Business case for

Lower Bound

High Productivity Motor Vehicles

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3.0	*31/10/12*	*Conversion into report framework better aligned with Better Business Case format.*
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Document Review

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Contents

Executive summary

1. This business case addresses the demand for heavy vehicles to go anywhere on the network with increased payloads, with no increased impact on bridge and pavement infrastructure. Significantly increased freight productivity is expected.

2. The 2010 High Productivity Motor Vehicle (HPMVs) amendment to the Vehicle Dimensions and Mass Rule enables heavy vehicles to operate under permit at weights above the standard legal maxima on specified routes where the bridges are capable of coping with the additional load.

3. Customers find HPMV permits a useful means of achieving freight productivity but are unable to achieve both additional weight <u>and</u> flexibility to operate on most routes

4. Refining the HPMV rule to create a Lower Bound HPMV permit would enable vehicle configurations of up to 50 tonnes gross vehicle weight <u>and</u> flexible operation across almost all routes accessible to Class 1 vehicles (up to 44 tonnes), which do not require a permit.

5. 50% of HPMV permits are already for gross vehicle weights of up to 50 tonnes. Further widespread permit take-up by other heavy vehicles is expected if general access were available at this weight.

6. The Lower Bound pro-forma vehicle designs are a 9 axle rigid truck & trailer, and a nine or ten axle B-train. The gains are achieved by lengthening the first to last axle distance to spread the extra loads on bridges and an additional axle to avoid any increase in pavement wear. A nine-axle Lower Bound HPMV may achieve a cost saving of up to 15-17% compared to an alternative seven or eight-axle class 1 vehicle.

7. The key strategic benefit is increased freight productivity across New Zealand and service improvements for NZTA heavy vehicle customers through faster and more certain permit applications.

8. The benefits to the New Zealand economy are vehicle operating cost savings to service an assumed fixed freight task. These benefits have been modelled as a function of:

    a) Permit take-up rates, for which pessimistic, base and optimistic scenarios have been developed. Factors currently increasing the tendency to take up Lower Bound HPMV permits include attractive operating cost saving for most but not all sectors and the strong state of rivalry in the industry. Current low growth economic conditions might be expected to dampen the pace of take-up.

    b) Level of vehicle operating cost reduction achieved under each permit for purposes of servicing a fixed freight task. Each of the permit take-up scenarios has been tested for the sensitivity of benefits to variations in assumed operational cost savings achieved by permitted vehicles. In the base scenario, net annual transportation cost savings (after consideration of costs of vehicle conversions and wider safety and administrative benefits) range from $103 to $162 million by end of year five assuming operational cost savings in a range from 8-12% (A more conservative level of savings has been used for modelling purposes compared with the theoretical possible operating cost saving of 15-17%)

9. In the short term, operational cost savings would be expected to flow to transport operators. Mainly linehaul and rural vehicles except logging are expected to take-up Lower Bound HPMV permits. Some logging sector take-up is assumed only in the optimistic scenario. Over time it is expected that competition among transport operators will transfer benefits to the shippers of heavy goods from farms, factories and warehouses.

10. The expected financial investment requirement and bridge/pavement infrastructure risk for central and local government is, in a worst case, low. Despite this low risk and in order to mitigate any residual RCA concerns, monitoring of reactive maintenance post Lower Bound HPMV uptake is recommended. The capital investment requirement for commercial operators in new or converted rigs is modest relative to the potential payload and financial gains.

11. Implementation will require consultation with Road Controlling Authorities, a rule change and identification of local road bridges with spans greater than 25 metres that may require posting for Lower Bound HPMVs.

12. Lower Bound HPMVs would support objectives of - improving freight productivity while protecting infrastructure, and removing regulatory barriers while maintaining public safety.

13. Significant financial gains are possible for New Zealand industry in return for little or no additional capital or operational investment above existing government budget baselines.

Introduction

14. Lower Bound High Productivity Motor Vehicles are a modified Class 1 vehicle that extends length and gross combination weight from 44 to up to 50 tonnes while still allowing general access to state highways and local roads.

15. This business case seeks approval for a transport rule change to support the introduction of Lower Bound HPMVs. The economic benefit is expected to be an 8-12% operating cost reduction for an assumed fixed freight task. This could deliver net annual transportation cost savings (after costs of vehicle conversions) of more than $100 million by year five.

16. No central or local government capital investment is required to support this initiative beyond the worst case possibility of $600,000 for modification of signage on bridges already posted for Class 1 vehicles. Operational costs are limited to the administrative costs to the NZTA and Ministry of Transport promulgating a rule change. These operational costs are expected to lie within existing budget baselines. Because of the low or no capital expenditure required, this paper could equally be called a “case for regulatory change” as a “business case”.

17. Only small increases in capital costs to heavy vehicle operators are required to secure these gains.

18. This proposal follows the Treasury requirements for Better Business Cases, organised around the five case model designed to systematically ascertain that the investment proposal:

    - is supported by a robust case for change – the ‘strategic case’
    - maximises value for money – the ‘economic case’
    - is financially affordable – the ‘financial case’, and
    - is achievable – the ‘management case’.
    - can be procured – the ‘commercial case’ – although this is not particularly relevant in this report as there is little or no capital expenditure and therefore relatively few procurement issues.

Background

19. The 2010 High Productivity Motor Vehicle (HPMVs) amendment to the Vehicle Dimensions and Mass Rule provided for heavy vehicles to operate under permit at sizes and weights above the standard legal maxima on routes where bridges are capable of coping with them.

20. HPMV applications to date have been mostly at about 50 tonnes. The proposed “Lower Bound HPMV” concept is a proposed rule refinement to increase the vehicle gross mass above the current 44 tonne limit to include up to 50 tonne vehicles.

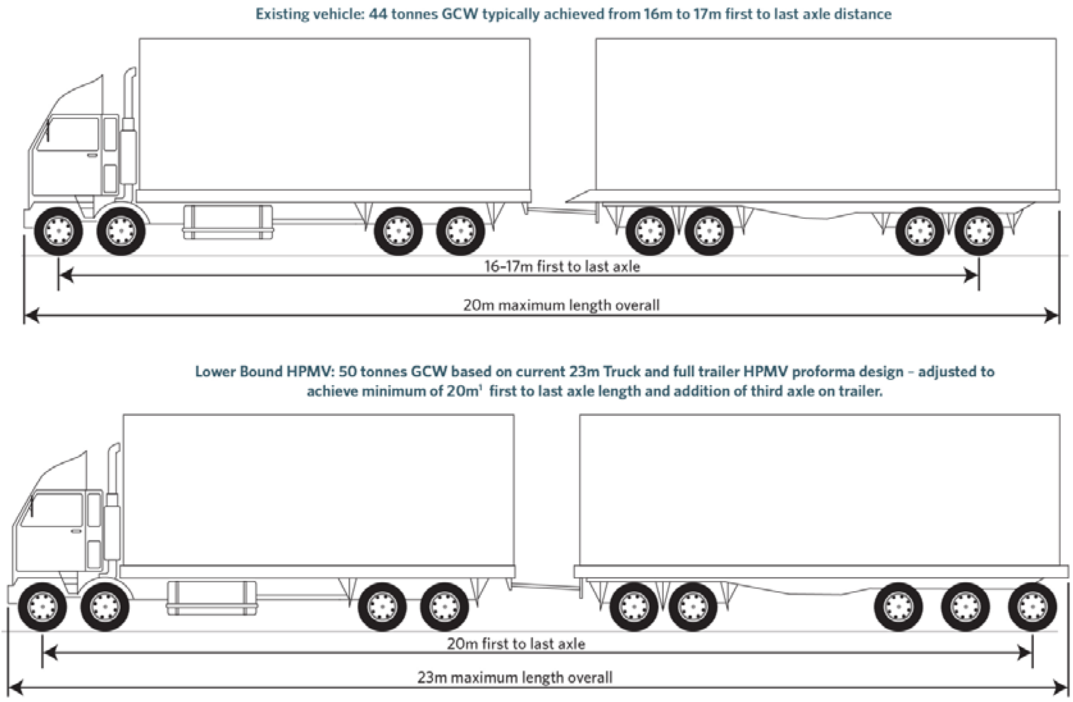
The Lower Bound High Productivity Motor Vehicle proposal

21. Lower Bound HPMV vehicles would be able to travel anywhere on the network constrained only by the same bridge postings for weight and speed applying to any unpermitted (Class 1) heavy vehicle.

22. Two pro-forma 22.3 metre long, 9-axle vehicle designs have been designed to achieve 50 tonnes gross weight (GCW). These are a rigid truck and trailer (R22T23) and a B-Train (B1233 or B2233)

23. Figure 1 shows how, for a rigid truck and trailer, increasing the first to last axle length from a current length of around 16-17metres for a general access 44 tonne vehicle combination to 20 metres for a Lower Bound HPMV allows combined vehicle mass to increase up to 50 tonnes on all Class 1 routes. Similar calculations apply to the pro-forma designs for B-Trains.

Figure 1.



[1] Maximum gross weight is determined by the formula **18 tonnes + (1.6 multiplied by first to last axle length)**. A minimum of 20 metres first to last axle length is therefore required to achieve 50 tonnes GCW. Examples of maximum GCW available from shorter first to last axle lengths are provided in the following table:

First to last axle length	Maximum gross combination weight (GCW)
18.75m ≤ y < 19.375m	48t
19.375m ≤ y < 20m	49t
20m ≤ y	50t

24. The vehicle gross mass limit formula would be the current “General Requirements” or Class 1 Gross Mass formula extended beyond the 44 tonne limit.

25. Low levels of capital expenditure on vehicles are required to achieve this loading. Bridges with spans less than 25 metres will be largely unaffected, while some bridges with spans greater than 25m will be slightly affected compared with the effects of current Class 1 (up to 44 tonne) vehicles.

26. Because there is in most cases no change in bridge impact compared with a general access vehicle at 44 tonnes, a 50 tonne Lower Bound HPMV permit could be issued without requirement for any bridge analysis by the NZTA or Road Controlling Authorities (RCAs).

27. The additional axle provides no increase in pavement wear on roads of both state highway and local road pavement strength standard. These designs have the same geometric performance (swept path) as the quad semi-trailer, which is the existing general access vehicle requiring the most road space.

Strategic Case

The strategic context

28. The strategic context for this initiative are the goals within the “*Government policy statement on land transport funding, 2009/10-2018/19“* to maximise value for money from investment in land transport and the removal of regulatory barriers. The Lower Bound HPMV initiative also supports the New Zealand Transport Agency priorities of improving the efficiency of freight movement and improving customer service.

The case for change

29. Current arrangements (status quo option) for heavy trucks on New Zealand roads are to:

- EITHER, operate up to a legal maximum of 44 tonnes on most roads and bridges,
- OR, apply for a HPMV permit to operate at higher weights and longer lengths on specifically approved routes. The existing HPMV rules provide the opportunity where bridge limits allow for greatly increased payloads. However the availability of these HPMV routes is limited due to the requirement for investment in bridge strengthening.

30. The Lower Bound HPMV concept provides heavy truck operators the flexibility to go almost anywhere on the network at a weight increased from 44 to up to 50 tonnes. While the payload increase is below the gains available under a full HPMV permit, it is likely to be commercially attractive for most operators.

31. Key stakeholders are businesses with heavy freight needs, heavy transport operators servicing these businesses at farms, factories and warehouses, road controlling

authorities and all road users. The case for change is summarised in Table 1 for each investment objective.

32. Lower Bound HPMVs provide the opportunity for significant cost reductions for New Zealand transport, with little or no additional infrastructure investment and modest investment in trucks and trailers. The key risk is some small additional administrative costs of promulgating an enabling rule change that operators may not take-up permits. The risk of maintenance cost increases on roads with low strength pavements is low.

Table 1: Investment objectives for Lower Bound HPMVs

Investment Objective One	**Improve freight productivity while protecting infrastructure**
Existing Arrangements	EITHER: Heavy vehicle operators continue to have general access to most NZ roads at up to 44 tonnes gross weight , OR: operators apply for an HPMV permit for increased mass and/or length on specified routes only.
Business Needs	Operators and their business customers seek increased vehicle payloads with the flexibility of general access. Infrastructure owners wish to facilitate productivity gains for national and local economic benefit provided there is no increased impact on bridge and pavement infrastructure.
Potential Scope	The proposed rule change would provide an opportunity for increased heavy truck payloads on both State Highways and local roads providing the heavy vehicle meets a new 9-axle pro-forma design that creates no greater bridge or pavement impact.
Potential Benefits	The range of potential financial benefits to operators and their customers is an 8-12% reduction in operating costs compared with a 7 or 8 axle alternative linehaul vehicle combination respectively. This is after taking into account: payload gains assuming strict compliance with maximum weights, changes in RUC and operating costs and the extent to which gains can be consistently achieved on all annual vehicle kilometres travelled. It is assumed that operator cost savings will support the New Zealand economy. The precise mechanisms by which operator cost savings might flow through the economy are, however, beyond the scope of this paper. Economic benefits in the form of operator cost savings has been modelled for pessimistic, base and optimistic scenarios of permit take-up. These scenarios have been tested for their sensitivity to an assumed 8%, 10% and 12% efficiency gain achieved by permitted vehicles. In the base scenario, net annual transportation cost savings (after costs of vehicle conversions) range from $103 to $162 million by end of year five.
Potential Risks	The main risks to achieving economic benefits are the levels of permit take-up and operational cost savings actually achieved. Scenario and sensitivity modelling indicate that net operational cost savings by the end of year five would be $36 million assuming a pessimistic scenario of uptake and 8% efficiency gain actually achieved. The investment at risk however is only the small administrative costs of promulgating a rule change. The risk of increased pavement and/or bridge damage has been assessed as low.
Constraints and Dependencies	• The NZTA needs to ensure enforcement rules and tolerances are the same for existing heavy vehicles at 44 tonnes and the proposed 50 tonne. Higher enforcement tolerances for Lower Bound HPMVs may otherwise discourage permit take-up. • *A* specific Road User Charge (RUC) rate will need to be developed for the proposed 9-axle Lower Bound HPMV.

Table 1 (continued)

Investment Objective Two	**Remove regulatory barriers while maintaining public safety**
Existing Arrangements	Heavy vehicle operators wishing to secure productivity gains through operation at gross weights above 44 tonnes must apply for an HPMV permit. These permits take time to process because of the required bridge analysis, and on many routes, analysis reveals that bridges have insufficient capacity.
Business Needs	Transport operators wish to maximise their flexibility to go anywhere on the network at any time, while maintaining public safety standards.
Potential Scope	A streamlined permitting process for Lower Bound HPMV permits would not require bridge analysis. Checks only of the vehicle suitability would be required. Pro-forma Lower Bound HPMV designs are in line with the vehicle operating standards of existing vehicles.
Potential Benefits	Heavy vehicle operators would have quick access to a permit that allows general access to both state highways and local roads.
Potential Risks	There is a small administrative risk of processing delays if permit take-up is significantly higher than expected.
Constraints and Dependencies	• Current HPMV permit processes will need to be redesigned to provide for a streamlined process for Lower Bound HPMV applications. • Rule changes would be needed to extend current Class 1 weight limits to 50 tonnes without requirement for specific access permission from individual Road Controlling Authorities. A staged approach could be taken if say Auckland, and possibly other councils with significant coverage of key freight networks, agree to operate lower bound HPMVs under existing rules. This could operate while the rule change goes through.

Economic Case

33. It is assumed that operator cost savings will support the New Zealand economy. The precise mechanisms by which operator cost savings might flow through the economy are, however, beyond the scope of this paper. This section discusses:

- Scenarios for the likelihood and extent of permit take-up.
- Operator efficiency gains and sensitivity of permit take-up scenarios to these assumptions.
- Operator costs (capital costs of vehicle changes).
- Other wider costs and benefits to road controlling authorities and society.

34. The options assessed in this report are a status quo option and the preferred option of rule changes to provide for Lower Bound High Productivity Motor Vehicles. Other options identified by stakeholders have included requests for increased gross mass on 8 axle vehicles with general access. These alternatives have been ruled out of scope because any increase in pavement damage for a fixed freight task is likely to be unacceptable to road controlling authorities.

35. The heavy transport industry has a range of segments each with its own technical and commercial issues that can make analysis of potential permit take-up and benefits realisation appear complex. The economic modelling supporting this report is conceptually simple however.

36. The operator cost savings are modelled as a function of:

- Permit take-up rates, for which pessimistic, base and optimistic scenarios have been developed.
- Level of vehicle operating cost reduction achieved under each permit for purposes of servicing a fixed freight task. This is a function of the percentage decrease in kilometres required and the operational cost reduction for each kilometre saved. Each of the permit take-up scenarios have been tested for the sensitivity of benefits to variations in assumed operational cost savings achieved by permitted vehicles.

37. Firm evidence for these permit take-up rate and operating cost reduction assumptions is difficult to establish. Discussions have been held on input assumptions with a range of industry participants. The industry feedback varies. At one extreme, comments are that the Lower Bound rule would offer insufficient gain over existing alternatives. At the other extreme, comments indicate that the Lower Bound pro-forma designs could become a widely used industry standard vehicle.

38. The transport industry is particularly rivalrous and uncovering true commercial intentions is difficult. Additionally the commercial factors impacting permit take-up are complex and fully informed reactions are therefore difficult to gauge from operators. NZTA experience with the introduction of quad semi-trailers was that the proposal initially met with many expressions of indifference whereas actual permit take-up numbers proved to be significant.

39. In light of wide-ranging reactions and a problematic evidence base, the reasonableness of assumptions has been tested with NZTA staff and industry representatives. A viable business case exists even under the pessimistic scenario assumptions. In any event the government investment risk is near to zero, beyond the risk of wasted administrative effort implementing a rule change that may not be sufficiently utilised.

LIKELIHOOD AND EXTENT LOWER BOUND HPMV PERMIT TAKE-UP

40. Considerations for permit take-up have included:

- Whether the operator needs additional payload mass. Many operators reach a cubic restriction before maximum weight is reached and would have no demand for a Lower Bound HPMV permit. The extent of this “cube out” constraint varies across different transport businesses.
- Commercial considerations for alternative choices of existing seven or eight axle vehicle combinations include: the cost of conversion, changes in

payload, changes in enforcement tolerances and fines, changes in RUC and changes in vehicle operating costs. The cost modelling in Appendix One indicates, after allowing for all the considerations above, *financial savings* from a Lower Bound HPMV of up to 17% for a Lower Bound HPMV compared with an 8-axle alternative vehicle.

- Also underpinning commercial considerations is the general state of the economy. As a general rule, it would be expected that permit take-up would be accelerated by good economic conditions. On the other hand, efficiency gains are likely to be attractive even in tough economic times and take-up of Lower Bound HMPV permits could still be expected at the time when vehicle replacement becomes essential.
- Bridge weight restrictions on local roads. Appendix Five shows that bridge restrictions are not an issue on State Highways and less than 10% of local road bridges are estimated to have posted restrictions for Class 1 vehicles. While these weight restrictions potentially limit permit take-up, particularly for rural operations, the constraints are no worse than a Class 1 operator currently running at up to 44 tonnes.
- Truck and trailer manufacturing capacity to build new, or convert existing, trailers.
- Technical capability. The logging sector for example has technical constraints to its use of Lower Bound HPMVs

Cost modelling of vehicle choices for a fixed freight task

41. Permit take-up rates and benefits, in the form of reduced operating costs to service a fixed freight task, are assessed for:

    - Rigid truck and trailers – rural.
    - Rigid truck and trailers – non-rural / linehaul
    - B-Trains

    A key simplified assumption underpinning modelling of benefits and take-up in this business case is that the freight task remains fixed. The efficiency gains of the Lower Bound HPMV could however, in some circumstances, facilitate trade that would not otherwise have taken place. For example land previously uneconomic for forestry could become viable. These potential benefits to land-owners, nor costs of increased roading demand arising from this potential for some induced traffic are not calculated in the model.

42. Benefits, are expected mainly in the non-rural / linehaul fleet operating principally on state highways.

43. Levels of potential benefits relative to costs of vehicle change are expected to be the fundamental driver of permit take-up rates. To support permit take-up assumptions a set of cost models are detailed in Appendix One. This shows various vehicle combination options to service a theoretical fixed freight task. Table 2 shows a

summary of one of the main truck types expected to deliver benefits. This is the rigid truck and trailer combination - designed for general freight linehaul. This analysis indicates that *payload improvements* (after allowing for the weight of an extra axle and chassis) from a 9-axle Lower Bound HPMV vehicle are around 17% or 20% compared with a 7 or 8 axle alternative combination respectively.

44. There are however a wide variety of factors that would influence operating cost reduction benefits including: RUC costs, changes in operating expenditure, and the extent enforcement tolerance is utilised. After allowing for changes in RUC and operating costs only, the range of potential *financial savings* to operators assuming strict compliance with maximum weights is a 15 or 17% gain compared with a 7 or 8 axle alternative linehaul vehicle combination respectively.

Table 2. Payload and cost advantages of a 9-axle linehaul / general freight rigid truck and trailer operating under Lower Bound HPMV permit compared with 7 and 8-axle Class 1 vehicles to service a fixed freight task

Payload and financial gains	7-axle rigid truck & trailer operating under Class 1 rules	8- axle rigid truck & trailer operating under Class 1 rules	9 axles rigid truck & trailer operating under Lower bound HPMV permit	Gains from a Lower Bound HPMV vehicle servicing a fixed freight task compared with -	
				(i) 7- axle standard Class 1 vehicle	(ii) 8- axle standard Class 1 vehicle
a) Payload gains					
Payload (tonnes) with <u>no</u> use of enforcement tolerance	27.0	26.5	31.70	*17%*	*20%*
b) Financial gains assuming <u>no</u> utilisation of enforcement tolerance					
RUC rate: $ / km	0.547	0.522	0.478		
RUC paid to service fixed freight task	$53,687	$52,200	$39,959		
Operating cost: $ / km (excluding RUC)	2.78	2.81	2.84		
Operating cost to service fixed freight task	$273,229	$281,197	$237,421		
Total operating cost	$326,917	$333,397	$277,380	*15%*	*17%*
Note: This model is based on a theoretical fixed freight task for an 8-axle rig operating 100,000 km per year.					

45. However, operators on average tend to consistently utilise some or all of the 1.5 tonnes enforcement tolerance available on a 7 or 8 axle standard vehicle operating at a 44 tonne limit. Fines for breach of weight limits are significantly higher for Lower Bound HPMVs at more than $2,000 compared with a standard 44 tonne combination at less than $200. An operator's choice of vehicle type could therefore consider use of enforcement tolerance for a Class 1 vehicle and no utilisation of enforcement tolerance for a Lower Bound HPMV. In this case the operation cost saving benefits of a 9-axle

Lower Bound HPMV fall to around 12% or 14% improvement over a 7 or 8 axle alternative respectively.

46. In light of these potential perverse regulatory incentives for sub-optimal vehicle combination choices by operators - it is recommended that the NZ Transport Agency create the same enforcement tolerances and fines across all Class 1 heavy vehicles and Lower Bound HPMVs. This report assumes that this consistent enforcement treatment of Class 1 and Lower Bound HPMVs is achieved.

47. Sensitivity of the pessimistic, base and optimistic permit take-up scenarios has been tested to changes in operating cost savings at 8, 10 and 12%. These assumptions compare with the 15-17% potential operating cost savings shown in Table 2. These assumptions are made because operators have been more conservatively assumed able to achieve only between 50-75% of full payload gains on all annual kilometres travelled.

Permit take-up results

48. Permit take-up is modelled for three scenarios – pessimistic, base, and optimistic. Assumptions to build these scenarios are based on discussions with industry participants. Table 3 shows total permit take-up over five years of 4,782 vehicles out of a total heavy fleet of around 11,450 (42%).

Rigid truck and trailer - rural fleet permit take-up

49. Almost all of the rural truck and trailer fleet are considered to have underlying commercial interest in the additional mass allowed by Lower Bound HPMVs. Bridge restrictions may have some dampening effect, but these constraints are no worse than those already applying to Class 1 vehicles. By the end of year five, 766 vehicles or 20% of the rural fleet are modelled to have taken up permits.

    a. The base scenario of **dairy** sector permit take-up is for the third of the fleet servicing the central and south of the South Island. The pace of permit take-up is assumed to be driven by two assumptions - for replacement and conversion, as follows-

        i. 7.5% of the total fleet *replaced* each year. This is inline with replacements at a rate assuming a 15-year trailer life. While typical trailer life is 20 years, some accelerated replacement is assumed.

        ii. 7.5% of the total fleet *converted* each year.

    b. Nil **logging** sector permit take-up is modelled in the base scenario due to difficulties of achieving piggybacking of 5-axle logging trailers onto trucks. While technically possible from a truck and trailer design point of view, the widespread operational availability of loaders with capacity to lift the heavier trailers is a significant barrier.

    c. 90% of **stock and bulk** vehicles are considered to have commercial interest in permit take-up. Pace of permit take-up in the base scenario is modelled in two parts to give 600 permits, or 38% of the total fleet by the end of year five.

i. 7.5% of the total fleet *replaced* each year.

ii. 7.5% of the total fleet *converted* each year.

Non-rural / linehaul fleet permit take-up

50. 70% of rigid truck and trailers operating as non-rural / linehaul vehicles are assumed to have commercial interest in additional mass. The 30% balance of the fleet is assumed to be mainly constrained by cubic capacity. It is assumed in the base scenario that 7.5% of the fleet numbers with commercial interest in increased mass are replaced and 7.5% are also converted each year.

51. The same assumptions and scenarios as used for the rigid truck and trailers operating as non-rural / linehaul vehicles are used for B-Trains.

Table 3. Base scenario permit take-up assumptions

Fleet segment	Total fleet #	Fleet # with commercial interest in permit take-up	Pace of permit take-up over five years. *Two means of permit take-up - a) At time of replacement b) Conversion of existing trailer*	Permit take-up by end of year 5	
				#	*% of total fleet*
Rigid truck & trailers – Rural.					
a) Dairy	500	166 *1/3rd of fleet (central & southern South Island.*	***Replacement:*** 7.5% of total fleet/year ***Conversions:*** 7.5% of total fleet /year	166	*33%*
b) Logging	1,500	0 *Nil permit take-up because of operational implementation barriers.*	***n/a***	0	*0%*
c) Stock & bulk	1,600	1,440 *Commercial interest is assumed for almost (90%) all rural vehicles – subject to small ongoing bridge availability constraints.*	***Replacement:*** 7.5% of interested fleet/year ***Conversions:*** 7.5% of interested fleet per year	600	*38%*
d) Other	200	0 *Nil permit take-up. All considered to be specialist vehicles.*	***n/a***	0	*0*
Total - rural	3,800	1,606		766	*20%*
Rigid truck & trailers – non rural / linehaul	5,**200**	3,640 *30% assumed to cube out, and 70% assumed to be interested in higher mass*	***Replacement:*** 7.5% of interested fleet/year ***Conversions:*** 7.5% of interested fleet per year	2,730	*53%*
B-Trains (linehaul)	2,450	1,715 *30% assumed to cube out, and 70% assumed to be interested in higher mass.*	***Replacement:*** 7.5% of interested fleet/year ***Conversions:*** 7.5% of interested fleet per year.	1,286	*52%*
TOTAL	**11,450**	**6,961**		**4,782**	**42%**

Other scenarios of permit take-up

52. A pessimistic and optimistic scenario of permit take-up has been modelled around the base scenario. Table 4 shows assumed rates of permit take-up via trailer replacements based on a range of 15 – 20 year trailer lifecycles. These lifecycles equate to replacement at rates of 5% of the interested fleet per annum in the pessimistic scenario and 7.5% of the fleet in the base and optimistic scenarios.

53. Conversion of existing vehicles range from nil in the pessimistic scenario up to 10% of the interested fleet per year in the optimistic scenario.

54. The results range from total permit take-up after five years of 1,539 in the pessimistic scenario to 6,041 in the optimistic scenario. Appendix Two provides details of these take-up scenarios.

Table 4. Other scenarios of permit take-up

Scenario	Total fleet #	Fleet # with commercial interest in permit take-up	Pace of permit take-up over five years. *Two means of permit take-up - a) At time of replacement b) Conversion of existing trailer*	Permit take-up by end of year 5		
				#	*% of interested fleet*	*% of total fleet*
Pessimistic	11,450	6,961	***Replacement:*** 0% for dairy & logging. 5% of interested fleet/year for stock & bulk and non rural. ***Conversions:*** Nil.	1,539	*17%*	*13%*
Base	11,450	6,961	***Replacement:*** 7.5% of interested fleet/year ***Conversions:*** 7.5% of interested fleet /year	4,782	*52%*	*42%*
Optimistic	11,450	6,961	***Replacement:*** 7.5% of interested fleet (including logging) /year. ***Conversions:*** 10% of interested fleet (including logging) /year.	6,041	*66%*	*53%*

OPERATOR EFFICIENCY GAINS (Operator cost savings to service an assumed fixed freight task)

Vehicle operation benefits

55. Annual rule benefits (before consideration of vehicle conversion costs) under the base scenario are shown in Table 6 to reach over $145 million per annum by year five. This assumes a 10% efficiency gain to service an assumed fixed freight task. Appendix Three provides details on calculation of benefits across the industry segments.

Calculation of operator efficiency gains / financial benefits

56. Operator efficiency gains are made technically possible by stretching trucks to allow more weight on bridges. The first to last axle length is around 16-17 metres for a general access 44 tonne vehicle combination. Increasing this length to 20 metres for a Lower Bound HPMV allows combined vehicle mass to increase to up to 50 tonnes on all Class 1 routes. The gross combination weight (GCW) from 44 to 50 tonnes comes at the cost of a one tonne increase from the required additional axle (750 - 800kgs) and associated body work / chassis changes. The additional axle is required to ensure no increase in pavement wear for a fixed freight task.

57. Efficiency gains are calculated from reduced trips to service the same freight task. Trip reductions are assumed to reduce vehicle-operating costs and have positive impacts on safety and emissions. The value of financial benefits to operators is calculated by multiplying an assumed vehicle operating cost of $2.81[1] per kilometre saved by the estimate of kilometres avoided to service the same freight task.

58. All scenarios of take-up assume a 10% efficiency gain equating to savings of 10,000 to 11,000 kilometres per year for rural and linehaul vehicles respectively. This would provide annual operational cost savings of $28,120 for a rural vehicle and $30,932 for a linehaul vehicle. These annual savings are in line with the approximate cost of vehicle upgrade or conversion indicating a payback period for operators of around a year.

59. Cost modelling in Appendix One shows that a slight decrease in RUC under Lower Bound HPMV permits would be a further incentive for operator permit take-up. For the purpose of benefits calculation, RUC reductions for operators are not included and pavement wear is assumed to be neutral.

60. Average annual distances travelled by truck and trailer combinations are based on estimates in Pearson (ibid). Based on industry discussions this report noted 100,000 and 110,000 kilometres per year for rigid truck and trailer and B-Trains respectively.

61. Table 5 shows very significant gross benefits from a Lower Bound HPMV permit regime under all scenarios of take-up (assuming 10% operating cost savings in all scenarios. Benefits in all scenarios are overwhelmingly in the non-rural/linehaul sectors.

Table 5. Summary of operator benefits (gross benefits - before vehicle conversion costs)

Scenario of take-up					
Pessimistic	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Rigid truck & trailer - rural	$1,124,787	$2,249,574	$3,374,361	$4,499,148	$5,623,935
Rigid truck & trailer - non rural	$5,629,559	$11,259,118	$16,888,676	$22,518,235	$28,147,794
B-train	$2,652,388	$5,304,777	$7,957,165	$10,609,553	$13,261,941
Annual benefits	**9,406,734**	**18,813,468**	**28,220,202**	**37,626,936**	**47,033,670**
Base	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Rigid truck & trailer - rural	$5,483,336	$10,966,673	$14,790,949	$18,165,309	$21,539,670
Rigid truck & trailer - non rural	$16,888,676	$33,777,353	$50,666,029	$67,554,705	$84,443,381
B-train	$7,957,165	$15,914,330	$23,871,494	$31,828,659	$39,785,824
Annual benefits	**30,329,177**	**60,658,355**	**89,328,472**	**117,548,674**	**145,768,875**
Optimistic	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Rigid truck & trailer - rural	$7,620,432	$15,240,863	$22,861,295	$30,481,727	$38,102,158
Rigid truck & trailer - non rural	$19,703,456	$39,406,911	$59,110,367	$78,813,823	$98,517,278

[1] The "*Review of Road Freight Costs in NZ & Comparable Australian States,* Bob Pearson, 2007, calculated total 8-axle heavy vehicle operating costs including RUC, cost of capital, fuel, driver time and repairs & maintenance of $2.80 per kilometre in 2007. Updating this 2007 figure for inflation gives a current cost of $3.25 or a cost of $2.81 per kilometre net of RUC at $0.435 per kilometre.

B-train	$9,283,359	$18,566,718	$27,850,077	$37,133,436	$46,416,795
Annual benefits	**36,607,246**	**73,214,492**	**109,821,739**	**146,428,985**	**183,036,231**

Sensitivity analysis on level of operator cost saving

62. Table 6 shows the sensitivity of gross operator cost savings (before consideration of vehicle capital costs) to changes in the assumed net annual financial benefit to operators. Even under a pessimistic scenario of take-up and operator cost savings at the lowest assumed level of 8%, the case for introduction of Lower Bound HPMVs remains strong.

Table 6. Scenarios of annual benefits to operators in year five

Scenario	Assumed operator efficiency gain	Gross annual OPERATOR gains by end of year 5
Pessimistic	8%	$ 37,626,936
	10%	**$ 47,033,670**
	12%	$ 56,440,404
Base	8%	$ 116,615,100
	10%	**$ 145,768,875**
	12%	$ 174,922,651
Optimistic	8%	$ 146,428,985
	10%	**$ 183,036,231**
	12%	$ 219,643,477

Distribution of gains from cost savings over time

63. The transport industry is highly rivalrous, the bargaining power of customers is strong and the barriers to new entrants are low. Therefore, pressure is expected to be on all operators to bid prices based on Lower Bound HPMV operating costs. In the short term, operational cost savings would be expected to flow to transport operators. Over time it is expected that competition among transport operators will transfer benefits to the shippers of heavy goods from farms, factories and warehouses. These businesses will become more internationally competitive with improved profitability - all other factors remaining equal. In the case of rural benefits, increased farm profitability is likely to eventually lead to improved land values. There could be increased pressure for consolidation of the industry as a result of the need for new capital investment in vehicles.

OPERATOR COSTS OF PERMIT TAKE-UP

64. Appendix Four provides detailed calculations of the costs to operators of permit take-up. The permit take-up assumptions indicate permit take-up via either replacement of new vehicles and also, in the base and optimistic scenarios, conversion of existing vehicles.

65. Replacement costs are assumed to be the marginal increase in costs for a new build compared with a standard 44 tonne rig. The marginal increase in cost for a new build is assumed at $20,000 based on $14,000 for an additional axle and $6,000 for additional chassis and canopy length and administrative costs of permit application.

66. Costs for a conversion of an existing trailer are assumed to be double that of a new build. An additional axle is likely to require reconfiguration of the existing axle set and associated brake work. Extension of chassis deck and curtain side and roofs would make up the balance. Some relatively low cost solutions may be available to some existing truck configurations such as lengthening the draw bar only and therefore the average figure of $40,000 for a conversion might be considered conservative.

67. Table 7 shows a summary of replacement and conversion costs across five years of permit take-up. These costs occur once only in the year of permit take-up whereas benefits are on going for the life of the vehicle combination. In the base scenario, costs of vehicle change approach $30 million per year in each of the five years modelled. By comparison, benefits climb to $145m by year five in the base scenario as shown in Table 5.

Table 7. Summary of conversion costs for all vehicle types

Operator New build & conversion costs - SUMMARY					
	Year 1	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Pessimistic	$6,155,000	$6,155,000	$6,155,000	$6,155,000	$6,155,000
Base	$29,947,500	$29,947,500	$28,177,500	$27,697,500	$27,697,500
Optimistic	$37,862,500	$37,862,500	$37,862,500	$37,862,500	$37,862,500

BENEFITS AND COSTS TO PARTIES OTHER THAN OPERATORS

Administration benefits and costs

68. The costs of the regulatory change process for government agencies are expected to be very modest compared with the likely benefits to operators and industry. Table 8 discusses the differences in NZTA operating costs between status quo and Lower Bound HPMV options.

69. In the worst case – assuming all permits represent new applications, additional NZTA operating costs could range from $75,000 to $300,000 per year in the first five years. This range assumes a processing time of 0.5 to 2.0 hours and a staff processing cost of $100 per hour. The actual processing time would depend on the extent to which the NZTA can achieve a straight through processing flow targeting 0.5 hours.

70. In a best-cost scenario for the NZTA, there is an opportunity in future to extend Lower Bound HPMV permits, from the current one-year permit duration, out to two years. This would require that the Lower Bound regime proves to pose no implementation or operator oversight issues.

71. The risk of NZTA facing an unexpected spike in Lower Bound HPMV permit application numbers, resulting in processing delays, is small as operators must first secure a suitable trailer.

Table 8. Impacts of Lower Bound HPMVs on NZTA operating costs

Status quo arrangements	Lower Bound HPMVs
a) Class 1 vehicles continue to run as at present with no permit applications and no processing costs for NZTA or RCAs.	Under the status quo with operators continuing without need for a permit at 44 tonnes, then the Lower Bound HPMV option would represent increased permit volumes and a small increase in NZTA operational costs.
b) Existing full HPMV permitting provisions continue requiring processing times of approximately eight hours.	From an NZTA perspective there would be some cost savings if the alternate *do nothing option* is a full HPMV application. The time required to process a Lower Bound HPMV permit application is estimated at 30 minutes, The reduced time is largely because there is no change in bridge impact compared with a general access vehicle at 44 tonnes. A 50 tonne Lower Bound HPMV permit could therefore be issued without requirement for any bridge analysis by the NZTA or RCAs.

Pavement costs

72. Opus[2] concluded that the *"overall risk of increased pavement deterioration as a result of LB HPMVs is assessed to be low."*

73. The number of equivalent standard axles (ESA) increases from 2.81 ESAs for an average laden weight standard 8-axle truck and trailer to 3.42 ESAs for a 9-axle Lower Bound HPMV rigid truck and trailer. While the number of ESAs increases, so does the payload, resulting in a neutral to small increase in overall pavement wear. In this regard, TERNZ calculated 0.117 ESAs / payload tonne for a laden Class one 8 axle rigid truck and trailer, compared with 0.118 ESAs / payload tonne for a Lower Bound HPMV 9 –axle rigid truck and trailer[3].

74. Opus analysed the ESA impacts at weigh in motion (WIM) sites of assumed take-up of Lower Bound HPMVs at new maximum allowable weights with an assumed efficiency gain for the same amount of freight. Assuming no overloading, Opus concluded, *"the addition of Lower Bound HPMVs to the existing fleet mix produces a neutral impact in terms of pavement loading, based on the 4th power law approach*".[4]

75. Overloading above 50 tonnes (up to 53 tonnes) results in a 4% increase in pavement loading at assessed industry permit take-up. Opus concluded that the strict penalties imposed on HPMV permit holders would make significant overloading by LB HPMV operators unlikely.

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[2] Page 1, *Lower Bound HPMVs - Analysis of pavement impacts*, Opus, 2012.

[3] Pages 22 & 23, *Lower Bound HPMVs - Vehicle configurations*, TERNZ, June 2012.

[4] Page 14, Opus, Ibid.

76. Calculation of ESA impacts is the standard methodology for assessment of pavement damage. Opus went on to also assess pavement impacts with alternative methodologies investigating shear stresses and surface damage. The findings were *"In terms of the impacts of dynamic loading resulting in shear failure and pavement surface damage, there is no conclusive pavement impact*".[5] Opus noted risks of impacts on networks with soft subgrades, poor quality pavement materials and road alignment.

77. The final Opus recommendation was that *"Although indications are that LB HPMVs will have a neutral impact on pavements at assessed base case take-up, it would be prudent to complete monitoring of reactive maintenance post LB HPMV uptake*"[6]

Bridge costs

78. The vehicle gross mass limit calculation for Lower Bound HPMV bridge acceptability would be the current "General Requirements" or Class 1 Gross Mass curve extended beyond the 44 tonne limit. Bridges with spans less than 25 metres will be largely unaffected, while some bridges with spans greater than 25m will be slightly affected compared with the effects of current Class 1 (44 tonne) vehicles.

79. A total of 18 bridges in the State Highway network are identified as potentially unsuitable for Lower Bound HPMVs. Further investigations at a total cost of approximately $40,000 are considered likely to result in 10 state highway bridges being posted as unsuitable for Lower Bound HPMV.

80. Most of these State Highway bridges are on low traffic routes. The extent to which these bridge restrictions limit the take-up of Lower Bound HPMV permits is therefore likely to be small. No increase in capital or maintenance expenditure on bridges is required to carry the same freight task unless it is decided to remove the "Lower Bound HPMV" posted bridges through strengthening.

81. The number of bridges on local road networks likely to require further weight restriction posting for Lower Bound HPMVs is not known with precision, but is thought to be small. For example, Auckland Council advises that 46 or 4.6% of its 996 bridges have spans greater than 25 metres, but only 2 would not be suited to Lower Bound HPMVs. A further 16 bridges with existing postings for Class 1 vehicles would not be suitable for Lower Bound HPMVs. A sample of local authorities in Canterbury (Opus June 2012) indicated 6.6% of bridges had restrictions. In a worst case, costs could total $600,000 if 6.6% of all 9,000 local road bridges nationwide were to require new posting signage at a cost of $1000 per bridge. It is proposed that these local road bridges and analysis and posting costs be identified as part of the detailed rule design process.

Enforcement costs

82. Existing enforcement activity and costs are assumed with implementation of a Lower Bound HPMV rule. The requirement that, at least in the initial years, a permit is

[5] Page 32, Opus Ibid.

[6] Page 34, Opus Ibid.

required for Lower Bound HPMV operation may provide higher standards of operator compliance.

Safety impacts

83. There are some minor safety gains arising from lower accident exposure arising from the reduced kilometres required to service an assumed fixed freight task. Appendix Six shows annual benefits from reduced death and injury could reach $15 million per annum by year five. No material increase in crash severity from increased gross vehicle mass is considered likely.

84. Increased rollover risk is noted as a potential risk that is assumed to be mitigated by the existing Static Roll Over Threshold (SRT) requirements that will continue to apply to both HPMV and Class 1 vehicles.

85. Nil increase in crash severity is assumed. Pearson[7] noted other work indicating that further increases in mass are unlikely to make any material difference to existing crash severity.

86. The risk of negative public perceptions concerning increasing number of longer trucks on roads has been considered and discounted as a concern. Austroads research has indicated that perceptions of vehicle length increase are not encountered on well-trafficked routes. On lower volume routes where a longer truck may be more likely noticed, the reduced volume of trucks to service the same freight task offsets the increase in longer trucks.

Emissions benefits

Reduced vehicle kilometres travelled for the same freight task provide emissions savings. This part of the methodology may be sensitive to any mode shift from rail to road, which is outside the scope of this study. The value of emissions benefits has been assessed on an assumption of $5 per tonne of CO2. 2.6 tonnes of CO2 are assumed avoided per 1000 litres of fuel.[8] Carbon cost savings could climb to more than $300,000 per year in the base scenario. These savings are incorporated into the operational cost savings as fuel costs include carbon charges.

Summary of all benefits and costs

87. Calculation of a traditional benefit cost ratio is not considered useful for the purposes of this business case, as there are minimal upfront investment costs to central and local government. Costs to operators, while more material, are still not high. A more useful metric is considered to be the present value of net operational benefits to the

[7] p.18. Report to Ministry of Transport and Transit NZ. *Review of the potential for increasing transport productivity through concessions on heavy vehicle mass and dimension characteristics*. Bob Pearson, May 2007.

[8] p.36 Pearson May 2007 ibid.

New Zealand economy of the status quo option compared with the option of introducing Lower Bound HPMV permits.

88. The base scenario shows strong net benefits from year two onwards because of the substantial operating cost savings available at little upgrade cost to operators and assumed zero impact on pavements and bridges. A five-year cash flow calculation in Table 9 shows a net present value (NPV) in excess $164 million. This NPV is calculated at the beginning of the first full year of implementation. This future point would be following a period of rule change development and up to a year during which industry awareness builds up and vehicle fleet changes begin to take place.

Table 9: Summary of costs and benefits over time. BASE scenario

Base scenario	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	Total
Permit take-up						
Rigid truck & trailers - rural	195	195	136	120	120	766
Rigid truck & trailers - non rural	546	546	546	546	546	2,730
B-trains	257	257	257	257	257	1,286
Total take up	998	998	939	923	923	4,782
Operator benefits - annual	$30,329,177	$30,329,177	$28,670,117	$28,220,202	$28,220,202	
Annual cumulative operator benefits	$30,329,177	$60,658,355	$89,328,472	$117,548,674	$145,768,875	
Operator costs - annual	$29,947,500	$29,947,500	$28,177,500	$27,697,500	$27,697,500	
Operator cash flow (ignoring RUC) - annual	$381,677	$30,710,855	$61,150,972	$89,851,174	$118,071,375	
Costs to parties other than operators						
Pavement impacts (net cost)	$0	$0	$0	$0	$0	-
Bridge impacts (net cost)	$0	$0	$0	$0	$0	-
Agency processing (worst case)	$199,650	$199,650	$187,850	$184,650	$184,650	
Safety Benefits	$3,020,010	$6,040,020	$8,894,830	$11,997,478	$15,240,636	-
Cash flow - all sectors	**$3,202,037**	**$36,551,225**	**$69,857,952**	**$101,664,002**	**$133,127,362**	
NPV of financial gains to operators	**8%**	**$164,483,204**				

Sensitivity analysis on total net benefits to all parties

89. Table 10 shows three permit take-up scenarios: base, pessimistic and optimistic. Each of these permit take-up scenarios has been further tested for its sensitivity to changes in the assumed level of operator efficiency gain that might be achieved.

90. The base scenario shows that annual net gains by year five reach levels of $103 to $162 million. The sensitivity analysis shows that even under a pessimistic scenario with operator efficiency levels at 8%, or around half of the theoretical available levels, the annual gains by year five are still very worthwhile at $36 million.

Table 10: Sensitivity analysis of results to changes in assumed operator efficiency gain

Sensitivity analysis of results to changes in assumed operator efficiency gain			
Scenario	**Assumed operator efficiency gain**	**Net annual gains by end of year 5**	**NPV years 1-5**
Pessimistic	8%	$ 36,204,817	$ 71,058,987
	10%	$ 45,734,651	$ 61,835,305
	12%	$ 55,018,285	$ 113,822,510
Base	8%	$ 103,973,586	$ 187,765,692
	10%	$ 133,127,362	$ 164,483,204
	12%	$ 162,281,137	$ 322,409,207
Optimistic	8%	$ 127,518,901	$ 223,212,285
	10%	$ 164,069,172	$ 194,560,632
	12%	$ 200,733,393	$ 389,630,813

Financial Case

91. The financial case from a government perspective for the Lower Bound HPMV initiative is very strong as low or no capital expenditure is required on the part of central or local government infrastructure owners. The sole capital expenditure risk is a potential requirement for new bridge posting signage with a worst-case estimate of $600,000. It is assumed that all administration costs can be met within existing budget baselines.

92. The operational costs and revenue implications to government relate to levels of HPMV permit applications. There are costs to the agency and local government to process these permit applications, which are not recovered at current fee levels. There are separate initiatives proposed to streamline heavy vehicle permitting which would mitigate this financial risk. The worst-case financial risk to the agency is not significant relative to the scale of national benefits. Assuming a peak permit application flow of 1,400 in any one-year, fee income at currently levels could be less than $100,000. Assuming two hours processing time at $100 per hour, agency costs could be nearer $300,000.

93. The financial costs on operators is the additional expenditure required to either convert an existing trailer to a Lower Bound HPMV pro-forma design or the incremental costs of buying a new Lower Bound HPMV capable rig. These costs have been considered in the factors driving realisation of the rule benefits.

Implementation case

94. There are three administrative options for implementing a Lower Bound HPMV regime:

a) Initiate a rule change that extends Class 1 general access conditions to include operation under a Lower Bound HPMV pro-forma design.

b) Use the existing HPMV rules and processes. This approach would also require:

- Lower Bound HPMV pro-forma design to be published.
- Approvals for general access with all 67 Road Controlling Authorities to be negotiated.

c) Initiate a rule change as per option a) and while this process is underway, as soon as practical introduce Lower Bound HPMV rules under existing HPMV rules with selected local authorities as per option b).

95. Option c) is the preferred option as it minimises administrative delay in the medium term, while opening up the benefits of Lower Bound HPMVs in a small number of local authorities as soon as possible.

96. The tasks required to implement the Lower Bound HPMV option are largely administrative steps by central government to prepare, consult on and gazette a rule change.

- NZTA approval
- RCA and industry consultation
- Regulation change which will consider permitting details including issues such as nature of signage on vehicles.
- RCAs to investigate local road bridges with spans greater than 25 metres, which in some cases are not currently required to be posted for Class 1 vehicles at 44 tonnes, but may require posting for Lower Bound HPMV vehicles at 50 tonnes.

97. The process of rules changes is well known and does not pose material risks within existing baseline budgets. There is no procurement of capital goods required. Some regulatory change work could be procured from externally contracted sources, but this work is expected in the main to be delivered by internal departmental staff.

98. The most significant risk is achieving agreement with Road Controlling Authorities on the net benefits of the rule change to local communities.

Next Steps

99. Table 11 sets out the key activities required to establish, design and deliver the rule change.

Table 11: key implementation activities

Activity	Date	Lead / participants
1. All technical reports finalised and received at NZTA	End November	Stephen Patience, all consultants
2. Present Lower Bound HPMV proposal to MOT and request a VDM Rule Amendment	Early - Mid December	Graham Taylor, Harry Wilson and Marinus La Rooij (TBC), David Stimpson
3. Article for next VDM Newsletter.	Mid October	Stephen Patience
4. All technical reports available on NZTA website (Post discussions with MOT)	December	Stephen Patience
5. Email final reports to roading managers in local councils. Aim is for them to discuss reports with CEs/Mayors & provide feedback and questions	December	Graham Taylor, Harry Wilson (TBC)
6. Communicate LB HPMV to LGNZ Zone meetings	December onwards	Harry Wilson (TBC), Graham Taylor, RCA (Mark Allingham/ Allan Wallace (TBC)

References

1. Lower Bound HPMVs - Analysis of pavement impacts, Opus, 2012.

2. Lower Bound HPMVs - Vehicle configurations, TERNZ, June 2012.

3. Assessment of take-up of Lower Bound High Productivity Motor Vehicles, Stimpson & Co, 30 October 2012. (File: *Lower Bound Take-up Report 301012.xls*)

4. Report to Ministry of Transport and Transit NZ. Review of the potential for increasing transport productivity through concessions on heavy vehicle mass and dimension characteristics. Bob Pearson, May 2007.

5. Review of Road Freight Costs in NZ & Comparable Australian States, Bob Pearson, 2007.

6. NZTA report, Number 459CS. Assessment of HPMV Load Limits for Bridges - Final (R2).doc prepared by Opus, October 2011.

Appendix One: Cost modelling of vehicle choice for Lower Bound HPMV permits

The table below details the vehicle combination choices for a theoretical fixed freight task for a typical linehaul general freight rigid truck and trailer unit. Further cost models for Linehaul Bulk, Logging, B-Trains and Dairy examples are provided in the separate report - *Assessment of take-up of Lower Bound High Productivity Motor Vehicles*, *Stimpson & Co*, 11 October 2012.

Example single truck (LINEHAUL GENERAL FREIGHT UNIT) rig options under existing and proposed Lower Bound HPMV rules						
Cost components	**a) Status quo. 6-axle rigid truck & trailer (PAT Class 63)**	**b) Status quo. 7-axle rigid truck & trailer (PAT Class 751). [3 axle truck / 4 axle trailer]**	**c) Status quo. 8 axle rigid truck & trailer (PAT Class 891)**	**d) Same freight task as c) using 9-axle rigid truck & trailer under Lower Bound HPMV permit**		
1. Rig combination weight data						
Truck Tare	10.50	10.50	11.00	11.00		
Trailer Tare	5.50	6.50	6.50	7.30		
Combination Tare weight	16.00	17.00	17.50	18.30		
GCW with precise max weight compliance	42.00	44.00	44.00	50.00		
Payload without enforcement tolerance	26.00	27.00	26.50	31.70		
gain on seven axles				*17%*		
gain on eight axles				*20%*		
Enforcement tolerance.	1.50	1.50	1.50	0.50		
Extent enforcement tolerance is utilised	0%	0%	0%	0%		
Enforcement tolerance used	-	-	-	-	*7-9 gain*	*8-9 gain*
Payload with assumed use of tolerance	**26.00**	**27.00**	**26.50**	**31.70**	*17%*	*20%*
GCW with assumed use of enforcement tolerance	**42.00**	**44.00**	**44.00**	**50.00**		
2. Fixed freight task						
Annual freight task (tonnes)						
Return trips per day			2			
Trip length (single leg of round trip)	100	100	100	100		
Operating days per week			5			
Operating weeks per year			50			
Annual freight task (tonnes) - defined by 8 axle truck capacity	**13,250**	**13,250**	**13,250**	**13,250**		
Annual kms required for fixed freight task	101,923	98,148	100,000	83,596		

3. RUC costs for fixed freight task						
RUC Class Truck	Class 6 Assuming > 18 tonnes	Class 6 Assuming > 18 tonnes	Class 14	MOT estimate		
RUC / km Truck	0.353	0.353	0.328			
RUC class trailer	Class 37 > 10 tonnes	Class 43	Class 43			
RUC / km trailer	0.26	0.194	0.194			
Total RUC / km	0.613	0.547	0.522	0.478		
Gain on seven axles				*13%*		
Gain on eight axles				*8%*		
Total RUC / year	**$ 62,479**	**$ 53,687**	**$ 52,200**	**$ 39,959**		
RUC / revenue or payload tonne	$ 4.72	$ 4.05	$ 3.94	$ 3.02		
4. Annual operating cost - for fixed freight task						
Operating cost (exc RUC) / km based on 8 axle rig benchmark	$ 2.81	$ 2.81	$ 2.81	$ 2.81		
Operating cost increase / decrease relative to 8 axle benchmark	-2%	-1%	0%	1%		
Operating cost / km (excluding RUC)	2.76	2.78	2.81	2.84		
Annual operating cost	**280,872**	**273,229**	**281,197**	**237,421**		
		2%				
Total cost (Operating + RUC)	**$ 343,351**	**$ 326,917**	**$ 333,397**	**$ 277,380**		
Ranking of options	***4***	***2***	***3***	***1***		
			15%	gain on 7 axles		
			17%	gain on 8 axles		

Appendix Two: Potential take-up of Lower Bound HPMV permits

Permit take-up summary

Permit take-up summary - All vehicle types and sectors	Total fleet	Fleet segment size	*Permit take-up achieved in each year*					Percentage of fleet
Base Scenario	available for take-up	& take-up by end of 5 years	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	taking up over 5 years
R22T23 - rural	3,800	766	195	195	136	120	120	20%
R22T23 - non rural	3,640	2,730	546	546	546	546	546	75%
B1233 / B2233	1,715	1,286	257	257	257	257	257	75%
TOTAL	**9,155**	**4,782**	**998**	**998**	**939**	**923**	**923**	52%
Take-up over five years as % of current total fleet		*52%*						
Take-up summary - All vehicle types and sectors	**Total fleet**	**Fleet segment size**	***Take-up achieved in each year***					**Percentage of fleet**
Pessimistic Scenario	available for take-up	& take-up by end of 5 years	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	taking up over 5 years
R22T23 - rural	3,800	200	40	40	40	40	40	5%
R22T23 - non rural	3,640	910	182	182	182	182	182	25%
B1233 / B2233	1,715	429	86	86	86	86	86	25%
TOTAL	**9,155**	**1,539**	**308**	**308**	**308**	**308**	**308**	17%
Take-up over five years as % of current total fleet		*17%*						
Take-up summary - All vehicle types and sectors	**Total fleet**	**Fleet segment size**	***Take-up achieved in each year***					**Percentage of fleet**
Optimistic Scenario	available for take-up	& take-up by end of 5 years	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	taking up over 5 years
R22T23 - rural	3,800	1,355	271	271	271	271	271	36%
R22T23 - non rural	3,640	3,185	637	637	637	637	637	88%
B1233 / B2233	1,715	1,501	300	300	300	300	300	88%
TOTAL	**9,155**	**6,041**	**1,208**	**1,208**	**1,208**	**1,208**	**1,208**	66%
Take-up over five years as % of current total fleet		*66%*						

Permit take-up by rigid truck & trailers – rural. Base scenario

Rigid truck & trailers - rural fleet		Fleet segment size		*Take-up achieved in each year*					Percentage of fleet
Base Scenario	**Notes**	& take-up by end of 5 years		***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***	taking up over 5 years
a) Dairy - national fleet estimate	**1**		**500**						
Total take up *target* estimate based on 33% of the national fleet (say central and southern South Island only). Take up *rate* based on trailer replacements (7.5% pa) calculated across 100% of the national fleet.		33%	*83*	38	38	8	0	0	17%
Take up rate based on trailer conversions of existing trailers (7.55% pa) calculated across 100% of the national fleet.		33%	*83*	38	38	8	0	0	17%
Total dairy			*166*	*75*	*75*	*16*	*0*	*0*	*33%*
b) Logging- - national fleet estimate	**2**		**1500**						
Take-up % and #		0%	*0*	0	0	0	0	0	0%
c) Stock & bulk - national fleet estimate	**3**		**1600**						
Total take up *target* estimate based on trailer replacements of 7.5% pa across 50% of the national fleet (estimated at 1600 vehicles in total).		50%	*300*	60	60	60	60	60	19%
Take up rate based on trailer conversions of existing trailers (7.5% pa) calculated across 90% of the national fleet.		50%	*300*	60	60	60	60	60	19%
Total stock and bulk			*600*	*120*	*120*	*120*	*120*	*120*	*38%*
d) Other - national fleet estimate	**4**		**200**						
Take-up % and #		0%	*0*	0	0	0	0	0	0%
			3,800	195	195	136	120	120	20%
			766	195	195	136	120	120	

Notes

1	(i) The longer length requirements for lower bound will cause difficulty for Fontera tankers to access farms that already have tight turning access. Therefore, a change to lower bound is likely only for the newer, larger dairy units, such as those in the central and lower part of the South Island. (ii) Fontera want a consistent fleet of vehicles. Lower bound will require a truck with a larger, higher performance engine resulting in a changed, higher cab configuration, etc. This affects fleet management efficiency. (iii) Fontera expects that they would only incorporate Lower Bound into their fleet in Southland and Otago.
2	There will be no logging take-up because lengthening a trailer will prevent piggybacking.
3	Of the total estimated fleet of 1600 vehicles, 10% will cube-out on most trips at 44 tonnes and are not likely to be attracted to a Lower Bound permit but will already have HPMV overlength permits. A further 40% of the fleet will not have sufficient commercial imperatives to consider the vehicle modifications to meet the pro-forma requirements.
4	Other vehicles are assumed to be somewhat specialised in nature and therefore unlikely to take-up lower bound

Permit take-up by rigid truck & trailers– rural. Pessimistic scenario

	Rigid truck & trailers - rural fleet		**Fleet segment size**		***Take-up achieved in each year***					**Percentage of fleet**
	Pessimistic Scenario	**Notes**	& take-up by end of 5 years		***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***	taking up over 5 years
	a) Dairy - national fleet estimate	**1**	0%	**500**						
	Take-up % and #			*0*	0	0	0	0	0	0%
	b) Logging- - national fleet estimate	**2**		**1500**						
	Take-up % and #		0%	*0*	0	0	0	0	0	0%
	c) Stock & bulk - national fleet estimate	**3**		**1600**						
	Total take up *target* estimate based on trailer replacements of 5% pa across 50% of the national fleet (estimated at 1600 vehicles in total).		50%	*200*	40	40	40	40	40	13%
	d) Other - national fleet estimate	**4**		**200**						
	Take-up % and #		0%	*0*	0	0	0	0	0	0%
				3,800	40	40	40	40	40	5%
				200						
Notes										
1	For maintenance, efficiency and operational practicality, Fontera is assumed not to use Lower Bound.									
2	There will be no logging take-up because lengthening a trailer will prevent piggybacking.									
3	Of the total estimated fleet of 1600 vehicles, 10% will cube-out on most trips at 44 tonnes and are not likely to be attracted to a Lower Bound permit but will already have HPMV overlength permits. A further 40% of the fleet will not have sufficient commercial imperatives to consider the vehicle modifications to meet the pro-forma requirements.									
4	Other vehicles are assumed to be somewhat specialised in nature and therefore unlikely to take-up lower bound									

Permit take-up by rigid truck & trailers – rural. Optimistic scenario

	Rigid truck & trailers - rural fleet		**Fleet segment size**		***Take-up achieved in each year***					**Percentage of fleet**
	Take up: Optimistic Scenario	**Notes**	(& take-up by end of 5 years)		***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***	taking up over 5 years
	a) Dairy - national fleet estimate	**1**		**500**						
	Total take up *target* estimate based on 100% of the national fleet. Take up *rate* based on trailer replacements (7.5% pa) calculated across 100% of the national fleet.		100%	*187.5*	37.5	37.5	37.5	37.5	37.5	38%
	Take up rate based on trailer conversions of existing trailers (7% pa) calculated across 100% of the national fleet.		100%	*150*	37.5	37.5	37.5	37.5	37.5	30%
	Total dairy			*338*	*75*	*75*	*75*	*75*	*75*	*68%*
	b) Logging - national fleet estimate	**2**		**1500**						
	There is no take up of logging as the extended trailer length prevents piggy-backing.		100%	*0*	0	0	0	0	0	0%
	There is no take up for conversions of existing trailers.		100%	*0*	0	0	0	0	0	0%
	Total logging			*0*	*0*	*0*	*0*	*0*	*0*	*0%*
	c) Stock & bulk - national fleet estimate	**3**		**1600**						
	Total take up *target* estimate based on trailer replacements of 7.5% pa across 70% of the national fleet.		70%	*420*	84	84	84	84	84	26%
	Take up rate based on conversions of existing trailers at 10% pa calculated across 70% of the national fleet.		70%	*560*	112	112	112	112	112	35%
	Total stock and bulk			*980*	*196*	*196*	*196*	*196*	*196*	*61%*
	d) Other - national fleet estimate	**4**		**200**						
	Take-up % and #		0%	*0*	0	0	0	0	0	0%
				3,800	271	271	271	271	271	36%
				1318						
Notes										
1	(i) The longer length requirements for lower bound will cause difficulty for Fontera tankers to access farms that already have tight turning access. Therefore, a change to lower bound is likely only for the newer, larger dairy units, such as those in the central and lower part of the South Island. (ii) Fontera wants a consistent fleet of vehicles. Lower bound will require a truck with a larger, higher performance engine resulting in a changed, higher cab configuration, etc. This affects fleet management efficiency. (iii) Fontera expects that they would only incorporate Lower Bound into their fleet in Southland and Otago. In an optimistic scenario, there also may be an opportunity to increase trailer length for a further over the rest of the fleet around the country over time. We have assumed approximately 70% of the fleet over five years.									
2	There will be no logging take-up because lengthening a trailer will prevent piggybacking.									
3	Of the total estimated fleet of 1600 vehicles, 10% will cube-out on most trips at 44 tonnes and are not likely to be attracted to a Lower Bound permit but will already have HPMV overlength permits. A further 40% of the fleet will not have sufficient commercial imperatives to consider the vehicle modifications to meet the pro-forma requirements.									
4	Other vehicles are assumed to be somewhat specialised in nature and therefore unlikely to take-up lower bound									

Appendix Three: Potential benefits of Lower Bound HPMV permits

Appendix 3 a) Potential benefits – Base scenario

Operator benefits - Rigid truck & trailers

Base scenario	Rural - Rigid Truck and Trailer	Non-Rural - Rigid Truck and Trailer (Linehaul)	B-train (linehaul)
Maximum possible payload gain	19%	19%	19%
Gain after consideration of extent of enforcement tolerance used, RUC & operating cost impacts	9-16%	9-16%	12-16%
Assumed achievable efficiency	10%	10%	10%
Average kilometres travelled / year	100,000	110,000	110,000
Average kilometres saved per year	10,000	11,000	11,000
Average operator cost / km saved	$2.81	$2.81	$2.81
Total savings / vehicle / year	$28,120	$30,932	$30,932

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Total take-up Rigid truck & trailer - rural	195	195	136	120	120
Total take-up Rigid truck & trailer - non rural	546	546	546	546	546
Total take-up B-train	257	257	257	257	257
Total take up - All fleet types	**998**	**998**	**939**	**923**	**923**
Annual new benefits to operators	30,329,177	30,329,177	28,670,117	28,220,202	28,220,202
Cumulative annual benefits	**30,329,177**	**60,658,355**	**89,328,472**	**117,548,674**	**145,768,875**
Cumulative Rigid truck & trailer - rural take-up	195	390	526	646	766
Cumulative Rigid truck & trailer - non rural take-up	546	1,092	1,638	2,184	2,730
Cumulative B-train take-up	257	515	772	1,029	1,286
Cumulative total vehicle take-up	998	1,997	2,936	3,859	4,782
Annual kilometres avoided	10,785,750	21,571,500	31,767,250	41,803,000	51,838,750
Kilometres / litre	2	2	2	2	2
Litres avoided	6,163,286	12,326,571	18,152,714	23,887,429	29,622,143
Tonnes Co2 / 1000 km	3	3	3	3	3
CO2 avoided (tonnes)	2,370,495	4,740,989	6,981,813	7,962,476	11,393,132
Price C02 / tonne	5	5	5	5	5
	11,852,473	23,704,945	34,909,066	39,812,381	56,965,659

Appendix 3 b) Potential benefits – Pessimistic scenario

Operator benefits - Rigid truck & trailers Pessimistic Scenario	Rural - Rigid Truck and Trailer	Non-Rural - Rigid Truck and Trailer (Linehaul)	B-train (linehaul)
Maximum possible payload gain	19%	19%	19%
Gain after consideration of extent of enforcement tolerance used, RUC & operating cost impacts	9-16%	9-16%	12-16%
Assumed achievable efficiency	10%	10%	10%
Average kilometres travelled / year	100,000	110,000	110,000
Average kilometres saved per year	10,000	11,000	11,000
Average operator cost / km saved	$2.81	$2.81	$2.81
Total savings / vehicle / year	$28,120	$30,932	$30,932

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Total take-up Rigid truck & trailer - rural	40	40	40	40	40
Total take-up Rigid truck & trailer - non rural	182	182	182	182	182
Total take-up B-train	86	86	86	86	86
Total take up - All fleet types	**308**	**308**	**308**	**308**	**308**
Annual new benefits to operators	9,406,734	9,406,734	9,406,734	9,406,734	9,406,734
Cumulative annual benefits	**9,406,734**	**18,813,468**	**28,220,202**	**37,626,936**	**47,033,670**
Cumulative Rigid truck & trailer - rural take-up	40	80	120	160	200
Cumulative Rigid truck & trailer - non rural take-up	182	364	546	728	910
Cumulative B-train take-up	86	172	257	343	429
Cumulative total vehicle take-up	308	616	923	1,231	1,539
Annual kilometres avoided	3,345,250	6,690,500	10,035,750	13,381,000	16,726,250
Kilometres / litre	2	2	2	2	2
Litres avoided	1,911,571	3,823,143	5,734,714	7,646,286	9,557,857
Tonnes Co2 / 1000 km	3	3	3	3	3
CO2 avoided (tonnes)	735,220	1,470,440	2,205,659	2,548,762	3,676,099
Price C02 / tonne	5	5	5	5	5
	3,676,099	7,352,198	11,028,297	12,743,810	18,380,495

Appendix 3 c) Potential benefits - Optimistic scenario

Operator benefits - Rigid truck & trailers

Optimistic Scenario	Rural - Rigid Truck and Trailer	Non-Rural - Rigid Truck and Trailer (Linehaul)	B-train (linehaul)
Maximum possible payload gain	19%	19%	19%
Gain after consideration of extent of enforcement tolerance used, RUC & operating cost impacts	9-16%	9-16%	12-16%
Assumed achievable efficiency	10%	10%	10%
Average kilometres travelled / year	100,000	110,000	110,000
Average kilometres saved per year	10,000	11,000	11,000
Average operator cost / km saved	$2.81	$2.81	$2.81
Total savings / vehicle / year	$28,120	$30,932	$30,932

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Total take-up Rigid truck & trailer - rural	271	271	271	271	271
Total take-up Rigid truck & trailer - non rural	637	637	637	637	637
Total take-up B-train	300	300	300	300	300
Total take up - All fleet types	**1208**	**1208**	**1208**	**1208**	**1208**
Annual new benefits to operators	36,607,246	36,607,246	36,607,246	36,607,246	36,607,246
Cumulative annual benefits	**36,607,246**	**73,214,492**	**109,821,739**	**146,428,985**	**183,036,231**
Cumulative Rigid truck & trailer - rural take-up	271	542	813	1,084	1,355
Cumulative Rigid truck & trailer - non rural take-up	637	1,274	1,911	2,548	3,185
Cumulative B-train take-up	300	600	900	1,201	1,501
Cumulative total vehicle take-up	1,208	2,416	3,624	4,833	6,041
Annual kilometres avoided	13,018,375	26,036,750	39,055,125	52,073,500	65,091,875
Kilometres / litre	2	2	2	2	2
Litres avoided	7,439,071	14,878,143	22,317,214	29,756,286	37,195,357
Tonnes Co2 / 1000 km	3	3	3	3	3
CO2 avoided (tonnes)	2,861,181	5,722,363	8,583,544	9,918,762	14,305,907
Price C02 / tonne	5	5	5	5	5
	14,305,907	28,611,813	42,917,720	49,593,810	71,529,533

Appendix Four: Potential costs of permit take-up for Lower Bound HPMV permits

The costs of take-up are assumed to be either the marginal increase in costs for a new build compared with a standard 44 tonne rig, or the cost of conversion of existing equipment.

The marginal increase in cost for a new build are assumed at $20,000 based on $14,000 for an additional axle and $6,000 for additional chassis and canopy length and administrative costs of permit application.

Costs for a conversion of an existing trailer are assumed to be double that of a new build. An additional axle is likely to require reconfiguration of the existing axle set and associated brake work. Extension of chassis deck and curtain side and roofs would make up the balance. Some relatively low cost solutions may be available to some existing truck configurations such as lengthening the draw bar only and therefore the average figure of $40,000 for a conversion might be considered conservative.

Operator Costs Base scenario	**Cost per trailer**	Year 1	Year 2	Year 3	Year 4	Year 5
Means of take up -						
a) New builds (additional costs on a new build)	$20,000					
b) Conversions (additional costs on an existing trailer)	$40,000					
Rigid truck and trailer - rural - new		98	98	68	60	60
Rigid truck and trailer - rural - conv.		98	98	68	60	60
Rigid truck and trailer - non rural - new		273	273	273	273	273
Rigid truck and trailer - non rural - conv.		273	273	273	273	273
B-train - new		129	129	129	129	129
B-train - conv.		129	129	129	129	129
Total take up		**998**	**998**	**939**	**923**	**923**
New build costs		$9,982,500	$9,982,500	$9,392,500	$9,232,500	$9,232,500
Conversion costs		$19,965,000	$19,965,000	$18,785,000	$18,465,000	$18,465,000
Total annual costs		**$29,947,500**	**$29,947,500**	**$28,177,500**	**$27,697,500**	**$27,697,500**

Operator Costs Pessimistic Scenario	Cost per trailer	Year 1	Year 2	Year 3	Year 4	Year 5
Means of take up -						
a) New builds (additional costs on a new build)	$20,000					
b) Conversions (additional costs on an existing trailer)	$40,000					
Rigid truck and trailer - rural - new		40	40	40	40	40
Rigid truck and trailer - rural - conv.		0	0	0	0	0
Rigid truck and trailer - non rural - new		182	182	182	182	182
Rigid truck and trailer - non rural - conv.		0	0	0	0	0
B-train - new		86	86	86	86	86
B-train - conv.		0	0	0	0	0
Total take up		**308**	**308**	**308**	**308**	**308**
New build costs		$6,155,000	$6,155,000	$6,155,000	$6,155,000	$6,155,000
Conversion costs		0	0	0	0	0
Total annual costs		**$6,155,000**	**$6,155,000**	**$6,155,000**	**$6,155,000**	**$6,155,000**

Operator Costs Optimistic Scenario	Cost per trailer	Year 1	Year 2	Year 3	Year 4	Year 5
Means of take up -						
a) New builds (additional costs on a new build)	$20,000					
b) Conversions (additional costs on an existing trailer)	$40,000					
Rigid truck and trailer - rural - new		122	122	122	122	122
Rigid truck and trailer - rural - conv.		150	150	150	150	150
Rigid truck and trailer - non rural - new		273	273	273	273	273
Rigid truck and trailer - non rural - conv.		364	364	364	364	364
B-train - new		129	129	129	129	129
B-train - conv.		172	172	172	172	172
Total take up		**1208**	**1208**	**1208**	**1208**	**1208**
New build costs		$10,462,500	$10,462,500	$10,462,500	$10,462,500	$10,462,500
Conversion costs		$27,400,000	$27,400,000	$27,400,000	$27,400,000	$27,400,000
Total annual costs		**$37,862**	**$37,862**	**$37,86**	**$37,86**	**$37,862,**

	,500	**,500**	**2,500**	**2,500**	**500**

Appendix Five: Bridge costs

The proposed rules are to provide general access to Lower Bound HPMV vehicles on all routes other than where posted restrictions may apply. Bridge and pavement infrastructure costs to both state highways and local roads are assumed neutral.

For Lower Bound HPMV vehicles, the vehicle gross mass limit curve would be the current “General Requirements” or Class 1 Gross Mass curve extended beyond the 44 tonne limit. Bridges with spans less than 25 metres will be largely unaffected, while some bridges with spans greater than 25m will be slightly affected compared with the effects of current Class 1 (44 tonne) vehicles. This is based on the NZTA report, October 2011, Number 459CS, Assessment of HPMV Load Limits for Bridges - Final (R2).doc prepared by Opus, which concluded on page 5 -

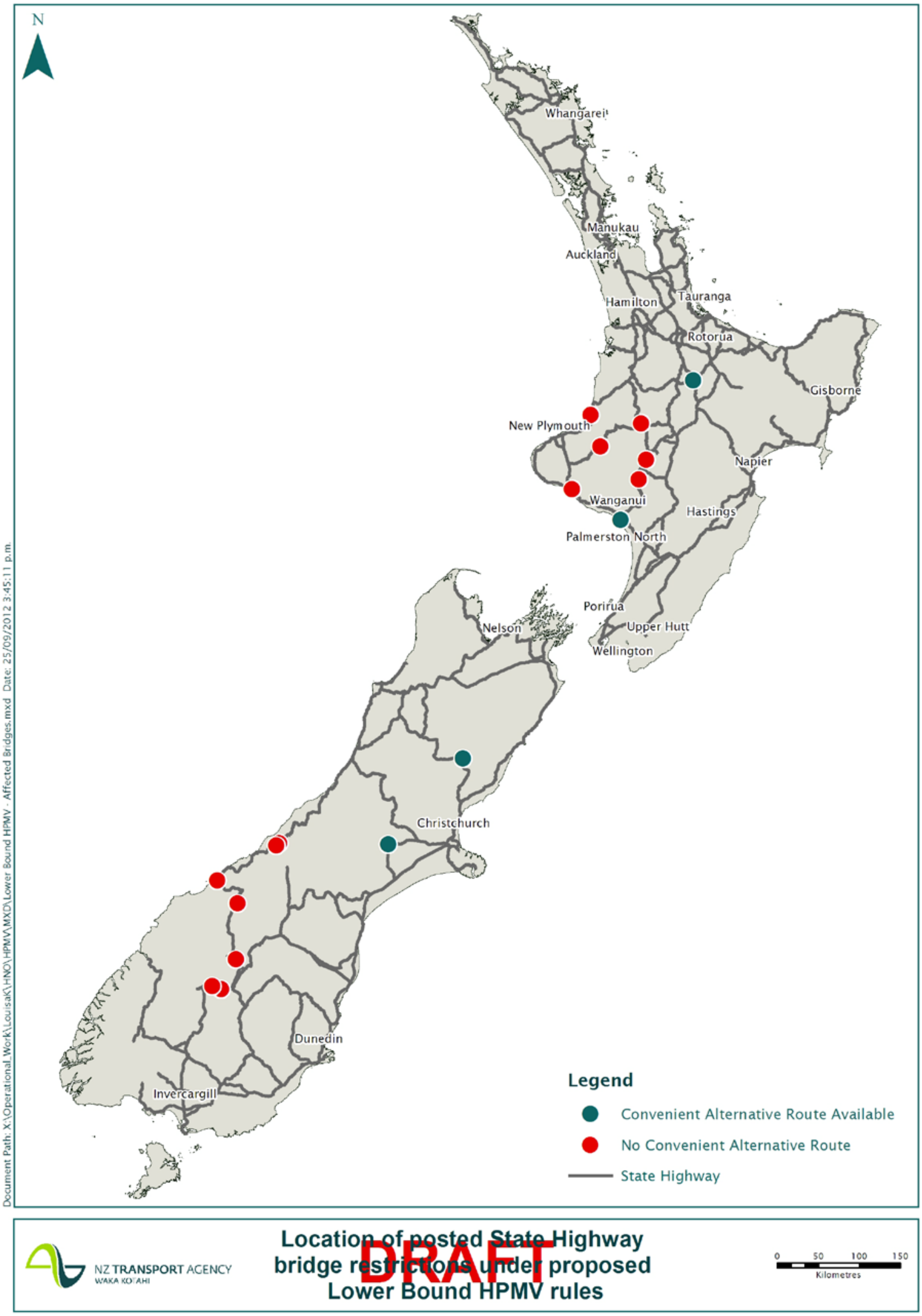
> *“the load effects caused by Lower Bound HPMVs will be almost identical to those caused by the Class 1 vehicle runs undertaken in the 2010 National Screening, as a Lower Bound HPMV slightly heavier than 44T will cause the same load effects as two shorter, closely spaced Class 1 vehicles.*
>
> *……*
>
> *It is expected that all unposted bridges with span lengths less than 25m, and longer span bridges with GROSS Posting Capacities greater than 106% Class 1 will be able to safely support Lower Bound HPMV loading.”*

a) State Highway bridge costs

A total of 18 bridges in the State Highway network are identified as potentially unsuitable for Lower Bound HPMVs. Further investigations at a total cost of approximately $40,000 are considered likely to result in 10 state highway bridges being posted as unsuitable.

Table A shows that most of the 18 potentially restricted State Highway road bridges are on low traffic routes. The extent to which these bridge restrictions limit the take-up of Lower Bound HPMV benefits is therefore likely to be small. No increase in capital or maintenance expenditure on bridges is required to carry the same freight task unless it is decided to remove the “Lower Bound HPMV” posted bridges through strengthening.

Table A. State Highway Bridges potentially impacted by Lower Bound HPMVs



b) Local road bridges

The aim of the rule change is that Lower Bound HPMV vehicles would be able to travel anywhere on the network constrained only by the same bridge postings for weight and speed applying to any unpermitted heavy vehicle. It is proposed that detailed identification of impacted local road bridges and analysis and posting costs be clarified as part of the detailed rule design process. For the purposes of the current business case however, the scenarios of local authority bridges are shown in Table B.

Table B: Local authority bridge scenarios

Bridge characteristics	Impact on Lower Bound HPMV bridge restrictions ("postings")
1. Bridges with spans less than 25 metres with no current Class 1 restrictions.	
a) Assessed capacity is actually greater than Class 1.	Acceptable for Lower Bound HPMV. No further postings required.
b) Bridges with assessed capacity less than Class 1 and currently not posted (due to allowance of overload for rare heavy vehicles)	These are the shorter span bridges that would need to be posted for Lower Bound HPMV. The number of bridges affected would need to be determined through consultation with Local Authorities, but Opus does not anticipate a large number.
2. Bridges of any length already posted for Class 1.	Current Class 1 restriction applies equally to Lower Bound HPMV. No signage changes are likely, but worst case is need for some specific reference to Lower Bound HPMV.
3. Bridges with spans greater than 25 metres currently not posted for Class 1.	
a) Pre 1942 construction	Likely to need posting. Opus does not anticipate a large number.
b) Post 1942 construction	May need posting. Opus does not anticipate a large number.

A worst-case is that all current bridge posting signage may need to be adjusted to provide for Lower Bound HPMVs. A sample of local authorities in Canterbury (Opus June 2012) indicated 6.6% of bridges had Class 1 vehicle restrictions of some sort. Costs could total $600,000 if 6.6% of all 9,000 local road bridges nationwide were to require new posting signage at a cost of $1000 per bridge.

Most of these weight restricted State Highway and local road bridges are on low traffic routes. Only a small impact on the take-up of Lower Bound HPMV benefits is therefore assumed.

Appendix Six: Safety impacts

Safety impacts have considered the reduced exposure to crash risk arising from reduced Vehicle Kilometres Travelled (VKT) to service the same freight task. These gains could climb to around $15 million per year from year five. This calculation is based on Economic Evaluation Manual January 2010 assumptions where the typical heavy vehicle accident rate / year = coefficient x exposure in 100 million heavy vehicle kilometres per year. A cost per reported accident of $700,000 has been sourced from EEM1 January 2010 Table A6.22.

Safety benefits by year four		***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Uptake						
Rigid truck & trailers - rural		195	195	136	120	120
Annual kilometres saved	10,000	1,950,000	1,950,000	1,360,000	1,200,000	1,200,000
Rigid truck & trailers - non rural		546	546	546	546	546
Annual kilometres saved	11,000	6,006,000	6,006,000	6,006,000	6,006,000	6,006,000
B-trains		257	257	257	257	257
Annual kilometres saved	11,000	2,829,750	2,829,750	2,829,750	2,829,750	2,829,750

SAFETY GAINS					
Heavy VKTs avoided pa	10,785,750	10,785,750	10,195,750	10,035,750	10,035,750
Cumulative Heavy VKTs avoided	10,785,750	21,571,500	31,767,250	41,803,000	51,838,750
Exposure / 100,000,000 kms per annum	0.1079	0.2157	0.3177	0.4180	0.5184
Coefficient (after adjustment) from EEM1 Jan 2010. A6.6(12) Rural two lane road - heavy vehicles >80km/h)	40	40	40	41	42
Typical heavy vehicle accident rate / year =	4	9	13	17	22
Cost per reported injury accident. (From EEM1 Jan 2010 Table A6.22)	700,000	700,000	700,000	700,001	700,002
Annual safety cost saved	3,020,010	6,040,020	8,894,830	11,997,478	15,240,636