Reducing conflict between bicycle riders and pedestrians

Purpose

This note examines the causes of conflict on shared bicycle/pedestrian paths and provides information on methods that aim to reduce this conflict.

Defining the problem

This note discusses practical ways to reduce conflict on shared paths that may have arisen due to:

1. failure to adequately plan, design, build and maintain a facility to fully account for the diversity of users
2. behaviour of users.

The problems experienced when a variety of users share a path are outlined in Cycle Note C1 – *Assessing footpaths for shared use*.

Where can conflict occur?

The potential for conflict among users needs to be considered on existing paths and when new facilities are being planned and designed. Conflict can occur on the following facilities:

- **shared paths:** off-road facilities designed to be shared by pedestrians and bicycle riders
- **separated paths:** off-road facilities where separate paths are designated for pedestrians and bicycle riders and each signed respectively
- **footpaths:** paths beside a road principally designed for foot traffic (note - under Queensland road rules, a person can ride a bicycle on the footpath unless specifically prohibited by local laws), and
- **roads:** bicycle riders and pedestrians might share road space at the edge of a road when no footpath is provided.

This note focuses mostly on designated shared paths and footpaths, as these have been the main facilities experiencing bicycle rider/pedestrian conflict to date. All footpaths in Queensland are shared paths unless cycling on the footpath has been prohibited by local laws.

A designated shared path can offer a number of benefits by providing:

- a dedicated space for walking and cycling away from general traffic to minimise interaction with motor vehicles
- a safe place that provides the opportunity for people to undertake physical exercise
- a key connection for commuter riding that may be convenient, and
- an opportunity for visitors and tourists to gain access to and appreciate parkland, vistas or places of interest.

It can be challenging to provide one facility that offers the appropriate level of service to all of these potential users without unnecessary or unsafe hindrance to their movement.

Aim

This series of notes aims to assist planners and engineers to provide for cycling in their local area.

The Cycle Notes should be read in conjunction with:

- Guide to Traffic Engineering Practice, Part 14 – Bicycles (Austroads, 1999)
- Queensland Manual of Uniform Traffic Control Devices, Part 9 Bicycle Facilities
- Road Planning and Design Manual (Queensland Department of Main Roads).
- NS1018 Pedestrian/cyclist conflict minimisation on shared paths and footpaths (ARRB 2006)

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What do the road rules say?

For the complete set of rules concerning usage of paths, please refer to *Transport Operations* (*Road Use Management – Road Rules Regulation 1999*) that can be found at http://www.legislation.qld.gov.au/Legislation.htm.

Finding out about conflict

Before developing a strategy to deal with conflict on designated shared paths and footpaths, information about the type of conflict is required. Ways of gathering information include:

- review any documented complaints lodged with the local government
- consult with user groups (e.g. cyclists, pedestrians) about the types of problems experienced, how often, when, where and by whom
- survey users of the facility
- observe the facility and take written, photographic or video records of interactions to identify common user patterns.

From the information gathered from user groups, user surveys and photographic evidence, determine the primary cause(s) of the conflict.

For a toolkit on minimising conflict between cyclists and pedestrians on designated shared paths and footpaths, please refer to http://www.abc.dotars.gov.au.

Problems with failing to reduce conflict

If the conflict occurring on a particular designated shared path or footpath is not addressed, it can result in:

- an increased potential for injury for both bicycle riders and pedestrians
- ongoing frustration resulting in decreased use of the facility
- physical violence
- pressure to ban cycling in particular areas.

A well-planned, designed and managed facility will provide enjoyment and convenience, thereby attracting more users. Conflict needs to be dealt with quickly and effectively when it arises. Otherwise, the incidence and severity of conflict are likely to increase.

The remainder of this note deals with ways to reduce conflict on shared paths by:

- applying planning and design principles that enable the facilities to meet the needs of all users, and
- implementing user behaviour strategies that allow a variety of users to coexist on the facility.

Reducing conflict on new facilities

The key to reducing conflict is to plan and design facilities to meet the needs of all users. Thoroughness in the initial planning process will enable these needs to be met (see Table 1).

When planning a new designated shared path or footpath, consideration needs to be given to:

- the purpose of the path - the potential type and number of users
- the capacity of the environment to support a path that will meet user needs, and
- resource availability.

Table 1: Planning considerations to reduce conflict on new off-road bicycle/pedestrian facilities

Planning considerations	Solutions
Understanding the potential number of users (both pedestrian and bicycle): The designer of a new designated shared path or footpath needs to understand the patterns and habits of potential users of the facility. This includes existing patterns and habits and those that may occur in the future (e.g. when a new connection is added). There is often a high latent demand for cycling and walking facilities.	**Consultation.** The planner/designer must fully understand current bicycle and pedestrian activity and potential for increased usage if better facilities are provided. **Observing** potential users on site can reveal a preferred path (e.g. an informal track worn through a park). Desire lines must be recognised to obtain greatest user compliance. Observing the proposed site can provide information on the type, volume and speed of potential users as well as any site conditions that may result in design restrictions, such as grade and width. Observing paths in similar locations (e.g. layout, demography) will also be helpful. This can include discussion with other local governments that provide such facilities. It is important to note that observations can only reveal existing patterns, habits etc. Changes that may occur in the future (e.g. land use planning, construction of a business centre or school) should also be considered. **Modelling** to determine latent demand. There are models available to estimate latent demand. The website http://www.tfhrc.gov/safety/pedbike/pbworkshop.htm gives one such model that determines a latent demand score based on the trip generating capacity of an area due to the locations of workplaces, shops, recreation facilities and schools. *Austroads Part 14* also provides guidance on determining demand for cycling facilities. **Local Cycle Network Plans and Regional Cycle Network Plans:** These identify routes that potentially will carry a high number of cyclists. If cyclists share the same route and facility as other users, there may be a high potential for conflict. This in turn may influence the planning design and selection of the facility.
Pedestrian attractor off-road environment: ■ picnic and rest spots ■ scenic views ■ shady trees ■ playground equipment. footpath environments: ■ shops, schools, workplaces etc.	If the site is more attractive to pedestrians than to bicycle riders, consideration should be given to providing separate designated and delineated paths (i.e. a pedestrian only path leading through the pedestrian areas and a bicycle only facility keeping bicycle riders away from the pedestrian areas). However, in many lower population areas there may be inadequate demand from either pedestrians or cyclists to justify anything but shared facilities.
Bicycle attractor When designing facilities for bicycle riders, remember their five basic requirements: 1. space to ride 2. smooth surfaces (slip-resistant) 3. speed maintenance 4. connectivity, and 5. information. Remember, a path may provide a fast, direct route for commuters.	If the site is more attractive to bicycle riders, consideration should be given to providing an exclusive bicycle facility. Pedestrian facilities may also be necessary and must be placed a safe distance from potentially fast moving bicycles.

Planning considerations	Solutions
Note: *If an off-road facility provides a high-speed direct route to popular commuter destinations (e.g. CBD), commuters will use it. Paths that are primarily recreational and weave indirectly through a park or reserve are unlikely to be used by commuters unless the more direct on-road conditions are too dangerous. Providing facilities that serve many purposes will maximise use of the facility. But care must be given to providing adequate width to minimise conflict.*	

Reducing conflict through appropriate design and engineering

Engineering or re-engineering of existing facilities is an important method of reducing conflict on shared paths. Upgrading facilities can be difficult and expensive. So getting the design right the first time makes economic sense.

A flexible planning and design approach should allow for future layout adjustments. This includes line marking that directs traffic in a particular way, staged expansions or replacement of an existing facility that may no longer suit user needs. Particular points to consider are existing and future dimensions, geometry, sight lines, clear routes, consistency of treatment, signs, surface line markings etc.

Table 2 is a reproduction of Table 6.3 from *Austroads Part 14* showing the minimum dimensions of a shared path. Where use is expected to be high or there is a variety of user skill levels and activities (such as children on bicycles, people walking dogs, joggers and experienced bicycle riders), adequate width is essential to minimise conflict (see Brisbane City Council Case Study).

Tables 3 and 4 provide path design and maintenance details respectively.

Austroads Part 14 indicates that the capacity of a 1.5m wide path in one direction is approximately 150 cyclists per hour. Additional width is needed where the path is shared with pedestrians and user volumes require it. In considering the suitability of a path's width to handle the anticipated number of cyclists and pedestrians, it is recommended that path volumes be assessed on the basis of highest demand over the periods of two separate hours (weekday or weekend).

When bicycle riders and pedestrians are sharing a path, opportunities for passing must be available either through the provision of additional path width (minimum width of 2.0m) or by allowing users to move to the other side of the path (provided sufficient opportunities exist).

Table 2: Minimum dimensions of shared paths (from Table 6.3 of *Austroads Part 14*)

	Path width (m)		
	Local access path	Commuter path	Recreational path
Desirable	2.5	3	3.5
Acceptable range	2.0 - 2.5	2.0 - 3.5	3.0 - 4.0

Table 3: Design considerations for minimising conflict at each element of a path

Design elements	Design considerations	Design solutions
Path geometry and route options	■ Path alignment may create blind corners or the path may be too narrow; or, ■ Topography will influence the route due to vertical and horizontal curvature requirements. ■ Avoid height variance with surrounding ground (avoid drop-offs).	■ Widening at points of conflict can provide a relatively inexpensive solution to alleviate conflict at blind corners. Consider the need to provide separate paths for bicycle riders and pedestrians at locations with limited visibility. ■ By staging the widening of a path, starting with the most conflict-prone areas, path capacity can be increased over time. ■ The path needs to be designed with sensitivity for the gradient required of pedestrians and bicycle riders, keeping wheelchair users in mind.

Design elements	Design considerations	Design solutions
Surrounding environment - Layout of existing environment (e.g. trees, poles, street/ park furniture) - Protection of surrounding areas (gardens, lawn etc).	■ There is a need to consider path layout in conjunction with the surrounding environment including landscaping. The presence of culverts or embankments limits opportunities for emergency escape.	■ Environmental conditions may have limited the initial design of the path. Where use has exceeded the capacity of the path and redesign is not possible, user management strategies are required. These are discussed in the Tables 6 and 7.
Access to the facility and intersections with roads and other paths	■ Bicycle riders may need to be slowed when approaching sites of potential conflict (e.g. intersections with roads or other paths). Position holding rails to assist halted cyclists. ■ A deflection rail terminal has potential (see Figure 6.38 of *Austroads Part 14*) but is not appropriate where a high volume of bicycle riders and pedestrians is expected.	■ An example of a treatment for an intersection of a bike path and a road on a primary school user route is given in Figure 6.36 of *Austroads Part 14*. ■ A number of strategies for slowing down bicycle riders approaching intersections are given in *Austroads Part 14*. The critical factor in choosing the right treatment to slow riders is the volume of bicycle and pedestrian traffic. This document also shows good solutions for slowing bicycle traffic at approaches to intersections (see Figures 6.17 and 6.37 of *Austroads Part 14*).
Lighting	■ Users, particularly pedestrians are unlikely to have adequate reflective clothing or lighting at night.	■ Install the best lighting for the environment on the shared path following the principles outlined in Cycle Note C5 – *Personal security and bicycle facilities*.
Signs	■ Signs may have been vandalised, removed, become redundant, are causing a hazard or are not well placed. ■ There may be no signs at all.	■ Provide clear signs showing: - the rules of operation/use of the path particularly at intersections - location information to avoid confusion - a list of valid users. ■ Provide: - a clear message - number of signs - sign size - sight distance to signs - signs at hazards - sign conditions. See *Queensland Manual for Uniform Traffic Control Devices* for standard bicycle/ pedestrian shared and separate path signs. ■ Signs may need to be lit at night as pedestrians usually rely on street lighting for visibility and bicycle lights may not provide adequate illumination to see signs by the side of the path.

Design elements	Design considerations	Design solutions
Linemarking, on-pavement symbols and coloured pavement	■ This includes centrelines and intersection delineation. ■ Line marking may be worn away, no longer reflective or be in the wrong place.	■ The facility requires a complete analysis of the sight lines, speed environment, signing, line marking and symbol use. A misplaced centreline can cause continued conflict when all other features have been rectified.
Awareness of points of potential conflict or changes in standard	■ Path may change from shared (mixed) use to separated. This can lead to confusion.	■ Consistent application of the same facility layout will lead to consistent use. For example, keeping pedestrian sections always on the same side or using a separated treatment along the entire length of the facility - instead of swapping to a shared path and then back again. ■ Surface treatments or restricted curves approaching points of potential conflict or confusion.
Physical separation	■ This is necessary when combined volumes of bicycle and pedestrian traffic exceed 300 per hour. ■ If the facility has an attractive view or other interesting feature on one side, it is often better to direct pedestrian traffic on to that side. ■ Structures (e.g. bridges) may offer a pedestrian side and bicycle side.	Possible methods include: ■ a median kerb (this may mean less flexibility for bicycle riders in an emergency so extra path width may be required) ■ vertical or grade separation with one path 75mm to 100mm below the other ■ a fence or landscape barrier that does not obstruct sight lines ■ horizontal separation of at least 1.0 metre, but preferably at least 2.0 metres ■ providing a 'break-out' area for pedestrians.

Table 4: Consideration for maintenance of each element to minimise conflict

Considerations	Solutions
■ Poor maintenance may have led to poor surface conditions. ■ Signs of neglect discourage users and validate undesirable behaviour such as graffiti and vandalism.	■ Poor maintenance of a shared path can reduce its effective width and lead to greater conflict. Leaf fall may require the path to be swept more frequently at certain times of the year. Tree roots may damage the path. Path-side mowing may throw burrs onto paths. Routine maintenance inspections are necessary particularly after heavy rain. ■ Graffiti eradication campaigns including mural projects and removal within 24 hours of reporting.

Case Study: Brisbane City Council
The Brisbane City Council has an extensive network of shared paths throughout the city. Initially the paths were built 2.5m wide. A common difficulty with this width arises from couples walking side-by-side. Each pedestrian has a design envelope of 1.0m leaving only 0.5m for a bicycle rider to pass from behind. This has led to conflict. As a result, all new shared paths in the city are designed to be at least 3.0m wide giving the bicycle the required 1.0m envelope for passing. The city's designers realised that as the network of shared paths increases, so too does their popularity. Starting with a minimum width of 3.0m will help to minimise conflict.

Reducing conflict through user behaviour management

Users of joint bicycle/pedestrian facilities each contribute to conflict in a variety of ways. These are summarised in Table 5.

Any type of user may complain that the path does not feel safe. It may be that users are concerned the environment surrounding the path poses a threat to personal safety or the path is too narrow to use safely. Solutions for minimising conflict include thoughtful planning and design, education campaigns and instructional signs. These all play a part in improving shared path performance.

Table 5: User behaviour issues contributing to conflict on shared paths

Bike riders	Pedestrians	Other path users
■ excessive speed ■ lack of awareness, confusion or disregard for rules on paths ■ attitudes - lack of recognition that paths are shared ■ lack of awareness of other users' needs and abilities and failure to respond ■ lack of control of children and pets/children unpredictable ■ wearing dark clothing at night ■ riding without lights at night ■ riding two abreast or in a group ■ wearing headphones ■ inattentiveness and lack of concentration ■ failure to keep left ■ failure to have or use a bell ■ failure to give way to pedestrians at all times ■ inexperienced cyclists with inadequate skills ■ children cyclists	■ lack of awareness, confusion or disregard for rules on paths ■ attitudes - lack of recognition that paths are shared and lack of courtesy to other path users ■ wheelchair users and other people with disabilities - slower response ■ lack of awareness of other users' needs and abilities ■ lack of control of children and pets/children unpredictable ■ walking with inadequate reflective clothing or footwear at night ■ walking in pairs/groups ■ wearing headphones ■ lack of knowledge of cycling performance limitations ■ failure to keep left ■ unpredictable movement on path ■ unleashed dogs are unpredictable and are a hazard to cyclists.	■ excessive speed ■ lack of awareness, confusion or disregard for rules on paths ■ attitudes - lack of recognition that paths are shared ■ lack of awareness of other users' needs and abilities and failure to respond ■ different characteristics (e.g. in-line skaters, fast/slow) ■ wearing dark clothing at night ■ not using lights at night ■ travelling two abreast or in groups ■ wearing headphones ■ lack of knowledge of cycling performance limitations ■ failure to keep left or give way ■ unpredictable movement on path.
NOTE: Bike riders can be either recreational or commuters and include: ■ adults ■ children ■ families ■ individuals and groups ■ power assisted bicycles.	**NOTE:** Pedestrians include: ■ joggers ■ groups ■ dog walkers ■ children ■ seniors ■ people with prams ■ users with disabilities (mobility, hearing, vision or cognitively impaired).	**NOTE:** Other path users include: ■ wheeled recreational device users (in-line skates, skateboards, foot scooters).

Reducing conflict between bicycle riders and pedestrians

The key factors for consideration are:

- **traffic volume:** path width must reflect the volume of traffic expected or currently being experienced on the path. Such widths for designated shared paths are given in Table 6.3 and Figure 6.19 of *Austroads Part 14*. It is important that auditing of path use is monitored over the life of the path to assist those managing the path (e.g. to be aware of increases in use that may affect its efficient, conflict-free operation).
- **bicycle speed:** if experienced cyclists are expected (e.g. on a commuter route), then separate paths are preferred. It may be better to create an on-road bike lane or wide kerbside lane to carry more confident cyclists.

Key strategies for improving user behaviour

Table 6 provides campaign strategies that incorporate education, enforcement and encouragement dimensions in managing user conflict.

Table 6: Campaign strategies to reduce conflict by managing user behaviour on designated shared bicycle/ pedestrian facilities.

Type of campaign	When to use this strategy	Description
Education of users	Where rules of operation are not clearly defined there can be confusion and frustration (pedestrians on the bicycle side of a separated path, bicycle riders overtaking without sounding their bell etc).	Research has shown that some conflicts arise on shared paths because users are not fully aware of what is expected of them. Conflicts can be heightened by a lack of tolerance for other types of user. Appropriate information about users' rights and responsibilities provided through signs and leaflets may improve interaction. Leaflets outlining rights and responsibilities of all users can also be useful but need to be distributed widely. They may be less effective if there are many tourists or occasional users.
Encouragement of desired behaviours	Bad habits need to be broken. Encouragement is the provision of incentives for users of shared paths to behave more appropriately.	Information to encourage safe behaviour can be provided through signs, the media and brochures. Special events can also encourage desired user behaviour and give a positive message. For example, bell give-aways can encourage the installation and use of a bell. Raising awareness of the benefits of bicycle riding is also a type of encouragement. This may increase use of shared paths and may need to work hand-in-hand with education campaigns.
Enforcement	Where the above methods have not improved behaviour, police have powers to book offenders who do not comply with the rules of shared bicycle/pedestrian facilities.	Enforcement by police patrols can enhance a sense of user security. While it can be expensive for police to undertake occasional patrols, the establishment of dedicated bike-mounted patrols is becoming more commonplace in metropolitan areas.

Table 7 provides measures for particular facility user types.

Table 7: Additional solutions for specific types of facility users

User type	Types of solutions
Bicycle riders	■ Faster riders may need to be diverted onto a safe road environment. If there is not a designated, safe and continuous space on the road, commuters will tend to stick to the safety and convenience of the path. The potential variety of users can include bicycle riders of various skills and speeds. Rest stop facilities for slower/less experienced bicycle riders need to be positioned away from the path of faster riders. ■ Education and reinforcement campaigns in conjunction with clear design are key to improving behaviour on paths. Examples include: - a code of conduct that specifically draws attention for the need to ride at safe and proper speeds in all circumstances - awareness campaigns for greater use of audible warning devices (e.g. bells) - raise awareness of each path user's travel characteristics.
Pedestrians and in-line skaters	■ Education and reinforcement campaigns in conjunction with clear design specifically for pedestrians include: - develop and promote a "Shared Path Code of Conduct" targeting specific user groups - raise awareness of each path user's travel characteristics - encourage visibility of pedestrians and in-line skaters (e.g. reflective stripes on footwear and wearing lights at night).

Reducing conflict at local centres

Conflicts in and around local shopping and neighbourhood centres can present particular difficulties. However, a range of techniques are available that can improve amenity (see Table 8).

Encouraging cycling to a shopping precinct is important. This can increase the potential catchment area and patronage of stores without filling car parking spaces in close proximity. The use of local laws to ban cycling on footpaths in these areas should always be a last resort. Prohibitions have the potential to send vulnerable and inexperienced bicycle riders out into what may be the complex and dangerous road environment at and around a local centre. Prohibition also requires ongoing enforcement.

It is important to consider the needs of bicycle riders in all local centre improvement programs and main street redevelopments. Incorporating bicycle facilities into streetscape and centre improvements from the early planning and design phases can significantly reduce conflicts and improve amenity for both pedestrians and bicycle riders.

Table 8: Strategies to minimise conflicts at local centres.

Type of campaign	Sub-strategy	When it should be used	Description
Education	Promotional campaign	In localities where conflicts are occurring, often in conjunction with other measures.	Promotional campaigns in council newsletters, local papers, signage, leaflets, posters in the local centre, schools or other facilities to educate different street user groups.
Encouragement of desired behaviours	Dismount signage	In shopping streets and other locations where some conflicts occur.	Signage is erected to 'request' that cyclists dismount in a specific area, rather than prohibiting cycling entirely. This approach, employed on occasions by Brisbane City Council, uses the philosophy of requesting rather than requiring a dismount, eliminating the illegal 'thrill' for youth of disobeying the law. Young and vulnerable cyclists are not forced onto the road, enforcement is less of an issue and the signage informs all cyclists who do ride through the area that they should be particularly aware of their surroundings and ride accordingly.
Engineering and design	Bicycle/car parking lanes	Any centre with sufficient road width to provide for an on-road bicycle facility.	The installation of a shared bicycle/car parking lane (as described in Section 4.4.2 of *Austroads Part 14*) can provide cyclists with a safer on-road cycling option that is separate from pedestrians. It may, however, increase conflict between bicycle riders and cars making parking manoeuvres. (Note: the number of car parking manoeuvres is likely to be relatively higher at a local centre).
	Wide paths	Any centre with sufficient road width to provide for additional path width.	Where feasible, increased path width is the easiest way to decrease congestion on a path and reduce conflicts.
	On-path separation	On wider paths in centres or in mall areas where conflicts are occurring.	Separating bicycles and pedestrians via separate paths with kerbing, signage, centre line marking and/or different surface treatments can effectively separate street users. An approach for malls and wide paths is to strategically place street furniture and plantings so as to channel faster moving street users away from congested areas. Quality urban design can create safe and exciting streetscapes that give greater amenity to both window-shoppers and slow moving pedestrians, and at the same time, meet the needs of faster street users.
	Location of end-of-trip facilities	All local centres.	Placing end-of-trip facilities at all cycle access points to a centre can avoid the problem of cyclists travelling back and forth among pedestrians and shoppers to park their bicycle. Refer to Cycle Note C4 – *End-of-trip facilities for bicycle riders* for more details.

Type of campaign	Sub-strategy	When it should be used	Description
Enforcement	Time-based bans	When there are conflicts during peak periods of pedestrian activity on confined footpaths and few conflicts throughout the rest of the day or evening.	A local law is passed and signage erected to prohibit cycling in a given area during specific times of the day (e.g. from 4pm to 6pm during the evening rush-hour peak, or only during business hours).
	Full bicycle bans	When there are significant conflicts during the entire day and evening and where other approaches have not improved behaviour.	A local law is passed and signage erected to prohibit cycling in a given area. A process of education and the discretionary use of first-time warnings may be preferable to strict enforcement.

Conflicts with Wheeled Recreational Devices

Wheeled Recreational Devices (WRDs) such as roller blades, scooters and skateboards are a legitimate mode of non-motorised transport. However these devices are primarily used recreationally. WRD users can experience conflict with other road users for a variety of reasons. In built-up areas, WRD users can be considered a nuisance as they are perceived to damage street furniture. It is important to note that there are a number of benefits to attracting and encouraging WRD users in local centres. These include:

- increased use of non-motorised and active transport
- increased levels of physical activity
- the provision of passive surveillance in certain areas, especially after hours.

Decisions about whether to encourage or discourage WRD users are made by local councils. The use of local laws to ban WRDs on footpaths in places such as local centres should always be a last resort, as effective enforcement can be difficult. Table 9 outlines measures that can be applied to encourage or discourage the use of WRDs.

Table 9: Alternative approaches to managing WRDs

Type of campaign	Description
Education	Provide signage, leaflets and innovative communication materials. Work directly with young people to inform and encourage skaters about responsible behaviour. Use 'skate cards' to show locations of skate parks and rules for sharing footpaths. Develop a code of conduct in conjunction with skaters.
Encouragement	Develop a WRD strategy to promote safety and more responsible skating. Develop a marketing campaign to actively promote WRD user participation and activities to celebrate responsible skating.

Type of campaign	Description
Engineering and design	Develop high quality dedicated WRD facilities in appropriate and convenient locations to encourage the use of WRDs in purpose-built facilities. Plan and develop these facilities to capture latent demand. Designate WRD routes and zones in conjunction with WRD users. Use robust structures and materials in street furniture and buildings to accommodate WRDs and use specific devices to prevent use or damage (e.g. metal clips to eliminate 'rail' and ledge manoeuvres, foot plates to eliminate damage to glass doors and full-length windows). Provide wide paths to minimise the potential for conflicts with pedestrians, bicycle riders and other street users. Consider WRD users in all urban planning and design processes and ensure inner-city development approvals also consider them.
Enforcement	Pass a local law and erect signage to prohibit certain WRDs in a given area. Such laws should be introduced with education and information for the public and on-going enforcement.

Conflicts with wheelchairs

Wheelchairs (either powered or unpowered) are a legitimate mode of transport that can generally use shared paths and footpaths. However, powered wheelchairs are restricted by the road rules to operating at a speed of less than 10 km/hr while using any path.

The flat grades provided on many new shared paths that comply with the Australian Standards for wheelchair paths is one of the benefits to bicycle riders of allowing wheelchairs to operate on shared paths.

Other references

1. The Government of Western Australia (1998), *Conflicts on Shared Paths,* Perth, Western Australia.
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Phone: (07) 3253 4437
Fax: (07) 3253 5858
Email: cycles@transport.qld.gov.au
Website: www.transport.qld.gov.au/cycling

Postal Address
PO Box 673
Fortitude Valley Q 4006

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Queensland Government
Queensland Transport