Royal Automobile Club of Victoria (RACV) Ltd

Report No. 16/02  Date October 2016  ISBN 978-0-9945666-0-7  Pages 27

Title
Assessment of new recreational transport devices

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Abstract
Recreational wheeled devices are growing in diversity and popularity, and with these trends, there are rising concerns about the safety of the users themselves and those around them. This study aims to provide an assessment and overview of the range of motorised recreational vehicles that are available in Victoria, how they impact on the safety of their users and other road users, and what actions or initiatives may be required to ensure their safe use. Currently, there are conflicting restrictions and limited enforcement towards these devices despite their comparatively high speed and lack of protection. The overall recommendations relate to communication of current regulations and safety advice for the community, removal of inconsistencies in regulations regarding recreational transport devices, and development of a clear definition of categories of motorised personal mobility devices and an appropriate legal framework.

Key Words
Motorised recreational transport devices, wheeled toys, road rules and regulations

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Executive Summary

ARRB Group was commissioned by RACV to assess motorised recreational devices available in Victoria, and the rules, regulations and safety implications surrounding them.

This report includes:

- a review of existing recreational devices available on the Victorian market
- a review of existing regulations both in Victoria, the rest of Australia and internationally
- a review of the safety implications of these devices including a literature review and consultation with councils, state road authorities, police, crash data collection agencies, and suppliers
- an assessment of the inconsistencies between regulations and safety implications and recommended future actions and initiatives.

The devices selected for further study include Segways, hoverboards, motorised unicycles, monkey bikes, electric roller skates and skateboards, motorised eskies, golf carts and motorised children’s toys. It was found that the power outputs of these devices were often substantial (up to 6 000 watts), top speeds were as high as 35 km/h, and very little guidance was given on weight restrictions, age restrictions or safety gear recommended/required.

The regulations for these devices in Victoria state that motorised devices with a power output of more than 200 watts or which can exceed 10 km/h are classified as ‘vehicles’, but as they do not reach the minimum requirement under the Australian Design Rules (Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005), they cannot be registered. The rules state that they can still be used on private land. Consultation with other states and territories has shown that other states are allowing the use of Segways and have not yet experienced any difficulties with this. Some councils, however, are having issues with monkey bikes and other devices in their jurisdiction.

The literature review revealed that Segways and motorised unicycles give the rider a higher centre of gravity, which means that if struck by a vehicle, they would sustain less head injuries than a pedestrian (similar to a cyclist). However, due to the speeds that these devices can achieve, there are concerns about pedestrian safety. Despite various differences in approaches both in Australia and internationally, there is very little information available regarding crashes and injuries sustained from these devices.

Recommendations

In anticipation of increased popularity of these devices, the following actions should be undertaken:

- RACV to advise members and the community of current regulations and issues regarding recreational devices, and to provide guidance on their safe and legal use.
- Victorian government to develop a clear definition of categories of motorised personal mobility devices (or other preferred terms) and an appropriate legal framework.
- Inconsistencies in regulations for non-motorised recreational devices need to be addressed.

Consideration also needs to be given to the following:

- development of an Australian/New Zealand Standard or equivalent document to define performance standards in relation to electrical or fuel safety, warning devices, lights and reflectors, speed control and limiting, braking, and human factors requirements
- development of regulations and advice to encourage the use of appropriate safety equipment and protective clothing
- consideration of training, test and licensing for riders, including age for solo riding in different settings
- consideration of registration and insurance arrangements
- consideration of enforcement arrangements and responsibilities
- conditions that should be attached to their use on different types of infrastructure.
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Assessment of new recreational transport devices
1.1 Background
Recreational wheeled devices are growing in diversity and popularity, and with these trends, there are rising concerns about the safety of the users themselves and those around them. Currently, there are conflicting restrictions and limited enforcement towards these devices despite their comparatively high speed and lack of protection.

There are a number of motor driven versions of recreational devices entering Victorian markets, including skateboards, scooters, roller skates, Segways and ride on eskies. With the changing shape of Australian cities and regional centres and the mounting interest in sustainable living, this is likely to become a growing issue in the future. An emerging trend is that fewer people will own cars and will be more likely to live closer to activity centres, making these different modes of transport more appealing for commuting and recreational trips.

ARRB Group was engaged by RACV to provide an assessment and overview of the range of recreational vehicles that are available in Victoria.

1.2 Aim and scope
The primary purpose of this report is to provide an assessment and overview of the range of recreational vehicles that are available in Victoria, and how they impact on the safety of their users and others using the road. The report also includes recommendations on the actions that could be taken to improve the safety of their use. This review considered the following:

- issues raised by different stakeholders – i.e. suppliers, police, VicRoads, the TAC and councils in inner metropolitan Melbourne
- the availability of injury rates and crash data involving recreational devices
- Victorian, interstate and international road regulations around these devices.
An inception meeting was held between the ARRB team and RACV representatives at the ARRB offices in Vermont South to agree on how many devices and which devices were to be selected and analysed. It was decided that all recreational devices that have at least one wheel and that were motorised would be included:

- personal mobility devices or electric scooters (e.g. Segways)
- self-balancing scooters (e.g. hoverboards or mini-Segway)
- any form of motorised/self-balancing unicycle, scooter, skateboard or roller skates
- motorised devices such as eskies
- motorised kids toys (e.g. mini-motorised cars)
- golf buggies.

This report does not include a review of any after-market devices that can be added to provide power to an otherwise non powered device (e.g. skateboard, park bench), and does not include electric bikes, dune buggies or quad bikes.

2.1 Review of Existing Recreational Devices

An exhaustive internet search of supplier websites, news sites and forum pages was conducted to gain an understanding of the types of devices available. This also enabled the team to determine the device specifications, such as speed, restrictions on sale (e.g. age) or use (e.g. helmet protection), and any known hazards associated with its operation. A profile was compiled for each device, as shown in Appendix A.

A selection of suppliers and importers to Victoria were contacted to gauge the quantities of these vehicle types that are entering the state, and to gain an understanding of how many types of devices may be currently in use.

2.2 Review of Existing Regulations

A comprehensive review of existing road regulations surrounding motorised and non motorised recreational devices in Victoria was undertaken. This included reviewing existing road rules, Australian design standards and import quality restrictions where possible. An assessment of other state and territory road authority regulations, as well as any international best practice or experiences was also conducted.

2.3 Review of Safety Implications of Recreational Devices

A literature review was undertaken to assess the safety implications of the selected recreational devices, in terms of the risks they pose to the user as well as other road users. Databases examined included the Australian Transport Index (ATRI), the Road Research Register (Australia) and Transportation Research Information Documentation (TRID) whose content is coordinated by ARRB Group, and the OECD/U.S. Transportation Research Board respectively.

Feedback was also sought from a number of sources, including VicRoads, Transport Accident Commission (TAC), the Victorian Injury Surveillance Unit, Victoria Police and a selection of local government agencies. Any crash data pertaining to the selected devices was sought from the Victorian crash database Road Crash Information System (RCIS) and other states and territories.

2.4 Assessment of Inconsistencies between Regulations and Safety Implications

Using the above approach, the ARRB project team was able to identify the major gaps in the current Victorian road regulations regarding the selected devices. One of these gaps was the need to set a maximum speed limit in keeping with Safe System principles\(^1\). This formed the basis for the future actions and initiatives recommended in Section 6.3 of this report.

\(^1\)Core to the Safe System approach is the recognition of human fallibility and the inability to tolerate violent force. This means managing vehicle speeds to minimise kinetic energy and the impact energy in the case of a crash.
3 Review of existing recreational devices

3.1 Internet Search
As a result of the internet search and consultation with RACV, the following devices were selected for further study:

- electric scooter (Segway)
- self balancing scooter (hoverboard or ‘mini Segway’)
- self balancing motorised unicycle
- monkey bike
- electric roller skates
- electric skateboard
- motorised eskies
- golf buggy/cart
- motorised children’s toys.

A description of each type of device, images and general characteristics (for example, popularity/uptake, power output, top speed, weight limit, age restrictions, registration requirements/legal conditions and safety instructions) has been provided in Appendix A.

A summary of the findings were as follows:

- Uptake levels and interest were fairly high for all devices with the exception of golf buggies. This is expected to have been inflated in the lead up to Christmas.
- Power outputs were often not provided, but generally were around 1,000 watts, but could go up to 6,000 watts.
- Top speeds of these devices range from 5–6 km/h for specific children’s toys, and up to 30 km/h for the majority of the devices studied. Some devices also have speed limiters. Golf buggies are limited to 35 km/h, but can be modified to 80 km/h.
- Weight limits were also often not given, and where applicable were always above 100 kg.
- Age restrictions were rarely given. For the children’s toys, there were ‘suggested’ age limits as low as 3 years of age (for the slower devices).
- The websites of providers for most devices did not provide any safety information or mention any safety gear required or recommended.

3.2 Feedback from Suppliers
A range of suppliers were contacted regarding the popularity, safety, legal use and range of devices available in Victoria and elsewhere in Australia. While attempts were made to contact as many suppliers as possible, only a few responded and provided information. Of those that responded, one was a monkey bike restorer, two hoverboard suppliers and two electric scooter suppliers. No suppliers of other types of device responded.

Monkey bikes
Information on the bikes, power and usage was provided. There was no clear indication on the level of uptake for these devices. The supplier, one of the few Australian based ones, indicated that the bikes, in original form, can be used by children for off road purposes and that since 2004, they can be registered for on road use in some Australian jurisdictions. The supplier does not provide information on the safe use or legislation regarding the use of monkey bikes.

For monkey bikes, the user forums were concerned with the safe use and registration requirements for the different jurisdictions. It was evident that they were mainly used off road rather than on road.
**Self balancing scooters (hoverboards)**

Two suppliers provided information on the safe use of the device, recommending the use of protective gear. In some cases, the devices are sold with complimentary safety gear. The suppliers also provide information on the legal use of the devices across Australia with links to different road rules for the respective jurisdictions. A detailed review indicated that suppliers were providing accurate and up-to-date information. At the time of contact, the suppliers indicated a high level of sales within Australia but could not provide a state by state breakdown. Following a number of recent fires and malfunctions with the batteries (which attracted wide attention), most of the Australian suppliers have added information on the batteries and compliance with Australian standards.

**Electric scooters (Segway)**

Two suppliers provided information on the safe use of the devices, complete with the rider instructions and recommendations for safety gear, which is available on their websites. One of the suppliers provides website links for the different manufacturers and the relevant jurisdiction regulations.

Due to the limited information from the suppliers, an additional assessment was undertaken of available online information on the different user boards with the aim of determining the uptake levels and the nature of the information that the users sought. From this assessment, it was apparent that self-balancing scooters were very popular across Australia with higher uptake levels for teenagers. Most of the questions posted online were regarding the legal use of the devices and regulations in Australia.
4 Review of existing regulations

4.1 Australia

The Australian Road Rules (National Transport Commission 2006) specify rules for motorists, motorcyclists, cyclists and pedestrians. In the Road Rules, wheeled recreational devices and wheeled toy users are treated as pedestrians. A wheeled recreational device is defined as a machine propelled by either the user or gravity. Examples of recreational devices include roller skates, roller blades, skateboards or scooters. This does not include motorised devices, such as motorised scooters, motorised skateboards and golf buggies. The rules also indicate that wheeled recreational devices cannot be used:

- beyond a ‘no wheeled recreational devices or toys’ sign
- on roads with a dividing line or median
- on roads with a speed limit over 50 km/h
- on one way roads with more than 1 lane.

Furthermore, the rules specify how the devices are to be used on footpaths and nature strips. In these settings, users must keep to the left side as much as possible, and must give way to other pedestrians. When used on a road they must not travel alongside more than one other pedestrian or vehicle travelling in the same direction, unless overtaking.

The rules require riders of motorised scooters to wear approved bicycle helmets. Motorised scooters are defined as devices with a floorboard supported by two or more wheels, designed for single person use, steered by a handlebar and propelled by one or more electric motors. The rules also specify a maximum combined power of 200 watts and a speed of no more than 10 km/h. The Australian Road Rules do not specify any regulations regarding the use of motorised recreational devices with the exception of motorised scooters with a power output below 200 watts (National Transport Commission 2006).

Motorised wheeled recreational devices with an output of more than 200 watts or which can exceed 10 km/h are classified as ‘vehicles’. Vehicles require registration, third party injury insurance cover and operation by a licenced driver/ rider. However, these devices do not meet the minimum requirements under the Australian Design Rules (Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005) e.g. fitting a vehicle identification plate or meeting minimum safety standards and therefore cannot be registered. This means that the use of these devices on public roads, parks, footpaths or nature strips is illegal and may lead to fines for operating an unregistered vehicle and/or operating a vehicle without a licence.

4.2 Victoria

The Victorian Road Safety Road Rules (VicRoads 2009) for wheeled recreational devices are similar to those in the Australian Road Rules. Similarities include the exclusion of wheeled recreational devices from separate bicycle lanes, but allowing them to be used on footpaths. Also, wheeled recreational devices cannot be used at night except to cross the road.

Motorised skateboards, scooters, roller skates or blades and monkey bikes cannot be used on footpaths, public roads or nature strips, but they can be used on private land.

Following a regulation amendment, the use of Segways on specified routes is permitted for commercial tour operators. The specific route, speed limiting and road rules are currently being considered for trial by VicRoads in selected Local Government Areas (LGAs). This is discussed further in Section 5.3.1.

Golf buggies/carts are designed mainly for use outside the public road system. They can be used on public roads for no more than 2km at a time in one direction and only for the purpose for which they were built (i.e. to or from a golf course). *(Content updated November 2017)*

The VicRoads website (2014) provides a summary of the Victorian Road Safety Road Rules, and also makes clear...
that motorised skateboards, roller skates or roller blades are not to be used on public roads, footpaths or nature strips, but can be used on private property. Table 4.1 provides a summary of the regulations in Victoria.

### Table 4.1: Device regulations in Victoria

<table>
<thead>
<tr>
<th>Device</th>
<th>Regulation</th>
<th>Safety equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segway</td>
<td>Can only be used on private property with property owner's approval. Devices can also be used on footpaths or predetermined routes with a commercial tour operator's licence.</td>
<td>The safety equipment requirements depend on individual tour operators.</td>
</tr>
<tr>
<td>Hoverboards</td>
<td>Can only be used on private property with property owner's approval, use on public roads, footpaths or nature strips is illegal and the rider is penalised for operating an unregistered vehicle and driving without a licence.</td>
<td>n/a</td>
</tr>
<tr>
<td>Motorised skateboards and roller skates</td>
<td>Can only be used on private property with property owner's approval, use on public roads, footpaths or nature strips is illegal and the rider is penalised for operating an unregistered vehicle and driving without a licence.</td>
<td>n/a</td>
</tr>
<tr>
<td>Motorised scooters</td>
<td>Devices with an electric motor with a maximum output exceeding 200 watts and a maximum speed over 10 km/h can only be used on private property with the property owner's approval. If the maximum output is below 200 watts and the maximum speed below 10 km/h, the device can be used on bicycle paths, footpaths or roads with a maximum speed limit of 50 km/h.</td>
<td>An Australian standards approved bicycle helmet. The device must be fitted with a warning bell. Reflectors and lights required for night time riding.</td>
</tr>
<tr>
<td>Motorised unicycle</td>
<td>Can only be used on private property with property owner's approval, use on public roads, footpaths or nature strips is illegal and driving without a licence.</td>
<td>n/a</td>
</tr>
<tr>
<td>Motorised eski</td>
<td>Can only be used on private property with property owner's approval, use on public roads, footpaths or nature strips is illegal and the rider is penalised for operating an unregistered vehicle and driving without a licence.</td>
<td>n/a</td>
</tr>
<tr>
<td>Golf buggy/cart</td>
<td>Can be used on public roads for no more than 2km at a time in one direction and only for the purpose for which they were built (i.e. to or from a golf course).</td>
<td>Devices must be fitted with brakes, a warning bell or horn and lighting.</td>
</tr>
<tr>
<td>Monkey bikes</td>
<td>Can only be used on private property with property owner's approval, use on public roads, footpaths or nature strips is illegal and the rider is penalised for operating an unregistered vehicle and driving without a licence.</td>
<td>n/a</td>
</tr>
<tr>
<td>Bicycle</td>
<td>Can be used on roads, road related areas, bike paths and lanes and on shared and separated footpaths. Adults cannot ride on the footpath unless they are accompanying a child under 12 years of age.</td>
<td>Devices must be fitted with a white light (front), red light (rear) and a rear reflector. The device must also be fitted with a warning bell and brakes. Riders are required to wear Australian Standard complying helmets.</td>
</tr>
<tr>
<td>Wheeled recreational devices (i.e. scooters, skateboards, roller skates and roller blades)</td>
<td>Can be used on public roads and road related areas. However, devices cannot be used on bike paths, divided roads (either dividing lines or median strips) nor on roads with speed limits over 50 km/h. Additionally, most of the devices (except for scooters), cannot be used on the road at night time.</td>
<td>n/a</td>
</tr>
<tr>
<td>Scooters</td>
<td>The rules for wheeled recreational devices apply to the use of scooters. Further rules regarding safety equipment also apply.</td>
<td>Riders are required to wear Australian Standard complying helmets. Devices must be fitted with a warning bell or horn and brakes. The device must also be fitted with a white light (front), red light (rear) and a rear reflector.</td>
</tr>
</tbody>
</table>
4.3 Australian Case Studies

4.3.1 Northern Territory

The rules for wheeled recreational devices and the definition of these devices in the Northern Territory are similar to the Australian Road Rules (NTC 2006).

Motorised recreational devices cannot be used on public roads, footpaths or nature strips and can only be used on private property. Any device with a power output of more than 200 watts is classified as a vehicle and therefore requires registration.

The Department of Transport (DoT) was contacted for further feedback and comment on the regulation and use of Segways, golf carts and other devices in the Northern Territory. Their response provided detailed information on Segways and golf carts, and some indications of progress with other recreational vehicles.

Segways

Segway use was legalised in May 2014 for all road users. The rules stipulate that riders must be 12 years and above, with supervision required for those between 12 and 15 years. They are not used on roadways; use is limited to footpaths and nature strips with a speed limit of 12 km/h. Segways must adhere to the normal rules when on a footpath/shared path; i.e. keep left and give way to pedestrians. There are requirements for fitting a warning device (bell or horn) and wearing an approved helmet. There is a further requirement for lights when the device is used at night. The rules also state that users are prohibited from carrying another person (DoT 2014).

Segways are currently exempt from registration, motor accident compensation, vehicle design standards and driver licensing requirements when ridden on a footpath or shared path. They may, however, be used on roads in specific circumstances:

- where there is an obstruction on the path, and the Segway travels less than 50 m on a road to avoid the obstruction
- where use is permitted by the relevant authority with control and management of the road, provided care is exercised.

Currently there have been no safety or compliance issues that have come to the attention of DoT or Northern Territory Police regarding Segway use. There are currently only one dealer/distributor and one tour operator within the Northern Territory that provides group tours on shared paths and walkways in some areas. Since 2015, it is estimated that the company has provided tours to 2,500 individuals; it is planning to expand operations to regional locations.

Northern Territory Police currently own and use six Segways, and have not reported any issues with these devices. The Police are exempt from the 12 km/h limit (when necessary).

Golf buggies/carts

Golf buggies are permitted for use on golf courses in the Northern Territory without registration or compulsory third party insurance requirements. They are only permitted for use on a golf course, a public street or area which intersects a golf course, or on a footpath/shared path running in or between parts of a golf course.

Drivers of golf buggies must hold a current driver’s licence, and use the vehicle in accordance with the manufacturer’s instructions. The Northern Territory Motor Vehicle Registry also recommends that golf buggy owners take out adequate insurance to cover any incidents (DoT 2014).

DoT is only aware of one safety or compliance issue with golf buggies. In November 2014, an individual was apprehended for driving a golf buggy on a private road whilst intoxicated. The individual was charged with drink driving, driving an unregistered and uninsured vehicle, and driving without lights on.

Other motorised devices

DoT has recently received more enquiries regarding motorised foot scooters recently as they have increased in popularity. The issue of motorised scooter use in public places is currently being considered in a related Austroads project, where the Northern Territory is a participating jurisdiction (see Section 5.2.3). This project may result in changes to the regulatory framework for these devices nationally, but until any national changes are adopted, the use of these devices in the Northern Territory will continue to be permitted on private property only, and not on roads, road related areas or in public areas.
4.3.2 Queensland

The road rules for wheeled recreational devices in Queensland are broadly similar to the Australian Road Rules. One difference is that a helmet is required when using motorised foot scooters. The definition for a motorised scooter is similar to that in the Australian Road Rules (Section 4.1). ‘Pocket rockets’ (or monkey bikes) are illegal on all public roads and roadides.

Segways

The use of Segways and ‘personal mobility devices’ has been open to individuals and tour operators across Queensland since August 2013. For a device to classify as a personal mobility device, it must (Queensland Government 2015):

— be designed for use by a single person only
— be self-balancing while in use
— be powered by an electric motor
— have 2-wheels that operate on a single axis
— have a control to limit speed to 12 km/h or less
— have a maximum speed of 20 km/h2
— have a maximum width of 850 mm
— have a maximum weight of 60 kg – when not carrying a person or load.

Under this definition, hoverboards are also classified as a wheeled recreational device.

Individuals do not require a commercial tour licence to operate these devices. The rules surrounding their use include footpath and nature strip use only (unless there is an obstruction), minimum rider age of 12, helmet wearing at all times, prohibition of mobile phone use, and adult supervision of riders aged 12–15. The device must also be fitted with a horn or bell (Queensland Government 2015).

Exemptions apply in Queensland to the Australian Design Rules (Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005) for Segways and other devices that fit the personal mobility device definition.

The City of Brisbane was contacted for their feedback on their experiences with the changes in Segway laws. Unfortunately, Council does not collect any information on the use of Segways. They are aware of limited use of Segways within the city, although this is mainly through commercial tour operators.

Golf buggies/carts

Similar to Victoria and the Northern Territory, conditional registration is required for golf buggies. However, this requirement applies to buggies that are operated away from the golf course, golf course parking lot or the road across from the golf course. Route restrictions and a maximum speed limit of 20 km/h apply for registered golf buggies.

4.4 Other States and Territories

4.4.1 Australian Capital Territory (ACT)

The ACT permits the use of Segways for licensed commercial tour operators (Justice and Community Safety Directorate 2012). The legislation permitting Segway use stipulates that the devices be speed limited to a maximum speed of 12 km/h and should be fitted with reflectors and warning devices. Furthermore, the legislation specifies a minimum age of 12 years, the use of bike helmets and a minimum height requirement. The height requirement specifies that the rider’s elbows should be the same height or higher than the handlebars. There is a predetermined route and area for Segway use and additional road rules such as prohibiting pushing or towing of devices across pedestrian crossings, prohibiting riding on a dividing strip or median and complying with pedestrian road rules also apply.

As with other jurisdictions, motorised scooters, roller skates and monkey bikes do not meet the minimum requirement for a vehicle and therefore cannot be used on roads, footpaths or nature strips. They can still be used on private property.

2The concern with maximum speeds arises from the fact that speed limiting can be overridden by changing the speed settings on the device controller or increasing the device tyre size (http://www.segway.com/media/1195/24010-00001_aa_se_um_en_usb_user-manual.pdf).

### 4.4.2 New South Wales (NSW)

Road rules for wheeled recreational devices in NSW are similar to the Australian Road Rules (NTC 2006). The definition of a wheeled recreational device is also similar to that of Victoria and in the Australian Road Rules, where motorised devices are not considered wheeled recreational devices.

In NSW, motorised wheeled recreational devices, regardless of output or speed, are classified as vehicles. Therefore, they require registration, licensing and third party insurance cover. As mentioned previously, these devices do not meet the minimum requirement under the Australian Design Rules and therefore cannot be registered, and this restricts their usage to private property.

The rules governing the use and registration of golf buggies are similar to those in Victoria. Their use is permitted on restricted routes and are speed limited to a maximum speed of 20 km/h.

### 4.4.3 South Australia

The rules for wheeled recreational devices and the definition of these devices is similar to the Australian Road Rules (NTC 2006).

The rules state that motorised wheeled recreational devices cannot be used on footpaths, public roads or nature strips and can only be used on private property. Segways are included in this definition and therefore it is considered illegal to use them outside of private property.

Golf buggies can be used around golf course grounds and car parks and to cross the road across the golf course. Additionally, the vehicle can only be driven by the owner or authorised individual and third part liability insurance is required. Any other use requires conditional registration.

Motorised wheeled recreational devices are classified similarly to NSW.

### 4.4.4 Tasmania

The rules for wheeled recreational devices and the definition of these devices is similar to the Australian Road Rules (NTC 2006). Furthermore, motorised scooters with a maximum power output of up to 200 watts can be used on footpaths, nature strips and public roads.

Segways can be used on public roads with a commercial tour operator licence, otherwise they can only be used on private property. In the case of tour operators, similar rules to those in Queensland apply; i.e. the device is speed-limited to 12 km/h and the user must wear a helmet, and be 12 years or older. Weight and height restrictions apply. Route and other rules are also stipulated.

Motorised wheeled recreational devices with an output of more than 200 watts (regardless of top speed) are classified as ‘vehicles’, but as stated previously, they do not meet the requirements of the Australian Design Rules (Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005).

### 4.4.5 Western Australia

The rules for wheeled recreational devices in Western Australia are similar to the Australian Road Rules (NTC 2006) and Australian Design Rules (Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005). Motorised wheeled recreational devices cannot be used on footpaths, nature strips or public roads. They can be used on private property.

### 4.5 International examples

#### 4.5.1 Europe

In Paris, Segways or electric scooters can be ridden on footpaths or bicycle paths. The devices are speed limited to 6 km/h and treated as pedestrians with the same road rules applying. They cannot be ridden on public roads, except in shared zones (Segway France n.d.).

In Germany, Segways are classified as electronic mobility aids. The legislation requires the device to be fitted with head and tail lights, rear and front reflectors, side reflectors, brakes and a warning bell or horn (Regulation on the participation of electronic mobility aids on the transport (mobility assistance regulation - MobHV) 2009 (in German)). The devices also need to be registered and insured. They can be used on bicycle lanes or paths and footpaths. The legislation also specifies that pedestrians have priority and requires Segway riders to use helmets.
Segways are classified as bicycles in Austria. The minimum age for riders is 12 years or 10 years for bicycle licence holders. The device can be used on public roads or bicycle lanes; they can only be used on footpaths where specified. For public road use, head and tail lights, reflectors and warning bells must be fitted. However, there is no helmet law (Segway Austria n.d).

The use of electric unicycles is legal in Switzerland. The devices must have a maximum power output of 2 000 W and maximum speed of 20 km/h. They need to be registered and insured, with a minimum age requirement of 16 years or 14 years with a licence. Similar legislation applies for Segways or electric scooters (Segway Switzerland n.d., the International Commission for Driver Testing 2008). The legislation applies to two types of Segways which are classified as small motorcycles. They can be used on roadways but are not permitted on footpaths or in pedestrian zones. The devices are fitted with head and tail lights, parking stands and a registration plate.

4.5.2 United States

Currently, the use of hoverboards on public roads, footpaths and nature strips within New York City is considered illegal and attracts a fine of $200 USD. Under the legislation, hoverboards are considered motor vehicles which cannot be registered or insured (New York Vehicle and Traffic Law Article 1 Section 125).

Although the use of hoverboards is legal in California, several restrictions apply. They are restricted to lower speed roads i.e. 35 mph or less (56 km/h or less) or bicycle lanes. Use is limited to riders aged 16 years and above and helmet wearing is required (Ehlers 2015). Fitting of safety equipment e.g. headlights, rear, front and side reflectors, helmets and speed limiting of the devices are also a requirement. However, the legislation does not address the use of hoverboards on the footpath, with local laws applying, e.g. riding on footpaths is illegal in San Francisco. As the legislation came into effect on 1 January 2016, information on local government regulations is not available.

4.5.3 United Kingdom

The use of hoverboards and Segways on public roads, footpaths and nature strips in the United Kingdom is considered illegal and they can only be used on private land with prior consent from the landowner (Department for Transport 2015). The legislation in the UK is similar to that in Australia, specifying that these devices cannot be defined as motor vehicles (and therefore cannot be registered) but cannot be classified as wheeled recreational devices due to the speed and power.

4.5.4 New Zealand

For New Zealand, motorised skateboards, roller skates, Segways and hoverboards are classified as vehicles. Therefore, they require registration and licensing. However, these devices do not meet the minimum safety requirements under the New Zealand Vehicle Classes and Standards and therefore cannot be registered. This means that the use of these devices on public roads, parks, footpaths or nature strips is illegal and leads to a fine for operating an unregistered vehicle and operating a vehicle without a licence (NZ Transport Agency 2016). Segway tours are available across New Zealand, however, regulatory information on this use is not available.
5 Review of safety implications of recreational devices

5.1 Crash data collection

5.1.1 Transport Accident Commission (TAC)
Data on crashes involving motorised recreational devices was sought from the TAC. However, they indicated that recreational device user crash data was classified under pedestrians in keeping with the Australian Design Rules (Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005). The code selected is determined by the direction of travel, angle and location of the crash, as done with any other pedestrian crash. There is no breakdown by motorised or non-motorised recreational device.

5.1.2 VicRoads crash database
Crashes involving recreational devices could not be identified in the VicRoads crash database as, similar to the TAC, these are classified as pedestrian crashes.

5.1.3 Victorian Injury Surveillance Unit (VISU)
Consultation with the Victorian Injury Surveillance Unit confirmed that it would not be feasible to collect crashes involving recreational vehicles, as it would require going back to the narrative section of the crash records to identify pedestrian crashes where there was specific mention of a particular device. It is also likely that this would be a very small sample of the total. They suggested that most of these incidents would probably occur off-road and would therefore not be recorded. Even those occurring on footpaths are unlikely to be perceived as reportable crashes, even if the person was willing to report the incident.

The main crash type of concern is recreational devices colliding with vulnerable road users, namely pedestrians. In theory, these crashes should not be reportable at all in jurisdictions which do not classify recreational devices as motor vehicles – only if a pedestrian is involved in a collision with a vehicle is the incident required to be reported. If these devices are classified as ‘pedestrians’, then a collision with a recreational device would simply be a ‘pedestrian-pedestrian’ crash only.

5.1.4 Institute of Safety, Compensation and Recovery Research (ISCRR)
ISCRR had similar comments to VISU. As ISCRR is the data hub for the TAC and WorkSafe datasets, it is unlikely that recreational vehicles will be covered in either of these datasets as they are often not considered ‘traffic accidents’ (unless it involves another vehicle, in which case a recreational vehicle user would be classified as a pedestrian) and it would be highly unlikely that incidents involving motorised recreational vehicles would occur in workplaces. There is no separate classification for these devices even if incidents involving them do appear in the records.

5.2 Literature Review
A literature review on the safe use and effects of the devices was undertaken as described in Section 2.3. Existing literature on the safety and operation of motorised recreational devices mainly focuses on Segways and similar devices.

5.2.1 Crashes and sustained injuries
Boniface et al. (2011) conducted a retrospective study of Segway-related injuries. The study involved 41 cases, 11 males and 30 females. All the 41 individuals received medical treatment, 10 were admitted in hospital, with 4 admitted into the ICU. Information on how the injuries were sustained was not provided.

Another study on the use of Segways on footpaths reported that the devices posed a higher crash and injury risk for other users (especially pedestrians) than the riders due to the speed and weight differences (Litman & Blair 2010). However, this was a qualitative report and no quantitative results were presented.

Xu et al. (2016) evaluated the safety of electric self-balancing scooters, specifically, electric unicycles and Segways. The safety concerns for the devices stem from the high speeds and manoeuvring abilities and speed differences. The study analysed device-vehicle conflicts, and injury risk factors. They identified rider height as a key factor in...
injury severity, placing the rider at particular risk of head injuries. Figure 5.1 shows the expected repercussions of a collision with a vehicle at 10 m/s (36 km/h) with a pedestrian, Segway rider, unicycle rider and cyclist. They also found that of the different groups tested, pedestrians were more likely to sustain head injuries from striking the engine bonnet (and thus receive higher levels of trauma), whereas the other devices were more likely to strike their head on the windshield due to their higher centres of gravity. Figure 5.2 shows that pedestrians also travel further when struck at any speed compared to a Segway or motorised unicycle.

**Figure 5.1**  
Impact speed

![Figure 5.1](image)

Source: Xu et al. (2016).

**Figure 5.2**  
Airborne flying distance as a result of impact speed (m/s) for Segway (doublewheel), unicycle (solowheel) and pedestrian

![Figure 5.2](image)

Source: Xu et al. (2016).
Ashurst and Wagner (2015) studied reported injury types following Segway incidents in the United States. The National Electronic Injury Surveillance System (NEISS) recorded 33 injuries under the term ‘Segway’ between 2009 and 2013. The average age of those injured was 46 years old, and 44% of the reported injuries had significant head trauma requiring intensive care admission. The paper concluded that although injuries involving recreational devices are most likely underreported, the trauma sustained in the incidents that had been reported was significant. No advice on countermeasures was provided.

The German Insurance Association (2009) evaluated the safety implications of Segways. As part of the study, they conducted two crash tests, a Segway rider against a stationary vehicle and a Segway rider against a stationary pedestrian. These tests are illustrated in Figure 5.3. The Segway vs. pedestrian crash test showed that a crash between a Segway travelling at 15 km/h and a stationary pedestrian leads to severe head injuries for both the rider and pedestrian. Pedestrians also experience serious lower leg injuries. The crash test involving a Segway travelling at 15 km/h and a stationary vehicle study showed that the Segway rider was likely to sustain neck injuries at that speed.

Ironically, the only reported death involving a recreational vehicle (specifically, a Segway) was the late owner of the Segway company himself, who died after he rode off a 30 foot cliff into water in the United Kingdom (Williams 2015).

5.2.2 Rider Behaviour

Miller et al. (2008) assessed the speed and clearing or passing distance of Segways on footpaths. The study was designed to discover how clearance distance for pedestrians and objects is related to speed. It involved 20 Segway riders, 10 novice and 10 experienced riders.

The study found that rider approach speeds ranged between 4.3 km/h and 10.9 km/h and that clearance distance ranged between 8.4 cm and 110 cm. Approach speeds were higher on wider footpaths than narrow
The study also found higher approach speeds for pedestrians relative to objects along the footpath. Overall, approach speed and passing distance differed by rider experience, with higher speeds for the experienced riders who were on average 3.1 km/h faster than novice riders.

Darmochwal and Topp (2006) assessed the use of Segways on public roads and footpaths in Germany. They investigated the speed, handling and manoeuvring, and safety of the devices. The considerations included determining the length of time required to feel safe on the device, interactions with other devices and road users and possible age restrictions on use. They found that users were riding comfortably and handling the devices well with three hours of practice or less. However, inexperienced riders tended to overreact in complex situations. After three months' riding experience, all participants reacted appropriately in complex situations and handled the devices safely. The braking tests found that stopping distance was longer for inexperienced riders, gradually falling with experience and increasing the safety margin. The study found that 15.4% of participants had trouble braking in the first round of the tests (inexperienced riders), with the proportion falling to 0.7% in the second round (more experienced).

During the study period, almost all participants reported minor abrasions during the learning period, with a smaller number (8 participants) reporting falls from the devices in a range of circumstances. The study recommended attaching rubber protection around the standing platform as a safety measure for other road users; this would reduce shin injuries in the case of a collision. Additionally, they recommended a minimum age of 15 years and the classification of Segways as electric personal assistive mobility devices, a classification that was, at the time of the study, not in place. They also recommended the devices be limited to walking speeds for use on footpaths, traffic calmed areas and in some cases, on bicycle lanes.

Castonguay and Binwa (2006) evaluated the use of Segways and other personal mobility devices (PMDs). The evaluation involved two stages: a driving/riding test in a controlled environment and a survey of users, and another driving/riding test in actual traffic conditions. The first evaluation involved 49 users and the second one 143 users across three different Canadian cities (St Jerome, Laval and Quebec City). The first phase found that the training period of 3.5 hours recommended by the manufacturer was sufficient for the safe use and handling of Segways. The user's age and helmet wearing also contributed to their safety, with safer handling and use for older riders and those wearing helmets. Overall, both the first and second phases of the study found that the users' perception of the device's safety and observed safe handling increased with continued use of the device.

Li and Ando (2013) provide a different perspective in the personal mobility device literature. Their study assessed public attitudes towards two-wheeled self-balancing devices in the City of Toyota, Japan. The study was based on a survey of 124 individuals before and after using the device. The participants were split into two equal groups, one group used the device while the other watched. Those who used the device operated it for 10 minutes before responding to the survey questions. The age and gender profiles in the treatment and comparison groups differed slightly with more males and younger respondents in the treatment group. However, these differences were not statistically significant.

The study found that use of the device improved the attitude towards future use for tourism and short trip purposes. Also, participants in the treatment group had a more positive attitude towards the device and its usefulness than the comparison group.

Dowling et al. (2015) investigated the use of a range of different motorised personal mobility devices in a campus setting (Macquarie University) which was large enough and busy enough to provide a realistic test of how people were likely to use the devices, the challenges they would face and how they would interact with pedestrians. The trial focussed on two types of devices, two wheelers and three-wheelers. Participants in the trial were given training then left to use the devices as they saw fit, journeys and speeds being recorded by a GPS unit fitted to each of the devices in the trial. Each type of device had its particular advantages and disadvantages. The two wheeled device was most effective in terms of flexibility and ability to negotiate pedestrian precincts and narrow paths. The three wheeler was more comfortable, but had significant difficulties negotiating past pedestrians on account of its width. The usability of both devices was limited by their weight, poor performance climbing gradients, lack of ease of carrying portability, and parking. The study recommended maximum speeds of 10 km/h on open footpaths and 5 km/h when pedestrians are present. Despite the limited nature of this trial and the atypical community in which it was held, it is of particular interest as it examines the practical usability of a range of devices, taking into account interactions with pedestrians.

### 5.2.3 Assessments of Rules/Regulations

The ACT Government (Justice and Community Safety Directorate 2012) summarised views from key stakeholders, available literature and data on the use of Segways across different jurisdictions. The report outlined different options for managing the use of Segways in the ACT. The key issue for discussion was the safety of these devices.
The study concluded that due to high risks for both the riders and other road users, Segways should not be used on public roads and that use should be limited to designated areas with few road crossings. The study also recommended helmet use, specifying maximum operating speeds (12 km/h), establishing designated routes and rider training. Furthermore, the use of safety devices, such as warning devices (e.g. horn or warning bells) and lighting, was recommended.

The Queensland Department of Transport and Main Roads (TMR) has been recently commissioned by Austroads (Project Number RS1978) to undertake an assessment on ‘Alternative Vehicles – Motorised Personal Transportation Devices’. The project manager reported that this project aims to develop a national policy framework for Personal Electric Transportation Devices (PETDs) to ensure that these devices are regulated consistently across Australia. The guiding principles around this project are:

1. Rules surrounding access to the road network should be consistent and clear.
2. PETDs should not unreasonably impose on the transport network.
3. PETDs should not negatively impact the safety of other road users.
4. Regulation should be flexible and not limit innovation.

The project will determine the scale of the problem, current regulatory framework, safety review, registration, insurance and licensing issues.

The literature review undertaken in this report highlights the emerging nature of the devices as there is limited quantified information on the use, safety and safe handling of the devices.

### 5.3 Feedback from Stakeholders

#### 5.3.1 VicRoads

According to VicRoads, the main issue with recreational devices is the classification. High and low speed devices and heavy and light weight devices are all considered in the same category. There needs to be a clear differentiation between these devices due to the damage they can cause to users and others. Additionally, while most of the devices can reach high speeds, there needs to be differentiation between devices that are capable of speed limiting and those that cannot be speed limited. For example, currently available models of electric skateboards cannot be speed limited and can reach speeds of up to 40 km/h while Segways and hoverboards can be speed limited to, for example, 12 km/h, even though they are capable of reaching speeds of up to 20 km/h. Additionally, route choice, pavement width, pedestrian volumes and surrounding environment should be taken into consideration.

VicRoads is currently undertaking a trial aimed at reviewing and amending existing regulations regarding Segway use for tour operators on the Port Melbourne foreshore. Council involvement is based on interest and support, and therefore the trial is being conducted in Port Phillip, Hobsons Bay and City of Greater Geelong.

#### 5.3.2 Victoria Police

The definition of motorised recreational devices as motor vehicles is one of the key issues facing Victoria Police. Under Victorian legislation, Segways, hoverboards, motorised skateboards, roller skates, motorised unicycles and other self balancing devices are classified as motor vehicles as they are propelled by an engine. Electric foot scooters with a maximum speed below 10 km/h are exempted from this classification. However, while posing a danger to pedestrians and riders alike, these devices are not as dangerous as other motor vehicles. Additionally, their classification as motor vehicles means they need to be registered, riders need to comply with all road rules and the rider needs to be licensed in order to operate the device.

The motor vehicle classification creates several enforcement issues, e.g. young riders can be penalised for underage driving, unlicensed driving and operating an unregistered vehicle. Furthermore, if a crash occurs on private property e.g. a hoverboard crash inside the house, in keeping with drink driving legislation, blood samples can be drawn from the rider who can then be prosecuted for drink driving, operating an unregistered vehicle and unlicensed driving. Enforcement is therefore on a case by case basis, taking into consideration other factors such as surrounding environment, the rider’s age and overall behaviour.

According to Victoria Police, there is knowledge of crashes involving these devices, but none has been officially reported to the police. However, there is a fatal monkey bike court case underway in Victoria at the moment. Victoria Police indicated that in the case of a crash, a rider is entitled to medical bills compensation from the TAC. They anticipate a reduction in crash underreporting as the public become aware of this fact.
Victoria Police, VicRoads, Department of Justice (DoJ) and the TAC identified the need to develop a policy and legislation framework for these devices. They are currently discussing legislating for risk and how the devices interact with other road users. As part of these discussions, the devices are now classified as personal mobility devices.

5.3.3 Local Government

A number of councils were contacted to provide feedback regarding recreational devices. They were asked to comment on whether they were aware of any current Victorian road rules for these devices, and what safety concerns they were facing. They were also asked to provide details on any strategies or ideas they may have regarding how to deal with these safety issues. The following two councils provided feedback.

City of Port Phillip

Their main concern is regarding pedestrian safety, as this is a priority for the council. In particular, Port Phillip is concerned about the combination of the presence of pedestrians, high device speeds and narrow footpaths. The main devices council have encountered include electric skateboards, hoverboards and motorised unicycles. These are often used on footpaths even though legislation prohibiting their use in these settings is clear. Although Port Phillip is aware of these devices being used within the municipality, there has been no effective policing of their usage.

Council feels that before any regulation changes can be made, specific routes and speed limits need to be in place. Port Phillip has been selected as one of the trial sites for the Segway tours project by VicRoads (Section 5.3.1).

City of Whitehorse

Council is aware of the use of these recreational devices on footpaths and in car parks. There are Council regulations which stipulate that the use of recreational devices should not damage property or endanger other road users. There is no explicit regulation on whether the devices can be used on public roads (which include footpaths, car parks and nature strips). They did not mention any particular safety concerns that they had.

A recent survey was conducted by Whitehorse Council of young road users (12 years and under) on their bicycle usage. It found that a considerable proportion also used electric scooters, motorised unicycles, hoverboards, Segways and monkey bikes.

Municipal Association of Victoria (MAV)

The MAV felt this was a timely project, as it addresses one of the key issues a number of councils have concerns with. For instance, the City of Banyule has specifically raised monkey bikes as a key problem in their area.
Discussion

It has been previously noted that there are a number of benefits to the use of recreational devices, including increased mobility and potential congestion reductions (Dowling et al. 2015). However, with the forever growing list of innovative devices, there needs to be clear guidance and regulations that ensure the safety of the user and other road users.

6.1 Assessment of Inconsistencies between Regulations and Safety Implications

There are noticeable inconsistencies in the Australian and Victorian road and design rules that cause conflicts and confusion over the use of recreational devices. As a result of the literature review and consultations covered in this report, the following points are of particular concern:

- The current Australian Road Rules (NTC 2006) do not specifically mention the use of motorised recreational devices. It is left up to the state road authorities to apply their own amendments to specify recreational device use on their roadways and in public areas. This means there is no consistency with the rules across the different states and territories.

- There appears to be confusion amongst the public over the rules around where these devices can be used. Due to the lack of consistency in the regulations across different jurisdictions, they are often not easy to comprehend. Regulations need to be clear, easily accessible and concise.

- There are no design standards or product quality enforcement for devices being sold on the Australian market.

- There have been numerous reported incidents of fire and property damage as a result of faulty manufacturing (particularly of hoverboards). There are also no regulatory design limitations on the speeds that these vehicles can achieve, with maximum speeds found to be as high as approximately 35 km/h.

- Although, in Victoria, motorised recreational vehicles are restricted to private properties only, there is little guidance on appropriate age restrictions when purchasing or using many of these devices.

- These devices are often classified as ‘vehicles’ in the Australian Design Rules (2005) due to their maximum speed and/or power output (unless jurisdictional amendments apply); however, when collecting crash data, users are defined as ‘pedestrians’. There needs to be clarification over what ‘mode’ these devices fall under (or potentially creating a new category altogether).

- There is generally no guidance on the use of safety gear or equipment that should be worn when using a recreational device and no enforcement of these or other requirements, such as speed. Although the studies on injuries sustained from these devices are limited, there are concerning incidents of significant injuries and head trauma is particularly prevalent.

6.2 Other Issues

Several other issues have arisen through the project, but which do not seem to have been explicitly considered by the various organisations consulted or by any of the literature or internet sources reviewed.

- Riding a personal mobility device places substantial demands on the rider, e.g. monitoring other road users, potentially uneven footpath surfaces, debris or slippery patches due to leaves, etc., and continual attention to balance. Until more is known about the relative demands in relation to other forms of transport, it would be advisable to prohibit mobile phone use and to require zero blood alcohol concentration while riding.

- Ensuring ergonomic design and consistency of control positions and operation are essential if these devices are to perform safely.

As of the 18 March 2016, Minister for Small Business and Assistant Treasurer, the Hon Kelly O’Dwyer has imposed an interim ban to prevent the supply of hoverboards that do not meet safety standards for batteries and related circuits. (http://kmo.ministers.treasury.gov.au/media-release/027-2016/)
• Regulation enforcement should involve both the police and local government officers as local government is likely to have to deal with most of the issues that arise from personal mobility device use. Furthermore, the devices represent an opportunity for local government in encouraging a wide range of locally based activities. If both local government and police are to have a role, then the same operating instructions and training on these issues can be applied.

• Although consideration has been given to the maximum speed permissible for devices which are allowed access to different parts of the road system, little consideration appears to have been given to appropriate operating speeds when large numbers of pedestrians are present (apart from the restriction on Segway speeds on Paris footpaths to 6 km/h discussed in Section 4.5.1 and the recommendation from Dowling et al. on p.18 for speeds of 5 km/h in the presence of large numbers of pedestrians). Nor does consideration seem to have been given to the point at which pedestrian density makes riding impractical or unsafe. Some suggestions for addressing these issues are included in Table 6.1.

6.3 Future Actions and Initiatives

In order for RACV to make an informed critique of any future suggested changes to the rules and regulations surrounding recreational vehicles, a framework has been suggested based on the findings in this report.

The greatest safety risks associated with a recreational device are the rider being hit by a vehicle, or the rider hitting another pedestrian. The findings of Xu et al. (2016) suggest that, due to the higher centre of gravity, recreational device users are at similar risk of injury as a cyclist when involved in a collision with a motor vehicle. Similarly, the range of injuries inflicted on pedestrians in collisions with motorised recreational devices would be similar to the injuries inflicted in pedestrian bicyclist collisions. These injuries would vary according to the relative movements of the participants (e.g. head on, from the rear, or side on) and the relative speed of the devices.

There should be a clear definition of what constitutes a ‘motorised recreational device’ (or other term adopted for official purposes), and its legal status clarified as a motor vehicle or the introduction of a new category. Classifying them as motor vehicles potentially involves creating a new set of design rules, a lengthy and expensive process, and it may be preferable to classify them as a new element in the traffic system.

If a new classification emerges, then an Australian/New Zealand Standard should be developed to ensure that the devices meet appropriate safety standards and are generally suitable for their intended use. In line with current practice, this standard should focus on performance standards and be aligned with any emerging international standards.

The items covered by the standards should include:

- electrical or fuel safety
- warning device (bell or horn)
- lights and reflectors
- steering and manoeuvrability
- accuracy and responsiveness of the speed control
- braking system
- speed limiting
- human factors considerations.

Regulations should be enacted to require the following behaviours from riders:

- wear an approved helmet at all times when using the device
- mobile phone use of any sort prohibited (including hands-free)
- zero blood alcohol concentration
- all riders must be at least 12 years old, and all riders aged less than 16 must be supervised by an adult.

Consideration should be given to the following:

- training, testing and licensing for riders, particularly if higher speed versions are approved for use on the roads
- registration and insurance requirements for personal recreational devices
- appropriate enforcement of regulations specified above.

Some consideration needs to be given as to specific conditions that should apply.
Table 6.1
Suggested conditions should access be given to recreational devices on certain paths/roads

<table>
<thead>
<tr>
<th>Access</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footpaths</td>
<td>• Devices shall be restricted to a 12 km/h speed limit (i.e. similar to a jogger).</td>
</tr>
<tr>
<td></td>
<td>• Devices must keep to the left of the footpath and give way to other pedestrians.</td>
</tr>
<tr>
<td></td>
<td>• Riders shall be restricted to a lower speed in the presence of large numbers of pedestrians (e.g. 5 km/h).</td>
</tr>
<tr>
<td></td>
<td>• Devices will be excluded from areas with high levels of pedestrian activity.</td>
</tr>
<tr>
<td>Shared paths</td>
<td>• Devices should be restricted to a 12 km/h speed limit.</td>
</tr>
<tr>
<td></td>
<td>• Devices must keep to the left of the footpath and give way to other pedestrians.</td>
</tr>
<tr>
<td>Separated paths</td>
<td>• Devices should be restricted to a 25 km/h speed limit.</td>
</tr>
<tr>
<td></td>
<td>• Devices should only be permitted on the bicycle side of the path.</td>
</tr>
<tr>
<td>Bicycle paths</td>
<td>• Devices should be restricted to a 25 km/h speed limit.</td>
</tr>
<tr>
<td>Roads</td>
<td>• Devices should be restricted to a 25 km/h speed limit.</td>
</tr>
<tr>
<td></td>
<td>• Devices should only travel on roads with permanent speed limits of 50 km/h or less, with no dividing line or median strip.</td>
</tr>
</tbody>
</table>

Considering the above, golf carts, due to their size, weight and speed output, should continue to be restricted to use only on golf courses, roads within the golf course grounds, intersecting roads and car parks. Currently, children's toys can be used on footpaths, nature strips and roads with a maximum speed limit of 50 km/h. Children's toys should therefore be restricted to use on private property (mainly due to the age of their users).

6.4 Recommendations

In anticipation of increased popularity of these devices, the following actions should be undertaken:

- RACV to advise members and the community of current regulations and issues on recreational devices, and provide guidance on their safe and legal use.
- Government to develop a clear definition of categories of motorised personal mobility devices (or other preferred terms) and an appropriate legal framework.
- Inconsistencies in regulations for non-motorised recreational devices need to be addressed.

Consideration also needs to give to the following:

- development of an Australian/New Zealand Standard or equivalent document to define performance standards in relation to electrical or fuel safety, warning devices, lights and reflectors, speed control and limiting, braking, and human factors requirements
- development of regulations and advice to encourage the use of appropriate safety equipment and protective clothing, along with training and manuals to ensure consistent enforcement
- training, testing and licensing for riders, including age for solo riding in different settings
- registration and insurance arrangements
- enforcement arrangements and responsibilities
- conditions that should be attached to their use on different types of infrastructure.
References


Darmochwal, A & Topp, H 2006, *Segway in public spaces: evaluation of the Saarland pilot trial with regard to the usage and compatibility and the road traffic regulatory handling of these special transport devices*, Institute of Mobility & Transport, Kaiserslautern University of Technology, Kaiserslautern, Germany.


German Insurance Association 2009, *Compact accident research: assessing the safety characteristics of the Segway*, Berlin, Germany, viewed 23 February 2016, <udv.de/download/file/fid/1475>.


Justice and Community Safety Directorate 2012, *Segway review: a review of Segway use and commercialisation in the Australian Capital Territory*, Justice and Community Safety, Canberra, ACT.


New York Vehicle and Traffic Law Article 1, Section 125.


Segway
(Source: http://www.ptrider.com.au/)
Segway: a two-wheeled motorised (battery powered) self-balancing device. It consists of two electric motors, platform, sensors, computer, steering frame and handlebar. The sensors detect the speed, direction, balance and overall pitch of the device. Furthermore, the backward and forward motions are determined by the rider.
Top speed: 20 km/h
Device weight: 45–55 kg
Device width/dimensions: 48×63.5 cm
User weight restrictions: minimum 45 kg, maximum 117 kg
Age restrictions: While different tour operators impose an age restriction (minimum age of 9 years), the user’s weight is a more important factor.
Price range: $5000–$7500
Power: 900 W motor each
Device has speed limiting capabilities
Safety information from suppliers: The manufacturers and suppliers include safety warnings in the product manual. These warnings indicate the risk of death and serious injury. Additionally, they emphasise the use of protective gear and speed limiting.
Road rules information from suppliers: One of the Australian suppliers provides information on the legal use of the devices.
**Self-balancing scooter (hoverboard)**
(Source: http://www.segioboard.com.au/)
Hoverboard (aka. Mini-Segway): Self-balancing, two-wheeled device with two electric motors. Turning and all movements are controlled by the rider.
Top speed: 20 km/h
Device weight: 10–12 kg
Device width/dimensions: 56×18×18 cm
User weight restrictions: minimum 20 kg, maximum 120 kg
Age restrictions: not all suppliers provide age details, however, a few of the suppliers recommend a minimum age of 6 years
Price range: $800–$1200
Power: 700 W with instant power of 2 000 W
Safety information from suppliers: most of the suppliers provide information on device use, brief instructions on how to operate the device and recommended safety equipment.
Road rules information from suppliers: suppliers generally recommend users check with local agencies regarding the legal use of devices on footpaths. Only a handful of suppliers outline the different regulations across Australian jurisdictions.

**Motorised unicycle**
(Source: http://www.solowheelaustralia.com/)
Motorised unicycle: Self-balancing device using a single wheel for forward and backward motion. Does not balance side to side. It consists of two metal foot rests either side of the wheel. Manoeuvring is controlled by the rider's movements.
Top speed: 20 km/h
Device weight: 12 kg
Device width/dimensions: 48×45×18 cm
User weight restrictions: maximum 120 kg
Age restrictions: no explicit age limit information available, however, supervision recommended for users under 14 years
Price range: $1500–$3000
Power: 800 W
Device can be speed limited
Safety information from suppliers: most of the suppliers provide information on the safe use of the device and the use of safety equipment.
Road rules information from suppliers: some of the websites provide links to the different rules across the Australian jurisdictions.
**Monkey bike (or mini bike)**
(Source: http://www.retrobikesaustralia.com/)

Monkey bike: a miniature motorcycle, about half the size of a standard motorcycle.

*Top speed:* top speeds vary by engine type. In most cases, engines are modified to high power.

- **Device weight:** 60 kg
- **Device width/dimensions:** 120 cm wheelbase
- **User weight restrictions:** n/a
- **Age restrictions:** n/a
- **Price range:** $1500–$4000
- **Power:** varies, from 49 cc engine to 150 cc engine
- **Safety information from suppliers:** n/a
- **Road rules information from suppliers:** n/a

**Electric roller skates**
(Source: http://shop.actonglobal.com/)

Electric roller skates: battery powered roller skates that strap on to the shoes. Most of the devices are propelled by a wireless remote control, however, a few remote free products are available.

*Top speed:* 19 km/h

- **Device weight:** 3.17 kg each
- **Device width/dimensions:** 26×24×23 cm
- **User weight restrictions:** maximum 113 kg
- **Age restrictions:** 16 years and above
- **Price range:** $500–$900
- **Power:** 55 W × 4
- **Safety information from suppliers:** n/a
- **Road rules information from suppliers:** n/a.
### Electric skateboard
(Source: http://www.evolveskateboards.com.au/)
Electric skateboard: a skateboard with an electric motor attached.

- **Top speed:** 38 km/h
- **Device weight:** ranges from 8–34 kg
- **Device width/dimensions:** varies from 102×30×14.5 cm to 112×54×25 cm, 73 cm wheelbase
- **User weight restrictions:** maximum 135 kg
- **Age restrictions:** different boards for age groups with minimum age of 5 years and supervision for riders under 15 years
- **Price range:** $800–$2000
- **Power:** 900 W to 2000 W

Most of the products have LED head and tail lights.
Safety information from suppliers: suppliers provide information on safe use of devices and the need for protective gear.
Road rules information from suppliers: some of the suppliers provide links to jurisdiction level legislation.

### Motorised eski
(Source: http://www.supercheapauto.com.au/)
Motorised eski: petrol powered four wheeled cooler with a steering handle bar. They have pedals or a footboard.

- **Top speed:** varies from 24 km/h to 35 km/h
- **Device weight:** 35.8 kg
- **Device width/dimensions:** 106×60×80 cm
- **User weight restrictions:** maximum 100 kg
- **Age restrictions:** n/a
- **Price range:** $600–$1000
- **Power:** 49 cc 4 stroke single cylinder motor (1 000 W–1 200 W)

Safety information from suppliers: suppliers provide safe use information.
Road rules information from suppliers: n/a

### Golf buggy/cart
(Source: http://www.batterygolf.com.au/)
Golf buggy: battery powered electric golf buggies.

- **Top speed:** 13.5 km/h
- **Device weight:** 129.4 kg
- **Device width/dimensions:** 125×73×100 cm
- **User weight restrictions:** 150 kg including golf clubs
- **Age restrictions:** n/a
- **Price range:** $4500–$6500
- **Power:** 900 W

Safety information from suppliers: n/a
Road rules information from suppliers: n/a
Kid’s motorised vehicles
(Source: http://www.elitetoys.com.au/)
Top speed: 5 km/h–8 km/h
Device weight: 10–20 kg
Device width/dimensions: 134×81×77 cm for cars, 117×40×70 cm for motorcycles and 112×57.5×82.5 cm mopeds
User weight restrictions: maximum 40 kg
User age restrictions: 2 to 7 years of age
Price range: $350–$650
Power: 30 W × 2
Safety information from suppliers: n/a
Road rules information from suppliers: n/a

Electric foot scooter (adult)
(Source: http://www.extremetoys.com.au/)
Electric foot scooter: battery powered foot scooter for adults
Top speed: 36 km/h
Device weight: 14–40 kg
Device width/dimensions: n/a
User weight restrictions: 100–120 kg
Age restrictions: 12 years and above
Price range: $600–$1300
Power: 400 W–1 000 W
Safety information from suppliers: n/a
Road rules information from suppliers: n/a
**Electric foot scooter (kids)**


Electric foot scooter: battery powered foot scooter for kids

- Top speed: 16–20 km/h
- Device weight: 13–20 kg
- Device width/dimensions: 83×41×91 cm
- User weight restrictions: 54–70 kg
- Age restrictions: 8 years and above
- Price range: $180–$300
- Power: 200 W–400 W

Safety information from suppliers: information on safety gear and safe use is provided

Road rules information from suppliers: n/a