



Transport Regulation
Office of Regulatory Services
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Submission on Segways

This submission addresses the questions posed in the Justice and Community Safety Directorate's February 2012 *Segway Review* paper.

1. What (if any) safety considerations for Segway users are relevant to deciding whether Segways should be able to be used on roads or road related areas in the ACT?

It is clear from the *Review Paper* that Segway users can suffer serious injuries.

Australian cars average about eight million kilometres between documented serious injuries¹. The CEVEQ study cited in the Discussion Paper found no documented serious injuries in more than 9,000 km of Segway riding. This result suggests that Segway riding is less than a thousand times more dangerous than car travel.

From any given speed, a Segway takes longer to stop than bicycle, and much longer than a car.

A Segway rider accelerates by transferring weight to the front of the standing platform, and brakes by transferring weight to the rear of the platform. The deceleration of braking causes weight transfer towards the front of the platform, which can cause the Segway to re-accelerate. Effective braking requires specific balancing skills.

The US Federal Highway Administration² found that Segway riders took an average of 1.97 seconds and 4.3 metres to make planned stops from 12.5 mph (20 km/h). This represents a deceleration of 2.8 metres per second per second (m/s/s).

For unplanned stops, Segway riders took an average of 2.8 seconds and 6.6 metres to stop from 12.5 mph. This represents a deceleration of 2 m/s/s.

By way of comparison, a bicycle can stop from 20 km/h in less than 3.5 metres, with a deceleration of 4.5 m/s/s³. A car can stop from 80 km/h in 25.2 metres⁴, a deceleration of ~~35~~ 9.8 m/s/s. [\[Corrected 29 June 2012 from previous erroneous estimate of 35 m/s/s\].](#)

¹ According to the *Australian Infrastructure Statistics Yearbook 2011*, Australian passenger cars provided 263.68 billion passenger kilometres of travel in 2007-08 and Australia's injury rate in 2007 was 155.56 per 100,000 population. This is 33,443 injuries for Australia's estimated 2007-08 population of 21,498,500 (ABS 3101.0, September 2011), or one injury per 7.9 million passenger kilometres.

² Federal Highway Administration (2004), *Characteristics of emerging road users and their safety*, U.S. Department of Transportation, Publication FHWA-HRT-04-103.



2. What (if any) safety considerations for other road users are relevant in deciding whether Segways should be used on roads or road related areas in the ACT?

Cycling is permitted on ACT footpaths, and so there is no strict legal distinction between footpaths and shared paths. Most footpaths are relatively narrow, but some “shared” paths are wide enough to safely accommodate both pedestrians and cyclists.

Segways are potentially more dangerous to pedestrians than are bicycles. The George Institute's 2011 *Pedal Study*⁵ found that 16% of bicycle crashes on shared paths involved pedestrians, and recommended the introduction of traffic controls such as speed limits.

For Segways on shared paths, the main safety considerations are their poorer braking ability (discussed under Question 1 above) and greater weight, compared with bicycles. A Segway weighs fifty kilograms, compared with eight to fifteen kilograms for a normal bicycle, or twenty to fifty kilograms for a motor-assisted bicycle.

For Segways on footpaths, the main safety considerations are their limited braking ability and greater speed and weight, compared with a pedestrian. A Segway with rider weighs 50 kilograms more than a pedestrian, and can travel at up to 20 km/h.

3. What (if any) particular safety requirements (e.g., training or wearing of helmets) should be imposed on Segway use on road or road related areas?

Segway riders should be required to undergo training sufficient to ensure that they represent minimal risk both to themselves and to other road users including pedestrians.

The Review Paper raises doubts about whether bicycle helmets provide Segway riders with adequate head protection. It may be appropriate to require Segway riders to wear motorcycle helmets.

³ Arundell, L, 2008, “Does moving back off the seat mean better braking?” Canberra Cyclist. Copies available from the author.

⁴ NRMA, 2007. *Kia Magentis EX-L Car Review*, <http://www.mynrma.com.au/motoring/reviews/car-reviews/kia/magentis-exl.htm>, accessed 13 April 2012.

⁵ De Rome, L, Boufous, S, Senserrick, T, Richardson C and Ivers R, 2011, *The Pedal Study: factors associated with bicycle crashes and injury severity in the ACT*, George Institute for Global Health, University of Sydney Medical School, Australian National University .



Consistent with the Australian Road Rules definition of “pedestrian⁶” Segways that can travel at more than 10 km/h should **not** be permitted on footpaths.

If a Segway rider at 10 km/h collides with a pedestrian, the Segway rider brings seven times as much potentially damaging kinetic energy to the collision as the pedestrian. At 20 km/h the Segway rider brings thirty times as much kinetic energy.

It is theoretically possible to impose a 10 km/h footpath speed limit on Segways. However, such a rule is unlikely to be policed more effectively than (for example) the rule that prohibits cycling across pedestrian crossings. That rule is observed by only 5% of cyclists.

If Segways that cannot exceed 10 km/h are permitted on footpaths, then it may be necessary to distinguish them from other Segways. This could be achieved through different coloured registration plates.

4. Would permitting Segway use in road or road related areas enhance transportation options available in the ACT without unreasonably interfering with the use of these areas by other users of roads and road related areas?

On the one hand, permitting Segway use will slightly broaden transportation options.

On the other hand, there is potential for reduction in transport options for non-Segway users, due to interference by Segways with pedestrians and/or cyclists, unless the use of Segways is adequately controlled.

5. Can you suggest ways in which any potential impact of Segways on other users of roads and road related areas may be mitigated?

See our response to Question 3 above.

6. Do you think that Segways are vehicles which should be exempt from the applicable vehicle safety standards in the ADRs that cannot be complied with? Why?

Segways should be subject to appropriate vehicle safety standards. This might require the development of new standards that are appropriate for Segways.

7. If you think Segways should be exempt from the vehicle standards, are there any vehicle standards that they should comply with?

n.a.

⁶ Australian Road Rule 18: *Who is a pedestrian*

A pedestrian includes:

(a) a person driving a motorised wheelchair that cannot travel at over 10 kilometres per hour (on level ground)...



8. For what purposes (if any) should Segway use be allowed - mobility assistance, transportation or recreational use?

There does not seem to be a strong argument to prefer any of these uses.

9. Should any groups be precluded from using Segways (for example, by application of an age limit or requirements as to fitness to operate or control the device)?

The physical operation of a Segway requires a person to have a certain size, weight and skill, though these requirements could change if different designs (e.g. child models) became available.

The Lake Burley Griffin Segway operators restrict Segway hire to people aged 12 and over, and to people who weigh from 45 to 120 kg. These limitations seem to be appropriate for the current Segway design.

10. Are the restrictions and conditions of the Road Transport (General) (Segway Exemption) Determination 2011 adequate to regulate the commercial use of Segways in the ACT? Should any particular items be removed or added?

Segways should be subject to the Road Rules in much the same way as are mopeds or motor-assisted bicycles.

Segways that are not capable of speeds in excess of 10 km/h could be treated under the Road Rules as pedestrians.

11. Do the tourism and local economic benefits of Segway commercialisation warrant allowing Segway commercialisation permanently in the ACT?

The Review Paper does not provide sufficient information to allow the tourism and local economic benefits of Segway commercialisation to be estimated.

We see no reason to object to permanent commercialisation of Segway use on private land in the ACT.

If commercial operation uses public areas, then Segway use should continue to be fully supervised and limited to 13 km/h (the lowest speed setting available on current Segways), and its safety and other impacts should be monitored.

12. What, if any, protective or high visibility gear should Segway riders be required to wear?

The information in the Review Paper suggests that bicycle helmets may not offer sufficient head protection. If that is the case, then it may be appropriate to require Segway riders to wear motorcycle helmets.

13. Would permitting use of Segways contribute to sustainable transport objectives?

There is potential for Segways to contribute to sustainable transport objectives, provided that their level of uptake exceeds their impact in discouraging other forms of sustainable transport.



14. Is the likely take up rate of Segways as an alternative to walking, cycling or driving, relevant to whether their use on roads and road related areas in the ACT should be legal?

No. Safety is the primary consideration .

15. Are there other benefits that justify allowing Segway use?

No comment.

13. Should individual Segway users be required to obtain vehicle registration for their Segway (which would require exemption from various ADRs)? What about the owners of commercial Segway ventures?

Any Segway that is capable of more than 10 km/h should be required to display a registration plate so that it can be identified, and so that authorities can contact the owner if the Segway is reported for dangerous behaviour.

A \$50 registration fee, such as is required for bike rack number plates, would be insignificant compared with the ten thousand dollar purchase price of a Segway.

14. Should individual Segway users be required to obtain insurance? What about the owners of commercial Segway ventures?

Individual and commercial Segway users should be required to hold insurance for injury caused to others. Commercial Segway ventures should also be required to hold insurance for injury to the people who use their Segways,

The cost of insurance would be proportional to risk. The cost of third party bicycle insurance is about \$20 per year. Bicycle organisations include this insurance in their membership fees.

15. Which implementation option is the most suitable for the ACT? Why?

There does not seem to be a strong reason to distinguish between commercial, individual and commercial-and-individual use.

16. Can you suggest any additional implementation options that have not been considered in this discussion paper?

No.

Leon Arundell
Convenor
13 April 2012