

Transport for NSW | Centre for Road Safety

Evaluation of permanent 40 km/h speed limits: Summary report

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1 Key findings

- **There have been statistically significant reductions in crashes following implementation of 40 km/h High Pedestrian Activity Areas.**
High Pedestrian Activity Areas with 40 km/h speed limits have experienced almost double the reduction in casualty crashes compared to other urban roads since the High Pedestrian Activity Area program began in 2003.
- **Reduced casualties in High Pedestrian Activity Areas occurred for road users generally, not just for pedestrians.**
It is notable that the road safety benefits applied to crashes for all road users. Although the program is focused on vulnerable road users, it can contribute more broadly to the achievement of road safety objectives.
- **It is likely that expanded coverage of 40 km/h High Pedestrian Activity Areas would generate further road safety benefits.**
High Pedestrian Activity Areas have improved safety where 40 km/h limits have been implemented, but the great majority of urban pedestrian road trauma occurs outside 40 km/h speed zones. Many areas remain that would benefit from 40 km/h speed limits.
- **There are high levels of community support for 40 km/h zones.**
A community survey of NSW residents showed that 78 per cent of respondents were at least moderately in favour of 40 km/h speed limits on roads where lots of people are walking. Eighty per cent thought the 40 km/h limit on such roads was 'about right'.
- **Low speed zones achieve broader benefits, as well as safety benefits.**
The evaluation found a broad consensus that low speed zones lead to broader benefits in creating an environment that supports pedestrian activity and urban amenity. Integrating speed management as part of urban planning creates an opportunity to improve both road safety and urban liveability.

2 About the evaluation

The Centre for Road Safety commissioned Martin Small Consulting to evaluate the effects of permanent 40 km/h speed zones on road safety and community amenity and, in particular, the impact of the High Pedestrian Activity Area (HPAA) program. The evaluation did not examine school zones or other non-permanent 40 km/h zones.

Martin Small Consulting engaged the University of Adelaide's Centre for Automotive Safety Research to conduct the crash analysis for the evaluation, and Australian Survey Research to conduct the community survey.

This summary report presents the key findings of this evaluation.

The vision of the *NSW Road Safety Strategy 2012–2021* is “Working towards Vision Zero”. This strategy adopts a Safe System approach, which acknowledges that road users will make mistakes and that the road system should be designed to accommodate these mistakes.

A central concept of the Safe System is the recognition that speed limits can be set so that the consequences of road user mistakes will not be death or serious injury. These speed limits vary according to the road environment and usage. The lowest speed limits are for environments where vulnerable road users can interact with motor vehicles. Above 30–40 km/h the risk of death or serious injury in a pedestrian crash increases rapidly. In Australia, speeds are often restricted in these locations to 40 km/h, although many European jurisdictions have adopted 30 km/h as a more appropriate speed.

All types of permanent 40 km/h speed zones were included in this evaluation, i.e.:

- High Pedestrian Activity Areas (HPAAs)
- Local traffic areas
- Ordinary 40 km/h zones.

Local traffic areas and ordinary 40 km/h zones occur in mostly self-contained residential precincts with streets used mostly for local access.

The HPAA program was launched in 2003 and is administered by the Centre for Road Safety. It provides funding to assist councils, in partnership with Roads and Maritime Services, to design and implement traffic calming projects to create a 40 km/h speed environment in locations with more complex traffic issues to manage compared with a typical quiet residential precinct. In these busier locations the safety benefits should be greater but the challenge of managing roads with mixed uses is also greater.

2.1 Current permanent 40 km/h zones in NSW

As at May 2016, more than 900 km of roads in New South Wales had a permanent 40 km/h speed limit including:

- 188 HPAA zones covering 343 km of roads. For the purpose of the crash analysis, these zones were combined into 155 discrete areas: 75 in the Sydney Metropolitan area and 80 elsewhere.

- 431 other permanent 40 km/h zones covering 582 km of roads, including local traffic areas.

Speed zones are not established in isolation. The characteristics of individual zones are determined by the road function and design, traffic, and surrounding land use as well as the design of the speed zone and associated road engineering.

Speed zones can address both safety and amenity objectives. The HPA program funds the creation of zones where safety is the only or main objective, such as that shown in Figure 1.

However, considerable investment has also been made to improve amenity in other zones, with infrastructure to support a variety of roadside activities, such as dining or shopping, as shown in Figure 2.

Figure 1: Sydney – 40 km/h to manage pedestrian interactions with traffic



Figure 2: Parramatta – 40 km/h to improve pedestrian safety and amenity



2.2 Evaluation questions

1. What effects have 40 km/h speed zones had on fatalities and injury crashes?
2. What other positive (public amenity, local economy) and negative effects have they had?
3. How do effects differ by:
 - existence of and type of traffic calming measure
 - whether funded under the HPAA Program
 - road user group
 - other circumstances.
4. To what extent is there appropriate coverage of 40 km/h zones?
5. To what extent has the HPAA Program been designed and implemented effectively?
6. How might the implementation of low speed zones be improved to achieve better road safety outcomes for vulnerable road users?

2.3 Evaluation methods

The evaluation components included the following:

- Information on 40 km/h speed zones was sourced from the Centre for Road Safety's Speedlink database, reviewed and validated with Roads and Maritime officers. Additional site information was obtained from visits to approximately 40 per cent of the HPAA zones, supplemented by desktop sources.
- The crash analysis was undertaken by matching crash data with known locations of permanent 40 km/h zones.
- Information about other impacts of 40 km/h limits, the effectiveness of HPAA program design and implementation, and views about potential improvements and future directions were sought in two ways. First, four workshops were held with 79 participants from Roads and Maritime, councils and NSW Police. Second, the views of 17 representatives of stakeholder organisations were obtained through semi-structured face to face or telephone interviews. Stakeholders included government agencies and peak bodies representing various road user groups.
- A review of literature was undertaken to supplement the information gathered through the discussions with practitioners and stakeholders.
- An online survey of 498 NSW residents gathered information on the community's experience with 40 km/h speed limits, their views on the impact of 40 km/h limits, and their opinions about future options. The survey had quotas to ensure respondents were representative of the NSW population by gender, age and location.
- A questionnaire on policy and practices for low speed limit zones was sent to members of the Austroads Safety Task Force, representing all Australian states and territories and New Zealand. Responses were received from all jurisdictions.

3 What effects have 40 km/h speed zones had on crashes?

The crash analysis examined changes in:

- all recorded crashes
- casualty crashes – crashes in which a person had been killed or injured
- fatal crashes – crashes in which a person had been killed
- serious casualty crashes – crashes in which a person had been killed or was injured and admitted to hospital (note that serious casualty crash changes were examined only from 2005 onwards, because hospital admissions were not recorded before 2005).

The crash analysis was undertaken in two ways.

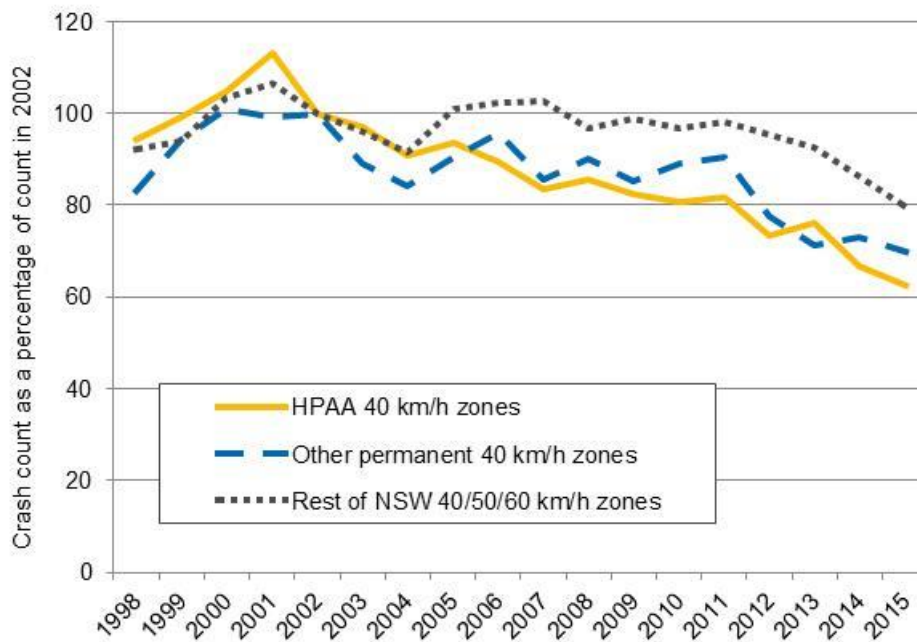
The first analysis covered all permanent 40 km/h zones. It compared crash numbers for the most recent year with available data, when all HPAA zones had been installed, with crash numbers for 2002 on the same lengths of road, before any HPAA zones had been installed. To understand the effects that broader trends in road safety may have had on crashes, changes in crash numbers in 40 km/h zones were compared with changes on comparable roads (with speed limits of 60 km/h or below) that had not had permanent 40 km/h limits put in place in that period.

The second analysis covered zones where a date was known for the installation of the 40 km/h limit. Crash numbers were compared before and after this date. Numbers were compared for periods of one, two, three, four and five years before and after installation – that is, one year before installation compared to one year after, two years before compared to two years after, and so on.

Both crash analyses showed statistically significant reductions in crashes and casualty crashes on the HPAA zone roads after the HPAA zones had been implemented.

Changes in casualty crashes over time for the different groups of zones are shown in Figure 3. The reduction in casualty crashes in HPAA zones was greater than the reduction in other permanent 40 km/h zones. Moreover, the reduction was substantially greater than the reduction on similar roads that had not had permanent 40 km/h limits put in place in that period.

Figure 3: Casualty crashes – trends by zone type, 1998–2015



Crash reductions over time by crash type and area are shown in Table 1. The analysis identified statistically significant effects of HPAA implementation for all crashes as well as for:

- casualty crashes
- serious casualty crashes, and
- pedestrian serious casualty crashes.

Table 1: Crash reductions over time by crash type and area

Crash type (years compared)	HPAA 40 km/h zones (% reduction)	Other permanent 40 km/h zones (% reduction)	Rest of NSW 40/50/60 km/h zones ^a (% reduction)
All crashes (2002–2014)	40%*	35%	28%
Casualty crashes (2002–2015)	38%*	30%	20%
Pedestrian casualty crashes (2002–2015)	49%	46%	46%
Serious casualty crashes (2005–2015)	33%*	11%	4%
Pedestrian serious casualty crashes (2005–2015)	46%*	23%	19%
Fatal crashes (2002–2015)	100%	50%	29%
Fatal pedestrian crashes (2002–2015)	100%	100%	19%

^a Note: Crashes identified by Police as occurring in a 40 km/h speed limit, which were not in identified HPAA or permanent 40 km/h zones, were included in this group. This includes school zones, roadwork zones, or cases where the speed limit may have been incorrectly recorded.

* Reduction is statistically significantly greater than reduction on comparable 40/50/60 km/h roads in the rest of NSW (chi square test at 5 per cent level).

For zones where implementation dates were known, a statistically significant reduction of 13 per cent to 16 per cent in casualty crashes was seen in the three to five years after implementation of HPAA zones compared to the three to five years before implementation (Table 2).

Table 2: Casualty crash numbers in HPAA zones before and after implementation

Number of years before/after	Number of casualty crashes 1-5 years before ^a	Number of casualty crashes 1-5 years after ^a	% change ^b
1 year	408	384	-6%
2 years	538	516	-4%
3 years	790	691	-13%*
4 years	828	696	-16%*
5 years	1,036	866	-16%*

^a Total number of casualty crashes in the years before and years after HPAA implementation, summed for all zones with crash data available.

^b Percentage change in number of casualty crashes in the after period compared to the before period.

* Statistically significant change (chi square test at 5 per cent level).

Looking at all recorded crashes (including those that did not result in a casualty), statistically significant reductions of 13 per cent to 22 per cent were seen in the two to five years after implementation (Table 3).

Table 3: Crash numbers in HPAA zones before and after implementation

Number of years before/after	Number of crashes 1-5 years before ^a	Number of crashes 1-5 years after ^a	% change ^b
1 year	488	453	-7%
2 years	937	811	-13%*
3 years	1,149	934	-19%*
4 years	1,505	1,207	-20%*
5 years	1,784	1,396	-22%*

^a Total number of crashes in the years before and years after HPAA implementation, summed for all zones with crash data available.

^b Percentage change in number of crashes in the after period compared to the before period.

* Statistically significant change (chi square test at 5 per cent level).

In the period since the program was launched, roads treated in the HPAA program experienced almost double the reduction in casualty crashes as the comparable roads not included in the program. The general reductions over the same time period in crashes and casualty crashes in this comparable group suggests that part of the HPAA reduction may be due to other background factors. However, as the reductions in the HPAA zones were statistically significantly greater than for the comparable roads, this strongly suggests that the HPAA zones were effective in reducing crashes and casualty crashes.

Zones implemented under the HPAA program were responsible for most of the casualty reductions measured in the evaluation. HPAA zones demonstrated greater percentage reductions in casualty crashes compared with other permanent 40 km/h zones. As these

zones also included roads with a far greater number of pedestrian and other crashes, they therefore experienced far greater reductions in absolute numbers of casualties.

It is notable that the road safety benefits applied to overall crashes. Although the program is focused on vulnerable road users, it can contribute more broadly to the achievement of overall road safety objectives.

While there were many other factors influencing crash numbers in this period, the consistency of these results with previous studies on the impacts of speed reductions provide confidence that the 40 km/h zones have successfully reduced road crashes and consequent casualties by significant amounts.

The number of fatal crashes in 40 km/h zones is too low to allow any further conclusions to be made regarding effects on these crashes.

4 What have been the other positive and negative effects of 40 km/h speed zones?

The views expressed by practitioners and stakeholders support the published evidence that lower speeds have a positive impact on amenity and walkability. This is particularly so when these limits are introduced in association with attractive roadside spaces.

Respondents to the community survey were asked how much they favoured 40 km/h speed limits where lots of people are walking near or across the road. The results showed 78 per cent of respondents were at least moderately in favour of 40 km/h speed limits in these circumstances. Moreover, 80 per cent of respondents thought the 40 km/h speed limit on such roads was 'about right'.

In the stakeholder interviews, some stakeholders pointed to wider benefits from creating pleasant places for people to use. A number of published sources also indicated that this in turn can lead to improved community perceptions about social issues such as crime. On the other hand, some stakeholders who were more interested in the movement of motorised traffic had concerns that traffic efficiency should not be adversely affected.

It is also likely, supported by the literature, and information collected in this evaluation, that lower speeds will result in the relationship between pedestrians and vehicles changing, with interactions being safely negotiated between road users rather than controlled by prescriptive rules. For example, in lower speed environments, drivers are less likely to exploit a perceived right of way.

5 To what extent is there appropriate coverage of 40 km/h zones?

While the crash analysis has shown significant safety improvements in HPAA zones, the proportion of pedestrian crashes being targeted by these zones remains low. Of the 1,276 pedestrian casualty crashes in 2015 in NSW on roads with a speed zone of no more than 60 km/h, 84 per cent occurred outside permanent 40 km/h zones. There remain many areas outside current zones in which pedestrian activity and crashes are clustered. In some cases, these are adjacent to existing HPAA zones indicating that further benefits are possible by expanding some zones.

Safety benefits will be maximised by expanding the program into roads with clear pedestrian activity but more traffic, which are also likely to receive the strongest community support. However, it should be recognised that there will always remain some roads where solutions other than speed limit changes are necessary.

Many practitioners and stakeholders in NSW, and other jurisdictions, consider that coverage of 40 km/h zones will increase in the future. Proponents of active transport modes and attractive urban centres believe that further coverage is warranted to achieve the urban design outcomes that support more vibrant cities.

6 What type of sites work best?

The HPAA zones and other permanent 40 km/h zones have been installed in a wide variety of road environments. These include busy roads carrying significant vehicle traffic with high pedestrian activity, often accessing transport hubs such as railway stations. Shopping strips on local roads, roads around recreational areas and, in some cases, entire inner urban suburbs have been included in the program.

The evaluation was unable to measure whether any of these types of sites performed better than any others. However, the results show that where speeds are reduced in the vicinity of pedestrians, there will be benefits. Consequently, the areas of greatest pedestrian and traffic volume will show the greatest benefits.

A key issue investigated in the evaluation was the need for physical traffic calming devices, such as humps, linemarking or narrower traffic lanes to reinforce the 40 km/h limit (see Figures 4 and 5). The evaluation also considered which of these devices were the most effective.

Figure 4: Merrylands – Raised platform with pedestrian crossing



Figure 5: Belmont – Road narrowing using islands and linemarking



The overriding view of practitioners was that the effectiveness of different traffic calming devices depended on context: that most devices have their place, and the most effective approach was to develop a complete plan, taking into account the particular characteristics of the site in question.

There was a strong consensus among the traffic practitioners that the installation of 40 km/h zones without traffic calming would have less impact than if traffic calming were implemented. When asked to comment on the need for traffic calming in general, 67 per cent of workshop participants believed that it was essential to emphasise the low speed zone and moderate speeds, 29 per cent believed that it should be used only when needed to reduce free speeds and 4 per cent believed that it was unnecessary, as a speed limit sign should be sufficient.

On the other hand, traffic practitioners expressed a strong consensus that the cost of traffic calming was a significant impediment to the use of 40 km/h zones more broadly. Traffic calming that imposes vertical or horizontal displacement of traffic, such as raised platforms (see Figure 4), provides the greatest speed reduction. However, there is a growing awareness that providing a consistent cue to the driver of higher pedestrian activity (particularly thresholds where the speed limit changes) can also provide benefits. In addition, there is high community acceptance and support for 40 km/h school zones despite their lack of traffic calming, with 90 per cent of community survey respondents believing that these 40 km/h limits were either too fast or about right.

A more subtle approach, with less intensive traffic calming where appropriate, has the advantage that it should be lower cost and could also be used in a wider range of road types. In particular, arterial roads, where there is a significant proportion of pedestrian casualties but where the need to preserve traffic flow is also important, may be more suited to this approach.

7 To what extent has the HPAA program been designed and implemented effectively?

The success of the HPAA program is testament to its original design and to the long-term funding commitment to it. The provision of dedicated funding and clear guidelines for the identification and development of projects has resulted in an ongoing focus on the opportunities and a significant number of locations now benefiting.

However, the program is now 15 years old and warrants consideration of an update of the Guidelines and improvements to the process for identifying and approving projects. There is an opportunity, now, to consider whether the role of the program is to continue to address localised road safety concerns or whether it is part of a broader strategy for the network as a whole.

The HPAA program leverages well understood safety and network management principles and has assisted those who wish to implement 40 km/h limits, but needs to be better positioned within the strategic planning framework for the NSW road network to facilitate further safety gains.

8 Conclusions and recommendations

The results of this evaluation are consistent with previous studies of speed limit reductions – 40 km/h speed zones have reduced road trauma by significant amounts. Roads with HPAAAs have experienced almost double the reduction in casualty crashes compared to other urban roads since 2003. The HPAA program should continue and consideration should be given to expanding the scope of current programs to explore more opportunities for safer speed limits.

The HPAA program has successfully expanded the use of 40 km/h speed zones. Further expansion should be considered within a wider speed management and transport planning context, and should build on a common understanding of the role of speed management in improving safety and supporting other programs to improve urban liveability.

The strategic planning framework for the NSW road network recognises both the movement and place functions of roads. The 'place' function acknowledges that a road can be a destination in its own right, or a place for people to be, as well as a way to get from one place to another. This framework provides a strong reference point for expanding speed zones below the urban default limit of 50 km/h, particularly where a location has a primary place function. A strategy should be developed for future deployment of safer speed limits for pedestrian safety, considering a range of options for doing so. These options should range from incremental growth to one that establishes strategic expectations for roads to target vulnerable road user safety, while aligning with the development of successful places for people.

The HPAA program guidelines could be usefully revised to reflect learnings and to support continued safety improvement. Flexibility could be improved by removing prescriptive selection criteria for HPAA zones. Funding approvals could be subject to a prioritisation process that responds to community concerns, addresses safety risks, and recognises the other benefits such as urban place-making.

A communication and engagement program should be a key component in implementing any future changes to the program, to build on the high community support identified. This should increase understanding of the role of the program, engage with the community and other stakeholders to achieve support, and provide decision makers with the confidence that they can support safer speed limits.

This evaluation shows there is an opportunity to capitalise upon the success of the HPAA program and expand the program. Initial quick wins include improving the consistency of signage, looking for opportunities to introduce 40 km/h zones where conditions already support this speed, and enabling implementation of safer speeds in a broader range of road environments.

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