

# Upgrading the network for HPMV

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National Network Optimisation Manager

- Bridge Improvement Programme for HPMVs
- 50MAX HPMV
- 23-25m Over length vehicles



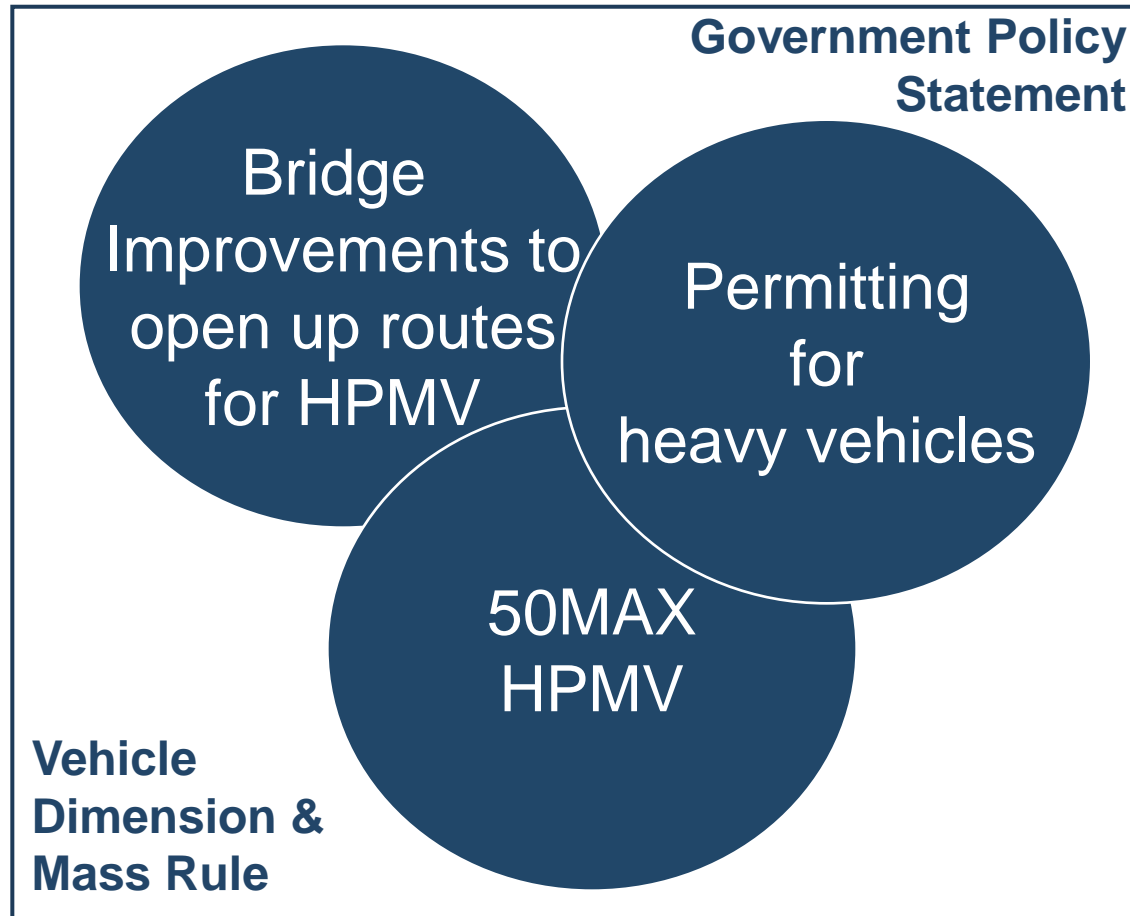
Prepared for the IRTENZ Innovative & High Productivity Vehicles  
Conference, Rotorua 18 - 20 June 2013



**NZ TRANSPORT AGENCY**  
WAKA KOTAHI

New Zealand Government

# Context



# Strategic priority

- The objective of the 2010 VDAM amendment is to improve the productivity of the heavy vehicle fleet
- Freight can be moved more efficiently and, where possible, enable a given amount of freight to be carried on fewer vehicles, without reducing the safety of road users
- Movement of freight with greater ease - more efficient freight supply chains (GPS)
- VDM is high on previous Minister's Letter of Expectation to Board

full and timely implementation of rule changes, particularly the Vehicle Dimension and Mass Rule Amendment 2010, and implementation of the provisions of the Road User Charges Bill (once enacted)

# VDM – 3 years on

- 1,876 applications received
- 782 higher mass permits
- 1,094 over length permits

	2011	2012
Declined	28%	11%
Approved	71%	82%

- 2,900 kms approved (common sections counted once)

- 4,500kms investigated as strategic HPMV freight network
- 20% reduction in trips for the same freight task for higher mass permits and a 14% reduction in trips for over-length
- \$9M benefits with no capital investment
- HPMV permitting manual

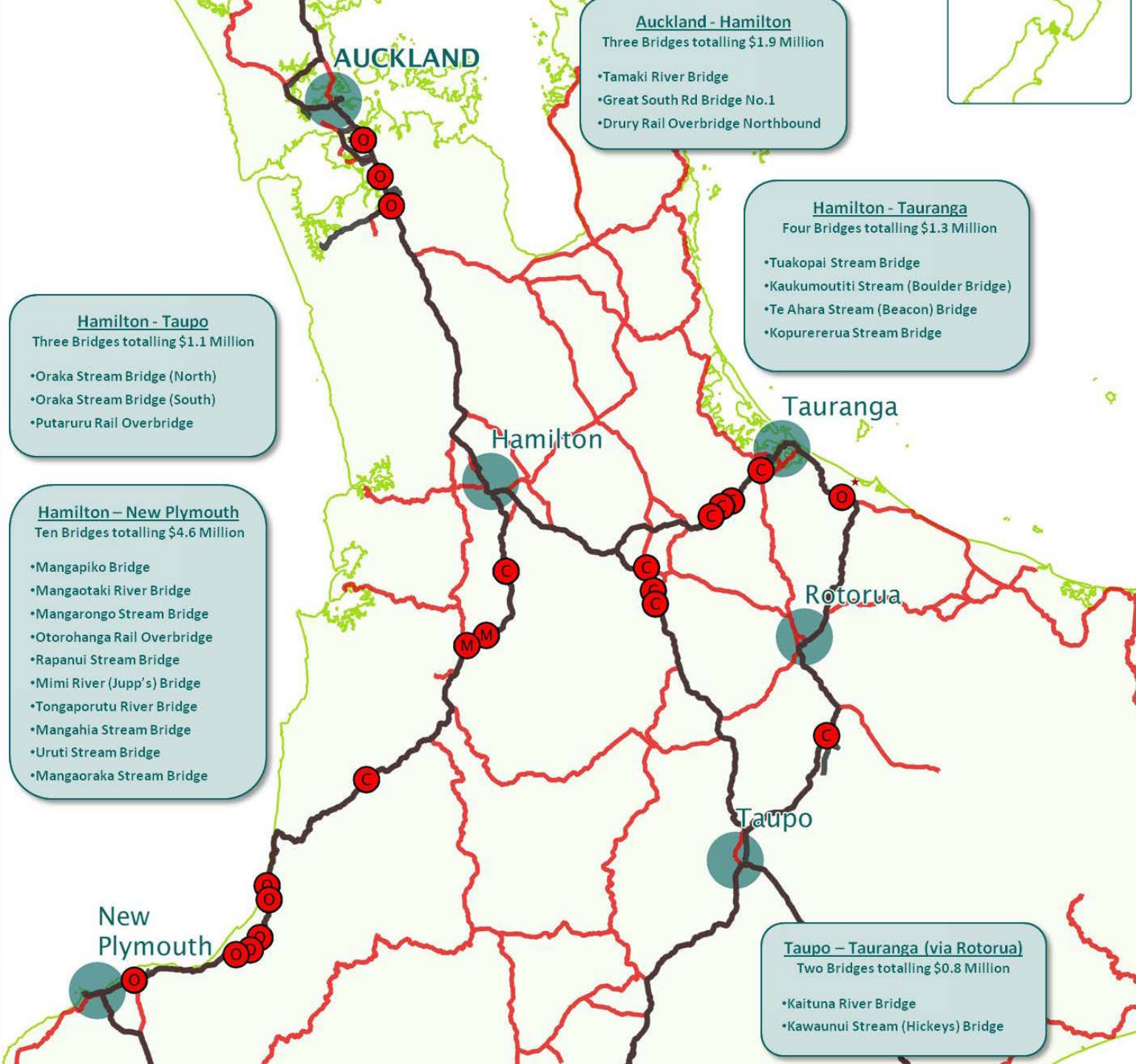
# VDM – National Bridge Improvement Programme

- Routes have been evaluated and prioritised on expected efficiencies and productivity gains
- The strategic freight network routes have been approved by NZTA Board with upper bound spend of \$32M SH and \$13M for local roads
- HPMV projects will compete for funding in the 2012-15 NLTP
- Overall investment is subject to TAs agreeing to upgrade the first and last mile

# HPMV Route investment 2012-15

- 50% of the total freight task is carried on 95% of network. 50MAX vehicles provides an economically viable solution without upgrading local roads
- The strategic freight network (HPMV investment routes) opens up 4500 km of most productive corridors to 62T vehicles. This is 5% of total road network carrying 50% of freight





**AUCKLAND**

Auckland - Hamilton  
 Three Bridges totalling \$1.9 Million

- Tamaki River Bridge
- Great South Rd Bridge No.1
- Drury Rail Overbridge Northbound

Hamilton - Taupo  
 Three Bridges totalling \$1.1 Million

- Oraka Stream Bridge (North)
- Oraka Stream Bridge (South)
- Putaruru Rail Overbridge

Hamilton - Tauranga  
 Four Bridges totalling \$1.3 Million

- Tuakopai Stream Bridge
- Kaukumoutiti Stream (Boulder Bridge)
- Te Ahara Stream (Beacon) Bridge
- Kopurererua Stream Bridge

Hamilton - New Plymouth  
 Ten Bridges totalling \$4.6 Million

- Mangapiko Bridge
- Mangaotaki River Bridge
- Mangarongo Stream Bridge
- Otorohanga Rail Overbridge
- Rapanui Stream Bridge
- Mimi River (Jupp's) Bridge
- Tongaporutu River Bridge
- Mangahia Stream Bridge
- Uruti Stream Bridge
- Mangaoraka Stream Bridge

Taupo - Tauranga (via Rotorua)  
 Two Bridges totalling \$0.8 Million

- Kaituna River Bridge
- Kawaunui Stream (Hickeys) Bridge



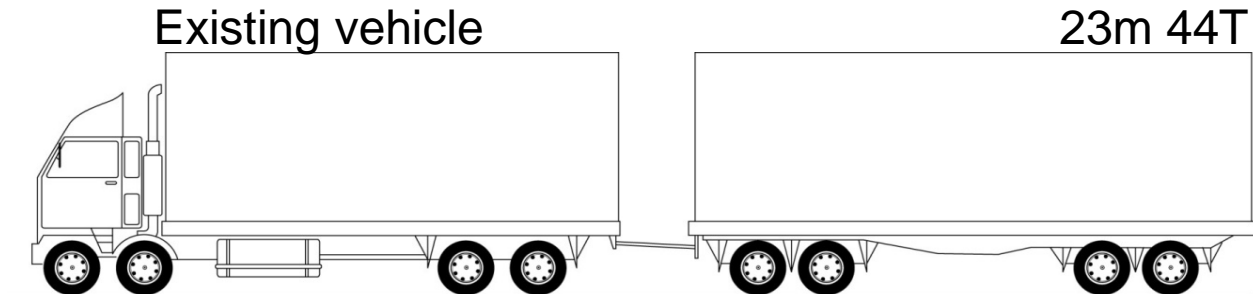
# 50MAX HPMV - overview

## Aim:

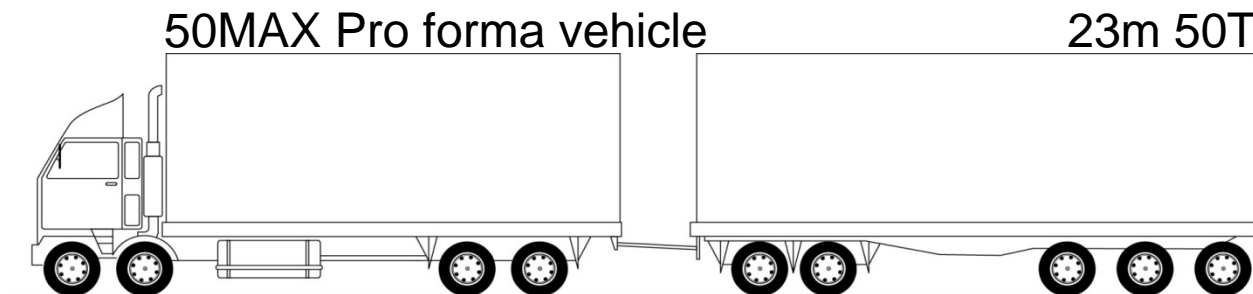
- Moving more freight with less trucks
- Bigger returns for producers and communities
- Increase allowable weight to 50T, cost neutral impacts on bridges and pavements, and pro forma vehicle designs that conform to VDM
- Unleash freight productivity with no investment and alleviate asset management concerns
- NZTA issues permits for all roads in a region with list of excluded bridges



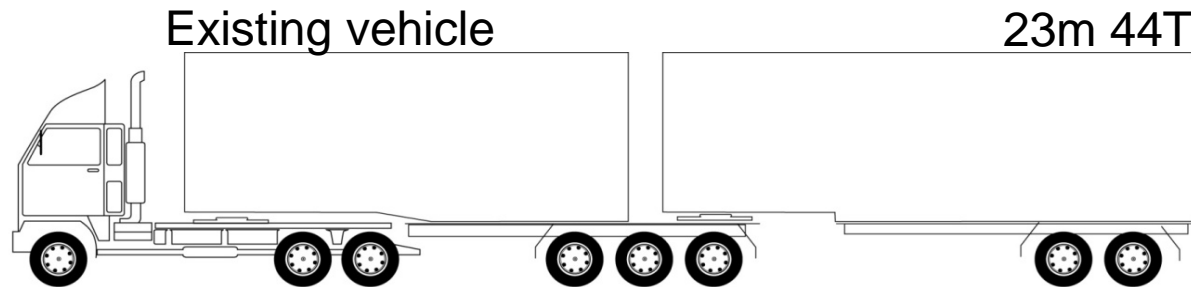
# Limited to new vehicle types – Pro forma 23m truck and trailer



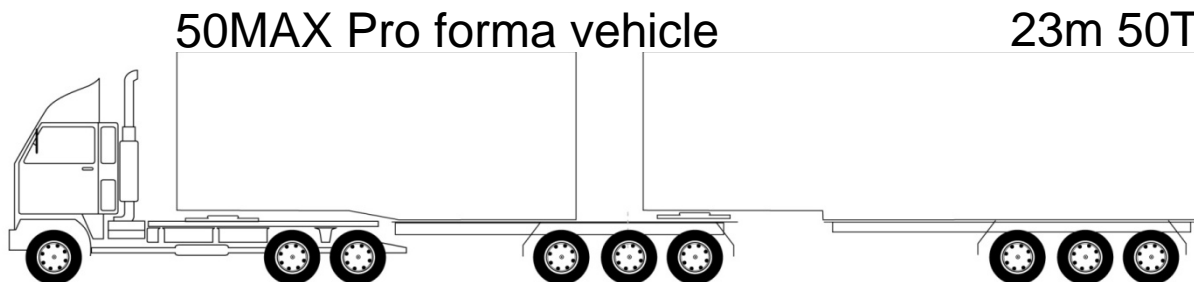
- Same swept path as quad semi truck
- Additional axle to disperse loads and prevent pavement wear



# Limited to new vehicle types – Pro forma 23m B-Train

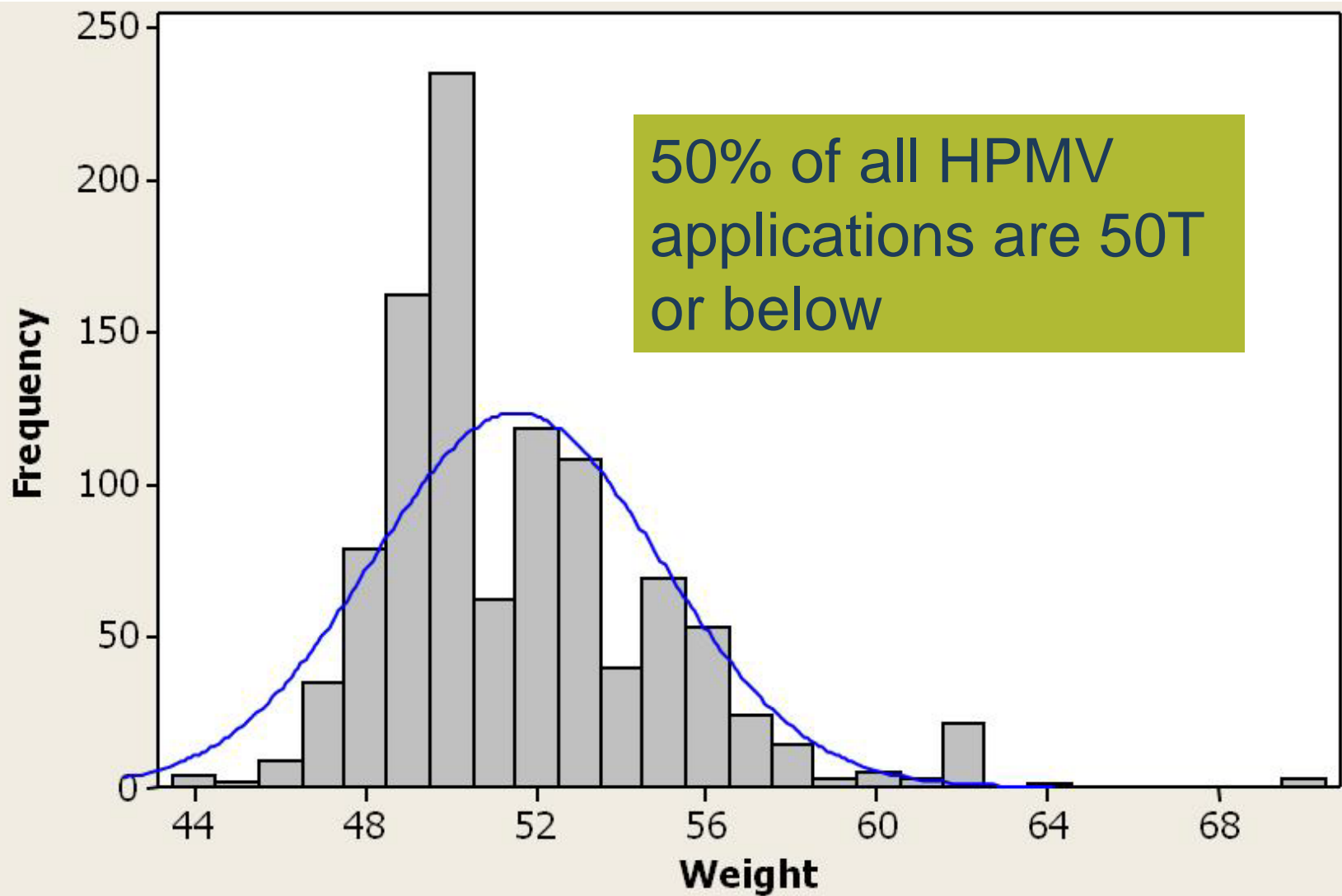


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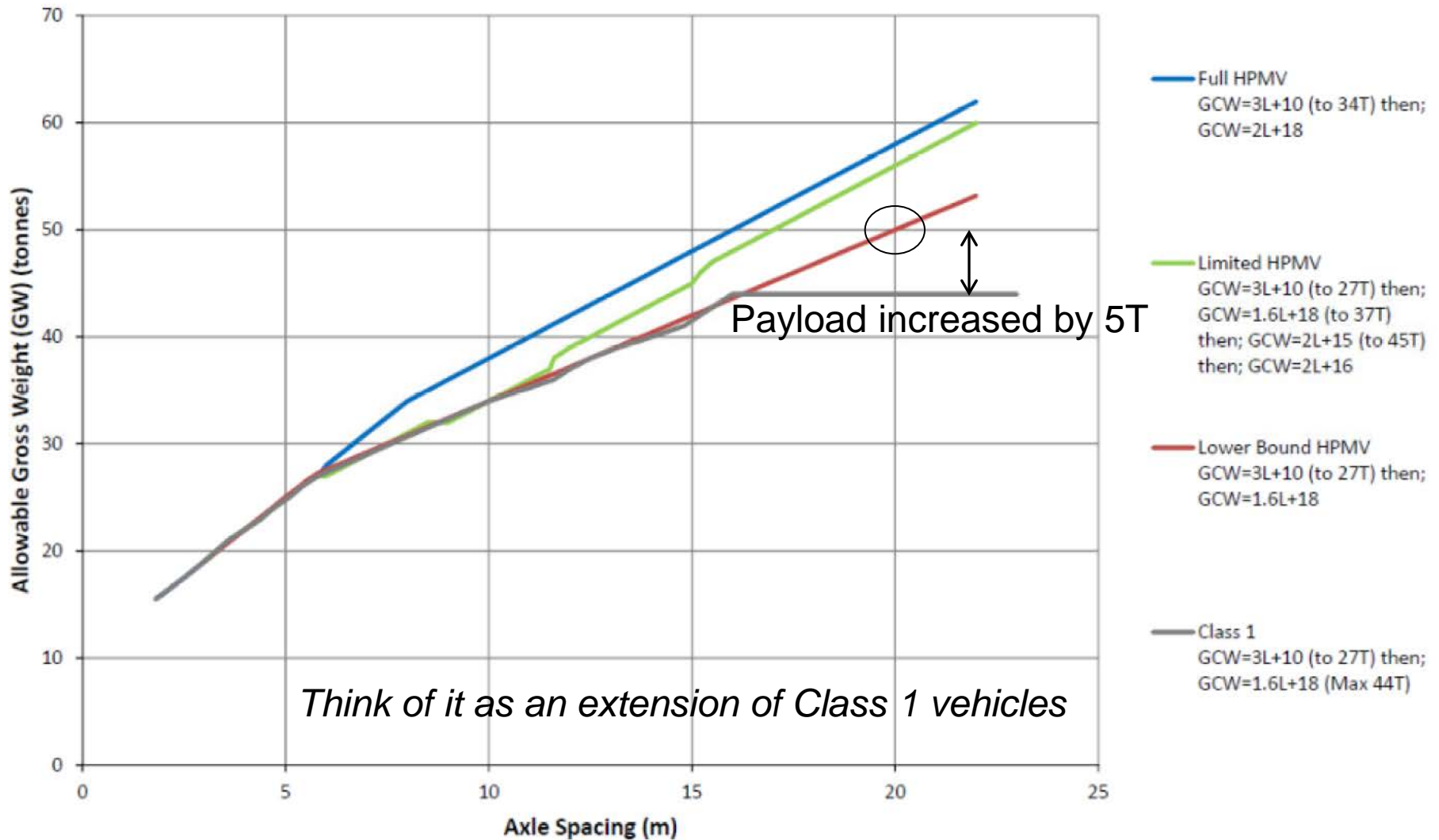




# HPMV mass applied for



# 50MAX HPMV replicates Class 1 load curve beyond 44 tonnes for wheelbases >16m





# 50MAX HPMV – Bridge Capacity

The table should only be used by experienced civil/structural engineers, in conjunction with a review of the structures condition, structural form and failure mechanisms. The table should not be relied on for a structure that contains any critical structural weaknesses that could create a non-ductile failure mechanism under live loading.

Design Loading	Construction Date	Acceptable Span Range		
		Lower Bound HPMV (with Class 1 AWF)	Ltd. HPMV (with Class 1 AWF)	Full HPMV (with Class 1 or HPMV AWF)
HN-HQ-72	1972-	All spans	All spans	All spans
H20-S16-T16	1961-1971	All spans	0 - 50m	0 - 45m
H20-S16-44	1944-1960	0 - 30m	0 - 25m	0 - 20m
H20-S16-41	1943	All spans	0 - 25m	0 - 20m
Traction Engine	1933-1942	0 - 25m*	0 - 17m*	-

\* Provided bridge is unposted and is assessed as being able to safely support Class 1 vehicles.

**Table 4.2: Acceptable Span Ranges for Limited and Full HPMV's for Various Design Loadings**

# Bridge capacity

- In theory, all “Unposted bridges” up to about 25m span should be able to carry 50MAX HPMV’s
- The initial approach for bridges with spans greater than 25m is to post with a Class 1 limit
- Over time, there may be a desire by RCAs to open up some posted bridges on strategic routes after re-analysis, or by strengthening or replacing



# Tracking on the network

Vehicle Configuration	Off-tracking (m)			
	12.5m radius	25m radius	50m radius	100m radius
<b>19m quad semitrailer</b>	3.95	1.81	0.74	0.22
<b>20m 4-axle truck and 4-axle trailer</b>	2.90	1.02	0.31	0.16
<b>23m HPMV 50MAX truck and trailer</b>	3.94	1.61	0.56	0.18
<b>23m HPMV 50MAX B-train</b>	4.07	1.51	0.49	0.09

# Reviewed by the RCA Forum Research & Guidelines Group

- 50MAX HPMV pro-formas have a neutral impact on pavement loading
- Access to almost all of the network, excluding posted bridge locations
- Viable business case shows \$100M net reduction in transport costs by year 4
- Reduction in transport costs will increase the return to the producer and hence the community with greater opportunities for economic growth



# Our activities

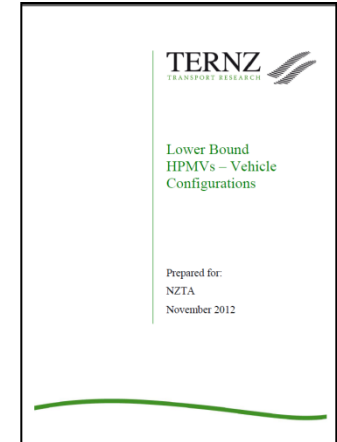
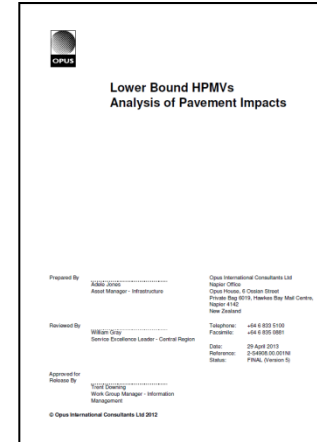
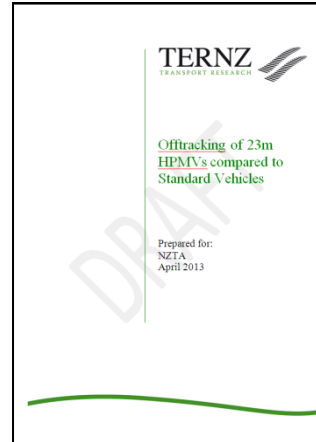
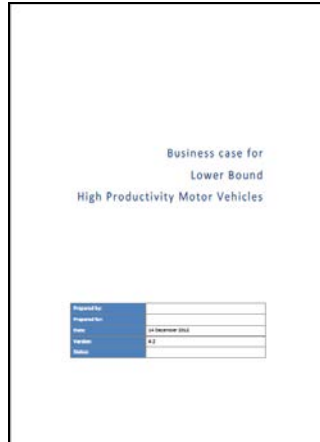
- Present to various forums for roading managers, CEs & Mayors, NZTA through their Regional Directors
- Screening of SH bridges and providing guidance to local authorities (Mar–Jun)
- Simplified permitting of pro formas done by NZTA on behalf of LAs. No bridge checks (July)

# Project needs from local authorities, if accepted for implementation

- Identify your problem bridges with >25m spans (they may become 'do not cross' as permit condition)
- NZTA seeks 'letter of delegation' with your approval for NZTA to issue permits for pro forma vehicles on behalf of RCAs



# 50MAX Resources ([www.nzta.govt.nz/hpmv](http://www.nzta.govt.nz/hpmv))



- Business case
- HPMV load limits for bridges
- Pavement impacts
- Vehicle configurations
- Vehicle tracking comparisons
- Bridge guidance for RCAs (coming shortly)

# Road Transport sector – perspective

1. The road freight sector accepts that road assets must be managed by Road Controlling Authorities to ensure that the impact imposed by users is within an affordable rate of consumption of the asset
2. We accept that roads are funded largely on a user pay basis through the FED, RUC, Motor Registration and local property taxes. To this end we support local Road Controlling Authorities receiving a fair share of the revenue gathered from road users

# Road Transport sector – perspective

3. We accept that under the Cost Allocation Model, the charges to individual users are roughly proportional to the cost imposed from pavement wear and impacts on structures
4. The 44T gross mass limit for general access has meant that the network asset has been conservatively managed to the lowest common denominator



# Road Transport sector – perspective

5. The Government's recent policy for allowing HPMV permitted vehicles allows higher payloads in circumstances where the asset has sufficient resilience to accommodate the additional impact. This has greatly enhanced efficiency and productivity but requires the permitting of a specific vehicle configuration on a specified route



# 23-25 M Overlength Policy

VDM Rule says permit may be issued only if the RCA has given due consideration to:

- the safety of the vehicle; and
- the safety of road users; and
- the durability of roads and bridges on which the vehicle may operate

# AUSTROADS PBS - Findings & recommendations (Sep 2012)

- 23 m is not expected to work universally. Manage a network by exception and apply treatments to mitigate risks. E.g. site modifications, signage and compliance regimes
- Any increase in length over the existing PBS Level 1 20m networks will likely result in reduction of available network and potentially seen as undesirable by some local govts

# PBS - Assessment Criteria and Relative Risk Levels

**Table 2.1: Assessment criteria and severity of risk**

Issue	Number	Criteria	Severity of risk
Overtaking	1	Establishment sight distance	Low
	2	Continuation sight distance	Low
	3	Overtaking opportunities	Low
Intersections	4	Signal timings	Low-medium
	5	Intersection length and effects of grade	Medium
Railway crossings	6	Signal timings	High
	7	Crossing length and effects of grade	High-medium
Stacking distance	8	Stacking distance	High

# Infrastructure assessment

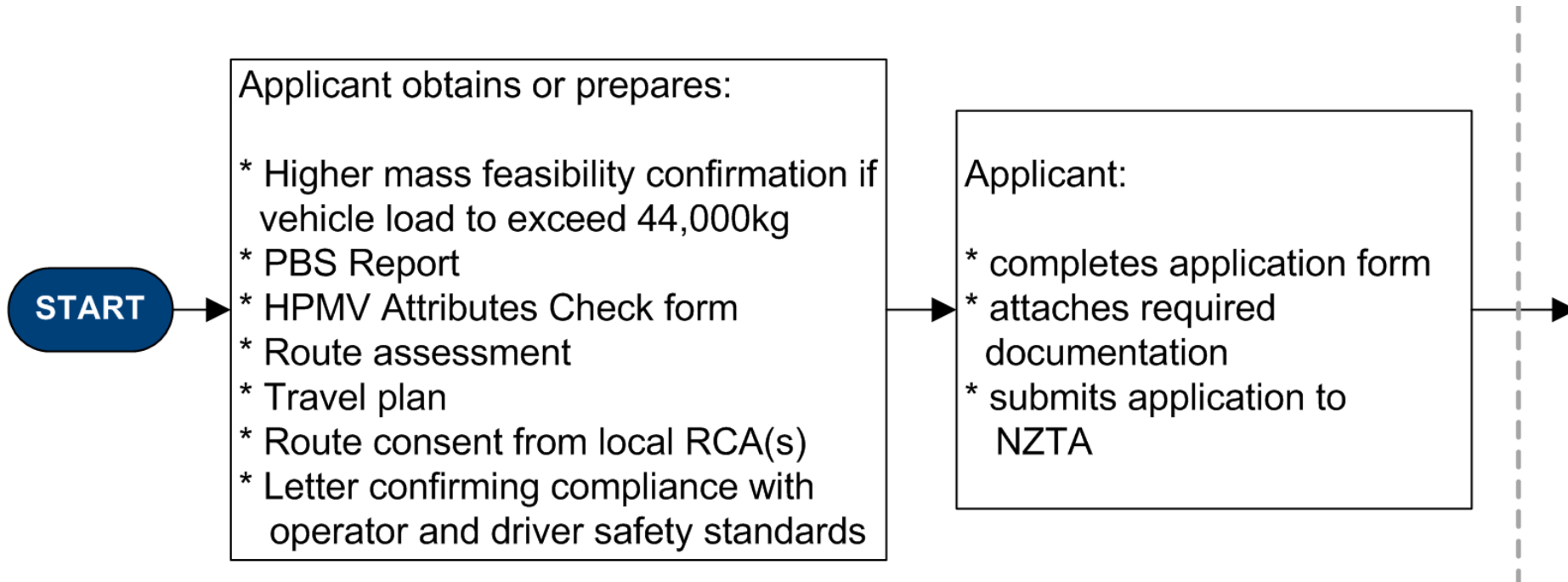
Policy sets 3 hazard severity levels:

- **Serious** – treatment required or driver awareness
- **Significant** - driver awareness
- **Not significant** - driver awareness

# Required hazard mitigation measures

If the route ...	Then the travel plan ...
exceeds a radius of 50km from the base of operations	must be both: <ul style="list-style-type: none"><li>• a printed route map (i.e. a graphical representation of the route applied for) with detailed descriptions of any hazards and mitigation measures, <b>and</b></li><li>• entered into an electronic driver warning system that alerts drivers to hazards immediately in advance of a hazard and provides the driver with verbal instructions on the mitigation response.</li></ul>
is within a radius of 50km from the base of operations	<ul style="list-style-type: none"><li>• may be a printed route map only, <b>or</b></li><li>• entered into an electronic driver warning system (optional).</li></ul>

# Gathering prerequisites for a 23-25m HPMV permit application





# Next steps

- The policy remains as 'DRAFT' as we 'hand-hold' and test some applications through the process, followed by potential revisions
- Policy is available on the NZTA website [www.nzta.govt.nz/hpmv](http://www.nzta.govt.nz/hpmv)