Access to PBS mass limits for truck and trailer combinations
Discussion Paper
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National Transport Commission

Access to PBS mass limits for truck and trailer combinations: Discussion Paper

Report prepared by: Sri Kannan
Title: Access to PBS mass limits for truck and trailer combinations

Type of report: Discussion paper

Purpose: For public consultation

Abstract: The paper identifies and discusses options under which six and seven-axle truck and trailer vehicle combinations may operate at mass limits currently offered under the PBS scheme without the need for a PBS assessment. It outlines the nature of the project, the risks and benefits of uptake and potential roles for government/NHVR. The paper addresses project options, industry impact, risks, timeline and the benefits. The paper is based on stakeholder engagement with the states and territories, industry and desktop research.

Submission details: Submissions will be accepted until 28 October 2014. They can be submitted online at www.ntc.gov.au or by post to:

National Transport Commission
L15/628 Bourke Street
MELBOURNE VIC 3000

Key words: Performance Based Standards, PBS, technology, compliance and enforcement, PBS Assessment, certification

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How to make a submission to the NTC

Who can make a submission?
Any individual or organisation can make a submission to the National Transport Commission (NTC).

How to submit
To make an online submission please visit the NTC homepage (www.ntc.gov.au) and select ‘Submissions’.
Alternatively, you can post your comments to: National Transport Commission, Level 15/628 Bourke Street, MELBOURNE VIC 3000.
Where possible, you should provide evidence to support your views, such as data and documentation.

Publication of submissions
Unless submissions clearly request otherwise, all submissions will be published online. Submissions that contain defamatory or offensive content will not be published. The Freedom of Information Act 1982 (Cwlth) applies to the NTC.
Foreword

The National Transport Commission (NTC) is an independent body established under the National Transport Commission Act 2003 and Inter-governmental Agreement for Regulatory and Operational Reform in Road, Rail and Intermodal Transport. It has an ongoing responsibility to develop, monitor and maintain uniform or nationally consistent regulatory and operational reforms relating to road, rail and intermodal transport.

The Performance Based Standards (PBS) scheme was an NTC initiative aimed at improving the safety and productivity of the road transport industry through innovative truck and bus design.

The PBS scheme takes into consideration the dynamic and static behaviour of heavy vehicles as well as their impacts on infrastructure. Heavy vehicles that meet or exceed the standards are offered dimensional and/or mass concessions beyond those of prescriptive combinations.

The PBS scheme has operated successfully for over five years and to date has involved more than 400 vehicle design applications. More than 1,300 vehicle combinations have been approved during this time.

The increasing use of the PBS scheme is a result of the ongoing drive of the Australian road freight industry to develop and adopt innovation. In more recent years, this has been encouraged by state and territory officials who understand the need to foster innovation in the interests of the nation's economic wellbeing.

With the introduction of the Heavy Vehicle National Law (HVNL) in February 2014, heavy vehicles approved under the PBS scheme have as-of-right access to the appropriate road networks.

Vehicle types approved by the PBS scheme include truck and trailer combinations, A-doubles, B-doubles, semi-trailers and buses. Of these, truck and trailer combinations have formed the majority of PBS applications, representing close to 63 percent of all PBS design applications.

PBS-approved truck and trailer vehicles now account for approximately 3.5 per cent of six and seven-axle truck and trailer combinations.

While the growth in the number of PBS applications shows strong industry interest in the scheme, there is also strong interest in streamlining access to six and seven-axle truck and trailer vehicle combinations that meet equivalent performance standards. This paper considers how operators can be given greater access to vehicles and combinations that enhance productivity without compromising safety.

Feedback on identified issues and proposed options is invited to ensure this important national project delivers improvements in road freight productivity.

I acknowledge the work of NTC staff in developing this discussion paper, particularly Sri Kannan.

David Anderson PSM
Chairman
Executive summary

This discussion paper examines if the efficiencies delivered by the Heavy Vehicle National Law (HVNL) can be supplemented by a ‘prescriptive’ design for six or seven-axle truck and trailer combinations that meets the safety and infrastructure standards of the Performance Based Standards (PBS) scheme. This may allow a number of truck and trailer combinations not currently registered under PBS, but which meet PBS standards, to travel with increased mass limits.

This would give access to PBS-equivalent productivity benefits without the administrative time and costs currently incurred by industry and government. For this to occur it is necessary to establish that a prescriptive design can be developed without compromising vehicle safety and performance.

The PBS scheme has an important role in helping road authorities to manage heavy vehicle access to Australia’s road networks. The PBS scheme has now been integrated into the HVNL.

Designing, developing, assessing and constructing new high-productivity vehicles to comply with PBS incurs significant cost and time. PBS-compliant truck-trailer combinations can operate with up to 20 per cent higher payloads than conventional truck and trailer combinations. However, the time, cost and complexity of obtaining access to the road network through the PBS process can dissuade some operators from using the scheme and high-productivity vehicles.

Some of the barriers to participation in the PBS scheme have been resolved with the introduction of the HVNL. The National Heavy Vehicle Regulator (NHVR) is able to process PBS applications. Some administrative improvements have been instituted and participating states and territories can better advise where the PBS vehicles can have access to their road networks. The development of truck and dog trailer PBS-approved blueprints by manufacturers has made it easy for operators to purchase ‘off the shelf’ six and seven-axle truck and trailer combinations.

The PBS is seen as a means of promoting innovation in the Australian road transport industry. For example, it is a means of identifying new vehicle designs that could be translated into prescriptive regulations; research shows that around 63 per cent of all PBS vehicle design applications and approvals are for truck and trailer combinations.

Feedback from this paper and information gathered directly from stakeholders will be used to help to develop policy recommendations for states and territories to consider.
Summary of questions for submissions

Several specific questions are posed through this report. For the convenience of readers who may wish to make a submission, these questions are summarised here, together with some additional questions to assist us in analysing the responses we receive.

To make an online submission please visit the NTC homepage (www.ntc.gov.au) and select ‘Submission’.

Alternatively, you can post your comments to: National Transport Commission, Level 15/628 Bourke Street, MELBOURNE VIC 3000.

Background Questions

Are you a:

a. trailer manufacturer
b. truck driver/operator
c. representative of a road transport organisation – if so, which one?
d. representative of government and/or regulator
e. other (please state)

- If you are a truck driver do you operate a PBS approved truck and dog combination?
- If you are a trailer manufacturer do you use existing NTC blueprints?

Questions specifically identified in the report.

1. How do the improvements to the PBS scheme under the NHVR affect you as a manufacturer or an operator? (See page 5)

2. What further improvements to the NHVR-led PBS scheme are necessary to improve or expedite the approvals process for truck and dog combinations? (See page 6)

3. What aspects of the current PBS scheme have attracted you to participate? (See page 10)

4. Of the options presented here, which do you prefer and why? (See page 14)
   a. Are there any options that have not been considered in this paper, but you feel deserve merit? If so, please provide details.
   b. Of the options presented here, are there any you feel strongly against? If so, why?

5. Have you used any of the NTC released PBS approved blueprints? If so, which and to what degree of success? (See page 18)

6. What effect do you expect the release of NTC-developed blueprints to have on the industry? Please provide a detailed response. (See page 18)

7. Does the use of available manufacturer blueprints meet the needs of operators seeking access to PBS mass limits? (See page 18)
8. If, as a manufacturer, you do not have your own PBS blueprints, how would the release of government developed blueprints/specification envelopes influence your decision to pursue the PBS truck and dog market? (An envelope is envisaged as a document that contains a set of requirements in drawings and text form that a vehicle will be required to comply with so that it operates with increased mass limits.) (See page 22)

9. If, as a manufacturer, you already have your own PBS blueprints, how would the release of government developed blueprints/specification envelopes impact on or influence your business? (See page 22)

10. If the NTC develops these specification envelopes for commercial use, do you think this will affect innovation in the design and manufacture of truck and trailer combinations? (See page 22)

11. Are the specification envelopes developed in this discussion paper practical and easy to read and adopt, from a manufacturer/operator as well as a state and territory point of view? (See page 22)

12. Are the assumptions on which the envelopes are based reasonable? Do any of these assumptions need to be modified before such an envelope can be implemented? (See page 22)

13. The complexity of PBS blueprints means they can be difficult to add to regulations. Do you expect any of the options presented in this paper to improve access to higher mass limits for heavy vehicles? What is your preferred option to advance this project? (See page 27)

14. For existing combinations, significant modification may be required to take the vehicle from being prescriptive to meeting the requirements of the blueprint. This would likely involve modifications being certified by approved engineers. Given the monetary and time costs associated with getting the vehicle modified, certified and exempted, are you more likely to: (See page 27)

   a. Modify your vehicle? If so, why?
   b. Replace your vehicle with an ‘off the shelf’ model constructed to the blueprint specification? If so, why?
   c. Replace your vehicle with another PBS approved design? If so, why?
   d. Continue to use the prescriptive vehicle? If so, why?
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1. Introduction

Trucks and buses help carry the nation’s goods and passengers to their destinations. They are a key component of the Australian economy. Improved transport productivity reduces the cost of moving people and freight and, in turn, goods and services. However, productivity improvements should not be achieved at the cost of reduced safety for road users. The PBS scheme was developed to meet both needs, by promoting the development and use of more productive and safer heavy vehicles. Performance Based Standards (PBS) have been identified by the Council of Australian Governments (COAG) as an important enabler of safe productivity growth in the road freight sector. As COAG stated in 2006:

*Performance Based Standards is seen as an important element in a regulatory approach to road transport which will enable continuous productivity gains and technological improvement, whilst meeting reasonable safety, road asset protection and environmental standards.*

The PBS scheme was approved by Australian transport ministers in October 2007. It is a world-leading approach to the regulation of heavy vehicle access, focusing on how a vehicle performs on the road, rather than on prescriptive measures such as dimensions and mass.

Vehicles that comply with the performance standards in the PBS scheme are permitted to operate with mass and dimension limits beyond those that apply to conventional vehicles. The PBS scheme was managed by the NTC until January 2013. It is now managed by the National Heavy Vehicle Regulator (NHVR), and operates under the Heavy Vehicle National Law (HVNL) which came into effect in February 2014.

Since its inception, safety standards in the PBS scheme have been subjected to an extensive and rigorous development process. As the PBS scheme has grown, a substantial body of knowledge has developed on the design features necessary for a vehicle or combination to meet PBS scheme standards. Improved standard designs for six and seven-axle truck and trailer combinations have been developed by industry, enabling operators to purchase pre-approved PBS combinations from manufacturers.

In June 2012 the registration information from all states and territories, indicated there were over 37,000 registered six and seven-axle truck and trailer combinations. Of these vehicles approximately 1,300 (3.5 per cent) were PBS-approved and able to operate at higher mass limits. The remaining 96.5 per cent of the fleet continue to operate at lower mass limits applicable to non-PBS vehicles. PBS-approved combinations offer up to 20 percent more productivity than non-PBS vehicle combinations. There is considerable interest in industry about whether the knowledge gained from the PBS assessment of six and seven-axle truck and dog trailer combinations can be translated into a set of prescriptive regulatory requirements that can be applied to all truck and trailer combinations.

The purpose of this discussion paper is to draw on the views and expertise of stakeholders to help the NTC identify the likely impacts of introducing prescriptive regulatory requirements for truck and trailer combinations. A comprehensive national information resource on the PBS scheme is available at [www.ntc.gov.au](http://www.ntc.gov.au) and [www.nhvr.gov.au](http://www.nhvr.gov.au).
2. Background

Heavy vehicle productivity improvement reforms have been driven by Australia’s increasing demand for, and reliance on, land-based freight transport. Since the early 1960s, the national freight task has increased more than 10 times from under 20 billion-tonne-kilometres (btks) to over 200 btks (as at 2008) (Transport Infrastructure 2050, IBISWorld prepared for Infrastructure Partnerships Australia, 2008).

Early efforts to increase productivity focused on expanding prescriptive regulations, (mass and dimension), such as:

- Increasing the permissible gross mass of a semi-trailer and prime-mover from around 35 tonnes to 42.5 tonnes
- Increasing maximum length from 16 metres to 19 metres
- Introducing B-double combinations

The ability to further extend mass and dimension limits is constrained by existing infrastructure. Further, prescriptive standards are limited by the lowest performing vehicles that may comply with them. As mass and dimension extension became limited, states and territories began to offer concessions and exemptions for better-performing vehicle designs, or those with special needs (such as vehicles transporting over-dimensional loads).

The use of permit and general notice schemes has grown, increasing the administrative load. In addition, different restrictions on access have been applied to heavy vehicles in different states and territories. These restrictions were necessary to address the varied limitations of infrastructure around Australia.

The prevalence of inconsistent assessment processes and methods led to the development of the PBS concept in 1998. The objective was to apply national uniform assessment methods while accounting for different constraints and conditions of road networks in states and territories.

In May 2001, transport ministers endorsed the policy framework to develop a performance-based approach to heavy vehicle regulation, and in December 2003 they voted to adopt the Performance Based Standards (PBS).

During the final stages of reform development, the PBS Interim Review Panel was established to ‘road test’ the reform by reviewing ‘case study’ applications. While not empowered to approve access, the panel could make recommendations to road agencies about whether permits should be granted.

In October 2007, ministers approved a refined PBS package, including vehicle standards and assessment rules, business rules governing administration of the PBS scheme and network classification guidelines.

Under the revised PBS scheme, responsibility for reviewing applications shifted from the Interim Review Panel to the Performance Based Standards Review Panel. As part of the agreed 12-month review of the scheme, a PBS Regulatory Impact Statement (RIS) was approved in 2012 that allowed for integration of the PBS scheme into the Heavy Vehicle National Law (HVNL). In January 2013, management of the PBS scheme became the responsibility of the National Heavy Vehicle Regulator (NHVR).

Under the HVNL, which commenced in February 2014, the NHVR can make decisions on PBS design approval applications. The PBS review panel continues to play an advisory role.
role. Under the HVNL, the states and territories can declare networks for various levels of PBS access. The introduction by the NHVR of a modified administrative process in managing the PBS scheme is expected to reduce the time taken to approve PBS applications.

2.1 Most common vehicle combinations

Since the PBS scheme was introduced, the majority of approved vehicles have been six and seven-axle rigid truck and trailer combinations. Figure 1 shows the breakdown of PBS applications by vehicle type. Figures 2 and 3 show a six-axle and a seven-axle rigid truck and trailer prescriptive combination respectively.

PBS vehicles have a greater gross combination mass (GCM) than a comparable non-PBS vehicle. This offers several productivity and environmental benefits. The approved GCM for a typical six or seven-axle rigid truck and trailer combination is 15 to 20 per cent higher than the approved prescriptive mass limits for a similar non-PBS vehicle combination. The vehicles that pass the PBS requirements come with improved safety and emission performance. The overall quality of the fleet is improved by the PBS process.

![Figure 1: PBS applications by vehicle type](source: National Heavy Vehicle Regulator)
2.2 Breakdown of PBS tasks

A number of processes occur from the time a customer requests a trailer manufacturer to build a PBS-approved vehicle combination to the time the built vehicle can operate with a permit. Figure 4 shows the required process to obtain a permit for a PBS-approved vehicle before the HVNL was introduced in February 2014.

Prior to the HVNL, a customer needed more than four months lead-time to put a PBS vehicle on the road. These timeframes did not include the time required to build the vehicle combination (typically around 12 weeks). This timeframe has improved since the HVNL was introduced as it allows the NHVR to make decisions on PBS applications.
Nonetheless, the time taken by the approval process and the costs associated with vehicle design assessment and certification have been identified by industry as barriers to greater uptake of PBS designs.

Over the last few years, the PBS scheme has approved many truck and trailer combinations of the same basic design. However, each new vehicle design application of this type needs to be fully assessed as though it was the first of its kind.

Once a design is approved, applicants can build an unlimited number of vehicles with that design. Built vehicles still need to be certified as meeting the requirements (such as a ‘vehicle approval’) to operate the vehicle on the road network.

There are efficiency and cost-saving advantages to industry and government if the process is streamlined to reduce administrative burden.

2.3 PBS under the HVNL

Some improvements to the PBS scheme and the approval process (shown in Figure 5) are:

**Time saving** – Under the HVNL, the NHVR has authority to make decisions on PBS design approval applications. The role of the PBS Review Panel has changed from a decision-making panel to an advisory panel, reducing the time taken to approve new PBS applications and allow access to the network sooner.

**Cost saving** – A self-certification scheme for manufacturers is being established, where manufacturers can certify their vehicle combinations as compliant with the relevant PBS requirements without the need to use third parties.

**Access certainty** – Access rights are clearer in the HVNL-operated PBS scheme. A vehicle approved to a PBS level has access to the declared PBS network of the corresponding level in all participating states and territories.

![Figure 5: Current PBS process under the HVNL](image)

**Question 1:** How do the improvements to the PBS scheme under the NHVR affect you as a manufacturer or an operator?
3. Purpose of this discussion paper

This discussion paper examines if the efficiencies delivered by the HVNL can be supplemented by a ‘prescriptive’ design for six or seven-axle truck and trailer combinations that meets the safety and infrastructure standards of the PBS scheme.

If so, this may allow a number of truck and trailer combinations not currently operating under the PBS scheme that meet PBS standards to travel with increased mass limits.

This would give access to PBS-equivalent productivity benefits without the administrative time and costs currently incurred (through assessment and certification) by industry and government.

For this to occur it is necessary to establish that a prescriptive design can be developed without compromising vehicle safety and performance.

Table 1 highlights the various ways existing and proposed truck and trailer combinations may access the road network.

Table 1: Existing and proposed system to obtain access for a truck and trailer

<table>
<thead>
<tr>
<th>System</th>
<th>Prescriptive vehicle with regulatory (MDL) compliance</th>
<th>NHVR Class 3 National Notice under NHVR</th>
<th>PBS scheme</th>
<th>Proposed in this discussion paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass limits (tonnes [t])</td>
<td>42.5t max</td>
<td>50.5t max</td>
<td>Up to 57.5t</td>
<td>Up to 57.5t</td>
</tr>
<tr>
<td>Overall length (metres [m])</td>
<td>19.0m</td>
<td>19.0m</td>
<td>20.0m</td>
<td>20.0m</td>
</tr>
<tr>
<td>PBS assessment</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Vehicle certification</td>
<td>No</td>
<td>No</td>
<td>3rd party or self-certification</td>
<td>No*</td>
</tr>
<tr>
<td>Access</td>
<td>General access and with some restrictions</td>
<td>General access (PBS level 1 &amp; 2)</td>
<td>Less than general access (PBS level 1 &amp; 2)</td>
<td>Less than general access (PBS level 1 &amp; 2)</td>
</tr>
<tr>
<td>Documentation</td>
<td>None</td>
<td>None</td>
<td>Must carry PBS approval</td>
<td>None</td>
</tr>
</tbody>
</table>

Note 1: Vehicle certification is not required if Option 4 explained in Section 5.4 is chosen as the preferred method. However, if a vehicle is modified it would require a certified engineer’s signature.

Note 2: MDL – Mass Dimension and Loading Standards

Question 2: What further improvements to the NHVR-led PBS scheme are necessary to improve or expedite the approvals process for truck and dog combinations?
4. Performance Based Standards

4.1 How PBS assessment works for truck and trailer combination

The PBS scheme was developed with the purpose of codifying acceptable levels of vehicle performance. An underpinning principle applied to development of the PBS scheme was that performance standards would be set at a level at least equivalent to corresponding prescriptive schemes. The PBS scheme provided a means for innovations in heavy vehicles and new vehicle designs to be approved without the need to build and demonstrate the performance of a prototype vehicle. The PBS scheme offered a much cheaper and more reliable way to obtain approvals on new designs despite the cost of obtaining a PBS assessment for a new vehicle. The current project may lead to further reductions in the costs to industry of accessing safer and more productive vehicles on a more extensive road network.

The performance of a truck and trailer combination under the PBS scheme is assessed against 16 safety standards and four infrastructure standards (shown in Table 2).

Table 2: Performance standards for PBS vehicles

<table>
<thead>
<tr>
<th>PBS vehicle standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety performance standards</td>
</tr>
<tr>
<td>Startability</td>
</tr>
<tr>
<td>Gradeability</td>
</tr>
<tr>
<td>Acceleration capability</td>
</tr>
<tr>
<td>Tracking ability on a straight path</td>
</tr>
<tr>
<td>Low-speed swept path</td>
</tr>
<tr>
<td>Frontal swing</td>
</tr>
<tr>
<td>Tail swing</td>
</tr>
<tr>
<td>Steer tyre friction demand</td>
</tr>
<tr>
<td>Static rollover threshold</td>
</tr>
<tr>
<td>Rearward amplification</td>
</tr>
<tr>
<td>High speed transient off-tracking</td>
</tr>
</tbody>
</table>
Yaw damping coefficient | The rate of decay of the ‘sway’ from the rearmost trailer after a single pulse steering movement

<table>
<thead>
<tr>
<th>Infrastructure protection standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement vertical loading</td>
</tr>
<tr>
<td>Pavement horizontal loading</td>
</tr>
<tr>
<td>Tyre contact area</td>
</tr>
<tr>
<td>Bridge loading</td>
</tr>
</tbody>
</table>

Truck and trailer combinations built to the dimensional limits set out in the HVNL Mass Dimension and Loading Regulations (MDL Regulations) may not exceed a total length of 19 metres. While the sum of the permitted axle mass loadings is 48.5 tonnes for a three-axle truck towing a three-axle trailer (a six-axle truck and dog combination) and 56 tonnes for a three-axle truck towing a four-axle trailer (a seven-axle truck and dog combination), the maximum mass at which such non-PBS combinations can operate is limited to 42.5 tonnes (although through Class 3 notices some states and territories allow seven-axle truck and dog combinations up to 50.5 tonnes).

This limitation is due to the impact of these loads on bridges (concentrated within 19 metres). The acceptable impact limits a vehicle may have on a bridge is set out in bridge formulae specifying a relationship between axle spacing and mass.

Vehicles approved through the PBS process are not limited to the 19 metre maximum length set out in the MDL Regulations, and so can be designed with axle spacings that permit the combination to be loaded up to the maximum permitted mass of each axle group. They must also comply with other PBS standards, several of which are influenced by the gross mass of the combination.

One standard of particular note is the Static Roll-over threshold, which assesses the amount of lateral acceleration that a vehicle can sustain without rolling over. An important factor in determining the roll-over threshold of a vehicle is its centre of gravity. A vehicle loaded with a dense load, such as quarry products will have a lower centre of gravity (and hence a better static roll-over threshold) than the same vehicle loaded with the same mass of a less dense product, such as grain. Limiting the height of the bins in a truck and dog trailer combination is used as a method of controlling the loading of the vehicle so it does not exceed the standard for the Static Roll-over threshold.

The differences between the mass limits offered for a PBS and a non-PBS truck and trailer combination are summarised below. PBS vehicles have access to higher mass limits because their designs are tested to demonstrate a safe level of performance at these masses against the 16 safety standards and four infrastructure standards.

Table 3 shows the maximum permitted gross combination mass (GCM) for prescriptive and PBS truck and trailer combinations. Table 4 shows the greater GCM and payload available to a PBS vehicle.
Table 3: Prescriptive and PBS mass limits

<table>
<thead>
<tr>
<th>Vehicle combination type</th>
<th>Maximum prescriptive GCM</th>
<th>Maximum PBS GCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-axle truck and trailer</td>
<td>42.5 t</td>
<td>49.5 t</td>
</tr>
<tr>
<td>7-axle truck and trailer</td>
<td>50.5 t</td>
<td>57.5 t</td>
</tr>
</tbody>
</table>

GCM – Gross Combination Mass

Table 4: Mass limit benefits for PBS vehicles

<table>
<thead>
<tr>
<th>Vehicle combination type</th>
<th>Gain in GCM</th>
<th>% Gain in GCM</th>
<th>% Gain in Payload</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-axle truck and trailer</td>
<td>7.0 t</td>
<td>16.5</td>
<td>25.5</td>
</tr>
<tr>
<td>7-axle truck and trailer</td>
<td>7.0 t</td>
<td>13.9</td>
<td>19.7</td>
</tr>
</tbody>
</table>

Payload gain based on a 15 tonne tare mass

The productivity and safety benefits offered by PBS are achieved by assessing a vehicle’s design against the standards set out in the PBS scheme. In most cases, the maximum mass limit that can be approved for a PBS vehicle is the sum of the individual axle group mass limits. A vehicle design (and subsequent vehicles built from that design) can maximise productivity benefits only when the design performs satisfactorily against the standards when they are assessed at the maximum axle group mass limits. After a PBS assessment, actual additional payload available to a vehicle design is based on:

- compliance with the Tier 1 Bridge Formula (if general access to the level 1 PBS network is sought).
- performance against all of the PBS requirements.
- performance of component parts used to build the vehicle, including brakes, suspension and tyres.

The Tier 1 Bridge Formula sets the minimum distance required between successive axle groups. In order to comply with this requirement the extreme axles in a vehicle combination need to be placed sufficiently apart to make use of the highest allowable mass limits. This results in combinations designed at more than the prescriptive length of 19.0m. The Bridge formula ensures a PBS approved vehicle’s impact on the bridges is not greater than prescriptive vehicles.

Many vehicle designs cannot comply with one or more standards when tested at maximum axle mass limits. To make a design perform satisfactorily against the standards, several restrictions may be included in the design, limiting for example:

- options for use of suspensions and tyres
- gross mass limit and/or payload height

A PBS assessor decides what restrictions are necessary on a PBS vehicle by conducting a complete assessment of the design with computer modelling tools.

Question 3: What aspects of the current PBS scheme have attracted you to participate?
5. Options

Industry representatives, PBS assessors and certifiers, PBS Review Panel members and other experts from states and territories support the idea of incorporating vehicles which could safely operate at PBS mass limits into prescriptive regulations.

A major benefit identified by government agencies is reducing the administrative burden associated with considering vehicle approvals in only individual instances.

These stakeholders believed that further work is necessary to achieve an outcome that benefits industry, state and territories, but does not compromise safety. Options to develop this work are set out below.

The first step is to consider if it is feasible to provide a prescriptive vehicle specification, based on existing PBS-approved truck and dog trailers. This analysis also indicates whether it is possible to modify existing truck-trailer combinations, which have not been developed through the PBS process, to fit within the performance parameters of PBS six and seven-axle truck-trailer combinations.

Certifying the modifications applied to the vehicle combination and the required vehicle standards exceptions, (such as draw bar length) adds complexity.

The following options have been identified:

1. **Option 1: Maintain the status quo** – any new vehicle designs that do not meet existing prescriptive regulatory requirements will continue to undergo individual PBS assessment before being allowed access to the road network.

2. **Option 2: Limit bin and payload heights** – limiting bin heights and payload heights of non-PBS-vehicles to ensure the vehicle’s dynamic performance is acceptable.

3. **Option 3: Develop a PBS-compliant blueprint** highly-detailed blueprints that would apply to new vehicles.

4. **Option 4: Develop a specification envelope** – comprising a set of prescriptive requirements that can be incorporated into prescriptive regulations or operated under notices. Vehicles that meet those requirements would operate at PBS scheme mass limits and deliver equivalent safety performance and infrastructure impacts to vehicles that have been individually assessed through the PBS scheme.

5.1 **OPTION 1: Maintain the status quo** – Combinations continue to be required to use the PBS scheme to access increased mass limits

This option would make no change to the requirements to be applied under the HVNL, requiring six and seven-axle rigid truck and trailer combinations to either undertake a full PBS assessment of their proposed design or use an existing manufacturer’s blueprints.

**Advantages**

- Vehicles continue to be approved as individual PBS applications or blueprints of manufacturers. This option ensures each vehicle’s performance and safety meets the performance standards.

**Disadvantages**

- No further improvements in administrative costs or timing.
5.2 OPTION 2: Limit bin and payload heights

This option would consider whether vehicle dynamics can be adequately managed by controlling the centre of gravity of a combination. Vehicles can fail to pass PBS requirements at the highest assessed mass limits if the estimated location of the vehicle’s centre of gravity is too high. A high centre of gravity for a vehicle results in poor dynamic performance, including a greater likelihood to roll over. This can be managed by lowering the centre of gravity value by limiting the truck and trailer bin heights, and hence the payload heights, of the vehicle combination. Currently, PBS vehicles are approved with specific bin and payload heights as a preferred method of managing the centre of gravity of vehicles.

**Scope:** A technical assessment and development of maximum payload and bin height is required.

**Advantages**

- Bin height limits can ensure that a vehicle performs satisfactorily at higher mass limits.
- Special operating conditions can be applied to ensure only eligible vehicle combinations use this facility.

**Disadvantages**

- It is unlikely existing trucks and trailers would reduce their bin heights to comply with this option.
- Difficult to monitor compliance.
- Productivity will be improved for some payload types while others will be less productive.
- Vehicle operators carrying low-density bulk products will be unable to realise productivity benefits. In fact, a vehicle with low bin heights will be less productive when carrying bulk products.
- Vehicle operators willing to carry low-density bulk products will need to continue to invest significant cost and time to obtain higher productivity through the existing PBS process.

5.3 OPTION 3: Develop a PBS-compliant blueprint

PBS blueprints, similar to existing PBS-compliant blueprints, would be developed (one for six-axle combinations and one for seven-axle combinations) that fully comply with PBS requirements at the assessed mass limits. Operators and manufacturers could then use the blueprint to build their own combination. PBS certification would be necessary before obtaining access to the PBS-approved road network. Further details on this option are discussed in Chapter 6 PBS blueprints – streamlining the PBS process.

**Scope:** A technical assessment and development of fully PBS-compliant six and seven-axle truck and trailer blueprints.

**Advantages**

- PBS blueprint ensures only compliant vehicles access the increased mass limits.

**Disadvantages**

- It is likely industry interest in the blueprint will be minimal due to availability of blueprints from several current trailer manufacturers.
Vehicle operators using PBS blueprints must obtain PBS certification before they can receive an operating permit. This would still result in some administrative delay before a vehicle is approved for use.

5.4 OPTION 4: Develop a specification envelope

A specification envelope would be developed that would outline the conditions that a vehicle must comply with to access increased mass limits while meeting performance and safety standards equivalent to those that apply to individually-assessed PBS vehicles.

Two models can be developed:

1. A restricted bin height combination, suitable for a quarry payload with low centre of gravity.
2. A combination suitable for a uniform low-density bulk payload, such as grain (allowing operators carrying lower-density bulk products to use higher bins).

These specific six and seven-axle models would guarantee that specified combinations can safely carry PBS mass limits. The model could be incorporated into HVNL regulations, or combinations developed from these models could operate with ‘National Notices’.

Vehicles built to comply with these specifications would not need to be assessed under the current PBS scheme. However, they would need similar Australian Design Rules / Australian Vehicle Standards Rules (ADR/AVSR) exemptions that are currently offered under the PBS scheme. Vehicles can be registered as per the current process and may run with a gazette notice. It should be noted these vehicles would not be scrutinised unless they are stopped by a roadside enforcement officer. This is no different to how PBS vehicles with self-certification and vehicles running under national notices currently operate. Further details on the specification envelopes are discussed in Chapter 7.

**Scope:** A technical assessment and development of fully PBS-compliant six and seven-axle truck and specification envelope.

**Advantages**

- The specification envelope would ensure that all eligible vehicles can access maximum safe mass limits. This would give greater flexibility to the quarry operators who constitute the majority of current truck and trailer combinations. Controlled bin height also does not affect the productivity of high-density quarry operators.
- Operators with new vehicles can easily access the productivity benefits without needing to go through the PBS process.
- Separate high and low-density envelopes cover most current truck and trailer combinations.

**Disadvantages**

- Trailer manufacturers that own existing PBS-approved blueprints may feel disadvantaged, as the benefits offered by those blueprints would be available in notices.
- The envelope specifications may supersede several of the existing approvals held by industry.
5.5 Assessment of options

Based on initial discussions conducted with industry and the states and territories, Options 3 and 4 appear to offer benefits for industry as well as states and territories.

Although it is clear from Option 3 that it is feasible to provide blueprints for six and seven-axle combinations (as industry had already done so in a number of cases), it is not clear that a specification envelope approach is feasible. We have investigated and developed specification envelopes as described in Option 4. Details of this feasibility study are provided in Section 7 of this discussion paper.

**Question 4:** Of the options presented here, which do you prefer and why?

- a. Are there any options that have not been considered in this paper, but you feel deserve merit? If so, please provide details.
- b. Of the options presented here, are there any you feel strongly against? If so, why?
6. Performance Based Standards blueprints – streamlining the process

This section provides further details on Option 3 from Chapter 5. The Performance Based Standards (PBS) scheme was developed to codify acceptable standards of vehicle performance. The provision of PBS blueprints was intended to facilitate broader adoption of compliant vehicle designs. There are precedents for using PBS standards and assessments in the development of prescriptive regulations, such as the 26 metre B-double policy in 2005.

A PBS blueprint is an approved PBS design that provides specifications for a vehicle combination deemed to satisfy the PBS requirements for a given level of access. NTC’s current PBS-approved blueprints are:

- quad-axle semi-trailer specification sheet
- quad-quad b-double (standard) specification sheet
- quad-quad b-double (steering) specification sheet
- quad-tri b-double (standard) specification sheet
- quad-tri b-double (steering) specification sheet
- tri-axle semi-trailer specification sheet

In effect, PBS blueprints are a type of prescriptive standard. The key difference between blueprints and prescriptive regulations is that blueprints require more comprehensive specification than equivalent prescriptive regulations and are not always available for broader adoption, particularly if they were developed by a private applicant.
**Blueprint quad axle semi-trailer specifications**

This document provides specifications for a quad axle semi-trailer combination that is deemed to satisfy the Level 1 Performance Based Standards requirements set out in the ATC-approved national policy on quad axle groups (ATC 06/76(N)). Vehicles meeting this specification must also satisfy the conditions specified in the policy document.

Unless otherwise specified in the conditions below, the vehicle combination must have the dimensions shown in Figure 1 (± 10 mm), and is limited to the axle loads shown in Figure 1.

**Figure 1: Baseline quad axle semi-trailer dimensions and loads**

<table>
<thead>
<tr>
<th>AXLE LOADS (t)</th>
<th>6.0</th>
<th>17.0</th>
<th>27.0</th>
<th>50.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEERABLE AXLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Loading**
- Loading type is general freight or containerised freight.
- Load may be mixed or constant density. If mixed density, heavy freight must be loaded on the bottom and light freight on top.
- Under an agreed Australian Transport Council reform, a steer axle load of 6.5 t is allowed for heavy vehicles featuring the latest safety equipment and Euro 4 engine technology.

**Brakes**
- One of the following conditions must be satisfied:
  - Full brake compatibility and load proportioning on all axles and all vehicle units; or
  - An acceptable form of ABS/EBS and automatic slack adjusters on all vehicle units; or
  - An acceptable form of ABS/EBS and automatic slack adjusters on a prime mover and full brake compatibility and load proportioning on all trailer axles.

---

**Figure 6: Quad-axle semi-trailer blueprint Part 1**

Figure 6 and Figure 7 are examples of a PBS-approved quad-axle semi-trailer blueprint. The blueprint specifications provided must be complied with during the manufacture of the vehicle combination. This ensures the built vehicle will fully satisfy the strict safety and infrastructure standards of the PBS scheme.

The benefit of blueprints to industry is significant. It decreases the time and cost of conducting a PBS assessment of a vehicle design. A vehicle built from a blueprint can move straight to the ‘certification’ stage of the scheme (see figure 4).
Figure 7: Quad-axle semi-trailer blueprint Part 2

6.1 Manufacturer blueprints
Blueprints make PBS more accessible to industry. Since manufacturer blueprints were developed there has been a substantial increase in the variety of truck and trailer combinations. Innovative trailer manufacturers have made significant investments in developing and obtaining approval for their blueprints.
To recover blueprint development costs, manufacturers charge a premium in addition to vehicle build costs. In a typical scenario, a customer is offered several approved blueprint designs by the manufacturer. The customer chooses a blueprint design based on their requirements and the manufacturer charges vehicle build costs plus a 'PBS Premium'. Vehicles built from blueprints are PBS-compliant. Operators who purchase such vehicle combinations do not need to go through the whole PBS process, but still certify that the vehicle was built in accordance with the approved design. The PBS premium varies according to vehicle size and manufacturer. Typical market rates are $3,000–$5,000, or approximately 1.5 per cent of vehicle build cost, which covers PBS assessment, certification and an operating permit.

The HVNL now stipulates there is no need to obtain a permit unless the access route has not been gazetted.

A sample of a PBS manufacturer blueprint is shown in Figure 8.

Figure 8: PBS manufacturer blueprint

**Question 5:** Have you used any of the NTC released PBS approved blueprints? If so, which ones and to what degree of success?

**Question 6:** What effect do you expect the release of NTC-developed blueprints to have on the industry? Please provide a detailed response.

**Question 7:** Does the use of available manufacturer blueprints meet the needs of operators seeking access to PBS mass limits?
7. Feasibility of vehicle specification envelopes

7.1 Introduction

This option aims to develop a list of specifications along with a dimensioned drawing that could provide sufficient information for a vehicle manufacturer to build a compliant truck and trailer combination.

The envelope would be developed in a manner similar to a PBS design. It would be tested for performance against existing PBS safety and infrastructure standards.

NTC engaged the services of Advantia Transport Consulting Pty Ltd (the consultant) to assess the technical feasibility of developing a specification envelope for six and seven-axle truck and trailer vehicle combinations. The envelopes were to be developed in consultation with existing PBS customers.

7.2 Consultant methodology

The consultant liaised with the PBS customers to develop ‘boundary conditions’ for envelopes (i.e. the dimensional range within which PBS vehicles are currently built). Customers reported that each vehicle type needed two envelope designs to cater for high and low payload densities carried by the vehicles.

High-density payloads generally reach the mass limits before being loaded to the top of the vehicle bins. They can be designed with lower bin heights. High-density payloads provide productivity benefits by offering high mass limits when hauling commodities such as gravel (typically 1200 – 1400 kg/m3).

Low-density payloads reach the maximum bin heights before reaching the maximum mass limits, so a higher bin height is necessary to realise productivity benefits. Low-density design offer volumetric productivity benefits when hauling bulk freight such as wood chips (300 – 450 kg/m3) or grains and seeds (600 – 700 kg/m3).

Overall, four envelopes were considered for feasibility:

- 6-axle truck and trailer with low bins
- 6-axle truck and trailer with high bins
- 7-axle truck and trailer with low bins
- 7-axle truck and trailer with high bins.

Existing standards developed as part of the PBS scheme were used to assess these designs. The following assumptions/conditions were used:

- The Standards and Vehicle Assessment Rules of the PBS scheme recommends the use of sensitivity testing for vehicle design parameters that cannot be sourced from the manufacturer (Performance-Based Standards Scheme – the Standards and Vehicle Assessment Rules https://www.nhvr.gov.au/files/resources/0020-pbsstdsvehassrules.pdf). The sensitivity testing must use established baseline values and vary them by 20 per cent to test a vehicle’s dynamic performance. The agreed specifications of a standard tyre currently used in conducting PBS sensitivity analysis are outlined in the NTC’s Comparison of Modelling Systems report (http://www.ntc.gov.au/DocView.aspx?DocumentId=247). These baseline tyre values are used in the development of the envelope. As a result, the envelopes contain no specific tyre requirements.
- The envelopes do not have any specifications for vehicle suspension systems other than they are certified road-friendly suspensions. The technical data for
suspension systems meet the minimum requirements of the Australian Design Rules. Any other suspension can be expected to be superior and safe for use.

- The front and rear overhangs of a truck and trailer are not specified in the envelopes. The axle spacing distance between the first and last axles and the overall length of the combination determines the allowance for front and rear overhang limits. The envelopes are developed to accommodate the overhang lengths of a wide range of vehicles.
- The dynamic performance of a vehicle against a PBS standard varies extensively depending on the loading condition of the vehicle. A fully loaded vehicle may perform poorly against some standards while an empty vehicle may perform poorly against other standards. The envelopes are developed based on vehicle assessments that cover worst case scenarios for all vehicle types and loading conditions for all standards.
- The envelopes require vehicles to have an anti-lock braking system (ABS) or an electronic braking system (EBS) and for trucks to meet the regulatory requirements for a 6.5-tonne steer axle load.

When a non-PBS vehicle is designed and built, it is built according to the ADR/AVSR requirements. To ensure compliance with these requirements, a vehicle builder must obtain ADR compliance plates before registering a vehicle.

When designing vehicles against PBS standards, vehicles may not be able to meet the ADR/AVSR requirements. In these scenarios, a vehicle’s safety is ensured by assessing against the PBS standards and deemed to operate safely during service operations. Exemptions from ADR/AVSR standards will be necessary for PBS approved vehicles. This is granted from an approved list of ADR/AVSR exemptions in the PBS vehicle approval process.

Similarly, vehicles built to the specifications listed in these envelopes may need exemptions from certain ADR/AVSR requirements. These exemptions are provided in the envelopes and will form part of the conditions of the document that the National Heavy Vehicle Regulator (NHVR) uses to offer these envelopes.

7.3 Draft vehicle specification envelopes

The envelopes show all critical dimension ranges that a vehicle must comply with to access mass limits specified in the envelope. Compliance with minimum axle distances determines the maximum mass limits that a vehicle can carry. Other conditions such as payload heights, driveline requirements, braking and other regulatory requirements are listed in each specification.

7.3.1 6-axle truck and trailer with low bins

The 6-axle truck and trailers are dynamically the worst-performed truck and trailer vehicle combinations. Assessing this vehicle type resulted in a specification envelope that would allow vehicles to operate with up to 49.5 tonne GCM when fully loaded in bins up to 3 metres high, on the PBS level 2 network. This provides full compliance with all PBS requirements. A draft of this envelope is provided in figure 9 along with conditions that the vehicles would need to comply with to use this envelope. These vehicles could not operate on the Level 1 network, as even with the mass restricted to 48.5 tonnes, with a maximum payload height of 2 metres, the vehicle’s high speed transient off-tracking output was 0.62 (outside the maximum Level 1 PBS limit of 0.60).

7.3.2 6-axle truck and trailer with high bins

The 6-axle truck and trailer with high bins was developed for combinations carrying low-density freight. This vehicle design did not perform satisfactorily against the PBS requirements. A practical specification envelope for this vehicle type does not appear to
be feasible. At this stage we recommend that 6-axle truck and trailer with high bins continue to use PBS to access higher mass limits.

7.3.3 7-axle truck and trailer with low bins

The 7-axle truck and trailer with low bins is the most common vehicle type currently in use. Assessing this vehicle type resulted in an envelope which produced vehicles that met all PBS standards at both Level 1 and 2 limits for a vehicle with bins up to 3 metres in height, and with up to a 50.5 tonne mass limit at Level 1 and 57.5 tonne at Level 2. This vehicle type has a wide range for vehicle length from 15.33 metres to 17.33 metres measured from the first axle to the last axle. Figure 10 provides a draft version of the envelope.

7.3.4 7-axle truck and trailer with high bins

The 7-axle truck and trailer with high bins is predominantly used for carrying low-density bulk-type freight. Assessing this vehicle type resulted in an envelope which produced vehicles that met all PBS standards at Level 1 and 2 limits for a vehicle with bins up to 3.3 metres in height, and with up to a 50.5 tonne mass limit at Level 1 and up to 57.5 tonne at Level 2. The extra height in the bins (which were up to 3.3 metres) required the smallest vehicle’s length measured from the first to the last axles to be limited to 16.67 metres, as opposed to 15.33 metres for a 3-metres bin height vehicle. This length limit was necessary to ensure that its high speed dynamic performance was within PBS limits. Figure 11 provides a draft of this envelope.

7.4 Conclusion

Of the four designs assessed, one design is not suitable for development in an envelope. The other three designs yielded envelopes with access to PBS Level 2 or both Level 1 and 2. Table 5 summarises the outcomes of the feasibility study in the development of vehicle specification envelopes.

<table>
<thead>
<tr>
<th>Truck and trailer type</th>
<th>Network access</th>
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<tbody>
<tr>
<td></td>
<td>PBS Level 1</td>
</tr>
<tr>
<td>6-axle low bin height</td>
<td>No</td>
</tr>
<tr>
<td>6-axle high bin height</td>
<td>No</td>
</tr>
<tr>
<td>7-axle low bin height</td>
<td>Yes</td>
</tr>
<tr>
<td>7-axle high bin height</td>
<td>Yes</td>
</tr>
</tbody>
</table>

7.4.1 Implementation

National notices managed by the NHVR would be a simple way of implementing these envelopes. The notices would contain all necessary requirements for a vehicle to access the mass limits specified in the envelopes. These notices could operate in the same way as state and territory notices issued and managed by road agencies.

7.4.2 Compliance

The proposed notices would provide details such as dimensional ranges, maximum mass limits, access details, restrictions on the payload heights, essential technical and regulatory power-train requirements, and any other compliance requirements. These
requirements would be similar to the information contained in currently operating state and territory notices. An operator or builder would assess their vehicle’s compliance from the information provided in these notices. The requirements could also be enforced with a system similar to current notices.

7.4.3 Access

The current state and territory notices provide a list of roads that a vehicle can access. Access to PBS-approved vehicles are offered as network levels (Levels 1 – 4). States and territories provide details of the roads covered under the various PBS network access levels along with the issue of operational permits. States and territories now declare the roads under various PBS network access levels to the NHVR. The proposed envelopes would attempt to use this facility to provide access to vehicles built to envelope specifications. The envelopes would specify mass limits for various PBS access levels. Once converted to national notices, vehicles built under the notices could access the various networks declared by states and territories for different access levels. In the envelopes attached in Figures 5 – 7, ‘General Access’ and ‘Restricted Access’ represent PBS network Levels 1 and 2 respectively.

**Question 8:** If, as a manufacturer you do not have your own PBS blueprints, how would the release of government-developed blueprints/specification envelopes influence your decision to pursue the PBS truck and dog market?

**Question 9:** If, as a manufacturer, you already have your own PBS blueprints, how would the release of government-developed blueprints/specification envelopes impact on or influence your business?

**Question 10:** If the NTC develops these specification envelopes for commercial use, do you think this will affect innovation in the design and manufacture of truck and trailer combinations?

**Question 11:** Are the specification envelopes developed in this section practical and easy to read and adopt, from a manufacturer or operator perspective, as well as a state or territory perspective?

**Question 12:** Are the assumptions on which the envelopes are based reasonable? What, if any, limitations on these assumptions would be necessary before such an envelope could be implemented?
Vehicle Specification Envelope (3-axle dog)

**PRIMARY DIMENSION LIMITS (METRES)**

<table>
<thead>
<tr>
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<th>MAX</th>
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<tbody>
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<td>5.450</td>
</tr>
<tr>
<td>1.500</td>
<td>1.650</td>
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<td>3.000</td>
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**AXLE SPACING AND MASS SCHEDULE (METRES & TONNES)**

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<tr>
<th>GCM</th>
<th>GHL</th>
<th>CHL</th>
<th>BHL</th>
<th>GHL</th>
<th>CHL/BHL</th>
<th>L46</th>
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**FOR GENERAL ACCESS** the payload height is restricted to 2.000 metres from the ground
**FOR RESTRICTED ACCESS (B-DOUBLE NETWORK)** the payload height must not exceed top of bin

**Peak engine power (in HP)** must be not less than 395

**Peak engine torque (in Nm)** must be not less than 88,000 divided by (LGR x FDR)
where LGR equals Lowest Gear Ratio of gearbox and FDR equals Final Drive Ratio of drive axles.

Truck must satisfy technical requirements for 6.5-tonne regulatory steer axle load
Drive and trailer axles must have Certified Road Friendly Suspensions

Figure 9: Specification envelope for 6-axle truck and trailer
Access to PBS mass limits for truck and trailer combinations August 2014

Vehicle Specification Envelope (4-axle dog “low”)

Figure 10: Specification envelope for 7-axle truck and trailer with low bins
Vehicle Specification Envelope (4-axle dog “high”)

**Figure 11:** Specification envelope for 7-axle truck and trailer with high bins

**Primary Dimension Limits (Metres)**

<table>
<thead>
<tr>
<th></th>
<th>WBT</th>
<th>CRG</th>
<th>DBL</th>
<th>WBD</th>
<th>FHT</th>
<th>FRD</th>
<th>BHT</th>
<th>BHD</th>
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<tr>
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<td>3.300</td>
<td>5.500</td>
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<td>–</td>
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<td>MAX</td>
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<td>3.300</td>
<td>3.300</td>
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</table>

**Axle Spacing and Mass Schedule (Metres & Tonnes)**

<table>
<thead>
<tr>
<th></th>
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<th>CHL</th>
<th>MNL</th>
<th>GML</th>
<th>CHL</th>
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<td>8.833</td>
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<tr>
<td>MB/HC/HD</td>
<td>16.5 (GML)</td>
<td></td>
<td></td>
<td>17.0 (CMH/SHL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Peak engine power (in HP) must be not less than 405**

**Peak engine torque (in Nm) must be not less than 52,000 divided by (LGR x FDR)**

where LGR equals Lowest Gear Ratio of gearbox and FDR equals Final Drive Ratio of drive axles.

Track must satisfy technical requirements for 6.5-tonne regulatory steer axle load

Track and trailer must have ABS or EBS brakes

Drive and trailer axles must have Certified Road Friendly Suspensions
8. Next steps

Our feasibility study shows that a specification envelope offers a practical means of promoting the design and use of PBS-standard six and seven-axle combinations. There are two viable options to achieve this:

1. PBS blueprints
2. Specification envelopes.

Advantages and disadvantages of both these options along with the other listed options need to be carefully considered before a preferred project method is chosen.

There are two principal options for implementing a developed solution.

1. Update the HVNL with a Regulatory Impact Statement.
2. An interim option is to implement the solution with national notices issued by the NHVR. Notices can be structured in a similar way to the Class 3 Truck and Trailer notice released recently by the NHVR (http://www.comlaw.gov.au/Details/C2014G00244). Once the notice gains support from participating states and territories, these envelopes can be considered to be included in the regulation.

This project aims to offer benefits to existing and new vehicles. The factors governing qualification for higher mass limits need to be considered. Thorough analysis is necessary to identify:

- The likelihood that non-PBS vehicles (currently 96.5 per cent of registered vehicles) will be able to comply with the proposed solution without having to undergo modification.
- If benefits of this solution will offset the cost of any necessary vehicle modifications.
- How necessary vehicle modifications should be regulated.

We are seeking feedback on these and other key issues of this project. At the conclusion of our consultations, the NTC will consolidate the feedback we receive to perform necessary changes to the project methodology and/or the specification envelopes.

We will consult with states and territories to determine the best options for realising productivity and safety benefits from this project.

A final recommendation in the form of a project report will be prepared for consideration by states and territories, in November 2014.

If the recommendation is approved, the NHVR will be asked to implement it. The NTC will help the regulator to achieve this should ministers decide this is necessary and/or advisable.
**Question 13:** The complexity of PBS blueprints means they can be difficult to add to regulations. Do you expect any of the options presented in this paper to improve access to higher mass limits for heavy vehicles? What is your preferred option to advance this project?

**Question 14:** For existing combinations, significant modification may be required to take the vehicle from being prescriptive to meeting the requirements of the blueprint. This would likely involve modifications being certified by approved engineers. Given the monetary and time costs associated with getting the vehicle modified, certified and exempted, are you more likely to:

- a. Modify your vehicle? If so, why?
- b. Replace your vehicle with an ‘off the shelf’ model constructed to the blueprint specification? If so, why?
- c. Replace your vehicle with another PBS approved design? If so, why?
- d. Continue to use the prescriptive vehicle? If so, why?
9. Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR</td>
<td>Australian Design Rules</td>
</tr>
<tr>
<td>ABS</td>
<td>Anti-lock Braking System</td>
</tr>
<tr>
<td>ATC</td>
<td>Australian Transport Council</td>
</tr>
<tr>
<td>AVSR</td>
<td>Australian Vehicle Standards Rules</td>
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<tr>
<td>COAG</td>
<td>Council Of Australian Governments</td>
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<tr>
<td>EBS</td>
<td>Electronic Braking System</td>
</tr>
<tr>
<td>ESC</td>
<td>Electronic Stability Control</td>
</tr>
<tr>
<td>GCM</td>
<td>Gross Combinational Mass</td>
</tr>
<tr>
<td>HVNL</td>
<td>Heavy Vehicle National Law</td>
</tr>
<tr>
<td>NHVR</td>
<td>National Heavy Vehicle Regulator</td>
</tr>
<tr>
<td>NTC</td>
<td>National Transport Commission</td>
</tr>
<tr>
<td>PBS</td>
<td>Performance Based Standards</td>
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