

Submission on NTC discussion paper on PMDs

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Please note that our engineering consultancy has assisted with two relevant projects for Austroads:

- 2009-2010 RS1638 "A National Policy Framework for Alternative Vehicles"
- 2012-2016 RS1731 "Development of a Nationally Consistent Approach to the Use of Motorised Wheelchairs and Other Motorised Mobility Devices"

The second project resulted in the publication of Standards Australia Technical Specification 3695.3 (TS). The final reports for these two projects contain a substantial amount of information relevant to the current NTC discussion papers on PMDs and MMDs . The reports are not available as public documents but were available to NTC officers (who participated in both Austroads projects).

The MMD project was supported by a Road Rules Working Group (including an NTC representative) that identified numerous issues with the current ARR (and State rules) and developed some options for addressing these issues.

We have also authored two international conference papers:

- Paine M and Paine D (2019). "New Safety Standards for Motorised Mobility Devices in Australia", Proceedings of 26th International Conference on the Enhanced Safety of Vehicles (ESV), Paper 19-0205, Eindhoven (<http://indexsmart.mirasmart.com/26esv/PDFfiles/26ESV-000205.pdf>) . This describes the development of the TS and the rationale for some of the technical requirements

and

- Paine M (2010) "Safety requirements for small motorised alternative vehicles", Proceedings of 22nd International Conference on the Enhanced Safety of Vehicles (ESV), Paper 11-0108, Washington (<https://www-esv.nhtsa.dot.gov/Proceedings/22/files/22ESV-000108.pdf>). This proposes some technical requirements for PMDs and MMDs and sets out an analysis of collision avoidance parameters.

The second ESV paper (2010) is referenced in the NTC PMD discussion paper but a key section on travel speeds and collision avoidance is absent from the discussion paper.

It should be noted that the findings in 2010 have been confirmed and enhanced during the subsequent MMD project. In particular, many of the safety-related performance requirements that are set out in the TS are relevant to PMD safety, such as stability on slopes and ability to safely negotiate obstacles. An ideal outcome would be for PMDs to be required to meet key safety requirements of

the TS. It is acknowledged that this would be difficult to accomplish within the Australian Road Rules but it may be possible to encourage conformance with these key requirements through the "fit-for-purpose" provisions of Australian Consumer Law. This would be facilitated by the publication of a document for PMDs that is similar to the technical specification for MMDs.

Speed restrictions

Our ESV papers provide justification for recommended maximum speeds and a low-speed mode. In brief, the primary concern is *collision avoidance* because a PMD user thrown from the device is likely to suffer severe injuries irrespective of the kinetic energy of the collision. Pedestrians, including PMD and MMD users are at risk of severe injuries through collisions or near-collisions, particularly as a result of falls onto hard surfaces. Users also risk losing of control of the device in the event of a collision or near-miss.

Our 2010 ESV paper sets out an analysis of maximum speed associated with various sight distances in order to avoid a collision. This confirms that a maximum of 5km/h is appropriate for busy pedestrian areas and 10km/h for open footpaths. The TS requires MMDs capable of exceeding 6km/h to have a low speed switch that limits the speed to 5km/h (this is a legal requirement for MMDs in the UK). The intention is that users engage this switch on a voluntary basis when they enter a busy area. It is noted that Lime scooters (a type of PMD) are capable of being geofenced to limit maximum speed in prescribed areas and it is recommended that a low-speed switch or geofencing be encouraged for all PMDs.

It is noted that Tables 6 and 8 of the NTC paper compare the kinetic energy of various PMDs and MMDs. Our research found that kinetic energy has little to do with collision avoidance or the risk of injury for MMD/PMD-related incidents. Travel speeds and available sight distances are the crucial parameters for collision avoidance.

Subject to these concerns, our research on MMDs and PMDs supports the favoured Option 3: Speed Approach 1 that proposes a maximum powered speed of 10km/h for PMDs using footpaths and shared paths and 25km/h for PMDs using bicycle paths and local roads.

Mass and dimensions

Our 2010 ESV paper has a section that discusses unladen mass and dimensions of PMDs. The NTC proposal (page 18) for a 60kg limit on unladen mass agrees with our analysis: "...60kg would allow the rider to manually negotiate steps and other common obstacles and for two people to lift the vehicle, where necessary..."

The NTC proposal (page 18) to limit PMD width to 700mm should be reviewed. Under the TS MMDs intended for footpath use are limited to a maximum width of 850mm. This takes into account the special needs of mobility-impaired MMD users and MMD characteristics and so is not necessarily applicable to PMDs. Our 2010 ESV paper notes that the Austroads Guide to Road Design Part 6A:

Paths for Walking and Cycling uses a standard unpowered wheelchair that is 740mm wide (see Figure 3.2 of the 2017 edition of the Guide) and a cyclist 800mm wide (Figure 3.5). For PMDs we recommended a maximum width of 740mm for footpaths and 800mm for bike paths and roads. If there is to be no distinction between footpath and bike path PMDs (see response to Question 6 below) then it is recommended that PMDs be limited to a maximum width of 740mm to ensure compatibility with infrastructure and to minimise space conflicts with other infrastructure users. It is considered that there is no pressing reason for a one-person PMD to exceed 740mm in width and it would assist user compliance if there is a single width limit for all infrastructure.

For reference, an i2 Segway is 630mm wide and an x2 Segway is 838mm wide. In 2009 the Segway brochure cautioned that "The x2 is not intended for use on sidewalks or pedestrian walkways."

Similarly the TS limits MMDs to a maximum length of 1500mm but there is no reason for PMDs to exceed the NTC-proposed length limit of 1250mm.

Response to NTC Questions

Question 1a - Are the requirements in the proposed regulatory framework appropriate?

Qualified yes - see above and responses to the other questions

Question 1b - Are there any requirements that should be removed, included or modified?

Yes - see above for rationale:

- a) Increase proposed maximum width to 740mm
- b) Require a low-speed switch (not exceeding 5km/h) or equivalent geofencing for busy pedestrian areas
- c) Add key safety requirements (eg stability on slopes, braking, negotiating obstacles etc) based on SATS 32695.3 (for MMDs)

It is recommended that these safety requirements be developed and published, possibly as a Vehicle Standards Bulletin so that they can either be referred to in Australian Road Rules or used to establish fit-for-purpose under Australian Consumer Law.

Question 2 - Is 60kg a suitable maximum weight for a PMD?

Yes - it agrees with the findings of the Austroads project

Question 3

No comment

Question 4 - Do you agree with the criteria selected to assess the options?

Our 2010 Austroads report on PMDs considered several other objectives for assessing options but the criteria used in the discussion paper are adequate at this stage. Our research would assist if further justification is needed to support the proposed framework.

Question 5 - When considering the safety risk assessment, access and amenity impacts, broader economic impacts, as well as compliance and enforcement impacts; has the impact analysis sufficiently considered all relevant variables and available evidence?

As for Question 4, our 2010 Austroads report describes a detailed analysis of these issues. Our 2016 Austroads report on MMDs set out the basis for a Regulatory Impact Assessment of the proposed framework for MMDs that would be useful for further development of the PMD framework.

Question 6 - What do you believe is the most appropriate road infrastructure for PMDs to access: footpaths, separated paths, bicycle paths and/or roads?

Our 2010 Austroads report proposed different technical requirements for different infrastructure. This recognised that it would be too design restrictive to require every PMD to meet requirements for all types of infrastructure and would crush innovation. However it was recognised that there would be incentive to market products that were suitable for all types of infrastructure. At the time, some models of PMD were identified that had the potential to achieve this. Below is a table of proposed requirements from the 2010 report.

Proposed Primary Filters for Use of Infrastructure by Alternative Vehicles

Type of Infrastructure	Maximum powered speed	Maximum width	Maximum kerb mass	Other performance requirements
A. Footpaths, Shared Paths+	10km/h	740mm	150kg for mobility scooters, 60kg for others	<ul style="list-style-type: none"> ▪ Safety (e.g. crash avoidance, stability) ▪ Environment (e.g. emissions, noise) ▪ Footpath amenity (e.g. compatible dimensions for footpaths, stopping distance, line of sight)
B. Bike Paths, Shared Paths and most roads with speeds up to 50km/h*	25km/h	800mm	60kg	<ul style="list-style-type: none"> ▪ Safety (e.g. crash avoidance, stability) ▪ Environment (e.g. emissions, noise) ▪ Bicycle path amenity (e.g. compatible dimensions for bicycle paths, stopping distance, line of sight)
C. Roads >50km/h and on road marked bicycle lanes	Human powered over 25km/h	800mm	60kg	<ul style="list-style-type: none"> ▪ Safety (e.g. crash avoidance, stability) ▪ Environment (e.g. emissions, noise) ▪ Congestion/Road network efficiency (e.g. vehicle dimensions, traffic impedance)

Note we proposed that, in order to use roads with a speed limit more than 50km/h, the PMD be capable of exceeding 25km/h by human power alone - the same as a pedelec. However this recommendation was subject to a wide range of safety performance requirements that are not included in the NTC discussion paper and so this category of PMD is not supported for the current situation.

Question 7 - What is an appropriate and safe maximum speed that PMDs should be permitted to travel across the various infrastructure

See the above table. We agree that 10km/h is appropriate for pedestrian areas and 25km/h under power for other road-related infrastructure. However we also recommend that a low-speed switch be required to limit speed to no more than 5km/h - intended for voluntary use in busy pedestrian areas.

Question 8 - Do you agree with the overall assessment that Option 3, Speed Approach 1 is the option that best balances mobility and safety?

Yes - provided that the safety issues raised above are considered.