Infrastructure Investment for long term gains

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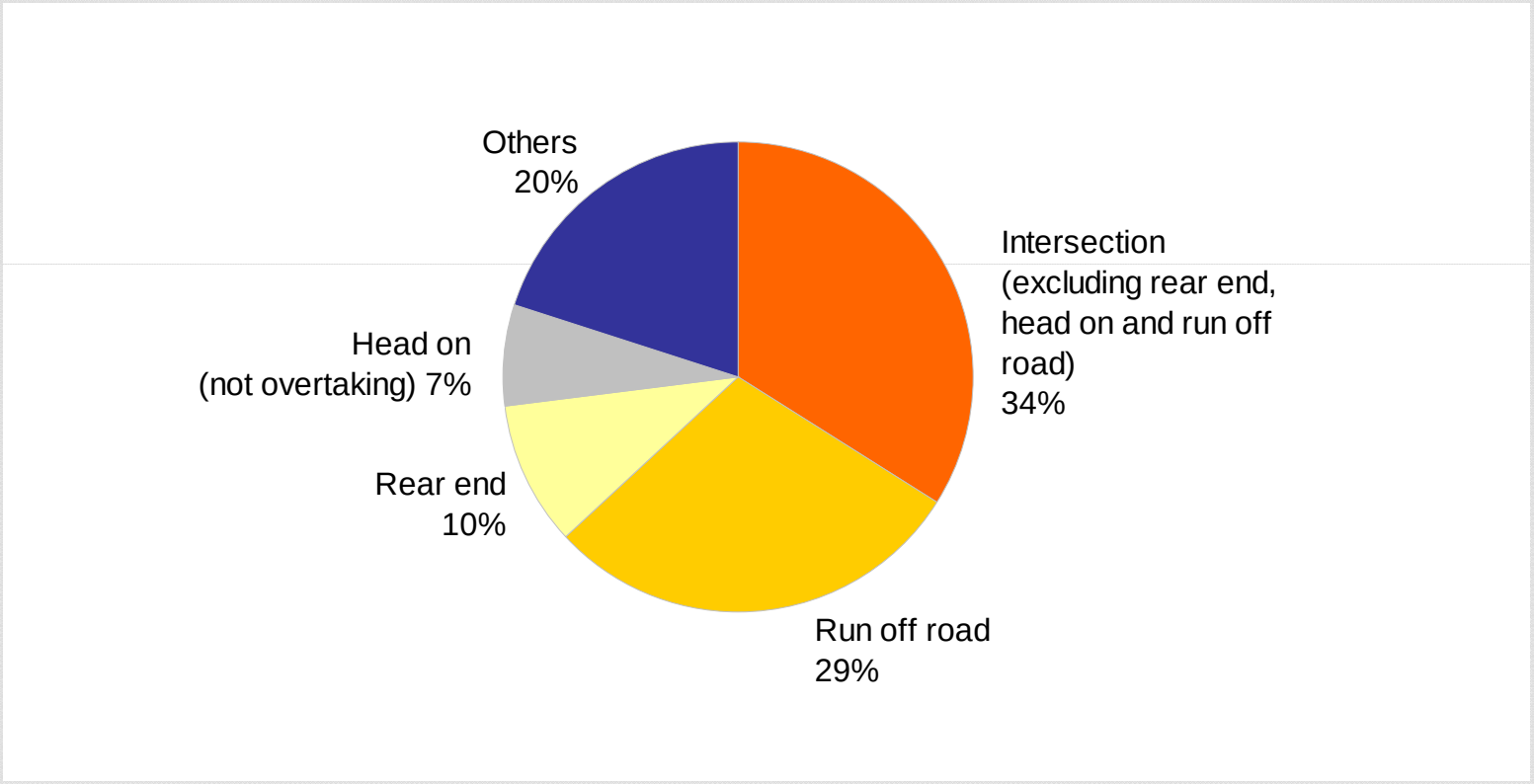
The problem

Percentage of serious casualties by crash types

Based on Victoria road crash data, 2003-2007



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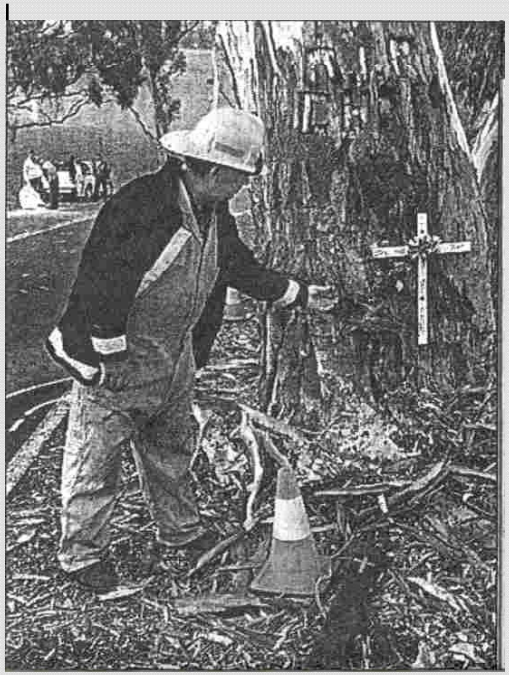
Fatal consequences



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Fatal consequences

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Potential issues

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Infrastructure solutions?

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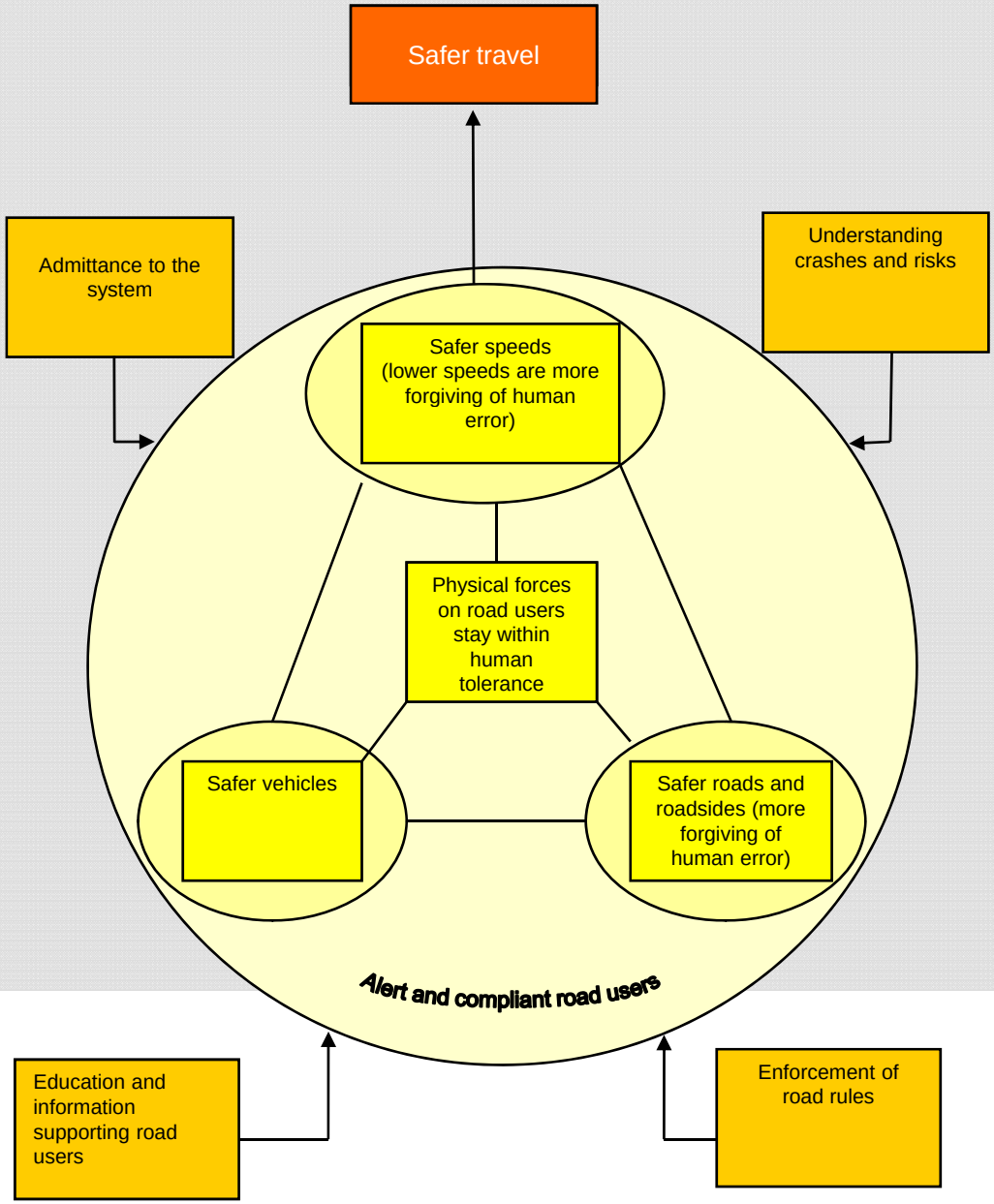
Australia's Safe System



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Safer Roads and Roadsides

- Needs to be both on road (largely preventative) and roadside (largely protective).
- Needs to be include new **and** existing projects.
- Could be network wide, area or road specific or project specific.
- The cost can vary – even low-cost safety-focused road treatments are associated with substantial crash and injury reductions.
- Spend versus speed debate

What is in scope?

Some options include:

- Intersection treatments
- Roadside barriers
- Roadside hazard removal
- Separation of road users
- Traffic calming
- Edge and centre line tactile markings
- Shoulder sealing
- Delineation improvements
- Improved or advanced warning signage
- Road upgrade

But given the money required needs to be targeted.

Example: Shoulder sealing (30 % reduction in casualty crashes) and guard fence

Before

After

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Example: Wire Rope Safety Barriers (barriers lead to a 30 – 45% reduction in casualty crashes)

Before

After

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Before

After

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NSW Lessons from Wire Rope Safety Barrier

The Benefits:

- Reduces head-on and run off road crashes
- Greatly reduces the severity of crossover crashes
- Lowest risk of injury and damage in cases when a vehicle crashes into a barrier
- Lower crash costs when compared with crashes into other barrier types
- Occupy less space on the road than other barriers
- No evidence that wire rope barrier more dangerous to motorcyclists than other barriers (major study underway)
- Enhances motorcyclist safety by separating opposing traffic flows

Intersection treatment

e.g roundabout (70% reduction in casualty crashes (55% for urban)

Before

After

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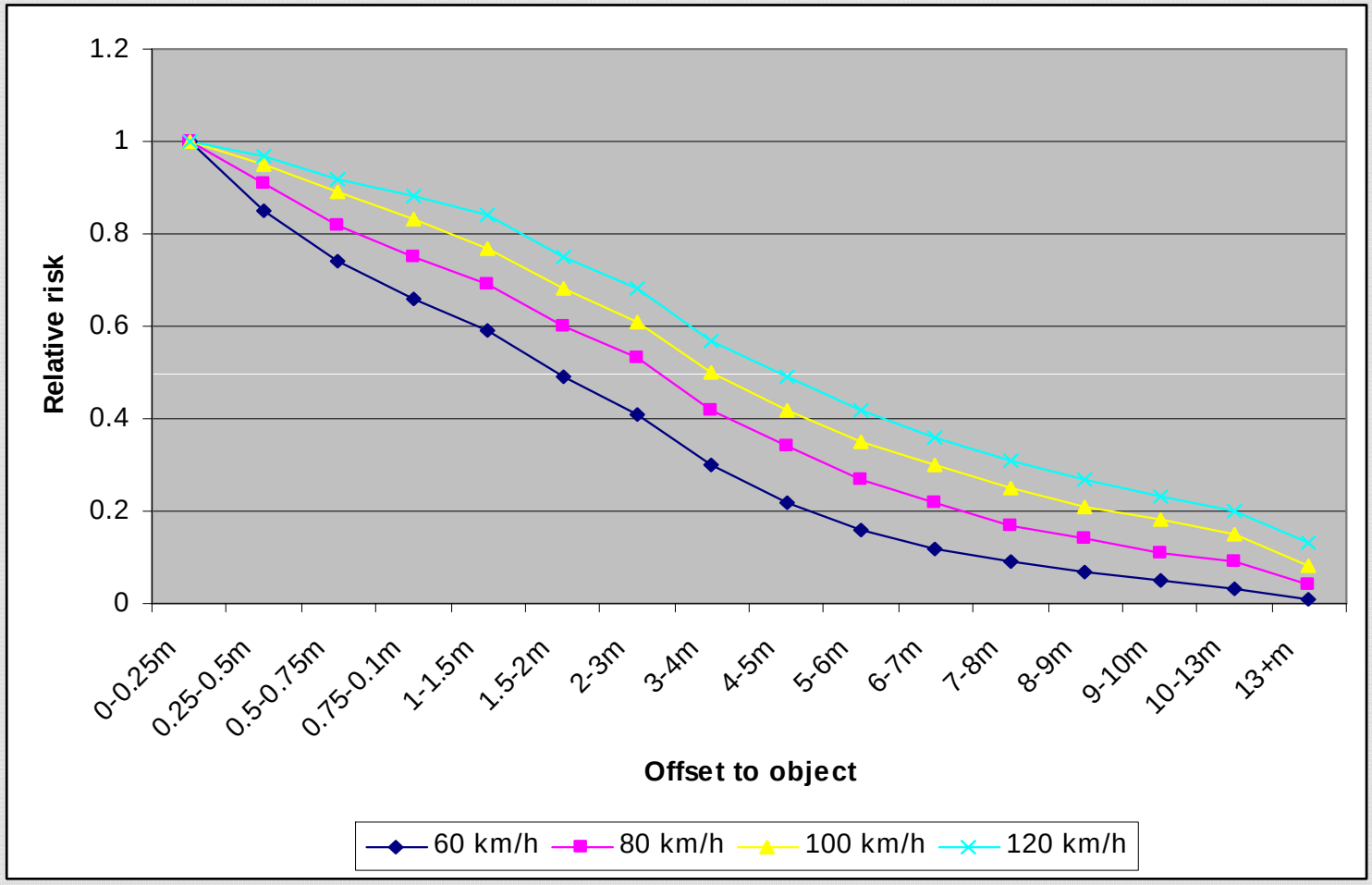
Pedestrian refuges

- These can lead to a 15% reduction in casualty crashes

Clear Zones



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Clear Zones

- 10 – 45 % reduction in casualty crashes

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Edge or centre tactile lines

- Edge lines – 25% reduction

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Advanced warning signage

- 25 – 30% reduction in casualty crashes

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Delineation

- Delineation e.g.:
  - Line marking = 20% reduction
  - Chevron alignment markers = 30%
  - Guideposts = 30% reduction

Traffic calming

- On urban roads – 20% reduction

And many more...

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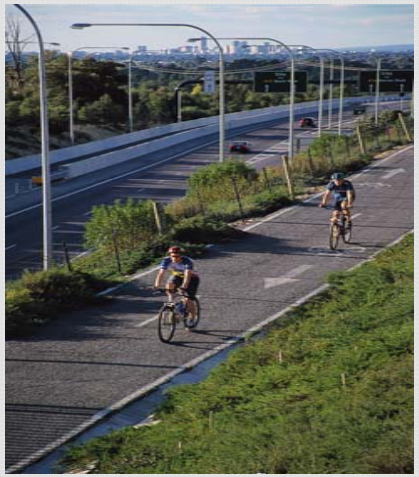
Vulnerable road users



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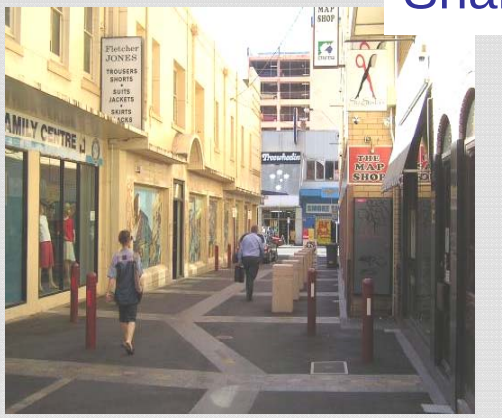
Pedestrians

Shared Use Paths

Shared Zones



School crossings

Variable speed limit signs

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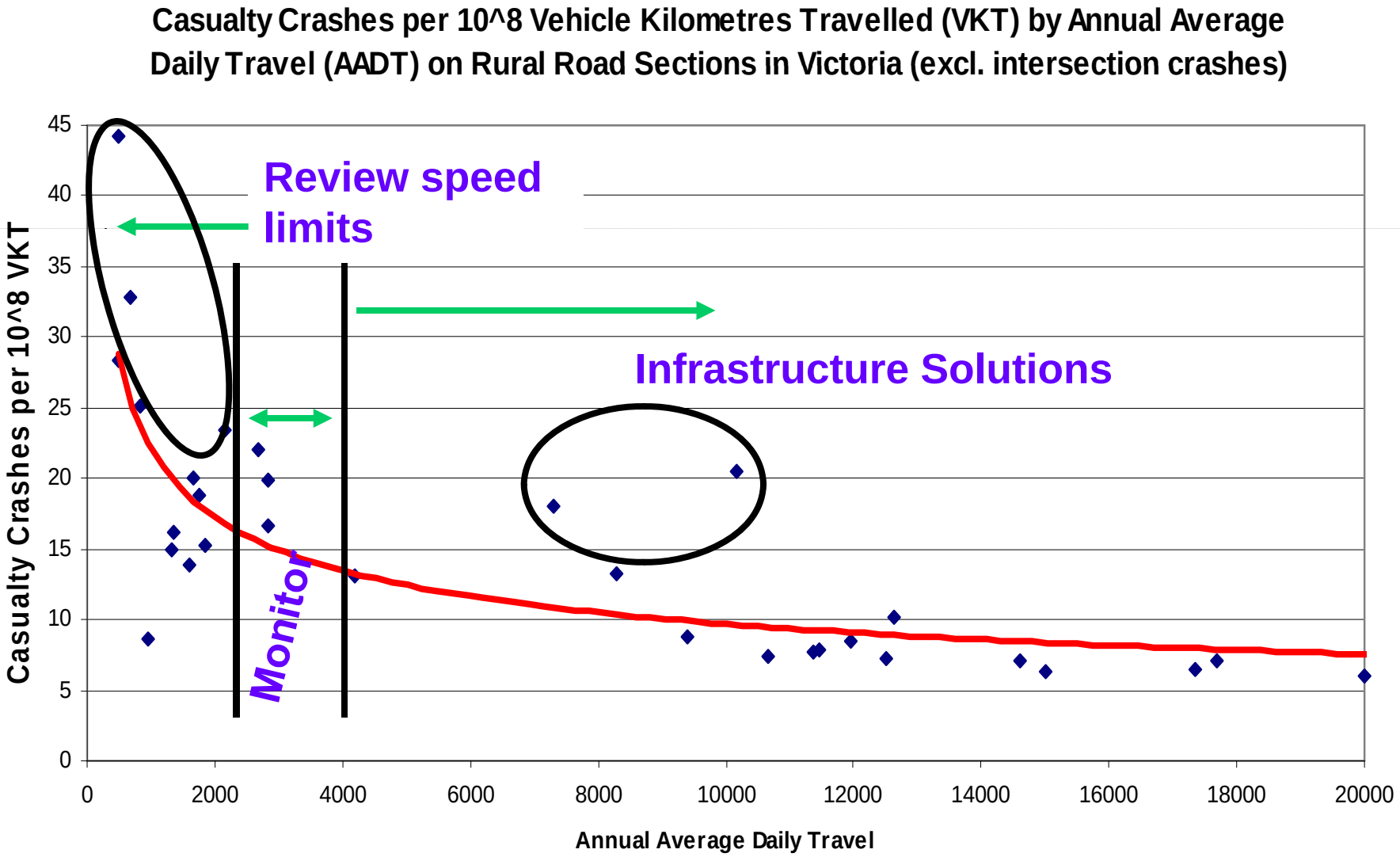
Targeting infrastructure works on higher speed roads (>80 km/h) – speed vs spend



Better targeting through reporting performance

Risk Rating	Percentage
Low	39%
Low-medium	26%
Medium	11%
Medium-high	11%
High	12%

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Victoria's Safer Road Infrastructure Program

- Started 2004 on arterial road network funded by Transport Accident Commission ($240m to 2006 then $650m from 2007 over 10yrs)
- Uses crash based approach similar to black spot programs but includes treatments for high risk sections for route consistency
- A combination of targeted infrastructure improvements to be delivered across Victoria:
  - Safety barriers
  - Removing hazards from the roadside
  - Sealing road shoulders
  - Improved signage and road guidance (e.g tactile edge and centre lining)
  - Intersection improvements
  - Lower speed limits (40km/hr strip shopping)
  - Grey spot program – prevent becoming a black spot

Estimated Benefits of SRIP

	# of projects	Predicted Number FATAL crashes saved per year	Predicted Number SERIOUS crashes saved per year	Predicted Number OTHER INJURY crashes saved per year	Overall Program BCR
Stage 1	113 ($130m)	9.6	66.2	78.4	3.4
Stage 2	252 ($110m)	10.3	87.8	129.5	4.5
Stage 3 (to Date)	355 ($209m)	13	85.8	114.6	3.9

New South Wales Route Reviews

- A strategic multi-disciplinary approach targeting ‘High-risk’ routes with engineering behavioural and enforcement strategies
- Engineering strategies include delineation, shoulder sealing, hazard removal, roadside and median wire rope barriers, rest areas and intersection improvements
- The program is developed to supplement planned maintenance treatments and precedes longer term and more costly road upgrades
- Two major highways – Pacific and Princes chosen initially

Locations


QUEENSLAND
NEW SOUTH WALES
VICTORIA
SOUTH AUSTRALIA
TWEED HEADS
LISMORE
BALLINA
BOGGABILLA
YETMAN
TENTERFIELD
MOREE
GLENN INNES
GRAFTON
INVERELL
BOURKE
WALGETT
NARRABRI
ARMIDALE
COFFS HARBOUR
COONAMBLE
GUNNEDAH
TAMWORTH
KEMPSEY
WILCANNIA
COBAR
NYNGAN
COONABARABRAN
GILGANDRA
PORT MACQUARIE
BROKEN HILL
DUBBO
TAREE
MUSWELLBROOK
IVANHOE
MUDGEE
MAITLAND
NEWCASTLE
CONDOBOLIN
PARKES
ORANGE
FORBES
BATHURST
LITHGOW
HILLSTON
WEST WYALONG
COWRA
SYDNEY
WENTWORTH
GRIFFITH
WOLLONGONG
MILDURA
LEETON
COOTAMUNDRA
BALRANALD
HAY
NARRANDERA
YASS
WAGGA WAGGA
GOULBURN
GUNDAGAI
JERILDERIE
CANBERRA
QUEANBEYAN
DENILIQUIN
FINLEY
HOLBROOK
BATEMANS BAY
ALBURY
COOMA
BEGA
BOMBALA
Pacific Hwy
Princes Hwy
NATION HIGHWAY
NATIONAL ROUTE
STATE HIGHWAY
FREEWAY
HIGHWAY
ARTERIAL ROAD

Pacific and Princes Highways

- Pacific Highway
  - $35 million of program works over a 3 year period
  - Total of 52 projects varying in cost from $8000 to $7.68 million
  - 55 fatalities and 617 injuries in 2003 reduced to 25 fatalities and 483 injuries in 2006
- Princes Highway
  - $30 million of program works over a 3 year period
  - Total of 50 projects varying in cost from $7000 to $1.9 million
  - 24 fatalities and 324 injuries in 2003 reduced to 4 fatalities and 294 injuries in 2006
- These figures represent a total saving of 50 lives and 164 injuries per year for these two highways

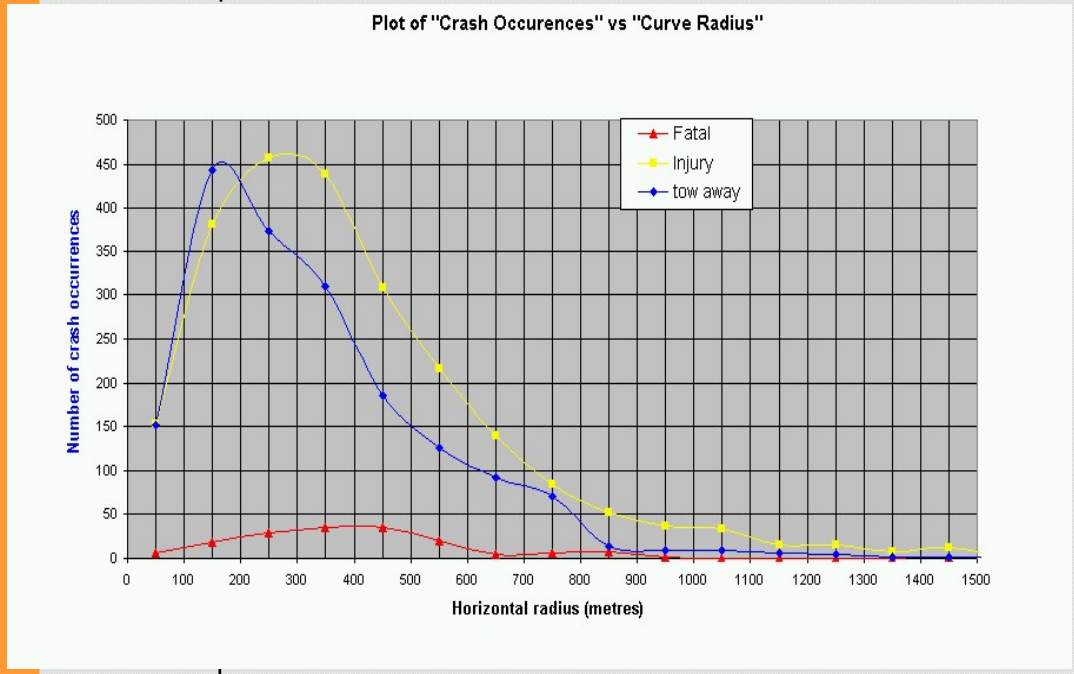
High returns on investment

- The benefits are expected to last for around five to fifteen years following completion although some sections of the Pacific Highway are expected to be replaced due to general upgrading over time

- Benefit Cost Ratio

		5 years	10 years	15 years
Pacific Hwy	Section 1	4.6	7.8	10.2
	Section 2	5.3	9.1	11.8
Princes Hwy	Section 1	1.9	3.2	4.2
	Section 2	4.7	8.1	10.5

Shoulders and curves

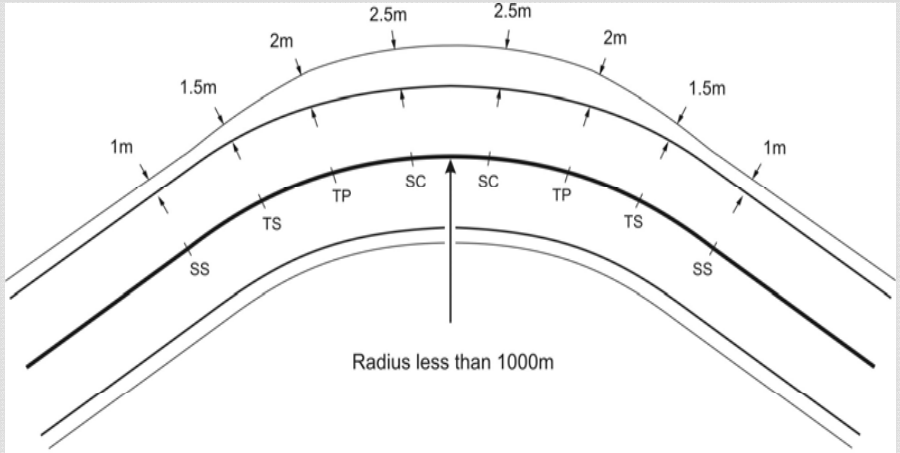


- Relationship between curve radii and crash severity on high speed roads
- Road alignment of less than 1000m radius comprises only 21% of the total length of NSW State roads
- Yet 60% of rural crashes occur on these curves
- Probability of certain types of crashes occurring is proportionately much higher than for similar type crashes on straight or large radius curve alignments.

Shoulder widths

- Shoulder widths: Variation in width of shoulder on curves Vs straights

Where the horizontal alignment is made up of long straights and single isolated curves then the outside of all curves in both directions with a radius less than 1000 metres should be identified and prioritised

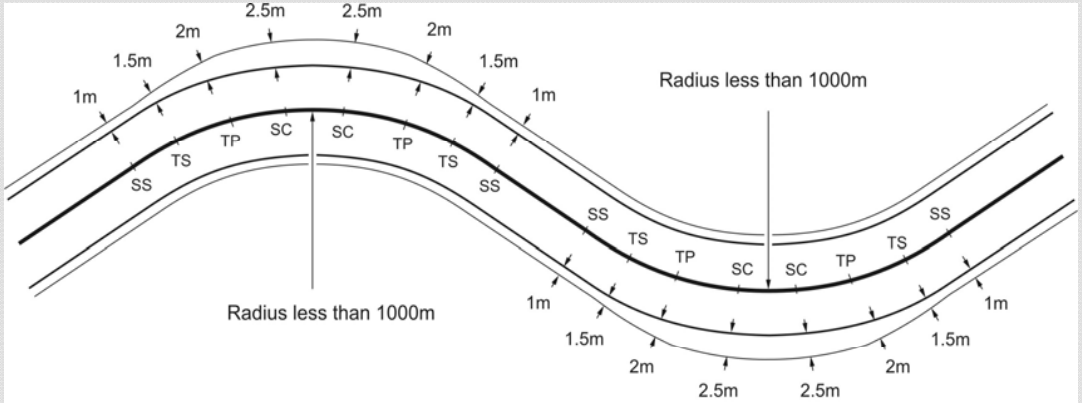


Generally straight horizontal alignment with single isolated curves

Shoulder widths

- Shoulder widths: Variation in width of shoulder on curves Vs straights

Where the horizontal alignment is made up of two reverse curves with both radii less than 1000 metres, then the outside of both curves should be treated.

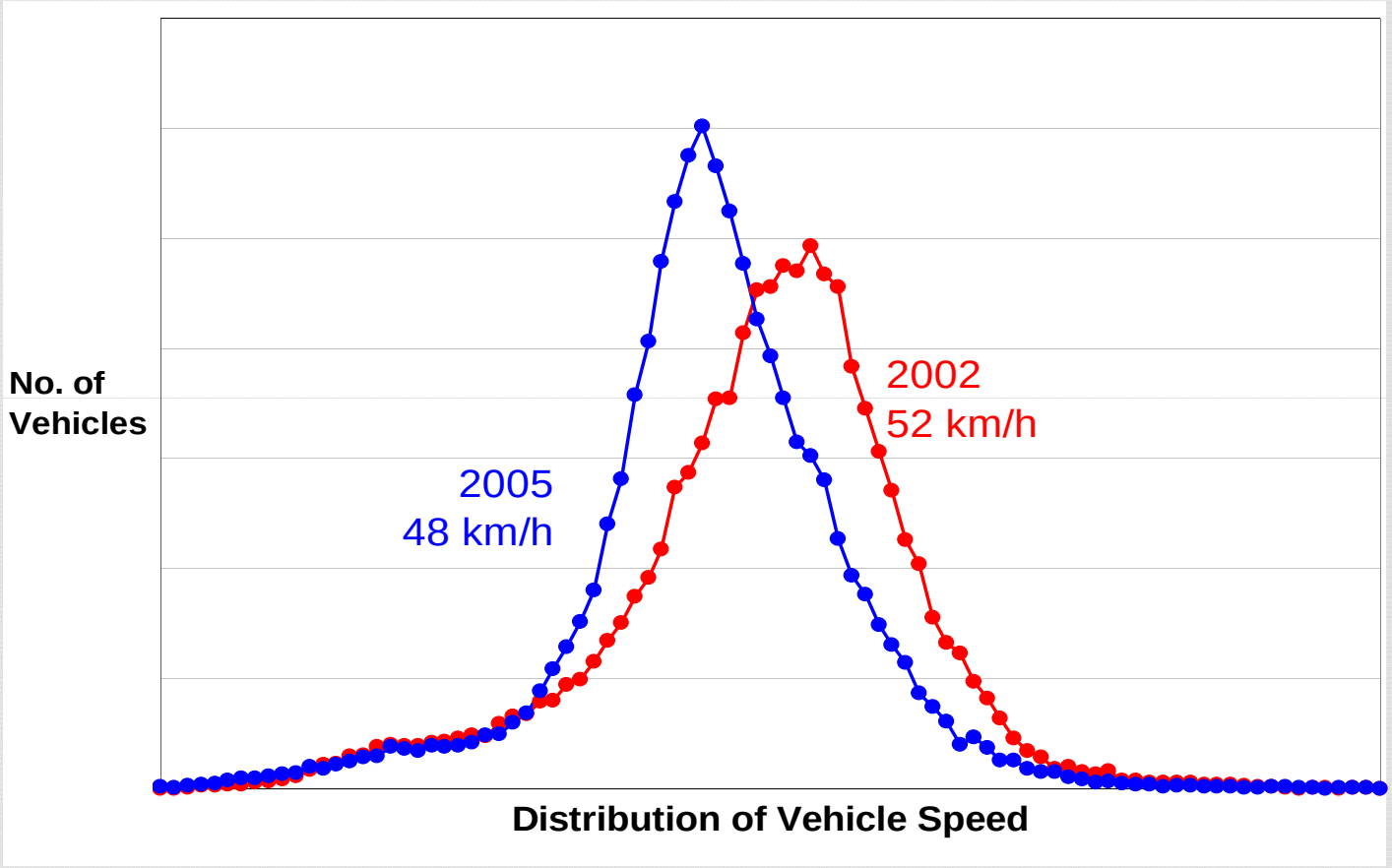


Generally straight horizontal alignment with reverse curves

Main Roads WA “Vision Zero” Logical Framework

- Took new 70 km Perth-Bunbury Highway project and generated internal analysis and discussion about response to Safe System principles
- Focussed on key crash types, including Run-off Road, Head-on, and Intersections
- References safe speed thresholds as goal where conflicts exist
- Overall goal of no deaths or serious injuries within first five years of operation
- Enabled innovative thinking and improvements that will see outcome closer to the ultimate aspiration than otherwise would have been the case

Urban speed limit reduction



Outcome: Number of casualty crashes fell by 23%

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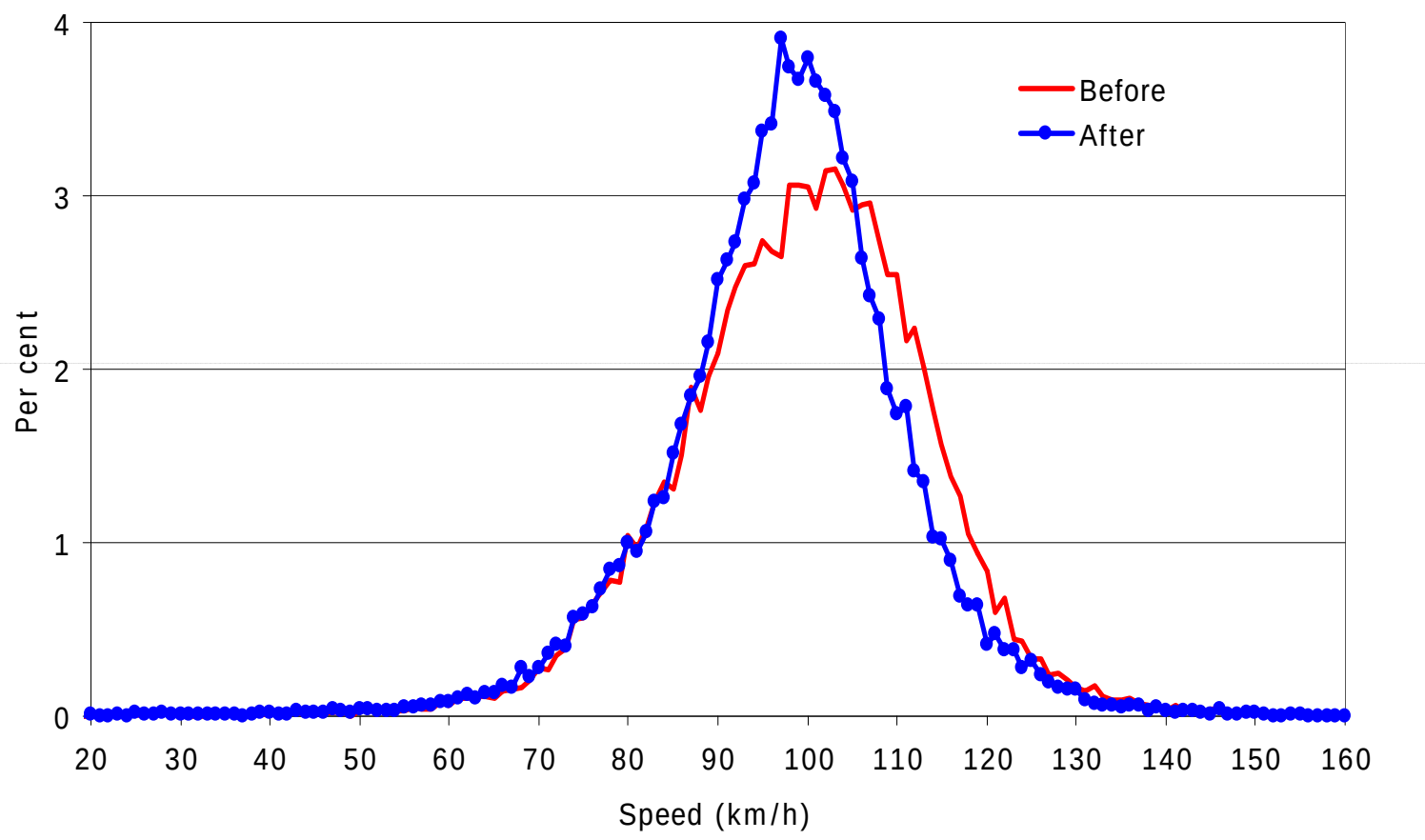
Rural speed limit reduction



Outcome: Number of casualty crashes fell by 20%

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Research and Trials

- **Victoria trialling rumble strips on approaches to intersections & level crossings, and investing in Innovative Intersection Treatments Study**

- **Austroads program**
  - **Development of risk assessment tools, safety engineering and safety audit toolkits**
  - **Full evaluation of median wire rope barriers**
  - **Performance measures for safety contribution of road engineering**
  - **Exploring valuation of safety in transport projects, and shift towards Willingness to Pay**

Lessons

- **There are opportunities for every road authority to apply safe system principles**
- **Safety managers need to engage early and often with engineers to:**
  - **Understand and prioritise primary crash types and routes for treatment**
  - **Ensure all new projects are safe system focused**
  - **Develop compelling, well targeted, business cases to gain best economic returns**
- **There is plenty of analysis, evidence and practice to start with. Then seek further investment over time as local results are demonstrated**

Thank you

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