

**Submission
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SPEED LIMITS AND ROAD SAFETY IN REGIONAL NSW

Organisation: Austroads
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The Honourable Lou Amato, MLC
Committee Chair
Joint Standing Committee on Road Safety
Parliament of New South Wales
Macquarie Street
Sydney NSW 2000

Dear Chair

I write in relation to the Staysafe inquiry into *Speed limits and road safety in regional NSW*. The purpose of this letter is to help inform the Committee of what Austroads believes to be key opportunities around speed limits, vehicle technology and road infrastructure to support NSW's efforts to improve road safety outcomes and ultimately eliminate death and serious injury on NSW roads.

Austroads is the peak body for Australasian road transport and traffic agencies. As an organisation owned by all Australia's and New Zealand's roads or transport departments and the Australian Local Government Association, Austroads assist our members and Australia's local government agencies to adopt harmonised road safety practices. We support the Australasian road transport and traffic agencies by:

- supporting safe and effective management and use of the road system
- developing and promoting national practices, and
- providing professional advice to member organisations and national and international bodies.

Both the United Nations General Assembly (United Nations General Assembly 2021) and the Global Plan for the Second Decade of Action for Road Safety (WHO 2021) have called for highly ambitious targets and importantly, have endorsed the Safe System approach as the means of achieving them.

The 2026 NSW Road Safety Action Plan, launched in April 2022, is based on the Safe System approach and targets a 50% reduction in death and 30% reduction in serious injury by 2030.

Australia's Infrastructure and Transport Ministers espoused a vision of eliminating death and serious injury from Australia's roads by 2050, in the new National Road Safety Strategy 2021-2030. The strategy requires jurisdictions to apply Safe System principles to all future infrastructure investments. The choice of Safe System hinges on its holistic, system-based approach to the problem with a view to making each trip not safer, but safe, despite the challenges of human fallibility. Road infrastructure must integrate with vehicle technology and safe travel speeds to neutralise the impact of human error and so eliminate serious road trauma.

The relationship between speed and safety

Speed plays a central role in serious road trauma, as a causal factor in some crashes and an outcome severity factor in all crashes.

Several meta-analyses¹ of research and practice projects across the globe and in Australia show that:

1. There is a strong statistical relationship between speed and road safety. No other road safety risk factor has a more powerful impact on crashes or injuries than speed.
2. The statistical relationship between speed and road safety is consistent. Almost all the time, when speed goes down, the number of crashes or injuries goes down, and when speed goes up, the number of crashes or injuries goes up. While it may to some extent be possible to offset the impacts of higher speed by introducing other road safety measures, a reduction in speed will almost always improve road safety.
3. The causal direction between speed and road safety is clear. Most of the evidence comes from before-and-after studies, in which there can be no doubt about the fact that the cause (i.e., speed reduction) comes before the effect (i.e., reductions in deaths and injuries) in time.
4. There is a clear close-response relationship between changes in speed and changes in road safety.
5. The relationship between speed and road safety appears to hold universally and is not influenced by, for example, the jurisdiction in which it has been evaluated, when it was evaluated or the type of traffic environment in which it was evaluated.

The relationship between speed and road safety can be explained in terms of elementary laws of physics. While speed is our commonly accepted and used means of quantifying safety, kinetic energy is a more appropriate property of the transport system, since safety levels are determined by the amount of kinetic energy that must be managed to avoid a crash, or dissipated to prevent severe injury in a crash. Kinetic energy of a moving vehicle is proportional to its mass and the square of its speed. Therefore, kinetic energy escalates at a rapid rate as speed increases. For example, when speed is increased by just 20% (e.g., from 50km/h to 60 km/h), kinetic energy increases by 44%.

At its core, road safety is about managing energy. This simple truth brings into sharp focus the key role that speed must play in securing safe outcomes on NSW's roads. It is critical for those with responsibility for setting speed limits and speed policy to understand the implications of this second-power (i.e., squared) relationship and the disproportionate influence of speed on crash and injury risk.

Speed limit impact on travel times, economic productivity and driver fatigue

The inquiry terms of reference indicate an interest in the role of travel time in road user behaviour and safety. A long-held belief among many in the community is that reducing speed limits will affect travel times significantly, which in turn will have a negative impact on commercial productivity and individual amenity. The opinions of decision-makers often reflect, all or in part, this view. A less commonly held, and unproven, view is that longer travel times increase fatigue, which in turn can be addressed by increasing speed limits.

The impact of speed limits on travel time varies according to numerous factors, such as:

- intersections and traffic signals
- road and street type and features
- land use types
- traffic conditions and drivers' personal speed choices
- vehicle type and driving style
- geography, topography, weather, and other environmental factors
- length and nature of journey
- sources of traffic delays such as construction or roadworks.

¹ For example Elvik R., Vadeby A., Hels T., van Schagen I. 2019, *Updated estimates of the relationship between speed and road safety at the aggregate and individual level*. Accident Analysis & Prevention 123, pp. 114-122.

In urban settings the economic case for higher speed limits (e.g., 60km/h instead of 50km/h on major arterial roads) is weak. Lower urban speed limits represent a giant step towards meeting the commitment to achieve Safe System outcomes and minimise serious road casualties by 2050. Lower speeds also deliver other important benefits, contribute to the achievement of several of the UN's Sustainable Development Goals, including the reduction of carbon dioxide emissions.

An economic assessment of higher speed by the Australian Government², *Potential Benefits and Costs of Speed Changes on Rural Roads (2003)* showed that there is no economic justification for increasing the speed limit on two-lane undivided rural roads, even on those safer roads with sealed shoulders. On undivided roads through terrain requiring slowing for sharp bends and occasional stops in towns, the increased fuel consumption and air pollution emissions associated with deceleration from and acceleration to high cruise speeds would add very substantially to the total social costs.

For rural areas with high-speed roads, the approach to speed setting may differ according to the importance of the road in terms of serving the key markers of personal amenity and commercial value. Freeways and major highways are usually characterised by extended lengths connecting key cities and towns. Providing a high level of safety, while minimising travel times, is important. As a result, most jurisdictions are upgrading high-speed roads through the provision of safety barrier systems, together with high-standard shoulders, alignments, and road markings to support low-risk travel at 100 or 110 km/h.

Moving down through the road hierarchy, there are trade-offs to be made between either upgrading the road infrastructure to support existing speed limits or leaving the road as-is while reducing speed limits to safe levels. Where the high-speed transport task is deemed important, Safe System infrastructure must be provided. For the remaining rural and remote network, where it is desirable to preserve the natural roadside environment, and expensive road and roadside infrastructure is uneconomical and/or unaffordable, speed limits must match the ability of modern vehicles to protect their occupants, both from being involved in a crash as well as being injured should a crash occur.

Speed and infrastructure

Because of the squared relation between speed and energy, speed is a principal element in system safety, together with vehicles and infrastructure. Speed limits are important regulators of speed, but not the only ones. Road infrastructure can serve to moderate speeds to safe levels in select road environments. At intersections the prime example of using infrastructure to manage speed is the provision of roundabouts. On straight sections of high-speed road, safely managing speed is primarily achieved through the separation of opposing directions of traffic, provision of safety barriers, sealed shoulders and audio-tactile line-marking. In all settings, the use of enforcement and driver education is a critical measure for supporting compliance with speed limits to ensure the safe operation of the infrastructure. Variable speed limits can play a role in some settings where higher speeds may be safely facilitated when conditions are suitable.

The road and roadside will become increasingly important in the future as a means of communicating to vehicles and supporting vehicle-to-vehicle and vehicle-to-infrastructure communications. While it is right to acknowledge these contributors to safe speed environments, it should also be recognised that infrastructure enhancements, while valuable, are relatively costly and at best can only be applied to a relatively small proportion of the road network. Managing speeds by other means is required to drive the number of deaths down by 50% by 2030 and to minimal levels by 2050.

² https://www.infrastructure.gov.au/sites/default/files/migrated/roads/safety/publications/2003/pdf/Rural_Speed_2.pdf

Speed and the vehicle

Over the most recent 17-year period, modelling has indicated that improvements to the vehicle to better protect occupants in the event of a crash have been responsible for approximately 30% in the reduction in death and injury across Australasia in that time (Newstead, 2022³).

In more recent times, the vehicle is taking on a more active role in protecting its occupants and, increasingly, vulnerable road users such as pedestrians and cyclists. Automatic emergency braking (AEB) is becoming prevalent among the new vehicle fleet. AEB works to reduce impact speeds and therefore the severity of a significant proportion of those crashes not avoided. Intelligent speed adaptation (ISA) has been shown to have the potential to deliver substantial safety benefits (Doecke, Rafferty, Elsegood, Mackenzie. 2021)⁴ through the incremental modification of travel speeds over time as the technology penetrates the vehicle fleet. This technology with haptic feedback was intended for introduction across Europe in 2022. Pressure from the vehicle industry, unfortunately, resulted in introduction of the less effective version that provides visual or audible alerts when the speed limit is exceeded.

While new vehicle buyers will continue to benefit from the introduction of new safety technologies, some of which will support drivers to comply with speed limits, the replacement rate of older, less safe vehicles with newer, safer ones is relatively slow, with the fleet taking more than 20 years to be effectively replaced. This means the community will derive a benefit incrementally as new safer vehicles permeate the fleet. Measurable safety benefits are likely to accrue as a significant proportion of the fleet is equipped with the new technology.

Notwithstanding the contributions by new vehicle technologies and infrastructure treatments to manage speed-related trauma, an appreciable burden will still need to be borne by revised speed zoning, reflecting Safe System thinking, if NSW is to meet its commitment to achieving its 2030 trauma target. Community engagement, tactical enforcement and public education will need to provide critical support.

Speed and driver behaviour

With regards to the relationship between speed limits and driver behaviour, the safe operation of the road system requires drivers to comply with speed limits. Generally, compliance with limits can be achieved through three means:

1. Engineering the road and environment in such a way that drivers perceive cues as to the appropriate speed, e.g., traffic calming devices used to slow traffic in local streets where pedestrians are present
2. Enforcement of speeding offences
3. Educating drivers on the value of driving at or below the speed limit and clearly communicating speed limits to drivers in-situ.

An Austroads study⁵ identified that speed limits are a crucial factor among several that impact a driver's choice of speed.

Compliance with speed limits is generally high across Australia and there is evidence that compliance has improved over time. A study of self-reported high-level speeding in Australia⁶ found that the percentage of drivers reporting they always, nearly always or mostly drive 10 km/h or more over the speed limit showed a general downward trend from 1996 to 2017. In

³ Newstead S., 2022, *personal communication*, 14/06/2022.

⁴ Doecke S.D., Rafferty S.J., Elsegood M.E., Mackenzie J.R.R. 2021, *Intelligent Speed Adaptation (ISA): benefit analysis using EDR data from real world crashes*. CASR Report 176, Centre for Automotive Safety Research, Adelaide.

⁵ Austroads 2013, *Driver attitudes to speed enforcement*. AP-R433-13, Austroads, Sydney, NSW.

⁶ van Souwe, J., Gates, P., & Bishop, B. (2018). *Community Attitudes to Road Safety—2017 Survey Report*.

2017, around six per-cent of drivers reported exceeding the speed limit routinely at 10 km/h or more over the limit.

Enforcement plays a significant role in road safety and achieves life-saving impacts. On the extensive high-speed NSW regional road network, automated speed enforcement can be a highly effective countermeasure to reduce speeds and save lives and serious injuries. Austroads, in partnership with the Australia New Zealand Policing Advisory Agency, published a concise statement⁷ that includes a set of principles for effective speed management.

Austroads' role

Austroads' primary contribution to Australia's road safety effort is through the conduct of research on road safety risks and countermeasures, and the publication of authoritative guidance. Austroads is in regular communication with its members around Australia and New Zealand and its peers in Europe and North America in relation to road safety, road design and the Safe System. Austroads sets a leading research agenda including a strong focus on speed management.

In addition to the references provided above, the following Austroads publications provide advice relevant to this inquiry, and are available for download from [austroads.com.au](https://www.austroads.com.au):

- *Guide to Road Safety Part 3: Safe Speed*, July 2021, publication no: AGRS03-21
- *Guide to Road Safety Part 4: Safe People*, July 2021, publication no: AGRS04-21
- *Methods for Reducing Speeds on Rural Roads: Compendium of Good Practice*, March 2014, publication no: AP-R449-14
- *Public Demand for Safer Speeds: Identification of Interventions for Trial*, February 2016, publication no: AP-R507-16
- *Model National Guidelines for Setting Speed Limits at High-risk Locations*, March 2014, publication no: AP-R455-14
- *Point-to-Point Speed Enforcement*, September 2012, publication no: AP-R415-12

Conclusion

No matter whether road trauma is being tackled through education and behaviour change, enforcement, vehicle technology or road infrastructure, the objective in the end is the same: to manage energy in the road system to the extent that death and serious injury are avoided. This is achieved through a Safe System lens that properly aligns speed limits with road design and vehicle technology, while supporting drivers through education and enforcement.

Speed is one of the most heavily researched areas in road safety, and this Staysafe inquiry presents an opportunity to engage with experts from across Australia and internationally, reflect on how the evidence applies to NSW and identify knowledge gaps that need to be closed. Austroads welcomes your inquiry and the opportunity to work with NSW to further develop the evidence base that will support the transition of the road network over the next 3 decades to one in which our shared vision can be realised.

Please contact [REDACTED], Program Manager Road Safety & Design, on [REDACTED] if you wish to discuss or if you have any questions.

Yours sincerely

[REDACTED]
GEOFF ALLAN
Chief Executive

⁷ Austroads 2020, *National Road Safety Speed Enforcement Approach*. AP-C108-20, Austroads, Sydney, NSW.