable for all future complying design applications. Figure 4 shows the most common combinations that are currently seen in the PBS application process. The NHVR is continuing its work to transition popular models into prescriptive standards.

Figure 4. PBS applications by combination type, 2014–17



4.2.3 Education and communication

The PBS scheme has delivered excellent benefits, in terms of productivity for industry and a reduction in accidents. It has also reduced the cost of road maintenance and has encouraged industry to use less carbon-emitting fossil fuels. These results are not widely publicised, and the community is mostly unaware of the rigorous process each PBS application goes through before a vehicle is permitted to access the road network.

Throughout this process, we have learnt that decision-makers in local governments, and some key staff in state and territory road authorities, are also not fully informed about the purpose and benefits of the scheme. This, understandably, could be causing resistance to, or concern about, allowing PBS vehicles access to roads in their jurisdictions.

4.3 Options from the discussion paper

4.3.1 Performance-Based Standards

Review the PBS framework and standards to improve productivity, safety and the precision of matching vehicles to roads. The task includes the following:

- Review current PBS standards to identify changes that could further improve the safety of PBS vehicles. The task is to assess if safety can be achieved or improved by use of new technologies, and include their optional use as deemed-to-comply provisions in lieu of case-by-case performance modelling or assessment. This approach will enable the future exploitation of technological developments.

- Review how new PBS applications report the performance results of vehicle designs. Identify how reporting can be restructured to better optimise vehicles to the freight task and the roads they intend to use.
- Amend the HVNL and supporting legislation to expand the list of Australian Design Rules and HV(MDL)NR from which PBS vehicles can be exempted, where it can be shown that safety performance will not suffer as a result.
- Develop a permanent Pavement Vertical-Loading Standard to replace the current interim standard. Consider the framework delivered as part of the Austroads project AP-R541-17.
- Review recommendations from relevant Austroads publications and prioritise these for inclusion in the forward work program.

4.3.2 Transitioning popular models into prescriptive standards

The option put forward in the 2017 discussion paper was to enable the NHVR to assess and approve popular and similar PBS design applications without consulting with the PRP. This improvement will speed up the process, since about 90 per cent of PBS design applications received are for truck-and-trailer, semi-trailer, B-double and A-double combinations. By allowing the NHVR to decide PBS design applications for popular vehicle types, the PRP can focus on innovative vehicle design concepts, and redirect its energies towards resolving access and other strategic issues that hinder heavy vehicle productivity.

4.3.3 Education and communication

The NTC focused on the need to educate local government road managers about the PBS scheme in our 2017 discussion paper (NTC 2017). Throughout our consultation process, it has become evident that this needs to be more widely applied to state and territory road managers and the wider Australian community. Online modules for road managers would allow better continuation of corporate knowledge across Australia and assist with a common understanding of the benefits of the PBS scheme into the future. It will also provide decision-makers with assistance to make informed access decisions related to PBS vehicles.

This will also provide local government decision-makers with tools to make informed access decisions related to PBS vehicles and publicise the benefits of the revised PBS standards and the online toolkit widely.

4.4 Consultation and feedback

All but one state and territory respondent supported revising the PBS standards. There was also support from industry for this to occur. There was clear support to make the standards more flexible to deal with innovation. The feedback also suggested that some of the current standards could be seen as prescriptive, in that they focus on dimensions, as opposed to being performance-based.

One jurisdiction is concerned that a seven-yearly review won't allow for automatic, timely updates to the standards to cater for new technology. It also believes that a more fundamental review of the PBS standards is needed, to ensure the scheme meets its objectives and remains world's best practice.

Respondents requested that other issues relevant to the PBS scheme, not discussed in the previous paper, be considered. These issues included the broad environmental impact, the impact on local amenity, the extent of productivity gains, and the need to deal with future technology such as automated vehicles. The need for standards governing the use of tyres was also raised.

The NTC is also aware that the bus industry believes that any review of standards should take into account the nature and benefit of bus operations.

The NTC considers that some aspects of some of the standards, and/or the methods by which applicants and designers can achieve the performance relevant to these standards, need to be reviewed. A review of standards should address:

- the need to ensure that the standards are flexible enough to cater for future technology not yet developed
- the management of tyres in PBS assessments and ongoing vehicle operations
- whether there is a continued need for four PBS network levels
- whether it is practical to assess a vehicle's impact on local amenity, public health and the environment. These matters may be better addressed in access guidelines.

We have included a detailed discussion around the issues we believe should be considered as part of a review at Appendix A.2. We believe that the standards can be revised in such a way to address general concerns and allow for technological improvements to be catered for as they develop.

With regard to common PBS vehicle designs, most stakeholders agreed it was inefficient to continue assessing the same popular vehicles several times over. A procedure to transition popular models to the prescriptive standards was widely supported. As discussed above, the NHVR has already achieved much in this regard. The pre-approvals for six-axle and seven-axle truck-and-dog combinations, B-doubles, semi-trailers and A-doubles impacts about 85 to 90 per cent of PBS design applications. Total turnaround time has been reduced to a maximum of three days for these applications, compared to an average of 26 business days previously. Given the continued work in this area, a recommendation to support this work was not necessary.

There is general support for increasing awareness of the benefits of the PBS scheme among the Australian community. Industry and some government submissions also recognised the need to educate decision-makers about the complexities and technicalities of the PBS scheme, to make their jobs easier and remove some of the fear around PBS vehicles.

4.4.1 Recommendations

Recommendation 3: That the NHVR review and revise the PBS standards by the end of financial year 2018–19 and every seven years thereafter. The initial review should include (but not be limited to) consideration of:

a. the effects of new technology, and catering to future technology
b. the management of tyres in PBS assessments and ongoing vehicle operations
c. whether there is a continued need for four PBS levels
d. the best way to assess a vehicle's impact on local amenity, public health and the environment, or whether these matters should be left to access guidelines.

Recommendation 4: That the NHVR develop and lead a comprehensive and ongoing communications plan as soon as resources permit, with the support of the states and territories, that:

a. publicises the benefits of the PBS scheme

b. provides information about:

- the background to the Performance-Based Standards
- their relationship to prescriptive standards
- application and approval processes
- National Notices for PBS networks
- route assessment guidelines and tools.

5 Conclusion

The National Transport Commission (NTC) evaluated the PBS scheme to identify:

- whether it is meeting its original policy intent
- whether the scheme's design and associated approval processes contain barriers to operating as an effective marketplace
- how access decisions affect its effectiveness
- whether there are modifications that could improve its effectiveness and efficiency.

This policy paper, *Reforming the PBS scheme*, has presented the findings of our evaluation and outlined our recommendations to improve the effectiveness and efficiency of the scheme.

We have found the benefits of the PBS scheme to be clear. In our 2017 discussion paper, we demonstrated that the PBS scheme delivers:

- increased productivity by 15 to 30 per cent, depending on the freight being carried
- less impact on road assets compared with the equivalent use of prescriptive vehicles, with $65 million saved in road maintenance expenses in 2016
- fewer vehicles on the road
- savings of an estimated 94 million litres of fuel in 2016, which in turn reduced the CO_2 emissions by about 250,000 tonnes.

The PBS scheme also encourages growth in the specialised vehicle manufacturing sector and continued investment in Australian innovation.

However, despite these benefits, we have not met the targets and estimates set out in the 2011 PBS regulatory impact statement. The single biggest barrier to take-up of the PBS scheme is industry's uncertainty as to whether a vehicle will be approved by road managers to access the relevant route. This is preventing the full realisation of the scheme's benefits.

To overcome these barriers, we have made four recommendations, which focus on improving PBS vehicles' access to Australia's road networks and improving the processes that support PBS applications. Recommendations 1 and 2, discussed in Chapter 3, are designed to provide greater access certainty to the proponents of PBS vehicles. These are designed to address the single biggest barrier to take-up of the PBS scheme: industry's uncertainty as to whether a vehicle will be approved to access the relevant route. Recommendations 3 and 4, discussed in Chapter 4, are designed to improve the PBS scheme's processes and the understanding of the PBS scheme and its benefits.

The results of this evaluation have informed recommendations put forward to the Transport and Infrastructure Council.

Appendix A Additional analysis

A.1 Benefits of the Performance-Based Standards scheme

Key points

- The PBS scheme offers significant benefits to industry, governments and the public.
- Having more productive vehicles means there are fewer vehicles on the road.
- Fewer vehicles means less congestion.
- Encouraging newer vehicles that incorporate new technology improves driver safety.
- Newer vehicles with the latest technology are usually quieter and less polluting.
- New technology is making it easier for businesses to compete on an international scale.

Figure 5. The estimated benefits if the PBS scheme continues to 2030

Source: *Austroads 2014*

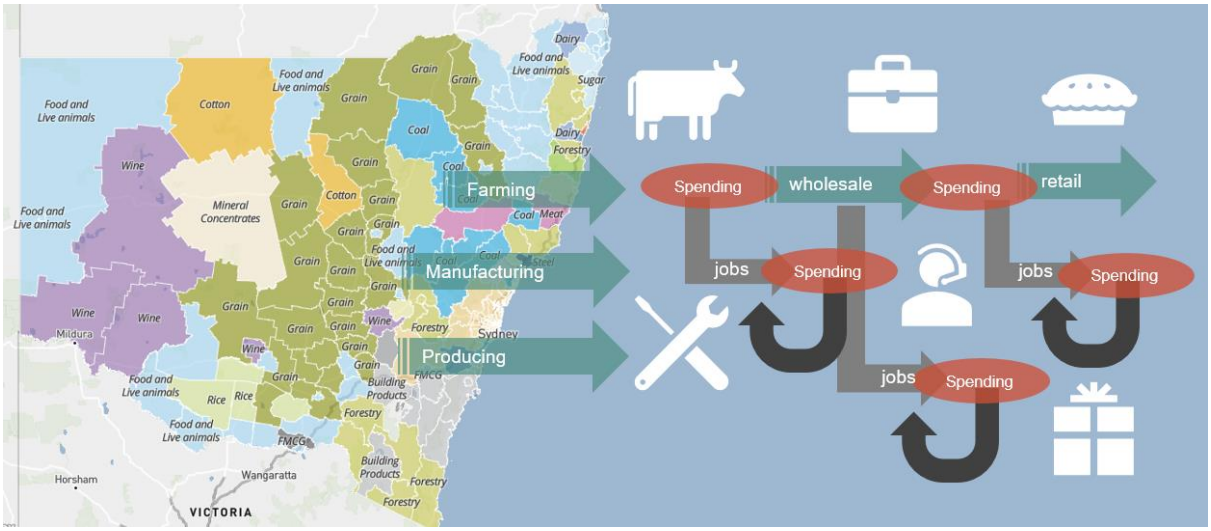
Productivity

The efficiency of Australia's freight is directly linked to business costs and the ability to compete on a global scale. This in turn determines which services a business can offer, or which goods it can manufacture and the number of employees it can hire. This in turn impacts on a community's quality of living.

'Investment in our transport infrastructure, urban and regional, is needed so that people and goods can move from one point to another in an efficient way … investment in urban transport networks is important – directly shaping how well our cities function. Well-targeted and efficient infrastructure investment in our cities and towns, complemented by integrated infrastructure planning, can offer potentially high economic and social benefits.' (Murphy, 2010)

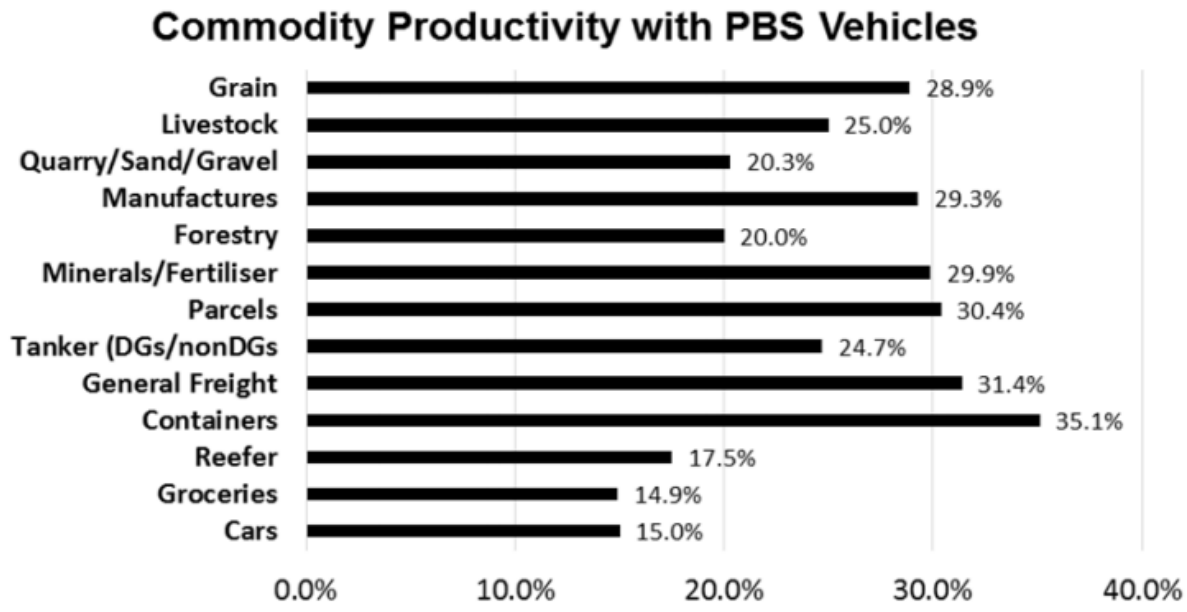
Over the past five years there has been a noticeable shift towards larger articulated vehicles. This has been driven by the increased efficiencies possible. However, using these larger vehicles in the capital cities and regional hubs can be hindered by poorly planned developments that do not account for freight deliveries, older infrastructure or refusal of access permits. In these cases, operators often rely on light commercial vehicles, despite the greater cost involved in transferring loads from one vehicle to another and the higher running costs overall. It also further compounds urban congestion challenges.

Figure 6. Flow-on effect of revenue and spending on goods and services



The PBS scheme has so far allowed operators to carry commodities with 15 to 30 per cent greater productivity (NTC, 2017). It allows businesses to move greater volumes of freight, for the same cost. This increased productivity reduces the number of trips and vehicles needed, allows more efficient loading and unloading, reduces tyre wear, and reduces other business costs, such as insurance and fuel.

Figure 7. Average productivity gains by commodity with PBS vehicles



Source: NTC, 2016b

The operating costs used in the models include labour, fuel, oil, vehicle maintenance and tyres. They are based on a variety of sources, including the HDM-4 model (Roper 2001) and the operator survey undertaken for the case studies in this project. They are:

Six-axle articulated – $910 per thousand km

Seven-axle articulated – $1,060 per thousand km

B-double – $1,500 per thousand km

B-triple – $2,000 per thousand km

Triple road train – $2,000 per thousand km

AB-triple – $2,000 per thousand km (Austroads, 2003)

> *'The productivity benefits of HPVs [higher-productivity vehicles] are significantly higher than was first thought, even three years ago. The current estimates for productivity savings will see HPVs performing the articulated freight task with 37 per cent fewer trucks with 37 per cent less kilometres, and the rigid truck task being undertaken with 26 per cent less vehicles performing 23 per cent less kilometres … The HPV initiative is poised to conservatively deliver $12.6 billion in real benefits to Australia by 2030 through $6.9 billion in discounted direct benefits and $5.7 billion in indirect discounted flow-on economic benefits.' (Austroads, 2014)*

Table 2. Higher-productivity vehicles direct financial benefits by state 2011-30 ($billion)

	NSW	Vic	Qld	SA	WA	TAS	NT	ACT	Total
Nominal ($b)	2.36	3.00	2.44	0.61	0.89	0.26	0.06	0.04	9.67
Real Discounted ($b)	1.68	2.13	1.73	0.44	0.64	0.18	0.05	0.03	6.88

Source: ILI estimates

Table 3. Estimated total indirect benefits of HPVs 2011–30

Benefit Segment	Realistic Scenario 2 Nominal Benefit ($m)	Realistic Scenario 2 Discounted Benefit ($m)
Fatalities Saving (Value)	218	156
Insurance savings $m	89	63
Value of CO_2 savings $m	200	142
HPV Operating Savings $m	9,164	6,529
Total HPV Direct Benefits $m	9,671	6,890
PBS Flow-on benefits $m	7,678	5,692
Total ($m)	17,349	12,582

Source ILI Estimates

Safety

Transport-related injuries are estimated to cost $6.6 billion per annum, including loss of earnings, family and community losses, pain and suffering, vehicle damage and insurance administration. Road transport generates the majority of accidents and the highest costs of all transport modes in Australia (ABS, 1997).

The road toll continues to be a major concern for the community. It also directly impacts on business and its related costs. The freight and trucking industry recognises the link between productivity and safety, and is beginning to take on more sustainable practices. Investment in driver safety technology reduces fatigue and encourages take-up in employment. This reduces expensive turnover costs, workers' compensation, sick leave and mental health leave.

The PBS scheme offers industry a way to invest in new technology, such as ABS and telematics, that better protects its drivers and assets. The PBS scheme offers industry the chance to trial this technology before it is regulated into prescriptive standards. While we can't know what technology will be developed in the future, an efficient PBS scheme means we can prepare for it now.

Table 4. Accident rates per 100 million km for higher-productivity vehicles vs conventional vehicles, for major and serious accidents 2013

Accident Type by Severity Rate per 100mK		Minor	Moderate	Serious	Major	Total Accidents	Total Serious & Major Accidents
Conventional Truck	Articulated (69%)	21	22	16	13	72	29
	Rigid Truck (31%)	42	34	19	7	102	26
Conventional incident Weighted Total		27.5	25.7	16.9	11.1	81.3	28
HPV s	Articulated (69%)	8	2	2	5	18	7
	Rigid Truck (31%)	20	26	4	2	53	6
Observed HPV incident weighted Total		11.7	9.4	2.6	4.1	27.9	6.7
Total HPV Incident Savings (Rate per 100mk)		15.8	16.3	14.3	7.1	53.5	21.4
Observed HPV Weighted Incident Savings %I		57%	63%	85%	63%	66%	76%

Source: Derived from NTARC data and ILI operator survey 2013.

Table 5. Fatal accident rates per 100 million km travelled, by truck configuration

Truck Type	Fatalities per 100m kilometre (Sept 2012)
Rigid Trucks	1.0
Articulated	1.8
HPVs [1].	0.3

Source: BITRE (Pers Comm)
Note 1: ILI Operator Survey calculation

The economy

The movement of freight affects people in almost all walks of life in Australia, from the manufacturer of parts to the consumer at home. Between these two ends of the logistics chain lies a mix of stakeholders with competing interests, including the businesses investing time and money, their employees, their suppliers, their clients and service providers. Also there is the community purchasing goods, and benefiting from employment and local investment.

The freight industry accounts for around 10 per cent of Australia's gross domestic product. It provides a crucial link between international economies and local services. Growing demand for domestic and international products, as well as the downturn in domestic manufacturing, has meant the freight task continues to grow (DIRD, 2017).

Road freight currently employs around 7,770 people, with a further 1.48 million employed in either transport, postal or warehousing. It accounts for around 30 per cent of Australia's national freight task, and continues to grow at a rate of about 3.6 per cent every year. The road freight industry is saturated with small businesses – mostly owner-operators. The majority run just one truck. Fewer than 0.5 per cent run more than 100 trucks (NTC, 2016).

More than half of all freight is now carried via rail. However, road freight continues to remain critical, because of the disconnect between rail hubs and production communities. The missing infrastructure link between ports and rail lines can make road freight the only viable choice for some importers and exporters. Further, the demand for fast delivery times (online purchases) and point-to-point freight (where goods are moved through a supply chain) are also reasons why road freight is favoured.

Figure 8. Road freight in Australia

Source: *Austroads 2014.*

The PBS scheme has a positive effect on the economy, in terms of investment in manufacturing, purchasing of vehicles, and offering more innovative freight services. It also saves money, by reducing the cost of accidents, and reducing the environmental impact.

At the very least, higher-productivity vehicles have been estimated to save industry and government more than $8 billion over 20 years. At best, the savings are more than $20 billion:

Table 6. Total estimated financial benefits of higher-productivity vehicles, 2011–30

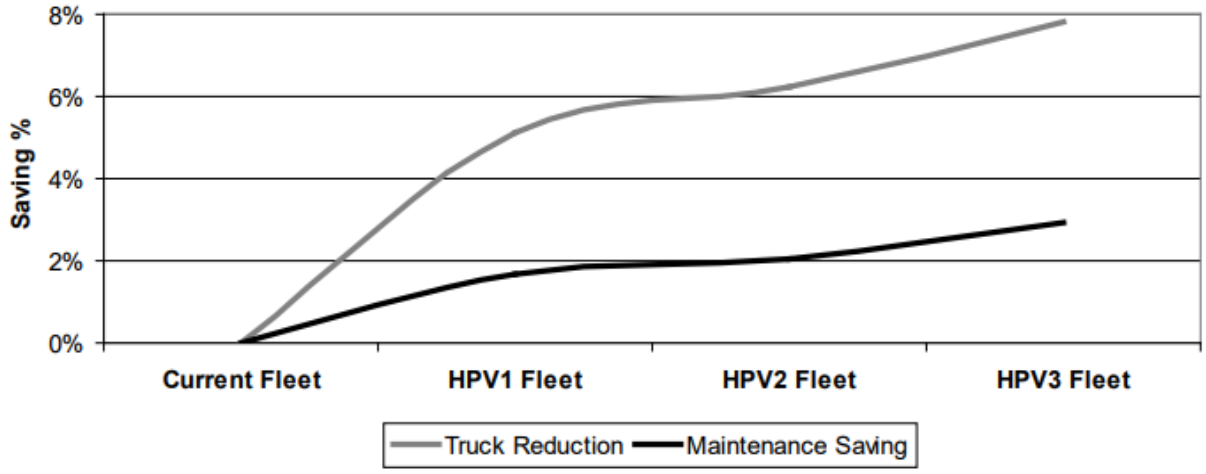
Benefit Segment ($m)	Scenario 1 High nominal ($m)	Scenario 1 High discounted ($m)	Scenario 2 Medium nominal ($m)	Scenario 2 Medium discounted ($m)	Scenario 3 Low nominal ($m)	Scenario 3 Low discounted ($m)
Value of Fatality savings	264	189	218	156	143	103
Insurance savings	107	76	89	63	59	42
Value of CO2 savings	242	172	200	142	159	113
HPV Operating Savings	11,101	8,231	9,164	6,529	6,028	4,470
Total Direct Benefits	11,714	8,668	9,671	6,890	6,389	4,728
HPV Flow-on benefits	9,224	6,839	7,678	5,692	4,971	3,686
Total	20,938	15,507	17,349	12,582	11,360	8,414

Source : ILI Estimates

Road maintenance

Austroads investigated the performance of higher-productivity vehicles in 2014, including their impact on pavement wear. It found that the more productive a vehicle, generally the less damage it caused. This was mainly due to the reduction in the number of vehicles needed to complete the same task. However, there is also a small but noticeable performance improvement in each higher-productivity vehicle. This is related to better design and more evenly spaced and better-controlled axle-weight.

Figure 9. Reductions in total routine and periodic road maintenance



> *'It should be noted that axle groups for HPV combinations are, most often, no heavier than conventional vehicle axle groups under HML ... it can be argued that total axle group kilometres are lower for HPV fleets when compared with a conventional fleet.' (Austroads, 2014)*

Environment

In terms of a vehicle's impact on the environment, the PBS scheme performs better than the equivalent use of conventional vehicles. This is mainly due to the reduction in the number of vehicles needed for the same freight task. This in turn reduces the total volume of fuel used and reduces road congestion. Stationary traffic is one of the most polluting forms.

> *'The largest environmental benefit arises from the Carbon Dioxide savings brought about through savings in operational kilometres. These CO_2 emissions savings are in the order of $142 million, on a carbon price basis. HPVs are also expected operationally to save 5.9 million tonnes of diesel by 2030.' (Austroads, 2014)*

Table 7. Fuel savings by using higher-productivity vehicles

Fuel Metric	High Productivity Scenario	Medium Productivity Scenario	Low Productivity Scenario
Fuel Savings (million litres)	2699	2228	1466
Fuel saving (million tonnes)	7.233	5.971	3.928
CO_2 Carbon saving ($ million)	$166.4	$137.4	$90.4

Source ILI Calculations

A.3 The current Performance-Based Standards

Startability		
Ability to commence forward motion on specified grade	Level 1	At least 15%
	Level 2	At least 12%
	Level 3	At least 10%
	Level 4	At least 5%
Gradeability		
Ability to maintain forward motion on specified grade; and achieve a minimum speed on 1% grade	Level 1	At least 20%
	Level 2	At least 15%
	Level 3	At least 12%
	Level 4	At least 8%
Acceleration Capability		
Ability to accelerate either from rest or to increase speed on a road (seconds taken to travel 100m)	Level 1	20
	Level 2	23
	Level 3	26
	Level 4	29
Tracking Ability on a Straight Path		
The total swept width while travelling on a straight path	Level 1	≤2.9m
	Level 2	≤3.0m
	Level 3	≤3.1m
	Level 4	≤3.3m
Low Speed Swept Path		
The maximum width of the swept path in a prescribed 90° low speed turn	Level 1	≤7.4m
	Level 2	≤8.7m
	Level 3	≤10.6m
	Level 4	≤13.7m
Frontal Swing		
Maximum lateral outswing of the front outside corner of the prime mover and trailer	Level 1	For rigid trucks and prime movers ≤0.7 m, for buses & coaches ≤1.5m
	Level 2	
	Level 3	
	Level 4	
Tail Swing		
Maximum lateral out-swing of the outside rear corner of the truck or trailer as the turn commences	Level 1	≤0.4m
	Level 2	
	Level 3	
	Level 4	
Steer Tyre Friction Demand		
Maximum steer tyre friction in a prescribed low speed turn	Level 1	≤80% of the maximum available tyre/road friction limit
	Level 2	
	Level 3	
	Level 4	
Static Rollover Threshold		
The steady-state level of lateral acceleration that a vehicle can sustain during turning without rolling over	Level 1	≤0.35g or 0.4g for road tankers hauling dangerous goods, buses and coaches
	Level 2	
	Level 3	
	Level 4	

Rearward Amplification		
Measures the 'whip crack' effect of a lane change manoeuvre (static rollover threshold of the rearmost unit or roll-coupled set of units)	Level 1	≤5.7 times
	Level 2	
	Level 3	
	Level 4	
High Speed Transient Offtracking		
The lateral distance that the last-axle on the rear trailer tracks outside the path of the steer axle in a sudden evasive manoeuvre	Level 1	≤0.6m
	Level 2	≤0.8m
	Level 3	≤1.0m
	Level 4	≤1.2m
Yaw Damping Coefficient		
The rate of decay of the "sway" from the rearmost trailer after a single pulse steering movement.	Level 1	≥0.15
	Level 2	
	Level 3	
	Level 4	
Bridge Loading		
The minimum distance, L (metres), between the extreme axles of any two axle groups—for a given total gross mass, M (tonnes), on the axles within that distance	Access to the PBS Level 1 road network M = 3L + 12.5 for M <= 42.5 t; and M = L + 32.5 for M >= 42.5 t	
	Access to the PBS Level 2 road network M = 3L + 12.5 for M <= 46.5 t; and M =1.5L + 29.5 for M >= 46.5 t	
	Access to the PBS Level 3 and Level 4 road networks M = 3L + 12.5 for all M	
Tyre Contact Area		
Degree to which tyre contact pressure is distributed over the pavement	Level 1	Same as prescriptive
	Level 2	
	Level 3	
	Level 4	

Pavement Vertical Loading			
Degree to which vertical forces are applied to the pavement (gross mass on 1 axle or 2 axles)	Level 1	≥35t	≥70t
	Level 2	≥45t	≥85t
	Level 3	≥45t	≥110t
	Level 4	≥45t	≥150t
Pavement Horizontal Loading			
Degree to which horizontal forces are applied to the pavement	Level 1	≥35t	≥70t
	Level 2	≥45t	≥85t
	Level 3	≥45t	≥110t
	Level 4	≥45t	≥150t

Ride quality (driver comfort)			
The effect of whole-body vibration on heavy-vehicle drivers (not implemented to date)	Level 1	For rigid trucks and prime-movers ≤ 0.7 m For buses and coaches ≤ 1.5 m	
	Level 2		
	Level 3		
	Level 4		
Overtaking provision			
Maximum vehicle lengths for each road class ('A' or 'B') (not implemented to date)	Level 1	≤ 20 m	≤ 20 m
	Level 2	≤ 26 m	26 < length ≤ 30 m
	Level 3	≤ 36.5 m	36.5 < length ≤ 42 m
	Level 4	≤ 53.5 m	53.5 < length ≤ 60 m
Handling quality (understeer/oversteer)			
Adequate steering control over a wide range of turn conditions (not implemented to date)	Level 1		
	Level 2		
	Level 3		
	Level 4		
Directional stability under braking			
Manage safety risk of vehicle instability when braking in a turn or on pavement cross slopes	A vehicle must not exhibit gross wheel lock-up behaviour in any loading condition and must remain in a straight lane of width equal to that specified in the standard 'Tracking ability on a straight path' for the corresponding level of operation when it is braked from 60 km/h to achieve the assessment deceleration level on a high-friction surface roadway.		

A.4 PBS pre-approvals – a snapshot

This is a snapshot of the existing PBS pre-approved routes. There are a total of 411 lines on the full spreadsheet, demonstrating the complexity and bespoke nature of the current access arrangements for PBS vehicles. Recommendation 1 is aimed to automate access and unlock the related productivity benefits.

RM code	Road manager (RM)	RM type	Class	Vehicle type	Vehicle details	Route	Start date	End date	Case	Comments	Approval	Date entered/ modified
NSW272	Campbelltown City Council	LGA	PBS	Level 1	Semi-trailer level 1	Route ID 1QM1-6 Version 1 – Williamson Rd, Ingleburn	21/07/2014		8108		Pending gazette request	21/07/2014
QLD21	Brisbane City Council	LGA	PBS	Level 2A	Level 2	**Route ID SI9-8 Version 1 –** Gosport St, Aquarium St	23/04/2014		Email		Pending gazette request	
SA111	Ceduna District Council	LGA	PBS	Level 4A	A-triple road train	**Route ID 672N-4 Version 3 –** Schwarz St, Goode Rd, Murat Tce, Thevenard Rd, Davison St, Bergmann Dr	01/04/2015		17971		Pending gazette request	27/05/2015
VIC139	Maroondah City Council	LGA	PBS	Level 2A	GML B-double	**Route ID 664B-5 Version 1 –** Colchester Rd	02/04/2015		17851		Pre-approval	27/05/2015
RMSA1	DPTI	RA	PBS	Level 2A	PBS truck & 6-axle dog (Tier 1)	Intersection of Chalk Hill Rd and Main Rd, McLaren Vale (right turn out from Chalk Hill Rd into Main St ONLY)	14/03/2017		22942	12 months maximum permit length	Pre-approval	21/03/2017

RM code	Road manager (RM)	RM type	Class	Vehicle type	Vehicle details	Route	Start date	End date	Case	Comments	Approval	Date entered/ modified
VIC153	Horsham Rural City Council	LGA	PBS	Level 2B	PBS A-double @ 68.5 tonnes	**Route ID CND5-2 Version 4 –** Plumpton Rd (No access past entrance to 88 Stawell Rd (Western Highway)), Golf Course Rd	30/03/2017		61384		Pending gazette request	13/06/2017
NSW275	Liverpool City Council	LGA	PBS	Level 1	PBS 3-axle pm quad semi-trailer @ 50.5 tonnes (Tier 3)	**Route ID G5EY-0 Version 3 –** Burando Rd, Yato Rd, Bernera Rd (between Yato Rd and Westlink M7)	31/03/2017	31/03/2020	62985		Pending gazette request	13/06/2017
SA85	Gawler Town Council	LGA	PBS	Level 2A	PBS 3-axle truck & 3-axle dog @ 49.5 tonnes	**Route ID: 8S3Z-5 Version 1 –** Tiver Rd, Evanston South (from Main North Rd to DMC concrete plant)	11/04/2017		63748		Pending gazette request	13/06/2017
RMACT1	ACT	RA	PBS	CAB	PBS bus (4 × 2) (12.5 m length) @ 16 tonnes	**Access to PBS Level 1 network in ACT**	08/08/2017		71152		Pending gazette request	11/08/2017

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