ROAD SAFETY BENEFITS OF 50 KM/H URBAN SPEED LIMITS

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Prepared: 30 June 2002.

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Prepared: 30 June 2005.

1.1 A brief statement of the issue

Until recently, most Australasian jurisdictions had a default urban speed limit of 60 km/h. The only exception to this was New Zealand, which for many years has had a 50 km/h default limit. It is opportune to review the road safety and other benefits that have already accrued or are expected to accrue from a lowered default urban speed limit.

1.2 An assessment of the road safety issue

Many countries in the Western world - Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Greece, Hong Kong, Hungary, Ireland, Israel, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland and the United States of America - have general urban speed limits not exceeding 50 km/h (Austroads 1996). In Australia, each jurisdiction has progressively introduced its own legislation allowing a 50 km/h default urban speed limit.

Until 2001, each state in Australia had an official default urban speed limit of 60 km/h. However, an urban speed limit at this level was not always the case in Australia. Prior to 1974, Australia's general urban speed limit was 35 mph (56 km/h). Following metrication in 1974, this was raised to 60 km/h. It has been argued that the decision 'to round up rather than down' has cost many thousands of lives and serious injuries over the intervening years (McLean 1998).

During the 1990s, Australia's high urban speed limit came under close scrutiny. The 1996 Austroads inquiry into urban speed management came down in favour of reduced speed limits on local streets, with the claimed benefits including reduced number and severity of crashes, reduced vehicle noise and emissions, high levels of community support and no significant impact on travel time (Austroads 1996). Since then, all jurisdictions have moved to a 50 km/h default limit.

1.3 Current policies and practices in Australasian jurisdictions

The current default 50 km/h urban speed limits were introduced in Australasian jurisdictions as follows:

New Zealand	pre-1965
Victoria	January, 2001
Western Australia	December, 2001
Tasmania	May, 2002
Queensland*	February, 2003
South Australia	March, 2003

ACT	July 2003
New South Wales	November, 2003
Northern Territory	March, 2005

*Note that a 50 km/h speed limit was introduced on 1 March, 1999 in South East Queensland only.

In addition, in many States, some streets are zoned at 40 km/h, usually in association with physical speed reduction measures such as humps or narrowings. Note that in South Australia, the City of Unley and a small number of other local areas have a limit of 40 km/h on all local streets.

1.4 A review of the research

1.4.1 The impact of reducing urban speed limits in other countries

Many research studies using a variety of methodologies have consistently demonstrated that the higher the travelling speed, the higher the crash risk, and the greater the severity of the crash (for a review see Frith, Strachan and Patterson 2003). Initially, these results were based primarily on the travel and crash patterns on high-speed open roads. More recently, however, similar conclusions have been reproduced in studies that have investigated the impact of lowered urban speed limits on both travelling speeds and traffic injuries.

Austroads (1996) made the case for lower urban speed limits by documenting direct evidence of the benefits of reducing urban speed limits to 50 km/h:

- After Norway reduced its urban speed limit from 60 km/h to 50 km/h, fatal crashes fell by 45%.
- After Denmark made the same change in speed limits, total crashes fell by 9%, fatalities by 24%, serious injuries by 7% and minor injuries by 11%.
- The reduction from 60 km/h to 50 km/h in Zurich, Switzerland saw a 20% fall in crashes involving pedestrians and a 25% fall in pedestrian fatalities. The severity of pedestrian injuries was also reduced by an unreported amount.
- It has been estimated that an equivalent speed limit reduction in France resulted in the saving of 14 500 casualty crashes and 580 fatalities (approximately 3% of all fatalities) during the first two years of operation.

These benefits need to be treated with some care. Invariably, the reductions occurred along with other road safety measures that may have contributed to the changes in crash levels. The exact nature of the changes in speed regulations, the extent of compliance with the new speed limits, the varying impact upon local traffic patterns and a host of other variables mean that the results cannot be unequivocally translated to an Australasian context. However, the finding that all reductions in speed limits led to reductions in casualties, particularly the more serious casualties, was interpreted as evidence that reducing urban speeds in Australia would also reduce casualties (Austroads 1996).

1.4.2 The impact of reducing urban speed limits in Australia

Background research

Prior to the progressive introduction of the 50 km/h default urban speed limit in all states in Australia, two local research studies provided data that supported the lowered speed limit. These studies also furnished estimates of the variations in pedestrian crash outcomes that would be expected to occur in response to variations in the speed of vehicles. The findings from the first study (McLean et al. 1994) included:

- A reduction of 5 km/h in vehicle travelling speeds in 60 km/h zones would result in a 30% reduction in pedestrian fatalities on those roads – and in 10% of cases, the collision would have been avoided.
- If travelling speed in all 60 km/h zones was reduced by 20 km/h, 75% of pedestrian fatalities would have been prevented.

The advantages of lowered urban speeds to pedestrians have been expressed thus:

- If hit by a vehicle at 60 km/h, a pedestrian has a 70% chance of being killed.
- If hit by a vehicle at 50 km/h, a pedestrian has a 40% chance of being killed (Newstead et al. 2002).

The main aim of the second key local study was to quantify the relationship between free travelling speed and the risk of involvement in a casualty crash for sober drivers in 60 km/h speed zones in the Adelaide metropolitan area (Kloeden et al. 1997). A secondary aim was to examine the effect of hypothetical speed reductions on crash levels.

Results of the study included:

- Above 60 km/h there was an exponential increase in risk of casualty crash involvement with increasing travel speed, such that the risk approximately doubled with each 5 km/h increase. A later re-analysis showed that a roughly exponential curve covered the full range of speeds in the sample, including speeds below 60 km/h (Kloeden et al. 2002).
- If all vehicles involved in crashes had been travelling at the posted speed of 60 km/h, the number of casualty crashes would have substantially decreased – either by 46% or by 29%, depending on the calculation method.
- Using the more conservative method of calculating crash reduction, it was estimated that, had the posted limit been reduced to 50 km/h (with the same level of compliance), the number of casualty crashes would have been reduced by at least 33%.

Local trials of 50 km/h speed limits

In its 1996 report on urban speed management in Australia, Austroads listed several local studies that in recent years had examined the effects of lower speed limits on traffic speeds. While the studies commonly returned positive results, it was also noted in the report that with one exception, the various Australian trials had been evaluated over relatively short periods, covered only limited geographical areas and had not made use of systematic enforcement. It was recognised that there was a need for more comprehensive evaluations before the full impact of a lower general urban speed limit could be assessed.

The evidence especially in regard to crash consequences was growing.

By March 2001, more than 90% of the population in New South Wales was living in areas which had a 50 km/h speed limit on local roads in built-up areas. Two evaluation reports (RTA 2000, Tziotis et al. 2001) showed that streets zoned as 50 km/h experienced:

- a 21% reduction in all crashes from expected levels. This meant 262 fewer crashes over a 21-month period, representing a saving of $6.5m in social costs
- a 20% reduction in all casualties – with substantially higher reductions for special road user groups (including young and older drivers)
- a reduction in the percentage of drivers travelling at speeds in excess of 60 km/h (38% to 16%).

From early 1999 - four years prior to the statewide implementation of a 50 km/h default urban speed limit on 1 February 2003 - all of South East Queensland had a 50 km/h limit on local streets. This area of Queensland contains about 60% of the state's population. There was an 18% reduction in fatalities on local streets in South East Queensland following the lowered speed limit compared to the previous five-year average. This resulted in an estimated saving of over $26m in social costs (Haworth et al. 2001).

The ACT trialled the 50 km/h urban speed limit for two years from March 2001. An evaluation of speed and crash changes over this period (Green et al. 2003) produced the following results:

- Mean and 85th percentile speeds were reduced on most streets zoned at 50 km/h and also on streets and roads which remained at 60 km/h. The changes in mean speed were 2 km/h and in 85th percentile speeds 2.6 km/h, for both speed zones.
- There were also small crash reductions but these were not statistically significant.

When considering the range of savings from these studies, it needs to be stressed that eventual benefits will depend upon a number of interrelated factors:

- the proportion of the urban road network to be converted to a 50 km/h limit
- the proportion of urban crashes accounted for by those streets and the roads to be converted to a 50 km/h limit
- the extent of compliance with the new speed limits
- the amount of education, engineering and, particularly, enforcement effort devoted to ensuring compliance with the new speed limits.

The importance of these factors is illustrated by the following estimated crash savings (based jointly on Kloeden et al. 1997 and Australian Transport Council undated):

Hypothetical situation	**% reduction in the number of casualty crashes**
10 km/h speed reduction from 60 km/h	38
5 km/h speed reduction from 60 km/h	26
Limit 60 km/h with total compliance	29
Limit 50 km/h with compliance as at present	33
Limit 50 km/h on local streets only with compliance as at present	6

These estimates (derived from the South Australian road network), provide support for the conclusion that a reduction of the default speed on local streets represents a worthwhile but relatively modest road safety benefit. However, a reduction of the speed limit on all streets and roads that currently have a 60 km/h limit produces very substantial benefits.

The effects of Statewide implementation of 50 km/h default urban speed limits

In Victoria, a 50 km/h default speed limit in built-up areas was introduced in early 2001. An interim report (Newstead et al. 2002) based on crash patterns for the first five months of the program produced the following results for streets zoned 50 km/h:

- for all crashes, a decline of 13.3% relative to streets remaining at 60 km/h (and a decline of 12.3% relative to all roads not affected by the change)
- pedestrians in particular were advantaged by the change. All casualty crashes involving pedestrians declined by 22.2% (relative to streets remaining at 60 km/h), with serious injury (including fatal) crashes declining by 46.1%.

The 50 km/h speed limit was introduced in Western Australia on 1 December 2001. 'Before' and 'after' speed surveys at metropolitan sites (Kidd and Radalj 2003) showed that the change for streets zoned at 50 km/h resulted in:

- a reduction in mean speed of 1.87 km/h at six months and 1.33 km/h at twelve months
- a reduction of 2.6 km/h in the 85th speed percentile at six months and 2.0 km/h at twelve months
- a 24% reduction in the percentage of motorists travelling over 60 km/h.

A follow-up study by Hoareau and Newstead (2004) covering the 24-months following the introduction of the 50 km/h limit in Western Australia showed:

- In the metropolitan region, there was a 20% net reduction for all crashes, a 51% net reduction for pedestrian crashes and a 19% and 18% net reduction for crashes involving young and older drivers, respectively.
- Although the reductions in fatal and serious injury crashes were not statistically significant, the 21% net reduction for all casualty crashes was statistically significant.
- While crash reductions in non-metropolitan regions were generally not statistically significant, there were two exceptions: a 16% decrease in all crashes and a 52% reduction in young driver crashes (findings pertaining to the first twelve months only).

Hoareau and Newstead (2004) also showed that over the 24 months, changes in metropolitan and regional mean and 85th percentile speeds were generally modest, with the greatest impact being on excessive speeding above the 50 km/h level.

The 50 km/h speed limit was introduced in South Australia on 1 March 2003. Speed surveys and crash analyses covering the first 12 months after the change (Kloeden et al., 2004) found that:

- On average, mean speeds on streets posted at 50 km/h fell by 2.2 km/h and on arterial roads posted at 60 km/h, by 0.7 km/h.
- Casualty crashes were reduced by 20% on 50 km/h streets and by 5% on arterial roads.

It was estimated that overall, the change saved the South Australian community around $62m because of the reduced casualty levels.

These relatively early findings suggest that as the new urban limits become established and evaluated over longer time scales, the accumulated benefits will become increasingly evident.

1.5 Political, social and other factors associated with lowered urban speed limits

Prior to the implementation of the 50 km/h default speed limit by each state, the issue of reducing urban speed limits was approached with caution, largely because of the possible response from motorists who might see their mobility as being compromised. Increased travel time, increased traffic congestion and increased vehicle operating costs were all variously raised as counter-arguments to lowering the limits.

1.5.1 Increased travel time

The issue of increased travel time can be readily dispensed with. Even if all urban 60 km/h streets and roads (including collector roads and arterials) in Victoria were reduced to 50 km/h, resulting in a cruise speed reduction of 5 km/h, then the average increase in travel time would be nine seconds per trip (Cameron 2002). (It was also estimated that if this across-the-board reduction was implemented, the small increase in travel time would save about 3 000 casualty crashes and 12 000 non-injury crashes annually).

1.5.2 Vehicle operating costs

It remains unclear as to how a 50 km/h limit will impact upon vehicle operating costs. On the one hand, estimates based on an 'urban stop-start' model and assuming a 5 km/h reduction in urban cruise speed, indicate small increases between 0.4 and 0.8% for operating costs on urban streets (Cameron 2002). On the other hand, the applicability of this model specifically to the 50 km/h limit has been questioned (for a review of the key issues, see Haworth and Symmons 2001 and Dyson et al. 2001).

1.5.3 Enforcement

The issue of enforcement has been acknowledged as an important factor to ensure compliance with lower urban speed limits (Woolley et al. 2003). A study conducted in Unley, South Australia (Woolley and Dyson 2003) compared three types of enforcement: hand held laser guns operated by motorcycle police, speed cameras, and Council's speed feedback signs (electronic signs that provide information to motorists on their travelling speeds). It was concluded that while all three methods succeeded in reducing travel speeds, laser gun enforcement was more efficient than the use of speed cameras by a factor of four and had a significant halo effect that lasted up to ten days after the event.

While enforcement efforts encourage higher levels of compliance, public attitude towards enforcement appears to be negative, at least at a general level. A 2002 survey conducted in Victoria, which investigated public perception of that state's speed enforcement initiatives, found that 71% of the sample population believed that speeding fines were issued mostly for revenue raising purposes (Smith and Senserrick 2004). Only 23.7% of respondents thought that speed cameras improved road safety.

Along similar lines, another survey has found that 62% of respondents agreed with the proposition that fines for speeding are mainly intended to raise revenue (Pennay 2005). However, the same survey showed that more specific questions produced different results:

- Most thought that speed enforcement levels should be either increased or maintained (39% and 46%, respectively) – with 14% arguing for reduced enforcement.
- Most either supported current speed penalties or believed that they should be increased (59% and 23%, respectively – with 14% wanting a reduction.

These results suggest that a substantial majority of Australians, while endorsing a cynical view of government motives, also recognise the links between speed, enforcement and safety.

1.5.4 Public attitudes

Some residual opposition notwithstanding, public approval of the reduced limit seems to have grown steadily during the 1990s (Haworth et al. 2001). For example:

- in a 1999 national survey conducted by the Australian Transport Safety Bureau, 68% of respondents approved of 'a decision to lower the speed limit in residential areas to 50 km/h', compared to a low of 55% in 1997. The 2004 version of the survey (Pennay 2005) showed that support for the 50 km/h limit has consolidated, with only 20% of respondents reporting that the limit was too low
- a 'before and after' survey in 1999 in New South Wales saw approval increase from 68% to 75%, with 82% recognising that the change had likely safety benefits (Tziotis et al. 2001).

In 2002 in Victoria, 74.3% of a population-based sample approved of lowering the residential speed limit to 50 km/h (Smith and Senserrick 2004).

The 50 km/h urban speed issue initially represented the reverse of the NIMBY (Not In My Back Yard) response (Austroads 1996). Many respondents wanted the reductions in their own neighbourhood for reasons of safety and amenity (including noise reduction) but wished to maintain the capacity to travel through other neighbourhoods at higher speeds. However the findings from recent surveys suggest a growing support for lowered limits across the entire urban road network and not just in respondents' own neighbourhoods.

1.6 Conclusions

The movement of all of Australia's jurisdictions to a reduced default urban speed limit of 50 km/h is expected to result in substantial crash savings, with the extent of savings depending upon a number of key factors:

- the proportion of the urban road network converted to a 50 km/h limit
- the proportion of urban crashes accounted for by those streets and roads converted to a 50 km/h limit
- the extent of compliance with the new speed limits
- the amount of education, engineering and, particularly, enforcement effort devoted to ensuring compliance with the new speed limits
- the level of enforcement required to maintain speed reduction in the long-term (Woolley et al. 2002).

Due to the relatively recent implementation of the 50 km/h default urban speed limit in some jurisdictions, and the recommended three-year before and after period for accident analysis, it may be several years before the full extent of the actual crash savings can be confirmed. In the meantime it remains that the growing evaluation evidence from most Australian jurisdictions supports the claim that the reduced default limit has been associated with substantial safety benefits.

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