Synthesis title:

Alternative Wheelers

Category: Other

Other Relevant Topics:

- Mobility Impaired (Drivers)
- Pedal Cyclists (Riders)
- Mobility Impaired (Riders)
- Buses, Minibuses & Coaches (Vehicles)
- Electric Vehicles (Vehicles)

Keywords:

Alternative wheelers, Other vehicles, Agricultural vehicles

About the Road Safety Observatory

The Road Safety Observatory aims to provide free and easy access to independent road safety research and information for anyone working in road safety and for members of the public. It provides summaries and reviews of research on a wide range of road safety issues, along with links to original road safety research reports.

The Road Safety Observatory was created as consultations with relevant parties uncovered a strong demand for easier access to road safety research and information in a format that can be understood by both the public and professionals. This is important for identifying the casualty reduction benefits of different interventions, covering engineering programmes on infrastructure and vehicles, educational material, enforcement and the development of new policy measures.

The Road Safety Observatory was designed and developed by an Independent Programme Board consisting of key road safety organisations, including:

- Department for Transport
- The Royal Society for the Prevention of Accidents (RoSPA)
- Road Safety GB
- Parliamentary Advisory Council for Transport Safety (PACTS)
- RoadSafe
- RAC Foundation

By bringing together many of the key road safety governmental and non-governmental organisations, the Observatory hopes to provide one coherent view of key road safety evidence.

The Observatory originally existed as a standalone website, but is now an information hub on the RoSPA website which we hope makes it easy for anyone to access comprehensive reviews of road safety topics.

All of the research reviews produced for the original Road Safety Observatory were submitted to an Evidence Review Panel (which was independent of the programme Board), which reviewed and approved all the research material before it was published to ensure that the Key Facts, Summaries and Research Findings truly reflected the messages in underlying research, including where there may have been contradictions. The Panel also ensured that the papers were free from bias and independent of Government policies or the policies of the individual organisations on the Programme Board.

The Programme Board is not liable for the content of these reviews. The reviews are intended to be free from bias and independent of Government policies and the policies of the individual organisations on the Programme Board. Therefore, they may not always represent the views of all the individual organisations that comprise the Programme Board.

Please be aware that the Road Safety Observatory is not currently being updated; the research and information you will read throughout this paper has not been updated since 2017. If you have any enquiries about the Road Safety Observatory or road safety in general, please contact **help@rospa.com** or call **0121 248 2000**.

How do I use this paper?

This paper consists of an extensive evidence review of key research and information around a key road safety topic. The paper is split into sections to make it easy to find the level of detail you require. The sections are as follows:

Key Facts	A small number of bullet points providing the key facts about the topic, extracted from the findings of the full research review.
Summary	A short discussion of the key aspects of the topic to be aware of, research findings from the review, and how any pertinent issues can be tackled.
Methodology	A description of how the review was put together, including the dates during which the research was compiled, the search terms used to find relevant research papers, and the selection criteria used.
Key Statistics	A range of the most important figures surrounding the topic.
Research Findings	A large number of summaries of key research findings, split into relevant subtopics.
References	A list of all the research reports on which the review has been based. It includes the title, author(s), date, methodology, objectives and key findings of each report, plus a hyperlink to the report itself on its external website.

The programme board would like to extend its warm thanks and appreciation to the many people who contributed to the development of the project, including the individuals and organisations who participated in the initial consultations in 2010.

Key facts

- ‘Alternative wheelers’ are defined for the purpose of this synthesis as any vehicle type that is not covered by the other road safety research syntheses on the Observatory.

With regards to the available statistics relating to ‘alternative wheelers’:

- In 2016 ‘other vehicles’ were involved in 52 fatal, 40 serious and 1,651 slight Road Traffic Incidents (RTIs) involving ‘other vehicles’. The ‘other vehicles’ code includes both motorised and non-motorised vehicles, including ridden horses, mobility scooters, and trams but agricultural vehicles.
- In 2016 there were 19 fatal, 128 serious and 380 slight RTIs involving agricultural vehicles on the public highway.

(RRCGB, DfT, 2017)

Summary

‘Alternative wheelers’ are defined for the purpose of this synthesis as any vehicle type that is not covered by any of the other road safety research syntheses.

In terms of road casualty statistics, Road Traffic Incidents (RTIs) involving alternative wheelers may fall into a number of different vehicle categories including pedal cycles, motorcycles, cars and other vehicles or agricultural vehicles. These categories can also be sub divided further in terms of the codes used on the STATS19 form used by the police to record the details of RTIs.

Specialised pedal cycles (such as recumbent cycles) can have a greater diversity in their operating characteristics which might make them unsuitable for use on a shared use cycle path. Planners should consider these types of pedal cycle when designing cycling infrastructure if demand is sufficient.

‘Other vehicles’ include various motor and non-motor vehicle types inducing emergency vehicles, such as ambulances and fire engines, quadbikes and refuse collection vehicles.

One of the greatest safety issues associated with refuse collection vehicles is reversing as it is difficult for drivers to have complete control of the road environment behind the vehicle. Reversing aids such as mirrors, CCTV cameras, high visibility warning lights, alarms and detectors and the use of reversing assistants (banksman) can help reduce RTIs involving refuse collection workers and the general public.

Electric Personal Assistive Mobility Devices (EPAMD), such as the Segway, have gained attention in recent years. These devices are not permitted on UK roads or pavements and can only be used on private land. A number of research articles are available which outline the benefits of such devices and their use in the United States.

In general there is a lack of research on the majority of vehicle types discussed in this synthesis. It is difficult to understand the number of RTIs involving each vehicle type discussed because the statistics are in most instances grouped together as ‘other vehicles’.

Methodology

This synthesis is concerned with 'Alternative Wheelers', 'Alterative Wheelers' are defined as any vehicle type that is not covered by any other synthesis on the Observatory. Some reference will be made to vehicle types mentioned elsewhere when a vehicle is different in some way i.e. a recumbent bicycle is coded as a pedal cycle when road casualty incidents are recorded by the police (STATS19 and Reported Road Casualties Great Britain) but can be associated with particular safety issues such as reduced sight lines which are not experienced by other pedal cyclists.

This synthesis was compiled during October – December 2012, and revised in May 2013. This synthesis was compiled during July 2012. In December 2017, statistics from Reported Road Casualties Great Britain were updated to Reported Road Casualties Great Britain 2016

A detailed description of the methodology used to produce this review is provided in the Methodology section of the Observatory website at http://www.roadsafetyobservatory.com/Introduction/Methods .

The steps taken to produce this synthesis are outlined below:

- **Identification of relevant research** – searches were carried out on pre-defined research (and data) repositories. As part of the initial search some additional information sources were also consulted, which included http://www.ingentaconnect.com and various project archives. Search terms used to identify relevant papers included, but were not limited to:
    - 'Alternative wheelers';
    - 'Other vehicles';
    - 'Three wheelers';
    - 'Quadbikes';
    - 'Quadricycles';
    - 'Tricycles';
    - 'Emergency vehicles';
    - 'Tractors';
    - 'Agricultural vehicles';
    - 'Construction vehicles';
    - 'Segway';
    - 'Refuse vehicles'; and,
    - 'Safety'.

  A total of 24 pieces of potentially relevant research were identified.

- **Initial review of research** – primarily involved sorting the research items based on key criteria, to ensure the most relevant and effective items went forward for inclusion in this synthesis. Key criteria included:
    - Relevance – whether the research focused on ‘Alternative Wheelers’ and the associated safety aspects.
    - Provenance – whether the research is relevant to drivers, road safety policies or road safety professionals in the UK. If the research did not originate in the UK the author and expert reviewer have applied a sense check to ensure that findings are potentially relevant and transferable to the UK.
    - Age – priority is given to the most up to date titles in the event of over-lap or contradiction.
    - Effectiveness – whether the research credibly proves (or disproves) the effectiveness of a particular ‘alternative wheelers’ initiative or intervention.

  Following the initial review, 12 pieces of research/policy document were taken forward to form the basis for this synthesis, 8 of which were published in the UK.
- **Detailed review of research** – key facts, figures and findings were extracted from the identified research to highlight pertinent road safety issues and interventions.
- **Compilation of Synthesis** – the output of the detailed review was analysed for commonality and a synthesis written in the agreed format. Note that the entire process from identifying research to compiling the synthesis was conducted in a time bound manner.
- **Review** – the draft synthesis was subjected to extensive review by a subject matter expert, proof reader and an independent Evidence Review Panel.

Key statistics

National road casualty statistics are reported each year in Reported Road Casualties Great Britain (RRCGB) and this report remains the single largest source of road traffic incident (RTI) data. The report is based primarily on STATS19 data which is collected by the police for each RTI, either at the scene or for those RTIs reported to the police within 30 days. The type of vehicle involved in an RTI is recorded, and 'Alternative wheelers' can be coded in a number of ways; the majority will be included in the 'other vehicles' statistics.

In certain RRCGB tables 'other vehicles' may also include buses and coaches and/or goods vehicles, as indicated in a footnote.

Three wheeled cars are included in car statistics and specialised pedal cycles are included in pedal cycle statistics.

STATS19

The STATS19 form is used by attending police officers to record all relevant details at RTIs. The same form is used to record RTIs reported to the police. The STATS20 document describes how to complete the STATS19 form and gives definitions for each "Type of Vehicle" code.

'Other vehicles'

The 'other vehicles' type code covers a number of different vehicle types including motorised and non-motorised vehicles. It should be noted that RTIs where vehicle type is not recorded are also included in the 'other vehicle' statistics.

- In 2016, the number of vehicles classified as "other vehicle" involved in a fatal RTI totalled 52. For serious and slight severity RTIs, the number of "other vehicles" involved totalled 40 and 1,651 respectively. (Note: these statistics do not include agricultural vehicles).
- In 2016, there were 19 fatal, 128 serious and 380 slight RTIs involving agricultural vehicles on public highways.

(DfT, 2017)

- In 2016, the road class distribution of casualties who were "other vehicle" occupants shows that 2,472 occurred on built-up roads, 1,522 occurred on non-built up roads and 415 occurred on motorways.

(DfT, 2017)

Agricultural vehicles

It should be noted that the agricultural vehicle code also includes construction vehicles such as diggers, mobile excavators and front dumpers and the following statistics relate to RTIs on the public highway only.

- In 2011, the number of agricultural vehicles involved in fatal RTIs totalled 21. For serious and slight severity RTIs, the number of agricultural vehicles involved totalled 111 and 389 respectively.
- In 2011, the number of casualties who were agricultural vehicle occupants was higher in the summer months of July – October (50 casualties) compared with 54 casualties spread across the rest of the year.

(Kilbey et al, 2012)

This review includes statistics from Reported Road Casualties Great Britain 2011, which were the latest available data when the review was written. More recent statistics are available in Reported Road Casualties Great Britain 2016.

Motor trikes

Three wheeled motorcycles are coded as motorcycles in STATS19 data. This means that it is not possible to specifically calculate the number of RTIs involving motor trikes.

Three wheeled cars

Three wheeled cars are coded as cars in STATS19 data. This means that it is not possible to specifically calculate the number of RTIs involving three wheeled cars.

Research findings

Summaries of key findings from several research reports are given below. Further details of the studies reviewed, including methodology and findings, and links to the reports, are given in the References section.

Specialised pedal cycles

Road safety issues related to standard pedal cycles are dealt with in the following syntheses:

- Pedal cyclists;
- Cycling infrastructure.

'RRCGB: notes, definitions, symbols and conventions' provides the following definition for pedal cycles:

- Pedal cycles include tandems, tricycles and toy cycles ridden on the carriageway. From 1983 the definition includes a small number of cycles and tricycles with battery assistance with a maximum speed of 15mph.

(DfT, nd)

Alternative pedal cycles (DfT, 2011a) include:

- Low step-through bikes;
- Standard tandems;
- Recumbent cycles (also known as 'crank forward' cycles);
- Trikes for one person;
- Trikes for two people allowing both riders to pedal;
- Trikes for two people where only one rider pedals;
- Handcycles; and,
- Quads.

- The results of a data collection event taking place on a shared use cycle path in the US confirmed the great diversity in the operating characteristics of various road and trail user types. The authors concluded that consideration should therefore be given to the following when designing cycle infrastructure:
  - Design Speed - Recumbent cyclists had the highest observed 85th percentile speeds of 18 mph, less than American Association of State Highway and Transportation Officials (AASHTO's) minimum design speed.
  - Horizontal Alignment - Most users did not reduce their speeds for turning radii greater than 16 m.

- Stopping Sight Distance - A recumbent cyclist in the 85th percentile requires a stopping sight distance of 32.7m on wet pavements, less than the AASHTO value.
- Vertical Alignment/Crest Vertical Curves - Recumbent bicyclists had a required length of a crest vertical curve of 46.7 m, less than the AASHTO value.
- Signal Clearance Intervals - Five-second clearance intervals would provide insufficient time for most users (85th percentile users) to clear a five-lane (18.3m wide) junction.

(FHWA, 2004)

Other vehicles

Other vehicles are types of vehicle not falling into any of the main categories (e.g. car, HGV). According to STATS20 (DfT, 2011b) examples are:

- Ambulances;
- Fire engines;
- Motor caravans;
- Quad bikes;
- Pedestrian controlled vehicles with a motor;
- Refuse vehicles;
- Road rollers;
- Mobile cranes;
- Tower wagons; and,
- Army tanks.

Also included are miscellaneous types of vehicles without a motor, other than pedal cycles. Examples are:

- Vehicles drawn by an animal;
- Invalid carriages that are self propelled without a motor; and,
- Pedestrian controlled vehicles without a motor which are normally used on the road (e.g. street barrows).

Emergency vehicles

Police vehicles are not specifically mentioned in the ‘other motor vehicles’ definition but can have safety concerns similar to those related to ambulances and fire engines. Other emergency vehicles which can use blue lights include: bomb disposal vehicles; mountain rescue vehicles; prison vehicles with escorts; coastguard vehicles; and, blood and organ donor vehicles. However, it should be noted that blue lights do not, in all cases, mean an exemption from speed limits.

- Police pursuits can be extremely dangerous to parties involved in the pursuit (police officers and suspected law violator) and the general public.

- Recent statistics and some high profile incidents in the United Kingdom have highlighted a rise in police-driver RTIs.
- In 2002 the UK Police Complaints Authority published a report investigating RTIs involving police vehicles. They reported that in the 9 months preceding the publication of the study there were 30 fatalities resulting from police pursuits. Compared with the 9 deaths that occurred in the 12-month period covering 1997–1998, this represents an increase of 344 per cent in police pursuit fatalities over a period of time during which road usage only increased by 4.7 per cent.
- There has been relatively little research undertaken on the behavioural factors that impinge on police driving with a view to reducing the number of RTIs.
- An eye movement and hazard perception study was conducted by Crundall et al (2003) using a driving simulator. Although police drivers did not report more hazards than the other participants (who belonged to either an 'aged matched' or 'novice' control group) reported, they had an increased frequency of electrodermal responses (response to stress or anxiety measured in the skin), a greater visual sampling rate and spread of search while viewing dangerous clips.
- However all drivers had a reduced spread of search in night-time pursuits because of the focusing of overt attention.
- Police drivers are generally more aware of their surroundings. The research has identified areas of concern regarding visual attention in prolonged hazardous situations and at night.

(Crundall et al, 2003)

In 2001 TRL assessed the effectiveness of vehicle designs, the potential for proposed changes in design, and identified areas where cost-effective safety improvements might be possible for other motor vehicles, including fire tenders and ambulances. Fatal RTIs which occurred between 1993 and 1995 were assessed.

- The database contained information on 11 RTIs involving emergency vehicles, 5 involving fire tenders and 6 involving ambulances. These RTIs resulted in 13 fatalities of which 11 were car occupants.
- 3 of the 5 RTIs involving fire tenders occurred when the fire tender was travelling through a red light; the cars were struck in the side.
- A system which sensed the approach of emergency vehicles on call and automatically changed traffic signals to give them priority would have avoided all of these RTIs.

(Knight, 2001)

Quadbikes

Recently there has been demand for mini motorbikes, quad bikes and other similar vehicles. Some of the bikes are capable of speeds in excess of 40mph. RoSPA has highlighted concerns that there is a lack of understanding regarding safety issues and recognised safe places to ride.

- Before buying mini-motorbikes and similar machines people should:
    - Check for local safe and legal riding places;
    - Be willing to transport the bike to and from such places; and,
    - Invest in appropriate safety equipment and training.

(RoSPA, 2010)

Refuse collection vehicles

One of the greatest safety issues associated with refuse collection vehicles (RCVs) is reversing as it is difficult for drivers to have complete visibility of the road environment behind the vehicle. Reversing aids such as mirrors, CCTV cameras, high visibility warning lights, alarms and detectors can help reduce RTIs involving refuse collection workers and the general public.

- Reversing causes a disproportionately large number of moving vehicle RTIs in the waste/recycling industry.
- Injuries to collection workers or members of the public by moving collection vehicles are typically severe or fatal.
- Unlike many other workplaces complete control often cannot be exercised over the environment during collection because of factors such as:
    - Street geography;
    - Street furniture;
    - Other vehicles;
    - Pedestrians; and,
    - Weather.
- People at risk of being struck by reversing vehicles include the following:
    - Loaders working at the vehicle;
    - Pedestrians, including:
        - Children (who might not understand the risks);
        - People with impaired sight and hearing (who might be unaware of the activity and its risks, or may not be able to avoid the moving vehicle);
        - People with limited mobility, (who may not be able to avoid the moving vehicle); and,
        - Other road users such as motorists, cyclists and horse riders who might unexpectedly appear during reversing operations.

- Examples of risk reduction measures include the following:
    - Liaison with householders and customers to re-locate waste and recycling collection points;
    - Use more appropriate vehicles;
    - Change collection methods;
    - Plan collection times, to avoid:
        - Busy times on major roads;
        - Shopping areas during opening hours;
        - School start and finish times; and,
        - Reversing into the direction of the sun.
- Wherever possible, risks can be reduced by eliminating reversing and reducing distances reversed. Many organisations have concluded that they will always use reversing assistants (banksman) unless it is not safe to do so.
- Drivers should have effective vision from the collection vehicle. The driver's direct vision through the windscreen (area swept by the wipers) should not be obstructed by items such as stickers, clothing, newspapers or additional equipment such as CCTV monitors.
- High-visibility warning lights/beacons should be fitted to the front and rear of RCVs and other vehicles that operate in a similar way.
- Reversing alarms should be fitted and be clearly audible at the side and rear of the vehicles.
- Reversing detectors can provide additional warning of objects or people entering the reversing zone.
- It is recommended that local authorities and waste management companies research and assess available products for best performance as technological advances have been rapid in this area.

(HSE, 2006)

Agricultural vehicles

According to STATS20 (DfT, 2011b) this category will include agricultural tractors (whether or not towing), mobile excavators and front dumpers.

Road rollers, mobile cranes, tower wagons and army tanks are categorised as other vehicles but are similar in nature to the construction vehicles coded as agricultural vehicles.

In 2001 TRL assessed the effectiveness of vehicle designs, the potential for proposed changes in design and identified areas where cost-effective safety improvements might be possible for other motor vehicles including agricultural vehicles. Fatal RTIs which occurred between 1993 and 1995 were assessed.

- According to STATS19 there were 195 fatal RTI involving at least one 'other motor vehicle' (OMV) between 1993 and 1995.
- Agricultural vehicles were by far the most common (41 RTIs) vehicle type.

- It would appear that agricultural tractors are considerably more hazardous for motorcyclists than other types of OMV.
- Fifty-nine per cent of all RTIs involving tractors occurred on an ‘A’ road, with a further 20 per cent on unclassified roads, 17 per cent on a ‘B’ road and 4 per cent on a ‘C’ road.
- Tractor usage is seasonal, therefore it would not be unreasonable to expect peaks for RTIs to follow seasonal use.
- Improving lighting and/or conspicuity such that agricultural vehicles are more readily identified in the dark, and direction signals are more easily seen was considered to have saved around one in five of the car occupant fatalities.
- Improving the side and rear visibility from the tractor such that overtaking cars might be more easily seen by the tractor driver is estimated to be capable of reducing car occupant fatality by ‘one or two’ over the study period.
- The use of seatbelts in tractors could have been of significant benefit in reducing injuries from fatal to serious.

(Knight, 2001)

Electric Personal Assistive Mobility Devices and other users of shared use cycle paths

Electric Personal Assistive Mobility Devices (EPAMDs), such as Segways, are becoming popular in the United States and some European countries. However, these devices are classed as motor vehicles in the UK and are not permitted to be used on pavements. However, they cannot be used on the road as they do not comply with road traffic law. Therefore their use in the UK is limited to private land, but only with the land owner’s permission.

Cycling infrastructure such as shared use cycle paths (pedal cycle and pedestrian use) are often referred to as non-motorised facilities or trails in the United States. A number of researchers have studied the implications of a more diverse range of users on these facilities.

- With the increasing variety of emerging users comes the question of whether the US is designing and building suitable facilities. Many jurisdictions throughout the United States have adopted the American Association of State Highway and Transportation Officials (AASHTO) Guide to the Development of Bicycle Facilities as a standard for shared use trail design and other facilities used by non-motorised travellers.
- The US Department of Transportation, Federal Highway Administration conducted data collection events involving 811 participants to better understand the physical dimensions and operational characteristics of an increasingly diverse group of trail and roadway users including:
    - Kick scooters;

    - Inline skates;
    - Hand cycles;
    - Recumbent bicycles;
    - EPAMD (e.g. Segway); and,
    - Mobility assistive devices (wheelchairs, powered wheelchairs and powered scooters).

- The results confirmed the great diversity in the operating characteristics of various road and trail user types. Therefore, consideration should be given to these alternative operating characteristics when designing cycle infrastructure. For example the 85th percentile inline skater had a 1.5 metre sweep width, which is wider than the AASHTO recommended width for bike lanes.
- These findings suggest that design guidelines may need to be revised to incorporate the needs of emerging trail users. The results of this study can be used to help professionals adequately design roadway and shared use path facilities to meet the operational and safety needs of this growing group of users.

(FHWA, 2004)

- Litman and Blair (2010) identified that there is an increasing variety of people using alternative modes (of transport) that are requesting permission to operate on non-motorised facilities (such as footpaths, cycle lanes, paths and trails), including Personal Mobility Devices (PMDs) small wheeled devices that provide personal mobility such as wheelchairs, skateboards and skates and Electric Personal Assistive Mobility Devices (EPAMDs) such as Segways.
- It can be difficult to categorise these devices since they have diverse features and uses.
- It is increasingly important for transport planners and public officials to decide how non-motorised facilities should be managed, including where and when specific modes and activities should be allowed, the rules each should follow, and how such rules should be promoted and enforced.
- Speed regulation is important for PMD facility management because space requirements and risk increase with speed.
- Effective education and enforcement are important for non-motorised facility management. Signs, brochures and maps can help educate users concerning how to share facilities, how non-motorised traffic rules are enforced, and how to report violations.

(Litman and Blair, 2010)

- In a pilot study conducted in a closed indoor track, technical tests demonstrated that in normal use situations, Segways were stable, operated quietly and smoothly, and gave users the feeling of being in control of the vehicle.

(Lavallée, 2004)

- Experimentation with Segways under actual operating conditions on public roadways involving 143 users, in 3 cities in Canada, was conducted in 2006. No incident or serious injury, nor any Segway/pedestrian RTIs or physical interference, was reported during the evaluation, where distances totalling more than 9,000 km were covered. The only incidents reported involved the user only. The frequency of such incidents may diminish as users gain driving experience.
- It was concluded that EPAMDs being driven on sidewalks, cycle paths and cycle lanes where speed is limited to 30mph will have little impact on user safety and still less on the safety of pedestrians, cyclists, motorists and other pedestrian route users.
- Sidewalks were the only type of pedestrian route where the acceptability of EPAMDs was at all in question. EPAMD traffic was found quite acceptable on cycle paths and roadway shoulders.

(Castonguay and Binwa, 2006)

Gaps in the research

In general there is a lack of research on the majority of vehicle types discussed in this synthesis. It is difficult to understand the number of RTIs involving each vehicle type discussed because the statistics are in most instances grouped together as ‘other vehicles’.

Due to the relatively small numbers of ‘alternative wheelers’ used there is very little robust evidence of safety issues regarding each vehicle type.

References

Title: Reported Road Casualties Great Britain: 2011 annual report
Author / organisation: P. Kilbey, D.Wilson, O. Beg, G. Goodman and A. Bhagat, Department for Transport (DfT) **Date:** 2012 **Format:** Pdf **Link:**https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/9280/rrcgb2011-complete.pdf **Free / priced:** Free
Objectives: This report delivers statistics relating to all Road Traffic Incidents (RTIs) reported to the police in Great Britain in 2011.
Methodology: Statistics are compiled from the STATS19 database of road traffic RTIs.
Key Findings • In 2011 there were 11 fatal, 74 serious and 260 slight RTIs involving pedestrians and one 'other vehicle'. • In 2011 there were 63 fatal, 407 serious and 2,245 slight RTIs involving 'other vehicles'. • In 2011 there were 21 fatal, 111 serious and 389 slight RTIs involving agricultural vehicles on the highway. • Three wheelers are included in car RTI statistics. • 'Other vehicles' are often included in the 'All vehicle' statistics which also include instances where vehicle type was not recorded. Where vehicle type is reported as 'other vehicle' this may also include instances where vehicle type was not recorded. • In 2011 reported casualties and casualty rates by month, road user type and severity show that agricultural vehicle casualty rates are higher in the months of August – October. • In 2011 reported casualties by built-up and non built-up roads and motorways, severity and road user type show that more RTIs involving other vehicles occur in built-up areas, few occur on motorways.
Themes: Road Traffic Incident, Statistics, Agricultural vehicles, 'Other vehicles'.
Comments: The national road casualty statistics remain the single largest source of RTI data but the 'other vehicles' category is not broken down into specific vehicle types such as ambulances. Agricultural vehicles are separated.

Title: Reported Road Casualties Great Britain: 2013 annual report

Author / organisation: Department for Transport (DfT)
Date: 2014
Format: Pdf
Link:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/359311/rrcgb-2013.pdf
Free / priced: Free

Objectives: This report delivers statistics relating to all Road Traffic Incidents (RTIs) reported to the police in Great Britain in 2013.

Methodology: Statistics are compiled from the STATS19 database of road traffic RTIs.

Key Findings

- In 2013 there were 2 fatal, 44 serious and 143 slight RTIs involving pedestrians and one 'other vehicle'.
- In 2013 there were 35 fatal, 265 serious and 1,262 slight RTIs involving 'other vehicles'.
- In 2013 there were 24 fatal, 123 serious and 411 slight RTIs involving agricultural vehicles on the highway.
- Three wheelers are included in car RTI statistics.
- 'Other vehicles' are often included in the 'All vehicle' statistics which also include instances where vehicle type was not recorded. Where vehicle type is reported as 'other vehicle' this may also include instances where vehicle type was not recorded.
- In 2013 reported casualties by built-up and non built-up roads and motorways, severity and road user type show that more RTIs involving other vehicles occur in built-up areas, few occur on motorways.

Themes: Road Traffic Incident, Statistics, Agricultural vehicles, 'Other vehicles'.

Comments: The national road casualty statistics remain the single largest source of RTI data but the 'other vehicles' category is not broken down into specific vehicle types such as ambulances. Agricultural vehicles are separated.

Title: Reported Road Casualties Great Britain: 2014 annual report

Author / organisation: Department for Transport (DfT)
Date: 2015
Format: Pdf
Link:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/463797/rrcgb-2014.pdf
Free / priced: Free

Objectives: This report delivers statistics relating to all Road Traffic Incidents (RTIs) reported to the police in Great Britain in 2014.

Methodology: Statistics are compiled from the STATS19 database of road traffic RTIs.

Key Findings

- In 2014 there were 8 fatal, 33 serious and 118 slight RTIs involving pedestrians and one 'other vehicle'.
- In 2014 there were 36 fatal, 261 serious and 1,329 slight RTIs involving 'other vehicles'.
- In 2014 there were 32 fatal, 111 serious and 436 slight RTIs involving agricultural vehicles on the highway.
- Three wheelers are included in car RTI statistics.
- 'Other vehicles' are often included in the 'All vehicle' statistics which also include instances where vehicle type was not recorded. Where vehicle type is reported as 'other vehicle' this may also include instances where vehicle type was not recorded.
- In 2014 reported casualties by built-up and non built-up roads and motorways, severity and road user type show that more RTIs involving other vehicles occur in built-up areas, few occur on motorways.

Themes: Road Traffic Incident, Statistics, Agricultural vehicles, 'Other vehicles'.

Comments: The national road casualty statistics remain the single largest source of RTI data but the 'other vehicles' category is not broken down into specific vehicle types such as ambulances. Agricultural vehicles are separated.

Title: Reported Road Casualties in Great Britain: notes, definitions, symbols and conventions
Author / organisation: DfT **Date:**[no date] **Link:** http://assets.dft.gov.uk/statistics/series/road-accidents-and-safety/reported-road-casualties-gb-notes-definitions.pdf **Free / priced:** Free
Objectives: Provide additional notes, definitions, symbols and convention information for readers of Road Casualties Great Britain reports.
Methodology: N/A
Key Findings: • Agricultural vehicles: Mainly comprise agricultural tractors (whether or not towing) but also includes mobile excavators**.** • Motorcycles: Two-wheeled motor vehicles, including mopeds, motor scooters and motor cycle combinations. • Other vehicles: Other vehicles included ambulance, fire engines, trams, refuse vehicles, road rollers, agricultural vehicles, excavators, mobile cranes, mobility scooters and motorised wheelchairs, except where otherwise stated. Also included are non motorised vehicles include those drawn by an animal, ridden horse, wheelchairs without a motor, street barrows, except where otherwise stated. • In certain tables 'other vehicles' may also include buses and coaches and/or goods vehicles, as indicated in a footnote. • Pedal cycles: includes tandems, tricycles and toy cycles ridden on the carriageway. From 1983 the definition includes a small number of cycles and tricycles with battery assistance with a maximum speed of 15mph.
Themes: Road Casualties, Great Britain, STATS19, Definitions.
Comments: This is not a research article but defines 'other vehicles'.

Title: Delivering Inclusive Cycle Training: A Good Practice Guide for Disability Cycle Training

Author / organisation: DfT
Date:2011a
Format: Pdf
Link: http://www.dft.gov.uk/bikeability/download/77
Free / priced: Free

Objectives: This Guide aims to ensure that cycle training for both children and adults is inclusive, by equipping instructors, and in particular new instructors, with the knowledge, confidence and potential strategies they might need to deliver effective cycle training to disabled people.

Methodology: Good practice guide.

Key Findings:

- Some people will require a cycle that is designed specifically to meet their needs. There is an extensive range of cycles on the market, encompassing bicycles, trikes and quads in various forms. Many of these cycles are foot pedalled in a similar way to a conventional bike, although hand propelled cycles are also popular.
- A summary of the types of cycles available for purchase, and in many cases for hire, is provided below. It should be noted that the list is by no means exhaustive but is intended to give an indication of the type of models available; and that there are many different manufacturers producing models similar to those below:
    - Low step-through bikes;
    - 'Standard tandems';
    - Semi recumbent cycles (also known as 'crank forward' cycles);
    - Trikes for one person;
    - Trikes for two people allowing both riders to pedal;
    - Trikes for two people where only one rider pedals;
    - Hand cycles; and,
    - Quads.

Themes: Bicycle, Trikes, Quads, Disability.

Comments: This is not a research article but highlights the different kinds of pedal cycle available. The good practice guide does not specifically discuss the safety implications of specialised pedal cycles using existing cycling infrastructure which is primarily designed for conventional pedal cycles.

Title: Characteristics of Emerging Road and Trail Users and Their Safety

Author / organisation: US Department of Transportation, Federal Highway Administration (FHWA)
Date: 2004 **Format:** Pdf
Link: http://www.fhwa.dot.gov/publications/research/safety/04103/04103.pdf
Free / priced: Free

Objectives: To better understand the physical dimensions and operational characteristics of an increasingly diverse group of non-motorised trail and roadway users.

Methodology: Three "Ride for Science" data collection events were conducted to obtain the physical dimensions, turning capabilities, lateral operating space, acceleration, speed, and stopping sight distance of trail users. A total of 811 participants were observed at the three events.

Key Findings:

- With the increasing variety of emerging users comes the question of whether the US are designing and building suitable facilities. Many jurisdictions throughout the United States have adopted the American Association of State Highway and Transportation Officials (AASHTO) Guide to the Development of Bicycle Facilities as a standard for shared use trail design and other facilities used by non-motorised travellers.
- The results confirmed the great diversity in the operating characteristics of various road and trail user types including:
  - Sweep Width - The 85th percentile inline skater had a 1.5 metre sweep width, wider than the AASHTO recommended width for bike lanes.
  - Design Speed - Recumbent cyclists had the highest observed 85th percentile speeds of 18 mph, less than AASHTO's minimum design speed.
  - Horizontal Alignment - Most users did not reduce their speeds for turning radii greater than 16 m.
  - Stopping Sight Distance - A recumbent cyclist in the 85th percentile requires a stopping sight distance of 32.7m on wet pavement, less than the AASHTO value.
  - Vertical Alignment/Crest Vertical Curves - Recumbent bicyclists had a required length of a crest vertical curve of 46.7 m, less than the AASHTO value.
  - Signal Clearance Intervals - Five-second clearance intervals would provide insufficient time for most users (85th percentile users) to clear a five-lane (18.3m wide) junction.
  - Characteristics of electric personal transporter devices (for example Segway) Users - Many characteristics of electric personal transporter devices users were comparable with those of other emerging trail users.
- These findings suggest that design guidelines may need to be revised to incorporate the needs of emerging trail users. The results of this study can be used to help design professionals adequately design roadway and shared use path facilities to meet the operational and safety needs of this growing group of users.

Themes: Design, User types, New technologies.

Comments: Although from the US, this research could potentially be relevant to the UK.

Title: Instructions for the Completion of Road Accidents Reports from non-CRASH Sources (STATS20)

Author / organisation: Department for Transport
Date: 2011b
Format: Pdf
Link:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48824/stats20-2011.pdf
Free / priced: Free

Objectives: Provide instructions to complete the STATS19 form.

Methodology: The STATS20 manual provides a detailed explanation of the information which needs to be collected on the STATS19 form, collected by a Police Officer when an injury road accident is reported to them.

Key Findings:

- Type of vehicle – Codes relevant to the 'Alternative Wheelers' road safety synthesis:
  - 01. Pedal cycle
  - 17. Agricultural vehicle (includes diggers etc.)
  - 18. Tram/Light rail
  - 90. Other vehicle
- Code 90 should be accompanied by a description of the vehicle type.
- Motorcycle includes mopeds, motor scooters, motorcycle combinations and three wheeled motorcycles. "Quad bikes" should be coded 90.
- Car: includes three wheeled cars, estate cars, family vans/multi-people carriers, Land Rovers and similar four-wheel drive vehicles.
- Agricultural vehicles (includes diggers etc.): This category will mainly include agricultural tractors (whether or not towing), mobile excavators and front dumpers.
- Other vehicles are types of vehicle not falling into any of the main categories. Examples are ambulances, fire engines, motor caravans, quad bikes, pedestrian controlled vehicles with a motor, refuse vehicles, road rollers, mobile cranes, tower wagons and army tanks. Also included are miscellaneous types of vehicles without a motor, other than pedal cycles. Examples are vehicles drawn by an animal, invalid carriages that are self propelled without a motor, and pedestrian controlled vehicles without a motor which are normally used on the road (e.g. street barrows). Vehicles which are normally on the pavement, such as prams, should not be recorded as vehicles nor should led horses. Toy cars and toy tricycles on the pavement should not be recorded, their riders being classified as pedestrians.

Themes: 'Other vehicles', Definitions.

Comments: Descriptive document which defines 'Other vehicles'.

Title: Eye Movements and Hazard Perception in Police Pursuit and Emergency Response Driving

Author / organisation: D. Crundall, P. Chapman, N. Phelps, and G. Underwood, University of Nottingham
J. Experimental Psychology: Applied, Volume 9, No. 3.
Date: 2003
Format: Pdf
Link:
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.128.7036&rep=rep1&type=pdf
Free / priced: Free

Objectives: To compare the hazard ratings, eye movements, and physiological responses of police drivers with novice and with age-matched control drivers.

Methodology: This study compared the hazard ratings, eye movements, and physiological responses of police drivers with novice and with age-matched control drivers while viewing video clips of driving taken from police vehicles. The clips included pursuits, emergency responses, and control drives.

Key Findings:

- Police pursuit driving has previously been defined as “an active attempt by a law enforcement officer operating a motor vehicle with emergency equipment to apprehend a suspected law violator in a motor vehicle, when the driver of the vehicle in question attempts to avoid apprehension” (Alpert, 1987, p. 299).
- This activity can be extremely dangerous to both parties involved in the pursuit and the general public.
- Recent statistics and some high profile incidents in the United Kingdom have highlighted a rise in police-driver RTIs.
- Sir Alistair Graham, chairman of the U.K. Police Complaints Authority, recently commented on a 178 per cent increase in fatalities involving police pursuits, which he described as “totally unacceptable. . . . Police forces must take urgent steps to meet the rising tide of public concern” (Police Complaints Authority,2001, p. 3).
- In 2002 the U.K. Police Complaints Authority published a report investigating road traffic RTIs involving police vehicles. They reported that in the 9months preceding the publication of the study there were 30fatalities resulting from police pursuits. Compared with the nine deaths that occurred in the 12-month period covering 1997–1998,this represents an increase of 344 per cent in police pursuit fatalities over a period of time during which road usage only increased by 4.7 per cent.
- There has been relatively little research undertaken on the behavioural factors that impinge on police driving with a view to reducing the number of RTIs.

• Although police drivers did not report more hazards than the other participants reported, they had an increased frequency of electrodermal responses (response to stress or anxiety measured in the skin) while viewing dangerous clips and a greater visual sampling rate and spread of search. • However, despite an overall police advantage in movement of their eyes and physiological measures, all drivers had a reduced spread of search in night time pursuits because of the focusing of overt attention. • Police drivers are generally more aware of their surroundings. • The present research has identified areas of concern regarding visual attention in prolonged hazardous situations, and future research must assess the implications of these findings for the safety of police drivers, the general public, and anywhere else it is possible to attempt to reduce any related risk.
Themes: Hazard perception, Police pursuit, Emergency response driving.
Comments: This research is concerned with video-based driving experience, real world testing was not used in this case.

Title: A review of fatal accidents involving agricultural vehicles or other commercial vehicles not classified as a goods vehicle 1993 to 1995

Author / organisation: I. Knight, TRL (TRL report TRL498)
Date: 2001
Format: Pdf
Link: https://trl.co.uk/reports/TRL498
Free / priced: Free

Objectives: The programme of research aims to assess the effectiveness of current vehicle designs, the potential for proposed changes in design and to identify areas where cost-effective safety improvements might be possible.

Methodology: Analysis of STATS19 data, concentrating on accidents involving agricultural vehicles, emergency vehicles, and electric vehicles.

Key Findings:

- The database contained information on 11 RTIs involving emergency vehicles, 5 involving fire tenders and 6 involving ambulances. These RTIs resulted in 13 fatalities of which 11 were car occupants.
- 3 of the 5 RTIs involving fire tenders occurred when the fire tender was travelling through a red light, the cars were struck in the side.
- A system which sensed the approach of emergency vehicles on call and automatically changed traffic signals to give them priority would have avoided all of these RTIs.
- According to STATS19 there were 195 fatal RTI involving at least one 'other motor vehicle' (OMV) between 1993 and 1995.
- Agricultural vehicles were by far the most common (41 RTIs) vehicle type.
- It would appear that agricultural tractors are considerably more hazardous for motorcyclists than other types of OMV.
- Fifty-nine per cent of all RTIs involving tractors occurred on an 'A' road, with a further 20 per cent on unclassified roads, 17 per cent on a 'B' road and 4 per cent on a 'C' road.
- Tractor usage is seasonal, therefore it would not be unreasonable to expect peaks for RTIs to follow seasonal use.
- Improving lighting and/or conspicuity such that agricultural vehicles are more readily identified in the dark, and direction signals are more easily seen was considered to have saved around one in five of the car occupant fatalities.
- Improving the side and rear visibility from the tractor such that overtaking cars might be more easily seen by the tractor driver is estimated to be capable of reducing car occupant fatality by 'one or two' over the study period.
- The use of seatbelts in tractors could have been of significant benefit in reducing injuries from fatal to serious.

Themes: Agricultural vehicles, electric vehicles, emergency vehicles, STATS19.

Comments:

Title: What do I need to consider when buying a mini-motorbike or quad bike?

Author / organisation: RoSPA
Date:2010
Format: Webpage
Link: http://www.rospa.com/faqs/detail.aspx?faq=310
Free / priced: Free

Objectives: Provide advice to parents.

Methodology: Provides information and links to other websites that provide additional advice.

Key Findings:

- There has been a big demand for mini motorbikes, quad bikes and powered scooters, particularly from children. People may be buying them without fully understanding the safety implications.
- Some of the bikes are relatively inexpensive but can travel in excess of 40mph. Mini-motorbikes and quad bikes are often illegal for road use and can only be ridden on private land with the landowner's permission. A major problem is finding somewhere that they can be used without putting the rider and other people in danger.
- Children may tell parents they will push the bike to their chosen riding spot, but invariably once away from parental supervision they will ride them there. Ideally children need to go to a course or properly organised club where they can be trained and enjoy riding rather than risk breaking the law and being injured. RoSPA is concerned that there is a lack of recognised safe places to ride.
- Before buying mini-motorbikes and similar machines people should:
    - Check for local safe and legal riding places
    - Be willing to transport the bike to and from such places
    - Invest in appropriate safety equipment and training. There is a network of clubs across the UK which can offer training and safe riding opportunities.

Themes: Mini-motorbike, Quad bike, Road use, Safety equipment.

Comments: This is not a research article, but it outlines a few safety concerns associated with the use of mini-motorbikes and quad bikes. It does not contain any specific information about which types of vehicles are road legal.

Title: Waste and recycling vehicles in street collection

Author / organisation: Health and Safety Executive (HSE)
Date: 2006
Format: Pdf
Link: www.hse.gov.uk/pubns/waste04.pdf
Free / priced: Free

Objectives: Provide examples of good practice

Methodology: Good practice guide outlining both vehicle issues and activities in public access areas (e.g. street collection, car parks)

Key Findings:

- Reversing causes a disproportionately large number of moving vehicle RTIs in the waste/recycling industry. Injuries to collection workers or members of the public by moving collection vehicles are typically severe or fatal.
- Unlike many other workplaces complete visibility often cannot be exercised over the environment during collection because of factors such as:
    - street geography;
    - street furniture;
    - other vehicles;
    - pedestrians; and
    - weather.
- People at risk of being struck by reversing vehicles include the following:
    - loaders working at the vehicle;
    - pedestrians, including:
        - children (who might not understand the risks); and
        - people with impaired sight, hearing, or limited mobility, (who might be unaware of the activity and its risks, or may not be able to avoid the moving vehicle); and
        - other road users such as motorists, cyclists and horse riders who might unexpectedly appear during reversing operations.
- Wherever possible you should control the risks by eliminating reversing and reducing distances reversed.
- Examples of risk reduction measures include the following:
    - Liaise with householders and customers to re-locate waste and recycling collection points.
    - Use more appropriate vehicles.
    - Change collection methods.
    - Plan collection times, to avoid:
        - busy times on major roads;
        - shopping areas during opening hours;
        - school start and finish times; and
        - reversing into the direction of the sun.

- Many organisations have concluded that they will always use reversing assistants unless it is not safe to do so. This is due to the constantly changing circumstances during street collections and the unpredictability of members of the public, who are often not aware of the dangers of working vehicles reversing on the street.
- Drivers should have effective vision from the collection vehicle. The driver's direct vision through the windscreen (area swept by the wipers) should not be obstructed by items such as stickers, clothing, newspapers or additional equipment such as CCTV monitors.
- When reversing, the driver's indirect vision is provided by mirrors and other reversing aids.
- High-visibility warning lights/beacons should be fitted to the front and rear of refuse collection vehicles (RCVs) and other vehicles that operate in a similar way. They should be fitted so that they can be:
    - clearly seen;
    - capable of warning pedestrians; and
    - easily and properly maintained.
- Reversing alarms should be fitted and be clearly audible at the side and rear of the vehicles. They should work at all times when the vehicle is reversing (during permitted hours).
- Reversing detectors can provide additional warning of objects or people entering the reversing zone.
- It is recommended that buyers research and assess available products for best performance as technological advances have been rapid in this area.

Themes: Reversing, Refuse Collection Vehicles, Pedestrians.

Comments: Provides useful interventions.

Title: Managing Personal Mobility Devices (PMDs) On Non motorized Facilities

Author / organisation: T. Litman and R. Blair, Victoria Transport Policy Institute.
Date: 2010
Format: Pdf
Link: http://www.vtpi.org/man_nmt_fac.pdf
Free / priced: Free

Objectives:

- Examine the various types of activities and modes that may use non-motorised facilities;
- Discuss potential conflicts among these uses;
- Describe general principles for managing non-motorised facility use; and,
- Describe appropriate planning, management and education strategies for minimising problems.

Methodology: Good practice guidance.

Key Findings:

- There is an increasing variety of modes that are requesting permission to operate on Non-motorised facilities, including Personal Mobility Devices (PMDs) (small wheeled devices that provide personal mobility such as wheelchairs, skateboards and skates) and Electric Personal Assistive Mobility Devices (EPAMDs) such as Segways.
- It can be difficult to categorise these devices since they have diverse features and uses.
- It is increasingly important for transport planners and public officials to decide how non-motorised facilities should be managed, including where and when specific modes and activities should be allowed, the rules each should follow, and how such rules should be promoted and enforced.
- Because space requirements and risk increase with speed, speed regulation is important for PMD facility management.
- Effective education and enforcement are important for non-motorised facility management. Signs, brochures and maps can help educate users concerning how to share facilities, how non-motorised traffic rules are enforced, and how to report violations.

Themes: Personal Mobility Devices, Electric Personal Assistive Mobility Devices, Non motorised facilities.

Comments: US document which outlines the considerations that need to made when allowing motorised vehicles on non-motorised facilities.

Title: Pilot Project for Evaluating Motorized, Personal Transportation Devices Segways and Electric Scooters

Author / organisation: P. Lavallée, Centre for Electric Vehicle Experimentation in Quebec (CEVEQ) prepared for Transportation Development Centre Transport Canada
Date: 2004
Format: PDF
Link: http://www.segway.com/segway-resources/downloads/pdfs/14285e.pdf
Free / priced: Free

Objectives: Evaluate two types of motorised personal transportation devices (MPTDs): the Segway and the electric scooter.

Methodology: Pilot project for evaluating two types of Motorised Personal Transportation Devices (MPTDs): the Segway and the electric scooter which included a general literature review, an analysis of existing safety regulation, the legal framework for using such vehicles, traffic rules and incidents. Alongside these activities, CEVEQ, supported by groups of experts and a group of 50 test participants, performed ergonomic, technical, and operational evaluations of the MPTDs on a closed indoor test track and in the laboratory.

Key Findings:

- Given the many problems of congestion, pollution and urban mobility, new modes of transportation, such as MPTDs, increasingly seem to be an alternative to widespread automobile use.
- Where Segways are concerned, the results of the technical tests demonstrated that in normal use situations, Segways were stable, operated quietly and smoothly, and gave users the feeling of being in control of the vehicle.
- The devices also compare favourably with other types of vehicles, particularly in terms of stability, where they seem superior to other vehicles such as bicycles and mopeds.
- A vast majority of test participants thought that both types of MPTDs were safe for getting around in closed environments.
- In light of the results of the technical and ergonomic evaluations performed in Phase 1 of the project, it is recommended that Phase 2 be carried out to evaluate electric scooters and Segways in actual operating conditions in order to evaluate their reliability and safety in an urban environment, their social acceptability, and their ability to replace cars for short trips in urban communities.

Themes: Segway, Motorised Personal Transportation Devices, Stability.

Comments: The devices were not tested in a real world situation. Report was accessed via the Segway.

Title: Pilot Project for Evaluating the Segway Motorized Personal Transportation Device in Real Conditions

Author / organisation: S. Castonguay and P. Binwa, Centre for Electric Vehicle Experimentation in Quebec (CEVEQ) prepared for Transportation Development Centre Transport Canada
Date: 2006
Format: Pdf
Link: http://www.segway.com/segway-resources/downloads/pdfs/14567e.pdf
Free / priced: Free

Objectives:

- Evaluate user perception of safety.
- Evaluate how safe the Segway seemed to pedestrians, cyclists and motorists who came in contact with it.
- Evaluation of reliability, social acceptability and safety when used in an urban environment, as well as potential applications to foster intermodality (using different modes of transport during commuting).

Methodology: Experimentation under actual operating conditions on public roadways involving 143 users, in three cities, who covered more than 9,000 km.

Key Findings:

- No incident or serious injury, nor any Segway/pedestrian RTI or physical interference, was reported during the evaluation, where distances totalling more than 9,000 km were covered. The only incidents reported involved the user only. The frequency of such incidents may diminish as users gain driving experience.
- The feeling of insecurity expressed by users generally arose from their lack of confidence in being able to properly control the device under difficult conditions, such as when encountering a pedestrian or navigating tight spaces and difficult surfaces, conditions which often exist on sidewalks. Most likely, with more driving experience, their confidence will improve, as when learning to ride a bicycle.
- Electric Personal Assistive Mobility Device (EPAMDs) being driven on sidewalks, cycle paths and road shoulders where speed is limited to 50km/h will have little impact on user safety and still less on the safety of pedestrians, cyclists, motorists and other pedestrian route users.
- Sidewalks were the only type of pedestrian route where the acceptability of EPAMDs was at all in question. EPAMD traffic was found quite acceptable on cycle paths and roadway shoulders.

Themes: Segway, Motorised Personal Transportation Devices, Safety.

Comments: Real world research. Report accessed via the Segway website.

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