

## **Inquiry into e-mobility safety and use in Queensland**

<b>Submission No:</b>	982
<b>Submitted by:</b>	Vehicle Design and Research Pty Ltd
<b>Publication:</b>	Making the submission and your name public
<b>Attachments:</b>	See attachment
<b>Submitter Comments:</b>	

## Inquiry into e-mobility safety and use in Queensland

Submission by Michael Paine, Principal, Vehicle Design and Research Pty Ltd

19 June 2025

### **Key points**

- I support the use of micromobility devices on public roads and footpaths, subject to the following points
- Design and performance requirements should be applied for three types of public infrastructure:
  - A. footpaths,
  - B. bicycle paths, shared paths and roads with a speed limit no more than 50km/h
  - C. roads with a speed limit greater than 50km/h
- Devices using footpaths (Type A) must be set to a maximum speed under power of no more than 10km/h and a switchable low speed mode of no more than 5km/h. The speed mode selection must be clearly evident to the rider and enforcement personnel. The width must not exceed 740mm and unladen mass not more than 60kg (separate requirements apply to powered wheelchairs including mobility scooters).
- Devices using Type B infrastructure must have a maximum speed under power of no more than 25km/h and must not be capable of being adjusted to a higher speed setting. The width must not exceed 800mm and unladen mass not more than 60kg.
- Devices using Type C infrastructure must meet Type B requirements and also must be capable of human-powered speeds in excess of 25km/h (without power assistance. For example, it must have pedals or other means of human propulsion).
- Other safety-related requirements as set out below.
- A national technical standard be developed and used for fit-for-purpose determinations under Australian Consumer Law.
- Any powered device that is capable of powered speed in excess of 25km/h must be registered and comply with applicable Australian Design Rules in order to use public infrastructure.

## **Introduction**

Thank you for the opportunity to make a submission to this inquiry. I am a consulting mechanical engineer with extensive experience in vehicle safety, including micromobility vehicles (e.g. e-bikes) using footpaths and other public infrastructure:

- In 2001 I conducted, for Vicroads, an analysis of the relative safety performance of bicycles and recreational scooters<sup>1</sup>. This included developing stability and braking tests.  
[http://www.mpainesydney.com/filechute/scooter\\_report\\_dec01.PDF](http://www.mpainesydney.com/filechute/scooter_report_dec01.PDF)
- From 2008 to 2010 I led a team of experts that developed a draft national policy framework for micromobility vehicles<sup>2</sup>. This work was conducted for Austroads - the national association of state road authorities. A summary of key findings is provided below. *I can provide the committee with a copy of the report prepared for Austroads, if requested. That comprehensive report covers most of the issues being considered by the committee.*
- From 2012 to 2016 I led a team of experts that developed, for Austroads, a draft policy framework for motorised wheelchairs and other motorised mobility devices (MMD)<sup>3</sup>. A summary of key findings is provided below.
- Our proposed technical requirements for MMDs were subsequently incorporated in Australian Standard Technical Specification 3695.3:2018 "Wheelchairs: Requirements for designation of powered wheelchairs and mobility scooters for public transport and/or road-related area use". Our team was a member of the Standards Australia committee that developed the technical specification.

Both Austroads projects contributed to subsequent national policy-making although it was disappointing that our key recommendations were not adopted at the time because the consumer market now has many devices that don't comply with the relatively simple safety measures. Enforcement of new safety requirements will be difficult possibly except for controlling the sale of new micromobility devices.

## **Speed amongst pedestrians**

In the case of mixing with pedestrians on footpaths there is a fundamental difference between an ambulant pedestrian and a wheeled device - the perception of speed. Usually it is easy to judge an appropriate speed for the circumstances when walking (~4km/h), jogging (~8km/h) or running (~12km/h) due to the change in gait. However, a wheeled device gives very little haptic feedback on speed and so it is easy to travel too fast for the circumstances.

---

<sup>1</sup> Paine M (2001) ANALYSIS OF RELATIVE SAFETY PERFORMANCE OF BICYCLES AND SCOOTERS, Report prepared for Vicroads. <https://www.vdrsdyd.com/mp/scooter.html>

<sup>2</sup> Paine M (2011) SAFETY REQUIREMENTS FOR SMALL MOTORISED ALTERNATIVE VEHICLES, Proceedings of the 22nd International Conference on the Enhanced Safety of Vehicles, Washington DC. <https://www-nrd.nhtsa.dot.gov/departments/esv/22nd/files/22ESV-000108.pdf> (see appendix)

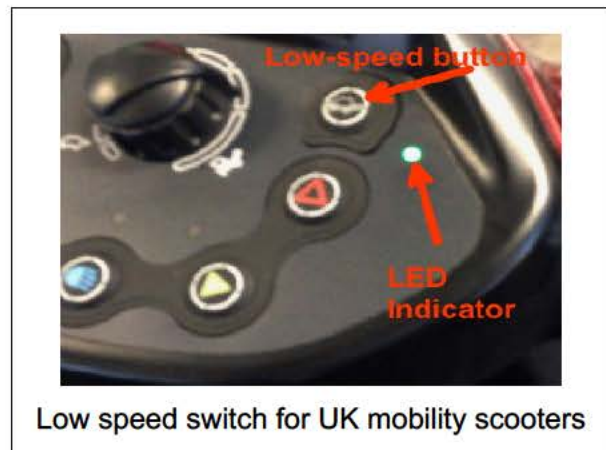
<sup>3</sup> Paine M (2019) NEW SAFETY STANDARDS FOR MOTORISED MOBILITY DEVICES IN AUSTRALIA, Proceedings of the 26th International Conference on the Enhanced Safety of Vehicles, Eindhoven. <http://www-esv.nhtsa.dot.gov/Proceedings/26/26ESV-000205.pdf> (see appendix)

For this reason an important finding from our research is that motorised micromobility devices must have reliable, tamper-proof speed limiters so that appropriate safe maximum speeds can be applied for the infrastructure and circumstances.

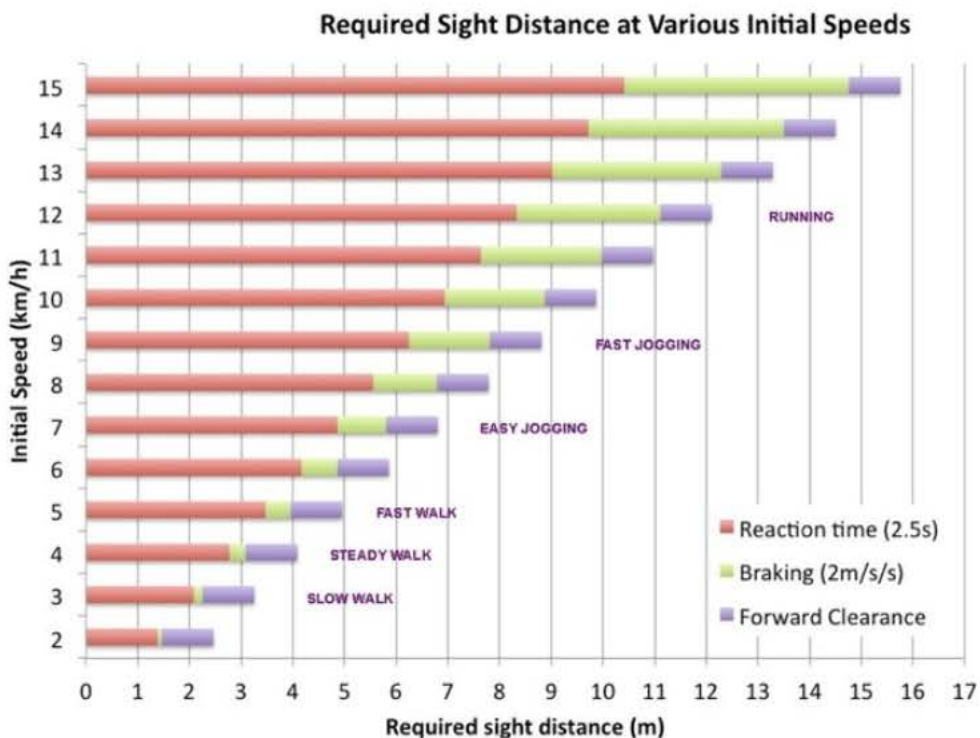
For example, ASTS 3695.3 requires *"On powered wheelchairs [including mobility scooters] with a maximum speed above 6 km/h, the powered wheelchair control system shall have an operator-controlled switch or speed mode that limits the maximum speed to 5 km/h or less. The powered wheelchair shall indicate to the operator when it is in this mode."*

The low-speed switch requirement was based on a UK requirement for mobility scooters.

The 5km/h value was based on research that I undertook to determine appropriate speeds for avoiding collisions with pedestrians in potentially congested areas such as shopping precincts and transport hubs. This built on work that I undertook in 2000 with Dr Michael Henderson on reducing the risk to children from reversing motor vehicles<sup>4</sup>.



Low speed switch for UK mobility scooters



<sup>4</sup> Paine M (2003) THE DANGER TO YOUNG PEDESTRIANS FROM REVERSING MOTOR VEHICLES, Proceedings of the 18th International Conference on the Enhanced Safety of Vehicles, Nagoya. <http://www-esv.nhtsa.dot.gov/Proceedings/18/18ESV-000466.pdf>

On footpaths total collision avoidance is crucial because a pedestrian who is struck by a micromobility device is likely to fall heavily onto the pavement. A head impact in these circumstances could be very serious. Similarly, a pedestrian attempting to dodge an approaching micromobility device could easily trip and impact the pavement.

In areas where there is less pedestrian congestion, such as relatively quiet suburban footpaths, a maximum device speed of no more than 10km/h is necessary to avoid collisions. This is the same as the 10km/h speed limit that applies to cars in shared pedestrian zones.

Micromobility devices that cannot be ridden at very low speeds (due to stability issues) must be of a design that the rider can easily get off and walk beside the device when in congested pedestrian areas. The option to walk a micromobility device (or bicycle) through a crowded pedestrian area should be included codes of practice and training for using these devices.

*In summary, no micromobility device should be ridden in excess of 10km/h when using footpaths and they should not be capable of exceeding 5km/h (through a low-speed switch or geofencing) in designated pedestrian areas such as shopping precincts, tourist precincts and transport hubs.*

### **Safety requirements based on infrastructure**

As set out in the 2010 report for Austroads, our team identified three fundamental types of infrastructure on which micromobility devices might be used:

- A. Footpaths shared with pedestrians
- B. Bicycle paths, shared paths (pedestrians and bicycles) and some residential roads
- C. Roads with speed limits greater than 50km/h

Each of these has safety-related technical limits on maximum speed, maximum width and maximum mass.

As outlined above, for footpaths we recommended a maximum speed under power of 10km/h, with the ability to select a speed no more than 5km/h for certain pedestrian areas. A maximum width of 740mm was recommended, based on Austroads Guidelines for footpath design and the need to avoid pedestrians having to dodge out of the way of a micromobility device.

*For bicycle paths, shared paths and residential roads we recommended a maximum speed under power of 25km/h and a maximum width of 800mm.*

The same requirements apply to devices using roads with a speed limit in excess of 50km/h except that, as with pedelecs<sup>5</sup>, they must also be capable of human-powered speeds in excess of 25km/h (without power assistance). For example, it must have pedals or other means of human propulsion and power-assistance must not be available beyond 25km/h. One reason for this requirement is to avoid hindering traffic flow and minimise incompatibility on Type C roads.

---

<sup>5</sup> <https://en.m.wikipedia.org/wiki/Pedelec>

It is noted that pedelecs require the rider to pedal continuously and, as a result, many jurisdictions treat them as bicycles. Our proposal would allow powered propulsion up to 25km/h without the need for pedalling. Many e-bikes and e-scooters that are currently illegal would meet this proposed requirement, subject to other safety requirements.

This means that, *in order to use public roads and road-related infrastructure, any device capable of powered speed in excess of 25km/h must be registered and comply with applicable Australian Design Rules such as those applying to mopeds.*

It is feasible for one device to meet the requirements for all three types of infrastructure, provided that speed ranges can be selected and are clearly indicated to users and enforcement personnel.

In the case of maximum unladen mass we recommended 60kg for micromobility devices.

Other safety requirements, such as stability and braking are recommended in our Austroads report. For example there are performance tests where the device is ridden across obstacles in the path.



Performance test with obstacles across path

Furthermore, internal combustion engines should not be permitted on micromobility devices.

It is noted that in 2013 Staysafe examined the safety of "non-registered motorised vehicles"<sup>6</sup>, including mobility scooters but this was before our Austroads project was completed.

### ***Safety requirements for mobility scooters***

Although powered wheelchairs/mobility scooters are not within the scope of the inquiry some important findings from our 2012-2016 Austroads project are relevant. Our conference paper setting out key requirements is included as an appendix.

---

<sup>6</sup> Joint Standing Committee on Road Safety (Staysafe) (2014) REPORT ON NON-REGISTERED MOTORISED VEHICLES, report 3/55, March 2014

### **Recommendations for administrative arrangements**

Our 2010 report included an analysis of options for vehicle and user identification. At the time we pointed out that it was desirable to register Type B and Type C devices and licence their riders (but not Type A devices such as mobility scooters). However, clearly the horse has bolted and there are now so many micromobility devices in use that conventional registration and licensing is not feasible.

Other options that were evaluated were a) that riders carry an acceptable form of identification or b) that riders have a certificate of competency (such as training provided by the supplier). It is recommended that these options be considered by the committee.

Regarding the need for certification/approval of devices, the proposal developed for mobility scooters could be extended to micromobility devices. During consultation with ACCC during the mobility scooter project it was recognised that a simple labelling system, where the manufacturer claimed conformity with published technical requirements, would be enforceable under Australian Consumer Law. Therefore there could be reasonable assurance that a product met safety requirements without the resources needed for third-party certification or government approval of each model of device. An example label from the Technical Specification is shown below.

It is recommended that technical standards for micromobility devices that use public infrastructure in Australia be developed and include labelling requirements similar to those in ASTS 3695.3. The requirements could be published by Standards Australia or as a Vehicle Standards Bulletin published by the Australian Motor Vehicle Certification Board.



White Label for footpath use - from SA TS 3695.3  
(© Standards Australia)

Appendices - 2011 and 2019 papers from the International Conference on the Enhanced Safety of Vehicles (ESV)