



NATIONAL ROAD TRANSPORT COMMISSION

---

**REGULATORY IMPACT STATEMENT:  
INCREASED MASS LIMITS FOR  
ROAD-FRIENDLY HEAVY VEHICLES**

**April 1998**

**Prepared by:  
National Road Transport Commission**

*National Road Transport Commission*

**Regulatory Impact Statement: Increased Mass Limits for Road-Friendly Heavy Vehicles – April 1998**

Prepared by: National Road Transport Commission

ISBN: 0 642 54487 5

## FOREWORD

This Draft Regulatory Impact Statement (RIS) details the work undertaken to date on increased mass limits for road-friendly heavy vehicles, including the consultative process adopted, the benefits and costs expected to result from the proposal, and the impacts on affected parties.

There are a number of ongoing investigations and studies being undertaken as a result of the Steering Committee Recommendations in August 1996 that are not considered in this RIS. These results will be made available at a later time.

The ongoing studies to be considered when available include supplementary work on compliance and enforcement issues, registration charges and the ongoing bridge program for testing and upgrading priorities.

This RIS contains the following chapters:

- Chapter 1: *Description*** - sets out the broad history and aims of the Mass Limits Review
- Chapter 2: *Objectives and Necessity*** - sets out the objectives of the Commission in proposing increased mass limits for road-friendly heavy vehicles.
- Chapter 3: *Identification of Alternatives*** - discusses the general alternatives to the recommended approach.
- Chapter 4: *Consultation with Affected Parties*** - outlines the consultative process which has been followed in the development of this proposal.
- Chapter 5: *Impact Analysis*** - is an overview of the components of the proposal, including comments received on the Steering Committee recommendations and the resulting additional work and analysis which forms the basis of the Commission's recommendations. This chapter looks at the costs and benefits associated with the proposed mass limit increases.
- Chapter 6: *Summary Justification*** - summarises the Commission's rationale for the Mass Limits Review and the impacts on stakeholders including governments, operators and the public.
- Chapter 7: *Implementation*** - describes the implementation processes proposed for the Mass Limits Review.



# CONTENTS

<b>1.</b>	<b>DESCRIPTION .....</b>	<b>1</b>
1.1	Introduction .....	1
1.2	Scope and Applicability.....	1
1.3	Recommendations.....	2
<b>2.</b>	<b>OBJECTIVES AND NECESSITY .....</b>	<b>4</b>
<b>3.</b>	<b>IDENTIFICATION OF ALTERNATIVES .....</b>	<b>5</b>
3.1	Mass Limit Options .....	5
3.1.1	<i>Axle Group Limits</i> .....	5
3.1.2	<i>B-Doubles</i> .....	5
3.2	Who Gets the Increases?.....	6
3.2.1	<i>Road-friendly Suspensions</i> .....	6
3.2.2	<i>Membership of Accreditation Schemes</i> .....	6
3.2.3	<i>Other Issues</i> .....	7
3.3	What is Road-Friendly?.....	8
3.3.1	<i>Performance Standard</i> .....	8
3.3.2	<i>Certification Options</i> .....	9
3.3.3	<i>Vehicle Identification Options: Administrative Systems</i> .....	10
3.3.4	<i>Vehicle Identification Options: Roadside Identification</i> .....	11
3.3.5	<i>In-service Performance of Road-friendly Suspensions</i> .....	11
3.4	Funding Options .....	12
3.5	Compliance and Enforcement.....	13
3.6	Implementation .....	14
<b>4.</b>	<b>CONSULTATION .....</b>	<b>15</b>
4.1	Consultative Process Overview .....	15
<b>5.</b>	<b>IMPACT ANALYSIS .....</b>	<b>17</b>
5.1	Introduction .....	17
5.2	Base Case.....	17
5.3	Impacts on Freight Costs .....	18
5.4	Compliance and Enforcement.....	23
5.4.1	<i>Mass Management Accreditation</i> .....	24
5.4.2	<i>Conventional Compliance and Enforcement</i> .....	26
5.5	Impacts on Road Pavements .....	26
5.6	Impacts on Bridges .....	28
5.6.1	<i>State/Territory Impacts</i> .....	29
5.6.2	<i>Local Government</i> .....	31
5.6.3	<i>Ongoing Bridge Impacts</i> .....	32
5.7	Administration Costs .....	32
5.8	Economy-Wide Effects.....	33
5.8.1	<i>Welfare Measures</i> .....	34
5.8.2	<i>Government Revenue Effects</i> .....	35
5.9	Funding.....	38
5.10	Charges .....	39
5.11	Environmental Impacts and Road Safety.....	39
5.12	Impacts on Rail.....	41
<b>6.</b>	<b>SUMMARY JUSTIFICATION .....</b>	<b>44</b>
<b>7.</b>	<b>IMPLEMENTATION.....</b>	<b>46</b>
<b>8.</b>	<b>REFERENCES .....</b>	<b>47</b>

**APPENDIX A: SOURCES OF ESTIMATES USED IN THE REGULATORY IMPACT STATEMENT .....49**

**APPENDIX B: IMPACTS ON COSTS, BENEFITS AND GOVERNMENT REVENUES BY YEAR.....51**

**LIST OF TABLES**

Table 3.1: Mass Limits Options Investigated by the Review ..... 5

Figure 4.1: Consultation Process to November 1997 ..... 16

Table 5.1: Base Case Costs ..... 18

Figure 5.1: Increases in Maximum Mass by Type of Vehicle ..... 19

Table 5.2: Estimated Savings in Freight Costs by State/Territory ..... 20

Table 5.3: Annual Vehicle Operating Costs by State/Territory: Financial Costs..... 21

Table 5.4: Annual Freight Cost Savings By Type of Vehicle: Option F..... 21

Table 5.5: Annual Freight Cost Savings by Industry: Option F..... 22

Table 5.6: Estimated Reductions in Annual Pavement Rehabilitation Costs ..... 27

Table 5.7: State/Territory Bridges Affected by Mass Limit Increases<sup>1</sup> ..... 29

Table 5.8: Estimated Upgrading costs for Bridges on State\Arterial Roads (\$000's)<sup>1</sup> ..... 30

Table 5.9: Change In Up Front and Ongoing Bridge Costs by Road Type..... 32

Table 5.10: Economy-Wide Effects of Savings In Freight Costs: Option F..... 35

Figure 5.2: Government Revenue Effects of an Increase in Mass Limits ..... 35

Table 5.11: Impacts on Public Debt and Taxation Revenues ..... 37

Table 6.1: Summary of Impacts ..... 44

Table B 1: Costs and Benefits of Increasing Mass Limits by Year: NRTC Estimates of Direct Benefits ..... 52

Table B 2: Costs and Benefits of Increasing Mass Limits: Benefits of Road Transport Regulatory Reforms Estimates of Direct Benefits..... 53

Table B 3: Proportion of Total Benefits During Bridge Upgrading by Year..... 54

Table B 4: Impacts on Governments by Year: NRTC Estimates of Direct Benefits of Mass Limit Increases .55

Table B 5: Impacts on Governments by Year: Benefits of Road Transport Regulatory Reform Estimates of Direct Benefits ..... 56

**LIST OF FIGURES**

Figure 4.1: Consultation Process to November 1997 ..... 16

Figure 5.1: Increases in Maximum Mass by Type of Vehicle ..... 19

Figure 5.2: Government Revenue Effects of an Increase in Mass Limits ..... 35

## **1. DESCRIPTION**

### **1.1 Introduction**

Worldwide, studies over the last twenty years, including two major studies in Australia, have found significant economic benefits from increasing mass limits for heavy trucks and buses. The reduced cost of transportation is passed on to customers because of the competitive nature of the road freight and passenger business. As a result the National Road Transport Commission (NRTC) undertook the Mass Limits Review.

The NRTC established the Mass Limits Review Steering Committee to study and report on "*the feasibility and net benefits of increasing mass limits for vehicles fitted with road friendly suspension systems*". The Steering Committee was chaired by the NRTC and comprised representatives from the road authorities, local government, bus and truck operators, light vehicle representatives, researchers and vehicle manufacturers.

Australia's review of mass limits for heavy freight vehicles with road-friendly suspension systems has taken over four years to reach the current point and has included a broad literature review, utilisation of previous relevant research and extensive consultation. This Regulatory impact Statement sets out the recommendations resulting from the process of the Review since its inception, both prior to and including the involvement of the Steering Committee.

The major issues considered in the Review include the impact of increased mass limits on roads, bridges, vehicle operations, funding and government finances.

### **1.2 Scope and Applicability**

The Review arose from pavement research summarised in an OECD report which suggested that certain types of heavy vehicle suspension systems, termed road friendly suspensions, cause less road wear than other heavy vehicle suspension systems<sup>1</sup>. This suggests that heavier loads can be carried on vehicles fitted with these suspensions without increasing road wear.

The Review examined mass limits applicable to various truck configurations ranging from rigid trucks to multi-trailer road trains and buses. Overmass vehicles including mobile cranes and low loaders were not included and are to be the subject of separate investigations by the NRTC.

A range of options were considered by the Steering Committee and a set of recommendations was made. These options examined by the Steering Committee are set out in Chapter 3 - Identification of Alternatives. The recommendations of the Steering Committee formed the basis for public consultation and for consideration and further development by the Commission.

---

<sup>1</sup> OECD - IR2 Report

### 1.3 Recommendations

The Commission recommends that Ministers:

1. acknowledge the productivity benefits obtainable from increasing allowable axle mass limits for vehicles with road-friendly suspensions, the need to upgrade Australia's bridges to realise these benefits and the importance of reducing gross overloading;
2. agree that, subject to the provision of additional funding for upgrading bridges, allowable general axle mass limits for vehicles fitted with road-friendly suspensions be increased, as follows:
  - 0.5 tonne increase on tandem axle groups, to 17.0 tonnes;
  - 2.5 tonne increase on triaxle groups, to 22.5 tonnes;
  - tonne increase on single drive axles on buses, to 10.0 tonnes; and;
  - tonne increase on six-tyred tandem axles, to 14.0 tonnes.
  - 0.7 tonne increase on steering axles of long combination vehicle prime movers (ie, road trains and similar) fitted with wide single tyres, to 6.7 tonnes (regardless of the type of suspension);
3. agree to restrict increases in allowable mass for triaxles to vehicles operated by members of approved mass-management compliance-assurance schemes;
4. agree to the imposition of substantial penalties on grossly overloaded vehicles, the penalties being commensurate with the risks to safety and infrastructure damage and the commercial benefits from overloading;
5. agree to establish a National Bridge Upgrading Program, to facilitate the adoption of these increased mass limits;
6. agree that an upgrading program of about \$75 million per annum (of new funding) over a period of about eight to ten years is appropriate. Because of its expected revenue gains from the productivity benefits of increased mass, the Commonwealth should provide the major part of the additional bridge funding;
7. agree that the capital costs of the Program be met as follows:
 

National Highways:	100 per cent Commonwealth funding
bridges on State/arterial roads:	50 per cent Commonwealth funding, 50 per cent State/Territory funding
Local government funded bridges	100 per cent Commonwealth funding;
8. agree that road users who take advantage of increased mass should contribute to ongoing funding requirements associated with increased mass limits. The Commission will recommend relevant charges in its Second Charges Determination.
9. agree that vehicles operating at increased mass limits be allowed general access to the road system, with some restrictions due to bridge limitations. These restrictions will be removed as bridges are upgraded.

It is proposed that B-doubles operate with the full increases in applicable axle group mass limits (a total of 68 tonnes) but they will not meet the relevant bridge formula. This may mean some additional restrictions on the bridges that can be used by these vehicles at the

maximum mass. Similarly, road trains would also operate with the same increases in axle group mass limits, including on converter dollies.

For suspensions to be considered road-friendly they must have:

- a sprung mass frequency no greater than 2.0 Hz;
- minimum critical damping of 20 per cent;
- static load sharing to within 5 per cent; and
- dual tyres.

These criteria match those in the current European Community (EC) Directive on road-friendliness and will be reassessed when the EC Directive is revised in light of the results of international research. At the current time, only air suspensions are expected to meet this performance standard.

A certification system for suspension types is to be developed along with a means of recording whether a vehicle is fitted with a road-friendly certified suspension system. The certification system will:

- apply to designs or types of suspensions;
- be completed by manufacturers for both existing and new designs; and
- not apply to individual vehicles in-service, although operators will need to be able to demonstrate they have a suspension that is road-friendly<sup>2</sup>.

Road-friendly performance must be maintained in-service, although means for ensuring that road-friendliness is maintained are not currently available. The performance of road-friendly suspensions in-service is to be monitored, and if necessary enforcement procedures for assessing road-friendliness developed.

The requirement for a mass management compliance assurance scheme for operators of vehicles with triaxles will provide increased confidence for road authorities and local governments that operators (those participating in approved schemes) are complying with mass limits. It should also assist in gaining public acceptance of higher mass limits.

Approved mass-management compliance-assurance schemes should include an agreed set of standards and audit processes, to be finalised by the NRTC over the implementation period for the Mass Limits Review. Any compliance-assurance scheme meeting these standards and audit processes would be approved.

A number of issues need further consideration, such as the costs this would impose on small businesses, the implications for the operation (and especially audit requirements) of compliance-assurance schemes and the time involved in establishing appropriate schemes capable of covering large numbers of operators<sup>3</sup>.

---

<sup>2</sup> Grandfathering will apply for older air suspensions where certification of road-friendliness is not available from the manufacturer. On new vehicles, the suspension must be certified as road-friendly and a statement obtained from the vehicle manufacturer that a road-friendly suspension is fitted.

<sup>3</sup> There are around 210 000 truck operators in Australia. A significant proportion of these would operate at the increased mass limits.

## **2. OBJECTIVES AND NECESSITY**

The three objectives set out in the Commission's charter are to improve transport efficiency, reduce administration costs and improve road safety. In addition, the Commission takes into account the environmental impact of its recommendations.

The construction of roads represents a balance between providing facilities for a range of users with different characteristics and competing priorities. The major influences on road design and construction are safety, the environment, vehicle volumes, the mass and volume of heavy vehicles using the road over its design life and the capital and ongoing costs associated with road construction and maintenance.

The allowable mass of heavy trucks and buses directly affects their productivity, and hence transport efficiency. For each truck or bus, more freight or passengers can be carried if higher mass limits are available. The net benefits from higher mass limits are the difference between the reduced cost of transport and the higher costs of operating the vehicle (including provisions to maintain roads and bridges), provided that there are no adverse safety or environmental effects.

The primary objective of the proposals being considered is to increase the efficiency of the current and future freight truck pool, by allowing vehicles with road-friendly characteristics to carry heavier loads. It is understood that road-friendly suspensions may allow this to happen without increasing the amount of wear and tear on the roads. This increase in transport efficiency occurs as a result of increasing productivity and therefore reducing freight costs. However, this results in an increase in the costs of bridge infrastructure and a small increase in suspension costs.

It is important to note the distinction that vehicles fitted with road-friendly suspensions are not necessarily road-friendly vehicles. The concept of road-friendliness is dependent on components like wheel assemblies in addition to the suspensions.

Another important issue is that of road safety and the environment. Work undertaken by the Steering Committee indicates that the proposed mass increases will not compromise either road safety, or the environment, but may actually improve them.

The necessity of the proposed mass limit increases in the context of the objectives above is to stimulate economic growth. The reduction in freight costs resulting from vehicle fleet productivity and efficiency gains is an important step towards providing the basis for economic growth and increased output.

### 3. IDENTIFICATION OF ALTERNATIVES

All options are assessed against a base case of "no change". In addition to the mass limits options assessed by the Steering Committee, options on different aspects of implementation of the proposed mass limit increases are evaluated here. Some of these aspects (eg funding and compliance issues) were not considered by the Steering Committee.

The do-nothing option would essentially retain the existing mass limits and not give the same incentive for improved pavement and truck designs. This option would have a significant opportunity cost in terms of the foregone benefits due to improved design in comparison to increases in mass limits.

#### 3.1 Mass Limit Options

##### 3.1.1 Axle Group Limits

The existing situation for the purposes of option consideration and cost-benefit analysis is that of vehicles operating at the Review of Road Vehicle Limits Study Option C (RoRVL C) mass limits which are equivalent to 42.5 tonnes on a six-axle articulated truck.

A set of four options was chosen for detailed examination, named D, E, F and G to follow on from the Option C limits in RoRVL. The details of these options are contained in Table 3.1.

**Table 3.1: Mass Limits Options Investigated by the Review**

(tonnes)

Option	Maximum allowable mass		Gross mass for 6-axle articulated vehicles
	Tandem axle group	Triaxle group	
Existing Limits (RoRVL C)	16.5	20.0	42.5
Option D	16.5	22.0	44.5
Option E	17.0	22.0	45.0
Option F	17.0	22.5	45.5
Option G	17.5	23.0	46.5

Option F was chosen over other options because it represented the best balance between benefits and impacts on road pavement and bridges.

##### 3.1.2 B-Doubles

In addition to the axle group limits above, the impacts of restricting B-doubles to 65 tonnes, instead of the total increase available to all axle groups (that is, 68 tonnes) was also considered. Overall, restricting the increase in the gross mass of B-doubles to 65 tonnes may reduce savings in vehicle operating costs by around 4.6 per cent<sup>4</sup>.

<sup>4</sup> NRTC CBA

The results of the analyses indicated that:

- less benefits (\$12.6 million per annum less) would result from lower increases in mass on B-doubles;
- B-doubles would be relatively disadvantaged compared to other less appropriate combinations;
- although bridge upgrading costs would be lower (by around 4 per cent), these cost savings were outweighed by the reduction in benefits.

## **3.2 Who Gets the Increases?**

### **3.2.1 Road-friendly Suspensions**

The proposed increases would only be allowed on axle groups fitted with road-friendly suspensions. An alternative to restricting higher mass limits to specific suspensions and axle groups is to allow mass limits increases for all suspensions. An analysis of the impacts of allowing increases in mass limits on all suspensions and axle groups has been undertaken and generally shows that the productivity gains are much higher than a restriction to road-friendly suspensions only. The option to allow mass limit increases on all vehicles has been disregarded at this stage due to the potential effects on pavement and bridge damage, especially on local government roads, and because it did not form part of the original deliberations<sup>5</sup>.

### **3.2.2 Membership of Accreditation Schemes**

The NRTC has proposed that mass increases be restricted to operators who are accredited under an approved mass-management compliance-assurance scheme.

A number of other alternatives were also considered however these were rejected. These alternatives included:

- restricting mass increases to operators who are participating in a maintenance management scheme. However, in the absence of any direct relationship between the key issues in maintaining road friendliness and maintenance management systems, this scheme was excluded at the present time;
- the introduction of a general management accreditation (such as ISO 9000). As this alternative cannot be linked directly with mass management it was rejected; and
- favoring operators with credible mass offences records. This alternative was aimed at linking and, in effect, rewarding those operators who have few mass offences with increased mass limits. This was rejected due its dependence on a high level of enforcement rather than on a high level of mass compliance as intended.

The introduction of a mass accreditation scheme or “second hurdle” for access to increased mass limits (where the “first hurdle” is the road friendly suspension systems) was included in the discussion paper *Increased Mass Limits: Compliance and Enforcement Issues*, released for public comment in December 1997.

---

<sup>5</sup> NRTC CBA

The response to this proposal was varied. Some respondents considered that the implementation of such a scheme would lead to greater control over mass and hence reduced road damage resulting from overloaded vehicles. Considerable concern was also expressed by some of organisations regarding the impact of accreditation on smaller operators.

The results of NIEIR's economic modelling suggest that, if there are no unquantified offsetting benefits, the costs associated with accreditation will reduce the benefit-cost ratio of increased mass limits (while still leaving the ratio high)<sup>6</sup>.

Therefore, in order to reduce the potential impact of accreditation on operators, whilst addressing the concerns of those seeking greater control over vehicle mass, the Commission now proposes that the requirement for membership of a mass-management compliance-assurance scheme be restricted to operators of vehicles with triaxles.

Triaxle vehicles constitute around one third of the vehicles eligible for mass increases under the proposal and account for almost two thirds of the distance driven.

The revised proposal has a number of advantages, including the exclusion of many smaller operators from needing to comply with a second hurdle. It also restricts the accreditation scheme to the vehicles which: yield the largest benefits from the proposed mass limit increases; are driven the greatest distances; and, are most likely to result in bridge damage (due to the aggregate mass of the vehicle). The cost-benefit ratio for the implementation of the proposed higher mass limits will be significantly improved if the second hurdle is restricted to vehicles with triaxles.

The Commission will review current mass-management compliance-assurance schemes and make recommendations about the type of mass-management scheme that would be best suited as a condition of access to higher mass limits.

### **3.2.3 Other Issues**

The issue of allowing mass limit increases on truck-trailer combinations, two, three and four axle dog trailers, and "super-dog" trailers has been examined by the Commission. In December 1997, the Commission released Technical Working Paper No.31 with a supporting policy proposal for comment by jurisdictions and industry. Comments received indicated support for the proposal of allowing additional mass for these vehicles, subject to agreed operating conditions.

The issue of allowing mass limit increases on vehicles with wide single tyres is also being investigated by the Commission. The earlier Steering Committee recommendations were that there be no mass limit increase on vehicles fitted with wide singles due to the high pavement wear believed to be associated. However, the research on which it was based was criticised for a number of reasons:

- The research was undertaken overseas on pavements, axle masses and in temperatures that may not be applicable in Australia;
- The "real-world" differences between wide single and dual tyres (such as pressure variations between the tyres in a dual set) were not taken into account.

---

<sup>6</sup> National Institute of Economic and Industry Research, Draft Report on Increases in *Mass Limits: Government Revenue Impacts*, February 1998.

Since this time the NRTC has commissioned ARRB Transport Research to examine appropriate ways of progressing research in this area. A draft report outlining methods for determining the relative road wear of wide single has been forwarded to the NRTC. This report, which identifies a number of options and systems for the measurement and assessment of tyre contact pressure will be released for comment.

### **3.3 What is Road-Friendly?**

#### **3.3.1 Performance Standard**

Introducing a performance standard for road-friendliness requires a more complex administrative structure yet it guarantees a minimum level of road-friendliness. The alternative is to define road-friendliness as air suspensions. While the latter would be easier to recognise visually and therefore easier to administer, it would not set a standard for what the suspension has to do and therefore its link with road-friendliness would be tenuous and variable.

The Commission has recommended that a performance standard be introduced to determine which suspensions are considered road-friendly.

If such a performance standard is adopted, criteria for the standard will be required. The alternatives are to introduce the DIVINE<sup>7</sup> results or to adopt the standards used in the EC Directive. It was originally proposed that the EC position be adopted at this stage, as more suspensions would be able to meet the criteria. It was thought that this would result in a greater take-up, which would translate to greater benefits due to reduced freight costs. However, it would not achieve the same benefits of reductions in road wear to offset mass increases.

Although the expectation has been that all air-suspensions would get the mass increases, not all of them meet DIVINE performance criteria and nor would this be consistent with the current EC position. The most feasible alternative appears to be to adopt the EC criteria as a performance standard in the short term and to switch to the recommendation of the DIVINE study when the EC does.

Therefore, the following criteria were proposed for meeting the performance standard:

- dual tyres;
- hydraulic dampers on each axle;
- a sprung mass frequency no greater than 2.0 Hz;
- a damping ratio (D) of more than 20% of critical damping (with dampers fitted);
- a damping ratio of no more than 50% of D when all dampers are removed; and
- the load of each axle of a multi-axle group remain within 5% of its nominal share of the total load of the group.

---

<sup>7</sup> Dynamic Interactions of Vehicles and Infrastructure Experiment, an international study co-ordinated by the Organisation for Economic Co-operation and Development (OECD).

It should be noted that the last criteria in this list was not part of the EC Directive. DIVINE did not give an indication of load sharing recommendations therefore this criteria was proposed by the Steering Committee.

The proposed maximum frequency of 2.0 Hz for body modes is equal to that currently allowed in the EC. A reduction in the road-friendly suspensions definition from 2.0 Hz to 1.5 Hz is believed to reduce peak dynamic wheel loads by 24 per cent.<sup>8</sup> If the 1.5 Hz cut-off for road-friendly suspensions was introduced now, a number of air-suspensions would not achieve road-friendly status because they operate at 1.6 and 1.7 Hz. It is therefore proposed that the 2.0 Hz cut-off be introduced to be consistent with the EC and change the limit at the same time as the EC.

Under this proposal, air suspensions, along with any other suspension type, would be required to meet the performance standard to be classed as road-friendly.

The proposed performance standard was included in the Compliance and Enforcement Issues Discussion paper. Comments received on the proposed performance standard do not indicate any need to amend the standard. However, as suggested in the Discussion Paper, the performance standard for road-friendliness will be reassessed once the EC Directive is revised in light of the DIVINE results.

### **3.3.2 Certification Options**

By introducing a performance standard, a certification system is required to determine whether the suspensions system on a given vehicle actually meets the standards criteria. Two alternative methods of certifying appropriate road friendly suspensions were considered. The first option is to certify the suspension type or design, while the second is to certify individual vehicles. The first option is simpler and cheaper in terms of administrative costs, although there is no guarantee that the certification will result in a road-friendly system on individual vehicles in-service. The second option would ensure that the vehicles in-service meet the performance standard, although the costs of the system will be high, especially in the early stages of implementation.

The preferred option proposed in the Compliance and Enforcement Discussion Paper is to certify suspension types rather than individual vehicles. This would allow a certification system to be set up by FORS that would be similar to the current Australian Design Rule type-approval certification process.

The Federal Office of Road Safety (FORS) supports the type-approval system proposed in the Compliance and Enforcement Issues Discussion Paper, subject to the detail of the scheme being finalised. Under this proposal, suspension manufacturers would apply to FORS in a similar way to the current Australian Design Rule type-approval system. Suspension manufacturers would be issued with an approval from FORS if there was satisfactory evidence of the suspension type meeting the performance standard. This approval system would be operated on a “fee for service” basis because it falls outside the provisions of the Motor Vehicle Standards Act 1989.

To enable a vehicle to be identified as road-friendly, the operator needs to demonstrate that the vehicle is fitted with road-friendly suspensions.

---

<sup>8</sup> DIVINE Policy Implications Chapter 4

New vehicles can rely on the certification process and statements provided by vehicle manufacturers to identify whether the suspension is road-friendly. The alternative is to inspect all new vehicles to record whether they are eligible for any mass limit increases, however this would be very expensive to administer.

It is more difficult to identify whether air suspensions on existing vehicles are road-friendly, especially if the air suspension is no longer manufactured. It is anticipated that inspections by an authorised person will be necessary.

An alternative approach would be to allow all existing vehicles with air suspensions to be considered road-friendly while the suspensions types on new vehicles would be required to be certified. This approach would allow for a simple inspection of existing vehicles to determine whether air suspensions are fitted. However, the usual equity problems involved with grandfathering would apply.

The Commission proposes that the following procedures be followed to identify vehicles fitted with road-friendly suspensions:

1. for new vehicles, a statement should be provided by the vehicle manufacturer that the vehicle is fitted with a suspension type that has been certified as road-friendly;
2. for existing vehicles fitted with suspensions that are currently being manufactured, whether the vehicle is fitted with a suspension type that has been certified as road-friendly, should be ratified by either an inspection by an authorised person or through a statement from the vehicle manufacturer; and
3. for existing vehicles fitted with suspensions that cannot be readily tested as to whether or not they meet the road-friendly performance standard (such as suspensions that are no longer manufactured), vehicles with air suspensions will be regarded as being fitted with road-friendly suspensions, for the life of the vehicle or suspension. These vehicles would require a physical inspection by an authorised person to confirm the existence of the air suspensions.

### **3.3.3 Vehicle Identification Options: Administrative Systems**

Once an operator has demonstrated that a vehicle is fitted with a road-friendly suspension, an administrative system needs to be in place to identify which vehicles are eligible for higher mass limits.

There are two potential methods of linking particular vehicles to higher mass limits:

- (i) Through the vehicle registration system. The vehicle is registered as being eligible for higher mass limits.
- (ii) By way of permits. A permit is issued which allows the vehicle to operate at the higher mass limit.

The Steering Committee suggested that mass limit increases should not be administered through a permit system because permits involve high administrative costs. One of the advantages of the *Road Transport Reform (Mass and Loading) Regulations* was the abolition of mass permit fees for general access vehicles. The Regulatory Impact Statement for the Mass and Loading Regulations estimated the reduced administrative costs for Victoria and New South Wales at \$1.6 million (half each to road authorities and operators). The aversion

to the use of permits was reiterated at a workshop held on this issue by the Commission in November 1996.

It is therefore suggested by the Commission that the vehicle registration system be used to implement the proposed higher mass limits.

However there are some inherent difficulties with using the registration system because of the need to identify a vehicle as being eligible for higher mass limits in the vehicle's registration details. The major problem is that it can take registration authorities up to twelve months to make changes to computer systems. Therefore, they are likely to wish to combine any changes due to higher mass limits with any changes associated with the Second Charges Determination.

Identification through the vehicle registration system was the mechanism proposed in the Compliance and Enforcement Issues Discussion Paper. This option was supported by comments received.

### ***3.3.4 Vehicle Identification Options: Roadside Identification***

Roadside vehicle identification options could include registration labels, special purpose labels or distinct registration plates. Labels have the advantage of flexibility and ease of replacement should the vehicle no longer be eligible for (or the operator not wish to operate at) the higher mass limits, while registration plates may be more conspicuous (although much more expensive and administratively complex).

Due to space constraints on current registration labels, the most likely outcome for vehicle identification is a separate label or decal to be attached to the windscreen of the vehicle. Other options may become available as technology changes.

Separate charging codes are likely to be required to match the new mass limits to allow enforcement officers to determine the vehicle's authorised mass limit. These codes could be displayed on the registration label. An alternative would be to use colour-coded labels where a particular colour would signify a particular mass increment.

Due to space constraints on current registration labels, the most likely outcome for vehicle identification is a separate label or decal to be attached to the windscreen of the truck or prime mover, or to the body of a trailer. Other options may become available as technology changes.

The Federal Office of Road Safety has suggested that electronic in-vehicle identification systems may provide a viable option for the on-road identification of vehicles operating under increased mass limits. The Commission would support any jurisdiction prepared to run a pilot program to test the feasibility of this option.

It is proposed that these matters be addressed as implementation issues.

### ***3.3.5 In-service Performance of Road-friendly Suspensions***

Further work is required to determine whether vehicles in-service will continue to meet the performance standard for road-friendly suspensions. To this end, the NRTC proposes a survey of the in-service performance of air suspensions, to determine whether there is a problem with deterioration of road-friendliness performance. At this stage only the in-service performance of air suspensions is being considered as these are the only suspension types that currently

meet the performance standard. If other suspension types meet the standard in the future, the testing of in-service performance of these suspensions will become an issue.

This survey will give an indication as to whether general maintenance of air suspensions will maintain their road-friendly performance and can be used to determine key factors in maintaining road-friendly performance. If general maintenance is not effective, the alternatives are to develop simple in-service tests which show that suspensions meet the performance standard or to produce effective guidelines for the maintenance of suspensions in a road-friendly condition.

Some jurisdictions already require periodic inspections of heavy vehicles. Checking the road friendliness of suspensions could be incorporated into these inspections in addition to random roadside inspections.

### **3.4 Funding Options**

Three options for funding have been considered. These were: to fund a bridge refurbishment program out of revenues collected through charges on vehicles operating at the higher limits; to introduce a federally-funded national bridge refurbishment program; or to introduce a combination of the first two options.

A number of comments were made about the impacts of each of the funding options:

1. There may be an initial revenue shortfall if funding is obtained through charges due to the need to upgrade some bridges prior to their use by vehicles operating at increased mass limits. Varying charges between years to reflect the change in costs over time is not feasible. Similar problems exist between States and Territories as a high proportion of bridge costs fall in the eastern States. Therefore a uniform charge would not match the funding requirements of each State.
2. Meeting additional costs out of charges is unpopular.
3. An alternative is to combine both options so that there is a smaller charge on vehicles operating at the higher limits along with a centrally funded bridge refurbishment program.
4. A further option is to borrow the funds for bridge refurbishment and repay costs over time from charges for higher mass limits. Finance could come from the Federal government, infrastructure bonds or private enterprise.

At their February 1997 meeting, Ministers were presented with a submission that the costs of increasing mass limits should be introduced such that no charges would be levied until July 1998 at the earliest and to agree in principle that funding should occur jointly between vehicle operators and Commonwealth, State and Territory governments in a manner to be agreed by Ministers.

A number of further comments were made in the February 1997 submission to the Ministers that suggested the following points:

1. Reallocation or increases in mass-related road authority expenditure are small in comparison to the total road authority expenditure.

2. Federal funding is generally supported due to the “growth dividend” arising from increased mass limits and the increase in federal taxation receipts.
3. A joint funding program is seen as attractive. Any shortfall in federal government revenues would be recouped over time due to the growth dividend.
4. Charges on vehicle operators that would have to recoup a high up-front cost, as well as the interest costs, are unpopular.
5. Private funding of the proposal may not be feasible due to the range of government instrumentalities involved, the large number of separate projects and the lack of identifiable revenue streams associated with the expenditure.

The recommended position is that joint (Commonwealth, State and Territory) government funding, combined with recovery of a proportion of ongoing costs from operators, should be the favoured approach. The final decision must consider the position of local government.

The ultimate aim of the adopted funding strategy is to target it at bridges requiring upgrading, and administer it in a cost effective manner. The proposed two stage funding arrangement recognises the significant benefits from the mass limits to vehicles with road-friendly suspensions, the likely distribution of these benefits and the need to achieve the benefits as early as possible.<sup>9</sup>

### **3.5 Compliance and Enforcement**

Concern has been raised in discussions on proposed mass limit increases about compliance with current mass limits. In particular, there is concern about the level of gross overloading and the perceived low penalties for overloading offences. This problem would be exacerbated by the introduction of higher mass limits.

A range of conventional enforcement options were considered in the Compliance and Enforcement Issues Discussion Paper to determine their likely effectiveness in improving compliance with mass limits.

The options considered were:

- increased on-road enforcement;
- reduced weighing tolerances;
- mandatory fitting of low-cost on-board weighing devices; and
- additional penalties for overloading offences.

The option of increasing on-road enforcement could be an effective deterrent against overloading. However, there has been no indication from road agencies of any intention to increase enforcement resources in conjunction with increased mass limits.

Smaller weighing tolerances may reduce the level of small overloading by operators who load up to the tolerance level. This is only likely to have a minor effect on small overloads and no effect on overloading that already exceeds current tolerances.

---

<sup>9</sup> ATC 97/25 (MC) Mass Limits Review - Implementation

Reducing weighing tolerances is not considered to be an effective method of improving compliance with mass limits. However, the Commission has instigated two projects relating to tolerances. One is a discussion paper on administrative tolerances while the other aims to produce proposals for weighing method tolerances.

Consideration was given to recommending the compulsory fitting of functional on-board weighing devices for vehicles granted mass limit increases. The intended device would be a low-cost, reasonably accurate air pressure gauge that would eliminate any doubt about the driver's ability to estimate the load on the vehicle.

However, these devices can only be taken as indicative and therefore it is proposed that the fitment of low-cost air-gauges be encouraged, but not made mandatory.

At their meeting of 14 November 1997, Ministers requested the Commission to report on proposals for overloading penalties, including substantial increases in penalties for gross overloading, commensurate with the risk to safety and the damage to bridges and roads.

In response to this request, the Commission included a proposal for overloading penalties in the Compliance and Enforcement Issues Discussion Paper. The Commission intends to further develop the range of sanctions for overloading as discussed in Section 5.4.2 of the Impact Analysis.

### **3.6 Implementation**

There are two main alternatives for the way in which increases in mass limits are implemented:

1. as 'general access'; or
2. on restricted routes.

Restricting the routes on which higher mass vehicles can operate involves a number of problems. Perhaps most significantly, it would be very expensive, if not impossible, to enforce. The potential benefits from mass increases would also be unnecessarily curtailed. 'General access' is therefore the preferred approach.

'General access' would mean that vehicles that are currently allowed to operate up to 42.5 tonnes gross mass would be able to operate up to 45.5 tonnes on all roads, unless they are specifically excluded by, for example, a sign post.

B-doubles, road trains and other vehicles with restricted access would continue to operate on restricted routes, although they may choose to do so at higher axle mass limits.

For all vehicles operating at higher mass limits, some restrictions are likely to apply to which bridges they can use, at least in the short term. In the longer term, as bridges are upgraded and access routes expand, these restrictions would be lifted.

Local governments have expressed concern about the potential impacts of increased axle masses on lightly constructed roads, that are already carrying heavier loads than they were designed too. While greater use of road-friendly suspensions is likely to partly mitigate the effects of increased axle masses (especially for cracking), impacts on roads subject to rutting are less clear. As a result, it may be necessary to consider restricting access of heavier vehicles to some local government pavements.

## **4. CONSULTATION**

### **4.1 Consultative Process Overview**

The Mass Limits Review was initiated in 1993. The work of the Review was divided into discrete modules that reflected the main issues to be addressed. These modules and their interrelationships are detailed in the Steering Committee Report. However, the whole Review process is described in this Preliminary RIS, including the period prior to the formation of the Steering Committee, the recommendations of the Committee, and the consultation and additional analysis that has followed to result in the RIS.

In the period between 1993 and 1996 (when the Steering Committee Report was released), a number of publications were prepared discussing issues associated with the Mass Limits Review. These publications are listed in Chapter 8.

This research and investigation phase culminated in the release of the Steering Committee Report and Recommendations in August 1996, supported by four Technical Supplements as detailed in the references. The release of this report coincided with the call for submissions and comment on the proposal. In response to this, more than sixty submissions were received.

The consultative process and study milestones to November 1997 are indicated in Figure 4.1, with initiation of the Review in 1993, release of the Steering Committee Report and Recommendations and media release in July 1996.

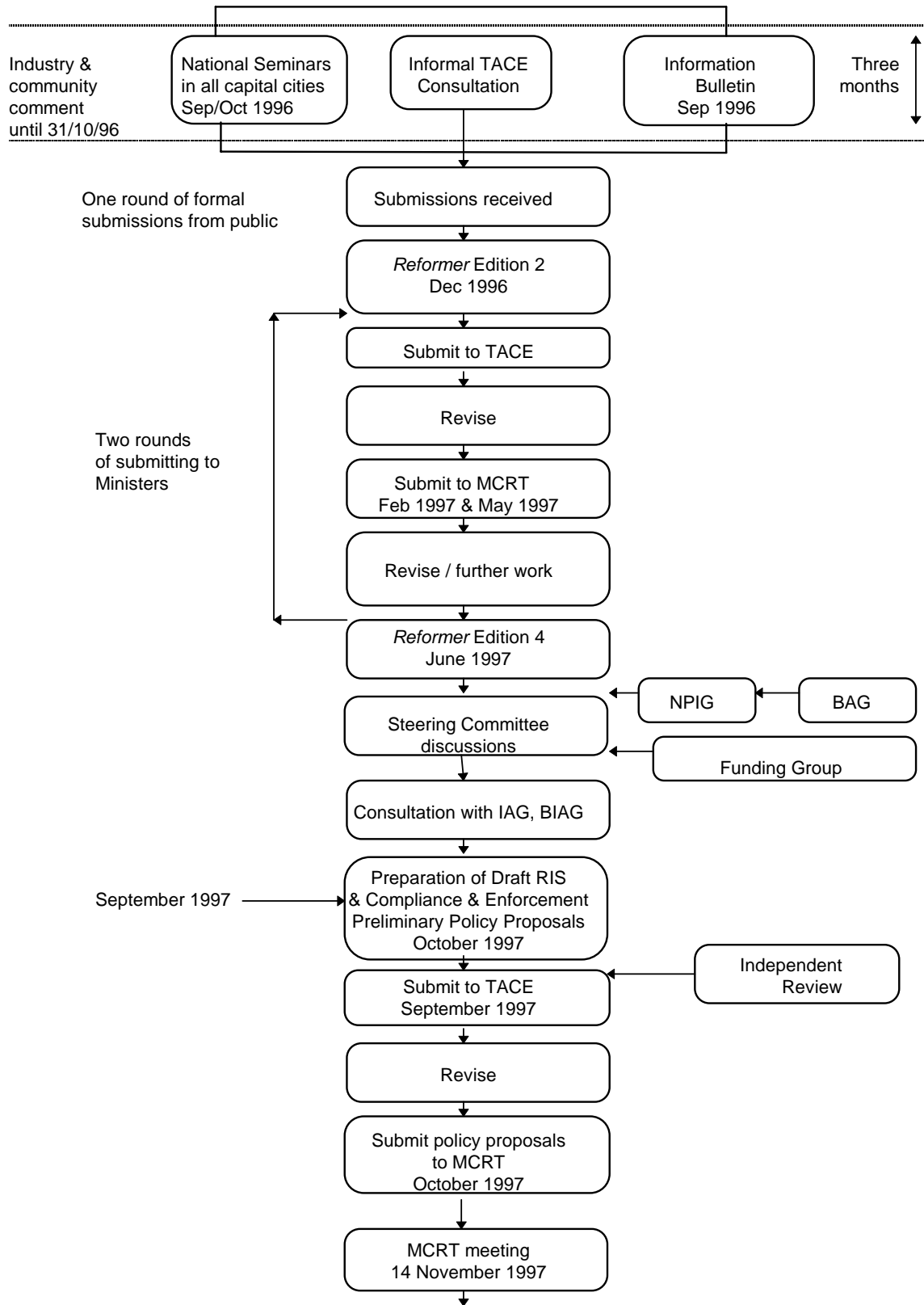
Community concerns covered environmental and infrastructure impacts. Local government concerns were raised over their independent role in infrastructure management and the limited options available to recover costs.

Following the release of the report of the Steering Committee, the consultation process has included a series of seminars run in each capital city during September and October 1996 and the release of printed information such as Reformer and Information Bulletins. A workshop on compliance and suspension issues was held in late 1997.

The purpose of these discussions was to provide a forum for raising relevant issues and to present and explain the Steering Committee Recommendations. The results of these consultations have been very similar to the views put forward in the earlier round of discussions. The targeted groups for consultation were the transport agencies, road user groups, the road transport industry, local government, community groups interested in environmental and safety issues and other interested organisations.

A number of formal and informal discussions were held with TACE and the Ministerial Council for Road Transport and have resulted in the identification of a number of additional issues that need to be resolved.

A number of issues raised in the discussions with interested organisations were considered in the Compliance and Enforcement Issues Discussion Paper which was released for public comment in December 1997.



**Figure 4.1: Consultation Process to November 1997**

## 5. IMPACT ANALYSIS

### 5.1 Introduction

A range of sources have been used in assessing the impacts of the proposals in this Preliminary Regulatory Impact Statement. These sources are explained in Appendix A.

Estimates of the monetary impacts of increasing mass limits were based on a “static” analysis, that estimates the difference in costs before and after mass limit increases are fully implemented. The estimates presented in Sections 5.3 to 5.12 represent the impacts after full implementation, that is, they represent the difference between current costs and the costs likely to occur after mass limits are increased, and all operators who wish to do so are utilising the increases.

It is expected that it will take around eight years to complete all the necessary bridge upgrading, and that the benefits will increase over this period. As bridges will be upgraded on high priority freight corridors first, the benefits are expected to accumulate more rapidly in the initial years. For simplicity, in the initial analyses it was assumed that there would be no growth in the aggregate freight task. This assumption was relaxed in the economic modelling exercises and in the work on impacts on rail.

In all the results reported, it is assumed that there would be a 70 per cent take-up of mass limit increases. This means that 70 per cent of travel that is currently fully laden would move to the higher limits and adopt suspensions classified as road friendly. This take-up rate was derived by examining information available on the take-up of previous increases in mass limits, especially the take-up of RoRVL C mass permits in New South Wales and Victoria in the late 1980s and early 1990s. For some industries a high proportion of travel is undertaken fully laden (in terms of the weight carried), and for others, such as car carrying, the space available restricts how much can be carried rather than mass limits. These variations are taken into account in the analyses.

### 5.2 Base Case

The base case or current situation is defined as vehicles operating at Option C (RoRVL) mass limits, 20 per cent of vehicles fitted with road-friendly suspensions and all bridges able to carry B-doubles at current mass limits. Benefit to pavements of using road-friendly suspensions are included for this 20 per cent of vehicles, along with higher capital costs associated with the more expensive suspensions. A real discount rate of 5 per cent has been used along with an evaluation period of 15 years and 1994/95 prices<sup>10</sup>.

The base case costs for bridges, shown in Table 5.1, are higher than current bridge expenditure levels. On the other hand, current pavement rehabilitation expenditure is higher than the estimated base case costs.<sup>11</sup>

---

<sup>10</sup> As bridge data shall be updated with the completion of desktop bridge assessments, bridge pricing shall be based on current prices. Prices for roads, administration and vehicle operating costs shall remain at 1994/95 prices.

<sup>11</sup> NRTC CBA Table 2.2

**Table 5.1: Base Case Costs**

(\$ million per annum)

State/ Territory	Bridges on Arterial Roads		Bridges on Local Roads	Pavement Rehabilitation		Administration Costs	Freight Costs <sup>1</sup>
	B-doubles Not Included	B-doubles Included		Arterial Roads	Local Roads		
NSW	30	32	118	113	171	33	4 167
Vic	13	13	na	51	74	7	2 333
Qld	21	22	na	63	49	10	2 145
WA	19	19	31	42	52	5	822
SA	5	5	na	66	54	1	1 116
Tas	4	4	na	7	8	1	270
NT	3	3	na	10	4	2	206
ACT	na	na	na	1	5	-	49
Total	95	99	237	353	417	58	11 108

1. Estimated as resource costs, not financial costs.

### 5.3 Impacts on Freight Costs<sup>12</sup>




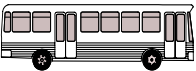

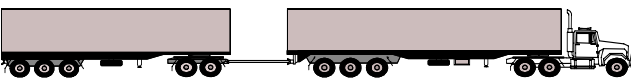

The effects of the proposed increases on the maximum mass of various vehicles are illustrated in Figure 5.1. It is clear from this illustration that substantial increases in the maximum allowable load will occur for some vehicles. The greatest increases occur for vehicles with triaxles. Consequently significant payload increases will be possible on six-axle articulated trucks, B-doubles and road trains. Obviously freight vehicles with single axles will not be affected as no increases are proposed, at this stage, for these vehicles.

Increases in payload will reduce the costs per tonne of transporting freight. Only fully laden travel will be affected, not travel by vehicles when they are partly laden. Empty travel may also be reduced, however, if fewer trips are needed to transport the freight. Industries that are affected by volume constraints (the space available on a truck) will not be able to increase payloads. On the other hand transport of bulk products may be significantly affected.

The effects of these increases on freight costs have been estimated by examining potential changes in costs of operating freight vehicles. The data on freight costs were disaggregated by State and Territory, area of operation (rural and urban), type of vehicle and industry classification.

The estimated changes in vehicle operating costs (VOC), or freight costs, include the savings resulting from the increased carrying capacity of freight vehicles and are net of the increased capital costs associated with fitting more expensive road-friendly suspensions.

<sup>12</sup> The forecast impact of the mass limits on freight costs is based on results of the analysis of the impacts of Option E, as it was the initial preferred option of the Steering Committee. However, the patterns emerging within the disaggregated data groups should be similar for Option F.

Vehicle Type	Current Maximum (tonnes)	New Maximum (tonnes)
	22.5	23.0
	39.0	40.0
	42.5	45.5
	15.0	16.0
	62.5	68.0
	79.0	85.7
	115.5	125.2

**Figure 5.1: Increases in Maximum Mass by Type of Vehicle**

The reductions in freight costs result from fewer vehicle kilometers travelled to carry the existing freight task, and therefore reduced capital costs associated with vehicle purchase as well as reduced recurrent costs such as fuel costs. These are offset by the increased capital costs related to road-friendly suspensions. Costs associated with accreditation under a mass-management scheme are not included in the estimates shown in this section.

All taxes have been omitted from the cost-benefit analysis as they represent transfers between groups in the community, not a flow of resources. These transfers are a gain to one sector of the community and a loss to another, with no net impact.

It is assumed in this analysis that 20 per cent of operators have road-friendly suspensions under the base case, and that under Option F this would increase to 70 per cent. The additional annual capital costs of installing road-friendly suspensions on 50 per cent of replacement vehicles is estimated to be \$21 million per annum across Australia as a whole.

A large proportion of new vehicles, however, is being fitted with road-friendly suspensions. This is partly a result of the potential to take advantage of proposed increases in mass limits for vehicles with these suspensions, but is also a result of other benefits to operators, such as improved ride for drivers and reduced damage to freight. Overseas experience indicates that large numbers of operators are installing road-friendly suspensions without incentives such as increased mass limits.

Consequently it has been assumed in this analysis that a significant proportion of new vehicles would be fitted with road-friendly suspensions regardless of any increases in mass limits. The additional suspension costs due to the increased limits have therefore been

halved. Resulting estimates of additional suspension costs, solely due to increases in mass limits, are shown in Table 5.2.

The savings in vehicle operating costs due to increased productivity are also shown in Table 5.2. The estimated savings in freight costs for Option F are \$274 million at a 70 per cent take-up across Australia<sup>13</sup>. Costs (and any benefits to operators) of accreditation under a mass-management scheme are not included.

**Table 5.2: Estimated Savings in Freight Costs by State/Territory**

*(\$ million per annum)*

State/Territory	Total Resource Cost Savings	Costs of Road-Friendly Suspensions	Net Resource Savings
New South Wales	124.0	4.1	119.9
Victoria	51.9	1.9	50.0
Queensland	65.2	2.2	63.0
South Australia	20.9	0.6	20.1
West Australia	18.0	1.1	16.9
Tasmania	3.3	0.2	3.1
Northern Territory	1.4	0.3	1.1
Australian Capital Territory	-	-	-
Australia	284.8	10.7	274.1

*Notes: Assumes the proportion of vehicles with road-friendly suspensions increases from 20 per cent in the Base Case to 70 per cent.*

It is estimated that for the base case, 66 per cent of freight vehicle operating costs occur in rural areas with the remaining 34 per cent in urban areas. The results indicate that relative to the base case, a higher proportion of savings are expected to occur in rural areas relative to the costs incurred in these areas.

The analysis in Table 5.3 refers to financial costs and as such includes government duties and taxes, capital costs and recurrent costs. The estimated financial savings in annual vehicle operating costs are \$498 million per annum. In other words, if the Option F mass limits were allowed, freight costs, in financial terms, would be reduced by \$498 million per annum.

The estimated financial savings in annual vehicle operating costs for Option F with mass increases to vehicles with road-friendly suspensions are \$329 million for rural operation and \$169 million for urban operation, giving a total of \$498 million for all vehicles across Australia<sup>14</sup>.

<sup>13</sup> NRTC CBA Table 5.1

<sup>14</sup> NRTC CBA Table 5.5

**Table 5.3: Annual Vehicle Operating Costs by State/Territory: Financial Costs**

State/Territory	Base Case	Option F	Savings in Freight Costs	Savings as a Proportion of Total <sup>1</sup>	Proportion by State/Territory
	(\$ million pa)	(\$ million pa)	(\$ million pa)	(per cent)	(per cent)
New South Wales	6 347	6 136	211	3.3	38
Victoria	3 519	3 426	93	2.6	21
Queensland	3 259	3 151	109	3.3	19
South Australia	1 250	1 211	39	3.1	7
West Australia	1 679	1 648	32	1.9	10
Tasmania	408	400	8	2.0	2
Northern Territory	313	305	8	2.5	2
Australian Capital Territory	72	72	-	0.4	1
Australia	16 847	16 349	498	3.0	100

.. not applicable

1. Savings in freight costs, in financial terms, compared to base case.

Note. Assumes the proportion of vehicles with road-friendly suspensions increases from 20 per cent in the Base Case to 70 per cent under Option F.

The savings for Queensland are higher than Victoria due to the high number of 6-axle articulated and 7-or-more axle combination vehicles in Queensland that benefit significantly from the mass limit increases. That is, they are the vehicle types that benefit most from the 2.5 tonne increase proposed for triaxles<sup>15</sup>.

The financial savings are disaggregated by vehicle type in Table 5.4. Greatest savings occur with larger vehicles using triaxle groups, as these vehicles get the greatest increases in maximum mass. Savings are smaller for other vehicles types, except 4-axle rigid trucks with trailers which incur small cost increases. The total savings are \$498 million per annum<sup>16</sup>.

**Table 5.4: Annual Freight Cost Savings By Type of Vehicle: Option F**

Vehicle Type	Financial Cost Savings <sup>1</sup>	Proportion by Vehicle Type <sup>2</sup>
	(\$ million per annum )	(per cent)
3-axle Rigid Truck	15.3	3.1
3-axle Rigid Truck with Trailer	4.9	1.0
4-axle Rigid Truck	0.9	0.2
4-axle Rigid Truck with Trailer	-0.3	-0.1
4-axle Articulated Truck	1.0	0.2
5-axle Articulated Truck	6.9	1.4
6-axle Articulated Truck	400.8	80.4
7-or more axle Combinations <sup>3</sup>	72.3	14.5
Total Trucks	498.0	100.0

1. Assumes the proportion of vehicles with road-friendly suspensions increases from 20 per cent in the Base Case to 70 per cent.

2. Savings in freight costs by vehicle type as a proportion of the total savings for all vehicles.

3. Includes B-doubles, road trains and twin-steer prime movers.

<sup>15</sup> NRTC CBA Figure 5.1

<sup>16</sup> NRTC CBA Table 5.6

Changes in freight costs by industry are shown in Table 5.5. The analysis by industry indicates that relative to the base case, consistent savings of between 1 per cent and 5 per cent (compared to the base case) are expected across a range of commodities.

**Table 5.5: Annual Freight Cost Savings by Industry: Option F**

Industry	Resource Costs		Financial Costs	
	Total Savings <sup>1</sup> (\$ million pa)	Proportion by Industry <sup>2</sup> (per cent)	Total Savings <sup>1</sup> (\$ million pa)	Proportion by Industry <sup>2</sup> (per cent)
<b>Ancillary Transport</b>				
Agriculture	39.4	14	70.1	14
Mining	2.4	1	4.6	1
Manufacturing	16.8	6	33.2	7
Construction	20.4	7	42.0	8
Wholesale/retail	18.5	7	33.3	7
Other	3.9	1	10.6	2
<i>Total Ancillary Transport</i>	<i>101.4</i>	<i>37</i>	<i>193.7</i>	<i>39</i>
<b>Hire-and-Reward Transport</b>				
Livestock	13.3	5	21.7	4
Mineral	6.8	3	11.9	2
Car Carriers	0.7	-	1.4	-
Quarry	11.7	4	21.3	4
Grain	15.3	6	24.9	5
Petrol	9.2	3	15.6	3
Bulk Liquid	2.3	1	4.3	1
Logs	10.3	4	16.7	3
Food	17.1	6	29.1	6
Waste	5.2	2	12.9	3
General Freight	64.4	24	113.1	23
Parcels	4.8	2	12.3	3
Containers	11.6	4	20.3	4
<i>Total Hire-and-Reward</i>	<i>172.6</i>	<i>63</i>	<i>305.8</i>	<i>61</i>
All Industries	274.1	100.0	499.5	100

1. Assumes the proportion of vehicles with road-friendly suspensions increases from 20 per cent in the Base Case to 70 per cent.

2. Savings in freight costs by industry type as a proportion of the total savings for all industries.

The most significant savings are expected for:

- hire-and-reward transport activities involving general freight, grain transport and livestock transport; and
- ancillary transport operations in the agricultural, wholesale/retail, food and construction sectors.

Ancillary transport operations refer to transport activity that is undertaken as part of another type of business. The companies concerned only carry their own freight and do not transport goods for other people. Savings are not expected in the transport of parcels and cars due to the volume constraint typical of this type of freight. That is, for this type of freight, dimensions limit impose a greater constraint on the amount of freight carried rather than mass limits.

In 1996 the NRTC commissioned RA Smith to investigate the direct and indirect benefits of reforms on road transport. The results of this analysis were published as a report on *The Benefits of Road Transport Regulatory Reform*<sup>17</sup>. In this study, benefits were estimated from a sample survey of operators and consultation with government agencies. Both operators and agency representatives were asked to estimate the impact of mass limit increase in terms of quantified costs and benefits. The study estimated the total direct benefits of savings in freight costs to be around \$310 million per annum.

As the costs of installing road-friendly suspensions are estimated to be around \$10 million per annum, a net saving in freight costs of around \$300 million per annum can be expected if *The Benefits of Reform* results are adopted. However, the sample in the investigation was small and only included representatives from New South Wales, Victoria, Queensland and South Australia. Small fleets/owner drivers were under-represented in the sample<sup>18</sup>. Remote areas were also under represented. Therefore the results may be limited in their ability to reflect the national benefits that might accrue from an increase in mass limits.

By way of comparison, the original estimates of net savings in freight costs were around \$275 million per annum, that is \$35 million per annum less than estimated by RA Smith's investigation.

#### **5.4 Compliance and Enforcement**

In response to the request from Ministers to report on proposals for penalties for overloading, including substantial increases in penalties for gross overloading, commensurate with the risk to safety and the damage to bridges and roads, the Commission released for comment the discussion paper *Increased Mass Limits: Compliance and Enforcement Issues*.

The Discussion Paper proposed a penalty structure as follows:

- nationally uniform maximum court penalties escalating as the percentage of overload increases;
- infringement penalties for smaller overloads;
- a five times corporate multiplier;
- a commercial benefits penalty;
- an off-loading policy;
- driver demerit points for gross overloading;
- suspension of registration for gross overloading.

In responses to the discussion paper, strong support was expressed for nationally uniform penalties for overloading, for a strengthening of existing penalties and for rapid escalation of penalties with the degree of overmass. Most of the proposals were supported, with some concern expressed over specific issues.

---

<sup>17</sup> Prepared by RA Smith and published by the NRTC in 1997.

<sup>18</sup> The sample comprised 300 transport operators, with just under 3000 vehicles. Most of these operators had medium to large size fleets, unlike the general population where more than 70 per cent of freight operators only have one vehicle.

Subject to some adjustment once all comments have been received and assessed, the range of penalties proposed in the Discussion Paper is considered to provide an appropriate sanction for all overloading situations. However, the inclusion of driver demerit points is likely to be reconsidered.

The Commission intends to develop the proposed penalty structure for inclusion in the compliance and enforcement provisions currently being prepared for the Road Transport Reform (Mass and Loading) Regulations. These provisions will also include the “chain of responsibility” principle. A Regulatory Impact Statement will be developed to support the proposed provisions.

The costs associated with the compliance-assurance schemes are not included in the Preliminary RIS.

#### **5.4.1 Mass Management Accreditation**

It is proposed that operators will be required to be accredited to a mass-management compliance-assurance scheme in order to operate at the higher limits, that is that they must clear a “second-hurdle”, in addition to installing road-friendly suspensions to operate at the higher limits.

Mass-management compliance-assurance scheme refers to a scheme to accredit operators who can demonstrate that they have put in place processes to ensure their vehicles are not overloaded. These processes must be able to be independently audited, so that enforcement agencies can be satisfied that the legal requirements are met at all times.

This will provide increased confidence for road authorities and local governments that operators in approved schemes are complying with mass limits. It would also lead to improved public acceptance of higher mass limits.

The impacts on agencies and operators associated with implementing a mass-management compliance-assurance scheme, under the alternative compliance system, were evaluated in a pilot study prepared by Kinhill Economics for VicRoads (1996)<sup>19</sup>. Nine operators participated in the pilot, with a total of 235 vehicles being evaluated. Structured interviews were used to collect data on categories which present potential costs and benefits for operators and agencies.

The pilot concluded that if such a mass-management scheme was implemented, operators and agencies would incur costs associated with record system design and audit requirements. Operators would also incur costs associated with putting in place mechanisms to assess the loads they are carrying (for example, accurate on-board scales had to be fitted by some operators). In addition, the pilot indicated that the implementation of a mass-management scheme may lead to more accurate loading, resulting in increased vehicle utilisation.

The Regulatory Impact Statement prepared for the pilot study on mass-management also suggested that unquantifiable benefits of reduced pavement wear might result from reductions in minor overloading. These benefits will be negated, however, if, as expected, many operators are able to improve the utilisation of their vehicles by loading more accurately to the maximum possible limit.

---

<sup>19</sup> Mass management Accreditation Scheme: Evaluation of Pilot Program. 1996 VicRoads: Kinhill Economics

Introduction of accreditation to a mass-management scheme is not expected to effect the incidence of gross overloading. This is because it is unlikely that the behaviour of operators who grossly overload would be affected by the introduction of requirements on operators to be accredited. In fact, these operators are unlikely to join the scheme, but would continue to overload in the same way as they do at present unless other deterrents are put in place (such as increased on-road enforcement of mass limits or increased penalties - see Section 5.4.2).

Approved mass-management compliance-assurance schemes for higher mass vehicles should include an agreed set of standards and audit processes. These standards and audit processes have not yet been finalised. The Commission will review current mass-management compliance-assurance schemes and make recommendations about the type of mass-management scheme that would be best suited as a condition of access to higher mass limits.

Rather than specify that operators must be accredited to a specific scheme, any compliance-assurance scheme meeting these standards and audit processes would be approved. This would provide operators with the options such as adapting current accreditation schemes (such as ISO) to include the processes and audit requirements established.

At this stage, the costs and benefits of requiring operators to be accredited to a mass-management compliance-assurance scheme have not been fully assessed. They will depend on the strictness of the scheme. The costs that would be imposed on small businesses also need further consideration.

Some operators may find that the costs of participating in an accreditation scheme is too high, particularly ancillary operators (such as farmers, mining companies, wholesalers, manufacturers and so on who carry their own products and do not transport goods for hire and reward). Around \$100 million of the estimated annual savings in freight costs due to increases in mass limits are from these operators (see Table 5.5).

In order to reduce the impact of operator accreditation, whilst addressing the concerns of those seeking greater control over vehicle mass, the Commission now proposes that the requirement for membership of a mass-management compliance-assurance scheme be restricted to operators of vehicles with triaxles.

Triaxle vehicles constitute around one third of the vehicles which would be eligible for mass increases under the proposal, and account for almost two thirds of the distance driven.

The revised proposal has a number of advantages, including removal of the need for many smaller operators comply with a second hurdle. It also restricts the scheme to the vehicles which receive the largest benefits from the proposed mass limit increases, are driven the greatest distances and are most likely to damage bridges (due to the aggregate mass of the vehicle). The cost-benefit ratio for the implementation of the proposed higher mass limits will be significantly improved if the second hurdle is restricted to vehicles with triaxles.

The process of implementation is to be tailored in such a way that the costs of the scheme are held at a level where the aggregate benefit-cost ratio for the implementation of increased mass limits for vehicles with road-friendly suspension systems remains above 2. On the basis of preliminary estimates, this would allow the introduction of a mass management compliance assurance scheme for triaxle vehicles at a annual per vehicle cost in the order of \$2,000 to \$3,000.

The Commission has also considered whether operators should also be required to participate in a maintenance-management scheme. Such schemes currently operate on a voluntary basis

and provide an effective method of ensuring vehicles are road worthy. However, in the absence of a direct relationship between the fundamental issues of maintaining road-friendliness and maintenance-management systems, this scheme was excluded at the present time.

#### **5.4.2 Conventional Compliance and Enforcement**

The National Road Transport Commission has prepared a national proposal on penalties for overloading, commensurate with the risks to safety and the damage to bridges and roads. As noted, the Commission has released a discussion paper to assist in developing detailed recommendations on the implementation of this proposal<sup>20</sup>.

The Commission's preliminary proposal in relation to conventional enforcement of mass offences is to provide a national regime of sanctions suitable for all overloading offences along with national tolerances on weighing. The proposals would include applying the "chain of responsibility" principle to ensure that those responsible for the overloading are punished. A structured range of sanctions is being proposed that would include:

- substantial increases in penalties for gross overloading along with court penalties that escalate as overloading increases;
- infringement penalties for smaller overloads;
- a five-times multiplier on sanctions for corporations;
- a penalty that reflects commercial benefits of overloading; and
- an off-loading policy for overloaded vehicles.

General sanctions that are suitable for overloading offences in limited circumstances are being examined, such as offences and sanctions for "persistent or systematic" overloading. Additional (non-monetary) sanctions for gross overloading are also being explored, such as the suspension of registration.

#### **5.5 Impacts on Road Pavements**

The fundamental premise underlying the Mass Limits Review is that different heavy vehicle suspensions interact in different ways with road pavements. Some suspensions are believed to be more "road-friendly" than others due to their "softer" reaction to variations in pavement surfaces, that is, roughness.

Suspensions are a spring that serve to absorb variations in the pavement surface to provide better ride as a vehicle passes over bumps and undulations and to ensure that the wheels of the vehicle remain in contact with the road surface. Road-friendly suspensions have lower frequencies than other suspensions, so that the effects of a bump in the road on the spring action of the suspension are replicated less often. In addition, they have high levels of damping, so that the spring rapidly stops oscillating. Improved load sharing also means that the loads on the axle group as a whole are evenly spread over the individual axles, so no one axle constantly causes more pavement wear than the others.

On the other hand, an increase in the loads carried over a pavement will generally mean that they wear out faster. The larger the load on an axle, the faster the pavement wears out. This

---

<sup>20</sup> Increased Mass Limits: Compliance and Enforcement Issues (December 1997)

relationship is widely believed to follow an average of a fourth power across the range of pavements used in Australia (the “fourth power rule”).

The Mass Limits Review Steering Committee concluded that pavement rehabilitation costs would not increase as a result of increased mass limits on vehicles fitted with road-friendly suspensions, as the effects of increased mass limits would be offset by reduced travel to carry the current freight and the expected beneficial effects of greater use of road-friendly suspensions. It was assumed that routine and periodic pavement maintenance would not be affected by mass increases or the use of road-friendly suspensions.

The analyses undertaken, however, indicated there would be a small saving in arterial road costs if mass limits are increased for road-friendly vehicles. This was estimated as a \$6.5 million per annum net saving across Australia based on a 70 per cent take-up<sup>21</sup>.

According to the analyses, as the proportion of vehicles with road-friendly suspensions increases, net savings in pavement rehabilitation costs occur.

Similarly, the analyses showed there would be a net saving across Australia in local road costs with mass increases on vehicles with road-friendly suspensions of \$4.7 million per annum for a 70 per cent take-up<sup>22</sup>. As the proportion of vehicles with road-friendly suspensions increases, savings also increase.

A number of issues remain unresolved with respect to the local government perspective on mass limit increases. Anecdotally it is claimed that local government pavements are currently deteriorating as a result of the RoRVL Option C mass increases. Local governments are skeptical about the benefits of road-friendly suspensions and are concerned that increased mass limits may accelerate the deterioration of many local roads.

Perhaps just as importantly the benefits of mass increases often accrue to through traffic rather than local traffic, from a local government viewpoint. Consequently, there are little benefits to individual local governments. There is therefore difficulty in justifying the increase from a local government perspective as the majority of benefits flow elsewhere or to other spheres of government. Another local government concern is that there will be no funding to achieve the required upgrading.

The net effect of Option F mass limits on pavements with a 70 per cent take-up is shown in Table 5.6. These estimates are based on the method developed by Austroads for the Mass Limits Review Steering Committee which was also used in the Cost-Benefit Analysis.

**Table 5.6: Estimated Reductions in Annual Pavement Rehabilitation Costs**

<b>Responsibility</b>	<b>Reductions in On-going Costs (\$ million per annum)</b>
Commonwealth/ State/Territory	6.5
Local	4.7
<b>Total</b>	<b>11.2</b>

<sup>21</sup> NRTC CBA Table 3.1

<sup>22</sup> NRTC CBA Table 3.3

The OECD international research programme into the dynamic interaction of vehicles and infrastructure (the DIVINE study) found that some reduction in pavement wear can be expected from an increased use of road-friendly suspensions. More specifically, it found that road-friendly suspensions reduce cracking, but have little effect on rutting. The relative impacts of road-friendly suspensions and mass increases were not examined as part of the study. In addition, the experimental pavements used in the study were not typical of Australian pavements, which are generally much thinner than those used in Europe and North America. Chip-seal pavements that are common in rural Australia were not examined. This means it is difficult to quantify the net impacts of an increase in use of road-friendly suspensions and increases in mass limits for Australian roads.

As there is some ambiguity over the impact on pavements of increases in mass limits for vehicles fitted with road-friendly suspensions, the accuracy of the small estimated savings in pavement rehabilitation costs can be questioned. Consequently, the net effects of the proposed increases in mass limits on pavements have been conservatively set at zero for the purposes of the calculations of net impacts and cost-benefit ratios to follow in Chapter 5.

## 5.6 Impacts on Bridges

The use of road-friendly suspensions does not ameliorate the effects of increased vehicle mass on bridges, unlike road pavements. In some circumstances for some bridges, the situation may be made worse by road-friendly suspensions while in others it may help, but not enough to counter the effects of the increased mass.

The NRTC Cost-Benefit Analysis presents estimates of the likely costs associated with bridge upgrading brought about by increased mass limits. The approach used to derive these estimates, developed by Austroads, gave a broad analysis of the relative impact of road friendly suspensions on different type of bridges. This approach assessed and classified bridges as:

- safe to carry vehicles at the increased mass limits;
- requiring immediately replacement; or,
- needing to be replaced sooner than it would have if mass limits were not varied.

Calculations for the initial Cost-Benefit Analysis were based on a take-up of 40 per cent. However, it is now considered that a 70 per cent take-up rate is a more realistic estimate. Therefore, an analysis at this higher take-up rate was conducted. The estimated costs include bridge replacements required if general access vehicles operated at the proposed limits up to 45.5 tonnes, and replacements necessary if the increased mass limits for the axle groups were also applied to B-doubles. Cost estimates at the 70 per cent take-up rate were higher than those originally estimated by the Steering Committee<sup>23</sup>.

Since this time a program was developed to complete theoretical desktop assessments of individual bridges throughout Australia. This program was designed to assess the capability of individual bridges to safely carry vehicles with increased mass limits.

---

<sup>23</sup> The NRTC CBA differed from the Steering Committee approach in that a more complete bridge inventory was included in the CBA and different assumptions were made in estimating local government bridge costs. The inventory is being split into up-front and on-going costs. However, there is considerable uncertainty over the costs to local government bridges

The NRTC, Austroads and the Australian Local Government Association (ALGA) have been working closely to refine estimates of the impacts of increases in mass limits on bridge costs. A Bridge Assessment and Upgrading Steering Committee was established to oversee this work, along with two supporting groups: the Network Priority Implementation Group and the Bridge Assessment Group.

One of the tasks of the Steering Committee has been to direct funds set aside by the Commonwealth for bridge assessment and testing. Detailed analytical assessments have been made for bridges on national highways and arterial roads. Estimates of the costs of upgrading bridges on these roads presented in this paper have been based on the results of these assessments. Similar assessments are under way for local government bridges, building on a local government bridge inventory survey. At the same time, a national bridge testing programme is being developed to confirm the capacities of typical bridges.

The results of this work for National Highways and arterial roads will be incorporated in the final estimates of the costs of bridge upgrading, along with an assessment of the priorities that should be assigned to upgrading bridges on different corridors.

It should be noted that the estimates of upgrading costs presented in the Cost Benefit Analysis and resulting from desktop bridge assessments are based on the marginal costs for work required for a bridge to safely carry the higher mass limits. These costs do not allow for upgrading which extends the life of a bridge at current mass limits.

### 5.6.1 State/Territory Impacts

As desktop assessments are still being conducted in some jurisdictions, final estimates of the upfront costs associated with mass limits are not certain.

Despite this, it is expected that the costs of upgrading bridges will be in total approximately \$600 million for State/arterial roads and a further \$150 million for local roads. This is equivalent to a cost of \$75 million per year over a period of 10 years. These estimates of upfront bridge costs were used in calculating the total costs of increasing mass limits presented in the summary justification section.

Current estimates of the number of bridges which are the responsibility of State and Territory governments and which may be affected by increasing mass limits are shown in Table 5.7. The analysis disaggregates bridges by State and Territory, road type and level of upgrading required. Bridges identified as “OK” do not require upgrading and have been tested for B-Doubles at 68 tonnes. “Assessment incomplete” indicates that the analytical assessment has not yet been completed while “testing required” indicates that physical testing is required in order to confirm the safe capacity of the type of bridge concerned. In both of these categories, some bridges are likely to be ultimately assessed as “OK” while others will ultimately require upgrading. The final category, “definitely no good” means that the bridge requires upgrading before it can carry vehicles at the higher mass limits. These estimates, and the estimates of upgrading costs included in Table 5.8, have been provided through the Network Priority Implementation Group. At this stage, complete estimates have been provided only for Victoria, Western Australia, South Australia and the Northern Territory.

**Table 5.7: State/Territory Bridges Affected by Mass Limit Increases<sup>1</sup>**

State/Territory	Not Affected	Definitely Needs	Physical Testing	Assessment Incomplete	Total
-----------------	--------------	------------------	------------------	-----------------------	-------

	<b>Upgrading</b>		<b>Required</b>		
New South Wales	4 005	na	na	371	4 376
Victoria	2 084	265	0	235	2 584
Queensland	1 804	17	5	733 <sup>2</sup>	2 559
Western Australia	641	64	1	0	706
South Australia	672	23	30	41	766
Tasmania	800	na	na	350	1 150
Northern Territory	87	45	11	36	179
Australian Capital Territory	133	na	na	217	350
<b>Totals</b>	<b>10 226</b>	<b>414</b>	<b>47</b>	<b>1 983</b>	<b>12 670</b>

na: not available

**Source:** Based on information supplied by road authorities

- Notes:**
- Includes only bridges which are the responsibility of State/Territory road authorities. Bridges on national highways are included. Bridges which are the responsibility of local government are not included.
  - Includes 580 timber bridges, for which no assessment has been carried out.

Knowledge of the state of Australia's State and Territory bridges has improved considerably but is still incomplete. We can now say that:

- over 80 percent of these bridges can handle the proposed mass increases; and
- of the bridges for which assessment and testing is complete, over 90 percent have been found to be able to cope with increased mass limits.

An indication of the likely costs of upgrading those bridges which have been assessed as not capable of safely carrying increased mass limits is presented in Table 5.8.

**Table 5.8: Estimated Upgrading costs for Bridges on State\Arterial Roads (\$000's)<sup>1</sup>**

<b>State/Territory</b>	<b>Definitely Needs Upgrading</b>	<b>Physical Testing Required</b>	<b>Assessment Incomplete</b>	<b>Total</b>
		_____ (“Worst case” scenario) _____		
New South Wales	na	na	na	na
Victoria	93 461	0	61 100	154 561
Queensland	8 460	675	na	na
Western Australia	27 605	250	0	27 855
South Australia	31 135	1 674	10 264	43 073
Tasmania	na	na	na	
Northern Territory	14 280	5 080	37 480	56 840
Australian Capital Territory	na	na	na	na
<b>Totals</b>	<b>174 941</b>	<b>7 679</b>	<b>108 844</b>	<b>282 329</b>

na: not available

**Source:** Based on information supplied by road authorities

- Note:** 1. Includes only bridges which are the responsibility of State/Territory road authorities.  
Bridges on national highways are included.  
Bridges which are the responsibility of local government are not included.  
SA: preliminary disaggregation- subject to minor alterations

Comparable data is not yet available for New South Wales, but is expected by the time of the meeting of Ministerial Council. New South Wales has completed a “worst case” estimate based on costs of completely replacing all bridges. As these estimates were not consistent with the method of estimating costs as agreed by the Bridge Assessment Group, these estimates have not been included.

The Australian Capital Territory has supplied information indicating that the cost of upgrading all bridges which are deficient at current mass limits is between \$9.45 million and \$11.57 million. This information is not included in Table 5.8 as it is not consistent with the marginal cost basis of data from other jurisdictions.

The estimates for bridges in Victoria, Queensland and the Northern Territory classified as requiring physical testing or for which assessment is incomplete represent “worst case” scenarios. These estimates reflect an upper bound of the costs that would be incurred should all these bridges fail testing and require upgrading.

As further testing is completed, all bridges will be classified as either capable or not capable of safely carrying vehicles at higher mass limits. Consequently, these estimates of upgrading costs will gradually fall.

On the basis of a “worst case” outcome, the expected costs of upgrading bridges for Victoria, Western Australia, South Australia and the Northern Territory (the jurisdictions for which comparable data are available) totals \$282 million. This total includes the estimates of those bridges assessed as requiring further testing and for which assessment is incomplete, in addition to the costs of those which definitely require upgrading.

### **5.6.2 Local Government**

The data presented in the Cost-Benefit Analysis for local government bridges is uncertain because it extrapolates results from local government bridges in New South Wales and Western Australia, to Australia as a whole.

In late 1997 the Australian Local Government Association (ALGA) undertook a bridge survey which assessed the capabilities of a sample of 254 local government bridges. Results of this survey were factored up to reflect estimates for all local government bridges. These results have been forwarded to the NRTC and estimates based on the survey results should be available shortly.

In addition to these sources of bridge data, Local Government Bridge Assessment Panels have also been established to aid in the assessment of the load capabilities of bridges on local government roads. Most panels have indicated that estimates for upfront and ongoing bridge upgrading costs will not be available until May 1998. The results that are obtained through local government assessment panels will provide more accurate estimates than the survey results.

The estimates for arterial bridges indicate that an aggregate approach can give a rough guide to costs, but a full assessment is required to provide estimates of upgrading costs with any certainty.

The results of the earlier assessment of local government bridge costs indicated that costs would increase by around \$85 million, in present value terms. This is equivalent to around \$8.2 million per annum over 15 years. These estimates will be updated once the full results of the bridge assessment program are known.

### 5.6.3 Ongoing Bridge Impacts

The ongoing costs that are associated with bridge maintenance and upgrading required for the introduction of Option F mass limits on bridges with a 70 per cent take-up, were taken from the cost-benefit analysis. They are therefore based on the initial work by Austroads for the Mass Limits Review Steering Committee.

At this stage they provide the only complete set of information on the ongoing bridge impacts. These costs, disaggregated by road type are shown in Table 5.9. These estimates were used in calculating the overall costs of increasing mass limits presented in the summary justification section.

The change in ongoing bridge costs for Option F are estimated at \$24 million per annum when B-Doubles are included, and \$20 million per annum without B-Doubles, on National Highways and arterial roads across Australia for a 70 per cent take-up<sup>24</sup>.

**Table 5.9: Change In Up Front and Ongoing Bridge Costs by Road Type**

Road Type	Ongoing Costs (\$ million per annum)	
	B-doubles Excluded	B-doubles Included
National Highways	3	3
Arterial Roads	14	19
Local Roads <sup>1</sup>	3	3 <sup>2</sup>
Total	20	24

<sup>1</sup> All estimates for bridge costs shall be replaced following the release of the bridge desktop assessments.

<sup>2</sup> No additional costs are included for B-doubles on local government bridges as it is assumed that B-doubles have restricted access to local roads.

<sup>3</sup> Assumes 70 per cent take-up of road-friendly suspensions and increased mass limits.

Note: Figures do not add to totals due to rounding.

### 5.7 Administration Costs<sup>25</sup>

Road authorities (both State, Territory and local governments) are also likely to face a range of administrative and implementation costs associated with increased mass limits in general. The types of costs concerned include:

- bridge design checks;
- bridge load testing;
- bridge approach upgrading;

<sup>24</sup> NRTC CBA Table 4.7

<sup>25</sup> These costs were not included in the original Steering Committee estimates of net benefits. They have since been estimated and disaggregated to State and Territory level, and into rural and urban areas.

- replacement of narrow bridges;
- placing speed and load limit signs on local road bridges;
- bridge condition monitoring;
- on-road enforcement, and
- registration data collection costs.

Administrative costs associated with accreditation of operators to an approved mass-management compliance-assurance scheme have not been estimated as discussed in Section 5.4.1. The estimates of up-front administration and implementation costs for any one of the options are \$58.7 million for rural areas and \$5.1 million for urban areas across Australia<sup>26</sup>. The significant proportion of these costs fall on local governments, with the majority of costs related to bridge approach upgrading and placing of speed and load limit signs on local road bridges. These costs do not vary with changes in the take-up of road-friendly suspensions or the size of the mass increases.

The estimates of ongoing administration and implementation costs are \$6.1 million per annum for rural areas and \$2.0 million per annum for urban areas across Australia<sup>27</sup>. A significant proportion of these ongoing administration and implementation costs are related to compliance and enforcement. The remainder (\$1.4 million per annum) relate to registration data collection costs. Furthermore, a number of these costs vary with changes in the take-up of road-friendly suspensions, but not the size of mass increases.

## 5.8 Economy-Wide Effects

Three separate economic modelling exercises on the impacts of increased mass limits for road-friendly heavy vehicles have been undertaken:

- (i) Mass Limits Review Steering Committee - Tasman Asia Pacific (April 1996)
- (ii) Benefits of Road Transport Regulatory Reforms - Tasman Asia Pacific (December 1996)
- (iii) National Institute of Economic and Industry Research (1998)

As part of the work of the Mass Limits Review Steering Committee, Tasman Asia Pacific (Tasman) used a comparative static general equilibrium model of the Australian economy to estimate the macroeconomic effects of the options for mass limit proposed by the Steering Committee. This work is published in Technical Supplement 4 of the report of the Steering Committee.<sup>28</sup> That work was based on the direct effects estimated by the Steering Committee, including the estimates of the rate of uptake of the increased mass limits. The work undertaken by Tasman for the Steering Committee was based on 40 per cent uptake of higher mass limits. An estimate of 70 per cent uptake was later used by NRTC in the cost-benefit analysis, which forms the basis of this RIS. For this reason, the impacts estimated in

---

<sup>26</sup> NRTC CBA Table 7.1

<sup>27</sup> NRTC CBA Table 7.2

<sup>28</sup> Tasman Asia Pacific "The Economy-Wide Effects of Increases in Mass Limits for Heavy Vehicles - Report to the National Road Transport Commission", April 1996, included in Technical Supplement 4 to the Steering Committee Report: **Operational, Financial and Charging Impacts**

the initial Tasman study have been interpolated to provide consistency with the cost-benefit analysis.

As the issue of funding of bridge work had not achieved prominence at that time, the modelling was not focussed on that area. In fact, a comparative static model is not suited to tracking government revenue impacts over time.

During the review of the role of the NRTC, which was undertaken in 1996-1997 by a Steering Committee comprising government, industry and community representatives, a study was undertaken by Russell Smith and associates of the benefits of the national reform process. As part of this study, Tasman was asked to estimate the macroeconomic effects of the reforms identified. Because the proposed increase in mass limit increases was the reform with the greatest single impact, these effects were identified separately.

The input data for this exercise was based discussions in focus groups, comprising mainly larger operators. Whilst the economic modelling methodology was consistent between the studies for the Benefits of Reform project and the work of the Steering Committee, separate sets of direct effects were used. In general the Benefits of Reform project produced higher estimates of direct benefits than did the Steering Committee.

Following the release of the Steering Committee report, concern was expressed over the bridge upgrade costs required to allow implementation of increased mass limits for general access vehicles. The Commission, among others, put forward the suggestion that, as the Commonwealth was a major beneficiary (in terms of increased taxation revenue), it was reasonable for the Commonwealth to fund a large proportion of the additional bridge expenditure required. In order to estimate the magnitude and timing of these government revenue effects, the National Institute of Employment and Industry Research (NIEIR) was asked to estimate the effects of increased mass limits using their long run dynamic model of the economy.<sup>29</sup>

The NIEIR modelling was done using a fully dynamic model, which traces impacts over time. The input data was based on 70 per cent uptake of higher mass limits.

As the nature of the modelling exercise differs between the two comparative static exercises conducted by Tasman and the dynamic modelling undertaken by NIEIR, the two types of results are reported separately. The Tasman results for welfare measures are reported and the NIEIR estimates of government revenue impacts are reported.

### **5.8.1 Welfare Measures**

Both sets of work by Tasman detailed the “multiplier-effect” that the proposed mass limit increases would have on Gross Domestic Product (GDP) and real consumption expenditure in the wider economy. This work showed that, for every dollar of direct saving, there would be three dollars of increase in GDP<sup>30</sup>. Similarly, real consumption and employment can also be expected to increase. This increase in economic activity in turn leads to increased government taxation revenue.

---

<sup>29</sup> NIEIR, **Increases in mass limits Government revenue implications**, NRTC Technical Working Paper, forthcoming

<sup>30</sup> Mass Limits Review Technical Supplement No. 4 Figure 8 Scenario F p110.

An important result of the economy-wide analyses was that both imports and exports would increase as a result of the economic growth associated with an increase in mass limits. Import growth, however, was found to be greater than export growth.

The overall impact of the increases in mass limits are presented in Table 5.10.

**Table 5.10: Economy-Wide Effects of Savings In Freight Costs: Option F**

*(\$ million per annum)*

Estimates of Direct Savings	Savings in Freight Costs	Net Savings <sup>1</sup>	Increase in Gross Domestic Product	Increase in Real Consumption
<b>NRTC Results</b>	<b>280</b>	<b>270</b>	<b>750</b>	<b>550</b>
<b>R Smith Results</b>	<b>315</b>	<b>305</b>	<b>840</b>	<b>620</b>

1. Savings in freight costs less additional costs of road-friendly suspensions.
2. Assumes a 70 per cent take-up of road-friendly suspensions and therefore the increases in mass limits.

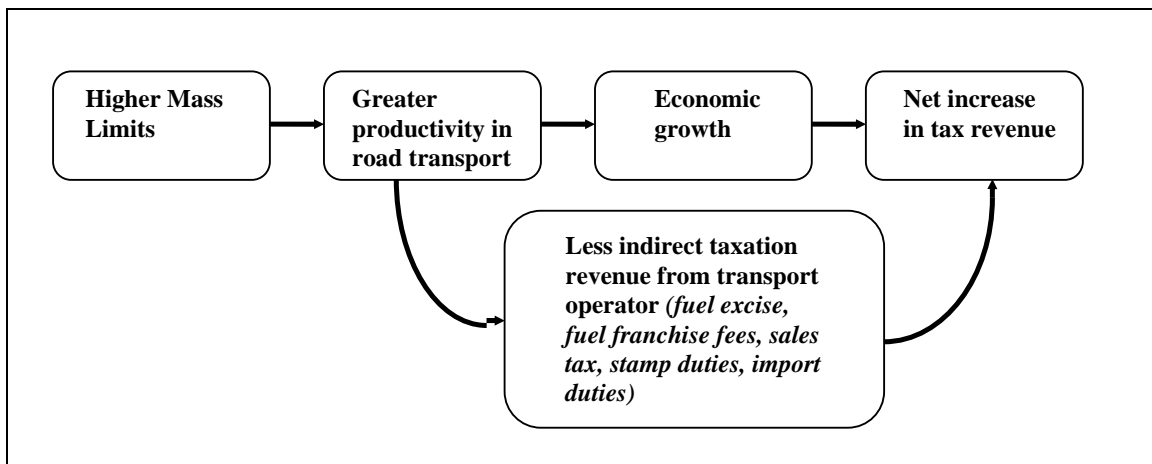
**5.8.2 Government Revenue Effects**

The factors affecting government revenues are:

1. Any additional revenue collected through charges for vehicles operating at higher limits;
2. Changes in fuel-related taxation revenues;
3. Reductions in other government taxation revenue, such as stamp duty, import duties and sales tax; and
4. Indirect effects resulting from the economic impact of higher mass limits.

These effects are illustrated in Figure 5.2. The important outcomes of the proposed changes are that the increases in direct taxation, minus the decreases in indirect taxation, results in overall net increases in taxation revenues.

**Figure 5.2: Government Revenue Effects of an Increase in Mass Limits**



The economy wide effects shown can be expected to have the further impacts of an increase in general taxation revenues of governments, arising from expansion of the economy. This expansion would be driven by increased productivity of freight movements. Federal and State/Territory taxation measures in the Australian economy are closely related to levels of income and output.

At the same time, the reduction in the road transport sector will lead to reductions in revenue from indirect taxes applying to road transport such as fuel-based taxes and charges, stamp duty, import duties and sales tax on vehicles and components, as shown in Figure 5.2. However, it is estimated that additional taxation revenue from accelerated economic growth will more than offset these reductions as discussed above.

Fuel-related taxation revenue can also be expected to change due to:

- small increases in fuel consumption for vehicles carrying heavier loads; and,
- total reductions in fuel consumption due to the reduction in the total vehicle kilometres driven that are required to complete the current freight task.

Local government taxation receipts are generally not closely related to economic output as they are not income or production based taxes. An increase in economic output and real consumption therefore has little impact on revenues of local governments. In addition, there is no mechanism to direct revenues collected from road use charges to local governments. Therefore there will be no direct revenue increase to local governments as a result of increased productivity from increases in mass limits. In addition to this they face additional costs as outlined previously.

Estimates of the impacts on government taxation revenue are shown in Table 5.11. A significant proportion of the taxation benefits accrue to the Commonwealth Government with a small increase for State and Territory Governments.

Analysis undertaken by the NIEIR for NRTC indicates that the Commonwealth Government will be a significant revenue gainer from increased mass limits (see Table 5.11). On the assumption that revenue gains, net of interest costs on funds required for bridge upgrading, are used to reduce government debt, NIEIR projects that Commonwealth debt levels will be about \$6 billion less by 2020 if mass limit increases are implemented. This impact derives from the Commonwealth's significant command over growth-related revenue sources.

NIEIR's analysis suggests that the States and Territories will not be significant revenue gainers from increased mass limits. Local government will not receive any direct revenue from the increase in mass limits. The revenue sources available to State and local governments are less directly growth-related than those of the Commonwealth and are smaller in absolute scale.

**Table 5.11: Impacts on Public Debt and Taxation Revenues**

(\$m1990)

Unit Differences	Public Debt		Taxation Revenue	
	Total State/Territory	Commonwealth	Total State/Territory	Commonwealth
1999	48.03	91.92	-21.16	-31.59
2000	100.85	143.25	-23.73	8.54
2001	150.65	188.51	-25.81	14.66
2002	200.0	223.34	-25.02	25.28
2003	306.39	177.67	-22.46	46.38
2004	410.01	114.10	-19.61	64.41
2005	511.51	35.25	-17.46	79.81
2006	608.88	-71.03	-13.18	107.36
2007	632.86	-198.05	-11.46	127.90
2008	649.16	-363.57	-3.96	166.75
2009	654.23	-584.98	7.33	222.95
2010	644.96	-869.25	21.70	286.06
2011	621.90	-1200.91	35.56	333.86
2012	585.66	-1574.98	48.77	376.51
2013	536.74	-1977.76	61.48	405.46
2014	476.04	-2402.30	73.29	427.27
2015	403.53	-2853.12	85.09	453.52
2016	317.65	-3346.95	98.47	496.55
2017	215.39	-3906.75	114.88	562.73
2018	93.22	-4555.88	134.83	652.33
2019	-52.33	-5311.16	158.26	758.88
2020	-224.31	-6179.07	184.79	871.95

Source: NIEIR Increases in Mass Limits: Government Revenue Impacts

Notes: 1. Based on Commonwealth funding of bridge upgrades  
2. Based on January 1999 start date for increased mass limits

The analysis by NIEIR included assessment of the prospective macro-economic impacts of increased mass limits. In present value terms, NIEIR projected national consumption gains will be about \$3 billion, or more, from increased mass limits, far in excess of the projected upgrading cost requirements. It also suggests that these macro-economic benefits would be

greater if the economy were operating under balance of payments constraints to growth, a situation NIEIR expects will occur because of the Asian economic situation.

State, Territory and local government bridge authorities will be faced with increased costs if mass limits are increased on vehicles with road-friendly suspensions. However, changes in bridge expenditure are small in comparison to the current overall road and bridge budgets.

## 5.9 Funding

The analysis of the financial implications for governments indicates that the benefits expected to result from the proposal flow on to governments. The increase in GDP resulting from increased productivity in turn increases taxation revenues accruing to governments. This suggests that costs of increasing mass limits may be met by governments without any net negative impact on government budgets.

The issues to be considered in the relationship between mass limit increases and the question of Who Pays? include the macroeconomic impact of the proposal. Equity issues and sustainability must be considered as much as the specific road user impacts.

The NRTC convened a Mass Limits Review Funding Group comprising representatives of State, Territory, Commonwealth and local governments. The group met in April 1997 to discuss general funding principles<sup>31</sup>. The recommended funding arrangements have been based on these discussions. The Group indicated broad support for the following:

1. Bridge and road upgrade costs should be estimated on a marginal cost basis;
2. Expected beneficiaries should pay for the upgrade and maintenance costs;
3. Payments from different groups should be related to, and not exceed, expected benefits;
4. Governments should return the growth dividend;
5. Governments should commit to joint funding of the bridge upgrade program;
6. User contributions to the programme should be included in the NRTC's Second Charges Determination;
7. Funding arrangements should be cost-effective, and
8. Compliance systems should aim to minimise gross overloading to contain required bridge upgrading.

In addition to the principles above, a number of funding priorities were established with general support as follows:

1. Target funding to key strategic routes and corridors;
2. Do not average funding across all local governments;
3. Do not arrange Commonwealth funding through untied grants;
4. Funding for local governments should be directed through the States;

---

<sup>31</sup> ATC 97/25 (MC) Mass Limits Review - Implementation

5. Administrative costs should be minimised, and
6. Additional classes of roads for funding purposes should be avoided.

It was proposed that the funding program should run for four years after which it could be extended if required, with an evaluation of the impacts of mass limit increases after this time.

In terms of the investment priorities, bridges in urban areas should be included for upgrading to benefit urban users although strategic routes and corridors could be targeted.

### **5.10 Charges**

The issues that need to be considered for charging under an increased mass limit regime are:

1. The current cost responsibilities of heavier vehicles
2. The responsibility for additional bridge costs, and
3. Changes in pavement rehabilitation costs.

At this stage, the Commission is of the opinion that users should share ongoing bridge costs with the responsible sphere of government. Current charges are based on the PAYGO system which assumes that current road expenditure adequately reflects the costs of providing and maintaining roads to carry current levels of traffic (Australian Road Cost Recovery, 1993). The proportion users shall meet is to be determined in conjunction with the Second Charges Determination.

The recovery of additional upfront costs are considerably more complex. Under the present PAYGO method, any increased bridge expenditure over the eight years of the National Bridge Upgrading Programme would be included in the PAYGO base that determines the amount of money to be collected from heavy vehicle users. These costs may be recovered by governments, however, from increases in general taxation revenue. Whether or not these upfront bridge costs should be included in the PAYGO base is to be examined as part of the Second Charges Determination. If they are to be excluded from PAYGO, the NRTC's charging principles will need to be altered. The voting support of "more than one third of the Voting Members" are required to disapprove a change to the present charging principles (Principle 16(c)).

### **5.11 Environmental Impacts and Road Safety**

The principal environmental issues associated with the mass limit increases are engine emissions and noise. The Steering Committee concluded that there would be small and unquantifiable benefits resulting from the mass increases. These effects have not been included in the cost-benefit analysis.

Heavier trucks produce more emissions when measured as grams per kilometre travelled. However, when carrying capacity is taken into account the heavier trucks produce less pollutants than lighter trucks based on a g/km/tonne basis. The additional exhaust emissions as a result of the increased mass have not been quantified although they are stated as being of a minimal level. The greater the take-up of mass limit increases, the greater is the potential

reduction in air pollution, as measured on a g/km/tonne basis.<sup>32</sup> In other words, the analysis demonstrated that mass limit increases would result in a reduction in total fuel consumed, and hence a reduction in greenhouse effects. For the current freight task, savings of around 1.4 per cent in diesel emissions are estimated.

Issues associated with noise pollution have concentrated on the position that road-friendly suspensions are quieter than conventional suspensions, particularly when the vehicle is unladen. However, the suspension noise is expected to be drowned out by the dominant noise sources from other areas in the vehicle and the vehicle-road interface including brakes, engine and tyres.

Testing has determined that mass increases are unlikely to result in a noise increase that is detectable by a skilled listener. However, empty trucks fitted with road-friendly suspensions should be considerably quieter than an equivalent truck fitted with steel suspension<sup>33</sup>.

The issue of road safety has been considered although the impacts were not quantified. The factors for consideration included; steering sensitivity and roll stability, braking, rear overhang, high speed off-tracking, crash severity and crash exposure.

The Steering Committee included the following general comments regarding safety<sup>34</sup>:

- Steering sensitivity and roll stability decrease with increased mass although both relate to centre of gravity and roll stiffness.
- Road-friendly air suspensions will improve roll stability.
- Braking distances will increase although the tendency for skidding should decrease.
- Rear overhang rules will still apply, but rear underrun crash severity may increase.
- High speed off-tracking increases with mass increases.
- Crash severity should not alter to a significant degree due to the large existing differential between heavy vehicle mass and car mass. However, low speed crashes in urban areas should be monitored.
- Crash exposure is not expected to change significantly due to reduced total travel being offset by increased freight task.

The Commission considers that road safety and the environment will not be adversely affected by increasing mass limits, and may benefit due to projected reductions in the total amount of travel by heavy vehicles. The macroeconomic modelling suggests that there will be an overall reduction in road freight transport, although economic growth may increase the freight task and cheaper road transport may result in the attraction of rail freight to road.<sup>35</sup>

---

<sup>32</sup> NRTC CBA Section 6.2 Air Pollution

<sup>33</sup> NRTC CBA Table 11.2

<sup>34</sup> NRTC CBA Table 6.1

<sup>35</sup> ATC 97/25 (MC) Mass Limits Review - Implementation

## 5.12 Impacts on Rail

Higher mass limits are expected to improve the productivity of the road transport sector, and hence improve the competitiveness of the Australian economy. Increases in mass limits would allow more freight to be transported in a single journey. Thus, a net transport saving would be expected, as fewer trips will be required to carry a given volume of freight.

Evaluations of the direct effects were undertaken on the basis of the simplifying assumption that the aggregate road freight task would not vary in response to the higher mass limits (and consequent reductions in road freight costs). In practice, additional road freight may eventuate as some freight shifts from rail to road and other freight activity becomes viable. Both effects may occur if freight costs are reduced.

Estimates of reductions in the cost of road freight resulting from increased mass limits were used as inputs to an economic model that evaluated economy-wide impacts. The economy-wide economic modelling estimated there would be significant falls in the output of all transport industries, due to the increase in productivity (ie., reduced overall resources are required to service a given freight task).

Savings in freight costs result in lower industry costs, and thus a more competitive economy, attracting greater capital and increasing employment opportunities. Lower vehicle operating costs may encourage more businesses and operators to convert from rail or other forms of transport, to road transport. In addition, these reduced costs may allow those who previously could not afford to transport goods to do so, generating new road freight. By way of example, consider a mine which was otherwise not economically viable. The reduced costs of road transport (as a benefit of increased mass limits) may now allow the mine to operate and its products to be exported, thus increasing gross domestic product and also the road freight task.

The economy-wide modelling indicated that, despite the additional road freight generated by increased economic activity and converted from other modes of transport, a net decrease in output of the road transport sector would occur. The results of the modelling showed a fall in road freight output of 1.10 per cent and a fall in employment of 1.18 per cent. It also indicated that rail transport output would decrease by 0.28 per cent and employment by 0.34 per cent. These falls in rail output resulted from a shift in modal choice from rail to road.

This modelling was based on the assumption of no change in productivity of rail transport. In the current environment, it is likely that rail productivity will improve leading to an improvement of the competitive position of rail vis-a-vis road.

The estimates of modal shift produced in the economy-wide model included impacts on modal split for each industry included in the model, but on an aggregate (Australia wide) basis. In fact, the impact on the relative competitive position of road and rail will be concentrated in corridors where the two modes provide real alternatives. These corridors are dominated by inter-capital links.

It is difficult to estimate the effects on modal split of changes in the relative price of road and rail freight. The most recent empirical work was based on data from the 1970s and its applicability to the industry structure of the late 1990s must be questioned.<sup>36, 37</sup>

---

<sup>36</sup> Luk, J and S Hepburn (1993) "New Review of Australian Travel Demand Elasticities" Australian Road Research Board, Research Report ARR 249

<sup>37</sup> Bureau of Transport Economics (1979) *The Long Distance Haulage Industry*, Canberra, AGPS

In work commissioned by New South Wales Roads and Traffic Authority, Sinclair Knight Merz (SKM) calculated that reductions in the cost of road freight resulting from the proposed mass limits increases would lead to a fall in rail freight of 5 per cent and 3 per cent in the Melbourne-Sydney and Sydney-Brisbane corridors respectively<sup>38</sup>. SKM estimated that this would lead, in itself, to an increase in the daily number of heavy vehicles using these corridors of 1.8 per cent for Melbourne-Sydney and 1.5 per cent for Melbourne-Brisbane. Following correspondence with the Commission on the methodology used to produce these estimates, SKM revised its initial results. Even on the basis of the initial SKM estimates, taking into account the increase in vehicle capacity resulting from increased mass limits, there would still be a net fall in the number of heavy vehicles in each corridor.

In response to the request from Ministers to consider this issue in more detail, the Commission engaged the Melbourne Institute of Applied Economic and Social Research (the Melbourne Institute) to undertake an assessment of the effect on rail of increased mass limits for road freight vehicles.<sup>39</sup> The assessment was limited to corridors where it was considered that these effects would be greatest:

- Brisbane - Sydney
- Sydney - Melbourne
- Melbourne - Adelaide
- Adelaide - Perth
- Sydney - Adelaide
- Brisbane - Cairns.

It is important to note that there is little competition between road and rail on most of the road network, as apart from any other factors, there is no rail line duplicating road links for most of the Australian road network.

The Melbourne Institute stated that the poor quality of the available data meant that estimates of effects on modal split could not be made with any confidence. The results of the work of the Melbourne Institute concluded:

- ... the estimated effects on rail freight demand differ substantially by corridor. A range of estimated is provided based upon different assumptions about the extent to which the increase in road freight demand is met by switching demand from rail, and the extent to which it is met by induced demand. In the extreme case that there is no induced demand (a situation considered to be unlikely), the estimated effect on rail demand is a decline of 5 per cent along the Sydney-Melbourne corridor, 2 per cent along the Brisbane-Sydney corridor, and 0.38 per cent along the Adelaide-Perth corridor (analogous figures for the other corridors are provided).

---

<sup>38</sup> Sinclair Knight Mertz (1997) *Independent Review of Mass Limits in New South Wales*, Appendices "Corridor Analysis", St Leonards, Sinclair Knight Mertz

<sup>39</sup> Kells, S (1997) "Effects on Road and Rail Demand of Increased Mass Limits for Heavy Road Vehicles", Report by the Melbourne Institute to the National Road Transport Commission. The extracts quoted are from the penultimate draft of this report. The final report will be released as an NRTC Technical Working Paper.

- Around 15 to 30 per cent of the change in road demand that will follow the fall in road freight prices will be due to induced demand (new freight) rather than converted traffic from other modes of transport. Accordingly, it is estimated that the impact on rail freight demand is likely to be a fall of between 3.5 and 4.3 per cent along the Sydney-Melbourne corridor, a fall of between 1.4 and 1.7 per cent along the Brisbane-Sydney corridor, and a fall of between 0.27 and 0.32 per cent along the Adelaide-Perth corridor in the long run.
- It is estimated that the increase in heavy vehicle mass limits will result in a reduction in the number of trucks required to shift the nation's freight task, as the effect of increasing individual loads is expected to more than offset the increase in the volume of road freight moved.

As many of the corridors chosen are particularly sensitive to relative freight prices, these results would not be indicative of an aggregate effect on rail freight. The work undertaken by the Melbourne Institute suggest that, while it is difficult to make confident estimates of the effects on rail of increased mass limits for road freight vehicles, it is unlikely that these effects will be large. In addition, the Commission does not believe that freight users should be denied productivity improvements in road transport due to concerns over effects on other modes.

## 6. SUMMARY JUSTIFICATION

The results discussed in Chapter 5 have been drawn on to prepare a cost-benefit analysis, which is presented in a summary format in Table 6.1. It includes the impacts on bridges, freight costs and implementation costs associated with the introduction of increased mass limits.<sup>40</sup> These results have been calculated for mass increases under Option F, with an expected takeup rate of 70 per cent. Where appropriate, up-front and ongoing costs have been presented separately. This table presents the benefits and costs as annual amounts over a thirty year period, in addition to showing the present values of impacts over this period.

**Table 6.1: Summary of Impacts**

Impact	NRTC Estimates		Benefits of Reform Estimates	
	Present Value	Annualised PV <sup>1</sup>	Present Value	Annualised PV <sup>1</sup>
<b>Bridges<sup>2</sup></b>				
Up-Front	-480	-30	-480	-30
Ongoing	-370	-20	-370	-20
<b>Freight Costs</b>				
Road Friendly Suspensions	-150	-10	-150	-10
Productivity increases	3990	260	4420	290
<b>Implementation</b>				
	-80	-10	-80	-10
<b>Total Costs</b>	-1090	-70	-1090	-70
<b>Total Direct Benefits</b>	3990	260	4420	290
<b>Net Effect</b>	2900	190	3330	220
<b>Benefit-cost ratio</b>	<b>3.6</b>		<b>4.1</b>	
<b>Economy Wide Analysis<sup>3</sup></b>				
Consumption	6376	410	7330	480
<b>Net Effects</b>	5286	340	6240	405
<b>Benefit-Cost Ratio</b>	<b>5.8</b>		<b>6.7</b>	

<sup>1</sup> Represents the equivalent amount as the present value as an equal amount each year over 30 years.

<sup>2</sup> Estimates of bridge costs presented in this table are based on \$75 million per annum over 8 years, spread over a 30 year analysis period, to give an equivalent annualised value for upfront costs.

<sup>3</sup> In this scenario the savings in productivity have been replaced with the increased real consumption. Therefore, the net economy wide effects are equivalent to consumption minus total costs.

The cost-benefit analysis has been carried out using two data sources for the impacts of increasing mass limits on freight costs. The table depicts results of cost-benefit analysis based on data from the NRTC, as well as results derived from data taken from the *Benefits of Road Transport Regulatory Reform*. The costs and benefits for bridges, implementation and installation of road friendly suspensions are based on the NRTC estimates only, and consequently are the same in the RA Smith estimates. As indicated in Chapter 5, estimates of the potential productivity increases differ between the two data sources. It is to this factor that differences in cost-benefit ratios can be attributed.

<sup>40</sup> Costs of the proposed mass management compliance assurance scheme have not been included here (see Section 5.4.1.).

The major result of the proposed mass limits review will be to significantly increase vehicle productivity by reducing vehicle kilometres travelled, without detrimental effects on safety or the environment.

The ongoing benefits of the proposal will result in a "growth-dividend" to governments from the macroeconomic effects of increased gross domestic product. The funding can therefore be provided by governments via the recommended method without any "out-of-pocket" expenses.

The net result of the Option F mass limit increases is a net saving of \$190 million per annum (expressed as an annuity over 30 years) which is equivalent to a cost-benefit ratio of 3.6. This is based on annual savings in freight costs of \$260 million once the mass limit increases are fully implemented and the Bridge Upgrading Programme completed, based on NRTC estimates.

## 7. IMPLEMENTATION

A general access approach is to be taken to implementation of mass limit increases. In other words there will be no special routes for upgrading. However, there will be initial restrictions and limitations on which bridges can be used. These limitations will be relaxed and the allowable areas of operation broaden as bridges are progressively upgraded.

Pending approval of the major policy issues by Council, remaining work includes:

1. confirmation of the availability of funding for the national bridge upgrading programme;
2. refinement of estimates of the cost of bridge upgrading, including:
  - completion of detailed analytical assessments for State and Territory government bridges;
  - detailed assessments for local government bridges; and
  - physical testing to confirm bridge load capacities;
3. development of a bridge upgrading strategy and funding mechanism that directs investment first to the highest priority corridors with the lowest upgrading costs;
4. confirmation of the appropriate charges for vehicles operating at higher mass limits in conjunction with the Second Charges Determination followed by implementation of any changes needed to charging arrangements;
5. development of and consultation on appropriate methods of identifying, at the road-side, vehicles able to operate at higher mass limits followed by appropriate amendments to vehicle registration (or other identification) systems.
6. development and implementation of a means of identifying where (on which bridges) vehicles at higher mass limits may be operated (for example, erection of signs showing bridge load limits);
7. development of a certification system for road-friendly suspensions;
8. review of maintenance required to keep suspensions road-friendly and, if the survey of in-service performance indicates it is necessary, development of enforcement procedures;
9. consideration of load-sharing performance requirements for road train dollies;
10. completion of the Austroads work on the axle-spacing mass schedule (bridge formula) that should apply to vehicles operating at higher mass limits; and
11. development of detailed proposals relating to conventional enforcement, development of requirements for approved accreditation schemes and establishment of national schemes able to cover large numbers of operators, followed by appropriate amendments to relevant legislation and training for enforcement officers.

National increases in mass limits can be set in place once this work is completed. A range of organisations is likely to be involved in the work concerned.

Additional investigations are also required on a number of other issues, however, they can proceed in conjunction with the implementation phase and need not precede it. These additional investigations include:

- monitoring of the extent to which suspensions remain road-friendly in-service; and
- review of the estimated relative road wear of wide single and dual tyres.

## 8. REFERENCES

*Administration and Enforcement Implications of the Mass Limits Review Seminar*, 26 November 1996

*Appendices to Technical Supplement No. 2 Road and Bridge Statistical Data Tables*, May 1996

ATC 97/25(MC), 9 May 1997 *Mass Limits Review - Implementation*

ATC 97/3(MC), 3 Feb 1997 *Mass Limits Review - Implementation Strategy*

Australian Transport Council (ATC) *Communique*, 23 May 1997

*Benefits of National Road Transport Regulatory Reforms*, RA Smith, December 1996

Briefing Note MLR/1 *Bridge Costs and Assessments*

Briefing Note MLR/2 *Divine Outcomes*

Commission Papers - *64th Meeting*

Final Draft, *Compliance Provisions for Gross Overloads Preliminary Policy Proposal Dynamic Interaction between Vehicle and Infrastructure Experiment Policy Implications*, 28 August 1997

Mass Limits Review *Cost-Benefit Analysis*

Remote Areas Project Group Meeting *Mass Limits Review - Status Report*

*Report & Recommendations of the Steering Committee*, July 1996

*Review of Mass Limits for General Access Vehicles and Medium and Long Combination Vehicles Background and Review Outline*, July 1993

"*Second Hurdle*" for Increased Mass Limits Preliminary Discussion Paper, August 1997

*Summary and Recommendations of the Steering Committee* July 1996

TACE 15/7 *Mass Limits Review*

TACE 16/3 *Mass Limits Review Implementation Strategy*

TACE 17/2 *Mass Limits Review Update*

Technical Supplement No. 1 *Definition and Compliance Aspects*, May 1996

Technical Supplement No. 3 *Road Safety and Environmental Impacts*, May 1996

Technical Supplement No. 4 *Operational, Financial and Charging Impacts*, May 1996



## APPENDIX A: SOURCES OF ESTIMATES USED IN THE REGULATORY IMPACT STATEMENT

### A.1 Sources of Information

The Steering Committee Report released in August 1996 examined the savings in vehicle operating costs (VOC), performance of heavy vehicle suspension systems, impacts on road and bridge infrastructures, environmental and road safety implications, effects on the Australian economy and implications for charging.

These estimates have since been updated in a more detailed cost-benefit analysis undertaken by the NRTC and in the case of bridge costs, work undertaken jointly by the NRTC, Austroads and the ALGA.

A range of sources has been used in assessing the impacts of the proposals in this Preliminary Regulatory Impact Statement, as shown in Table A.1.

**Table A. 1: Sources of Impact Estimates**

Impact	Source of estimates
Savings in Freight Costs	Steering Committee, cost-benefit analysis and <i>Benefits of Reform</i> estimates prepared by RA Smith
Suspension Costs	Cost-benefit analysis
Pavement Rehabilitation Costs	Cost-benefit analysis, and an international study co-ordinated by the OECD titled Dynamic Interaction Between Vehicle and Infrastructure Experiment (DIVINE)
Bridge Upgrading Costs	Detailed bridge assessments undertaken by Austroads and the ALGA to quantify the nature and condition of the Australian bridge stock and the impacts of increased mass limits, along with broad estimates from the cost-benefit analysis
Increased Ongoing Bridge Costs	Cost-benefit analysis
Environment and Safety	Steering Committee and cost-benefit analysis
Implementation Costs	Cost-benefit analysis
Macroeconomic Effects	Tasman Asia Pacific analyses for Steering Committee, <i>Benefits of Reform</i> estimates
Impacts on Other Modes of Transport	Tasman Asia Pacific economy-wide estimates prepared for Steering Committee, Sinclair Knight Merz analyses for NSW Roads and Traffic Authority, and review of the estimated impacts by an independent economic consultant, the Institute of Applied Economic and Social Research, University of Melbourne

The savings in freight costs have been estimated in the cost-benefit analysis (CBA) undertaken by the NRTC, with results disaggregated by vehicle type, road type, area of operation and industry. The performance of heavy vehicle suspensions has been examined in which has just been released. The impacts on road and bridge infrastructure have been examined in the NRTC CBA, as well as an ongoing bridge assessment research program (in

conjunction with Austroads and the ALGA) to quantify the nature and condition of the bridge infrastructure in Australia.

The environmental and safety implications were examined in the Steering Committee deliberations and again in the NRTC CBA. The effects on the Australian economy have been the subject of a macroeconomic modelling exercise and the charging and implementation issues have been considered by the NRTC and industry in the period following the release of the Steering Committee Report. Impacts on other modes of freight transport have been reviewed by an independent economic consultant, the Institute of Applied Economic and Social Research, University of Melbourne.

## **A.2 NRTC Cost Benefit Analysis**

The cost benefit analysis prepared by the NRTC in response to the steering committee report is based on the same data and methods as used by the Committee although there are some differences. The CBA also sets out the impacts of increasing mass limits in greater details, exploring a number of additional options and the sensitivity of the results to the assumptions made.

Minor variations in calculating pavement and bridge costs were made. Additional estimates were prepared to account for the impacts on roads and bridges of the alternative options for mass increases to all vehicle mass increases, regardless of suspension type. Further sensitivity testing was undertaken to test assumptions such as relative pavement wear associated with air and conventional suspensions and bridge costs.

The CBA was undertaken for Options C, D, E, F and G although the detailed impact of the preferred Option F is presented here. The reader is referred to the CBA and other relevant documents, listed in Chapter 8 - References, for the complete comparison of all non-preferred options.

The results of the CBA have been disaggregated by State, area of operation (rural/urban) and road type into the following components: pavements (roads), bridges, vehicle operations, suspension performance, funding and financial implications for governments, externalities, road/rail modal split, compliance and enforcement and misc/other.

The analysis assumes that 20 per cent of vehicles would be fitted with road-friendly suspensions at the existing Option C mass limits, rising to 70 per cent under the mass increases (70 per cent take-up). Further analysis of take-up rates of 60 per cent, 80 per cent and 100 per cent have been considered for sensitivity testing of the parameters. However, 70 per cent take-up is assumed to be the primary case for analysis, therefore the majority of the discussion and results relate to Option F with 70 per cent take-up of road-friendly suspension, where mass limit increases are available to road-friendly vehicles only. This take-up rate was derived by examining information available on the take-up of previous increases in mass limits, especially the take-up of RoRVL C mass permits in New South Wales and Victoria in the late 1980s and early 1990s.

## **APPENDIX B: IMPACTS ON COSTS, BENEFITS AND GOVERNMENT REVENUES BY YEAR**

### **B.1: Costs and Benefits**

The costs presented in this section reflect the costs and benefits of increasing mass limits as estimated by the NRTC in the cost-benefit analysis and those in the *Benefits of Road Transport Regulatory Reforms*. The summary results presented in Section 6 were based on the estimates provided in this section.

Original analyses were conducted over an analysis period of 15 years. Bridges, however, generally have very long lives. At the end of a fifteen year period, many bridges that have been upgraded or strengthened to carry the higher masses will still be able to be used for a number of years. Therefore to account for this residual bridge life and for the continuing benefits of bridge upgrading beyond the first 15 years, the analysis was extended to a 30 year period

Table B.1 presents the potential costs and benefits of increasing mass limits for vehicles fitted with road friendly suspensions based on NRTC estimates, while Table B 2 presents estimates based on estimates made for the report *Benefits of Road Transport Regulatory Reforms*.

Both tables show the expected impacts in each year of increasing mass limits. The discount factors shown are based on a real discount rate (social time preference rate) of 5 per cent. Impacts of accreditation to a mass-management scheme are not included.

Up-front and ongoing bridge costs and freight costs (due to the requirement of road-friendly suspension) are discussed in the impact analyses presented in Section 5.

The freight cost-savings, presented under “productivity increases” are also discussed in Section 5. Bridges yielding the greatest productivity gains are to be upgraded first. As a result increases in freight cost savings are likely to accumulate quickly as initial bridge upgrading progresses. Towards the end of the 8 year bridge upgrading programme, benefits would accumulate more slowly. After all the bridge upgrading is completed, the full benefits of increasing mass limits can be expected to occur.

In order to account for this gradual productivity increase, the proportions given in Table B.3 were applied to the estimated annual productivity increases after full implementation (from Section 5). These proportions reflect the estimated extent of access a vehicle has to a road and bridge network that can carry the increased mass limits.

**Table B 1: Costs and Benefits of Increasing Mass Limits by Year: NRTC Estimates of Direct Benefits***(\$ million per annum)*

Year	Discount Factor	Bridge Costs		Freight Costs/Savings		Implementation Costs	Economy-Wide Effects	
		Up-Front	Ongoing	Suspension Costs	Productivity Increase		Change in Consumption	Change in Gross Domestic Product
1	0.9524	-75	-24	-10	142	-65.2	-70	-100
2	0.9070	-75	-24	-10	185	-1.4	160	220
3	0.8638	-75	-24	-10	213	-1.4	230	310
4	0.8227	-75	-24	-10	236	-1.4	280	380
5	0.7835	-75	-24	-10	253	-1.4	310	430
6	0.7462	-75	-24	-10	264	-1.4	340	460
7	0.7107	-75	-24	-10	273	-1.4	360	490
8	0.6768	-75	-24	-10	278	-1.4	370	500
9	0.6446	0	-24	-10	284	-1.4	550	750
10	0.6139	0	-24	-10	284	-1.4	550	750
11	0.5847	0	-24	-10	284	-1.4	550	750
12	0.5568	0	-24	-10	284	-1.4	550	750
13	0.5303	0	-24	-10	284	-1.4	550	750
14	0.5051	0	-24	-10	284	-1.4	550	750
15	0.4810	0	-24	-10	284	-1.4	550	750
16	0.4581	0	-24	-10	284	-1.4	550	750
17	0.4363	0	-24	-10	284	-1.4	550	750
18	0.4155	0	-24	-10	284	-1.4	550	750
19	0.3957	0	-24	-10	284	-1.4	550	750
20	0.3769	0	-24	-10	284	-1.4	550	750
21	0.3589	0	-24	-10	284	-1.4	550	750
22	0.3418	0	-24	-10	284	-1.4	550	750
23	0.3256	0	-24	-10	284	-1.4	550	750
24	0.3101	0	-24	-10	284	-1.4	550	750
25	0.2953	0	-24	-10	284	-1.4	550	750
26	0.2812	0	-24	-10	284	-1.4	550	750
27	0.2678	0	-24	-10	284	-1.4	550	750
28	0.2551	0	-24	-10	284	-1.4	550	750
29	0.2429	0	-24	-10	284	-1.4	550	750
30	0.2314	0	-24	-10	284	-1.4	550	750

**Table B 2: Costs and Benefits of Increasing Mass Limits: Benefits of Road Transport Regulatory Reforms Estimates of Direct Benefits***(\$ million per annum)*

Year	Discount Factor	Bridge Costs		Freight Costs/Savings		Implementation Costs	Economy-Wide Effects	
		Up-Front	Ongoing	Suspension Costs	Productivity Increase		Change in Consumption	Change in Gross Domestic Product
1	0.9524	-75	-24	-10	158	-65.2	-40	-50
2	0.9070	-75	-24	-10	205	-1.4	210	280
3	0.8638	-75	-24	-10	236	-1.4	280	380
4	0.8227	-75	-24	-10	261	-1.4	330	450
5	0.7835	-75	-24	-10	280	-1.4	370	510
6	0.7462	-75	-24	-10	293	-1.4	400	550
7	0.7107	-75	-24	-10	302	-1.4	420	580
8	0.6768	-75	-24	-10	309	-1.4	440	590
9	0.6446	0	-24	-10	315	-1.4	620	840
10	0.6139	0	-24	-10	315	-1.4	620	840
11	0.5847	0	-24	-10	315	-1.4	620	840
12	0.5568	0	-24	-10	315	-1.4	620	840
13	0.5303	0	-24	-10	315	-1.4	620	840
14	0.5051	0	-24	-10	315	-1.4	620	840
15	0.4810	0	-24	-10	315	-1.4	620	840
16	0.4581	0	-24	-10	315	-1.4	620	840
17	0.4363	0	-24	-10	315	-1.4	620	840
18	0.4155	0	-24	-10	315	-1.4	620	840
19	0.3957	0	-24	-10	315	-1.4	620	840
20	0.3769	0	-24	-10	315	-1.4	620	840
21	0.3589	0	-24	-10	315	-1.4	620	840
22	0.3418	0	-24	-10	315	-1.4	620	840
23	0.3256	0	-24	-10	315	-1.4	620	840
24	0.3101	0	-24	-10	315	-1.4	620	840
25	0.2953	0	-24	-10	315	-1.4	620	840
26	0.2812	0	-24	-10	315	-1.4	620	840
27	0.2678	0	-24	-10	315	-1.4	620	840
28	0.2551	0	-24	-10	315	-1.4	620	840
29	0.2429	0	-24	-10	315	-1.4	620	840
30	0.2314	0	-24	-10	315	-1.4	620	840

**Table B 3: Proportion of Total Benefits During Bridge Upgrading by Year**  
(per cent)

Year	Proportion of Benefits
Year 1	50
Year 2	65
Year 3	75
Year 4	83
Year 5	89
Year 6	93
Year 7	96
Year 8	98
Year 9 and onwards	100

The implementation costs comprise up-front administrative costs of \$63.8 million with an ongoing data collection cost of \$1.4 million per annum. It should be noted that Section 5.8 stated that the majority of ongoing implementation costs referred to compliance and enforcement issues. However, the ongoing costs presented here, and likewise the Summary Justification section do not refer to these cost. They only include computer system and salary costs associated with collecting data on which vehicles have road-friendly suspensions and operate at the higher mass limits.

The change in net consumption is equivalent to the net effects in each year on bridge, freight and implementation costs, multiplied by a factor of 2.2. This provides an estimate of the change in consumption in the wider economy, reflecting increased competitiveness of Australian industries and improvements in the standard of living. Similarly the Gross Domestic Product increases presented are based on the same net effect, multiplied by a factor of 3.0. The factors used to obtain these estimates were derived from the macroeconomic modelling of the impacts of increasing mass limits undertaken for the Steering Committee and the report on *Benefits of Road Transport Regulatory Reform*.

### Government Implications

From this base information, financial implications for Governments, over a 30 year period, of increasing mass limits were calculated. Impacts based on the NRTC estimates of direct benefits are given in Table B.4 while Table B.5 presents estimates based on the estimates of direct benefits from the report *Benefits of Road Transport Regulatory Reform*. As with productivity increases, indirect taxation estimates for Commonwealth and State Governments were calculated for the first 8 years of mass limits increases using the proportions given in Table B.3.

Increases in economic growth also leads to increases in government taxation revenue. The increases in general taxation expected are based on a proportion of the increase in gross domestic product. However, it should be noted that these estimates are only accurate to plus or minus 30 per cent.

**Table B 4: Impacts on Governments by Year: NRTC Estimates of Direct Benefits of Mass Limit Increases**

(\$ million per annum)

Years	Indirect Taxation Revenues			General Taxation Revenues			Net Effects on Taxation Revenues			Total Government Costs	Net Impact on Government Revenue	Net Effect on Government. Finances
	C'wealth	State	Total	C'wealth	State	Total	C'wealth	State	Total			
1	-28	-4	-32	-25	4	28	-50	8	60	-165	-224	-175
2	-36	-5	-41	55	9	64	20	4	24	-100	-76	-110
3	-41	-6	-47	75	13	90	35	7	42	-100	-58	-110
4	-46	-7	-53	95	15	110	50	9	57	-100	-43	-110
5	-49	-7	-56	105	18	125	60	11	69	-100	-32	-110
6	-51	-7	-58	115	19	135	65	12	76	-100	-25	-110
7	-53	-8	-61	120	20	142	70	13	82	-100	-19	-110
8	-54	-8	-62	125	21	147	70	13	85	-100	-15	-110
9	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
10	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
11	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
12	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
13	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
14	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
15	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
16	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
17	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
18	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
19	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
20	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
21	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
22	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
23	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
24	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
25	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
26	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
27	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
28	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
29	-55	-8	-63	185	31	218	130	23	155	-25	130	-35
30	-55	-8	-63	185	31	218	130	23	155	-25	130	-35

**Table B 5: Impacts on Governments by Year: Benefits of Road Transport Regulatory Reform Estimates of Direct Benefits**  
*(\$ million per annum)*

Years	Indirect Taxation Revenues			General Taxation Revenues			Net Effects on Taxation Revenues			Total Government Costs	Net Impact on Government Revenue	Net Effect on Government. Finances
	C'wealth	State	Total	C'wealth	State	Total	C'wealth	State	Total			
1	-28	-4	-32	-15	-2	-15	-40	-6	-46	-165	-210	-175
2	-36	-5	-41	70	12	83	35	7	42	-100	-59	-110
3	-41	-6	-47	95	16	110	55	10	63	-100	-38	-110
4	-46	-7	-53	115	19	132	70	12	80	-100	-21	-110
5	-49	-7	-56	130	21	149	80	14	93	-100	-8	-110
6	-51	-7	-58	135	23	160	85	15	101	-100	1	-110
7	-53	-8	-61	140	24	168	90	16	108	-100	7	-110
8	-54	-8	-62	150	25	174	95	17	112	-100	11	-110
9	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
10	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
11	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
12	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
13	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
14	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
15	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
16	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
17	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
18	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
19	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
20	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
21	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
22	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
23	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
24	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
25	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
26	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
27	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
28	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
29	-55	-8	-63	210	35	245	155	27	182	-25	156	-35
30	-55	-8	-63	210	35	245	155	27	182	-25	156	-35

Net Government revenue reflects the sum of the net tax effects, bridge costs and implementation costs, whereas total government costs reflects only the costs to bridges and implementation. Finally the net effect on government finances reflect the costs of bridges, freight and implementation.

## **B.2 Calculation of Present Values and Benefit-Cost Ratios**

The Present Values, as shown in Section 6, were calculated as the sum of the discounted costs over a 30 year period. For example, the Present Value of up-front bridge costs in each of the first eight years, is equivalent to \$75 million multiplied by the discount factor for that particular year. The discounted results are summed for all years, giving a Present Value for up-front bridge costs over the 30 year period.

This method was applied to each of the estimated impacts of increased mass limits, including government finances. These Present Values were then annualised over the 30 year period in order to provide an equivalent yearly cost-saving.

Cost-benefit ratio's were calculated as the ratio of the direct net savings in freight costs (increased productivity) to the sum of bridge costs, additional costs of installing road-friendly suspensions and implementation costs. A second cost-benefit ratio was calculated using the economy wide effects of increasing mass limits. In this instance the cost-benefit ratio was calculated as the ratio of consumption savings to the sum of net bridge, suspension and implementation costs.

## **B.3 When the Cost Benefit Ratio is Held Constant**

In the Summary Justification section estimates of the residual benefits that would be available to implement a mass-management alternative-compliance scheme, while still maintaining total benefits at twice that of the total costs were presented. In order to calculate the margin available to maintain a cost-benefit ratio of two the following formula was used:

Benefits Required to Provide a Cost-Benefit Ratio of Two =  $2 * \text{Total Costs}$

$(\text{Total Benefits Available} - \text{Benefits Required})/2$

Therefore, the residual net benefit that remained, when the benefit-cost ratio was set at two, was \$900 million. The net cost of requiring operators to be accredited to a mass-management scheme can therefore be as much as \$900 million in present value terms, and the total benefits of increasing mass limits would still be twice the total costs.

On average, heavy vehicles have a service life of around 15 years. Thus, an annuity period of 15 years was applied to estimate the net costs per annum that could be incurred by requiring mass-management accreditation without dropping the benefit-cost ratio below two. Around 100 000 vehicles are expected to operate at the higher limits. Based on this estimate, the maximum net cost per vehicle of mass-management accreditation (if an overall benefit-cost ratio of two is to be maintained) could be calculated.