Hawkesbury City Council

attachment 3 to item 88

Draft Hawkesbury Mobility Plan 2010

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Hawkesbury Mobility Plan 2010

PAMP and Bike Plan

Hawkesbury City Council

GTAconsultants

Hawkesbury Mobility Plan 2010

PAMP and Bike Plan

Client: Hawkesbury City Council
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Quality Record

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1. Introduction

1.1 Background

The Hawkesbury City Council area spans approximately 2,800 square kilometres, has a population just over 60,000 and is located approximately 60 kilometres north-west of the Greater Sydney metropolitan area. This area consists of a number of towns and villages, along with several rivers and more than 70 percent of its area as National Park, making it an area that is vast and inviting to interact with.

Hawkesbury City Council is committed to providing a safe and effective transport network for its community, including consideration of pedestrian and cyclist mobility. A comprehensive plan is required to guide Council in the ongoing development and improvement of pedestrian and cyclist facilities to meet the needs of the community. As such, GTA Consultants was commissioned by Hawkesbury City Council to prepare a mobility plan to address the mobility needs of pedestrians and cyclists across the LGA. The desired outcome of the mobility plan is to:

"identify a cohesive strategy for linking residents, particularly residents living in localities with high proportions of vulnerable road users, to the major commercial centres of the city by means of safe and accessible pathways and cycleways".

The mobility plan is to consist of a Pedestrian Access and Mobility Plan (PAMP) and a Bike Plan. Undertaking both studies simultaneously and collating into the one document allows consistency and integration of the two user group networks, ultimately providing a more consolidated transport network.

1.2 Study Objectives

The Hawkesbury Mobility Plan, comprising a PAMP and Bike Plan, seeks to address the mobility needs of the community. The study objectives as outlined in the project brief are as follows:

- Facilitate improvements in the level of pedestrian accessibility and priority, particularly in areas of higher pedestrian concentration.
- Ensure the use and safe operation of special access vehicles are incorporated into the plan, particularly origin/destination of trips.
- Ensure the use and safe operation of bicycles are incorporated into the plan for all classes of bike users.
- Identify opportunities for infrastructure synergies between all classes of pedestrian and bicycle users, including recreational paths and pedestrian linkages.
- Reduce pedestrian access severance and enhance safe and convenient crossing opportunities on major roads.
- Identify and resolve pedestrian and bicycle crash clusters.
- Facilitate improvements in the level of personal mobility and safety for pedestrians with disabilities and older persons through the provision of pedestrian infrastructure and facilities which cater to the needs of all pedestrians.
- Provide links with other transport services to achieve an integrated land use and transport network of facilities that comply with best practise and relevant technical standards.
- Link existing vulnerable road user plans in a coordinated manner.
- Ensure that pedestrian facilities remain appropriate and relevant to the surrounding land use and pedestrian user groups.

Further address Council's obligations under the Commonwealth Disability Discrimination Act (1996).

- Develop a prioritised capital works program, including costings, which may be realistically delivered with consideration of the funding allocation and constraints.
- Identify linkages to and between Planning Instruments (e.g. Local Environment Plans (LEPs) and Development Control Plans (DCPs).

The key outcome of the PAMP is the identification of key pedestrian routes which form a coherent pedestrian network in areas of high pedestrian concentration, such as retail and service centres, schools and workplaces. Specific objectives of the PAMP component are as follows:

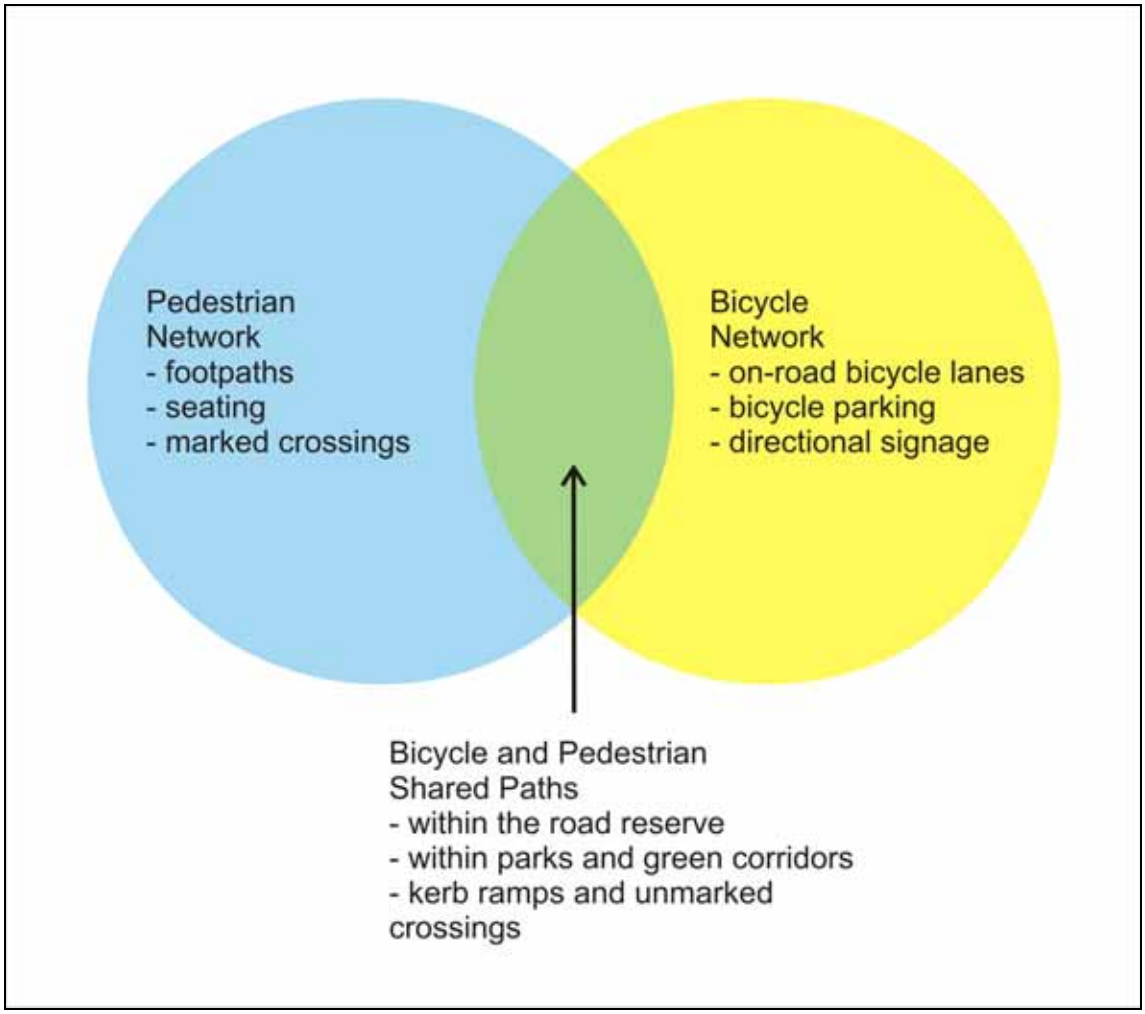
- Integrate consistent and continuous pedestrian networks into the land use and transport system, to facilitate and encourage more walking.
- Linkage of pedestrian concentrations to pedestrian networks to facilitate and encourage safe and convenient accessibility and mobility for pedestrians.
- Identify clusters and patterns of pedestrian crashes to highlight areas that restrict safe and convenient accessibility and mobility for pedestrians.
- Development and integration of pedestrian routes that form part of a connected pedestrian network.

The key outcome of the Bike Plan review and development is the identification of bicycle routes that are convenient, connected, coherent and serve major generators and attractors such as shopping centres, recreational facilities, schools parks and workplaces. Specific objectives of the Bike Plan component are as follows:

- Integrate consistent and continuous cycling networks into the land use and transport system, to facilitate and encourage more cycling.
- Development and integration of intra and inter-regional cycling routes, that form part of a connected cycling network.
- Identify a combination of on-road and off-road routes to meet the needs of users.
- Seek synergies between bike and pedestrian networks - addressing the potential for shared pathways or other alternatives where possible.
- Identify other cycling facilities that may be required for storage or security of bicycles.

The outcome from development of the PAMP and bicycle networks simultaneously will be a mix of facilities that are provided for pedestrians or bicycles only, or that accommodate both road users. This is demonstrated in Figure 1.1.

Figure 1.1: Integration of Pedestrian and Bicycle Networks



2. Strategic Context

2.1 Global Issues

Cycling and walking have been defined as "Healthy and Active Transport". Public transport is also considered an active transport mode as it invariably involves a component of walking to and from bus stops and rail stations. There is substantive evidence that healthy and active transport provides a strong and effective policy response to key global public policy issues, including:

- Public Health
  Physical inactivity is one of the major causes of ill health in Australia. Half the Australian adult population are insufficiently active to protect against sedentary lifestyle disease, such as diabetes. It is well-documented that regular physical activity, such as cycling and walking, significantly reduces the incidence and fatality rate from cardiovascular disease.
- Congestion
  Private automobile use is considered the major cause of congestion in Sydney. The Bureau of Transport and Regional Economics found that the cost of congestion in Sydney for 2005 was $3.5 billion and estimated to rise to $7.8 billion by 2020. Cycling (or walking and taking public transport) is an effective method of reducing unnecessary car use.
- Climate Change
  Motorised transport is a significant and growing source of greenhouse gas emissions. As a zero emission form of transport, cycling is increasingly seen both in Australia and internationally as a way of reducing greenhouse gas emissions. The Commonwealth Carbon Pollution Reduction Scheme, due for implementation in 2010 will include transport. This increases the importance of providing carbon free forms of transport, to lower the cost to the community of responding to climate change.
- Peak Oil and Petrol Prices
  Since 2004, world oil prices have increased significantly and hit record levels in 2008. The rise in petrol prices strongly relates to the increase in bicycle sales, both in Australia and in the United States. Strategic transport modelling emphasises strong sensitivities to increases in petrol prices with shifts to public transport, walking and cycling. The provision of cycling infrastructure and encouragement programs, in combination with public transport improvements offers a very effective method of increasing the resilience to higher fuel prices.

Further detail on each of these global policy issues is included in Appendix A.

Investment in physical, social and organisational infrastructure to support healthy and active transport can deliver positive benefit:cost ratios for each of these global policy issues individually, especially when considering externalities. The real benefit of investment in infrastructure for healthy and active transport, however, lies in recognition of the cross-disciplinary benefits.

2.2 National Policy Context

In Australia recently the focus on climate change associated with congestion and pollution together with the promotion of local accessibility and of personal health has been continuously highlighted. An increase in walking and cycling can be a central factor in offering an environmentally sustainable and health promoting local transport option. Over the years moves to highlight the role for cycling have been taken in a series of key strategic Government policy documents and guidelines as follows:

- National Cycling Strategy 2005-2010.
- RTA Action for Bikes 2010 (currently being revised).
- Austroads Guide to Traffic Management (previously Austroads Part 13 – Pedestrians and Austroads Part 14 – Bicycles).
- RTA (NSW) Bicycle Guidelines (2003).
- Planning Guidelines for Walking and Cycling (Department of Planning, 2004).

There are also a number of other state planning documents which reference the NSW Governments' commitment to planning for cycling, walking and public transport and encouraging active living. These are as follows:

- NSW State Plan, including Chapter 3 – Better Transport and Chapter 7 – Urban Environment and Lifestyle. This document outlines goals for increasing the number of people participating in sporting activities (target increase of 10% by 2016) and increasing walking and cycling (target bicycle mode share for all trips in Greater Sydney of 5% by 2016).
- North West Sub Regional Strategy. This document identifies Penrith as the Regional Centre for the North West Sub Region, with Windsor and Richmond identified as Town Centres and North Richmond as a Village. Rural Neighbourhood Centres include Pitt Town, Wilberforce and Glossodia. This document includes the action to influence travel choices to encourage more sustainable travel, including improving local and regional walking and cycling networks.

2.3 Benefits and Barriers

The Hawkesbury Mobility Plan provides Council with a proactive policy to increase the level of cycling and walking as important sustainable transport modes to benefit the health and economic wellbeing of the community. Facilities for walking and cycling within a community also provide recreational activities and experiences for visitors. The Hawkesbury Mobility Plan aims to build strategically on the positive characteristics of walking and cycling while considering the barriers to greater participation.

General Community Benefits

- Walking requires no specific equipment and is particularly suited for trips up to 1km.
- The bicycle is ideal for convenient, door to door travel. It starts instantly, it is easy to park and impervious to traffic congestion. It is particularly suited for trips up to 5km.
- Cycling and walking travel times are predictable and reliable.
- Construction of a workable bicycle network is relatively cheap, and bicycle infrastructure as well as footpaths and walking facilities can be easily (and cost effectively) included with road upgrades and maintenance works.
- Bicycle traffic does not pollute, does not emit greenhouse gases, is not noisy and is a practical way of reducing dependency on oil. Walking is also a quiet and pollution-free way of travelling shorter distances.
- Bicycles take up very little space, either when being ridden or when parked.
- Bicycle and pedestrian traffic has a humanising effect on neighbourhoods.
- Good walking facilities at public transport interchanges encourage the usage of public transport.
- Good walking facilities within and in the vicinity of retail and commercial areas are good for supporting local business.

- Walking travel is affordable and accessible to almost all the community.
- Walking and cycling is good for staying in shape and is relaxing.
- Bicycle travel is affordable and accessible to all able-bodied people.

Physical Barriers to Walking and Cycling

- Fragmented cycling and footpath networks with a lack of continuity and connectivity.
- Limited number of safe and convenient opportunities to cross major roads.
- Lack of end-of-trip and parking facilities (cycling).
- Poor integration with general road transport system - high speed and high volume roads along popular trip desire lines, threatening behaviour of motorists.
- Unsafe routes or pinch points.
- Terrain and weather.
- Narrow and poorly maintained roads, shoulders and footpaths.
- Lack of footpaths in some residential areas.
- Inadequate facilities for access by mobility impaired pedestrians.

Perceived or Subjective Barriers to Walking and Cycling

- Actual and perceived lack of personal safety and security, particularly after dark.
- Lack of confidence and cycling experience.
- Insufficient knowledge of available network facilities and alternative back-street routes.
- Perception of walking and cycling as a physical activity (too hard, too hot, too hilly, too dangerous, too difficult etc).
- Lack of 'how to' knowledge on cycling as an activity, eg where to ride, what to wear, what type of bike suits, equipment issues, navigation issues.
- Perceived unsafe road layouts.

Specific Barriers to Walking and Cycling in Hawkesbury

- Major roadways (e.g. Windsor Road, Hawkesbury Valley Way, Macquarie Street).
- Railway line.
- Waterways, particularly the Hawkesbury River.
- Limited number of safe and convenient opportunities to cross these physical barriers.
- RAAF Base Richmond – no public access through the site.

While some of these barriers are beyond intervention, the majority can be managed or addressed by individuals, communities and governments. The actions outlined in the Mobility Plan seek to address these issues and create an environment with minimal barriers to walking.

2.4 Council Policies and Plans

This section provides an overview of the pedestrian and walking issues as referenced in the various planning instruments in Hawkesbury City Council, including:

- Hawkesbury Sub Regional Bike Plan 1997.
- Hawkesbury Community Strategic Plan 2010-2030.
- Hawkesbury Local Environmental Plan 1989.

Hawkesbury Sub Regional Bike Plan 1997

In 1997 the Hawkesbury City Council Sub-Regional Bike Plan was released. This document summarised previous work undertaken in relation to cycling in the study area. It reviewed the previous 1986 Bike Plan and provided a number of observations and recommendations in relation to promotion of cycling in the Hawkesbury area. The Bike Plan identified a number of priority capital works to be undertaken to improve the wider bicycle network. These included:

Macquarie Street

- It was recommended that Macquarie Street between Hawkesbury Valley Way and George Street be added to the sub regional network. Although Macquarie Street had bicycle / car parking lanes marked they did not meet the Austroads Standard. It was also recommended that Macquarie Street through the Windsor CBD (Bridge Road to Hawkesbury Valley Way) was not included as this section of Macquarie Street was narrow.
- An alternate route through this section could be provided via Cox Street which is parallel to Macquarie Street.

Freemans Reach Road

- Although Freemans Reach Road provides a direct connection between Freemans Reach and Windsor, due to the constricted width and inability to provide the recommended bicycle lane width, it was recommended that this road not be included on the sub regional network.

Bells Line of Road / Kurrajong Road / Hawkesbury Valley Way (formally known as Richmond Road) (State Route 40)

- It was recommended that sealed shoulders be provided on each side of the road west of North Richmond. The width was dependent on the vehicle speed on the adjacent section of road.
- A shared path from Colo High School to Redbank Road and a pedestrian refuge adjacent to the school.
- Through Richmond, Francis Street was recommended as an alternative route through the town. Francis Street was recommended to be re-linemarked to provide 3.5m wide bicycle / car parking lanes on each side and 2.9m wide traffic lanes to achieve a lower traffic speed. Pedestrian refuges were also recommended every 400m along Francis Street.
- To provide an alternative route along Hawkesbury Valley Way between Moses Street to Macquarie Street, Brabyn Street was recommended. A number of pedestrian refuges were also proposed to improve safety for cyclists and pedestrians. Any future upgrading was recommended to include "stand-up bicycle lanes for cyclists as per Austroads guidelines".

Terrace Road / Kurmond Road

- Wide sealed shoulders of 1.5m to 1.8m were recommended to be provided to link Glossodia and Freemans Reach to Richmond and Windsor. It was also recommended that linemarking be improved.

Terrace Road / Kurmond Road

- It was recommended that this road connect up to routes in the Hawkesbury LGA and to Springwood via Hawkesbury Road across the Yarramundi Bridge.

Londonderry Road

- The section south of Vines Drive to the LGA's southern border at The Driftway was recommended to provide sealed shoulders on each side.

The Driftway

- The Driftway shoulders were identified as inadequate width and it was recommended that they be widened to conform to Austroads standards.

Dight Street / Percival Street

- The contra flow bicycle lane on the eastern side of Percival Street was identified as "inherently hazardous" and it was recommended that additional width be provided on Percival Street to allow shoulders on both sides. Dight Street was also recommended to provide sealed shoulders on both sides.

Rifle Range Road

- It was recommended that marked bicycle lanes be provided along the entire length of Rifle Range Road. This was envisaged to have involved some linemarking and minor shoulder works.

Windsor Road / Mulgrave Road

- It was recommended that the shared path connecting South Creek and Pitt Town Road be extended to Mulgrave Road. It was also recommended that the shoulders on Mulgrave Road be widened to accord with Austroads guidelines.

Pitt Town Road

- Sealed shoulders were recommended between Windsor Road and Pitt Town.

Lowland Bicycle Route

- A connection of local roads was recommended to provide a recreational cycle trail. A number of directional signs were also recommended to be provided.

Pitt Town Bottoms Road

- A recreational route utilising this road along with minor improvements to the road surface was recommended.

Connections over Rivers / Creeks

A number of connections were identified as hazardous to cyclists. These include:

- Windsor Bridge (Bridge Street) over Hawkesbury River.
- Fitzroy Bridge (Windsor Road) over South Creek.
- Buttsworth Creek (Wilberforce Road).

Local Links

A number of local links were also recommended in relation to specific local roads.

Bicycle Parking

A number of locations were identified where bicycle parking should be provided to assist with the increase in bicycle usage across the LGA.

Behaviour Strategy

The sub regional bike plan identified a number of initiative aimed at improving the behaviour of cyclists, motorists and students.

2.4.1 Hawkesbury Community Strategic Plan 2010-2030

The Hawkesbury Community Strategic Plan 2010-2030 includes a section entitled "Linking the Hawkesbury" which is headed by a vision statement for the Hawkesbury to be "a community which is provided with facilities and services efficiently linked by well maintained roads and accessible and integrated transport and communication systems which also connect surrounding regions". Each section of the Plan sets out a series of directions, strategies, goals, measures and milestones which are to assist Council and the community in achieving its vision, as follows:

- Directions provide a further expansion of the intent of the Vision Statement.
- Strategies identify how Council will aim to deliver what has been requested.
- Goals identify targets that must be achieved in order to reach the vision.
- Measures outline key performance guides to ensure that the vision is being achieved.
- Milestones describe the short-term (i.e. 4 years) deliverables for Council to undertake to deliver the strategies identified.

One of the strategies for "Linking the Hawkesbury" is for the implementation of the bicycle and pedestrian mobility plan. The milestones for "Linking the Hawkesbury" are outlined below:

- Work with neighbouring councils to lobby and implement transport services (2009-2012).
- Develop roads strategy, hierarchy plan and prepare and implement Asset Management System (2009-2012).
- **Implement Mobility Plan including Pedestrian Access and Bike Plan (2009-2012).**
- Lobby and facilitate provision of effective telecommunication network in the Hawkesbury (2009-2012).

More information can be found in the Hawkesbury Community Strategic Plan 2010-2030 report which is available from the Hawkesbury City Council.

2.4.2 Hawkesbury Local Environmental Plan 1989

The Hawkesbury LEP provides a framework for planning and development in the LGA.

The aims and objectives of this plan the provision of a mechanism for the management, orderly and economic development and conservation of land within the City of Hawkesbury and the provision of appropriate land in area, location and quality for living, working and recreational activities and agricultural production.

There are no specific details relating to provision of pedestrian or cycleway facilities within the LEP. However, it is noted that one of the objectives of the Zone 3(a) Business General and Zone 3(b) Business Special zones, which are allocated for all business-related land uses, is to minimise conflicts between pedestrians and vehicular movement within the zone.

3. Characteristics of Hawkesbury

3.1 Geography and Topography

The Hawkesbury Local Government Area (LGA) is located on the north-western edge of Greater Sydney. Bordering LGAs include Blue Mountains to the west, Penrith and Blacktown to the south and Baulkham Hills to the east. The LGA includes the regional commercial and retail centres of Windsor and Richmond.

The area is dominated by the Hawkesbury River and associated tributaries. As a result, the topography of the surrounding residential and commercial areas is generally flat and the Hawkesbury area experiences regular flooding events often resulting in considerable disruption to commerce and damage to agriculture and property. There are a number of existing river crossing points which act as pinch points and natural boundaries to movement between residential and commercial areas.

3.2 Population

According to the 2006 Census, the population in Hawkesbury is currently in the order of 63,000 people. It is a relatively young area, with approximately 20% of the population aged 14 years or younger. Nearly 90% of all residents are Australian citizens and 81% of all residents were born in Australia. The average weekly household income is slightly higher than the Australian Average ($1,146 compared with $1,027). Unemployment was lower than the national average (4.1% compared with 5.2%).

Census data from 2006 indicates that within the postcodes 2753, 2754 and 2756 (those that encompass the major towns within the Hawkesbury LGA) a total of 6% of households do not own a vehicle, while 29% of households own one vehicle and 58% own two or more vehicles. This equates to an average car ownership of 1.88 vehicles per household. A comparison of car ownership between the major Hawkesbury townships, the Hawkesbury LGA and other areas in Sydney is shown in Table 3.1.

Table 3.1: Car Ownership based on Census 2006 Data

Area	Do not own vehicle (% Households)	Own one vehicle (% Households)	Own two or more vehicles (% Households)	Average car ownership (vehicles per household)
Hawkesbury LGA (Post Codes 2753, 2754 and 2756 only)	6%	29%	58%	1.88
Hawkesbury LGA	9%	32%	53%	1.55
Outer Western Sydney	8%	34%	55%	1.65
Greater Sydney	13%	39%	44%	1.44

3.3 Journey to Work Data

An assessment of the Census 2006 Journey to Work data has been undertaken for those employed within and those residing in the Hawkesbury LGA. It was found for residents of the Hawkesbury LGA, a total of 1.0% and 3.8% of work trips were made by bicycle and walking only, respectively. For those whose workplace is based within the Hawkesbury LGA, a total of 1.4% and 5.1% of work trips were made by bicycle and walking only, respectively. It is interesting to note that the number of walking and cycling trips to and from work are significantly higher than trips made by bus. The results for all modes are shown in Figure 3.1 and Figure 3.2.

Figure 3.1: Method of Travel to Work – Residing in Hawkesbury LGA

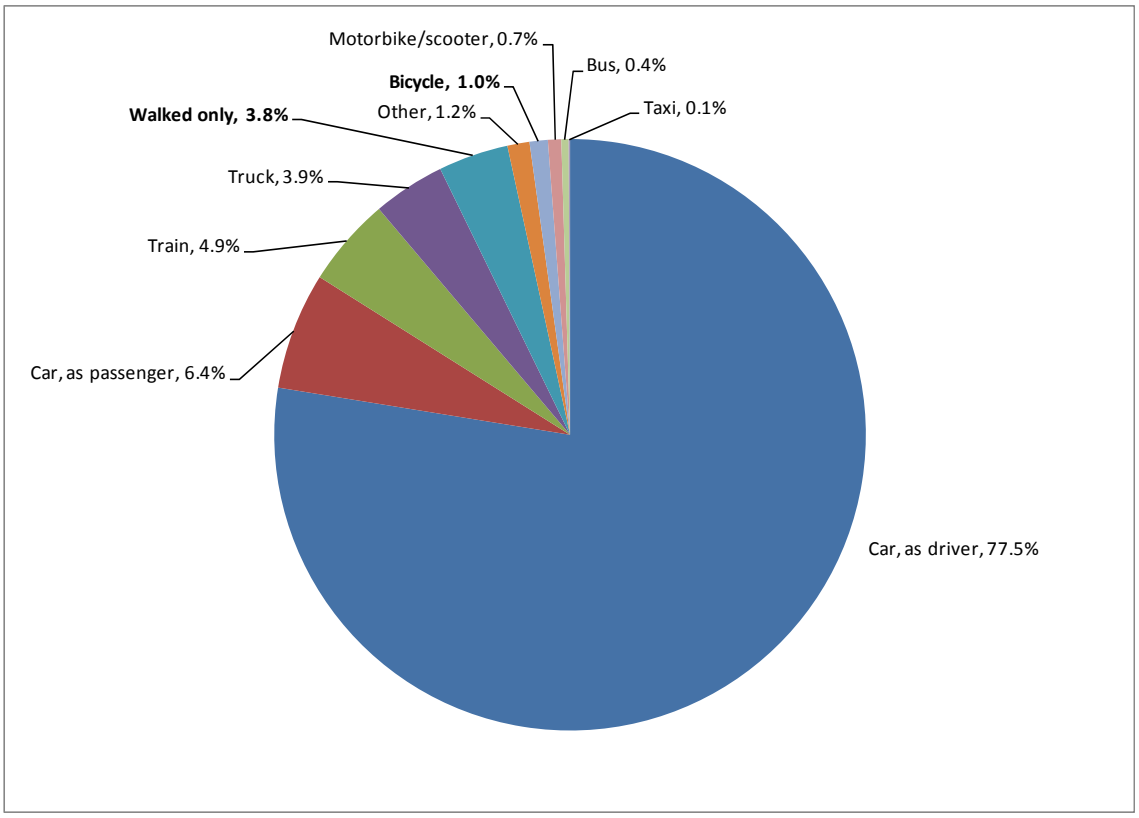
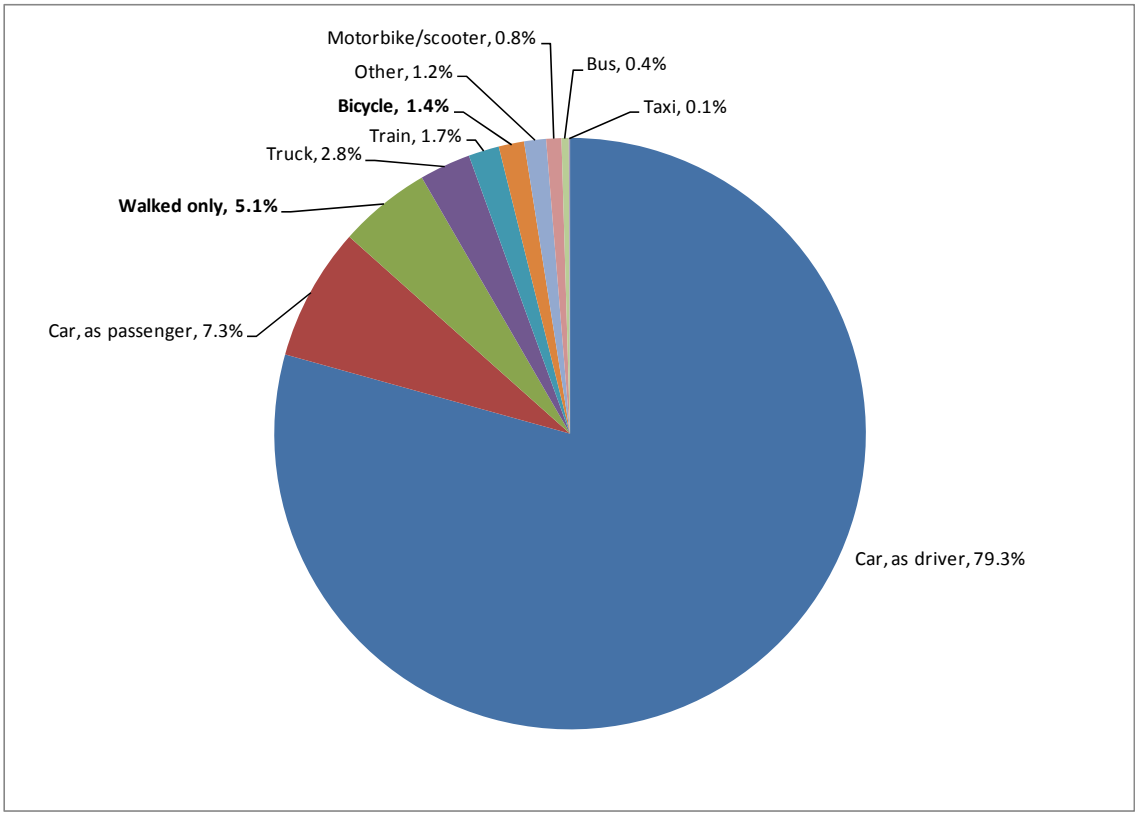


Figure 3.2: Method of Travel to Work – Employed in Hawkesbury LGA



3.4 Trip Attractors and Generators

Trip attractors and generators[1] are important for identifying the places which people will most commonly visit and are useful in determining the major pedestrian desire lines. The main trip attractors for the Hawkesbury LGA and nearby surrounds include the regional centres of Windsor, Richmond and North Richmond, smaller local centres such as South Windsor, railway stations, schools and educational institutions and recreational areas. The main trip generators are the residential land uses, including retirement villages.

Figure 3.3 identifies the main trip attractors and generators for the Hawkesbury LGA.

3.5 Road Network

3.5.1 Road Hierarchy

The functional and administrative classification of roads in NSW is:

- State/Arterial – Predominantly carry through traffic from one region to another, forming principal avenues of communication for urban traffic movements.
- Regional/Sub Arterial – Connect the arterial roads of development and carry traffic directly from one part of a region to another. They may also relieve traffic on arterial roads in some circumstances.
- Collector – Connect the sub arterial roads to the local road system.
- Local – Access roads to properties.

Figure 3.4 shows the road hierarchy within the study area.

3.5.2 Traffic Volumes

A summary of the Annual Average Daily Traffic (AADT) and Average Daily Traffic (ADT) volumes for a number of key roads are summarised in Table 3.2.

1 A Trip Attractor or Generator is defined as an activity, facility or event which attracts or generates the need for travel.

Table 3.2: Traffic Volumes in Hawkesbury LGA

Road	Two-Way Traffic Volume (RTA Roads = AADT*, Local Roads = ADT)
State and Regional Roads (Source: RTA)	
Windsor Road, Windsor	35,802**
Kurrajong Road/ Bells Line of Road (North Richmond Bridge)	27,174
Hawkesbury Valley Way, Windsor	20,890
Blacktown Road, Bligh Park	18,077
Windsor Street, Richmond	12,906
Pitt Town Road, Windsor	11,984
Wilberforce Road, Windsor	10,458
Bells Line of Road, Kurrajong	10,307
Local Roads (Source: Hawkesbury Council)	
Lennox Street, Richmond	7,765
Grose Vale Road, North Richmond	7,683
George Street, Windsor	6,798
March Street, Richmond	6,788
George Street, South Windsor	5,411
Mileham Street, South Windsor	5,384
Bourke Street, East Richmond	5,158
Francis Street, Richmond	4,922
Rifle Range Road, Bligh Park	4,901
The Terrace, Windsor	3,490
Cox Street, South Windsor	708

* Data recorded in axle pairs
** Data recorded in vehicles

Figure 3.3: Hawkesbury LGA Trip Attractors and Generators

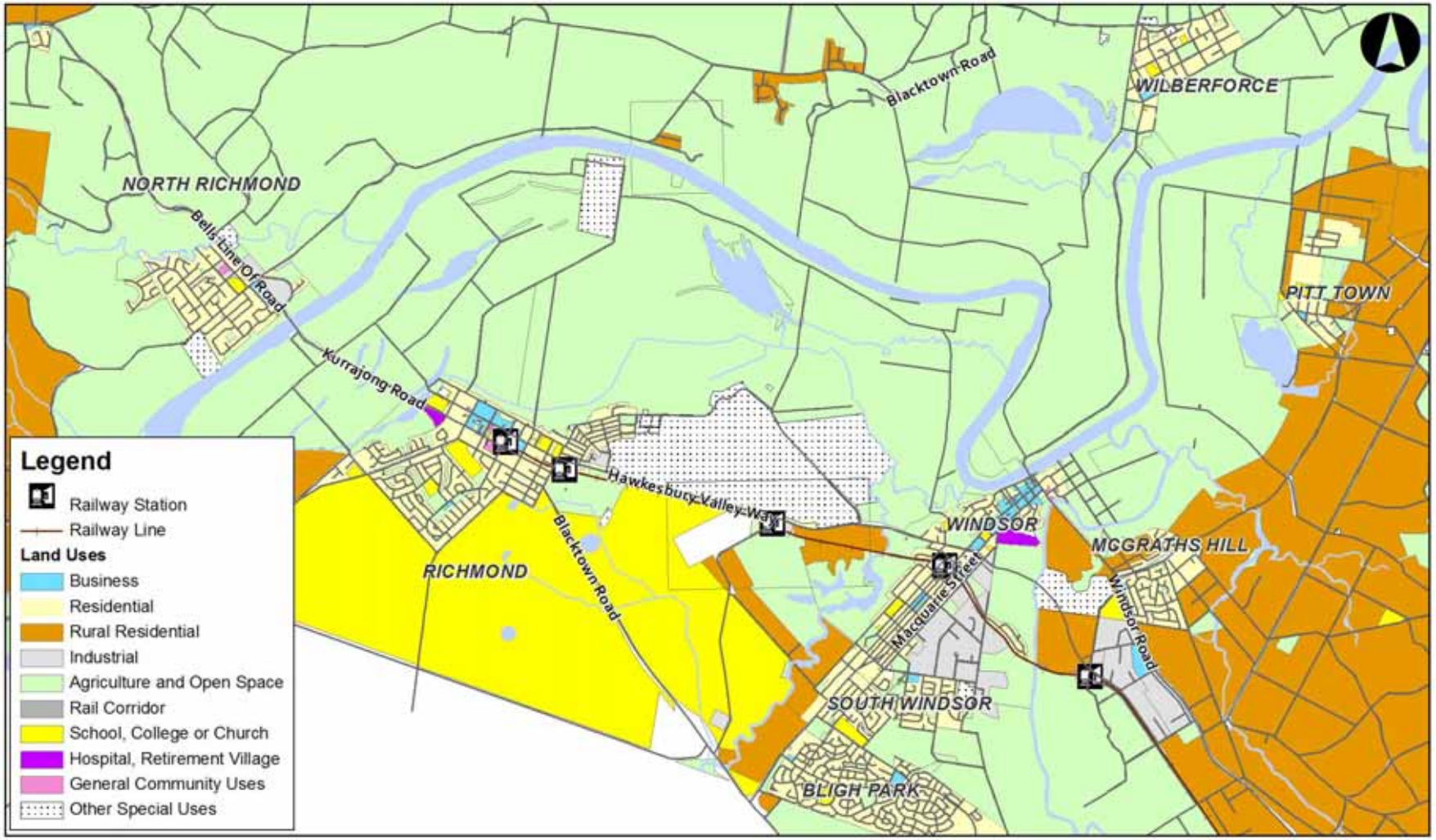
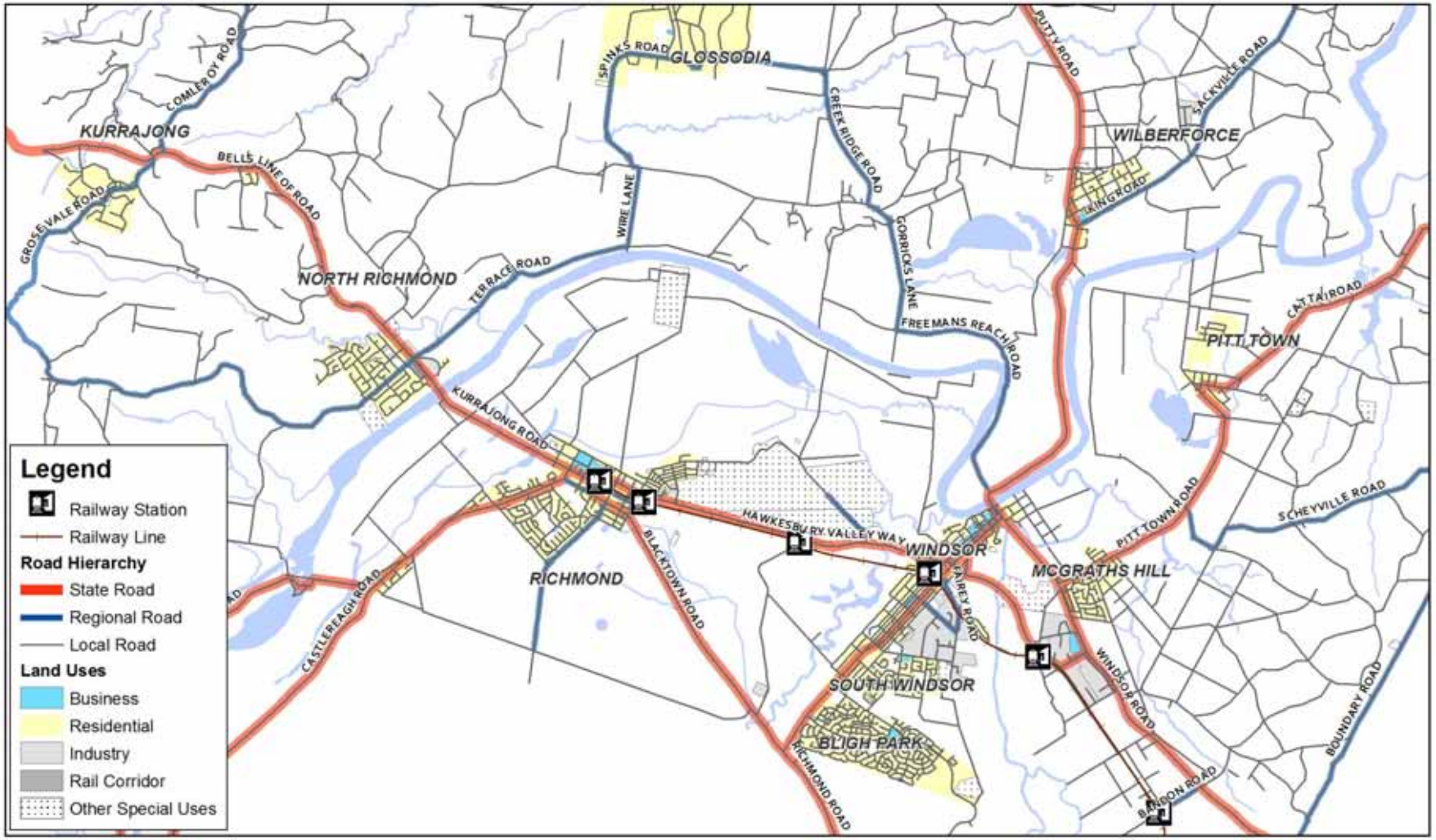


Figure 3.4: Road Hierarchy – Based on NSW Road Classification Review May 2009



3.6 Public Transport

The Hawkesbury LGA is serviced by a public transport network of trains and buses.

3.6.1 Rail

There are a total of five railway stations in the study area all of which provide access to the North Shore and Western line. These are as follows:

- Mulgrave
- Windsor
- Clarendon
- East Richmond
- Richmond.

Windsor, East Richmond and Richmond Stations are all serviced by buses, providing interchange opportunities between public transport modes.

Table 3.3 and Figure 3.5 show the results of barrier counts undertaken in 2007 at each of the railway stations within the Hawkesbury LGA. The data indicates that Richmond is the busiest station, followed by Windsor and East Richmond.

Table 3.3: 2007 Barrier Counts

Station	Total Entering (24 hours)	Total Exiting (24 hours)
Mulgrave	250	250
Windsor	690	690
Clarendon	100	100
East Richmond	420	420
Richmond	940	940

Figure 3.5: 2007 Barrier Counts

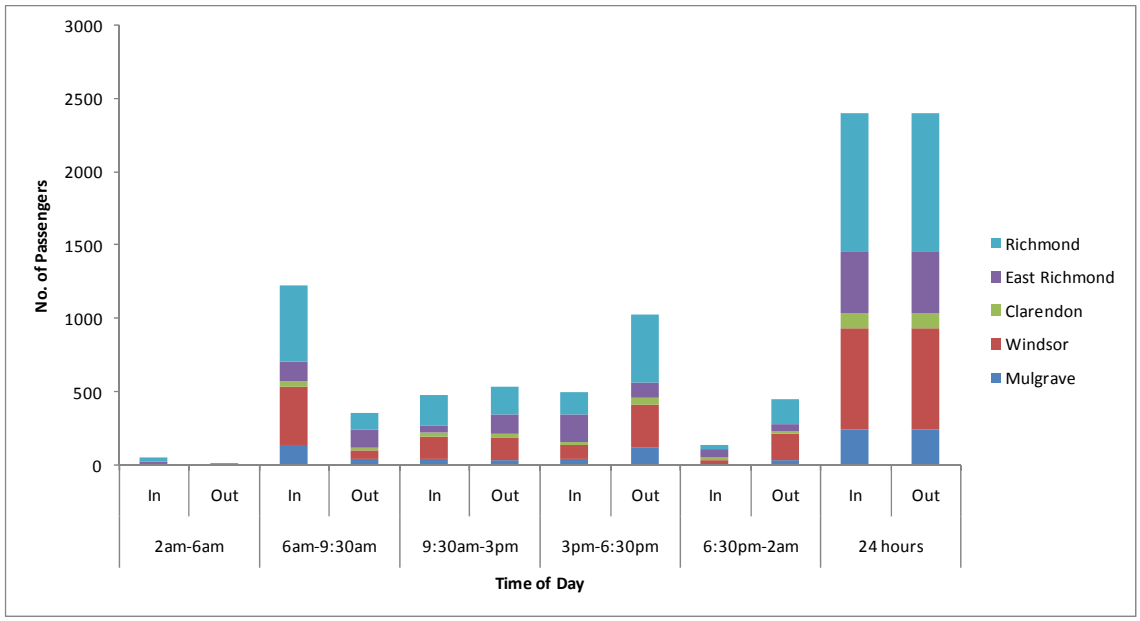


Table 3.4 provides a summary of the existing access facilities at each of the stations.

Table 3.4: Station Facilities

Station	Stairs	Ramp	Lift	Bus Stop	Taxi Rank	Car Park	Wheelchair Accessible Car Space	Bike Racks/ Lockers	Portable Platform to Train Boarding Ramp
Mulgrave	x	1:6	x	x	x	✓	✓	x	✓
Windsor	x	1:6	x	✓	✓	✓	✓	✓	✓
Clarendon	✓	1:6	x	x	x	✓	✓	x	✓
East Richmond	x	1:6	x	✓	x	x	x	✓	✓
Richmond	✓	1:14	x	✓	✓	✓	✓	✓	✓

Source: CityRail website www.cityrail.info/facilities

3.6.2 Windsor Railway Station Upgrade

Windsor Railway Station has recently undergone an upgrade with the development of a transport interchange and a commuter car park. Works are substantially completed as of March 2010, with the upgrade to be fully completed by mid 2010. The project includes a commuter car park with a capacity of 208 spaces, including 10 disabled parking spaces, new bus stops, taxi stand, kiss and ride drop-off zone and bicycle parking facilities. Pedestrian and cycle facilities are being improved as part of the upgrade to ensure appropriate access and egress for pedestrians and cyclists.

3.6.3 Buses

Bus services within the Hawkesbury LGA are operated by Westbus (ComfortDelgroCabcharge which includes HillsBus) and Hawkesbury Valley Bus Services.

A range of bus types currently operate throughout the LGA, with varying levels of accessibility. Easy access buses, or low floor buses, provide the highest level of accessibility for all members of the community, including wheelchair users and parents with prams. As part of the NSW Government's Accessible Transport Action Plan, each of the bus operators has a strategy to replace the older-style buses with easy access buses. However, this will progressively occur over a number of years and will take some time before the entire bus fleets are accessible to mobility impaired users. In 2008 approximately 30% of bus services in both the Sydney Metropolitan and Outer Metropolitan areas were timetabled as accessible.

With regard to bus stops and shelters, there are a range of facilities each with varying levels of compliance with accessibility requirements. Ideally, bus shelters should be provided with a space that allows a wheelchair or pram to be wholly contained under the shelter. There are currently a limited number of such shelters around the Hawkesbury area. It is recommended that all new shelters installed be accessible. In addition to the type of shelter, the bus stop should also include an accessible pedestrian connection into an existing footpath facility.

The existing bus routes within the Hawkesbury LGA are shown in Figure 3.6.

Figure 3.6: Westbus Bus Routes

Source: ComfortDelgroCabcharge
Note: for more detail, see http://www.yourbus.com.au/WestBus-Maps.html

3.7 Walking and Cycling Crash History

Bicycle and pedestrian crashes recorded in the Hawkesbury area for the most recent 5-year period available (January 2003 to December 2007 inclusive) were analysed as part of this study. Figure 3.7 shows the number of crashes for bicycles and pedestrians over the 5-year period. Figure 3.8 shows the location of the recorded pedestrian and cyclist crashes. More detail for Windsor/ South Windsor and Richmond is available in Figure 3.9 and Figure 3.10 respectively.

Figure 3.7: Reported Pedestrian and Bicycle Crashes by Year

In the whole of the Local Government area, there were a total of 111 pedestrian and cyclist crashes recorded, including 70 pedestrian crashes, 40 bicycle crashes and one bicycle/pedestrian crash. However, it is noted that pedestrian and bicycle crashes are known to be under-reported and may only be reported if they involve a death or serious injury.

The most commonly recorded pedestrian crash type was the near side pedestrian crash, where a pedestrian is hit by a vehicle as they emerge from the kerb to cross a road. A total of 39 crashes, or 55% of pedestrian crashes, were recorded as near side while a further 13 crashes were associated with other pedestrian crossing movements.

The most commonly recorded cyclist crash types were where a cyclist impact occurred with a vehicle travelling alongside in the same direction, either as a side swipe or turning impact. A total of 15 crashes or 37% of cyclist crashes of this nature were recorded. A further 10 crashes were associated with vehicle impacts with bicycles emerging from a driveway or footpath.

A summary of the crash types is shown in Figure 3.11.

Figure 3.8: Reported Bicycle and Pedestrian Crashes

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Figure 3.9: Reported Bicycle and Pedestrian Crashes – Windsor/ South Windsor

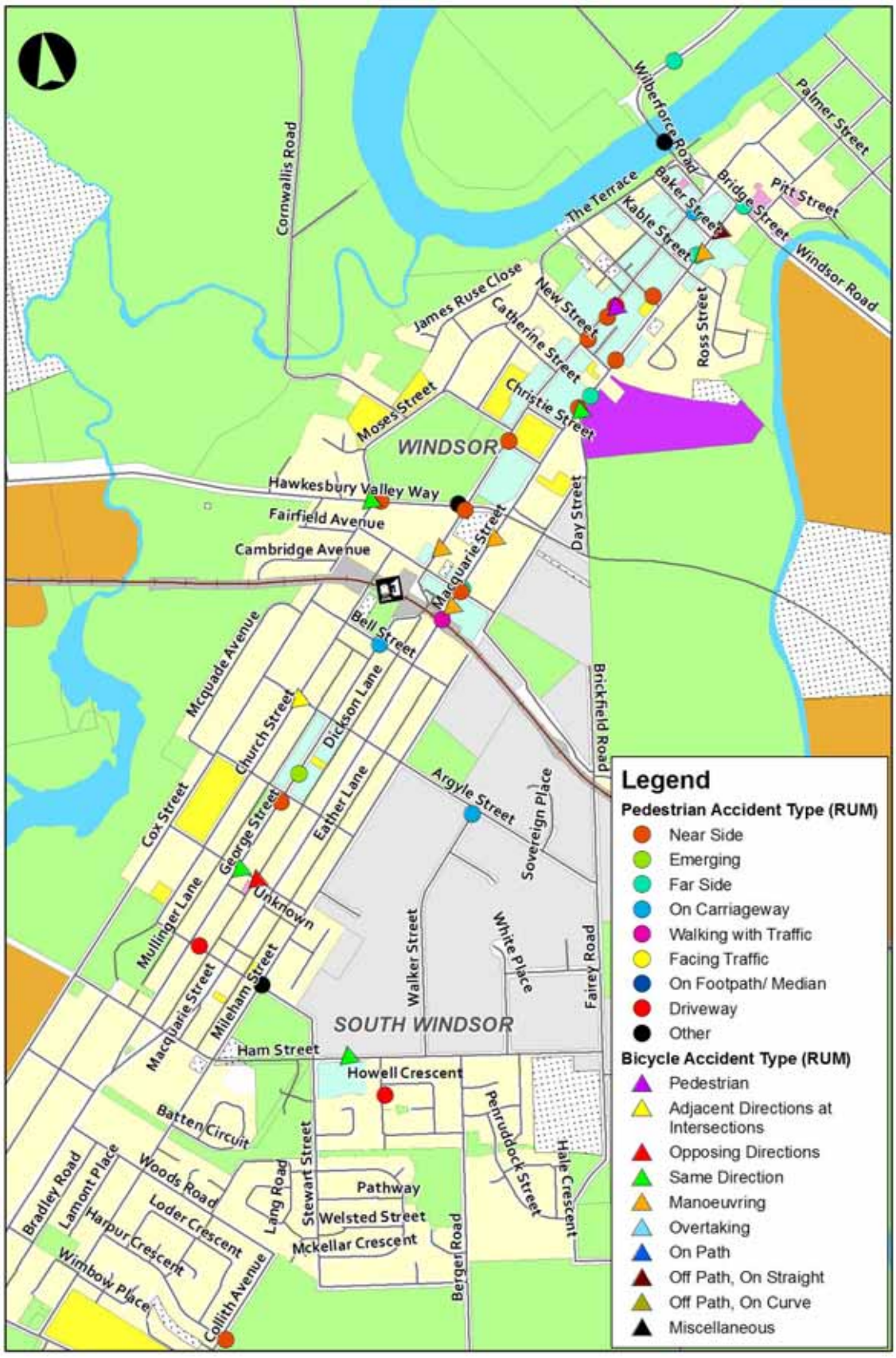


Figure 3.10: Reported Bicycle and Pedestrian Crashes - Richmond

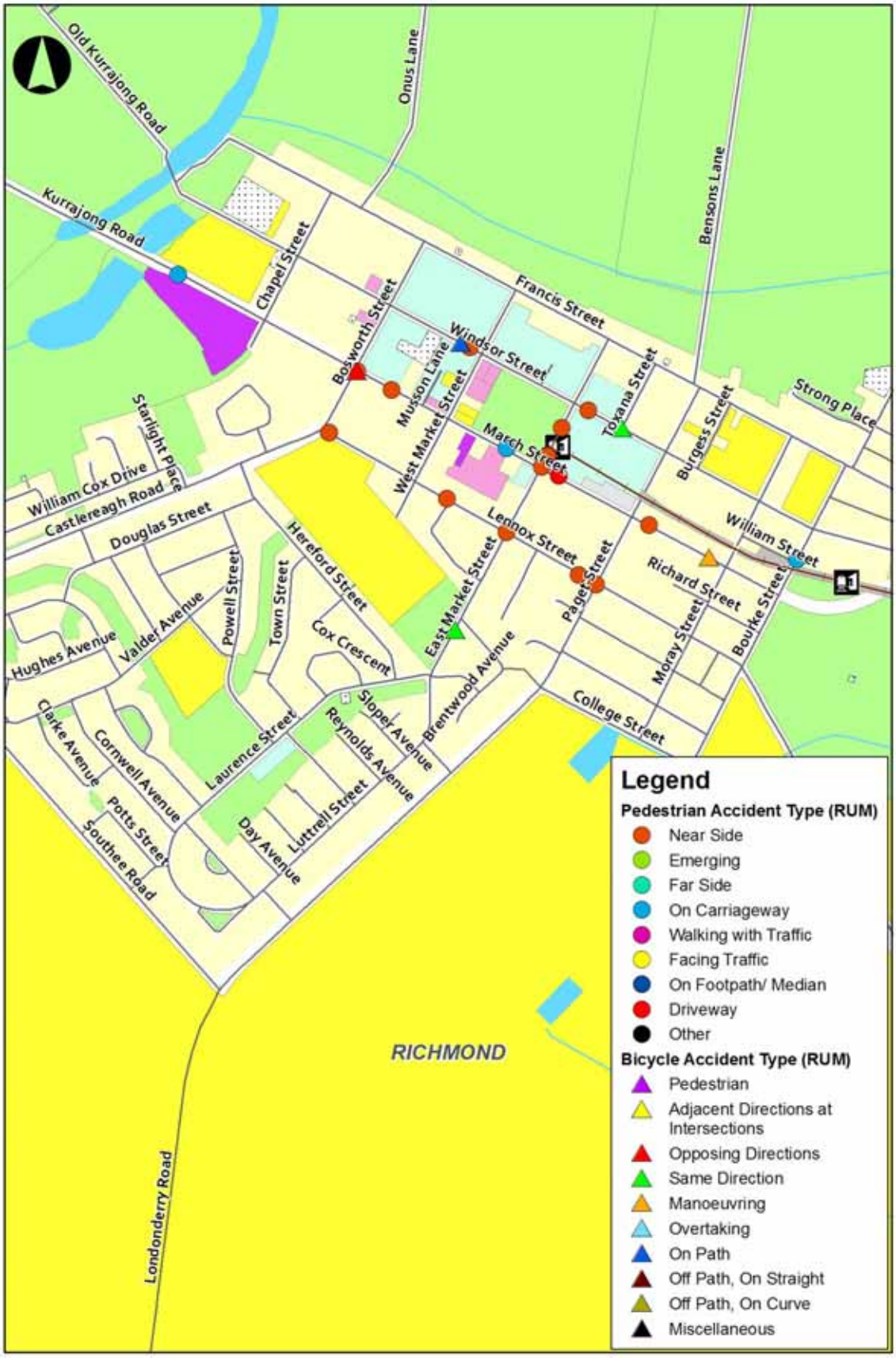
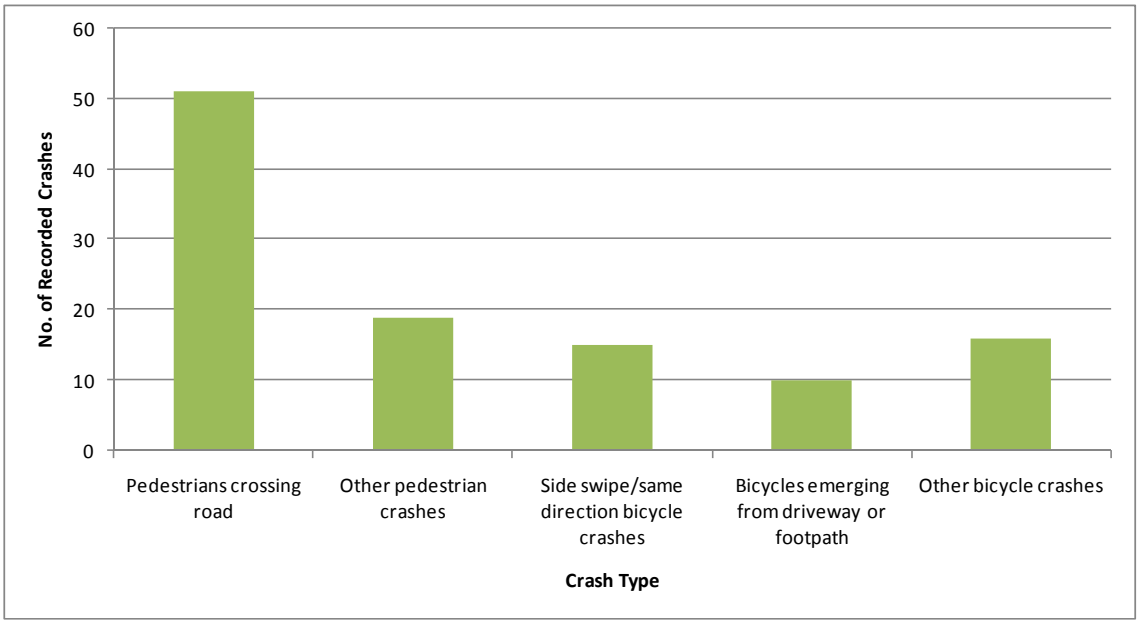


Figure 3.11: Pedestrian and Bicycle Crashes – Crash Type Summary



Although the crashes are generally spread-out throughout the LGA, some identified crash clusters and lengths are as follows:

- 6 crashes involving pedestrians (primarily near side movement type) near Richmond Station on East Market Street and March Street.
- 5 crashes (4 pedestrian, 1 bicycle) on George Street, Windsor, between New Street and Johnston Street. 4 of the 5 crashes were of a near side movement type.
- 3 crashes (2 pedestrian, 1 bicycle) on Macquarie Street, Windsor, at or near Day Street and Hawkesbury Hospital. No trend in movement type was identified.

There were a total of six pedestrian and cyclist fatality crashes within the most recent 5-year period, which were analysed in greater detail. These are summarised below:

- Bligh Park – George Street north of Hawkesbury Valley Way:
  - pedestrian crossing carriageway from the far side of the road
  - early in the evening (6:50pm)
  - street lighting in operation
  - speed noted as a factor.
- McGraths Hill – Windsor Road north of Pitt Town Road:
  - pedestrian walking along carriageway in same direction as traffic
  - late in the evening (10:40pm)
  - dark with no street lighting
  - elderly driver (77 year old female).
- Richmond – Blacktown Road west of The Driftway:
  - pedestrian crossing carriageway from the far side of the road
  - early hours of the morning (2:13am)

- dark with no street lighting
- articulated truck involved.

- Richmond – Londonderry Road north of The Driftway:
  - impact occurred while vehicle overtaking another vehicle (not the cyclist)
  - early in the evening (6:20pm)
  - cyclist travelling on incorrect side of carriageway
  - two 16 year old males on bicycle – one killed and one injured in crash.
- South Windsor – George Street north of Campbell Street:
  - pedestrian emerging (from parked vehicle)
  - late afternoon (4:40pm)
  - daylight, fine and dry conditions
  - 3 year-old male crossing the road
  - driver distracted or had vision obscured.
- Windsor – Intersection of Dight Street and George Street:
  - near side accident (pedestrian emerging from kerb)
  - AM peak period (8:55am)
  - unsignalised T-intersection
  - vehicle turning right
  - driver distracted or had vision obscured.

4. Consultation and Data Collection

4.1 High School Walking and Cycling Questionnaire

A walking and cycling questionnaire was distributed to each of the schools located within the Hawkesbury area. A total of 6 schools received a questionnaire with 2 completed responses received. The main findings of the questionnaire are as follows:

- Method of travel to school depended on the location of the school in relation to residential areas.
- Lack of facilities was considered a barrier to increased cycling.
- Parents were preventing their children from cycling to Primary School and the perception of danger continued into High School.
- The two schools both provide bicycle parking.
- The most popular transport modes used by students at the schools surveyed were walking, bus and private vehicle, with cycling ranking low as a transport mode.
- Of those schools that did note issues with the pedestrian facilities at their school, the most common issues noted related to the uneven footpath surfaces, lack of kerb ramps and kerb ramp design.

4.2 Previous Consultation Outcomes

Hawkesbury City Council has undertaken consultation with the community on a range of topics and areas during the preparation of other Council studies; in particular the Hawkesbury Community Strategic Plan. The outcomes of these surveys and workshops have been reviewed and used to inform the Hawkesbury Mobility Plan. A summary of the sources of information and the key findings are outlined below.

4.2.1 Hawkesbury Community Survey – August 2007

A random community survey of 400 residents was undertaken to assess community priorities and their attitude to the Council's performance. The respondents provided input on what is most valued about living in Hawkesbury LGA, what concerns they have about living in the Hawkesbury LGA, the importance and satisfaction of 37 different services and facilities and the importance of ten key objectives for the future development of the Hawkesbury.

The top three qualities that residents valued about living in the Hawkesbury area were the country atmosphere and lifestyle, access to services and facilities and a general love for the beauty of the area.

In terms of their concerns and living in the area, the top six reasons were identified as follows:

1. Lack of services/facilities
2. Council management/operations
3. Increasing development issues
4. Lack of public transport
5. Concern with rates
6. Crime and vandalism.

Of the 37 services and facilities that were ranked in terms of importance and satisfaction, ten were identified as requiring the most attention for improvements in the future. These were as follows:

1. Road condition
2. Storm water management and re-use
3. Reducing energy consumption
4. Generating more local employment opportunities
5. Footpaths and cycleways
6. Improving water quality
7. Improving air quality
8. Maintaining agriculture as a viable industry
9. Hazard reduction burning
10. Provision of mains sewerage.

Of note for the Hawkesbury Mobility is the ranking of footpaths and cycleways in the top five of all Council issues, which indicates that the community is keen to see improvements in this area.

4.2.2 Hawkesbury Community Engagement Strategy Workshops – August 2007

Using the Hawkesbury Community Survey results, a community engagement workshop was held to probe the major issues that arose from the Community Survey. Two workshops were held with a total of 43 residents attending. No issues in relation to pedestrian or cycleways were discussed in these workshops. In relation to spending on large projects, the residents were unable to identify which other area Council should redirect additional funds from if the infrastructure spending were to be increased, instead relying on reducing staffing levels and improving efficiency.

4.2.3 Hawkesbury Mobility Survey – February 2007

Completed in February 2007, the Hawkesbury Mobility Survey was randomly distributed to 1,000 households across the Hawkesbury LGA and an additional 70 surveys were distributed to disability, aged and bicycle user groups. This comprised 4.8% of all occupied households. A response rate of 18.5% was achieved which represented a total of 1% of occupied households across the Hawkesbury LGA.

The mobility survey showed that cycling accounted for 22%, 18% and 12% of all trips to work, school and shopping, respectively. Cycling accounted for 2%, 4% and 4%, respectively.

In relation to the issues identified as needing improvement, street lights was rated #2, footpaths #3, pedestrian crossings #4 and kerb ramps #7. On-road and off-road bicycle paths were rated #11 and #12, respectively.

"The Hawkesbury Mobility Survey asked respondent households to nominate three changes which would improve mobility in their neighbourhood. 39% of respondents listed the need for more footpaths, or the need to maintain them, as an aspect that needed upgrading in their local area to improve physical success and pedestrian or cyclist safety."

Of the physical access mobility issues that were of most concern, "providing footpaths and pathways" was ranked #2," improving safety of footpaths at night" was ranked #4, "extending network of cycle-ways" was ranked #6, "improving accessibility of Windsor/Richmond" was ranked #7, "installing kerb ramps" was ranked #10 and "installing pedestrian crossings" was ranked at #11.

The condition of footpaths and cycle ways was generally seen as staying the same. Footpaths were generally seen as insufficient with more required around urban areas. Wider shoulders and additional bicycle lanes extended to all towns and villages were also identified as an issue.

4.2.4 Hawkesbury Public Transport Survey – 2002

The survey completed in 2002 provided a number of statistics in relation to trains, buses and taxis. Information was provided in relation to the number of people using these modes across Hawkesbury, the purpose of the public transport trip and how often they used public transport, together with why people did not use each mode of transport.

4.3 Project Steering Group Consultation

GTA Consultants attended a number of project meetings with the Hawkesbury Mobility Project Steering Committee. The committee comprised Council employees from its Community Services, Planning, GIS and Engineering departments. In addition, representatives of the Bicycle and Access Mobility Committee were also part of the Project Steering Group and provided input from a mobility impaired and bicycle user perspective. These meetings were held to discuss the project details and allow the Steering Group to comment on interim project deliverables, including the summary of identified issues and the draft pedestrian and bicycle networks.

All comments and feedback received during the Steering Group meetings has been considered in developing the bicycle and pedestrian networks and the schedule of works as appropriate.

4.4 Site Inspections with Hawkesbury Valley Bicycle User Group Representatives

GTA Consultants undertook a site visit on Friday 29 May 2009 with a representative of the Hawkesbury Valley Bicycle User Group (BUG). The purpose of the site visit was to highlight some of the bicycle link opportunities and current issues with the existing bicycle facilities for consideration in developing the proposed bicycle network.

Discussions on site included the following issues and opportunities:

- Bells Line of Road and Old Bells Line of Road:
  - Extend the existing off-road shared path from Kurmond to Kurrajong.
- Rickaby Street link across Rickabys Creek:
  - Potential route combining a new shared path and the road reserve alignment between Racecourse Road to the north and the intersection of Rickaby Street and Cox Street on the south side of the creek.
  - This would require a new bridge to cross the creek.
- Racecourse Road, Clarendon:
  - Potential low traffic volume route between Blacktown Road and Hawkesbury Valley Way/ Clarendon Railway Station.
  - Would connect to the above Rickaby Street link.
- Rifle Range Road and surrounding Bligh Park streets:
  - Lack of intersection treatments, particularly at roundabouts where bike lanes disappear.
- Rifle Range Road connection between Windsor Downs and Bligh Park:
  - Link through Windsor Downs Nature Reserve along the Sanctuary Road alignment.

    - Currently an unsealed link which functions as a fire access trail and is also used by trail bikes.
- George Capper Park:
    - Narrow shared path which is suitable for recreational cyclists only.
    - There is a lack of connectivity at the two path ends (i.e. is an isolated facility).
- Old Kurrajong Road (local connection at North Richmond Bridge):
    - Some issues with maintenance, with overgrown plants and unsealed/rough surface.
- Southee Road and Castlereagh Road intersection:
    - Highlighted as a good intersection treatment (continuation of bicycle lane adjacent to a left turn slip lane).

4.5 Other Submissions

Two written bicycle and pedestrian submissions were received by Hawkesbury Council in 2009. These were considered during the development of the Mobility Plan and are summarised as follows:

- Rotary Club of Richmond:
    - A proposed concrete walking track loop to the north of Francis Street along Onus Lane, Cornwallis Lane and Bensons Lane was suggested, which would be delivered over the next ten years with support from Rotary.
- Pitt Town Progress Association:
    - Request for a pedestrian and bicycle shared path on the western side of Bathurst Street and Punt Road between the river and the shopping centre.

Bicycle route network recommendations were received from the Hawkesbury Valley BUG. These were discussed during the site visit outlined in Section 4.4.

A list of known pedestrian hazards and issues in Windsor and Richmond was also received from a member of the Bicycle and Access Mobility Committee. These have also been considered as part of the development of the pedestrian network and works schedule. This list is included in Appendix B.

4.6 Public Exhibition

The draft Hawkesbury Mobility Plan was placed on public exhibition from 23 December 2009 to 23 February 2010. During this period, a total of six (6) submissions were received from the following respondents:

- Resident of Windsor Country Village
- Hawkesbury Valley BUG
- Richmond High School
- Hawkesbury Council Strategic Planning Team
- Resident of Kurrajong
- UWS Hawkesbury.

The key themes of the comments received included the following:

- Existing footpath and cycleway deficiencies (e.g. condition, width, warning signage

requirements).

- New facilities and prioritisation.
- Reinforce links between East Richmond Station and UWS.
- Request for works to routes to LGA connections.
- Consideration of future developments, including provision of footpath and bicycle links.
- Mapping presentation and formatting.

A summary of the issues and comments raised has been provided in Appendix C. The table in Appendix C also includes GTA Consultants' response to each of the comments and the action taken in addressing the comments within the final report.

5. Existing Bicycle Network

5.1 Guidelines for Assessment of Existing Facilities

The existing bicycle route facilities were assessed against the design requirements outlined in the NSW Bicycle Guidelines (RTA, 2003) and the Austroads Part 14 Bicycles. A summary of the key design requirements that the existing facilities were measured against is as follows.

- Bicycle Shoulder Lanes (with parking):
  - Nominal 2.0m parking lane
  - 1.4m minimum bicycle shoulder lane
  - 3.0m minimum traffic lane width
  - Parking and bicycle shoulder lane separated by C4 continuity line
  - Bicycle logos centred within the bicycle shoulder lane and located/repeated at intersections as well as mid-block intervals of not more than 100m.
- Bicycle Shoulder Lanes/Sealed Shoulders (adjacent to unsealed verge on rural roads):
  - Lane width based on the posted speed limit of the road:
    - 60km/h = 1.5m shoulder width
    - 80km/h = 2.0m shoulder width
    - 100km/h = 2.5m shoulder width.
  - Bicycle logos centred within the bicycle shoulder lane and located/repeated at intersections as well as mid-block intervals of not more than 200m.
- Mixed Traffic Bicycle Routes:
  - Edge lines (E1) provided where the width of the travel lanes totals at least 5.6m (the edge lines provide longitudinal delineation for cyclists and vehicles and encourage uniform on-street parking close to the kerb line, and is relevant for travel lane widths up to 3.3m).
  - Where edge lines are provided, bicycle logos should be 1.5m from the edge line (measured to the centre line of the logo).
  - Where no linemarking is provided, bicycle logos should be located in the centre of the notional travel lane.
  - On intersection approaches where the above points do not apply, bicycle logos should be located in the centre of the travel lane.
  - Bicycle logos located/repeated at intersections as well as mid-block intervals of not more than 100m.
- Shared Path:
  - All shared pedestrian and bicycle off-road paths a minimum width of 2.0m (desirable minimum of 2.5m).
  - S4 continuity line provided on paths with restricted visibility and at intersections and S5 continuity line provided in all other situations.
  - Edge lines (E7) provided where the path width is 2.0m or greater.

- Bicycle and pedestrian logos located/repeated at intersections as well as mid-block intervals of not more than 100m.

Typical bicycle shoulder lane treatments are illustrated in Figure 5.1 and Figure 5.2. Typical mixed traffic road treatments are illustrated in Figure 5.3 and Figure 5.4.

Figure 5.1: Typical bicycle shoulder lane treatment 1

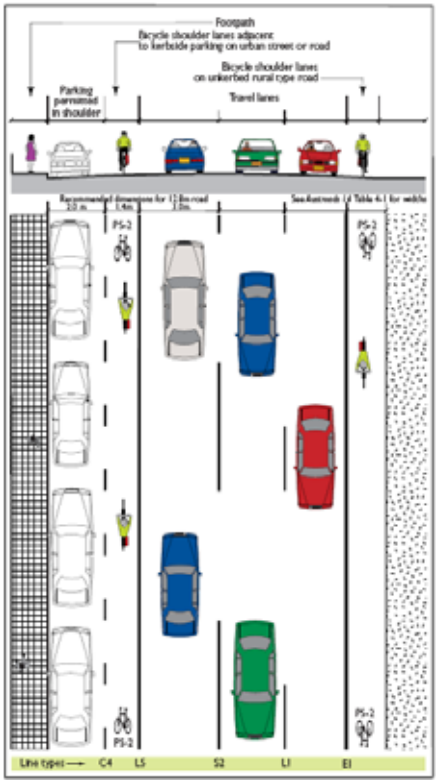


Figure 5.2: Typical bicycle shoulder lane treatment 2

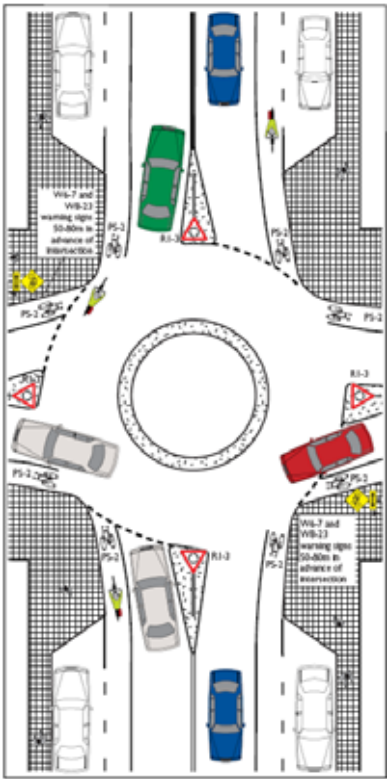


Figure 5.3: Typical mixed traffic bicycle treatment 1

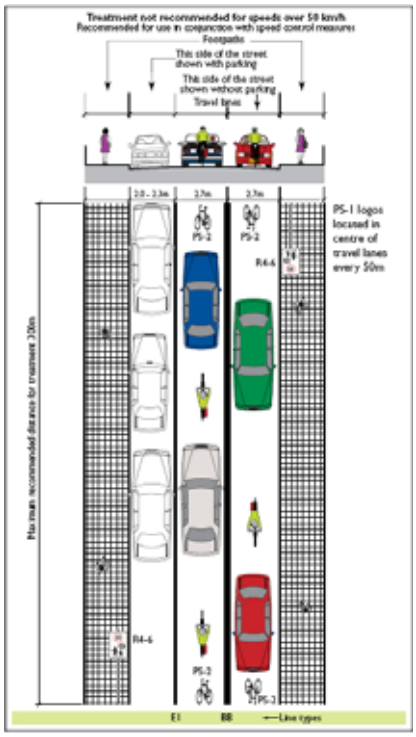
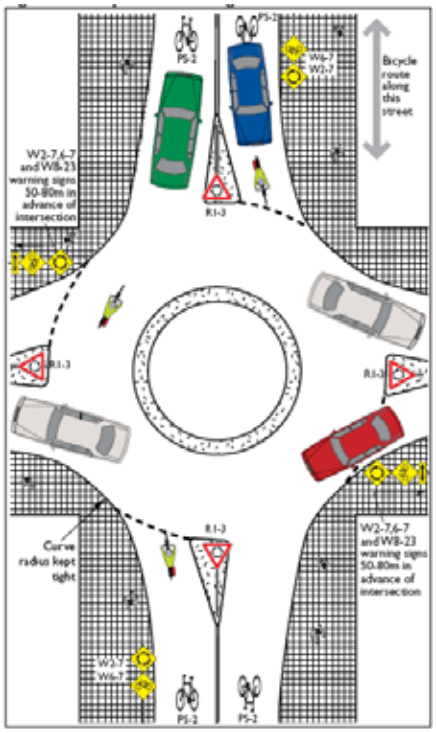


Figure 5.4: Typical mixed traffic bicycle treatment 2



Source: NSW Bicycle Guidelines

5.2 Implementation of 1997 Bike Plan and Summary of Existing Facilities

GTA Consultants undertook a review of the works schedule for the 1997 Bike Plan to determine those routes that have been implemented and those that remain as proposed (future) routes. The review also considers whether the proposed routes are still appropriate for inclusion in the latest Bicycle Plan and suggests specific treatment and action for those routes recommended to be retained as part of the bicycle network.

In addition, GTA Consultants undertook site inspections to identify the extent and condition of the existing network as constructed, based on the guidelines outlined in Section 5.1 and current best practice.

The condition assessment for each existing bicycle route facility was noted as one of the following three categories:

- satisfactory
- signage and linemarking improvements required
- inadequate shoulder/ lane/ path width.

The existing implemented routes as well as those proposed as part of the 1997 Bike Plan are shown in Figure 5.5. A summary of the 1997 Bike Plan route assessment is contained in Table 5.1 with the detailed assessment contained in Appendix D.

Figure 5.5: 1997 Bicycle Network Status

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Table 5.1: 1997 Bike Plan Route Assessment

Route No.	Route Description	GTA Consultants Comments
1	Bells Line of Road, Kurrajong Road and Richmond Road – between Kurmond Road, Kurmond, and Macquarie Street, Windsor	Existing shared path facility along Bells Line of Road between Kurmond and North Richmond Discontinuous on-road facilities through North Richmond North Richmond Bridge exists as a squeeze point with a narrow shared path on the south side that is poorly connected to the on-road facilities either side of the bridge On-road lanes existing between North Richmond Bridge and Richmond On-road bicycle shoulder lanes in Richmond but no treatment at intersections On-road lanes existing between Richmond and Windsor, but with varying width, some pinch points and a lack of appropriate intersection treatments
2	Terrace Road and Kurmond Road – between Bells Line of Road, North Richmond and Wilberforce Road, Wilberforce	Bicycle shoulder lanes are marked between Bells Line of Road and Wire Lane, but with varying width and quality No facilities from Wire Lane to Wilberforce Road Bike Plan included shoulder widening works for this route which has largely not been completed
3	Castlereagh Road – between Richmond and Penrith, including March Street and Bosworth Street in Richmond	March Street and Bosworth Street are treated with bicycle shoulder lanes, but need improved treatment of intersections Castlereagh Road between Lennox Street and The Driftway is treated with bicycle lanes in the sealed shoulders. Some improvements are required to the intersection treatments and the quality and width of the shoulders in some locations
4	Londonderry Road – between Richmond and Penrith, including Bourke Street and College Street in Richmond	Existing off-road shared path (2.0m wide) on Bourke Street and College Street Londonderry Road treated with on-road bicycle shoulder lanes, which are narrow in parts. The Bike Plan included shoulder widening works for Londonderry Road which has not been completed
5	Hereford Street connection in Richmond – including Hereford Street, Luttrell Street and Cameron Street	Mixed traffic treatment on low volume local roads currently only provided as wide kerbside lanes, with a lack of intersection treatments. Signage and delineation improvements required.
6	Blacktown Road – south of Richmond, including Windsor Road and Bourke Street	Windsor Road and Bourke Street are future off-road routes which are yet to be completed. Blacktown Road consists of bicycle shoulder lanes with generally satisfactory width and quality. However, intersection treatment is not provided at the intersection with The Driftway.
7	The Driftway – Castlereagh Road to Blacktown Road (south of Richmond)	On-road bicycle shoulder lanes are provided along the length of the route. There are some locations where the pavement is in poor condition and the shoulder lanes are too narrow. Shoulder widening works were proposed in the Bike Plan but have not been completed. Linemarking improvements are required.
8	Dight Street and Percival Street – in the vicinity of the Richmond RAAF Base	Percival Street is treated with a sub-standard two-way bicycle shoulder lane, which was identified in the 1997 Bike Plan for improvement but has not been addressed. Dight Street and Percival Street were both identified for shoulder widening works in the Bike Plan but these works have not been completed.
9	George Street, Macquarie Street and The Terrace – Windsor to South Windsor and Bligh Park	George Street and Macquarie Street between Blacktown Road and Hawkesbury Valley Way are treated with bicycle shoulder lanes, with the southern section generally on sealed shoulders and kerbside lanes with parking towards the northern end. General lack of intersection treatments. Some shoulder widening works required. Pinch point at the railway overpass. Moses Street and The Terrace in Windsor are low traffic routes suitable for on-road mixed traffic treatments. Delineation improvements are required for these two streets.
10	Rifle Range Road – George Street to Sanctuary Drive in Bligh Park	On-road cycleway currently not marked, with proposed linemarking and delineation works not completed. Need to ensure that intersections and LATM treatments have adequate provision for cyclists.

Route No.	Route Description	GTA Consultants Comments
11	Windsor Road and Mulgrave Road	The Parramatta to Windsor cycleway has been completed, which includes a shared path treatment along Windsor Road and a new crossing of South Creek. Mulgrave Road is treated with bicycle shoulder lanes adjacent to the school. Further south, the Bike Plan identified the need for shoulder widening works but these have not been completed.
12	Pitt Town Road – Pitt Town routes to the east of Windsor Road, including Bathurst Street and Pitt Town Bottoms Road	There are currently no existing cycleway facilities on this route. Sealed shoulder works were proposed for Pitt Town Road in the Bike Plan, as well as pavement upgrades to Pitt Town Bottoms Road, but these works have not been completed.
13	Wilberforce Road – Windsor to Wilberforce, including Bridge Street and Windsor Bridge in Windsor	No bicycle treatment has been provided for Bridge Street in Windsor, with a mixed traffic treatment not suitable in this location due to the high vehicle speeds and volumes. The Windsor Bridge is currently a cyclist pinch point. Wilberforce Road is treated with bicycle shoulder lanes. Shoulders are generally in good condition, but improved delineation and signage is required.

5.3 Other Bicycle-Related Issues

Site inspections also identified a list of specific site issues associated with existing and missing bicycle facilities throughout the LGA. These are summarised in Appendix E. The Mobility Plan seeks to address these issues as part of the proposed works outlined in the detailed schedules later on in this report.

5.4 Summary of Existing Network Assessment

The 1997 Bike Plan has not been effective in developing a comprehensive bicycle network for the Hawkesbury LGA. This may have been due to the lack of available Council funds for cycling infrastructure during the 1997-2009 period or similar financial constraints. By not achieving many of the physical aims of the 1997 Bike Plan the key aim of encouraging the community to take up cycling and to cycle more often has been difficult to achieve.

In terms of the physical infrastructure, the existing network generally does not provide high levels of route continuity, with missing or very narrow shoulders, intersection treatments not being provided and a lack of facilities through the town centres. However, observations indicate that there are opportunities to undertake low-cost works to enable the existing infrastructure to better accommodate cyclists both on-road and off-road. Many locations have wide shoulders and adequate pavement width and simply require linemarking, logos and signage to identify these roads as bicycle routes.

The typical treatments observed in the Hawkesbury LGA and potential opportunities for improvement are discussed in the following sections.

5.5 Typical Treatments and Improvement Opportunities

5.5.1 Bicycle Shoulder Lanes

There are bicycle shoulder lanes at several locations in the Hawkesbury LGA; predominantly in the form of a sealed shoulder on a rural-type road without kerb-and-gutter. Whilst there are many locations where the shoulder width is adequate, there are some pinch points along these routes where the shoulders become narrow or disappear, including at locations along Hawkesbury Valley Way, Windsor Road and Kurrajong Road which forms the main east-west spine through the LGA. There are also routes which have narrow or poor quality shoulders along the full length of the route, including The Driftway and Castlereagh Road.

As part of the bicycle shoulder lane facilities, there are generally very few intersection treatments, which affects the route continuity and creates gaps in the cycleway network. It should be noted that cyclists weaving in and out of the traffic stream results in a significant accident potential. Intersection issues exist where bicycle facilities are discontinuous, such as in the vicinity of Clarendon on Hawkesbury Valley Way, or the intersection treatment is the only bicycle facility along a route, such as at the Hawkesbury Valley Way and Macquarie Street intersection.

The use of the "Watch for Bicycles" sign is common on the approaches to intersections where formal bicycle facilities are not provided and a bicycle shoulder lane ends suddenly and cyclists are forced to merge with vehicles. These signs provide some recognition of the need to look for cyclists but there is the opportunity to support these signs with appropriate merge lane arrangements for cyclists or continuation of the bicycle lane where possible.

Opportunities exist for implementation of bicycle shoulder lanes where there are currently wide road shoulders that have been provided to delineate parking lanes and provide a traffic management function. These facilities typically exist on collector roads outside of town centres and in residential areas where on-street car parking is relatively low. These current treatments do not meet the requirements of the NSW Bicycle Design Guidelines but would only require updated signage and logos to make them compliant.

Some typical treatments and issues are shown in Figure 5.6 to Figure 5.11.

Figure 5.6: Percival Street – Inadequate separation of two-way facility from vehicles

Figure 5.7: Bicycle Shoulder Lane

Figure 5.8: Unsatisfactory Intersection Linemarking

Figure 5.9: Satisfactory Intersection Linemarking

Figure 5.10: Satisfactory Intersection Linemarking

Figure 5.11: Discontinued Bicycle Shoulder Lane

5.5.2 Shared Paths

There are some key shared path facilities within the Hawkesbury LGA for both recreational and transport purposes. These include the Ham Common shared path between Richmond and Clarendon, the shared path along the Bells Line of Road between North Richmond and Kurmond and the Parramatta to Windsor off-road cycleway which follows the alignment of Windsor Road.

The key issue with these facilities is that they do not link to one another, particularly the Ham Common facility which does not have appropriate links at either end to enable a connection between Windsor and Richmond. There is an opportunity to expand the shared path network between North Richmond and Windsor to provide a continuous facility between the centres and beyond. This would likely increase the use of the existing shared path facilities.There is also an opportunity to expand the shared path network as part of the development of the Great River Walk facility, which involves provision of a trail which will ultimately extend for 570 kilometres along the length of the Hawkesbury Nepean River, from the estuary at Broken Bay to its source in the Southern Highlands and beyond to Canberra.

Some examples of existing shared path treatments are shown in Figure 5.12 and Figure 5.13.

Figure 5.12: Satisfactory shared path treatment

Figure 5.13: Existing shared path – additional logos and linemarking required

5.5.3 Local Area Traffic Management (LATM)

Within local areas of the Hawkesbury LGA, traffic management devices, such as speed humps, kerb outstands and chicanes exist predominantly to control vehicle speeds. It is important that these physical measures do not act as cyclist pinch points, which have been observed in locations such as Bligh Park.

An example of a bicycle-friendly LATM treatment in Sydney where cyclists have been accommodated within the design of the LATM treatments is shown in Figure 5.14.

Figure 5.14: Cyclist Detour next to Traffic Calming Measure

5.5.4 Mixed Traffic Streets

Mixed traffic treatments are suitable for streets with low traffic volumes and speeds and require little infrastructure except for linemarking and logos as well as some route signage. However, there is a general lack of this type of treatment within the Hawkesbury LGA. An opportunity exists to expand the local cycle network for a relatively low implementation cost. An example of a mixed traffic treatment is shown in Figure 5.15.

Figure 5.15: Mixed Traffic Treatment Example

5.5.5 Laneway and Cul-de-sac Permeability

It is important that throughout the Hawkesbury LGA, permeability[2] for cyclists, as well as pedestrians, is maximised to ensure that walking and cycling are not discouraged within the LGA due to the need to take circuitous routes. In the Hawkesbury LGA there are pedestrian laneways which provide "short cuts" between streets and suburbs, such as in North Richmond, Bligh Park and McGraths Hill. These laneways commonly link to parks, major cross roads and important land uses such as schools or shopping centres.

Use of these laneways is currently being re-evaluated by Council due to community concerns regarding inappropriate use of laneways in some locations.

It is suggested that measures be taken to address the community concerns without closing the laneways, as both pedestrian and cyclist permeability would be affected if the laneways were to be closed. Such measures should aim to encourage use of these facilities, increasing the level of passive surveillance and deterring anti-social activity.

5.6 Major Constraints

It is noted that there are some major constraints to overcome in order to improve the continuity of the cycleway network. The constraints include:

- The crossing of the Hawkesbury River at the North Richmond Bridge and the Windsor Bridge.
- Road underpasses where overhead structures, including the railway line and other bridges, restrict the width of the travel lane and create a cyclist pinch point. The columns of the fixed structures limit the ability for a bicycle shoulder lane to be established.

The mobility plan seeks to identify treatments or alternative route improvements to address these barriers and constraints to local movement and mobility.

5.7 Existing Bicycle Parking

There is long term bicycle parking located at Windsor, East Richmond and Richmond Railway Stations. These facilities are shown in Figure 5.16 to Figure 5.19.

A review of the availability of lockers on www.131500.com.au indicates the following supply and availability (October 2009):

- Windsor (George Street) = 20 lockers, 1 currently available
- East Richmond (Bourke Street) = 14 lockers, 12 currently available
- Richmond (East Market Street) = 20 lockers, 3 currently available.

There is also information on bicycle parking demand at railway stations outlined in the document *Cycling in New South Wales – What the data tells us* which was prepared for the Premier's Council for Active Living (December 2008). The data, collected in 2008, indicated that in addition to the parking at bicycle lockers, there were also bicycles parked at more informal parking locations in the vicinity of the stations, with up to 16 bicycles observed at each station that were secured to rails or other fixed infrastructure, such as fences.

In terms of bicycle parking for other trip attractors, such as shops and parks, there is a general lack of suitable locations for parking of bicycles. In Windsor and Richmond, bicycles were observed being chained to street

2 Permeability is defined as the degree to which streets allow pedestrians and cyclists to take short cuts and select multiple alternative route options.

furniture and awning structures, such as in Figure 5.20 which shows a bicycle attached to a table.

In Richmond, there was a set of 12 butterfly-type bicycle rails that were identified on the north side of Richmond Park, shown in Figure 5.21. However, there are a number of issues with this arrangement, where the rails only allow one wheel to be locked which is not ideal and if knocked could result in buckled wheels, while the footing that the bicycle rails are located are obstructing a pedestrian thoroughfare. These issues could indicate why the rails were not being used at the time of the site inspections. Other formal bicycle parking locations include at the front entrance to Market Place Centre in March Street, in the car park at Riverview Shopping Centre and at the Woolworths shopping centre in Kable Street.

Figure 5.16: Windsor Station Bicycle Lockers

Figure 5.17: Richmond Station Bicycle Lockers

Figure 5.18: East Richmond Station Bicycle Lockers

Figure 5.19: East Richmond Station Informal Bicycle Parking

Figure 5.20: Example of Informal Bicycle Parking

Figure 5.21: Richmond Park Bicycle Rails

6. Bicycle Network Development

6.1 Hawkesbury Cyclist User Categories

Bicycle riders have no standard characteristics. The way a destination is accessed by them depends on the type of rider they are. This depends on a number of factors including:

- age
- level of experience
- riding proficiency
- their vehicle (bicycle type)
- fitness
- motivation for travel
- comfortable travel speed.

With reference to the above characteristics, cyclists would typically fall into one of the following key categories:

- A – Vulnerable to traffic (Children between the ages of 10 and 16, the elderly, the hard of hearing, very short trips, slow speeds (less than 15km/h), traffic shy, slower reaction times).
- B – Borderline "fair weather" cyclists (Infrequent adult cyclists, alert but lacking confidence, low to average riding skill, short to medium trips, primarily journey-to-work trips).
- C – Active adults (Speeds between 15 and 30 km/h, alert and 'road aware', average to high level of riding skill and proficiency, all trip purposes.
- D – Sports and fitness (Speeds higher than 30 km/h, prefers 'main road' environments).

In terms of increasing the number of bicycle trips made by the community, the key target group with the greatest potential for change would be the borderline cyclists. These users are likely to own a bicycle but are infrequent users, perhaps cycling with their children for recreational trips on the weekend. Such infrequent adult cyclists are most likely to prefer off-road cycle facilities for major routes, with suitable marked on-road facilities acceptable for low traffic volume roads and local links.

6.2 Bicycle Network Route Function

The proposed cycle network consists of four elements as detailed below:

- Regional Routes:
  - High level routes which traverse the Hawkesbury LGA linking the key centres of Windsor, Richmond and North Richmond and the surrounding suburbs of South Windsor and Bligh Park.
  - Connect to the neighbouring Council cycle routes, including those routes that form part of the wider RTA bicycle network.
  - Higher future cyclist volumes anticipated.
- Sub-regional Routes:
  - Connecting routes to link the surrounding village centres of Pitt Town, Wilberforce and

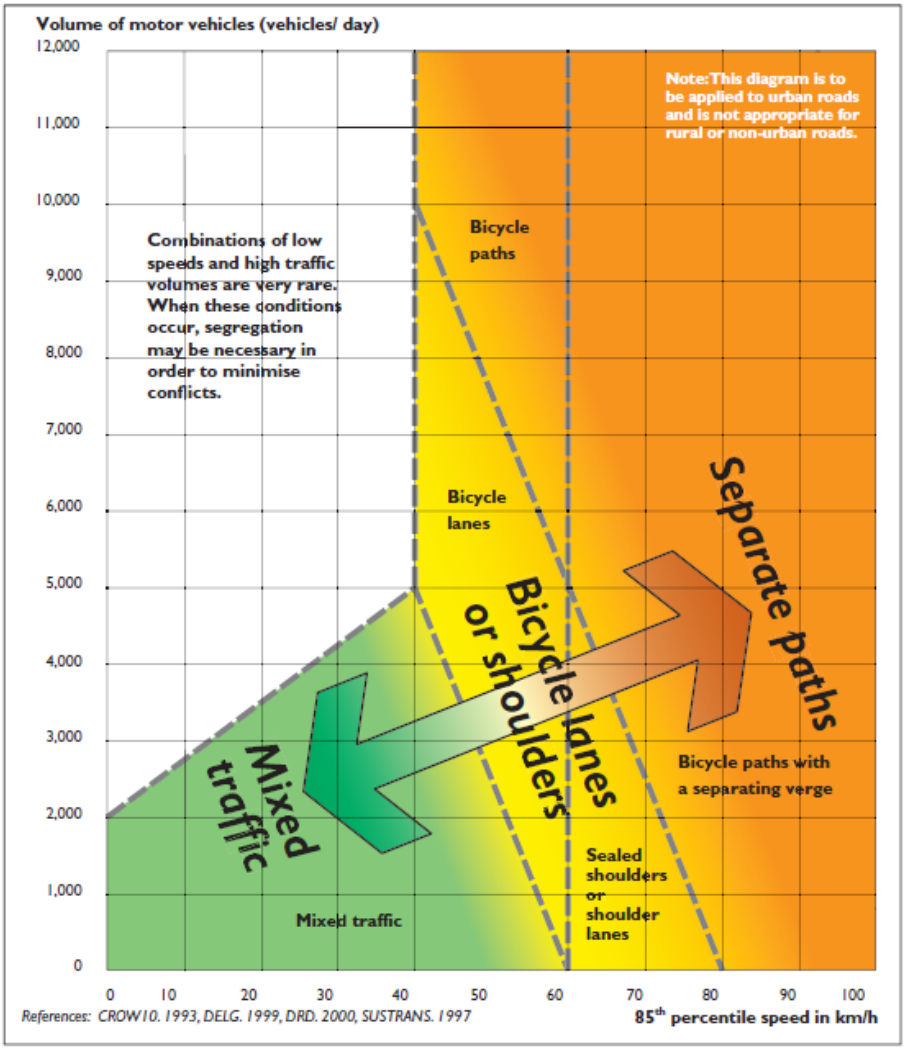
Glossodia to the nearest key centre.

- Provide access to the nearest Regional Route.
- Moderate future cyclist volumes anticipated.

- Local Routes and Links:
  - Provides links between the higher level Regional and Sub-regional network and key places of interest or population such as residential suburbs, schools and sporting fields.
  - Includes some alternative routes to the higher level Regional and Sub-regional network that are generally more scenic and have lower traffic volumes, but are less direct.
  - Includes some on-road tourism/ recreational routes as well as off-road recreational routes which provide a safe and family-friendly environment in the vicinity of parks and reserves.
  - Lower future cyclist volumes anticipated.

Figure 6.1 shows the methods of separation and the appropriate treatment based on road traffic volumes and speeds. It can be seen that separation is important of as a key to providing much needed operating space for bicycles in high speed and high volume environments.

Figure 6.1: Separation of bicycles and motor vehicles according to traffic speed and volume



6.3 Proposed 2010 Bicycle Network

The bicycle network for the Hawkesbury LGA should be based on best-practice cycle planning principles. Specifically, that it connects the main centres and trip attractors throughout the Hawkesbury LGA and provides a strategic network of routes to the neighbouring Councils. A number of criteria were considered to determine the most effective routes to include in the cycle network. These included:

- Develop and reinforce existing links between the key centres and surrounding villages within the Hawkesbury LGA.
- Connect Regional Routes into pre-determined connection points with adjoining LGAs.
- Connect local attractors to the key network through a series of local routes and links.
- Avoid, or provide alternatives to, heavily trafficked and high speed roads which may be unsafe for cyclists – as such, provide separation on high volume/high speed roads while low speed/low traffic roads may be established as a mixed traffic environment.
- Provide for the most direct and/or logical route where possible.
- Make use of existing facilities and those facilities implemented as part of the 1997 Hawkesbury Sub-Regional Bike Plan.
- Consider those routes which were proposed in the 1997 Hawkesbury Sub-Regional Bike Plan but have not yet been implemented.

It should be noted that the proposed cycle network does not imply that all other roads which are not included within the cycle network are not cycle friendly or should not be given attention should a cycle issue arise. Essentially, every street is a cycling street and therefore should be maintained or restructured to be "bicycle friendly" where possible in accordance with current standards. This is particularly important in any road construction and/or reconstruction projects undertaken by the RTA, Council or private developers within the Hawkesbury LGA.

Though bicycle routes are an essential component of a network, it is primarily the route intersections with busy roads which require detailed treatment, to show continuity for through routes and appropriate storage lanes or similar delineation to accommodate turning movements.

6.3.1 Regional Routes

A total of 13 routes have been identified as Regional Routes that would have maximum benefit in increasing the uptake of cycling as a transport mode. The key elements of the priority route network are identified as follows:

- Focus on the city centres of North Richmond, Richmond and Windsor.
- Assist in implementing a radial network from the respective centres.
- Provide good access to railway stations.
- Maximise the length of off-road facilities, particularly on roads with high traffic volumes and speeds, to maximise the safety for cyclists of all ages and abilities.
- Provide routes that are as direct as possible.
- Provide suitable treatment of cyclist movements at intersections, including roundabouts and traffic signals.
- Assist in delivering equitable town centre and public transport access to the local community.

- Promote and support active travel to and from the key town centres and surrounding residential areas.
- Provide links into adjoining LGAs.

The proposed Regional Routes are primarily high-quality off-road facilities with sections of on-road treatment in close proximity to the town centres where vehicle speeds are generally low and pedestrian activity is higher. Each of the routes is described in the following sections, shown in Figure 6.2 and summarised in Table 6.1.

Table 6.1: Proposed Hawkesbury City Council Regional Routes

Route No.	Route Name	Predominant Treatment	Route Description
RR01	Parramatta to Windsor Off-Road Cycleway (Baulkham Hills/Blacktown LGA to Mulgrave)	Off-road shared path	Existing path with satisfactory signage and delineation
RR02	Parramatta to Windsor Off-Road Cycleway (Mulgrave to McGraths Hill)	Off-road shared path	Existing with satisfactory signage and delineation
RR03	Parramatta to Windsor Off-Road Cycleway (McGraths Hill to Windsor)	Off-road shared path	Existing with satisfactory signage and delineation
RR04	Windsor CBD – Macquarie Street	Off-road shared path	Existing path, improved signage and delineation, provision for bicycles at signalised crossings to link into Windsor Town Centre
RR05	Windsor to Mulgrave via Hawkesbury Valley Way	On-road bicycle shoulder lanes (no parking)	Existing wide shoulders, provide signage and delineation
RR06	Windsor CBD – Hawkesbury Valley Way	Off-road shared path	New off-road link across Windsor, provision for bicycles at signalised crossings
RR07	Windsor to Richmond	Combination of off-road shared path and on-road bicycle shoulder lanes	Long term provision of an off-road shared path on the south side of the carriageway along Hawkesbury Valley Way and Windsor Street, on-road link into Richmond Town Centre
RR08	Richmond to North Richmond	Combination of off-road shared path and on-road bicycle shoulder lanes	Existing on-road bicycle shoulder lanes, long term delivery of Kurrajong Road and Bells Line of Road as an off-road shared path
RR09	North Richmond to Kurmond	Off-road shared path	Existing shared path, improve links at southern end into North Richmond
RR10	Kurmond to Kurrajong	Off-road shared path	Proposed off-road extension of existing path which terminates at Kurmond
RR11	Windsor to South Windsor, Bligh Park and Penrith (via The Northern Road)	Combination of off-road shared path and on-road bicycle shoulder lanes	Macquarie Street and George Street, predominantly on-road bicycle shoulder lanes, intersection improvements required and some shoulder widening
RR11a	Windsor to South Windsor via Windsor Railway Station	On-road mixed traffic	On-road link from Windsor Mall along George Street, treatments at intersection and links to station
RR12	Richmond to Bligh Park	On-road bicycle shoulder lanes	Existing bicycle shoulder lanes, some intersection treatments required
RR13	Bligh Park to Windsor Downs and Blacktown LGA	On-road bicycle shoulder lanes	Existing bicycle shoulder lanes, some intersection treatments required

Regional Route 1: Parramatta to Windsor Off-Road Cycleway (Baulkham Hills/Blacktown LGA to Mulgrave)

Regional Route 1 forms part of the Parramatta to Windsor Off-Road Cycleway, which was built as part of the upgrade of Windsor Road and Old Windsor Road, and the Parramatta to Rouse Hill T-way. The facility consists of a 3.0m wide off-road shared path located on the west side of Windsor Road between Boundary Road and Groves Avenue.

Regional Route 2: Parramatta to Windsor Off-Road Cycleway (Mulgrave to McGraths Hill)

Regional Route 2 also forms part of the Parramatta to Windsor Off-Road Cycleway. The facility consists of a 3.0m wide off-road shared path located on the west side of Windsor Road between Groves Avenue and Pitt Town Road.

Regional Route 3: Parramatta to Windsor Off-Road Cycleway (McGraths Hill to Windsor)

Regional Route 3 also forms part of the Parramatta to Windsor Off-Road Cycleway. The facility consists of a 3.0m wide off-road shared path located on the west side of Windsor Road between Pitt Town Road and Macquarie Street.

Regional Route 4: Windsor CBD – Macquarie Street

Regional Route 4 consists of an off-road shared path link on the southwest side of Macquarie Street between Windsor Road and Hawkesbury Valley Way. Local links would be provided in line with the signalised intersections at Ross Street/Kable Street and Day Street to provide access into the Windsor Town Centre. There is currently a shared path installed along this route with a width in the order of 2.0m, with some variations. Required works for this route include treatment of the signalised crossings with bicycle lanterns and general maintenance of the path including tree trimming and edge trimming.

Regional Route 5: Windsor to Mulgrave via Hawkesbury Valley Way

Regional Route 5 consists of on-road bicycle shoulder lanes along the flood evacuation route of Hawkesbury Valley Way and into Mulgrave along Groves Avenue. Hawkesbury Valley Way currently has a shoulder width in the order of 2.0m, which is adequate for a bicycle shoulder lane along a roadway with a speed limit of 70km/h. Required works for this route include logos and signage to formalise the bicycle facility.

Regional Route 6: Windsor CBD – Hawkesbury Valley Way

Regional Route 6 consists of an off-road shared path link on the north side of Hawkesbury Valley Way between Macquarie Street and Cox Street/Moses Street. This route provides links into the north-south routes for travel to the centres of Windsor and South Windsor. Required works along this route include provision of bicycle lanterns at the signalised crossings at the intersections of Macquarie Street/Hawkesbury Valley Way and Hawkesbury Valley Way/George Street, widening of existing footpath and links to existing path in McQuade Park.

Regional Route 7: Windsor to Richmond

Regional Route 7 follows the alignment of Hawkesbury Valley Way, Windsor Street and into the centre of Richmond via Bourke Street and March Street. The route extends from Cox Street/Moses Street in Windsor to East Market Street in Richmond. The objective for this route is to provide a predominantly off-road facility in the long term to cater for a larger range of cyclists, including young children and less confident cyclists.

In the short-term, prior to the construction of an off-road facility, local road alternatives suggested to

support Regional Route 7 include Francis Street (to the north of Richmond) and Dight/Percival Street. In terms of on-road facilities, Bourke Street and March Street have been selected over Windsor Street as they are lower speed and volume roads.

In the vicinity of Richmond, Regional Route 7 connects with local links for travel into the Richmond Town Centre in the north and to the UWS campus and Hobartville in the south.

Required works for the route include provision of a new shared path on the south side of the carriageway of Hawkesbury Valley Way to make use of the Ham Common section of existing shared path, treatment of the bridge pinch point at the Rickabys Creek crossing (ideally long term provision of an additional bridge structure), path widening on Windsor Street and Bourke Street, on-road bicycle lanes in March Street and some crossing facilities.

Regional Route 8: Richmond to North Richmond

Regional Route 8 follows the alignment of March Street, Kurrajong Road and Bells Line of Road. The route extends from East Market Street in Richmond and Terrace Road/Grose Vale Road in North Richmond. As for Regional Route 7, the route consists predominantly of off-road facilities in the long term to cater for a larger range of cyclists, including young children and less confident cyclists.

Local alternatives suggested to support the Regional route include Francis Street and Old Kurrajong Road. Specific pinch points that require treatment are North Richmond Bridge and the private road overpass just east of the North Richmond Bridge.

Required works include treatment of the above pinch points, improved links on the northwest side of North Richmond Bridge into the residential and shopping areas, and widening of existing footpath through North Richmond.

Regional Route 9: North Richmond to Kurmond

Regional Route 9 is an existing off-road path on the northeast side of Bells Line of Road, including crossing treatments at side roads. Required works to improve the off-road facility along this route include widening and delineation of the existing path between Charles Street and Terrace Road.

Regional Route 10: Kurmond to Kurrajong

Regional Route 10 is an extension of the existing off-road path along Regional Route 10, which currently terminates at Kurmond, on the south side of Bells Line of Road and into Kurrajong via Old Bells Line of Road.

Regional Route 11: Windsor to South Windsor, Bligh Park and Penrith (via The Northern Road)

Regional Route 11 follows the alignment of Macquarie Street from Hawkesbury Valley Way in Windsor to the intersection of The Northern Road and Blacktown Road. This route facilitates local links into South Windsor and Bligh Park and also links in the south to The Northern Road, which is the key bicycle link to Penrith. The route consists of predominantly on-road bicycle shoulder lanes with some off-road facilities. Required works for the route include intersection improvements, some shoulder widening and improvements to delineation and signage.

Regional Route 11a: Windsor to South Windsor via Windsor Station

Regional Route 11a follows George Street from Windsor Mall to Macquarie Street in South Windsor and acts as a key link to Windsor Station. The route consists of a predominantly on-road treatment where speeds and volumes are lower than Macquarie Street (i.e. Local Road instead of State Road). Required works for this route include delineation, signage and intersection treatments.

Regional Route 12: Richmond to Bligh Park

Regional Route 12 follows the alignment of Blacktown Road between Bourke Street in Richmond to The Northern Road and facilitates local links into Bligh Park. There is an existing facility of on-road bicycle shoulder lanes, with intersection improvements required.

Regional Route 13: Bligh Park to Windsor Downs and Blacktown LGA

Regional Route 13 follows the alignment of Richmond Road between The Northern Road and the Blacktown LGA boundary at South Creek. The route services the local area of Windsor Downs with links to Regional Route 11 to Windsor and Regional Route 12 to Richmond. There is an existing facility of on-road bicycle shoulder lanes, with intersection improvements required.

6.3.2 Sub-regional Routes

There are three routes that have been identified as Sub-regional Routes with the key role of connecting the outlying population centres of Pitt Town, Wilberforce and Glossodia with the larger centres of Windsor, Richmond and North Richmond. Due to the rural location of these villages, these routes are predominantly on-road using existing sealed shoulders where available. Future ongoing maintenance and repairs to widen and/or seal the road shoulders would be required to provide suitable bicycle facilities. The recommended Sub-regional Routes are shown in Figure 6.2.

6.3.3 Local Routes and Links

Local routes and links connect the higher level 'main road' network to key places of interest such as local centres, schools and sporting fields. They are generally local streets and roads which have had minor engineering improvements made to them to enable bicycle riders to get to trip destinations more easily and with less stress than on the existing road network. Local routes connect local streets to regional routes and extend the network 'web' further out into the municipality. A bicycle route passing through a local street is beneficial to residents because of the humanising influence (socialising as well as passive surveillance) and greater level of citizen supervision from people on bicycles when compared to motor vehicles.

Local route treatments include logos and signage for mixed traffic treatments in low speed/low volume residential streets, shared path routes through parks and green corridors and construction/maintenance and delineation of sealed shoulders on higher speed collector roads.

The recommended local bicycle routes and links that build upon the Regional and Sub-regional Route network and/or connect to local trip attractors and generators are shown in Figure 6.2.

6.4 Neighbouring LGA Connections

Existing and possible future connections between Hawkesbury and the surrounding LGAs have been identified in Table 6.2. Many of the future bicycle network connections have been incorporated into the proposed 2010 Bicycle Network as illustrated in Figure 6.2.

Table 6.2: Neighbouring LGA Connections

Neighbouring LGA	Connections
Penrith (Note that Penrith is the Regional Centre for the North West Sub Region)	The Northern Road Existing on-road facility with intermediate logos spaced too far apart. Shoulders provide poor riding surface, with varying and, at times, insufficient width. Shoulder works required. Preferred route between Penrith and Windsor.
	Londonderry Road No existing facility, unsealed road shoulders.
	Castlereagh Road No existing facility, shoulders vary in width.
Baulkham Hills	Parramatta to Windsor Off-Road Cycleway Shared path is completed.
Blacktown	Richmond Road (Blacktown Road) Existing facility of sealed shoulders.
Blue Mountains	Bells Line of Road Currently the formal facility only extends to Kurmond. Route is winding and steep and suitable only for experienced cyclists.
	Springwood Road/ Hawkesbury Road No existing facility, variable road and shoulder quality.

Figure 6.2: Proposed 2010 Bicycle Route Network

INSERT

6.5 Improving and Expanding Bicycle Parking

6.5.1 Key Characteristics

Bicycle parking (or lack thereof) remains one of the key barriers to cycling even though, in most cases, this is a relatively easy facility to design, fund and implement.

The most important issues to consider with cycle parking are to ensure that:

- The number of spaces provided meets the current demand as a minimum.
- It is located where people want to go.
- It is easily accessible.
- It is secure (whether passive or active).
- It is practical in terms of being able to secure both wheels and frame.

It is also important that a consistent approach be taken to cycle parking to ensure that the types of racks used are practical and suitable for the location where they are to be installed.

6.5.2 Bicycle Parking Types and Standards

In order to conform to Australian Standards (AS2890.3-1993 Part 3: Bicycle Parking Facilities) parking rails must allow the wheels and frame of a bike to be locked to it securely and also provide sufficient support to prevent the bike from falling over. The three classes of bicycle parking are:

i Class 1 facilities provide a high level of security such as enclosed individual lockers.
ii Class 2 facilities provide a medium level of security such as locked compounds with internal bike rails.
iii Class 3 facilities provide a low level of security such as external bicycle rails and racks.

Further details on bicycle parking facilities and their suggested use are in Appendix F.

6.5.3 Bicycle Parking Priority Locations

Good quality cycle parking in prominent locations will raise the profile of cycling in the Hawkesbury LGA and encourage more people to cycle. Hawkesbury Council should determine the specific locations where these future bicycle parking spaces are to be provided. However, to allow for a staged implementation of bicycle parking facilities potential locations have been prioritised.

The highest priority locations are the Windsor, South Windsor and Richmond centres along with the railway stations. Bicycle parking should also be provided at all Council buildings and parks, particularly the Council offices in Windsor.

It is important to have small numbers of cycle parking facilities located over a large number of locations, however not all the facilities need to be installed at once. Table 6.3 lists the priority locations and the types of parking suitable for each location.

Schools and businesses have a responsibility for providing parking for their staff, students and customers. Council has a role to promote cycling in the area and to assist them in developing positive parking programs. A useful reference is the City of Sydney website which includes a page on Cycle Friendly Work Places. This page provides information to assist organisations to determine the optimal number and type of bicycle facilities for a cycle friendly workplace, along with a spreadsheet to help determine the number of bike parking facilities for a workplace.

In terms of new developments, all efforts should be made to ensure that bicycle parking is provided as part of each development with reference to the recommended bicycle parking provisions in the NSW Department of Planning Guidelines for Walking and Cycling.

Table 6.3: Summary of recommended bicycle parking

General Location	Existing Parking Capacity	Future Parking Recommendations			
		No. of Additional Locations (minimum)	Rails	Bicycle Cages with rails	Priority
Retail/Employment					
Windsor Mall and George Street district	-	5	✓	-	1
South Windsor	-	1	✓	-	1
Windsor Street, Richmond	12 rails (not to standard)	3	✓	-	1
North Richmond, Bells Line of Road (south side)	-	1	✓	-	2
Bligh Park	-	1	✓	-	2
Wilberforce	-	1	✓	-	2
Pitt Town	-	1	✓	-	2
Leisure/Recreation					
Playgrounds, tennis courts, sports fields, etc	-	Approx. 20	✓	-	2
Railway Stations					
Windsor	20 lockers	1	✓	✓	1
East Richmond	14 lockers	1	✓	✓	1
Richmond	20 lockers	1	✓	✓	1
Health, Education and Private Business – To be implemented through encouragement from Council					
Primary and Secondary Schools	Various	Schools to implement	✓	✓	1
University of Western Sydney Campus	Some parking on campus	University to implement	✓	✓	1
TAFE NSW Western Sydney Institute	Some parking on campus	TAFE to implement	✓	✓	1
Hawkesbury Hospital	-	Hospital to implement	✓	✓	2
Other businesses	-	Businesses to implement	✓	✓	2

6.6 Cycle Signage Plan

In order for the cycle network to be navigated effectively, a coherent and easy to understand signage system is required, as it is a crucial part of an effective network. Hawkesbury LGA currently has very limited cycle signage, making it very difficult to navigate the routes that are currently available. The signage plan is intended to provide a framework for further development of the cycle signage requirements for the Hawkesbury LGA.

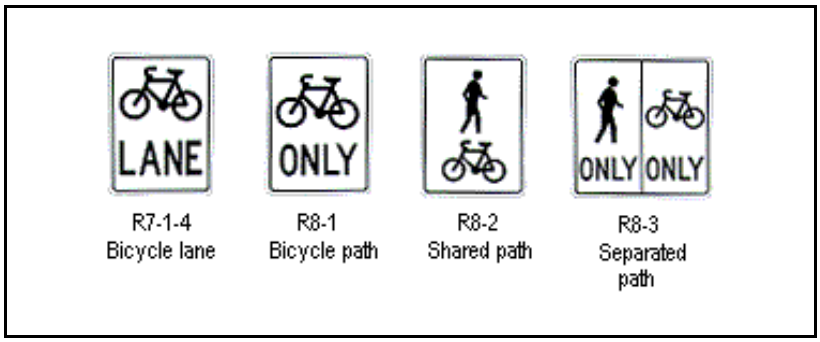
There are three categories of cycle signage used in NSW – regulatory, warning and directional. A particular emphasis is placed on the directional component of the signage requirements as this is regarded as one of

the more important components of the signage plan.

6.6.1 Regulatory Signage

Regulatory signs, with the use of linemarking, will generally define the type of bicycle facility provided. The NSW Bicycle Guidelines show the regulatory signs used for bicycle facilities, as well as optional supplementary plates. The four principal signs used are shown in Figure 6.3.

Figure 6.3: Regulatory Signage for Bicycle Facilities



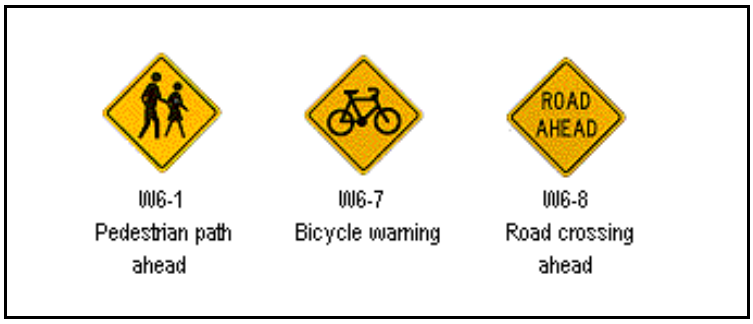
Regulatory signage is always used to define the start of a facility. Defining the end of a facility is generally not necessary, unless the facility is terminated mid-block, or at somewhere other than an intersection.

6.6.2 Warning Signage

Warning signs are diamond-shaped yellow signs and are used to warn cyclists of changed or particularly hazardous conditions. They are also used to warn other road users of bicycle movements. The NSW Bicycle Guidelines offer advice on the use of warning signs, as well as guidance signage and advisory signage.

Some of the most commonly used warning signs for the bicycle network, which may also be used on the general network, are shown in Figure 6.4.

Figure 6.4: Warning Signage Examples



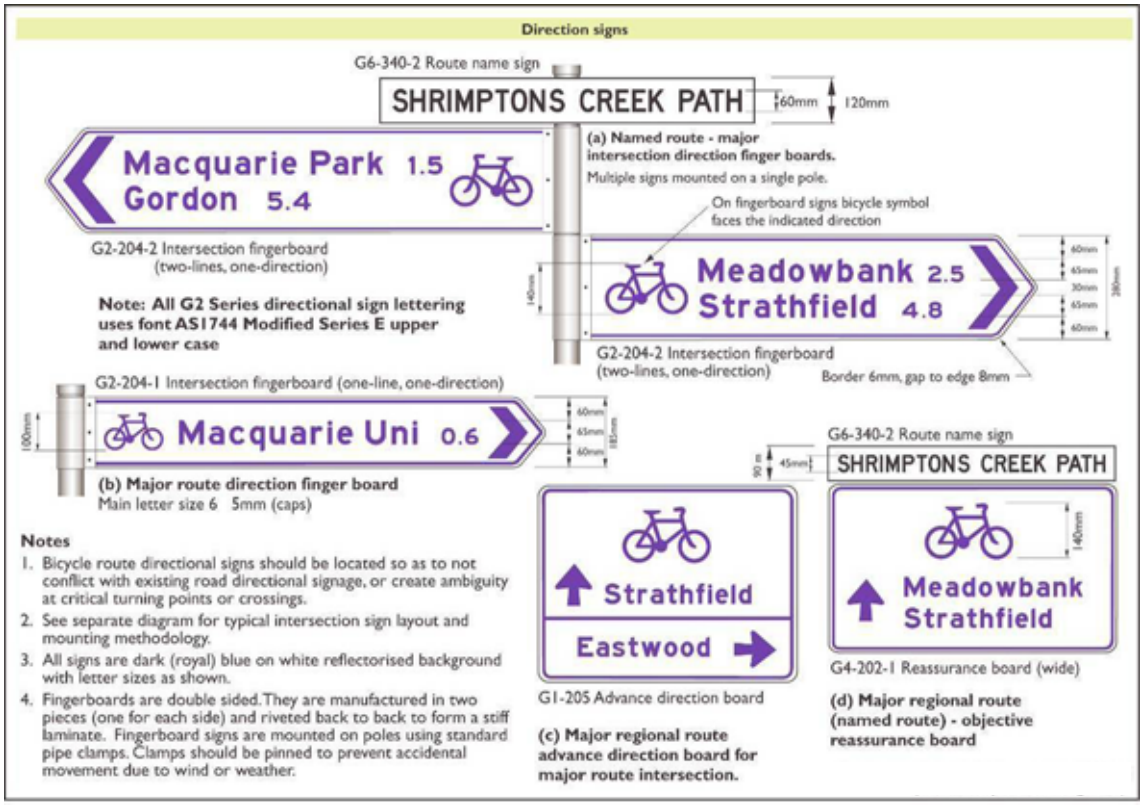
The location for warning signage will be different depending on the site, and should be placed to suit the overall design of the facility. Australian Standard AS1742.9 – Manual of Uniform Traffic Control Devices, Part 9 Bicycles Facilities and Part 2, Traffic Control Devices for General Use provide advice on recommended signage locations.

6.6.3 Directional Signage

A key element of the Signage Plan is the development of the directional signage component. It is important that directional signage is consistent throughout the network, and at all relevant intersections, to direct cyclists. Care should be taken during signage placement to avoid becoming lost in the clutter of other signs, or confusing motorised traffic, particularly for on-road routes.

Examples of typical directional signage are shown in Figure 6.5.

Figure 6.5: Directional Signage Example



Source: NSW Bicycle Guidelines

In order for the Hawkesbury Signage Plan to be most effective, key destinations should be identified and consistently used throughout the signage network including a range of regional, suburban and local destinations.

The sign examples shown above in Figure 6.5 would be suitable for signposting the Regional Routes. In terms of the local routes, signage at the intersections may include local destination signage to sports fields, schools or small shopping centres.

7. PAMP Routes

7.1 Study Area

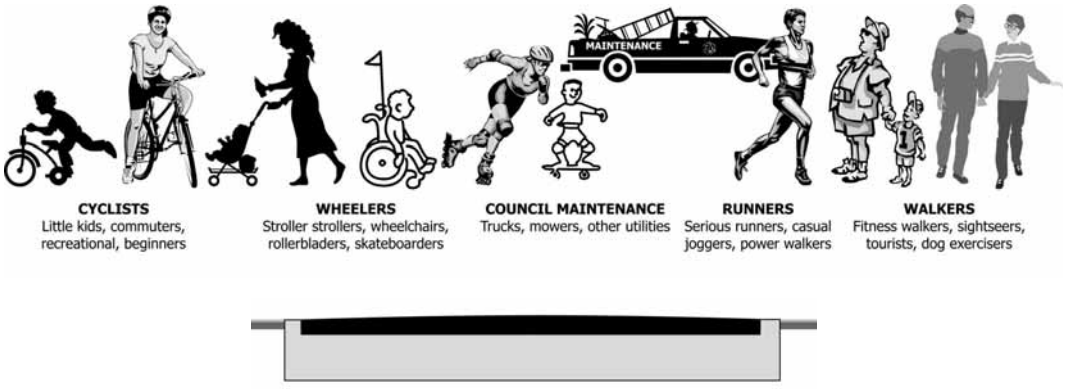
The PAMP component of the Hawkesbury Mobility Plan is focussed on the areas of North Richmond, Richmond, Windsor and South Windsor in accordance with the project brief. Suburbs and townships such as Bligh Park, McGraths Hill, Kurrajong, Glossodia, Pitt Town and Kurmond would be considered at a later date subject to additional funds becoming available.

7.2 Pathway User Categories

In NSW the vast majority of pathways are developed for shared use by pedestrians and cyclists. By nature these pathways attract a wide range of community groups as shown in Figure 7.1 and listed below:

- Commuter cyclists
- Recreational cyclists and families
- Rollerbladers
- Strollers and prams
- Wheelchairs
- Council, RTA, Sydney Water and other service vehicles
- Emergency vehicles
- Families and tourists on foot
- Older people on foot.

Figure 7.1: Pathway User Groups



7.3 Pedestrian Facility User Groups

Taking the above into consideration, the PAMP has been designed to cater for a range of user groups, including more vulnerable users such as mobility and vision impaired pedestrians. Pedestrian planning often considers a number of facility user groups to categorise pedestrians based on their age. These are noted as follows:

- Pre-school (aged 0-4)
- Infants (aged 5-8)
- Primary (aged 9-11)

- Secondary (aged 12-17)
- Young Adults (aged 18-25)
- Adults (aged26-59)
- Elderly (aged 60+).

7.4 Route Selection

The pedestrian routes for the Hawkesbury LGA should be based on best practice pedestrian planning principles. Specifically, that the pedestrian routes connect the main trip attractors and generators throughout the Hawkesbury LGA and meet the needs of the relevant facility user groups.

As mentioned previously, there are a range of trip attractors and generators including regional, district and local centres (commercial, retail), railway stations, schools and educational establishments and recreational areas. Each of these land uses attracts or generates one or more of the various facility user groups. For example, schools and educational establishments attract children and young adults while public transport nodes attract all ages and groups, including seniors. Figure 7.2 shows 400m (5 minutes) walking catchments around North Richmond, Richmond and Windsor on which this PAMP focussed.

7.5 Route Prioritisation Methodology

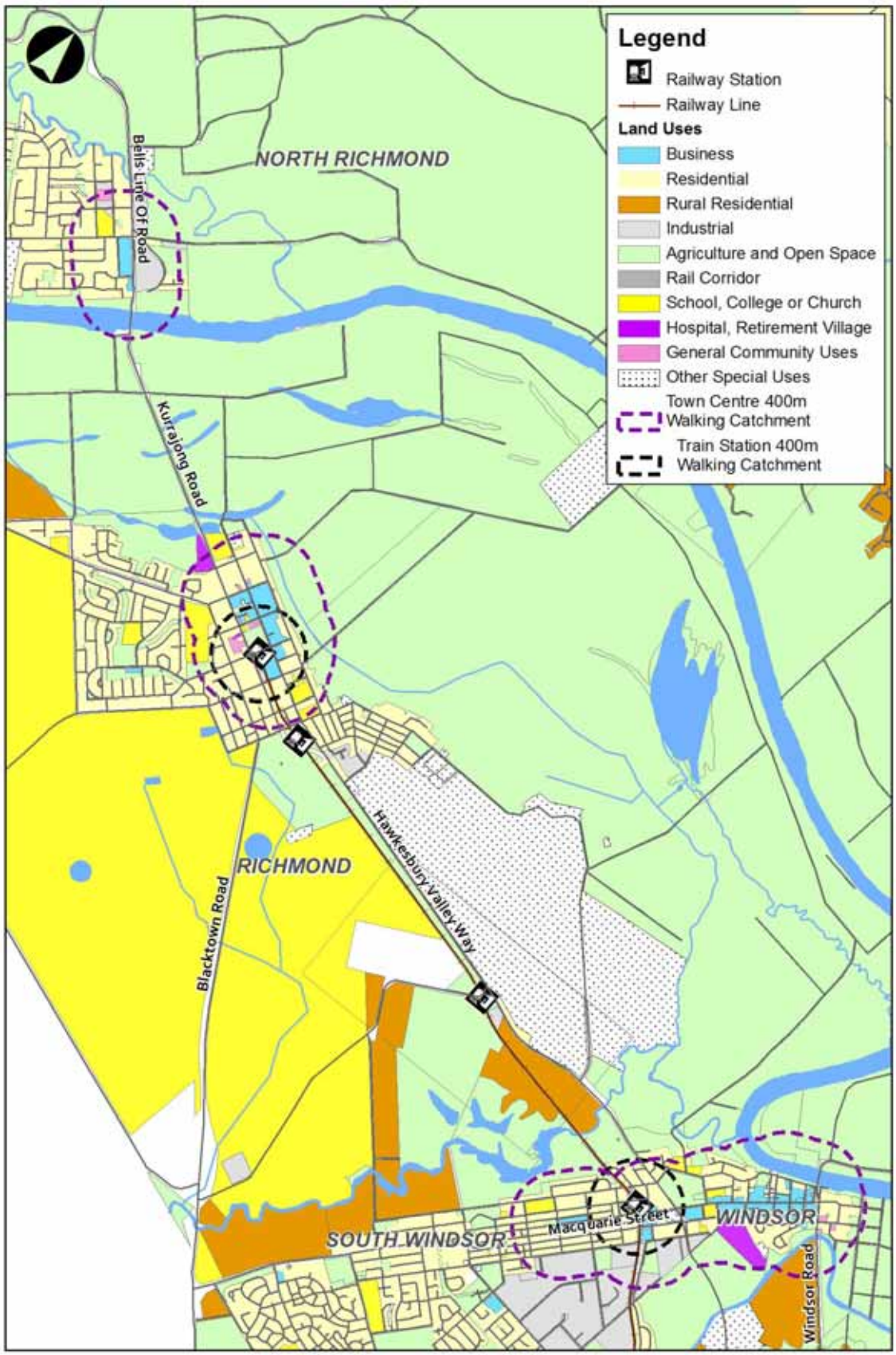
A route priority system, with the categories High, Medium and Low, has been evaluated based on the following factors:

- The proximity to a regional, district and/or local centre.
- The proximity to public transport facilities.
- The number of facility user groups serviced and the relative vulnerability of the user groups.
- Pedestrian accident history relative to other locations within the LGA.
- Anticipated pedestrian volumes.
- Various feedback from the community consultation process.

For example, a high priority route would be a route that services various user groups, particularly vulnerable users such as school children and the elderly, or a route that currently carries a large number of pedestrians and/or has a history of pedestrian crashes.

The proposed route ranking would allow limited funds to be allocated first to the high priority routes and progressively implemented to cover the medium and low priority routes as more funds become available.

Figure 7.2: Pedestrian 400m Walking Catchments (5 minutes walk)



8. Audit of Proposed Routes

8.1 Route Audit Process

Pedestrian route audits were undertaken of the study area which included the key centres of North Richmond, Richmond and Windsor and the links between these three centres, the surrounding suburbs of South Windsor, Bligh Park and Windsor Downs and areas of activity such as in the vicinity of schools, University of Western Sydney (Hawkesbury Campus), railway stations and retail areas. The key focus of the route audits was to identify any obstacles and barriers which limited the ability for less mobile and vulnerable pedestrians to move along the routes. Such barriers included:

- Lack of kerb ramps at pedestrian crossing points.
- Inadequate kerb ramp design.
- Missing or inappropriate crossing treatments.
- Damaged/slippery footpaths and paving.
- Road furniture or obstructions such as seating, electricity boxes, light poles that conflict with travel paths.
- Trees and other obstructions above footpaths.

The existing routes, together with the proposed new footpaths, are shown in Figure 8.1, Figure 8.2 and Figure 8.3 for Windsor/ South Windsor, Richmond and North Richmond respectively.

Figure 8.1: Existing and Proposed Pedestrian Network – Windsor and South Windsor

(Insert PDF)

Figure 8.2: Existing and Proposed Pedestrian Network – Richmond

(Insert PDF)

Figure 8.3: Existing and Proposed Pedestrian Network – North Richmond

(Insert PDF)

8.2 Summary of Existing Facilities – Opportunities and Constraints

The findings from the route audit have been summarised in the following sections. This discussion includes details of the identified issues, both generally around the study area and at specific locations, and also includes some opportunities for improvement. This information has been used in the development of the recommended works schedule. Full audit findings are detailed in Appendix E.

8.2.1 General Comments

Some of the recurring issues that were observed throughout the study area are detailed as follows and shown in Figure 8.4 to Figure 8.13.

- Service pits – causing problems with cracking and failure of concrete and asphalt paving within footpaths and on road pavement at crossings.
- Kerb ramps
    - Poor alignment in some cases – directing pedestrians into traffic, not in line with formal crossing points
    - Some redundant kerb ramps that should be removed at unsafe locations
    - Not all intersections/road crossings provided with kerb ramps
    - In the outer areas, kerb ramps provided without any adjoining footpath.
- Vegetation
    - Overhanging trees
    - Bushes and grass encroaching into footpath, reducing the clear width
    - Tree roots pushing up existing footpath pavement
    - Large trees along some streets limiting the ability for a footpath to be installed.
- Paved surfacing
    - Pavers need to be regularly monitored, some locations observed to have lifted.

Figure 8.4: Damaged service pit in footpath

Figure 8.5: Kerb ramps at intersection – incorrect alignment

Figure 8.6: Disjointed kerb ramps at an intersection

Figure 8.7: Kerb ramps on only one side of a street

Figure 8.8: Non-continuous footpath around pedestrian activity areas

Figure 8.9: Unsatisfactory footpath repair with deteroiation

Figure 8.10: Obstruction within footpath

Figure 8.11: Narrow kerb ramps – pedestrians directed towards traffic

Figure 8.12: Lack of connectivity between footpaths

Figure 8.13: Driveway pavement with vehicle priority at interface with pedestrian path

8.2.2 Windsor

Windsor Station

Pedestrian footpaths in the vicinity of Windsor Station are provided along George Street and Brabyn Street, with some kerb ramps provided. Ideally, all streets within a 400m radius of the station should have footpaths on both sides of the carriageway. However, there is a general lack of facilities within the 400m station radius, including a lack of formal crossing facilities.

Further site inspections needed to identify crossing desire lines in the vicinity of the station and the need for formal pedestrian crossings.

It is noted that Windsor Railway Station has recently undergone an upgrade with the development of a transport interchange and a commuter car park. Pedestrian and cycle facilities are being improved as part of the upgrade to ensure appropriate access and egress for pedestrians and cyclists.

Windsor Mall

There are existing transitions on either end of the mall at Baker Street and Fitzgerald Street. At these locations, there is currently nothing to prevent pedestrians from walking into the intersection on exiting the mall. The existing raised thresholds with marked crossings are only provided for NE/SW movements (refer Figure 8.14).

Figure 8.14: Windsor Mall

East of Bridge Street

There are very few pedestrian footpaths and facilities within the residential streets immediately east of Bridge Street. Barriers to pedestrian travel in this vicinity include Bridge Street, which acts as a major barrier to east-west pedestrian travel, and the roundabout intersection of Bridge Street and George Street, where there are no kerb ramps, no east-west crossing points in the vicinity and a major tree obstruction on the northwest corner restricting the ability to install a footpath.

8.2.3 Richmond

Richmond Station

At Richmond Station, there is a lack of direct connectivity between the car park and the station entry (via East Market Street). There are no formal pedestrian facilities within the car park, with access to East Market Street via an opening in the fence. Access to the station platform from East Market Street is acceptable, with both stairs and a ramp provided. There is generally a good provision of footpaths on both sides of roads within a 400m radius of the station, but works are required to improve the condition of existing facilities (footpaths, kerb ramps, etc).

Pedestrian connections to TAFE/UWS

There is an existing continuous footpath along Bourke Street, College Street and College Drive which connects East Richmond to the TAFE and University.

Bourke Street

There are no east-west crossing points in the vicinity of East Richmond Station and to the south of the railway line. A crossing of the railway line for pedestrians at Bourke Street is on the east side only, but there are no crossing facilities to get between the east and west sides. This is particularly an issue for travel between East Richmond Station and the commuter car park.

A new crossing is required in the vicinity of March Street to service the clubhouse, scout/guide hall, etc. A new crossing is also required to service the East Richmond commuters via a formal crossing on the north side of the railway, and/or crossing of railway on the western side of Bourke Street and a formal crossing to the south of the railway line.

Francis Street

A pedestrian footpath is provided only on the south side of Francis Street. It is important to consider implementation of a new footpath on the north side of Francis Street to the east of Toxana Street. Long term planning should consider provision of a footpath on the north side of Francis Street to the west of East Market Street towards Smith Park and Pughs Lagoon Reserve.

Bensons Lane Reserve

Bensons Lane Reserve is a large sporting complex (baseball, softball, cricket, soccer) that is not accessible by walking. The narrow roadway of Bensons Lane is also difficult for cyclists. An off-road shared path facility should be provided along the western side of Bensons Lane to accommodate pedestrian and cyclist trips, and would require structures to be installed at two minor waterway crossings.

Hawkesbury Village Hostel and Nursing Home

There is a lack of crossing facilities to north side of Kurrajong Road/March Street, with a church, cemetery and parks all located on the opposite side to the Hawkesbury Village Hostel and Nursing Home. A suitable crossing in the vicinity of Chapel Street should be provided. Ideally, an additional footpath in Chapel Street

should be provided, but this is limited by the location of large trees planted within the verge.

Other Locations

There are several other locations where there are opportunities to make improvements to the existing pedestrian network, including:

- Lack of footpath facilities within residential streets to the south of Richmond High School – should have footpaths on at least one side of the road in these streets.
- Improve treatment of pedestrian railway crossing on Moray Street – maintain link to the schools to the north of the railway line (Richmond Public School and St Monicas).
- Lack of footpath facilities within residential streets to the northeast of Richmond Public School and St Monicas – should have footpaths on at least one side of the road in these streets.

8.2.4 North Richmond

There is a general lack of footpath facilities in the North Richmond area, notably at the following locations:

- Terrace Road, Beaumont Avenue and Norfolk Place (NE part of town centre).
- Bells Line of Road – northeast side to the SE of Terrace Road.
- SW of Pitt Lane and Shortland Close through to Matheson Avenue and Keda Circuit – connecting pathways provided between properties at cul-de-sacs but no footpaths along roadways.
- Residential streets surrounding North Richmond Public School, including the Charles Street and William Street frontages and other streets to the north and west.

8.3 Proposed Pedestrian Network – Future initiatives

8.3.1 Footpaths – General Requirements

In terms of establishing the need for new footpaths or for repair of existing footpaths, the following general requirements have been adopted:

- Footpaths should generally be provided on both sides of all streets within a 400m catchment of accessible centres and major trip attractors such as schools. They should also be provided on both sides of streets that serve as key routes between trip generators, e.g. a walking route between a railway station and a university. In addition, on those streets that do not serve as key walking routes outside of the 400m catchment and up to a minimum of 800m from centres and major trip attractors, sealed footpaths should be provided on at least one side of all streets. As such:
    - Ensure there are sealed footpaths on both sides of all streets within a 400m radius of the Windsor and Richmond railway stations.
    - Ensure there are sealed footpaths on at least one side (preferably both sides) of all streets within a 400m-800m radius of the Windsor, South Windsor, Richmond and North Richmond town centres.
    - Ensure there are sealed footpaths on at least one side (preferably both sides) of all streets within a 400m-800m radius of all schools, particularly those located in close proximity to the three town centres, namely:
        - Windsor Public School
        - St Matthews Primary School, Windsor

- Richmond Public School
- St Monicas Catholic School, Richmond
- Richmond High School
- North Richmond Public School.

- Repair localised footpath damage, including issues with service pits.
- Implement maintenance schedule for trimming of vegetation.
- Address issues outlined in summary of site inspection findings.
- Treatment of footpath across driveways:
  - To overcome any issues with vehicles assuming priority when crossing a footpath, ensure that future locations construct the footpath through the driveway and not the other way around, creating a visual link between both sides of the footpath.
  - Progressively replace footpaths at existing driveways where the pavement indicates a vehicle priority.

8.3.2 Pedestrian Facilities – Windsor

The future initiatives for improving the pedestrian network in Windsor are:

- Treatment of Windsor Mall transitions at Fitzgerald Street and Baker Street.
- Ensure improvements to pedestrian safety and connectivity are implemented as part of the Windsor Transport Interchange.
- Investigate redesign of intersection of Bridge Street and George Street (e.g. signals) to accommodate greater pedestrian movement – refer to Windsor Great River Walk Master Plan for proposed treatments in the vicinity of Thompson Square and Bridge Street/George Street intersection. Note that potential future realignment of Windsor Bridge would open up Thompson Square and allow opportunities for improved east-west connection.

8.3.3 Pedestrian Facilities – Richmond

The future initiatives for improving the pedestrian network in Richmond are:

- Bourke Street – East Richmond Station and surrounds:
  - New pedestrian crossing in the vicinity of March Street to service clubhouse, scout/guide hall, park, etc, as well as East Richmond Station.
  - New pedestrian crossing directly north of the railway crossing, mainly for use by commuters in car park. Refuge crossing likely to be preferred design.
- Improve treatment of pedestrian railway crossing on Moray Street, including extension of the sealed footpaths connecting to the north side of the crossing and provision of footpath on south side of crossing.
- Provide new footpath on the north side of Francis Street to the east of Toxana Street (connecting with existing footpath opposite Richmond Club).
- Long term – install footpath on north side of Francis Street to the west of East Market Street towards Smith Park/Pughs Lagoon Reserve.
- Provide off-road shared path facility along western side of Bensons Lane from Francis Street to

Bensons Lane Reserve sporting complex. Note would require structures at two minor waterway crossings.

- Provide pedestrian crossing of Kurrajong Road in the vicinity of Chapel Street to link Hawkesbury Village Hostel and Nursing Home and the church, cemetery and parks located on north side.
- Richmond Station – It is noted that a proposal to upgrade the Richmond station interchange, including pedestrian and cyclist facility improvements, was prepared by the Ministry of Transport in 2009, but it is unclear when this proposal will proceed.

8.3.4 Pedestrian Facilities – North Richmond

The future initiatives for improving the pedestrian network in North Richmond are:

- Install footpaths in accordance with the plan (see Figure 8.3), including at the following locations:
  - Terrace Road, Beaumont Avenue and Norfolk Place (NE part of town centre).
  - Bells Line of Road – northeast side to the SE of Terrace Road.
  - SW of Pitt Lane and Shortland Close through to Matheson Avenue and Keda Circuit – connecting pathways provided between properties at cul-de-sacs but no footpaths along roadways.
  - Residential streets surrounding North Richmond Public School, including the Charles Street and William Street frontages and other streets to the north and west.

9. Implementation

9.1 Cost Estimate for Typical Items

Rates used to cost the works were obtained primarily from previous bicycle and pedestrian projects undertaken by GTA Consultants. Details of the rates used for this project are included in Table 9.1.

Table 9.1: Typical Items Cost Rates (Note: 2009 costs)

Item No.	Item Description	Rate	Source
1	New or widen existing concrete path	$100/m^2	Campbelltown City Council contract rates 2008/09
2	New or widen existing bitumen path	$150/m^2	Leichhardt Council Annual Cost Schedule for 2003/2004
3	Shared path (crushed gravel)	$42.60/m^2	RTA – NSW Bicycle Guidelines, 2003
4	Road shoulder pavement construction	$126.50/m	Leichhardt Council Annual Cost Schedule for 2003/2004
5	Road shoulder 1.5m wide bitumen seal	$69.70/m	Leichhardt Council Annual Cost Schedule for 2003/2004
6	Bicycle directional signs	$407.10/sign	Quotes for Leichhardt Council by HVS Services
7	Bicycle logos	$101 per logo	Quotes for Leichhardt Council by HVS Services
8	Bicycle shoulder lanes – signs and markings	$25.80/m	Quotes for Leichhardt Council by HVS Services
9	Mixed traffic treatment – signs and markings	$2.50/m	Quotes for Leichhardt Council by HVS Services
10	Shared path treatment – signs and markings	$10.60/m	Quotes for Leichhardt Council by HVS Services
11	Kerb ramps	$600/Ramp	Leichhardt Council Annual Cost Schedule for 2003/2004
12	Bicycle refuge islands	$10,000/refuge	Nominal amount based on GTA Consultants experience
13	Bicycle lanterns at existing signalised crossings	$1,755/pair	Verbal advice from the RTA 4 April 2005
14	Bicycle parking – inverted U-rail	$1,000 each	Information provided by South Sydney Council based on recent projects
15	Bicycle parking – bicycle cage	$35,000 each (for15-20 parks)	Based on recent installation work at Railway Stations in Perth

9.2 Methodology for Establishing Priorities

In the current political environment, there is increasing pressure on the application of limited funding across a wide range of transport-related projects. Therefore it is important to establish a consistent project assessment framework across all transport projects such that the relative merits of (for example) a small cycling project can be compared to a major highway upgrade project.

One common tool used for road projects is cost-benefit analysis. Such analysis seeks to derive a benefit-cost ratio (BCR) through valuing in current terms:

- capital project cost
- maintenance and other ongoing costs
- vehicle operating cost (VOC) savings
- time cost savings per vehicle hour

- accident cost savings
- environmental externalities (costs or benefits).

Such analysis can relatively easily be applied to cycling projects with additional economic parameters included such as health benefits. Such analysis is dependent on the availability of suitable data which can be difficult, particularly for smaller projects. Due to the wide-ranging benefits, quantification can be difficult where these involve other government sectors and indirect links, such as health benefits.

Historically, in terms of local cycling projects, prioritisation of projects has often been on the basis of cost (absolute or distance-based), ease of funding or perceived feasibility (often a measure of political or community resistance). This relatively ad-hoc approach has focused on "quick wins" at an infrastructure level, creating an under-utilised and often disjointed network.

To provide a simple yet effective method of prioritising projects where consistent quantitative data is not available, GTA Consultants has devised the priority evaluation matrix shown in Table 9.2.

Table 9.2: Priority Evaluation Matrix

Cost Estimate		Potential Benefits		
		High	Medium	Low
<$20,000*	Low	Priority 1	Priority 1	Priority 2
$20,000 - $100,000*	Medium	Priority 1	Priority 2	Priority 3
>$100,000*	High	Priority 2	Priority 3	Priority 3

* Values are indicative only.

Assessment of the potential benefits would include consideration of the following characteristics:

- Range of trip purposes serviced – commuter, school and education, shopping, recreation, etc (i.e. the greater the number of trip purposes, the higher the potential benefits).
- The percentage of the population that can access the route (i.e. routes servicing high density/built out residential areas would be able to service a higher percentage of the population).
- The type of facility and the ability for it to service the expected users. For example, facilities in the vicinity of schools require a high level of safety and would achieve greater use as an off-road route than as on-road lanes, particularly for younger children. In contrast, a route along the alignment of a major highway for the use of commuters would achieve greater use as on-road lanes where higher speeds can be maintained.

Once the relative priorities have been established, it is valuable to consider the overall feasibility of the projects or initiatives being considered. This includes engineering feasibility, political feasibility, community consultation and opinion, as well as conflicting priorities and needs. This "degree of difficulty" for implementation should avoid overlap with cost considerations where possible. Table 9.3 shows how the priorities from Table 9.2 can be translated to short, medium and long term actions through consideration of project feasibility.

Table 9.3: Action Evaluation Matrix

Priority	Project Feasibility		
	High	Medium	Low
Priority 1	Short Term	Short Term	Medium Term
Priority 2	Short Term	Medium Term	Long Term
Priority 3	Medium Term	Long Term	Long Term

9.3 Physical Works Schedules

The works schedules for implementation of the Bicycle Plan and PAMP have been prepared based on the following categories:

- Bicycle-only facilities (on-road bicycle lanes, bicycle parking, etc).
- Pedestrian-only facilities (footpath, pedestrian crossing, etc).
- Shared path facilities (along road reserves and within parks and green corridors).

To align with funding constraints, only works associated with implementing the Regional Routes from the bicycle network have been costed. The Sub-regional Routes and Local Routes and Links are included on the bicycle network map (see Figure 6.2). It is envisaged that works associated with implementing and improving these routes would be scoped and undertaken as additional funds become available. The PAMP works have been fully costed and separated into three priorities. It is likely that only the Priority 1 works would be able to be delivered with the expected funding allocation; however the Priority 2 and 3 works would also be undertaken as additional funds become available.

Each of the proposed works items was given a priority of 1, 2 or 3 based on the route priority system detailed above. A summary of the Priority 1, 2 and 3 proposals and implementation costs are indicated in Table 9.4, Table 9.5 and Table 9.6. Full detail for all works is provided in the works schedules contained in Appendix G.

Table 9.4: Works Schedule - Bicycle-Only Facilities (2009 costs)

Route No.	Route Description	Total Route Length (bicycle only and shared facilities)	Bicycle-Only Route Cost	Priority
RR01	Parramatta to Windsor Off-Road Cycleway (Baulkham Hills/Blacktown LGA to Mulgrave)	4,900m	$2,500	2
RR02	Parramatta to Windsor Off-Road Cycleway (Mulgrave to McGraths Hill)	1,260m	$2,500	2
RR03	Parramatta to Windsor Off-Road Cycleway (McGraths Hill to Windsor)	1,320m	n/a	n/a
RR04	Windsor CBD – Macquarie Street	1,080m	$10,000	1
RR05	Windsor to Mulgrave via Hawkesbury Valley Way	3,220m	$90,000	2
RR06	Windsor CBD – Hawkesbury Valley Way	390m	$25,000	1
RR07	Windsor to Richmond	5,900m	$90,000	1
RR08	Richmond to North Richmond	3,725m	$12,000	1
			$15,000	2
RR09	North Richmond to Kurmond	4,280m	n/a	n/a
RR10	Kurmond to Kurrajong	6,300m	n/a	n/a
RR11	Windsor to South Windsor, Bligh Park and Penrith (via The Northern Road)	4,460m	$195,000	1
			$180,000	2
			$170,000	3
RR11a	Windsor to South Windsor via Windsor Railway Station	2,900m	$70,000	1
RR12	Richmond to Bligh Park	4,650m	$20,000	2
RR13	Bligh Park to Windsor Downs and Blacktown LGA	4,700m	$25,000	3
			$402,000	**1**
Total			**$310,000**	**2**
			$195,000	**3**

Table 9.5: Works Schedule - Shared Path Facilities (2009 costs)

Route No.	Route Description	Total Route Length (bicycle only and shared facilities)	Shared Path Facility Route Cost	Priority
RR01	Parramatta to Windsor Off-Road Cycleway (Baulkham Hills/Blacktown LGA to Mulgrave)	4,900m	n/a	n/a
RR02	Parramatta to Windsor Off-Road Cycleway (Mulgrave to McGraths Hill)	1,260m	n/a	n/a
RR03	Parramatta to Windsor Off-Road Cycleway (McGraths Hill to Windsor)	1,320m	$1,500	1
RR04	Windsor CBD – Macquarie Street	1,080m	$85,000	1
RR05	Windsor to Mulgrave via Hawkesbury Valley Way	3,220m	n/a	n/a
RR06	Windsor CBD – Hawkesbury Valley Way	390m	$30,000	1
RR07	Windsor to Richmond	5,900m	$730,000	1
RR08	Richmond to North Richmond	3,725m	$65,000	1
			$130,000	2
RR09	North Richmond to Kurmond	4,280m	$25,000	2
RR10	Kurmond to Kurrajong	6,300m	$850,000	3
RR11	Windsor to South Windsor, Bligh Park and Penrith (via The Northern Road)	4,460m	$130,000	1
			$15,000	2
RR11a	Windsor to South Windsor via Windsor Railway Station	2,900m	n/a	n/a
RR12	Richmond to Bligh Park	4,650m	n/a	n/a
RR13	Bligh Park to Windsor Downs and Blacktown LGA	4,700m	n/a	n/a
Total			**$1,041,500**	**1**
			$170,000	**2**
			$850,000	**3**

Table 9.6: Works Schedule - Pedestrian-Only Facilities (2009 costs)

Location	Priority	Total Distance (m)	Item Cost
Windsor and South Windsor	Priority 1	3,000m	$650,000
	Priority 2	7,500m	$1,500,000
	Priority 3	3,000m	$600,000
Richmond	Priority 1	1,300m	$365,000
	Priority 2	9,000m	$1,800,000
	Priority 3	680m	$140,000
North Richmond	Priority 1	2,150m	$430,000
	Priority 2	2,300m	$470,000
	Priority 3	1,700m	$325,000
Total	**Priority 1**	**6,450m**	**$1,445,000**
	Priority 2	**18,800m**	**$3,770,000**
	Priority 3	**5,380m**	**$1,065,000**

9.4 Monitoring Program and Integration with Hawkesbury Council Operations/Processes

A program to monitor implementation of the Mobility Plan is recommended. Such a program will feed back into the ongoing development of the Mobility Plan and ideally will permit improvements and cost savings. The most important way to do this is to integrate projected pedestrian infrastructure works and programs with other Council plans and procedures. Proper and detailed planning often results in substantial cost savings to the Council and its residents when pedestrian and cycling infrastructure works can be carried out as part of major new capital works construction, periodic maintenance and infrastructure upgrades.

To ensure the maximum integration of pedestrian and bicycle infrastructure provision across all operational departments of the Hawkesbury City Council, it is recommended that:

- All pedestrian networks and recommendations for physical infrastructure improvements be included in Council's geographic information system (GIS) to ensure all future works are coordinated with other street improvements, including road resealing and maintenance works. Council are to coordinate with the RTA to ensure that this also applies to works undertaken within the LGA by the RTA.
- Key council staff be progressively encouraged to attend RTA training courses "Designing for Bicycles and Pedestrians" for technical staff and "Bicycles and Pedestrians for Managers" as part of their normal training requirement.
- Review Council's road and path based engineering standards to ensure that pedestrians and cyclists are always included and implicitly planned for. This is to ensure that facilities which are potentially hazardous to pedestrians and/or cyclists are not inadvertently installed. This applies to such features as road lane widths, intersection layouts, path clearances/widths, standard LATM designs, etc.
- Inclusion of provision for walking and cycling in all future council plans and developments.
- Council review its current planning policies to include provision for pedestrian and cycling requirements in development control plans (DCPs) and local environment plans (LEPs) for new and modified developments as detailed in the Planning Guidelines for Walking and Cycling (DoP 2004). Such provision will include but not be confined to the provision of parking and end of trip facilities, access to buildings and developments and the requirement for walking and cycling to be included in site/place/workplace-based transport plans.
- Develop internal process and procedures whereby all Council departments can coordinate and support the development and delivery of their separate walking and cycling programs and projects.
- Develop a Hawkesbury-based hazard reporting scheme to ensure infrastructure defects are fixed promptly and efficiently in response to pedestrians' needs. Whilst there are a range of options used by other Sydney Councils, the recommended system would be the "Report a Hazard" online system. More information can be found at www.reportahazard.com.au.
- Implement a regular cycleway maintenance program to ensure that on-road and off-road bicycle facilities are kept in good repair.
- Continually monitor the footpath network to ensure that footpaths are kept in good repair.

9.5 Statutory Planning Requirements for Pedestrian Facilities

The provision of pedestrian facilities as part of new development approvals can be regulated by a number of Council planning instruments, including:

- Local Environmental Plan
- Various Development Control Plans
- Section 94 Contributions Plan
- "Standard" consent conditions.

In addition to the above Council planning instruments, the Planning department within Council should ensure that future developments make allowance for through ways at the end of cul-de-sacs and easement allowances for tracks.

The NSW Planning Guidelines for Walking and Cycling (DoP 2004) provides useful information to assist in this process. There are strong planning guidelines for pedestrian and cycling catchment mapping, which help determine urban densities and thus the viability of businesses and community facilities within walking and cycling range (refer Figure 9.1).

Figure 9.1: Planning NSW Pedestrian Catchment Mapping

9.6 Funding Sources

The recommended bicycle network plan proposes high quality infrastructure in line with contemporary community aspirations for bicycle use. There are a number of funding programs which may provide the additional financial support necessary for implementation of both the physical infrastructure and the related social plan to meet current and future community needs.

There are two websites that provide further detail:

http://www.cyclingresourcecentre.org.au/7/Funding

http://www.cyclingpromotion.com.au/content/view/28/51/

Department for Infrastructure, Transport, Regional Development and Local Government (DITRDLG)

- AusLink Roads to Recovery Program
  In November 2000, this program was introduced as a single intervention by the Commonwealth to address the specific problem of local roads reaching the end of their economic life, and their replacement being beyond the capacity of local government. Over four years from 1 July 2005, the Australian Government, will provide additional funding of $1.23 billion. This is in addition to its untied Financial Assistance Grants to councils for roads and other purposes. On 8 May 2007, the Australian Government announced that it will further extend the Roads to Recovery Program until June 2014. Funding for the program will also be increased from $307.5 million a year at present to $350 million a year from 2009-10. This program has been used by many Councils throughout Australia to fund bicycle infrastructure development and upgrades. It is administered by the Commonwealth Department of Transport and Regional Services.
- AusLink Black Spot Program:

  The Black Spot program began in 1996-97. In recognition of its success the Australian Government has now extended the program until 30 June 2014 and Black Spot funding under AusLink 2 will be increased to $60 million annually from 2009-10 to 2013-14. That is an increase of 33 % on current program funding. The government will also provide $45 million for black spot projects in 2008-09 as part of its current AusLink program. This program has been used by many Councils throughout Australia to fund bicycle infrastructure development and upgrades. It is administered by the Commonwealth Department of Transport and Regional Services.
- Infrastructure Australia fund; is a new, national approach to planning, funding and implementing the nation's future infrastructure needs. It will provide advice to Australian Governments about infrastructure gaps which can include cycling infrastructure. (www.infrastructure.gov.au/department/infrastructureaustralia).
- Sustainable Cities.

RTA

The RTA's Bicycle Program allocates approximately $5 million annually to NSW Council bicycle projects, which includes over $1 million for Sydney Metropolitan Councils. The dollar for dollar funding is to assist Councils with the development and implementation of their local bicycle networks. Detailed information on RTA funding for Sydney Council projects is available from the website www.rta.nsw.gov.au. Programs for potential funding include:

- Regional Road Block Grants: The RTA assists Council with the costs for maintaining regional roads. For the maintenance, construction, resurfacing, shoulder widening and upgrades of regional roads, walking and cycling infrastructure can easily be included within this cost.
- Black-spots and "black-areas": The NSW Black Spot Program is funded by the NSW government and is also part of the Australian Government's AusLink Black Spot Program. Its objective is to reduce the occurrence and severity of crashes at known locations by installing cost effective treatments. This funding benefits walking and cycling infrastructure by increasing safety and reducing crash rates at intersections and other known crash locations.
- NSW Bike Week Funding: This program is a government funded initiative that raises the profile of cycling as a healthy, easy, low cost and environmentally friendly transport alternative for driving short trips. RTA funding is only provided for the promotion and advertising component of an event's budget. Funding is not fixed and will be assessed and valued independently.
- Co-Funding Program for bicycle infrastructure: the Government recognises that most cycling takes place on local roads. The development and implementation of local cycling networks is important to increase cycling within communities. The Government provides dollar for dollar funding to local councils which assists improving and developing cycling infrastructure within the Local Government Area.
- Bicycle User Support: the program supports the use of cycling through research, training and promotion. Funding of bicycle use promotions, bike plan preparation, development and production of cycleway maps, research into bicycle facilities and the implementation of bicycle training facilities can increase the number of cyclists and improve skills and knowledge on bicycle facilities design and implementation.

Other funding for pedestrian infrastructure delivery include:

- Funding to assist Councils in the implementation of PAMP actions.
- Road maintenance/management program.
- Road safety.

Department of Planning

The Metropolitan Greenspace Program (MGP) has provided over $15m to over 300 projects since 1990. It allocates over $1 million annually to Councils on a matching dollar basis and last year provided almost $1.5 million to Councils. The key objective of the program is to assist local government in the development and planning of regionally significant open space and to enable more effective use of these areas by the public. The program aims to promote partnerships between State and Local Government.

Department of Environment, Climate Change and Water

Various grants can be awarded for projects addressing climate change, and reducing Australia's green house gas emissions. Councils can apply for the grants up to $50,000. Cycling infrastructure can be incorporated into projects as a way to reduce green house gas emissions by reducing car dependency and increasing

cycling.

DECCW – Environmental Trust

The Environmental Trust is an independent statutory body established by the NSW government to support exceptional environmental projects that do not receive funds from the usual government sources. The Trust is empowered under the Environmental Trust Act 1998, and its main responsibility is to make and supervise the expenditure of grants. The Trust is administered by the Department of Environment and Climate Change.

Sport and Recreation

Grants and financial assistance: The NSW Sport and Recreation department provides funding for local councils to build and upgrade sporting facilities. This could include cycling tracks and training facilities. The 2008-2009 Capital Assistance Program can provide up to $30,000 for each local government and can be used for cycling sport and recreation facilities throughout the LGA.

Council

- Annual budget allocation for walking and cycling infrastructure.
- Developer contributions: until recently Council has depended upon Section 94 funding from developers to provide resources for construction of cycle ways, along with a range of other community facilities. This source is in doubt pending the outcomes of a review into the application of Section 94 levies on developers in NSW.

Business and Clubs

- Advertising (pedestrian bridges, bus shelters): Revenue from business and clubs in the local area can provide funding for advertising within the LGA. These advertisements could be cycling related by providing cycle maps and information as well as encouragement advertisements.
- Clubs NSW – CDSE funding: Clubs that earn over $1 million annually in gaming machine revenue provide funding for community projects and services, and in turn receive dollar-for-dollar gaming tax deductions. In 2008, clubs reported CDSE expenditure of over $58 million across New South Wales. This funding can be used to implement cycling encouragement initiatives like cycling programs, workshops and distributing maps. (www.clubsnsw.com.au/AM/ContentManagerNet/HTMLDisplay.aspx?ContentID=11935&Section=Community_Support).
- Developers can also choose to fund local cycling infrastructure in the local area. If a major development is occurring (such as a Shopping Centre), bicycle parking facilities and safe bicycle routes around the centre can be integrated into the plans to increase cycling and encourage cycling for short trips.

Cycling Promotion Fund

- Innovative projects to promote and encourage cycling: In the past the Cycling Promotion Fund has funded a number of innovative projects that promote and encourage cycling to assist in developing the evidence base that such projects are effective in encouraging and promoting cycling. CPF assists by listing potential funding sources for cycling encouragement and promotion programs.
- Continued advice and guidance on the development of effective cycling programs and initiatives.

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Appendix A

Global Policy Issues

Global Issues

Healthy and active transport includes walking and cycling as well as public transport, which invariably involves walking to and from bus stops and rail stations. There is substantive evidence that healthy and active transport provides a strong and effective policy response to five global public policy issues, including:

- Transport Equity
- Congestion
- Public Health
- Climate Change
- Peak Oil and Petrol Prices.

Investment in physical, social and organisational infrastructure to support healthy and active transport can deliver positive benefit: cost ratios for each of these five global policy issues individually, especially when considering externalities. The real benefit of investment in infrastructure for healthy and active transport, however, lies in recognition of the cross-disciplinary benefits.

The following sections detail the five global public policy issues referred to above.

Health Benefits

Physical inactivity is one of the major causes of ill health in Australia. Half the Australian adult population are insufficiently active to protect against sedentary lifestyle disease, such as diabetes (Australian Institute of Health and Welfare, 2006). Research shows that regular physical activity throughout life reduces the incidence and fatality rate from cardiovascular disease by up to 50% (Heart Foundation, 2007).

The direct gross cost of physical inactivity to the Australian health budget in 2006/07 was $1.49 billion (Econtech, 2007). This translates to **$198.57 per adult, per year**. Walking and cycling provide a practical, sustainable opportunity to help get more Australians active, and reduce the cost of physical inactivity. The specific health benefits relating to cycling are discussed in more detail below. Many of these benefits also apply to walking.

In 2006, over 1.68 million Australians cycled for recreation and of those, 417,400 cycled more than 104 times a year (Australian Sports Commission, 2006). These individuals can be classified as meeting the levels of physical activity to protect against sedentary lifestyle diseases from cycling alone.

By including the cycling that takes place for commuting purposes (to/from work) as well, bicycle riding participation cuts sedentary lifestyle disease costs by approximately $154 million (Bauman et al, 2008). There is also a significant amount of additional transport-based cycling that is not collected by the Census, such as visiting friends, or trips to local shops. According to the Australian Greenhouse Office (2006), around 66% of journeys are for non-commuting purposes.

Cycling has been shown by the World Health Organisation to be effective in the treatment and prevention of mental health (Dora & Phillips, 2000). Depression and anxiety have been found to cost Australian businesses almost $10 billion a year. This includes $6.6 billion for sick days and $3 billion for poor work performance (Hilton, 2005).

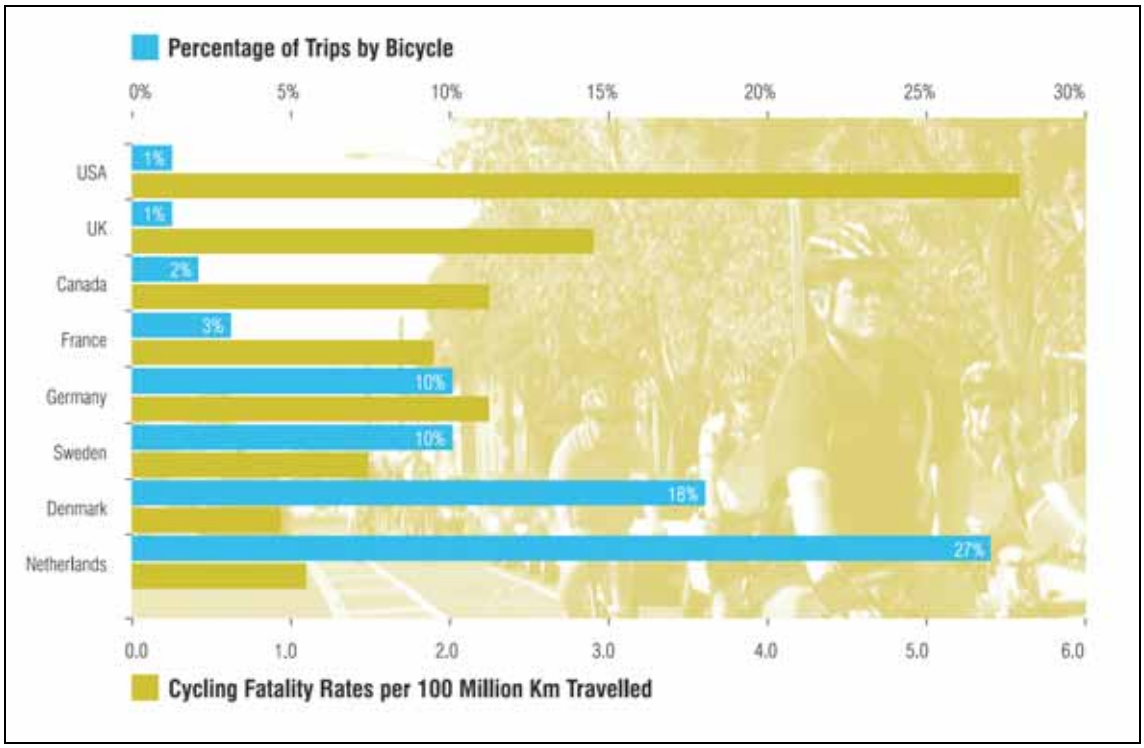
Cycling can provide benefits in terms of air quality. Air pollution caused by motor vehicles, especially in urban areas, is a major source of respiratory illness (Standing Committee on Environment and Heritage, 2005; Commissioner for Environmental Sustainability, 2007; Bureau of Transport and Regional Economics, 2005). Between 900 and 4500 cases of cardio-vascular and respiratory disease occurred due to motor vehicle related

air pollution in 2000, costing between $0.4 billion to $1.2 billion. Air pollution caused by motor vehicles accounted for between 900 and 2000 premature deaths, with an estimated cost of between $1.1 billion and $2.6 billion (Bureau of Transport and Regional Economics, 2005). Cycling, as a zero emission form of transport, offers significant potential to reduce this cost, particularly in urban areas where typical journey distances are short.

Cycling as a replacement for car use can have significant benefits in reducing road trauma. In Australia, road trauma costs $17 billion a year (Connelly & Supangan, 2006). Evidence is increasing that providing alternatives to motor vehicle use is an effective method of minimizing the incidence and severity of road trauma (Litman & Fitzroy, 2005).

Cyclists' safety is a crucial component of road trauma reduction. A recent review of the literature found that safety concerns are a primary reason why people choose *not* to cycle, and that the more cyclists there are, the safer cycling becomes. Figure A1 below demonstrates that the countries with the highest rates of cycling have the lowest levels of cyclists' fatality on a kilometre travelled basis.

Figure A1: Relationship between Bicycle Mode Share and Fatalities

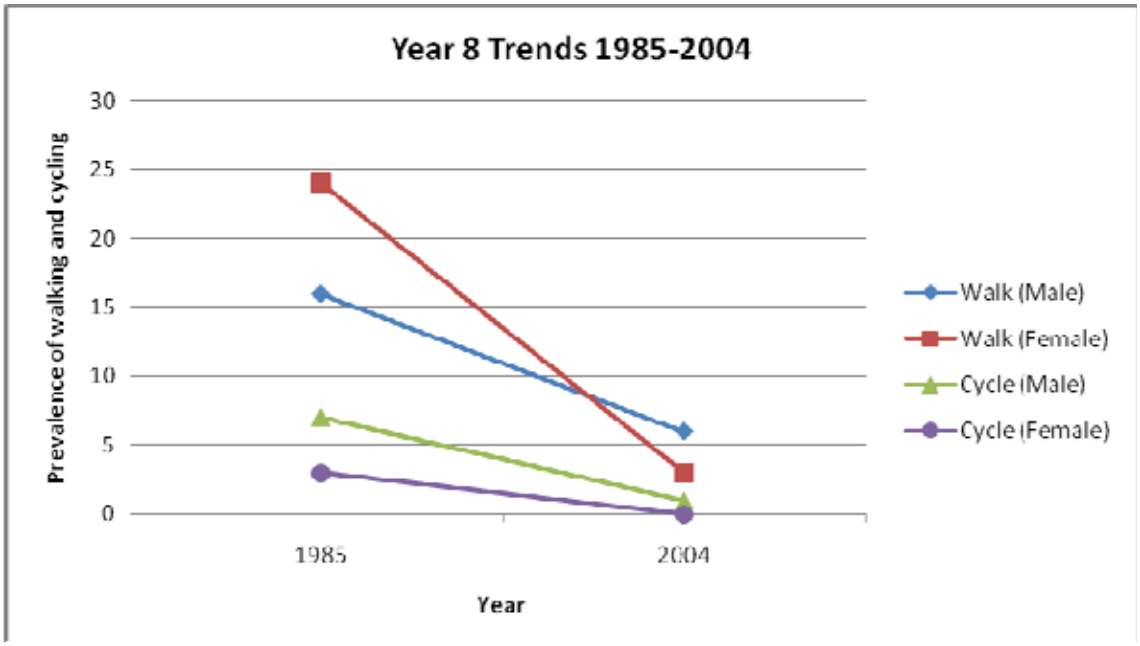


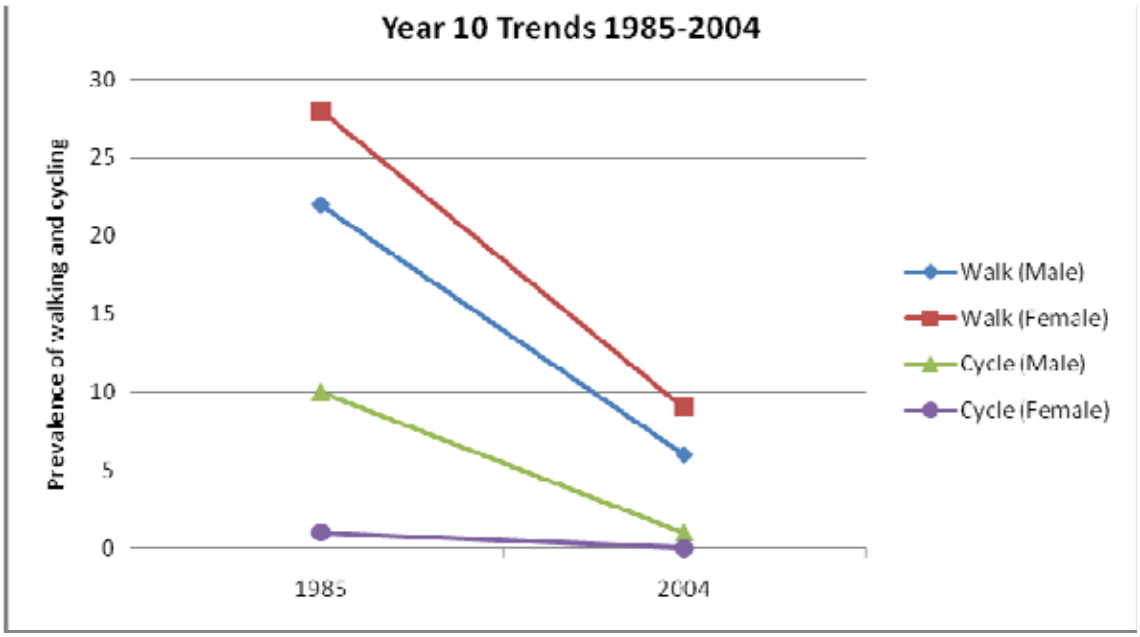
Source: Pucher & Buehler 2008; Organisation for Economic Cooperation and Development, 2005, European Union 2003, US Department of Transportation, 2003 & 2005 (cited in Pucher, 2006).

The data presented in Figure A1 is consistent with the findings of other road safety researchers who have discovered that when cyclist rates double, cyclist injury can be expected to fall by around 34% (Jacobsen, 2003, cited in Robinson, 2005).

In terms of the health benefits specifically for children, the SPANS reports by NSW Health indicate that walking and cycling to school have the potential to provide 50% of the daily physical activity requirement for children. However, there is evidence of a significant decline in walking and cycling to school as shown in Figure A2.

Figure A2: Trends in Walking and Cycling to School





Congestion Benefits

Cycling is an effective method of reducing unnecessary car use, and this has a congestion reduction benefit. Private automobile use is considered the major cause of congestion in Sydney (Bureau of Transport and Regional Economics, 2007). The Bureau of Transport and Regional Economics found that the cost of congestion in Sydney for 2005 was $3.5 billion and estimated to rise to $7.8 billion by 2020.

Cycling by Australians travelling to work in capital cities reduces congestion costs in Sydney by $23.7 million per year (based on calculations made in Bauman et al, 2008 using 2006 Census figures).

Climate Change

As a zero emission form of transport, cycling (and walking) is increasingly seen both in Australia and internationally as a way of reducing greenhouse gas emissions.

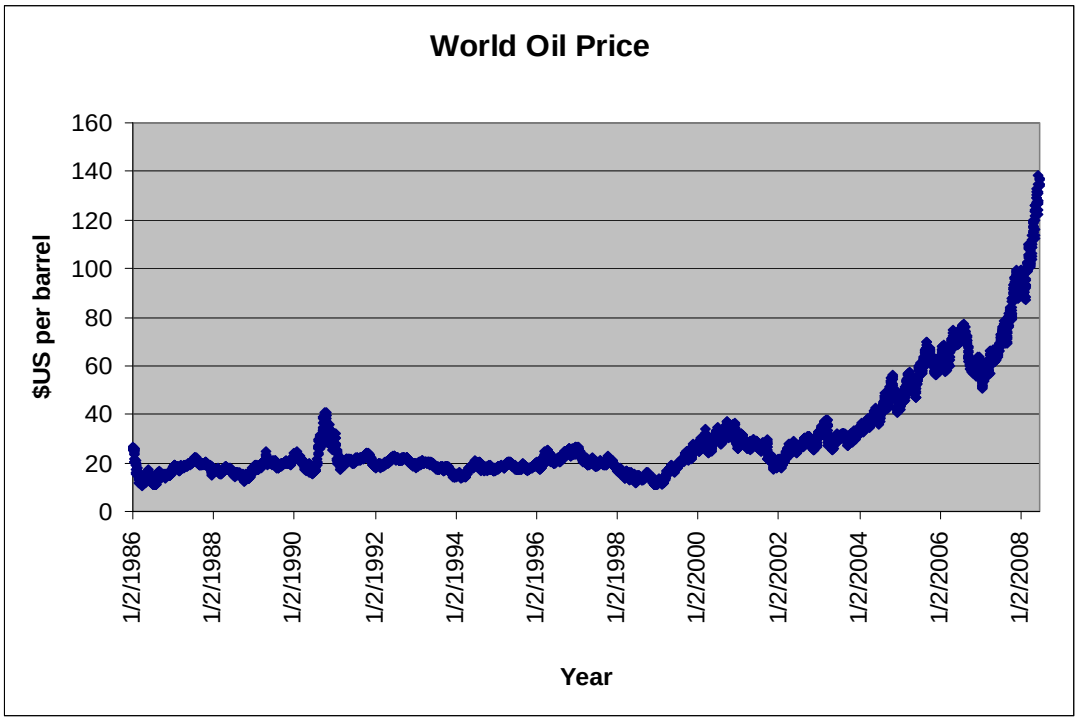
Motorised transport is currently a significant and growing source of greenhouse gas emissions. The Australian Greenhouse Office reports that 34% of household emissions are generated from transport (2006). Transport emissions increased 30% between 1990 and 2005 and this is expected to jump 67% above 1990 levels by 2020 (Department of Climate Change, 2008).

The Commonwealth *Carbon Pollution Reduction Scheme*, due for implementation in 2010 will include transport. This increases the importance of providing carbon free forms of transport, to lower the cost to the community of responding to climate change.

Fuel costs

Cycling has the potential to reduce household fuel costs as cycling is a petrol-free form of transport. Since 2004, world oil prices have increased significantly, as illustrated in the Figure A3.

Figure A3: World Oil Prices, 1996-2008

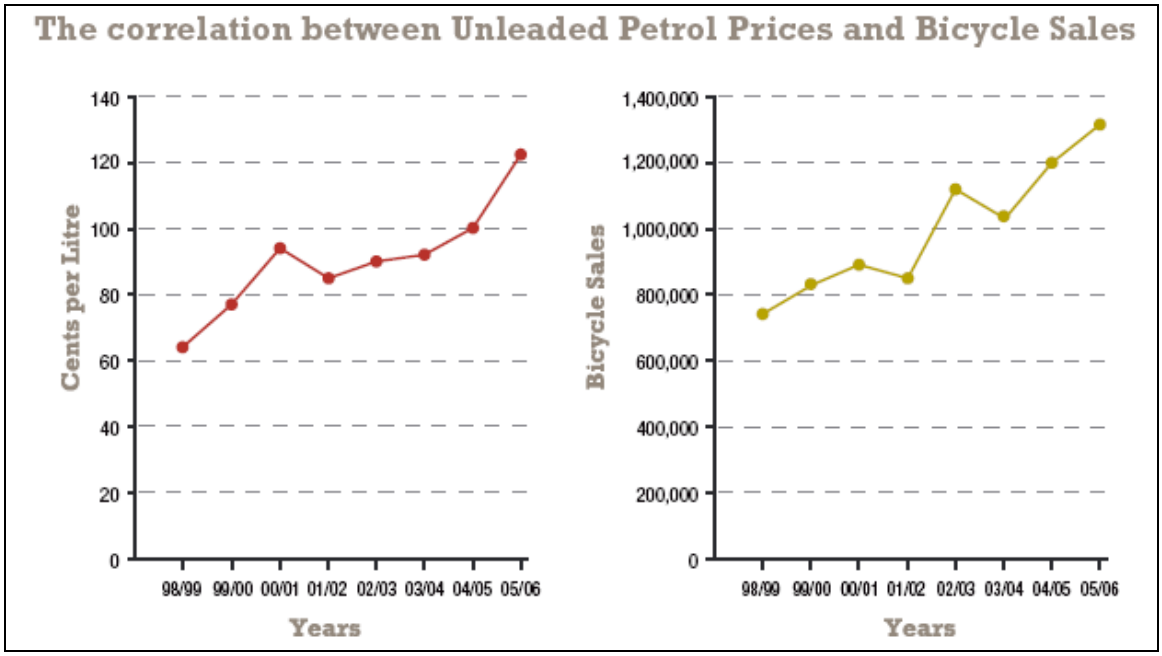


Source: Energy Information Administration, US Government.

In 2008, the cost of oil hit record levels and caused a significant increase in household fuel expenditure highlighting the vulnerability of Australian cities (Dodson & Sipe, 2008). Though oil prices have fallen since, there is growing evidence that a world production peak is imminent, bringing with it an era of greatly fluctuating oil prices and accompanying oil supply disturbances.

The rise in petrol prices over recent years has coincided with an increase in Australian bicycle sales, as demonstrated by the two graphs below in Figure A4.

Figure A4: Petrol Prices and Bike Sales



Taken from Cycling Promotion Fund, 2007

This relationship between fuel prices and bicycle sales is supported by research in the United States which showed that the vast majority of transport related bicycle expenditure has been influenced in part by the surge in petrol prices (Bikes Belong, 2008).

The provision of cycling infrastructure and encouragement programs, in combination with public transport improvements offers a very effective method of increasing the resilience to higher fuel prices (Litman, 2008; Pucher & Buehler, 2008).

The CSIRO found that the price of petrol in 2018 could reach $8 per litre (CSIRO, 2008). Even a rise to half that amount would put significant pressure on the transport system and strengthen public demand for the seamless integration of cycling and public transport.

Recent strategic transport modelling by Hensher for Melbourne and Northern Sydney further emphasises strong sensitivities to increases in petrol prices with shifts to public transport, walking and cycling (Hensher & Stanley 2008, Hensher & Li 2008, Sydney Morning Herald 2008).

Appendix B

List of Pedestrian Hazards and Issues Provided by Bicycle and Access Mobility Committee

Appendix C

Summary and Responses to Public Exhibition Comment

Appendix D

Assessment of 1997 Bike Plan Routes

Appendix E

Identified Issues – GTA Consultants Site Inspection

Appendix F

Bicycle Parking Infrastructure

Bicycle Parking Types and Standards

In order to conform to Australian Standards (AS2890.3-1993 Part 3: Bicycle Parking Facilities) parking rails must allow the wheels and frame of a bike to be locked to it securely and also provide sufficient support to prevent the bike from falling over. The three classes of bicycle parking are:

i Class 1 facilities provide a high level of security such as enclosed individual lockers.

ii Class 2 facilities provide a medium level of security such as locked compounds with internal bike rails.

iii Class 3 facilities provide a low level of security such as external bicycle rails and racks.

When determining the type of facility required the following principles apply:

- Class 1 and 2 facilities should generally be provided for medium to long term parking (i.e. railway stations, workplaces).
- Class 3 facilities are suitable for short term parking (cafes, shops, parks, etc).

An alternative bicycle parking facility to the Class 1 bicycle lockers is the Class 2 bicycle cage. These are becoming more popular around Australia as the preferred storage facility for large numbers of bicycles particularly at transport nodes such as railway stations and large bus stops. This type of facility contains racks within a compound that provides security and shelter from the weather. An essential feature of this type of parking is the smart card technology to enable a high level of security to be provided. Users would register with the relevant authority (Council, Bicycle NSW, Ministry of Transport or other) and receive a swipe card which contains identification details. This would enable the activity of the user to be recorded each time they use the facility. Only those that are registered users would be able to access the cage.

One example of this type of facility being implemented in Sydney is the Whistler Street Bicycle Parking Station. The bicycle parking station, set up and administered by Manly Council, has the capacity to store 72 bicycles in an area the size of five car parking spaces. Users are charged a one-off access card fee of $50 per bicycle parking space that enables easy access into the facility.

Another example at a location in Perth is shown in Figure F1.

Figure F1: Class 2 Bicycle Facility Example – High security bike cage, Perth

Photos: Jim Krynen, PTA WA

In terms of Class 3 facilities for short term parking, U-rails or medium top high density racks are the preferred design. The inverted U-rail (Securabike BR85 or similar approved) has the capacity to accommodate two parked bicycles and are appropriate for areas where large capacity rails cannot be provided either due to space or level of demand. Some examples of U-rail bicycle parking are shown in Figure F2 and Figure F3.

Figure F2: Class 3 Bicycle Parking Example

Figure F3: Class 3 Bicycle Parking Example

A number of proprietary rack systems are available for providing medium and high density bike parking. A summary of the size and capacity of some typical solutions are as follows:

- Cora "Expo Series" – single unit 1250 long x 850mm deep, holding 5 bikes (see Figure F4). Other single unit sizes are available.
- Securabike "Compact Security" – single unit 1200mm long x 1100mmm deep, holding 4 bikes (see Figure F5).
- Securabike "Concord" – single unit 950mm long x 950mm deep, holding 3 bikes (see Figure F6).

Figure F4: Cora "Expo Series" bike racks

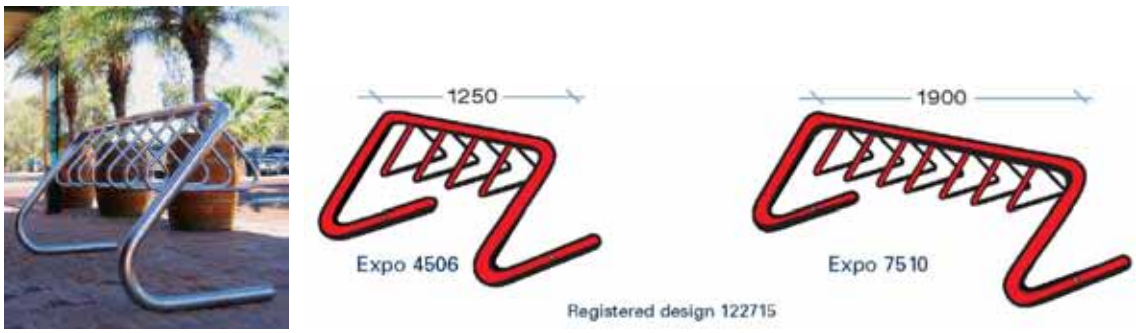


Figure F5: Securabike "Compact Security" bike racks

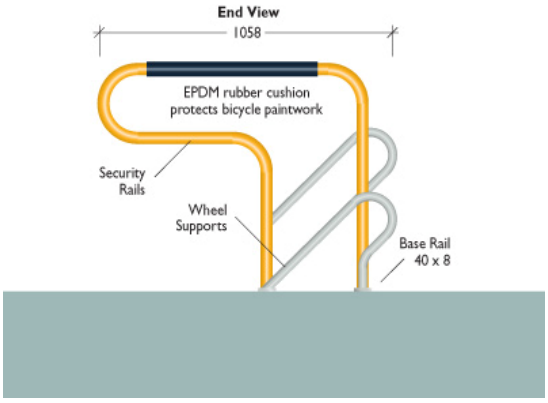
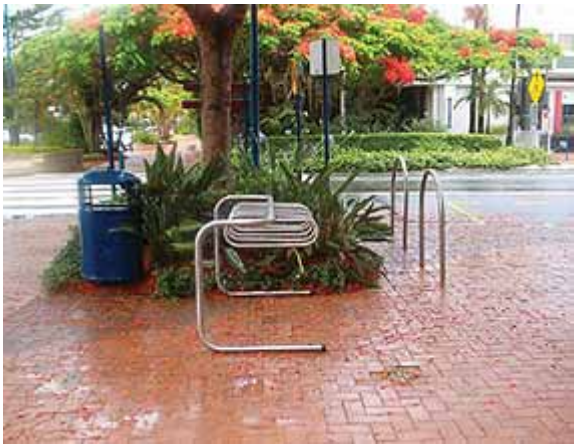
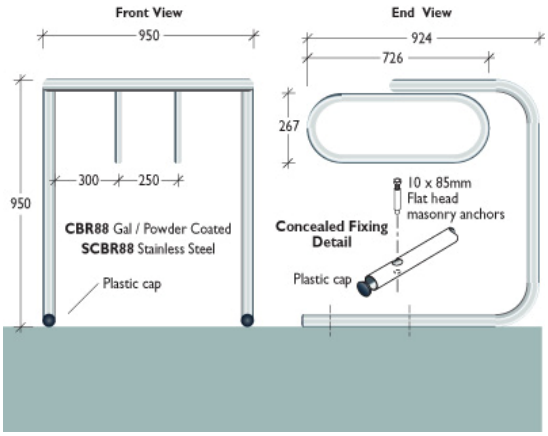


Figure F6: Securabike "Concord" bike racks





Another bicycle parking option for short-term (Class 3) facilities that could be utilised is a sign post ring, as has been installed throughout the City of Sydney. These rings can be retrofitted to existing signposts or power poles for low cost and are capable of holding up to two bicycles. An example of this style or bicycle parking is shown in Figure F7.

Figure F7: Bicycle Parking fitted to Existing Infrastructure

Appendix G

Implementation Works Schedules

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