Liverpool Bike Plan

2018 - 2023

LIVERPOOL CITY COUNCIL

LIVERPOOL THE GREAT SOUTH WEST

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1 INTRODUCTION

Liverpool City Council (Council) is committed to improving cycling and associated bike facilities within the Local Government Area (LGA) of Liverpool. Council recognises cycling as an important recreational and social activity for residents, and reaffirms cycling as a valid and equal first choice mode of transport. Through the Liverpool Bike Plan, Council aims to encourage residents to adopt healthier lifestyles, enjoy the natural environment and to help reduce traffic congestion through increased bicycle activity.

The Liverpool Bike Plan reviews existing bike paths and bike amenities while proposing additional cycle facilities to improve and augment the cycle network in the Liverpool LGA. The Liverpool Bike Plan 2018 reflects newly completed infrastructure and new proposed routes. The principal needs of cyclists and the type of routes required are discussed with a summary of key points to be considered in the planning and design of future cycle facilities in Liverpool.

It is important to note that the Liverpool Bike Plan is intended for planning purposes only. The actual locations of cycleways and associated cycle facilities are subject to change and will be determined as part of detailed design and construction processes.

Included in this study is a review of State and Commonwealth policies, principles and directives. These are used to provide advice and direction in the development of a bike network and encouraging bicycle usage.

1.1 Scope and Objectives

The Liverpool Bike Plan 2018-2023 (the Bike Plan) is a high-level planning document that outlines the provision of bicycle-related infrastructure, and is also a communication strategy designed to promote and increase the rates of cycling in Liverpool.

The Bike Plan includes new maps that outline the existing and proposed bicycle network from Council's LGA boundary with Canterbury Bankstown to the east to the suburb of Austral in the west. The Bike Plan recognises key challenges and opportunities in the Liverpool LGA, such as the arrival of two new university campuses, a large number of recently completed shared paths beside key arterial roads, poor connectivity within the Liverpool city centre, a number of missing connectivity links, and poor wayfinding signage.

The Bike Plan covers the urban and identified growth areas of the Liverpool LGA.

The key objectives of the Liverpool Bike Plan are listed as follows:

- To provide strategic direction and a plan of action for the provision of cycleways, bicycle facilities and the promotion of cycling within Liverpool. It will serve as a

reference document and planning tool for all bicycle related facilities and activities within the Liverpool LGA;

- To identify both existing and proposed cycleway routes in the context of key trip generators, neighbourhood attractions and recreational opportunities;
- To establish a safe, well-connected, easy-to-use cycling environment through the delivery of infrastructure and facilities within the five-year timeframe of this plan and beyond;
- Encourage members of the community to utilise both recreational and commuter trails through awareness and education programs in an effort to improve health outcomes for the community; and
- Implement the strategies and concepts contained within various Commonwealth and State government cycling strategies, and work with other stakeholders to encourage cycling and provide new cycling infrastructure.

1.2 Background

The Bike Plan was prepared following the review of various National and State cycle strategies in addition to previous Council Bike Plans. Council recognises the importance the Bike Plan can play in tackling local challenges such as continued population growth, development pressures, the expanding urban footprint and the high proportion of youth population within the Liverpool LGA.

The Bike Plan takes into consideration a number of strategies for bicycle activity in Australia. A detailed summary as to how each strategy applies to the Bike Plan can be found in APPENDIX 1 – BACKGROUND DOCUMENTS. Documents reviewed in preparing the Bike Plan include:

- Australian National Cycling Strategy (Austroads, Australian Bicycle Council, September 2010);
- Walking, Riding and Access to Public Transport (Australian Government, Department of Infrastructure and Transport, 2013);
- New South Wales Bike Plan (NSW State Government and RMS (formally RTA), May 2010);
- Planning Guidelines for Walking and Cycling (NSW Department of Planning and NSW Roads and Traffic Authority, January 2005);
- NSW 2021 (NSW Department of Premier and Cabinet, September 2011);

- A Plan for Growing Sydney (NSW Department of Planning, December 2014);
- NSW South West Subregional Strategy (NSW Department of Planning, December 2008);
- Draft South West District Plan (Greater Sydney Commission, November 2016);
- Sydney's Cycling Future (Transport for NSW, December 2013);
- NSW Cycling Safety Action Plan 2014-2016 (Transport for NSW, May 2014);
- NSW Long Term Transport Masterplan (Transport for NSW, December 2012);
- NSW bicycle guidelines (RTA, July 2005);
- Current versions of the Austroads Guide to Road Design;
- Guide to Traffic Management;
- Cycling Aspects to Austroads Guides and other Austroads guides as appropriate;
- Austroads Research Reports AP-R492-15 Bicycle Wayfinding and AP-R475-15 Level of Service Metrics (for Network Operations Planning) (Austroads, 2015);
- Manual of Traffic Control Devices (AS 1742.9-2000); and
- Integrating Land Use and Transport, Improving Transport Choice — Guidelines for planning and development (Department of Urban Affairs and Planning, 2001).

1.3 Liverpool City Council Bicycle Framework

Liverpool's first Bike Plan was produced in 1985, which resulted in several cycle routes being implemented across the LGA. This included the construction of cycleways at Green Valley (Cartwright Avenue), Lurnea High School to Miller, Chipping Norton recreational route and Flowerdale Road. However, there was no cycle parking installed during this process.

The second Bike Plan was produced in 1996 and was essentially an update of the previous Bike Plan and covered the increased urban area of Liverpool. The report identified five regional and nine local routes. Of the routes that were implemented many consisted simply of cycle signage with very few specific cycle facilities to assist cyclists. Other routes that were implemented include two short sections of shared path on Maddecks Avenue, Moorebank and Cosford Close, Chipping Norton, on-road lanes on Heathcote Road, off-road shared path through Kelso and McMillan Parks.

The Liverpool Bike Plan 2009 included comprehensive studies and consultation to improve and facilitate the use of bicycle infrastructure throughout the Liverpool LGA. Many commuter

links were constructed during this period. Under the plan large sections of the Liverpool to Campbelltown rail trail was completed. Shared paths beside Hoxton Park Road, Cowpasture Road, Camden Valley Way, Elizabeth Drive and Maxwells Avenue were also completed and shared paths adjoining Kurrajong Road, Jedda Road, Bernera Road, the Hume Highway and Anzac Road were partially completed. Several local and recreational trails were also completed during this period, including paths within the Western Sydney Parklands, Cecil Hills, Elizabeth Hills, Moorebank, Hoxton Park and Carnes Hill. The 2009 Bike Plan also proposed a network of new cycle paths across the LGA, many of which have been carried over or modified under this plan. The 2009 plan identified the need to erect signage along most routes to direct cyclists to local attractions and other centres further afield. Some routes were given appropriate signage treatment, however a large proportion of the cycling network within the Liverpool LGA is still poorly signposted and does not provide adequate bearing for cyclists.

This Liverpool Bike Plan provides an opportunity to expand upon previous Bike Plans with the view of achieving a connected network of cycleways that services key destinations within the LGA. This plan also explores various strategies to encourage bicycle usage and make cycling easier and more enjoyable in the area. It will also help to achieve commitments to liveability and environment under the Western Sydney City Deal, to which Liverpool City Council is a signatory.

1.4 Economic Benefits of Cycling and Cycling Infrastructure

The economic benefits of cycling infrastructure reach far beyond that of the cyclists' individual expenses. While cycling to and from work, shops, places of leisure or to visit an acquaintance can save households on the cost of fuel, or in some instances the need for a second car, the cost savings also extend to all levels of government. The costs of road-widening, parking, and the general economic losses of congestion can be somewhat mitigated by providing high-quality and well-utilised cycleways. The economic benefits of cycling also apply to the public health system (to tackle issues associated with obesity and a sedentary lifestyle), and the environment (reducing greenhouse gas emissions).

In August 2016, an appraisal framework was released by the Transport and Infrastructure Council NSW to ensure a consistent approach to assessing the benefits and costs of a range of infrastructure types. A table summarising the values of costs and benefits that should be apportioned to active transport infrastructure is shown in Figure 1.1. In broad terms, assessing by summing the upper and lower parameter estimates outlined below, it is

estimated that each kilometre cycled by an individual benefits the broader economy by between $0.048 and $2.383.

Benefit categories	Range of estimates ($/km)
Decongestion benefit	$0.207 - $0.258
Savings in car user costs	$0.135 - $0.350
Parking cost savings	$0.010 - $0.024
Travel time costs savings	Mostly excluded
Bicycle injury cost savings	-$0.020 to -$0.370
Walking injury cost savings	-$0.031 to -$0.240
Health benefits cycling	$0.014 - $1.660
Health benefits walking	$1.018 - $1.680
Air pollution reduction	$0.017 - $0.028
Noise reduction	$0.005 - $0.009
Infrastructure provision	$0.024 - $0.052
Greenhouse gas reduction	$0.006 - $0.022

Source: PWC (2009), SKM PWC (2011), PWC SKM (2010), Fishman et al (2011)

Note: Estimates are for a range of years between 2008 and 2010.

Figure 1-1: Estimates of Economic Benefits for Active Travel
Source: PWC (2009), SKM PWC (2011), PWC SKM (2010), Fishman et al (2011)

2 BICYCLE ACTIVITY IN LIVERPOOL

This section provides an overview of current bicycle activity within the LGA. This snapshot has been ascertained through the collection of key identifiers such as bicycle use statistics and data, local physical barriers to cycling, topography limitations, key land uses and destinations.

Additionally, this section outlines principles underlying an effective cycle network and differentiates the types of cycle routes that exist within an urban environment.

2.1 Topography and Physical Barriers

The Liverpool Bike Plan study area is generally level, however, a few areas are characterised by steeper terrain. These areas include Hinchinbrook, Heckenberg, Busby, Ashcroft and Casula. The difficult topography separating the suburbs of Austral and Leppington from the eastern suburbs of Liverpool will also pose a challenge for many cyclists travelling east-west as these areas become more urbanised.

There are numerous physical boundaries that restrict cycle movement in Liverpool. One of the major constraints to bicycle activity within Liverpool is the railway line, which runs north-south following the Georges River. Meanwhile, the Georges River creates a peninsular of Chipping Norton, Wattle Grove, Holsworthy, Hammondville and Voyager Point, separating it from the rest of Liverpool and Canterbury Bankstown. Furthermore, there are only five road crossings of the Georges River on this peninsular, of which two are motorway bridges and are not easily accessible for cyclists, especially more inexperienced cyclists or children.

There are three main creeks that flow into the Georges River within the LGA of Liverpool. Cabramatta Creek flows from Denham Court to Warwick Farm; Hinchinbrook Creek flows from Cecil Hills to Cabramatta Creek at Hoxton Park Road; and Brickmakers Creek flows from Lurnea to Cabramatta Creek at Warwick Farm. The Sydney Water Supply Upper Canal also separates the eastern areas of the LGA from the growth centres of Austral and North Leppington. They all act as barriers restricting movement, in particular Cabramatta Creek, as it is the longest with only five road crossings and one footbridge. Two other creeks present minor barriers: Harris Creek and Willis Creek in the Wattle Grove Precinct. However, the creeks and canal are considered to be small in width and are generally surrounded by wide corridors of park or reserve that can be relatively easily bridged for cyclists.

In addition, there are several roads that act as barriers to cycle movement, including the M5 South Western Motorway, the Hume Highway, the Cumberland Highway, Cowpasture Road, Camden Valley Way and Elizabeth Drive. The M7 Motorway also forms another barrier;

however, a shared bicycle path has been incorporated into the design of the motorway with numerous connection points with local cycleway networks.

The Liverpool LGA movement barriers are shown diagrammatically in Figure 2.1.

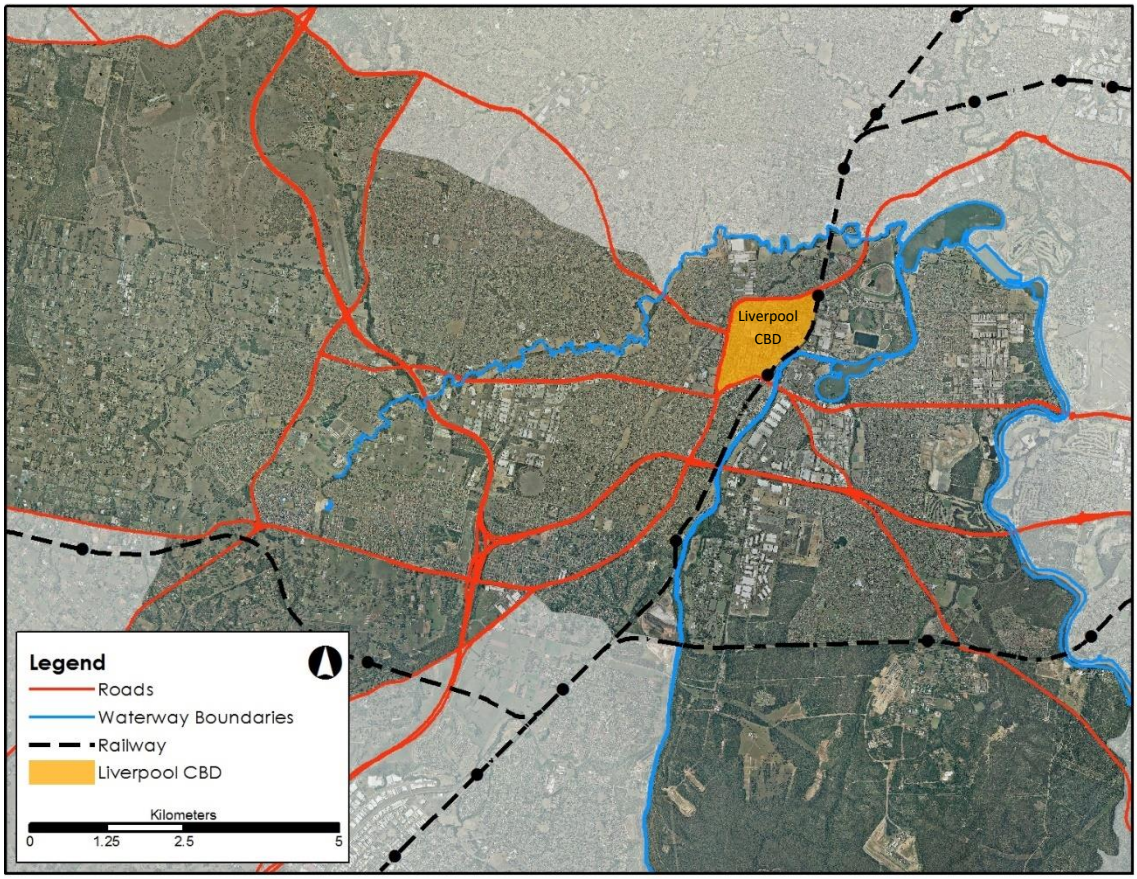


Figure 2-1: Existing Barriers to Movement in Liverpool LGA

Source: NSW Government Architects Office

2.2 Key land uses and public places

The main cycle trip generators in Liverpool are the residential areas, including the residential areas of Fairfield to the north. A small number of trips could be expected from Canterbury Bankstown in the west; however, this is limited because there are few crossing of the Georges River. To the south there are the residential areas of Campbelltown, Glenfield, Macquarie Fields, Ingleburn and Bardia.

The second most common cycle trip initiators are employment and education. The main employment areas include the Liverpool City Centre (which includes retail, commercial and hospital employment) and the industrial areas located in Moorebank and Prestons. There are numerous shopping centres scattered throughout the LGA with the main neighbourhood centres located in Green Valley, Carnes Hill, Casula, Wattle Grove, Moorebank and Miller. Schools, both primary and secondary, appear in all suburbs along with two TAFE colleges located in Miller and the Liverpool City Centre. The centres at Edmondson Park and

Leppington will also become major trip generators as these areas continue to become more urbanised.

Recreational and leisure facilities are again scattered throughout the urban area. However, the major attractions include the Casula Powerhouse Art Centre, Carnes Hill Recreation Precinct, Hammondville Sports Centre, Chipping Norton Lakes, the Whitlam Leisure Centre, the Michael Wenden Centre and the string of sports facilities along the Cabramatta Creek in Cartwright.

There are currently five railway stations in Liverpool that provide direct services to the Sydney CBD and Parramatta. The most heavily trafficked station is Liverpool, which encompasses the T2 (Inner West and Leppington Line), T3 (Bankstown Line) and T5 (Cumberland Line). Holsworthy station provides services to the T8 Airport line, while Casula encompasses both the T5 (Cumberland line) and T2 (Inner West and Leppington line) services. Edmondson Park is on the T2 (Inner West and Leppington line) and T5 (Cumberland Line), with a change-over at Glenfield that can offer express trains. Glenfield Station is located just outside of the Liverpool LGA but is popular with commuters in many suburbs in the south-east of the Liverpool LGA. There is a great deal of opportunity to integrate Edmondson Park railway station with Liverpool's bike network as this area develops. Similarly, bike paths to Leppington Station from Austral and surrounds will be critical to encouraging active transport and alternative modes of commuting.

2.3 Travel Patterns

Based on the 2016 census, the Liverpool LGA has a population of 212,232, having increased from 164,962 in 2006, a 28% increase over the last 10 years. In the 2016 census, there was reported to be an average of 1.9 vehicles per household. In 2011, 8,958 (13% of the workforce) travelled to work by public transport and 52,896 (80%) travelled to work as either a driver or passenger in a car. For single-mode commuters, a total of 382 (0.5% of workforce) people travelled to work by bicycle. In addition to the single mode commuters, a fair proportion of multi-modal commuters are expected to use cycling as part of their journey, however, survey data does not recognise these trips.

Key statistics have been sought to determine existing travel patterns and to examine the potential to increase bicycle use of Liverpool's residents. The figures provided are indicative only and are generated by the Bureau of Transport Statistics through their analysis of various data sources including ABS Journey to Work (JTW) and Household Travel Survey (HTS) datasets.

Typical daily trip purposes and volumes ranked from highest to lowest in Liverpool LGA are outlined in Table 2-1.

Table 2-1: Purpose of Travel in Liverpool LGA (Trips)

Purpose	Volume	%
Social/recreation	125,000	21%
Serve passenger	124,000	20%
Shopping	102,000	17%
Commute	85,000	14%
Education/child care	63,000	10%
Work related business	62,000	10%
Personal business	34,000	6%
Other	12,000	2%
	607,000	100%

Source: Bureau of Transport Statistics

As shown in Table 2-1, Social/ Recreational trips account for the largest proportion of daily trips by Liverpool's residents.

Mode of travel has been ranked by volume as shown in Table 2-2. Bicycle trips are included in "Other Modes". A previous detailed analysis of Mode of Travel indicated cycling could consist of 50% of "Other Modes".

Table 2-2: Mode of Travel in Liverpool LGA (Trips)

Mode	Volume	%
Vehicle driver	342,000	54%
Vehicle passenger	159,000	25%
Walk only	70,000	11%
Bus	30,000	5%
Train	27,000	4%
Other modes	7,000	1%
	635,000	100%

Source: Bureau of Transport Statistics

Given the above assumption of 50% of other mode of travel being bicycles, it is estimated that 3,500 bicycle trips could be undertaken daily by Liverpool LGA residents. Other data sources indicated that 1-2% of all trips are currently made by bicycle in the Sydney metropolitan area. Under this assumption 7,000 to 14,000 trips would be made by bicycle each day by Liverpool LGA residents. However, anecdotal references suggest that Liverpool

has a lower than average cycling mode share, so assuming a 0.5-1% mode share would see approximately 3,500 to 7,000 cycling trips per day.

2.4 Journey to Work Data

The 2011 Census Journey to Work (JTW) data measures existing travel patterns to employment areas and the mode of travel to work.

The JTW data is measured by Travel Zones, which is a small geographical area. The Liverpool LGA includes 117 Travel Zones as shown in Figure 2-2.

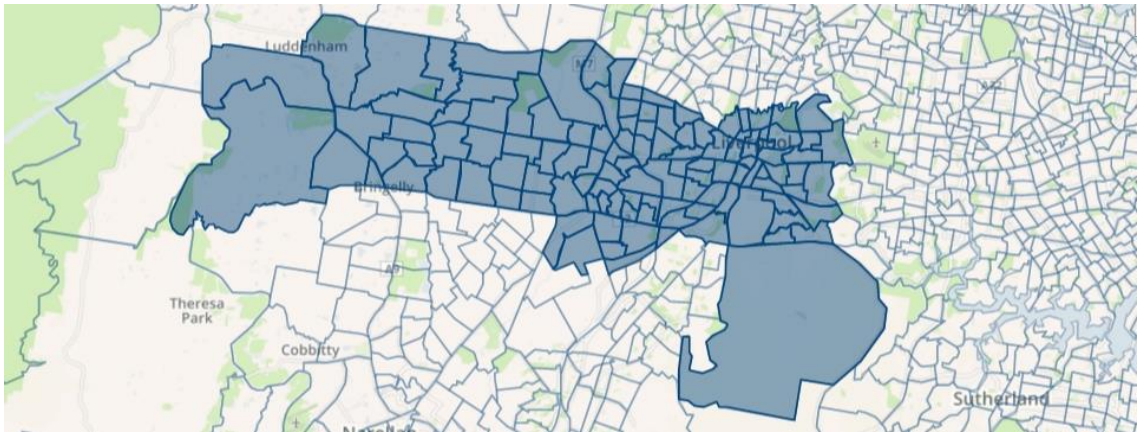


Figure 2-2: Liverpool LGA Travel Zones

Source: NSW Bureau of Transport Statistics

2.4.1 Liverpool Residents

Mode share for all trips made by the employed residents of Liverpool LGA to their place of employment, the results of which are summarised in Figure 2-3.

Figure 2-3: Employed Liverpool Residents Mode of Travel to Work (2011 Census Data)
Source: NSW Bureau of Transport Statistics

Of the 72,970 employed residents of Liverpool, the vast majority drive to work (74%) or catch the train (11%). Other modes contribute to 1% of all trips to work, 0.5% of which could be trips by bicycle. The largest proportions of employed residents travel within Liverpool LGA for work (24%), to Sydney CBD (9%) or to Fairfield (9%).

2.4.2 Liverpool Employees

Analysis was also undertaken of the mode share for all trips made by people employed within Liverpool LGA, the results of which are summarised in Figure 2-4.

Figure 2-4: Liverpool Employees Mode of Travel to Work (2011 Census Data)
Source: NSW Bureau of Transport Statistics

Of the 59,495 people who are employed in the Liverpool LGA, 78% drive to work. Other modes contribute to 1% of all trips to work, 0.5% of which could be trips by bicycle. Liverpool residents contribute to 24% of the workforce in the Liverpool LGA, other with large proportions travelling from bordering suburbs such as Campbelltown, Merrylands, Bankstown, and Fairfield. These are suburbs where people may consider cycling from.

There are 13,592 people who live and work in Liverpool with an 'other' mode choice of 2%. This is indicative of 136 people cycling to work. The low levels of cycling in Liverpool, taking into account the high proportion of trips within the LGA (i.e. a cyclable distance), suggest that either the current provision of cycling infrastructure (including wayfinding) is lacking or the cultural barrier to cycling is high.

2.5 Bike use statistics and data

The following information provides an indication of bicycle usage and activity in Liverpool:

2.5.1 Sydney Cycling Survey 2012 – Methods and Findings (Transport for New South Wales, July 2013)

This survey monitors the amount of people using a bicycle as their choice of transport for trips shorter than 10km in the Sydney Greater Metropolitan Area. The survey found that 3.85% of the Greater Sydney population had cycled the previous day, with 3.37% of the population cycling a distance of less than 10km. At the same time, 2.8% of trips less than

10km in the Liverpool-Fairfield area were undertaken by bike. Rates of cycling in this study appear significantly higher than cycling in other studies as it also includes trips for recreational and exercise purposes; most published cycling studies only measure trips for commuting.

The demographic profile of bicycle users in the Greater Sydney area show that younger males (school-age) are the most likely to have utilised a bicycle within the previous 24 hours, whilst females aged 50+ were the least likely, as seen in Table 2.3.

Table 2-3: Incidence of cycling by gender and age in the previous 24 hours

Gender:	Males			Females		
Age:	0-14	15-49	50+	0-14	15-49	50+
Rode yesterday (<10km):	9.27%	4.14%	2.65%	5.42%	1.73%	0.77%
Rode yesterday (>10km):	n/a	1.26%	0.9%	n/a	0.02%	0.14%
Total:	7.27%	5.4%	3.55%	5.42%	1.75%	0.91%

Source: Transport for New South Wales, 2013: p.23

2.5.2 Cycling in NSW: What the Data Tells Us (Premiers Council for Active Living 2008)

This report states that in 2001 the Liverpool LGA had 1-1.5% of journey to work trips made by cycling. This dropped to 0.51-1% in the 2006 data. However, this report states that the rate of cycling within the City Centre remained constant, and cycling within the suburbs dropped.

This report also stated that 142 per 1000 cyclists are likely to be injured in a commuting cycling related accident, which was the second highest rate in Australia. However, when normalised for the population, NSW has the third lowest injury rate of 0.42 per 1000 people. 3% of all fatalities on NSW roads in 2006 involved cyclists. In NSW the following crashes were reported: 33% occurred on road on an undivided road, 28% at T-junctions, 14% on the footpath/shared pathway and 10% occurred at driveways.

2.5.3 Australian Cycling Safety: Casualties, crash types and participation levels (BITRE, 2015)

In 2015, the Bureau of Infrastructure, Transport and Regional Economics (BITRE) released an information sheet on cycling safety. Cyclist fatalities across Australia have remained largely static over the past decade (approximately 40 per annum) despite participation increasing in some cities by 10% per year (such as Sydney). In contrast, total road fatalities have decreased from approximately 1,600 per year to 1,200 per year.

It is shown that the modal category of cyclist crashes are local roads, with a majority of cyclist accidents (>90%) occurring on streets with speed limits 60km/h or less. Where a

cyclist is involved in a single vehicle crash, nearly half of all accidents are a cyclist simply losing control on a straight road (perhaps a deficiency in the surface ie. crack or bump). Where the accident involves multiple vehicles, common types tend to be:

- Adjacent direction – cross traffic (ie. perpendicular intersection with vehicle failing to give way) 14%
- Opposing direction – right through (ie. right turning vehicle failing to give way to through traffic) 12%
- Manoeuvring – from footway (ie. collision with vehicle when transitioning to roadway) 10%
- Same direction – side swipe (ie. failing to pass safely) 8%

Overall, it is documented that most reported crashes (approximately 85%) involve another vehicle and there has been an increased effort to increase cycle awareness and safety (for example, through the 1 metre passing laws). In stating this, it is important to recognise that single vehicle cyclist crashes are prone to underreporting.

2.5.4 Cycling in Sydney – Bicycle ownership and use (RTA April 2008)

The area covered by this survey is much larger than the Sydney metropolitan area but offers a useful insight into bicycle users, and ownership. The following is an extract of the key statistics:

- In 2005, Sydney households own a total of 1.48 million bicycles with Fairfield-Liverpool owning just over 100,000 bikes, with an average of 0.91 bicycle per household;
- The most significant weekday trip purpose is social recreational, then commuting, and shopping;
- The most significant weekend trip purpose is social recreational, followed by shopping, then personal business;
- The majority of bicycle trips are less than 20 minutes;
- The average duration of bicycle trips on weekdays is 17 minutes, while on the weekends the average bicycle trip is 21 minutes;
- Males are still more likely to use a bicycle as part of their travel mode, but rates for females are growing at a faster rate;
- Younger age groups (<20 years old) are more likely to ride than any other age group;
- A large share of cyclists are school aged or adult students (TAFE, University).

2.6 Users of bicycle facilities

To understand what cycling infrastructure and campaigns will be effective, it is important to understand the users of such facilities. There are two aspects that must be considered in order to categorise cyclists for the purpose of infrastructure planning, namely ability/confidence and utility/purpose. That is, how confident is the user, and for what purpose is the user cycling?

2.6.1 Confidence & Ability

Roger Geller, a planning officer with the City of Portland, published a study that proposed that there are four types of cyclists with regards to their ability and confidence:

- Strong and fearless – Existing cyclists who have strong confidence riding on all roads and in all conditions (<1%)
- Enthused and confident – Existing cyclists who have sound confidence riding on most roads (7%)
- Interested but concerned – Existing non-cyclists who are interested in cycling if cycling was made a safe option through the provision of initiatives and infrastructure (60%)
- No way no how – Existing non-cyclists who do not have an interest in cycling (33%)

With regards to the future, by far the largest proportion of the population falls into the 'interested but concerned' category, whereby these individuals are capable and willing to cycle, but do not have the confidence, perhaps because of safety concerns.

2.6.2 Purpose & Use

For the purposes of the Bike Plan, to develop an effective and efficient cycle network, the particular use of infrastructure by cyclists must be understood. It is suggested that three types of local cyclists be considered within this Bike Plan, all characterised with varying road confidence and ability levels. The typology of cyclists is described as follows:

- Commuter cyclists – These are regular cyclists who cycle to work, TAFE, university, or school along with other occasional trips. This group will generally have good roads skills; some may take risks, while others may lack confidence. Speed and directness of routes are of key importance to many in this this group, however some may prefer low-stress, or higher amenity routes even if it is slightly longer. They will utilise a number of routes and some would consider bypassing cycle facilities if the road route is quicker. A lack of provision, lack of maintenance, or an oversight in design can be a deterrent to some members of this group and may cause frustrations.

- This group will typically desire on-road or off-road paths adjacent to arterial roads, and will choose the most direct route. Maintaining speed on a smooth surface is also important to this group.

- Recreational cyclists – This group cycle for pleasure or health, using sealed off-road routes or mountain bike trails and possibly driving to the start of a recreational ride. This group incorporates cyclists with a mixture of road skills, age and experience (and may include children). Lack of provision is not normally an issue as the purpose is a recreational ride, however there is an opportunity for members of this group to ride for other purposes (e.g. commute & short-trips) if infrastructure is available.
    - This group may utilise short segments of on-road routes through quiet streets but prefers off-road routes through scenic areas. Recreational cyclists will occasionally stop at local businesses (cafes) en route, so planning recreational routes to intersect with local shops can be of benefit to local business.
- Touring/Sport cyclists – These are recreational cyclists who regularly ride long distances for sport using the main highway network or rural roads. Suitable touring/sporting routes in Liverpool include the M5 (Sydney – the Southern Highlands), the M7 (Prestons – Bella Vista), Camden Valley Way (Liverpool – Camden) and rural roads such as Elizabeth Drive and The Northern Road. There is little scope to providing additional routes for this group as they will typically start and end outside of the Liverpool LGA. There is scope to enhance the safety aspects of existing routes to cater for this group.
    - This group will utilise on-road facilities and rural roads, even if they are not identified as a bike route. While most long-distance routes are well established, it is still important to address any safety issues that may face this group, including adequate pavement condition, consideration of signposting and lane marking, and adherence of motorists to posted speed limits.

In addition to the three groups that are associated with the purpose of cycling trips, a fourth group needs to be considered and catered for, particularly for their skill and experience:

- Vulnerable cyclists – This group includes young (primary school aged) children, the elderly, adults who lack road skills, those with limited physical and/or cognitive abilities, and inexperienced cyclists. Generally, this group may have little knowledge of the road rules and may not be able to safely operate on busy roads. Young children will often be escorted by adults.

- This group will typically desire off-road paths in quieter areas dispersed throughout the LGA.

In considering the above typology of cyclists, the key destinations and choice of bicycle infrastructure can be loosely determined. The planning and design of cycle routes is not an exact science. Generally, cycle routes are provided for the lesser experienced cyclists, as more experienced cyclists are still able to utilise these routes. However, in some instances, an on-road route may be provided alongside an off-road route to cater for different preferences by different groups.

2.7 Types of cycle routes

The RMS has established two categories of signed cycle route, namely being regional and sub-regional routes. Within this Bike Plan, two additional categories of cycle route/facilities have been considered – this specifically includes recreational routes and local routes. These cycle route categories are touched upon below:

- A regional cycle route starts and/or finishes outside of the Liverpool LGA or connects two major regional centres;
- A sub-regional cycle route both starts and finishes within the Liverpool LGA and generally connects two or more centres;
- A recreational route is generally an off-street route intended for recreational purposes; and
- A local route is a facility that assists cyclists in specific areas; it could include a shared path between two cul-de-sacs or a path linking residential areas to a regional or sub-regional route. Though it may not necessarily form a crucial part of a cycle route, it is invaluable to cyclists in completing local journeys to locations such as schools, or as short-cuts between other routes.

Furthermore, there are two basic types of bike path facilities, namely on-street and off-street bike paths, as seen in Figure 2-5 and Figure 2-6 respectively.

2.7.1 On-street Route

An on-street route can be a marked bicycle lane, or a signposted cycle route along a road with no cycle facilities, such as a residential street. It is important to note that cyclists are permitted to use any road or street unless they are subject to bicycle prohibited signage. The on-road routes identified in this bike plan indicate streets that are useful for cyclists to utilise in wayfinding between two destinations, or as a short-cut through quieter residential streets. They are also marked on the Bike Plan to highlight areas in which signage and lane markings should be provided. Signage raises awareness of cyclists' presence to other road

users and may reduce the number of accidents between bicycles and vehicular/pedestrian traffic.

Some examples of on-road infrastructure includes:

- mixed traffic (No formal lane linemarking for cyclists, but signage may be provided warning of the presence of cyclists, as well as bicycle stencils on the road)
- bicycle lane (A lane which is painted on the road and designated a bicycle lane; legally, cyclists are required to use these where they are provided)
- shared zone (A low volume local traffic environment which is restricted to speeds of 10km/h)

It is recognised that while lane marking may not be necessary for any given cyclist or motor vehicle traffic volume, it can be used as an assistive tool in providing wayfinding for cyclists wishing to follow a particular route.

2.7.2 Off-street route

Off-street routes can either be adjacent to the road or well away from the road, such as through a park or reserve. Off-street routes are often combined with pedestrian routes as pedestrian flows tend to be low outside of school, shopping, commercial and city centre areas. It should be noted that children under 16 years of age are legally permitted to cycle on all footpaths unless specifically prohibited. Adult cyclists may accompany a child under 16 years of age on footpaths. Off-road routes may include a variety of different path surfaces, such as concrete, asphalt, gravel, dirt or other unsealed routes.

Some examples of off-road infrastructure include:

- Separated path within the road corridor (This may include unidirectional or bidirectional cycleways that run parallel to the road. Examples are seen within the City of Sydney, include Kent Street and Bourke Street)
- Separated path outside of the road corridor (This typically includes bidirectional cycleways that run through recreational areas, for example, the Parramatta Valley Cycleway)
- Shared path (This is where cyclists are allowed to cycle on a ‘footpath’ which has typically been upgraded through widening and linemarking. An example includes the M7 shared user path)

Figure 2-5: On-road cycleway, Hoxton Park Road Serviceway, Hoxton Park Road, Cartwright.

Figure 2-6: Off-road shared pathway with markers and signposting, Mill Road, Liverpool

Figure 2-7: Off-road shared pathway Maxwells Avenue, Ashcroft

Figure 2-8: Off-road shared pathway with markers and signposting, Jedda Road, Prestons

Figure 2-9: Parking facilities on the Transitway, Maxwells Transitway Station.

The paragraphs above established four primary user groups and different cycling routes and cycling facilities. Figure 2.10 below provides an overview of how the different user groups are likely to utilise bicycle routes and infrastructure.

	Commuter	Recreational	Sport	Vulnerable
Mixed traffic – quiet street	Yes	Yes	Yes	Yes
Mixed traffic – busy street	Sometimes	Sometimes	Yes	No
Mixed Traffic - Motorway	Sometimes	No	Yes	No
Bicycle lane	Yes	Yes	Yes	No
Shared zone	Yes	Yes	Yes	Yes
Separated path in road corridor	Yes	Yes	Sometimes	Sometimes
Separated path outside of road corridor	Yes	Yes	Yes	Yes
Shared path	Yes	Yes	Sometimes	Yes

Figure 2-10: Bicycle routes and infrastructure for different user groups.

2.8 Crash Data

In reviewing the existing network and the proposed routes, it is of vital importance to understand where there have been recorded accidents involving bicycles within the Liverpool LGA and what factors led to these accidents. The Roads and Maritime Service keeps a record of all reported accidents on NSW roads. Whilst many minor incidents and near misses go unreported, key statistics such as injuries and fatalities are collected. In the study period of July 2009 – June 2014 there were no recorded fatalities of bicycle riders within the Liverpool LGA; however, there were 58 reported cyclists who were injured in this period.

Any accidents involving a bicycle will raise the importance of providing route infrastructure (such as paths) and awareness infrastructure (such as signage) to prevent further accidents. This is especially applicable to areas or routes where multiple accidents have been recorded. When the accident data is plotted it becomes apparent that some existing and proposed routes have recorded numerous accidents, such as:

- Cartwright Avenue: between Hoxton Park Road and Corriedale Street;
- Webster Road: between Graham Avenue and William Street; and
- Memorial Avenue: between the T-way and Northumberland Street.

It was also noted that there were loose clusters of accidents around Heckenberg, Ashcroft, Lurnea and Liverpool. This may be a reflection of higher bicycle usage in these areas, or it may highlight that infrastructure and/or road safety in these areas is inadequate.

3 EXISTING INFRASTRUCTURE

This section provides insight into the current state and location of cycleways and cycle amenities within the Liverpool LGA. The section looks into cycle routes in terms of cohesion and connectivity with adjoining councils, while investigating the effectiveness of local bike routes. Liverpool already has a fairly substantive network and amenities when compared to many other Sydney local government areas, but there still remains an opportunity to expand the network, fill in missing links, and provide more facilities at key destinations.

3.1 Existing bike routes

There is a mixture of recreational routes, regional routes, sub-regional routes and local routes within the Liverpool LGA. An ongoing effort is made to complete routes by filling in missing links.

With the assistance of private developers and government agencies, such as the RMS, many new routes have been completed (or largely completed) in Liverpool since the first bike plan was implemented in 1985. This includes a number of important regional and sub-regional routes which run partially or wholly through Liverpool. A complete list of important routes, including details as to which parts are/are not constructed within the Liverpool LGA is detailed later in the plan.

Liverpool has a number of important recreational routes, such as:

- The Wattle Grove Route;
- The Chipping Norton Lakes Scheme;
- The Shale Hills Loop (Western Sydney Parklands);
- The Cecil Hills Scheme; and
- The Middleton Grange to Canley Vale Trail (partially completed).

There are also various local routes, particularly within the suburbs of Cartwright, West Hoxton and Cecil Hills, which provide access from suburban areas into the strategic network.

3.2 Links to adjoining local government areas

Liverpool shares its boundaries with seven local government areas. As the Bike Plan only focuses on the urban areas of Liverpool, links within the rural districts were not thoroughly investigated. As the Growth Centres start to develop over the next 30 years, greater bicycle links will be needed between Liverpool, Penrith and Camden Councils.

Bicycle links to the Canterbury Bankstown LGA are via an on-road route on the M5 and the East Hills Foot Bridge at Voyager Point. The Georges River is a significant barrier to

connectivity between the Liverpool and Canterbury Bankstown LGAs. A route along Newbridge Road is proposed, and will link the Liverpool CBD (and its surrounds) with the extensive route following Henry Lawson Drive.

There are currently no bicycle links with the Camden LGA. Completion of works on Camden Valley Way will provide an important link between areas such as Narellan and Oran Park with Liverpool. This route will form the principal cycle spine with the Camden LGA for the foreseeable future. As the Growth Centres lands develop, additional cycleway links will be provided to the existing areas and will focus on the future Leppington Town Centre.

There is currently one link to the Campbelltown LGA, being the M5 Motorway Cycleway. Many areas of Campbelltown bordering Liverpool are intended to remain as rural in nature, to protect the scenic hills area and visually link the Western Sydney Parklands through to Campbelltown. The Liverpool to Glenfield Rail Trail is now largely complete, and a number of cycleways are proposed to link the suburb of Edmondson Park in Liverpool with Bardia in Campbelltown. An upgrade to Campbelltown Road will include new signal crossings and a shared path, improving connectivity between Liverpool and Campbelltown, especially in urbanising areas.

Fairfield LGA has the highest number of potential linkages. At present there are a handful of formed links, including the Liverpool to Parramatta Rail Trail, Elizabeth Drive, The Liverpool-Parramatta T-way, Cowpasture Road, Plough & Harrow (Western Sydney Parklands), and the M7 Cycleway. Providing a new shared path along the length of North Liverpool Road and a path through Whitlam Park, connecting to Fairfield's cycleway following Green Valley Creek, will provide significant opportunities for recreational and commuter cycling once the planned links are constructed.

Penrith LGA's border with the Liverpool LGA is rural residential at present with no cycleways. In the long term, as the Growth Centres develop, some regional and sub-regional paths will be required. Potential links will traverse Elizabeth Drive and meet The Northern Road. Links would also be provided at Devonshire Road (northbound and southbound via a new four-way intersection) and Mamre Road.

There is only one existing road link with Sutherland LGA, being Heathcote Road. It is currently proposed that an on-road cycleway be built along this road to link these areas in the long term. An on-road cycleway along this road would be unsuitable for all but highly experienced cyclists, given the 80-100km/h speed limit of the road, general narrowness of the route, and the steep inclines and declines of the route.

3.3 Recreational Facilities

There are many recreational facilities located across the Liverpool LGA that cycling enthusiasts of all ages and skill levels are able to utilise. These cater for recreational cyclists, mountain bike riders, BMX riders and those learning to ride.

3.3.1 Carnes Hill Recreation Precinct

In addition to the concrete ramps, mounds and quarter pipes, the recreation precinct is also close by to many off-road shared paths including the Shale Hills loop through the Western Sydney Parklands.

3.3.2 Collimore Park

A small bike training facility is located at Collimore Park, where children can learn to cycle in a dedicated environment. The park includes multiple obstacles cyclists are likely to come across on-road, such as intersections, curved roads, one-way streets, sharp corners, roundabouts, and pedestrian crossings.

3.3.3 Kelso Skate Park

BMX riders can take advantage of Kelso Park, located near the junction of Epsom Road and Newbridge Road, Moorebank. The facility is constructed of concrete and includes a half-pipe, quarter-pipe, platforms, ramps, rails, walls, and mounds.

3.3.4 Meere Park

A small facility is located on Paterson Avenue, near Hunter Avenue, Lurnea. The park includes a small ramp and a small quarter-pipe.

3.3.5 Powell Park

A free to use BMX park was located at Powell Park near Hoxton Park Road in Cartwright. It had a mixed sealed/gravel surface and a starting platform. As a BMX circuit, the park facility primarily consisted of dirt/gravel jumps and sealed banked corners. This facility is currently closed due to contamination, and remediation works are ongoing. There is strong public demand to support the reestablishment of this facility, and Council is assisting to find a suitable location for a BMX bike track in the LGA.

3.3.6 Wylde Mountain Bike Trail (Western Sydney Parklands)

A dedicated mountain biking facility officially opened in the Western Sydney Parklands in late 2014. The facility is located just off Elizabeth Drive (Range Road), Cecil Park. It is free to use, and open from sunrise until sunset, weather permitting. The purpose built facility has been completed to international standards and features a number of trails for differing skill levels. This facility may be closed for scheduled events and periods of heavy rain (to avoid damaging the riding surfaces).

3.4 Maintenance & Hazards

Ensuring existing bicycle infrastructure is adequately maintained has important safety and promotional effects. Many of Council's cycleways are relatively new and constructed of reinforced concrete, and as such require little maintenance. However, there are also a number of older, more heavily used routes (such as near the Chipping Norton Lakes), and newer surfaces, particularly paint, will also degrade as they age. Therefore, it is pertinent that adequate repairs are made before a hazard is likely to deter cyclists, or cause an accident. It is also recognised that cycleway surfaces need to be smoother than that of most road surfaces, as many bicycles have no suspension systems and have narrow tyres inflated to high pressure to reduce friction and drag.

Due to the extent of Council's cycleway network, existing or potential hazards may not be identified for long periods of time. Members of the community, and bicycle focussed organisations are encouraged to report an issue or hazard to Council to ensure that hazards are identified as quickly as possible and to find a solution in a timely manner. Council's Snap Send Solve app has been developed for Android and iPhone operating systems, which allows users to take a photo of the hazard, and uses the phone's GPS to record the location.

A cycle-route maintenance plan (similar to those for the maintenance of roads) should be developed by Council to ensure that the maintenance of bike paths and bike facilities is given the same scheduled treatment as council-owned roads and footpaths. The maintenance of bike facilities in the Liverpool LGA is primarily constrained by three factors: fragmented ownership (e.g. paths owned and maintained by other government agencies), the scale/extent of the network, and the funding to inspect and repair the network. Maintenance of existing cycleway assets is of significance. Given the location of many cycleways, it is highly important that cyclists contact Council as soon as practically possible if they note a deficiency or hazard in the existing cycleway network, not limited to:

- Condition/surface;
- Positioning of stormwater grates;
- Adherence of other vehicles to speed limits;
- Lighting;
- Sight lines and vegetation;
- Line markings;
- Non-compliant structures/obstacles;
- Kerbs, ramps, debris and the like;

4 LIVERPOOL LGA PRECINCTS

Due to the size of the Liverpool LGA it is beneficial to divide the area into distinct precincts. Each precinct consists of suburbs with similar characteristics and is bound by major barriers to movement. It should be noted that the names of the precincts do not necessarily correlate to the suburbs captured. The following eight precincts were identified:

- Liverpool CBD
- Green Valley
- Cecil Hills
- Austral
- Prestons
- Casula
- Wattle Grove
- Chipping Norton

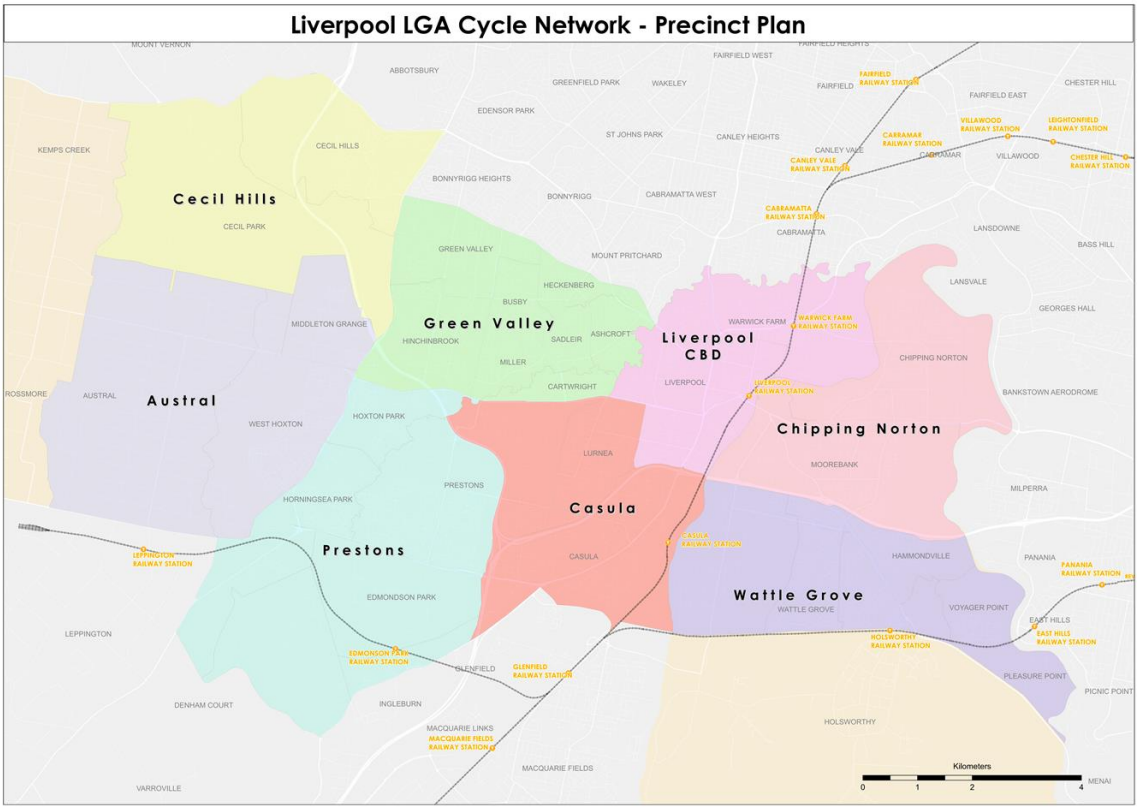


Figure 4-1: Overview of Precincts

4.1 Liverpool CBD

The suburbs within the Liverpool CBD precinct include:

- Liverpool
- Warwick Farm

The Liverpool CBD Precinct is the central hub of the LGA. The city centre has rapidly developed over the past decade, and continues to grow. Containing two railway stations, Westfield shopping centre, Liverpool Hospital, two new university campuses, and many new flat buildings, the city centre is both a key origin and destination location.

The precinct is marked by high traffic volumes and a limited number of cycling links, most of which currently terminate at the edge of the city centre. There is a need to provide high quality on/off road paths in the city centre (with high quality way-finding signage) in order for the Liverpool city centre to evolve into a 21st century city. Making the Liverpool city centre more bike friendly is an important step in facilitating a mode-shift away from private vehicles as traffic congestion and competition for car parking increases.

The Liverpool CBD precinct is bounded by the Hume Highway in the north and west, and the railway line and the Georges River in the east, making east-west boundary crossovers a high priority for connectivity.

Figure 4.2 shows the extent of the Liverpool CBD Precinct.

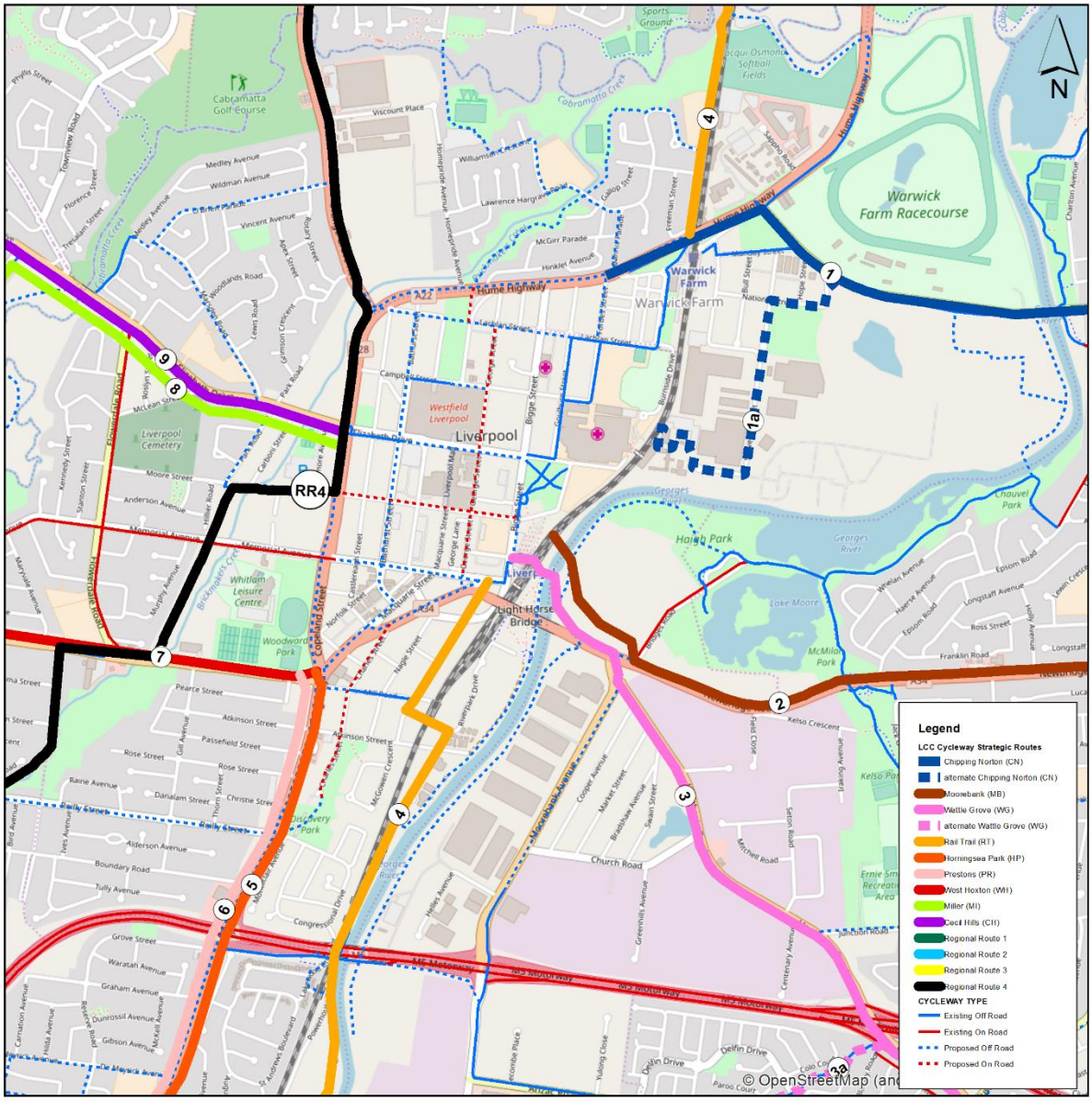


Figure 4-2: Liverpool CBD Precinct

Strengths	Barriers
Close proximity to Liverpool and Warwick Farm Station Access to all strategic routes	Railway Line, Georges River, Hume Highway High vehicle demand for limited road space
Opportunities	**Threats**
Hume Highway off-road cycleway Elizabeth Street on-road cycleway Cycleway through hospital precinct Cycleway through pedestrianised section of Macquarie Street Complete the Liverpool-Parramatta Rail Trail	Missed opportunities for road upgrades or/developments to include new bike paths.

4.2 Green Valley

The suburbs within the Green Valley precinct include:

- Green Valley
- Hinchinbrook
- Heckenberg
- Busby
- Miller
- Sadleir
- Cartwright
- Ashcroft
- Mount Pritchard

Figure 4.3 below shows the extent of the Green Valley Precinct.

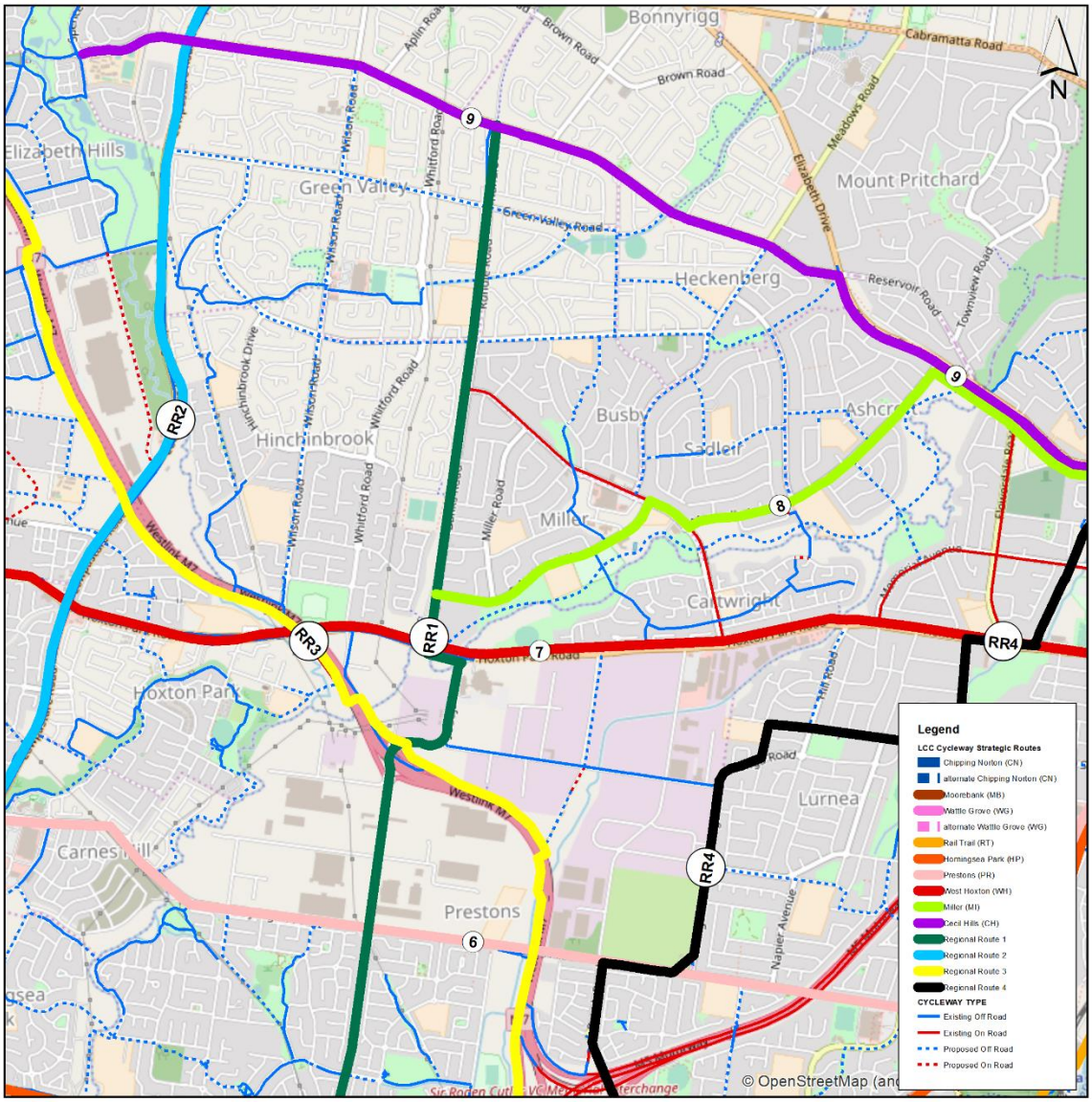


Figure 4-3: Green Valley Precinct

The Green Valley precinct sits immediately west of the Liverpool CBD precinct and consists of predominantly low density residential suburbs. It is notable for its large concentration of primary and secondary schools with 11 schools identified in the precinct. The precinct contains two local shopping centres in Miller and Green Valley, both of which are well connected to the existing bike network.

The precinct is notable for its large north-south cycle link along the Liverpool to Parramatta T-Way, which also acts as a regional link to the neighbouring Fairfield LGA in the north. It is also marked by several missing links that are reasonably practical to develop.

The Green Valley precinct is bounded by North Liverpool Road and Elizabeth Drive in the north (LGA Boundary), Hoxton Park Road in the south, Cabramatta Creek in the east, and Cowpasture Road in the West.

Strengths	**Barriers**
Large network of low traffic volume roads, Existing infrastructure along T-way and parks	Cabramatta Creek Topography in Green Valley and Miller
Opportunities	**Threats**
High concentration of schools, Predominantly residential buildings, Large number of parks	Missed opportunities for road upgrades or/developments to include new bike paths.

4.3 Cecil Hills

The suburbs within the Cecil Hills precinct include:

- Cecil Hills
- Elizabeth Hills
- Cecil Park
- Len Waters Estate

Figure 4.4 shows the extent of the Cecil Hills Precinct.

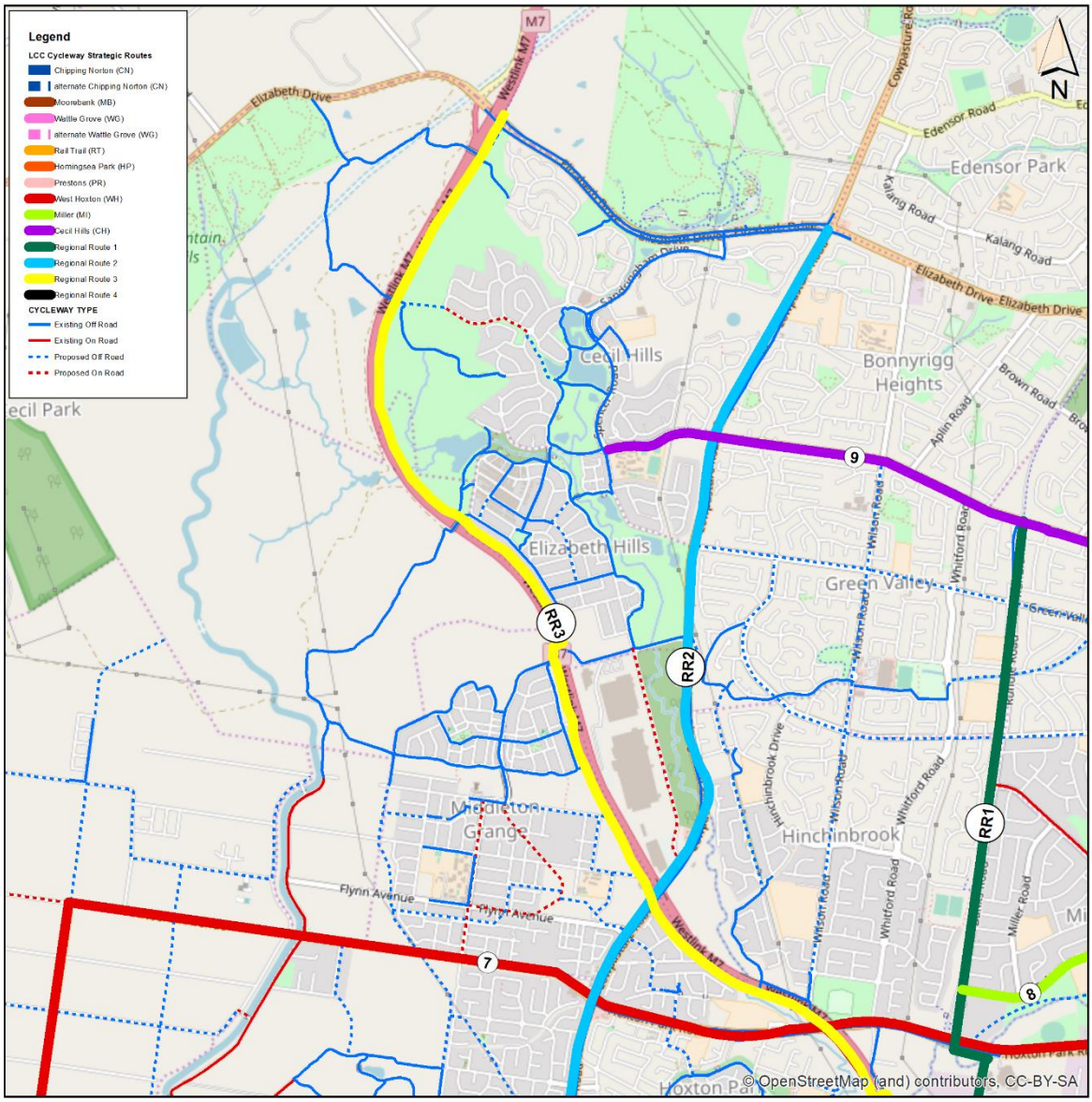


Figure 4-4: Cecil Hills Precinct

The Cecil Hills Precinct is the most northern precinct in the LGA and is notable for having predominantly modern cycling facilities. It contains a local shopping centre, primary school and a secondary school.

The precinct has modern cycling facilities that are mostly off-road running throughout Cecil Hills and Elizabeth Hills with connections to off-road cycling facilities along Cowpasture Road and Elizabeth Drive.

The precinct is bound by Elizabeth Drive in the north, Cowpasture Road in the east and the M7 in the west.

Strengths	Barriers
High quality existing cycle paths, Large network of low traffic volume roads	Cowpasture Road, Elizabeth Drive, M7, No development west of suburb
Opportunities	**Threats**
Proximity to M7 cycleway provides access to wider Sydney cycling network	Future developments not incorporating cycling facilities into plans

4.4 Austral

The suburbs within the Austral precinct include:

- Austral
- Middleton Grange
- West Hoxton

Figure 4.5 shows the extent of the Austral Precinct.

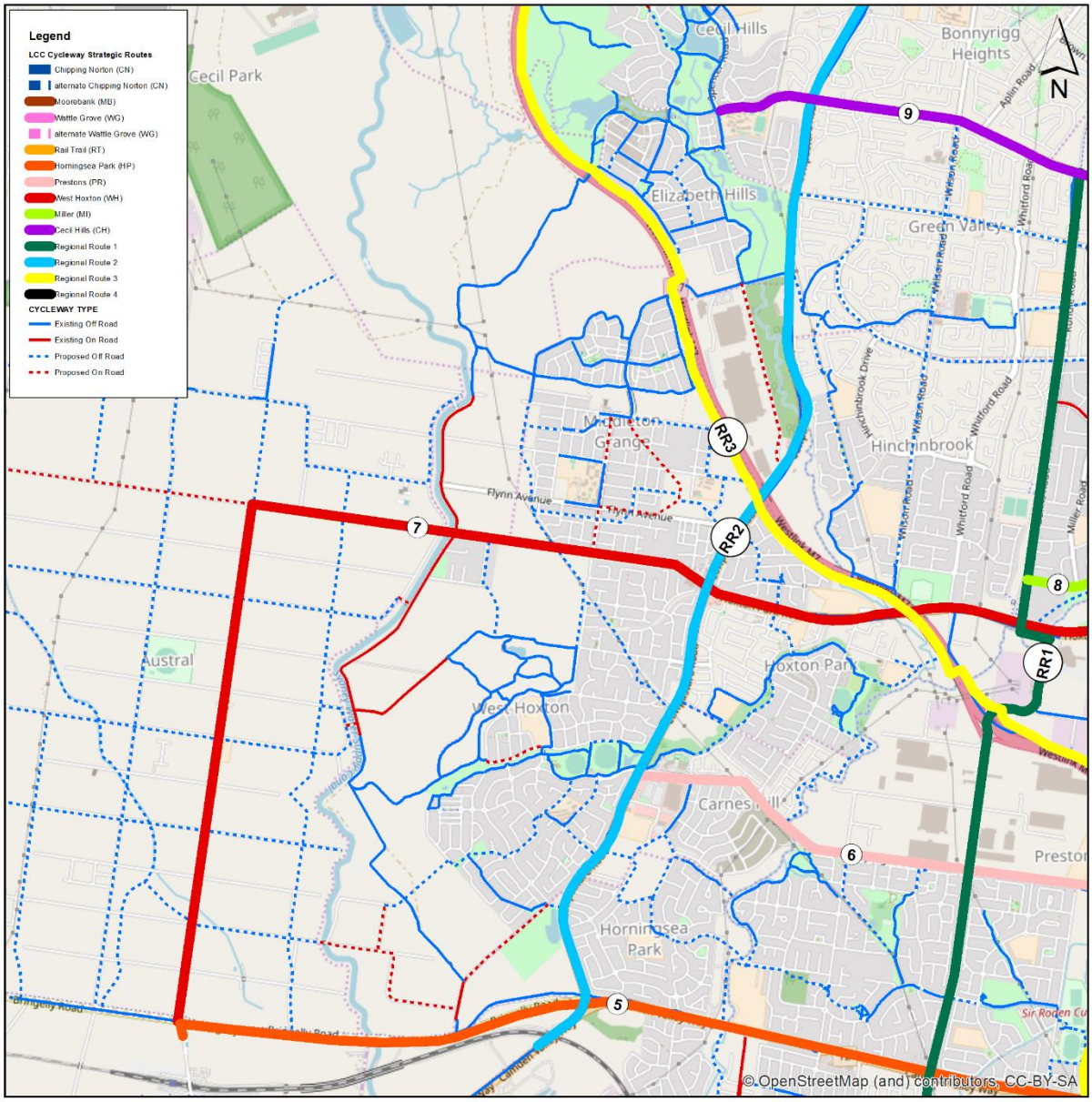


Figure 4-5: Austral Precinct

Austral is a precinct located in the west of the Liverpool LGA. It currently has mixed densities of development: semi-rural developments in Austral and modern residential developments in

West Hoxton and Middleton Grange. Its boundaries are the M7 and Cowpasture Road in the east, Fifteenth Avenue in the north, Kemps Creek in the west with and Bringelly Road in the south.

Strengths	Barriers
Large network of low traffic volume roads	Hills located west of precinct Isolation/ distance to rest of LGA Minimal existing off-road cycling facilities
Opportunities	**Threats**
Future developments incorporating cycling facilities into plans, Low density, semi-rural area provides opportunity for recreational cycle paths, Cycling link to Leppington Station	Future developments not incorporating cycling facilities into plans

4.5 Prestons

The suburbs within the Prestons precinct include:

- Part of Prestons
- Hoxton Park
- Carnes Hill
- Horningsea Park
- Edmondson Park
- Denham Court

Figure 4.6 shows the extent of the Prestons Precinct

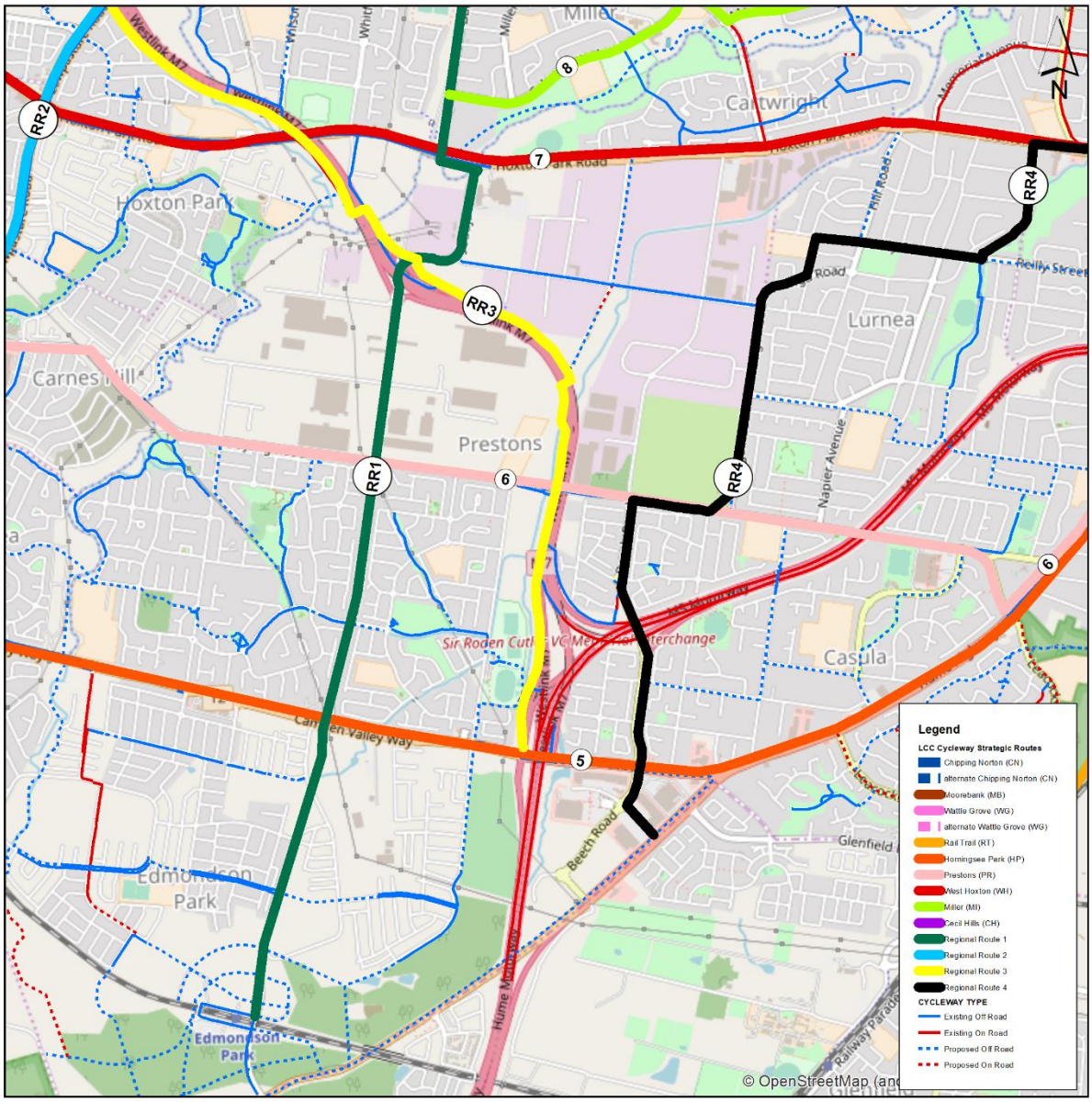


Figure 4-6: Prestons Precinct

The Prestons precinct is divided into the northern and the southern section by Camden Valley Way. The southern section, consisting of Edmondson Park and Denham Court, is currently being developed as part of the South West Growth Area with cycling infrastructure expected to provide links to the main cycle network. Edmondson Park Station, located close to the southern boundary of the LGA, is well connected to the proposed cycling network in the Prestons precinct.

The northern section, consisting of Hoxton Park, Horningsea Park and Prestons, is divided into east and west by Cabramatta Creek with links only through Kurrajong Road and Camden Valley Way.

The Prestons precinct's boundaries are Cowpasture Road in the west, the M7 and Hume Motorway in the north and east, and Campbelltown Road and Denham Court Road in the South (LGA Boundary).

Strengths	Barriers
Large network of low traffic volume roads, Existing shared paths and cycleways along key roads	Hills located west of precinct Isolation to rest of LGA Off-road cycling facilities not connecting into suburbs
Opportunities	**Threats**
Future developments incorporating cycling facilities into plans, Cycling link to Edmondson Park Station	Future developments not incorporating cycling facilities into plans

4.6 Casula

The suburbs within the Casula precinct include:

- Casula
- Lurnea
- Part of Prestons

Figure 4.7 shows the extent of the Casula Precinct

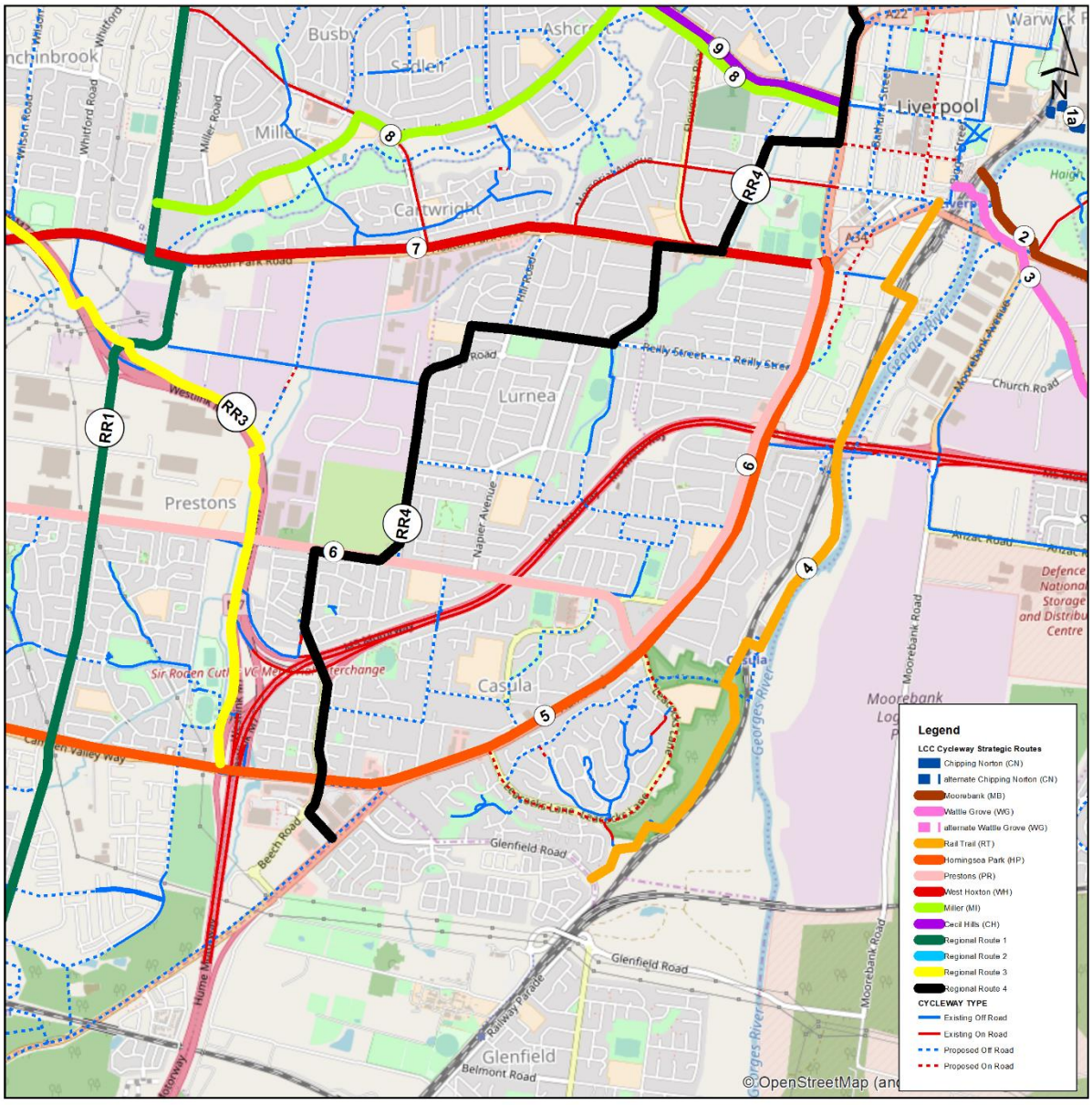


Figure 4-7: Casula Precinct

The Casula precinct is located south west of the Liverpool CBD precinct and is marked by major barriers to movement throughout the precinct. These barriers include the railway line in the east, the steep hills west of the rail line, the Hume Highway, the M5 motorway,

Cabramatta Creek (which contains a 1.8km long canal), the M7 motorway and Hoxton Park Road (northern precinct boundary). The most significant barrier is the M5 motorway with the Box Road pedestrian bridge being the only appropriate crossing for cyclists.

The site contains a large industrial park with an established cycle network providing connections to surrounding precincts and the M7. The main cycling link to the Liverpool CBD is through the existing Liverpool to Parramatta cycleway.

Strengths	Barriers
Proximity to Liverpool to Parramatta Rail Trail, Hume Highway off-road cycle path	Steep terrain within Casula M5 Motorway, Georges River, Lack of direct north-south link opportunity through Lurnea
Opportunities	**Threats**
Connections between key roads with existing cycleways	Increased road traffic with development of South-West Growth Area

4.7 Wattle Grove

The suburbs within the Wattle Grove precinct include:

- Wattle Grove
- Hammondville
- Voyager Point
- Holsworthy
- Pleasure Point

Figure 4.8 shows the extent of the Wattle Grove Precinct

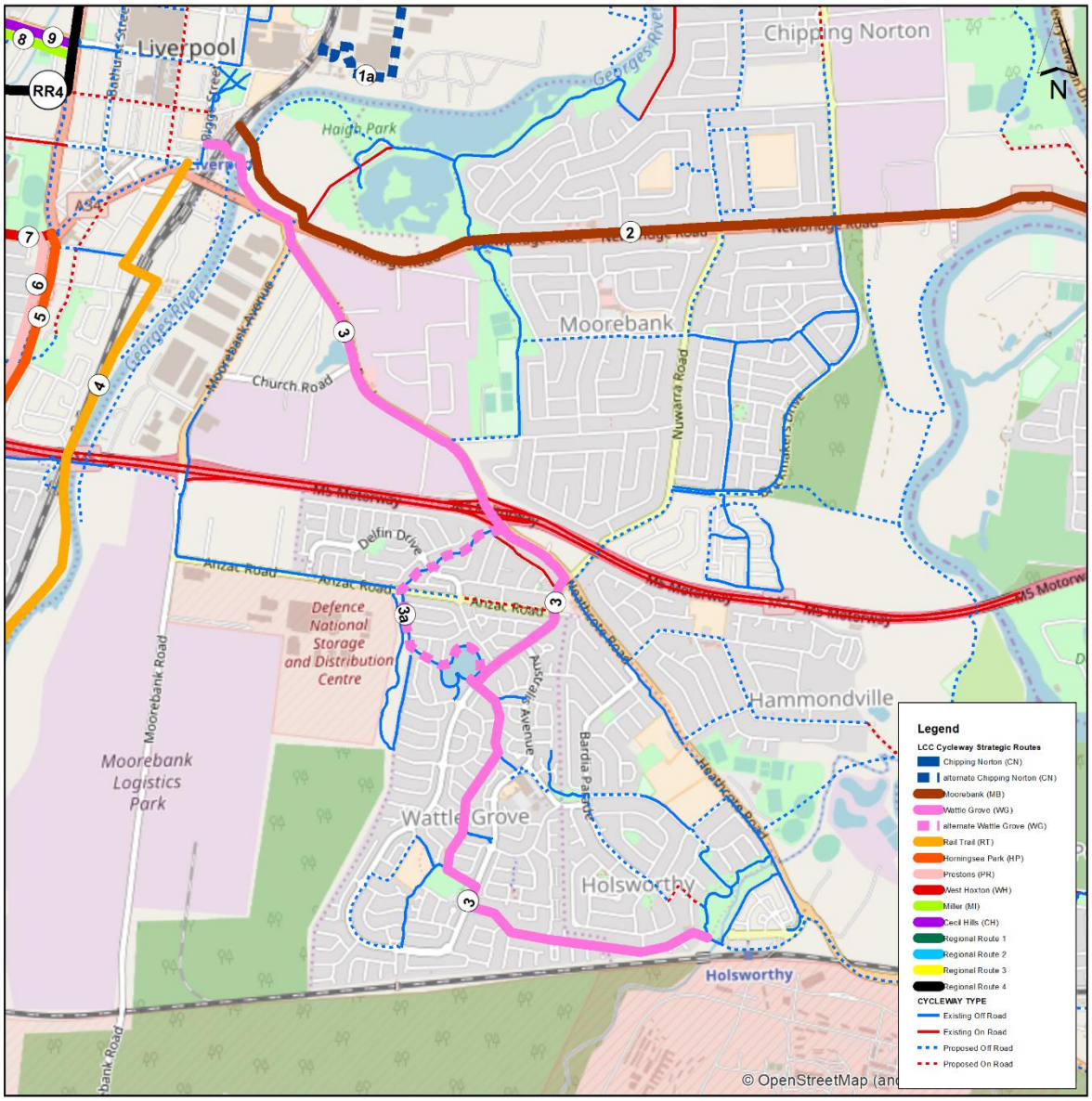


Figure 4-8: Wattle Grove Precinct

The Wattle Grove precinct lies south east of the Liverpool CBD and west of the Canterbury Bankstown LGA and Sutherland LGA. It is marked by excellent potential for local and

regional links. Wattle Grove contains an existing pedestrian and cycle path that connects large sections of residential properties to both local shopping centres and Holsworthy Station. Voyager Point is an isolated suburb with an existing pedestrian bridge crossing the Georges River to the Canterbury Bankstown LGA.

The Wattle Grove precinct is bounded by the Georges River in the east and west, the M5 in the north, and dense bushland and the railway line in the south.

Strengths	**Barriers**
Good existing internal cycle paths, Proximity to Holsworthy Station, Large network of low traffic volume roads	M5 Motorway, Georges River, Railway line in the south, Heathcote Road.
Opportunities	Threats
Development of industrial park in the west could provide space for future cycling infrastructure.	Isolation of precinct if M5 / Heathcote Road were not made more permeable.

4.8 Chipping Norton

The suburbs within the Chipping Norton precinct include:

- Chipping Norton
- Moorebank

Figure 4.9 shows the extent of the Chipping Norton Precinct

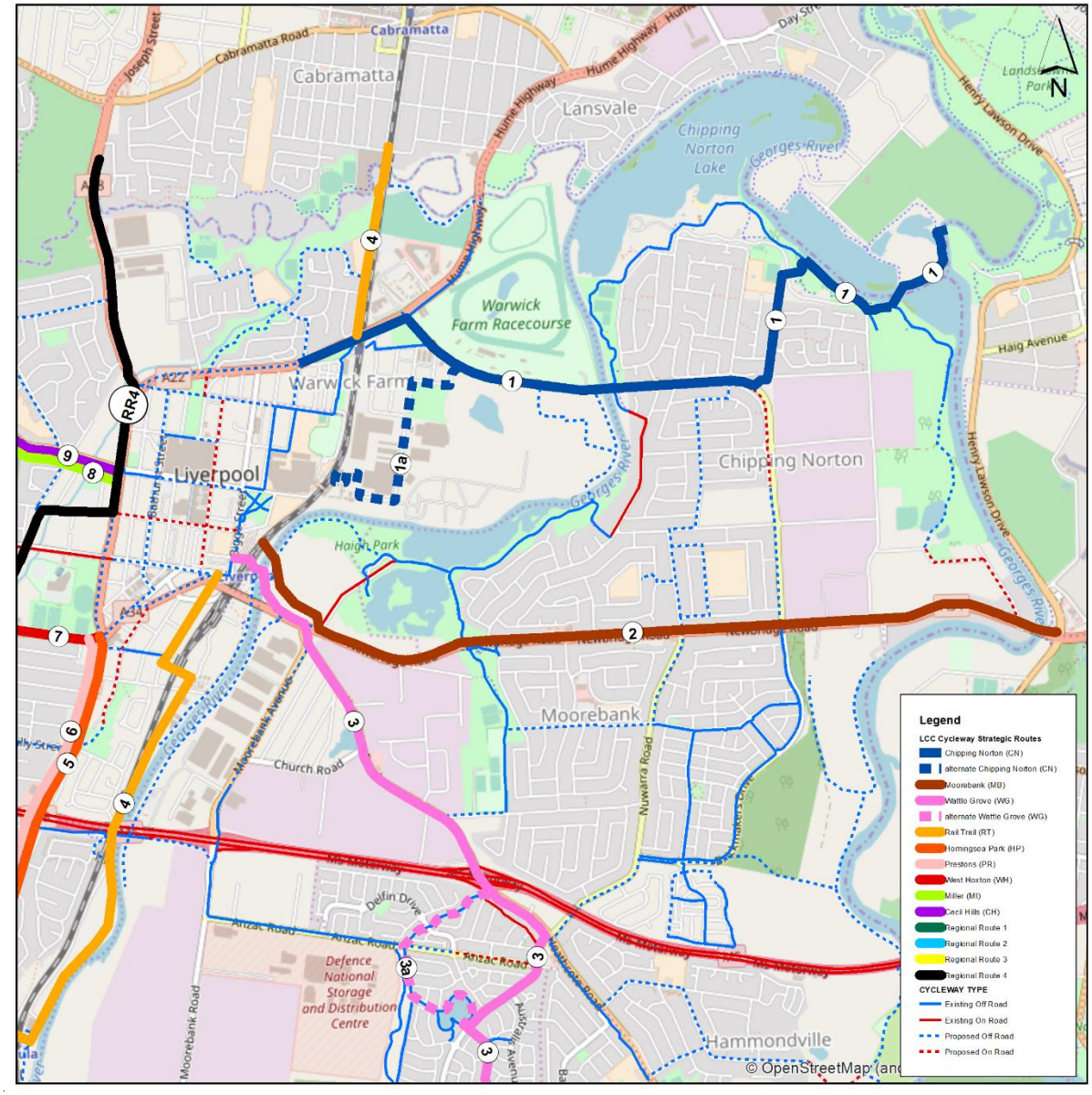


Figure 4-9: Chipping Norton Precinct

The Chipping Norton precinct is a mostly residential precinct consisting of four primary schools, a high school, three shopping centres and a large industrial precinct. The precinct has an existing cycle network along parklands surrounding the precinct with proposed on-road cycle ways to provide north-south and east-west links.

The Chipping Norton Precinct is bounded by the Georges River in the north, west and east and the M5 Motorway in the south.

Strengths	Barriers
Good network of off-road cycleways in local parks	Georges River creates a peninsular of the precinct M5 Motorway
Opportunities	**Threats**
Governor Macquarie Drive Bridge Residential area can attract more cycling Development of Moorebank Marina could create cycling environment	Future developments not incorporating cycling facilities into plans Pavement deterioration of the Chipping Norton recreational cycleway.

5 PROPOSED BIKE ROUTES AND INFRASTRUCTURE

This section highlights the new infrastructure to be delivered by the Bike Plan. These actions were formulated as a result of the information contained in the previous sections and are essentially Council's response to improving the quality and connectivity of cycle routes within the LGA.

In particular, this section outlines key missing cycle links within the Liverpool LGA and seeks to enhance and increase participation in cycling through its bike route, bike amenity and cycling signage strategies. Actual routes may be built in different alignments to those shown on maps, and may be built as either on-road or off-road, subject to detailed design.

5.1 Strategic Route Network

It is important to highlight key links throughout the LGA. This can be done by introducing a strategic route network that connects the precincts with the Liverpool CBD. In addition, a number of established regional routes exist (e.g. along the M7), which will also become part of the strategic route network.

The strategic routes act as collectors for the main cycling movements across the LGA. They will have to be supported by a network of local links connecting key destinations and residential areas within the precincts to the strategic route network.

The strategic routes should be of high quality and, where possible, separated from vehicular traffic. The network requires a wayfinding concept and would benefit from branding.

Based on a combined desktop and field study of existing cycling routes in the network, routes were identified for cyclists that would provide links throughout the LGA and where possible, neighbouring LGAs. Twelve routes were identified to be strategic for the LGA. A description of each and their influence on the network is summarised in Figure 5-1.

The strategic routes will generally be beside main/arterial roads. Where they aren't, they should generally be well-lit, as these will likely be part of the main commuter network, and require safe passage during all hours/weather conditions.

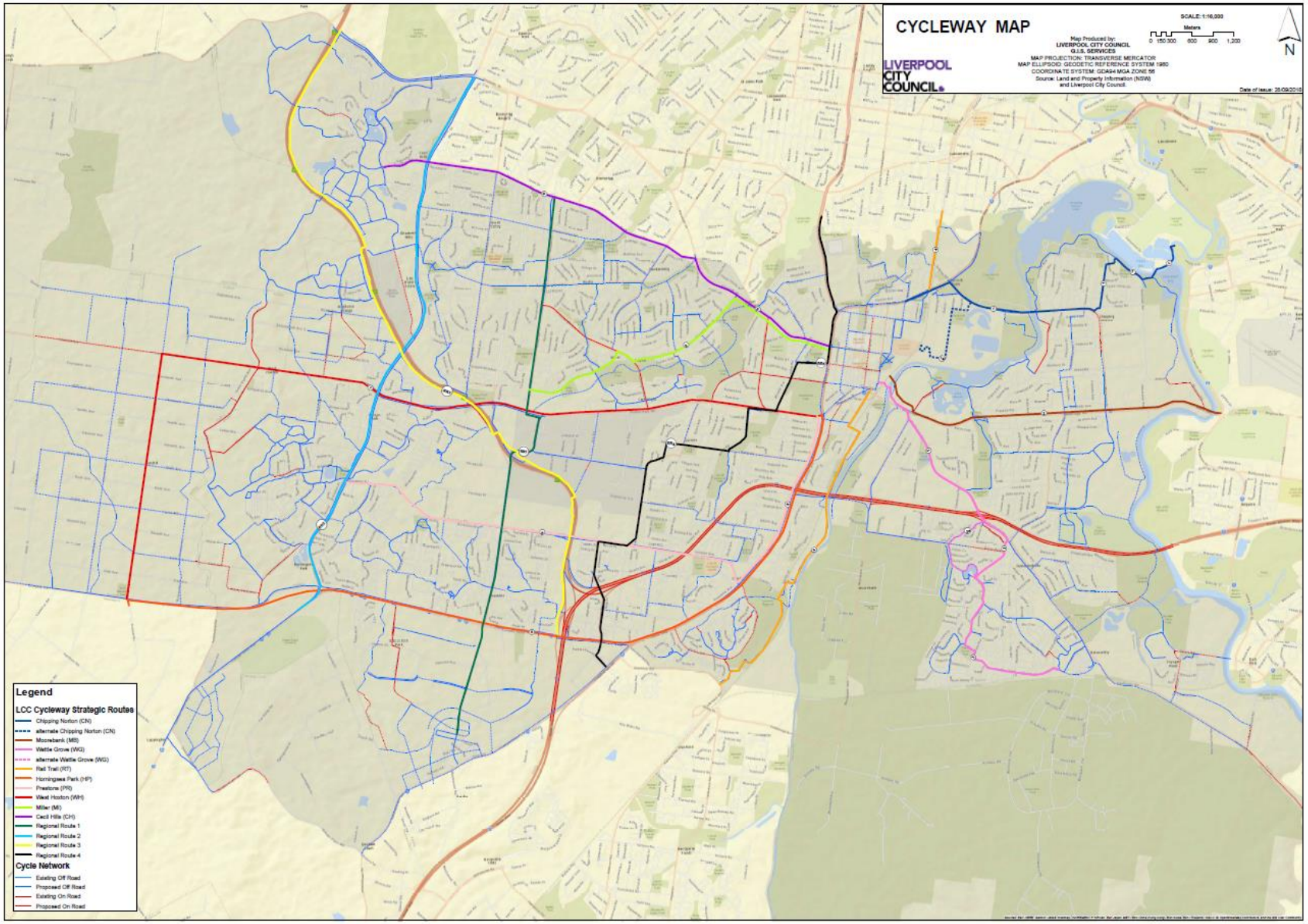


Figure 5-1: Strategic Cycle Network

5.2 Chipping Norton Route [1]

The Liverpool to Chipping Norton route provides a link to the north east of the LGA. The route starts on the Hume Highway at the northern end of the Liverpool CBD. From the Hume Highway it turns onto Governor Macquarie Drive. The route crosses over the Governor Macquarie Drive Bridge where a link to the Georges River Cycleway exists. The route then runs along Derby Crescent, a local road that runs parallel to Governor Macquarie Drive. The route then proceeds up Barry Road and Ernest Avenue to meet the Chipping Norton Lakes Cycleway near Black Muscat Park. There is the potential for a bridge to be provided across the Georges River to the north of Heron Park to link this route to a strategic route which links Fairfield to Canterbury Bankstown. This could be a key commuter as well as recreational route through a high amenity location.

Alternatively, the route can be directed through the hospital precinct near the City Centre where a crossing of the railway line exists. The route would then be directed along Scrivener Street, Stroud Street and National Street where it will connect to the Governor Macquarie Drive Bridge. This strategic route can be seen in Figure 5-2.

5.2.1 Precincts Affected

- Liverpool CBD
- Chipping Norton

5.2.2 Missing Links

- **Hume Highway & Governor Macquarie Drive**: Along both the Hume Highway and Governor Macquarie Drive exists minimal stretches of the proposed off-road cycleway.
- **Governor Macquarie Drive Bridge**: A decommissioned bridge exists adjacent to the existing Governor Macquarie Drive Bridge. The refurbishment of this bridge would provide a high-quality crossing of the Georges River for both cyclists and pedestrians.
- **Hospital Precinct**: Opportunity exists to cross the railway line through the existing hospital precinct. The proposed alternative route would most efficiently be achieved through a network of on-road cycleways. This is feasible due to the low traffic volumes. The alternative route connects with the main route at Governor Macquarie Drive.
- **Barry Road and Ernest Avenue**: to link to the Chipping Norton Lakes Cycleway and potential for extension across the Georges River.

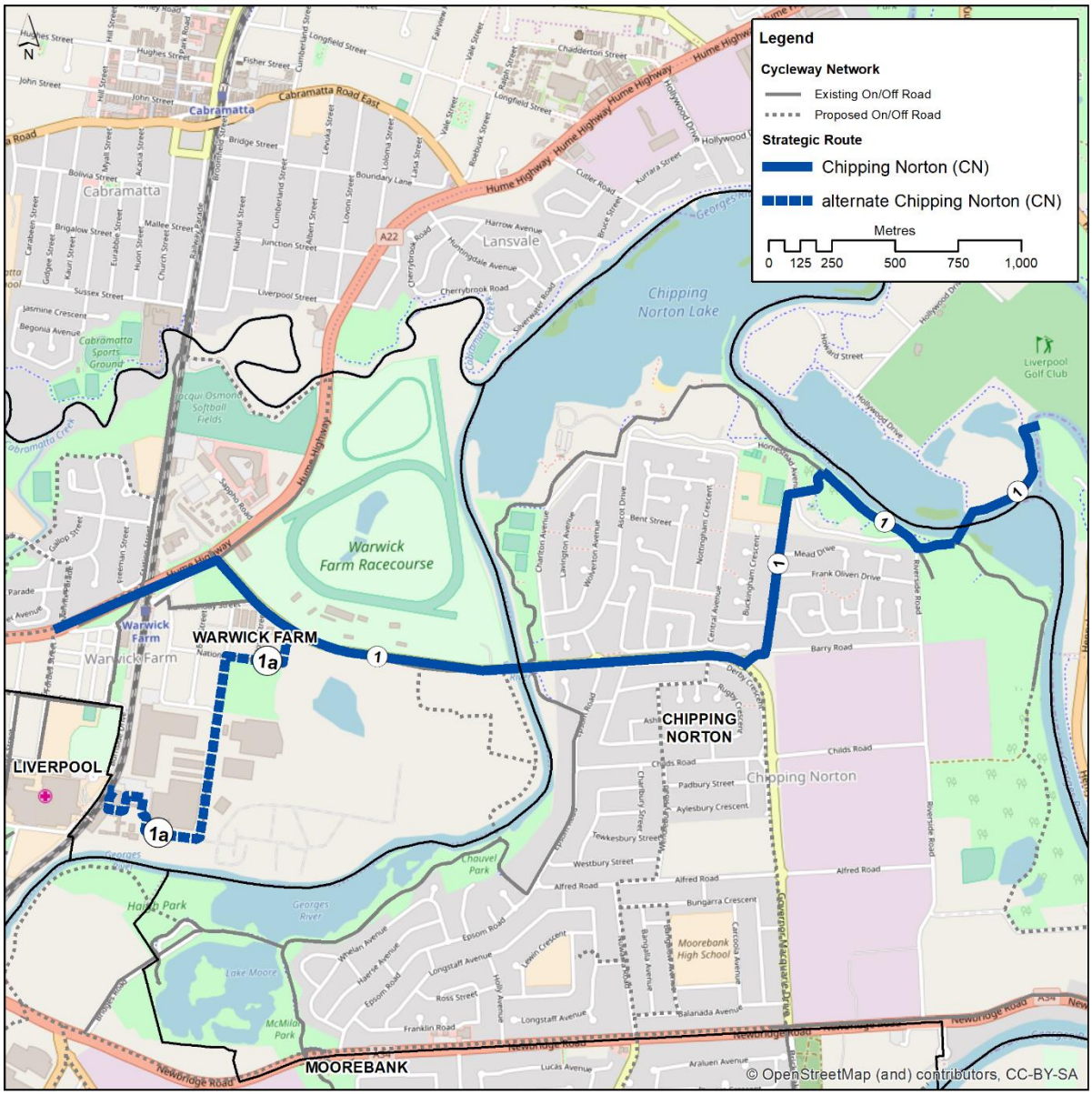


Figure 5-2: Route 1

5.3 Moorebank Route [2]

The Moorebank route provides a link to the eastern section of the Liverpool LGA and connects to the adjacent Canterbury Bankstown LGA at the eastern crossing of the Georges River on Newbridge Road. This would link into a high quality shared path in the Canterbury Bankstown LGA that runs alongside much of Henry Lawson Drive.

At the time of writing none of the infrastructure that makes up the route has been built; although works have started on building a shared path on the northern side of Newbridge Road, nearest the Bankstown crossing of the Georges River. When complete the route would consist of an off-road route that runs alongside the entirety of Newbridge Road between both crossings of the Georges River. It is also proposed that the route could run

from Newbridge Road to Liverpool Station via a decommissioned rail bridge adjacent to Newbridge Road.

5.3.1 Precincts Affected

- Liverpool CBD
- Chipping Norton

5.3.2 Missing Links

Newbridge Road Off-Street Cycle Way: this is a proposed off-road cycleway that runs along the entirety of the strategic route. While pedestrian footpaths exist along Newbridge Road, they are not suitable for being converted to a shared path. A shared path is being constructed on the northern side of Newbridge Road.

Liverpool Railway Bridge: this bridge was once a railway bridge that has since been decommissioned and deconstructed. It is part the proposed cycleway and if rebuilt as a shared path bridge would be a favourable alternative to the existing Newbridge Road Bridge for cyclists.

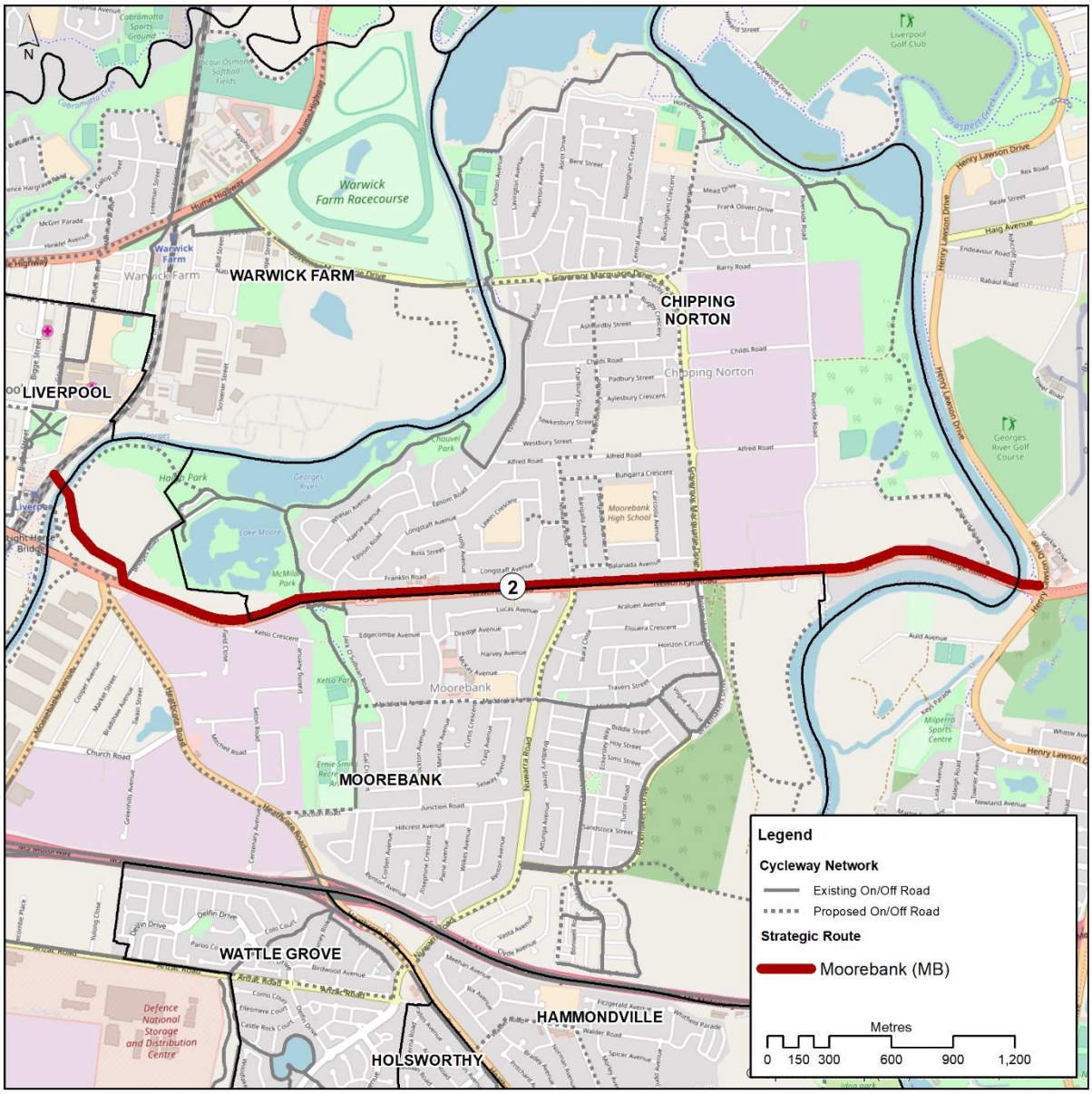


Figure 5-3: Route 2

5.4 Wattle Grove Route [3]

The Wattle Grove route provides a link to the south-eastern suburbs of the Liverpool LGA. Its main advantage lies in the utilisation of an existing cycling network throughout Wattle Grove. The proposed connection between Wattle Grove and the Liverpool CBD when complete would provide a much needed off-road link across the M5 Motorway as well as the Georges River.

Most of the proposed off-road cycleway along Heathcote Road has not been built. The crossing of the M5 poses a challenge for cyclists with no cycling facilities available.

5.4.1 Precincts Affected

- Liverpool CBD

- Chipping Norton
- Wattle Grove

5.4.2 Missing Links

Heathcote Road Off-Street Cycle Way: This is a proposed off-road cycleway that runs the entirety of Heathcote Road.

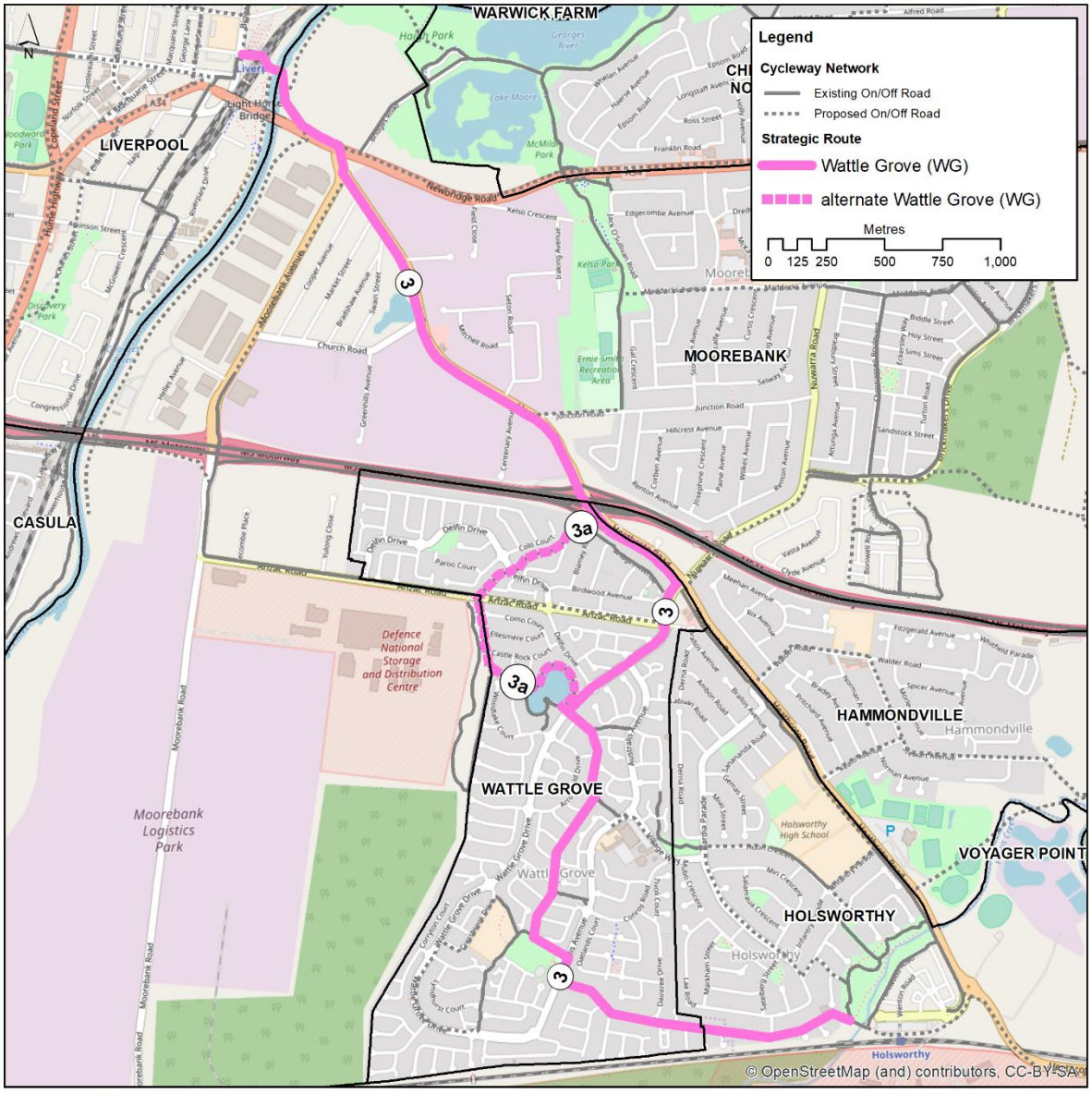


Figure 5-4: Route 3

5.5 The Rail Trail [4]

The Liverpool to Parramatta Rail Trail (Rail Trail) is a well-established cycling facility within the Liverpool LGA. It provides a north-south link between Liverpool and the Parramatta CBD. The route is generally a high-quality link that should be incorporated into the LGA wide Bike Plan wherever possible. The more recent Liverpool to Campbelltown Rail Trail is completed between Scott Street and Glenfield Station. Cyclists have to dismount at Casula Station to

cross the railway line, but the rest of the path is of high quality and is generally a pleasant ride beside the Georges River and Leacock Regional Reserve. Adequate lighting needs to be considered for this key route.

5.5.1 Precincts Affected

- Liverpool CBD
- Casula

5.5.2 Missing Links

None: Within the Liverpool LGA this strategic route requires linking the Liverpool railway station with Liverpool Hospital. A new path near Casula station may be provided in the future, which avoids the need to use the railway footbridge. Improved lighting should be addressed.

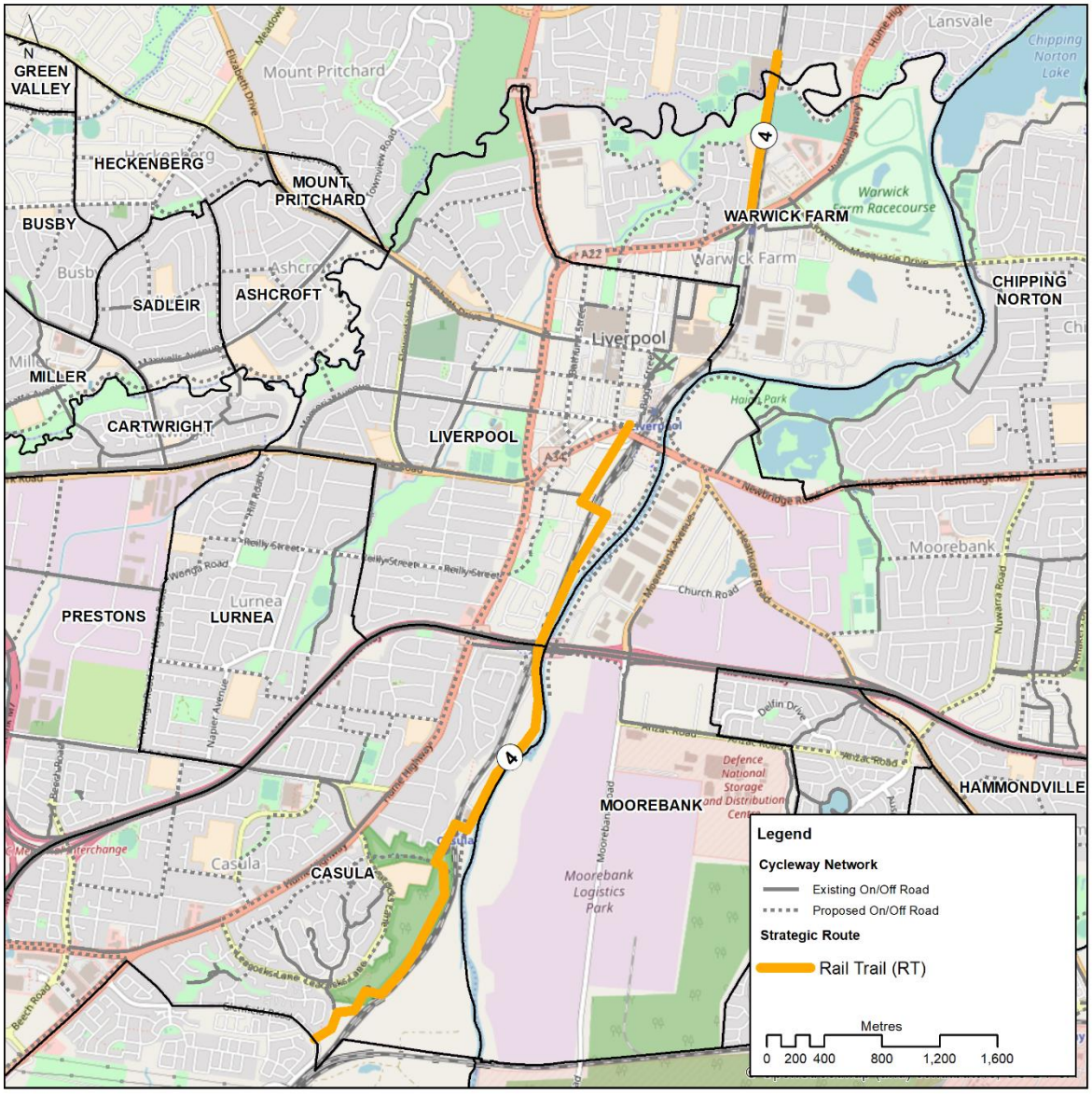


Figure 5-5: Route 4

5.6 Horningsea Park Route [5]

The Horningsea Park Route runs from the Liverpool CBD to Rickard Road via Casula, Prestons and Edmondson Park. This is achieved through utilising an off-road cycleway proposed to run along the Hume Highway and then using an existing path on the northern side of Camden Valley Way and Bringelly Road.

The route is complemented by a parallel subregional route that runs beside Kurrajong Road. The Kurrajong Road route is largely complete from the Hume Highway to the Carnes Hill Recreation facility, before joining Cowpasture road and other local routes towards West Hoxton.

The route is shown in Figure 5-6.

5.6.1 Precincts Affected

- Liverpool CBD
- Casula
- Prestons
- Austral

5.6.2 Missing Links

Hume Highway off-road cycleway: The majority of the cycleway between the CBD and the Hume Motorway currently does not exist. Cyclists may want to utilise the Kurrajong Road link and the Liverpool to Campbelltown Rail Trail in the interim, although this journey is challenged by the steep decline on the approach to Casula station.

Figure 5-6: Route 5

5.7 Prestons Route [6]

The Prestons Route runs parallel to the Horningsea Park [5] route. The two routes diverge at the intersection of Kurrajong Road and the Hume Highway. Route 6 continues along Kurrajong Road before ending at Cowpasture Road.

This route was selected to capitalise on the existing cycling infrastructure, schools and centres that run along Kurrajong Road. The route contains key links through the M5 motorway and Cabramatta Creek.

5.7.1 Precincts Affected

- Liverpool CBD
- Casula

- Prestons
- Austral

5.7.2 Missing Links

Hume Highway off-road cycleway: Similar to Route 5, the majority of the cycleway between the CBD and Kurrajong Road does not exist.

Unmarked Cycle Paths, Kurrajong Road: The off-road shared path for both pedestrians and cyclists is currently unmarked for much of its length. Proper shared path markings begin westward of the Kurrajong Road / Bernera Road intersection.

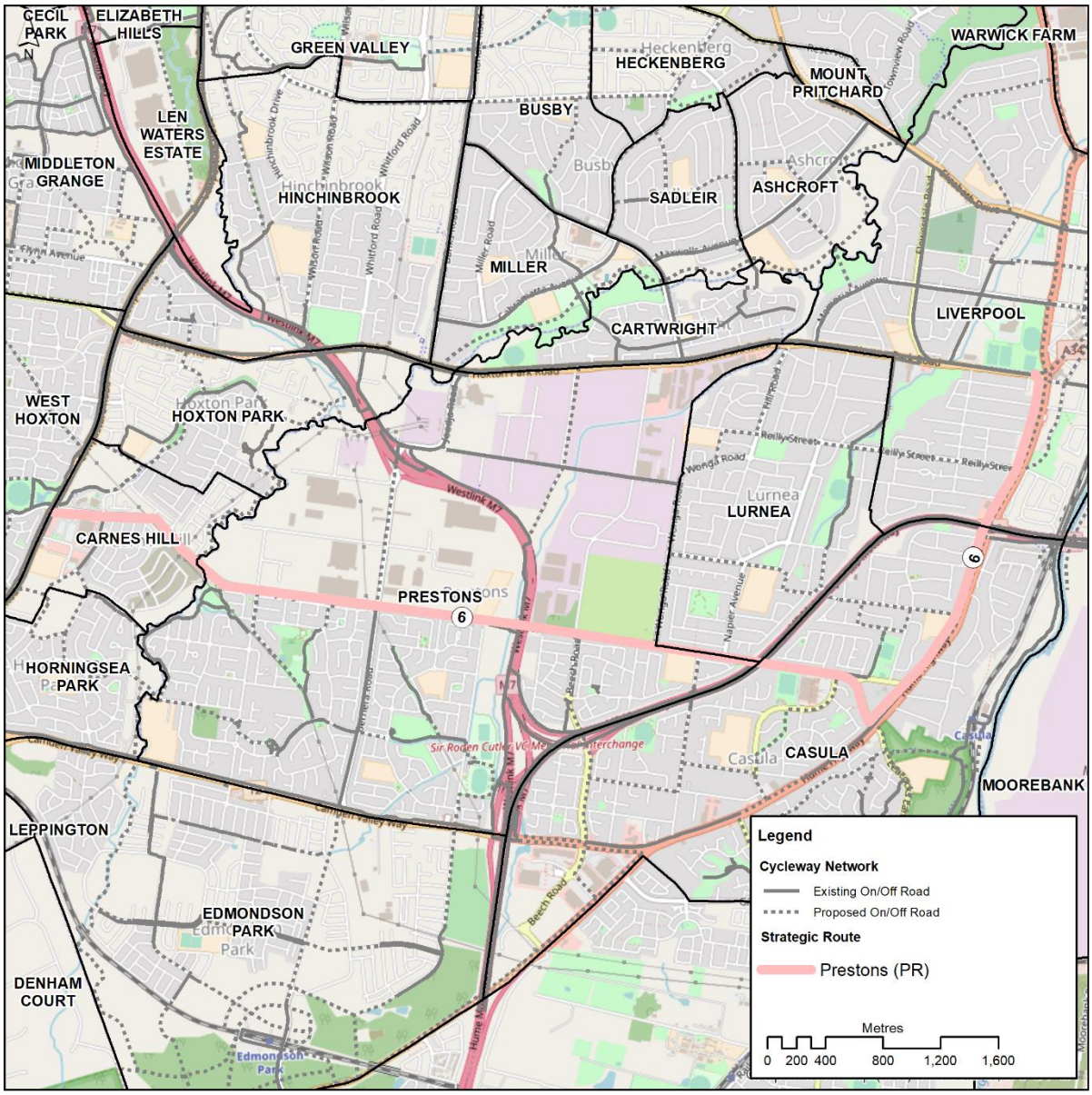


Figure 5-7: Route 6

5.8 West Hoxton Route [7]

Hoxton Park Road acts as a 6.5km long link between the Liverpool CBD precinct and the Austral Precinct. It also contains long intervals of existing cycleways beginning at the edge of the CBD and finishing at its intersection with Cowpasture Road. The off-road cycleway discontinues between Hill Road and Banks Road for approximately 2.5km. However, quiet service roads running parallel to Hoxton Park Road exist in these locations where cyclists can share the space with localised traffic away from the busier carriageway. Future shared paths adjacent to Fifteenth Avenue and Edmondson Avenue will expand this route connecting Liverpool and Leppington as the western areas develop.

5.8.1 Precincts Affected

- Liverpool CBD
- Green Valley
- Casula
- Prestons
- West Liverpool

5.8.2 Missing Links

Hoxton Park Road off-road cycleway: The on-road section through Cartwright requires better signage and markings. A link from Hoxton Park Road down Macquarie Street and into the Liverpool CBD is needed.

Fifteenth Avenue: A new shared path will need to be provided as this road is upgraded westwards. This road will become a key transit corridor in Liverpool.

Edmondson Avenue: As with Fifteenth Avenue, a shared path will need to be provided to complete this route.

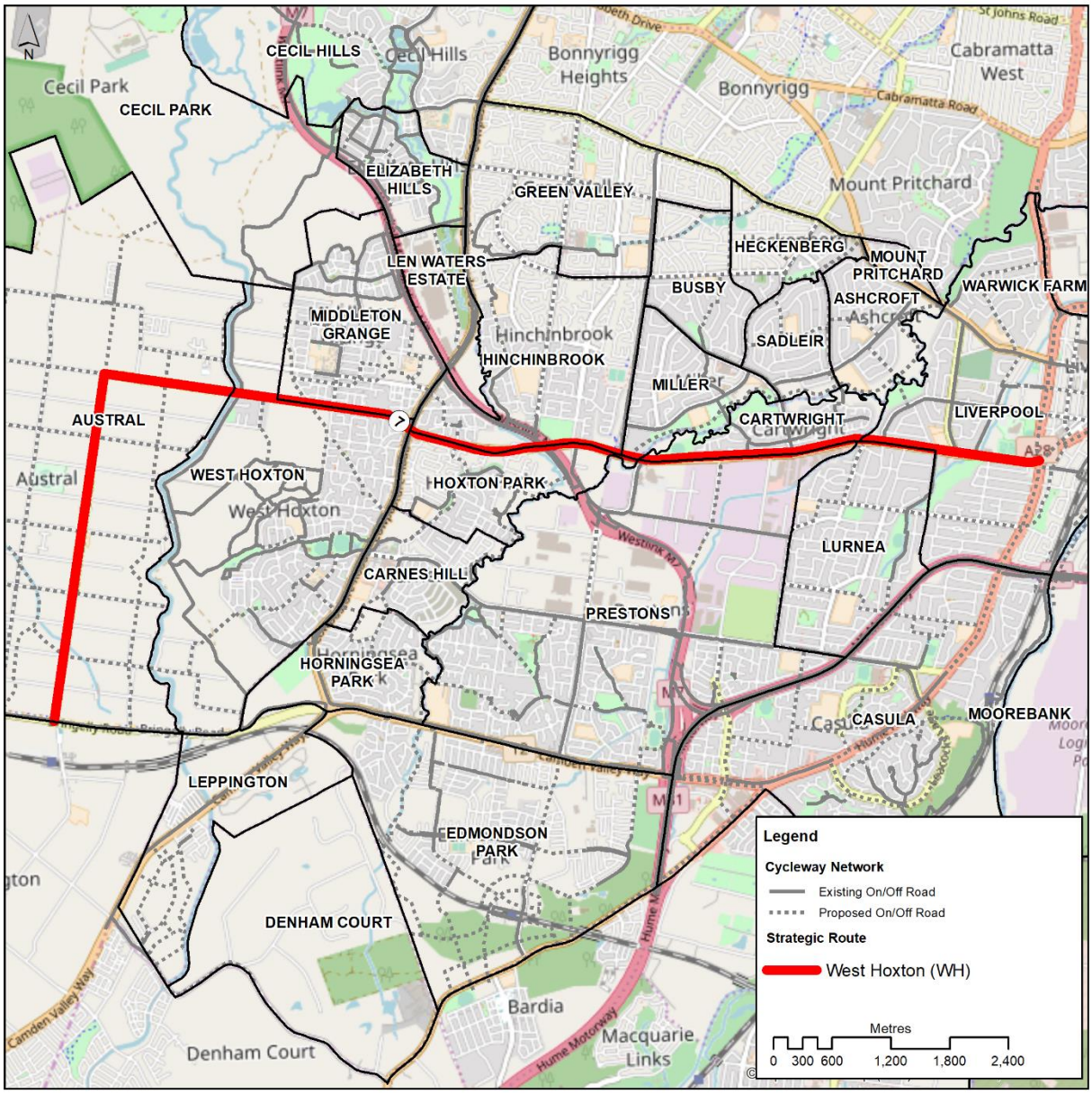


Figure 5-8: Route 7

5.9 Miller Route [8]

This route combines the off-road cycleway that runs along Maxwells Avenue between Elizabeth Drive and Cartwright Avenue with the on-road cycleway that runs along Cabramatta Avenue between Cartwright Avenue and Banks Road. Its primary advantage lies in connecting Route 10 with Route 7.

The route is shown in Figure 5-9.

5.9.1 Precincts Affected

- Green Valley

5.9.2 Missing Links

No missing links exist along this route. While it is split between an on-road and off-road cycleway, traffic volumes are currently low enough to accommodate cyclists along on-road sections of the cycleway. However, the route could benefit from better wayfinding signage and safety.

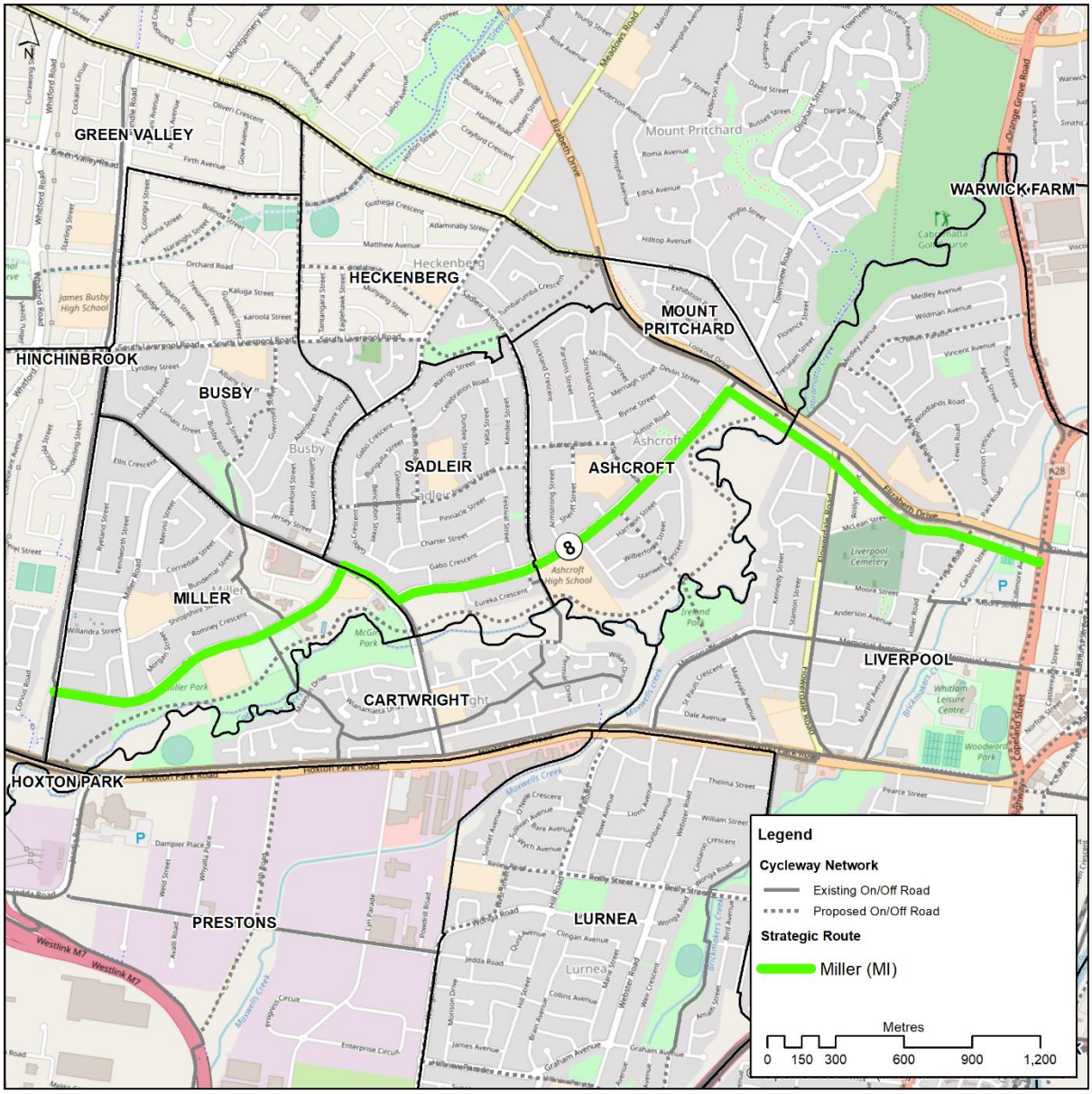


Figure 5-9: Route 8

5.10 Cecil Hills Route [9]

The CBD to Cecil Hills route is a strategic route providing access to suburbs in the north and northwest of the Liverpool LGA. The route begins in the CBD where it runs along an existing off-road cycleway along Elizabeth Drive before turning westward onto North Liverpool Road. From here the off-road cycleway no longer exists and it is proposed that one be built alongside the road. This route continues along North Liverpool Road before turning onto

Frederick Road where it ends at its intersection with Spence Road and distributes into local bike routes and streets. This is shown in Figure 5-10.

5.10.1 Precincts Affected

- Liverpool CBD
- Green Valley
- Cecil Hills

5.10.2 Missing Links

North Liverpool Road Off-Road Cycleway: The proposed off-road cycleway to run along North Liverpool Road has not yet been built. This is a gap of approximately 4.1km in the strategic route.

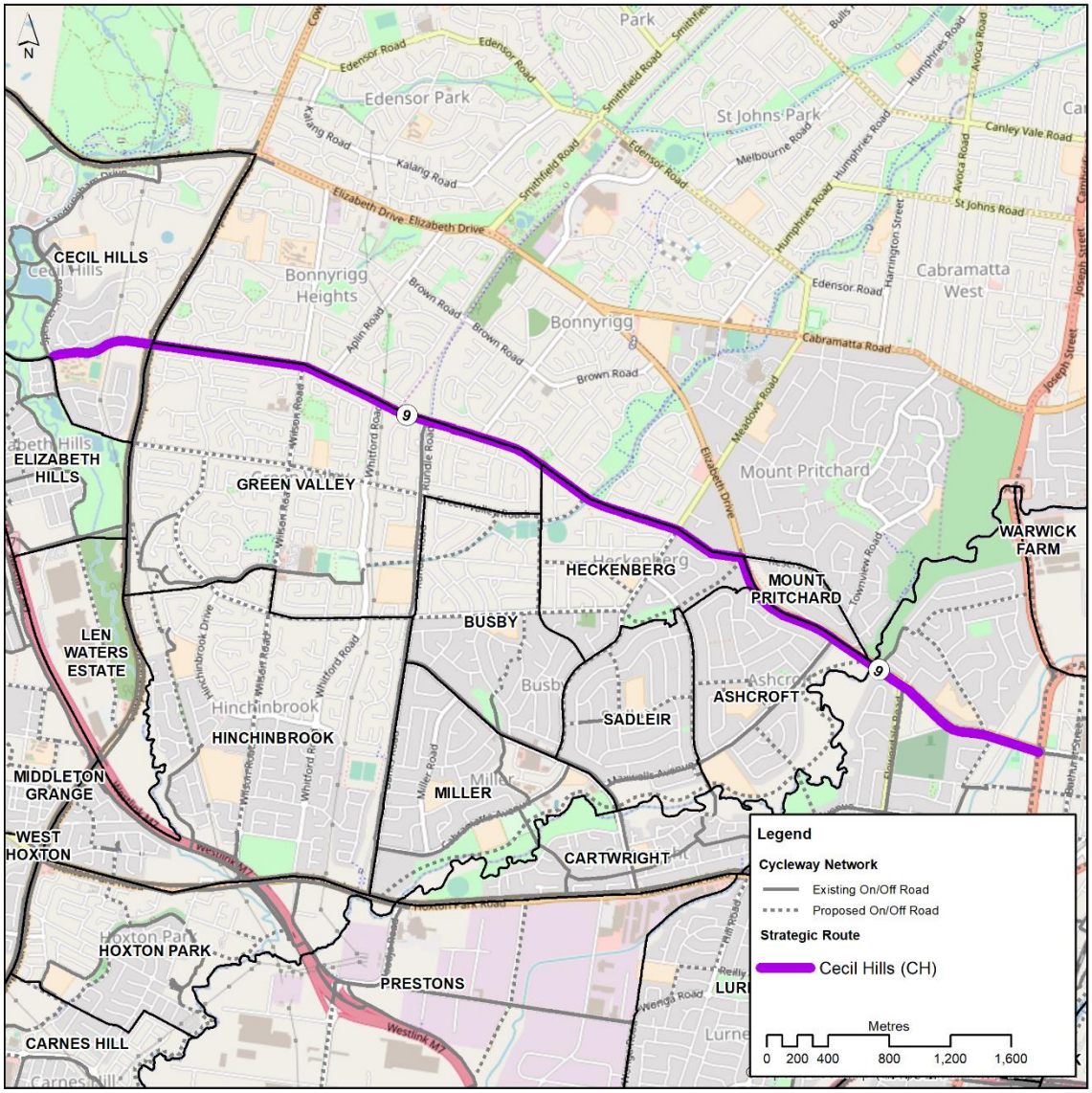


Figure 5-10: Route 9

5.11 T-Way & Southern Cycleway [RR1]

The T-Way & Southern Cycleway is a combination of the existing Liverpool to Parramatta T-Way Cycle Way, as well as an existing off-road cycleway along Bernera Road, Prestons. The route acts as a north-south link between the Green Valley precinct and the Prestons precinct, and utilises a highly valuable crossing of the M7 Motorway. The strategic route is mostly complete, with the T-Way Cycleway and off-road cycleways along much of Bernera Road already existing. The route contains a significant missing link from Kurrajong Road to the M7. Sections of the route are also missing line markings, signage and bicycle crossing lanterns.

5.11.1 Precincts Affected

- Green Valley
- Prestons

5.11.2 Missing Links

Small section of Hoxton Park Road, Joadja Road, Jedda Road and a 1.1km stretch of Bernera Road.

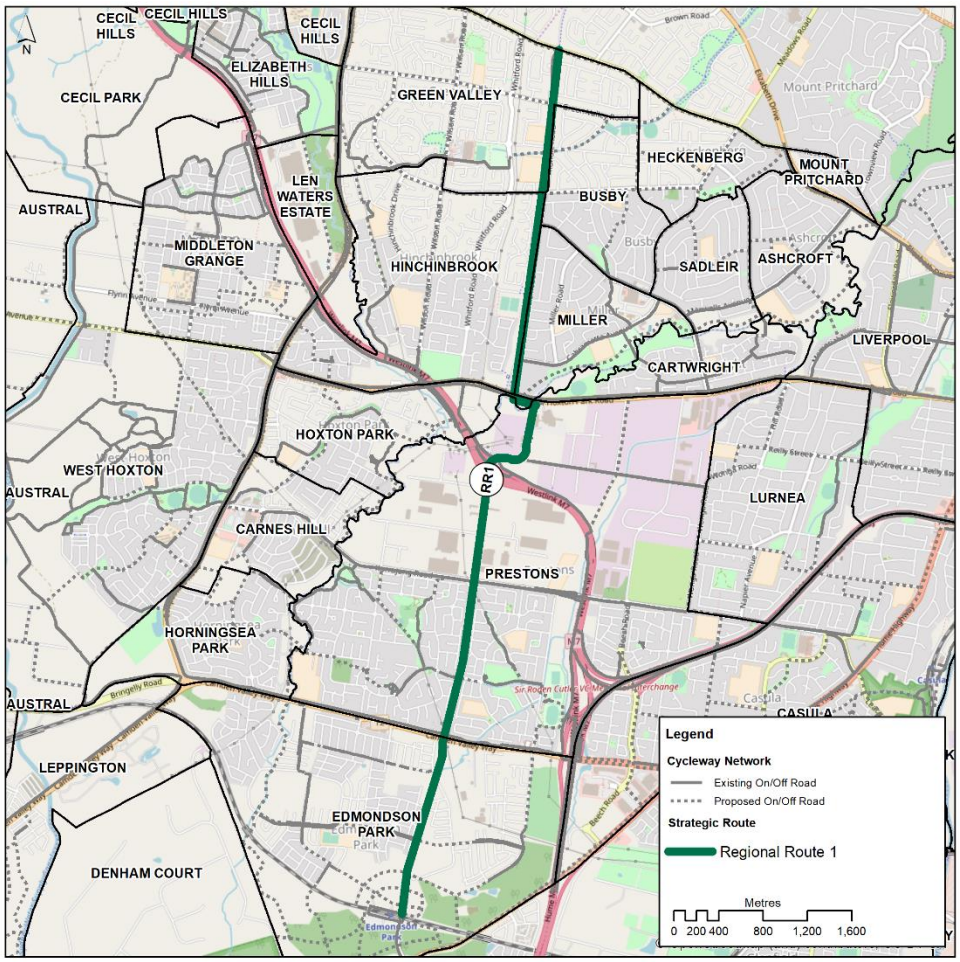


Figure 5-11: Route RR1

5.12 Cowpasture Road Cycleway [RR2]

Cowpasture Road contains an existing off-road cycleway along its entire length within the Liverpool LGA. This has been identified as a strategic route that provides the western region of the Liverpool LGA with a north-south connection. The Cowpasture Road Cycleway is less formal than the M7 Cycleway, however it contains significantly more access points. While the infrastructure has been built, small sections of the cycleway have not been properly marked, resulting in abrupt discontinuities along the cycleway.

The route is shown in Figure 5-12.

5.12.1 Precincts Affected

- Cecil Hills
- Green Valley
- Austral
- Prestons

5.12.2 Missing Links

Some marking and wayfinding issues exist along the cycleway. These discontinuities exist from: Elizabeth Drive to North Liverpool Road, Airfield Drive to Hoxton Park Road and Main Street to Camden Valley Way.

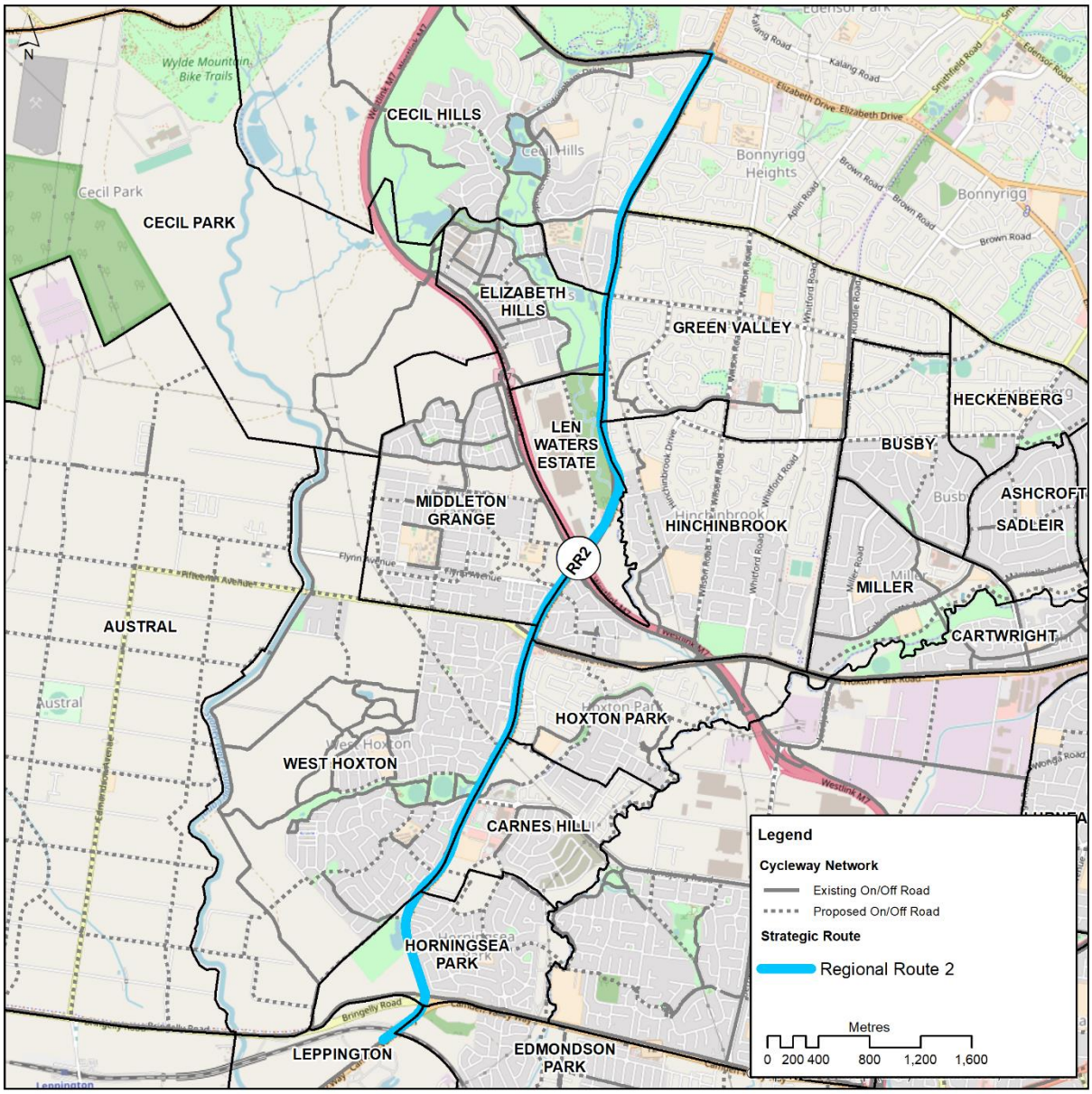


Figure 5-12: Route RR2

5.13 M7 Cycleway [RR3]

The M7 Cycleway is an existing piece of cycling infrastructure that runs alongside the entire length of the M7 Motorway. Within the Liverpool LGA the M7 cycleway has a north-south orientation and provides an important connection between the northern and southern suburbs of the western precincts of the Liverpool LGA. Although the cycleway has numerous missing links between itself and the main cycle network, it is entirely off-road with virtually no exposure to traffic.

5.13.1 Precincts Affected

- Cecil Hills
- Green Valley

- Austral
- Prestons

5.13.2 Missing Links

Connections: While the route itself has been completed, multiple gaps exist in connecting this route to the larger bike network. These missing links are sometimes as small as a few metres containing chain-link fences which act as a barrier between the M7 Cycleway and the larger cycling network. These are identified in Table 8-1.

Figure 5-13: Route RR3

5.14 Lurnea Route [RR4]

The Lurnea Route is an identified strategic route that can provide access to suburban areas of Fairfield to Campbelltown and Glenfield via Lurnea, as an alternative route to the Hume Highway. This route was designed to utilise back streets, connect Liverpool's central suburbs to the greater network, and as an alternative to the noisier route being the Hume Highway. The route begins at the Fairfield LGA boundary and passes several key links and destinations such as the Elizabeth Drive cycleway, Woodward Park via the T-Way, Phillips Park, the Prestons industrial estate, the Prestons Route via Kurrajong Road and the Crossroads precinct.

The route starts on Orange Grove Road at the bridge over Cabramatta Creek and then follows:

- Hume Highway;
- Moore Street;
- Liverpool-Parramatta T-way;
- Hoxton Park Road;
- Calabro Avenue;
- Rielly Street;
- West Street;
- Wonga Road;
- Kurrajong Road;
- Beech Road; and
- Parkers Farm Place.

This route was chosen as it intersects with other local routes in the area.

The route is shown in Figure 5.15.

5.14.1 Precincts Affected

- Liverpool CBD
- Casula

5.14.2 Missing Links

Orange Grove Road and Hume Highway: A shared path will need to be provided adjacent to these roads. Noting the narrow verge beside these roads, an alternative route might also need to be considered.

Reilly Street West Road and Wonga Road: This stretch of the route consists of the local roads listed above. Since a few key turns are required to complete the journey, clear wayfinding and appropriate markings are required. It was decided to have a shared path on this section as the route also feeds into several schools where parents have concerns with children riding on the road.

Beech Road: Good wayfinding signage and reassurance markers will also need to be included on this stretch as the path crosses numerous heavily trafficked roads. Given the volume of heavy vehicles on these roads, a shared path is more appropriate.

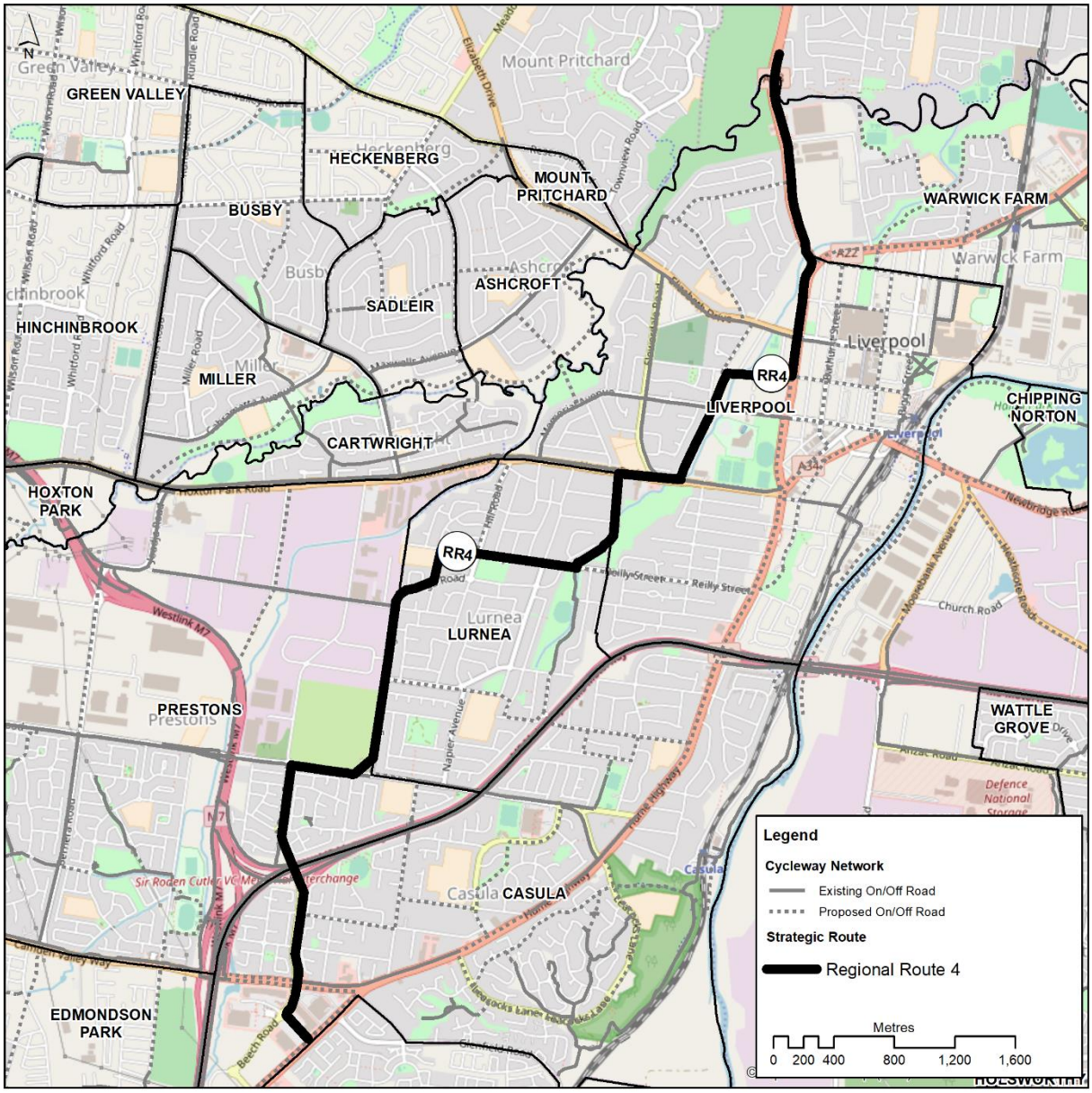


Figure 5-14: Route RR4

5.15 Recreational Routes

Recreational routes are generally shared pathways located in parklands. Liverpool has significant amounts of regional parkland, including the Chipping Norton Lakes, Georges River, Cabramatta Creek and the Western Sydney Parklands. This large level of regional parklands opens up significant recreational possibilities.

This plan envisages the following recreational trails:

- The Chipping Norton Lakes Scheme – a continuous path along the southern boundary of the Chipping Norton Lakes, from Haig Road through to Rickard Road, through the suburbs of Moorebank, Chipping Norton and Milperra. This path forms part of a larger cycleway through both Canterbury Bankstown and Fairfield Council areas, which forms a loop around the lake system. In the long term, the current trail will spread south through Moorebank and Hammondville to meet Heathcote Road, and a link in the east to provide a connection to the Liverpool – Campbelltown Rail Trail;
- Wattle-Grove Trail – This route weaves through an open space corridor in Wattle Grove. Starting at Harris Creek Field, this path meanders through the suburbs of Holsworthy and Wattle Grove before ending at Lakeside Park. There is scope for this route to be integrated into the Georges River Cycleway in the future via a western connection near Heathcote Road and an appropriate alignment to the east;
- The Western Sydney Parklands – The State Government has provided numerous cycleways through this parkland to provide for recreational opportunities. There is scope for providing a few missing links within the parkland and sealing gravel/grass trails; and
- Cabramatta Creek Route – This route from Camden Valley Way to Elizabeth Drive is a long term route to provide for a recreational route along the banks of this creek, linking up residential suburbs with the Western Sydney Parklands and the Chipping Norton Lakes (incorporating other routes).

5.16 Key missing connectivity links

5.16.1 Existing Network

The Liverpool LGA contains multiple high quality individual cycleways. These cycleways are usually contained within a single precinct where they can provide internal connections. It has been identified that a high-quality, LGA-wide cycle network can be created through

connecting these individual cycleways in key locations. These key locations are noted as the missing links of the cycle network.

In addition, Liverpool is also serviced by a series of high-quality regional cycle routes, including paths along the M7 & M5 as well as the Parramatta to Campbelltown rail trail.

6 WAYFINDING AND SIGNAGE STRATEGY

6.1 Overview

Wayfinding and directional signage are an integral component of a transport system. These elements help users negotiate the network easily and efficiently. Directional signage also reinforces system connectivity and coherence and gives high visibility and recognition to the collection of routes which make up the network.

When people understand where they are, and where they are going, they feel safer and more comfortable. A successful wayfinding system instils confidence in a wide variety of users and encourages walking and cycling for transport and recreation. An effective wayfinding strategy creates clear paths by using visual, verbal and/or auditory clues such as materials, patterns, signs, maps, landmarks and other signals.

While each mode has different needs in terms of the information required from signage, they also have common needs, principally the need for a consistent and coherent approach to sign design, sign placement and sign convention. Progressive disclosure and consistent, regular information presentation should underpin any successful wayfinding system.

Bicycle routes should be clearly identified for the public as a legitimate transport facility. Where off-road shared cyclist and pedestrian paths exist, they must be signposted with the appropriate R8-2 regulatory sign as shown in Figure 6-1.

Figure 6-1: Bicycle Regulatory Signage

Source: NSW Bicycle Guidelines, Figure 3.5, pg. 14 (RMS, 2003)

The current level of directional and bicycle route signage on cycle routes in the Liverpool LGA is poor, even along the major regional routes of the Rail Trail and the Liverpool-Parramatta T-way. Council is of the opinion that points of interest should also be added to signage, which will assist in wayfinding and point out local facilities that cyclists may not be aware of. Such points of interest may include recreation facilities, shops, public toilets, and drinking water. For reasonably unobstructed routes (such as the M7 route) the display of estimated travel time to destinations (in minutes based on an average speed of 15km/h depending on the route) would be desirable. Based on the distances cyclists normally cover

during a journey it is recognised that rounding distances to the nearest hundred metres provides the most practical information.

6.2 Wayfinding, Signage and Line-marking Strategy

Wayfinding, signage and line-marking are elements of the transport system that help users negotiate the network easily and efficiently. These aspects emphasise the fine grain needs of pedestrians and cyclists, to accentuate a more conducive walking and cycling environment. A successful wayfinding system integrates with the natural and built environment to create a homogenous network that utilises landmarks to provide cues.

The wayfinding and signage component of the strategy will assist cyclists with individual travel choices without littering the network with more sign posts and visual clutter. Early agreement on “focal points” is a key project element. The strategy would serve as the functional framework for cyclist and pedestrian wayfinding signage and line-marking in the Liverpool LGA and would include the following:

- Identifying and adapting intuitive wayfinding and line-marking elements from contemporary guidelines for use in Liverpool, including but not limited to:
    - NSW Bicycle Guidelines
    - City of Sydney Bicycle Network Directional Signage Design Guidelines
    - City of Sydney Shared Pathways Pavement Markings
    - Austroads Research Report AP-R492-15 Bicycle Wayfinding
- Providing generic principles for an overall wayfinding and identification signage system.
- Identifying principles to plan a logical sequence of directional signs and information – recognising and planning decision points and the hierarchy of messages.
- Preparing a standard signage template and an implementation plan for bicycle directional signage in the LGA.
- Development of a focal points map to guide the implementation of wayfinding signage including the locations/destinations to include on wayfinding signage (these destinations are summarised in Table 6-2).
- Providing clear guidelines and criteria for placing signs at key decision points.
- Graphic design - use of type, colour and other graphics that assist wayfinding.
- Providing indicative line-marking designs for on-road and off-road cycle facilities.

- Identifying distances on signs to enable the user to plan their journey with confidence.

6.3 Signage General Principles

Directional signs are required to transmit information quickly to cyclists. This is achieved by keeping signage simple, easy to identify and consistent throughout the cycling network. Good signage makes use of graphics and symbols to achieve this and convey messages to cyclists.

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

Examples of bicycle network route directional signage are shown in Figure 6-2.

Council has chosen to deviate from using the RMS standard signage and will instead adopt the signage specifications outlined in Appendix A-C of Austroads Research Report AP-R492-15 until such a time that they are replaced or introduced as a new standard. The RMS signage does not include the ability to display travel times, distances to the nearest hundred metres and points of interest. The signs included in the Austroads Research Report have been specifically designed to be friendly to cyclists (rather than based on a highway design as in the case of the RMS signage). They include a clearer typeface for lower speed cyclists and a retro-reflective lettering which is clearer in low light conditions.

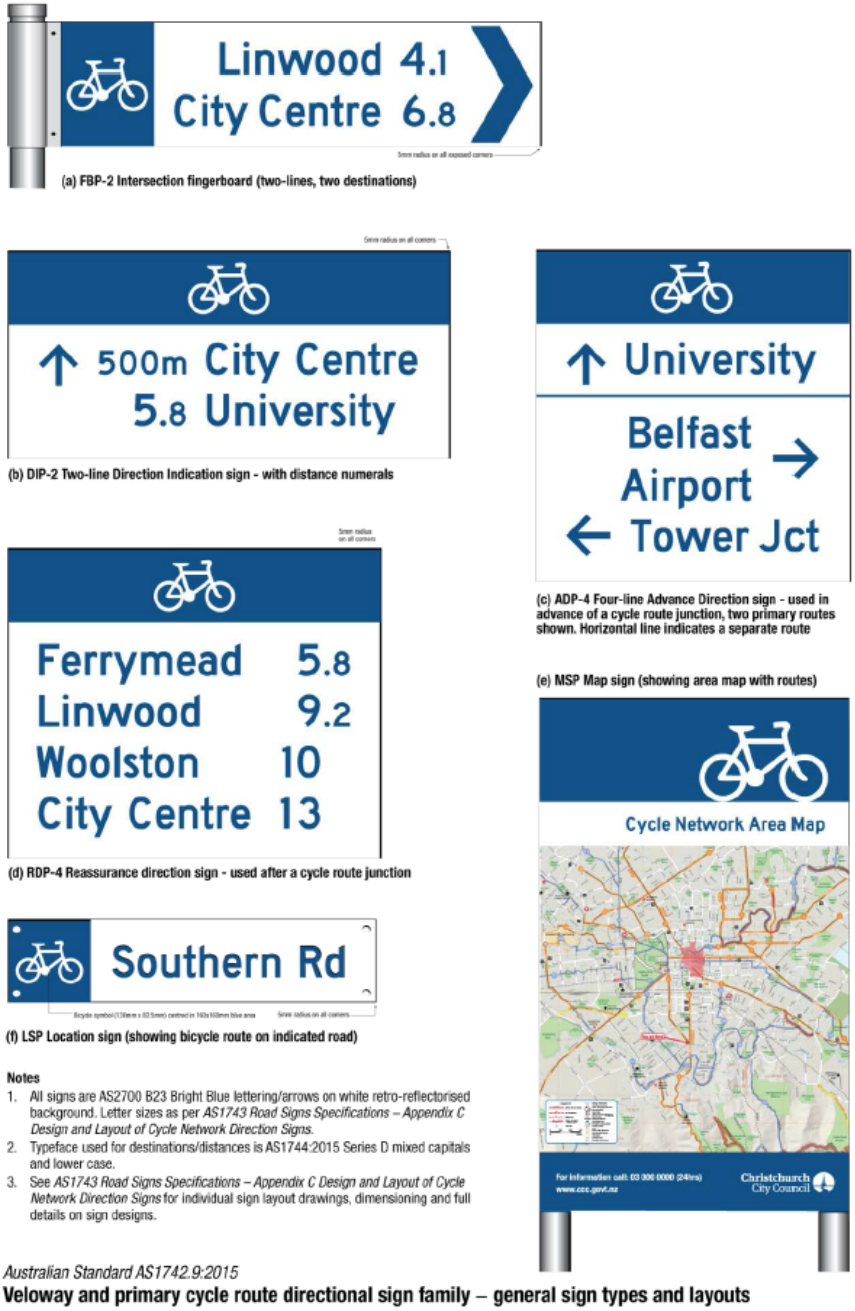


Figure 6-2: Example of Bicycle Wayfinding Signage

Source: AP-R492-15 – Bicycle Wayfinding

6.3.1 Signage Types

Signage types are used to separate signs into categories. These categories reflect where the use of a certain sign is appropriate and what message the sign is meant to convey.

For example, reassurance signs are a category of signage used to inform riders they are still on the same bike route. They are appropriately used over intervals where the lengths between changes in direction are long. To reduce clutter along the cycling network it is recommended that they are only used on recognised strategic routes or regional off-road routes (e.g. M7 Cycleway). Austroads has categorised different types of signs and

commented on their appropriateness in different situations. These comments can be seen in Table 6-1.

Table 6-1: Cycle Routes and the Sign Types Used on Each Route Type

	Route Types				
Sign Types	**Veloway**	**Primary**	**Local**	**Tourist / Recreational**	**Detour**
Route type description	High-speed, limited-access routes usually paralleling major arterial roads or motorways	The main arterial routes of urban cycle transport networks	Shorter routes connecting primary routes to local destinations	Off-road, shared path and tourist / recreational routes	Long-term detour routes for veloways, primary or tourist / recreational routes.
Fingerboards	Yes, at junctions with other routes and where the route changes direction	Yes, at junctions with other routes and where the route changes direction	Yes, integrated with street signs	Yes	Yes
Direction indication signs	Yes, at junctions with other routes and where the route changes direction	Yes, at junctions with other routes and where the route changes direction	No, use markers instead	No, use markers instead	Yes
Advance direction signs	Yes, before route junctions with veloways or primary routes	Yes, before route junctions	No, use markers instead	No, use markers instead	No
Reassurance signs with distances	Yes, after route junctions with other veloways or primary routes	Only on lengthy remote routes for reassurance	No, use markers instead	No, use markers instead	No
Route markers	No, use direction indication signs	No, use direction indication signs	Yes	Yes	No, use direction indication signs
Route numbering	Yes	Yes	No	Yes	Yes, if route replaced by detour is already numbered
Route branding	Yes	Yes	No	Yes	No
Street signs	Yes, if none exist	Yes, if none exist	Yes, if none exist	Yes, if none exist	Yes, if none exist

Source: AP-R4925-15 - Bicycle Wayfinding

An illustration of the different signs and appropriate uses is shown in

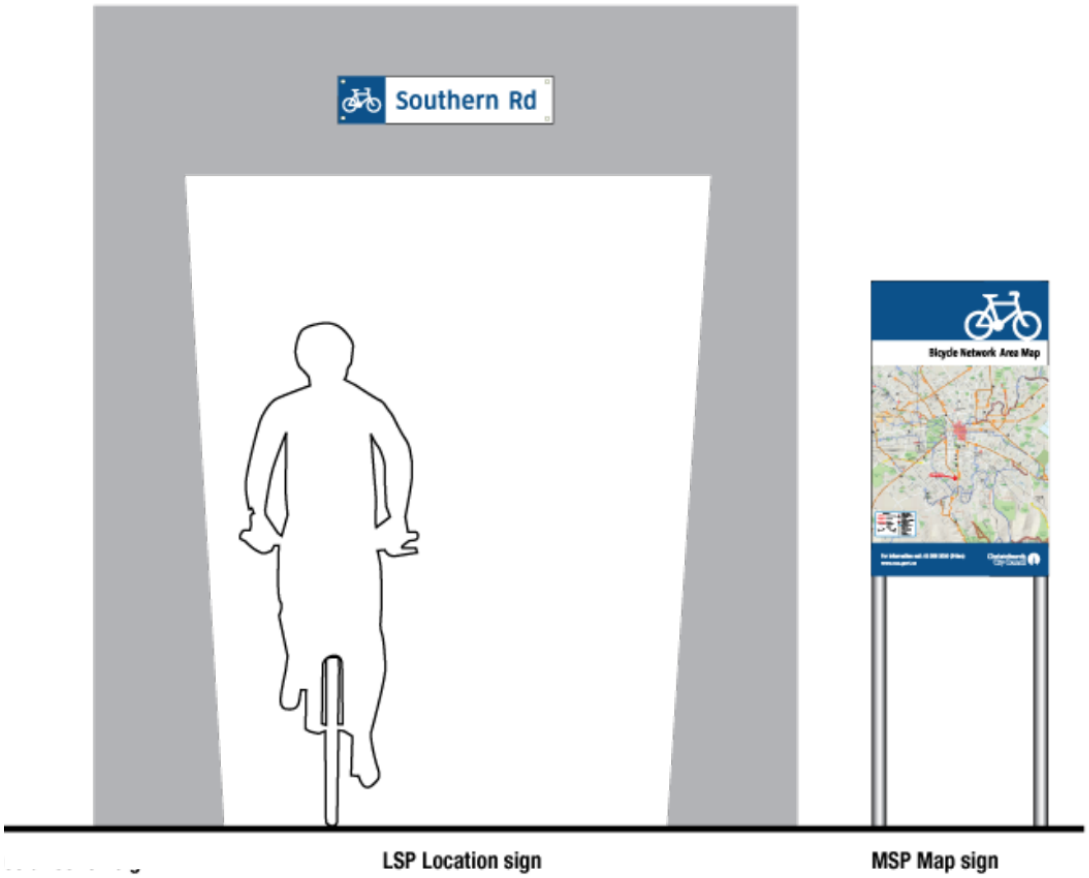
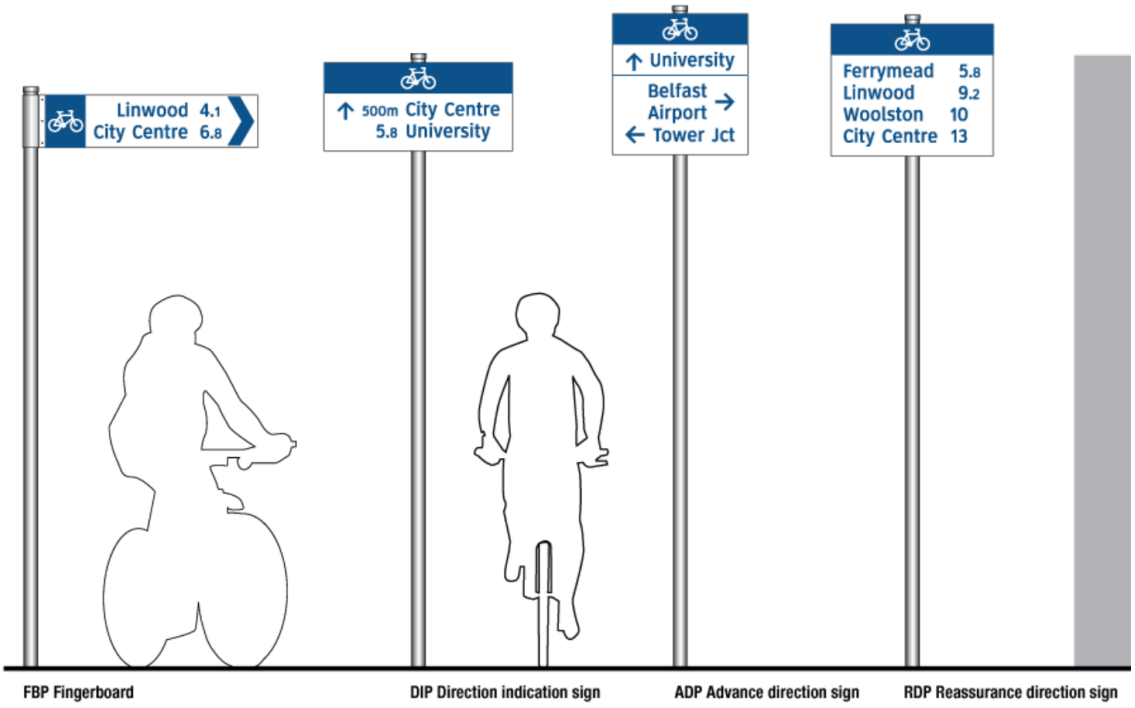


Figure 6-3.



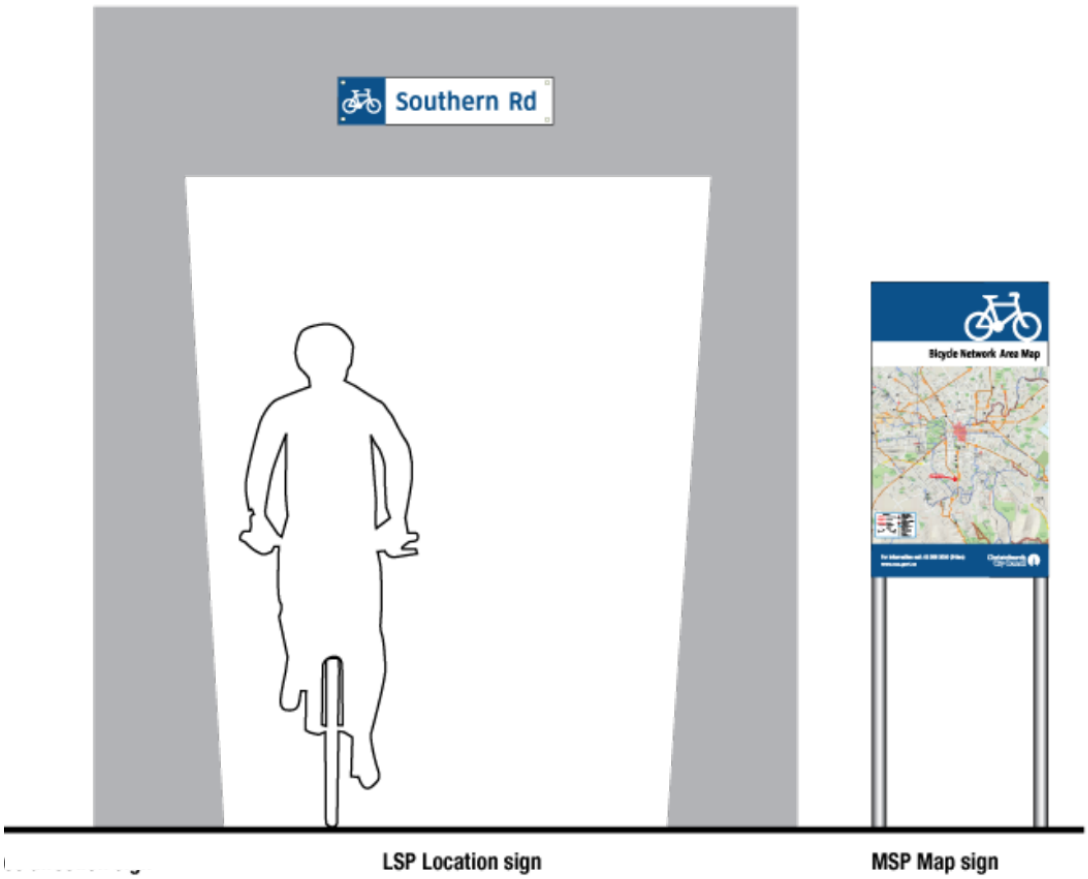


Figure 6-3: Sign Types

Source: AP-R4925-15 - Bicycle Wayfinding

6.4 Developing a Directional Sign Plan

A directional sign plan documents the location of each sign within the cycling network. Its purpose is to identify where in the network cyclists will need guidance and what type of signage will provide that guidance. A successful directional sign plan is one that conveys the desired information to riders and also produces the least amount of clutter along the cycling network.

6.5 Wayfinding Methodology

The wayfinding methodology shown below is designed to produce a directional signage plan from an existing cycling network. The existing network is analysed to identify cycling routes, facilities and focal points. Strategic routes are then identified, labelled and numbered. Junctions within the routes are then identified and an appropriate sign schedule is created for each route. The combined sign schedules form the overall directional sign plan.

Below is the methodology used to start the development of a wayfinding strategy for the Liverpool LGA.

1. Identify Cycle Routes
2. Identify Focal Points and Create Focal Point Map
3. Identify any Facilities that need to be named on signs
4. Create Route Numbering System
5. Provide Branding for Routes (e.g. names, colours)
6. Conduct pre-sign, risk assessment survey
7. Identify and Document all route junctions
8. Create a Sign Schedule for each Route
9. Prepare Sign Artwork for Sign Manufacturer

This method is adopted by Austroads in their research paper AP-R4925-15 - Bicycle Wayfinding.

6.5.1 Identify Cycle Routes

The cycle routes for the Liverpool LGA were defined as a strategic route network in Section 5.1.

6.5.2 Identify Focal Points and Create Focal Point Map

Focal points are areas within a network that attract or produce cyclists. Focal points can be defined as:

- Major cities

- Towns
- Regional centres
- Key locality within a region

Within the Liverpool LGA focal points are typically local shopping centres within suburbs as well as major centres such as the Liverpool CBD.

When mapping focal points, distinction is made between points located at or near cross roads of a strategic route and points at the end of a strategic route. Points at the end of a strategic route are called Destination Points and are distinct in being an end destination rather than the focus of a local area. Holsworthy Station is an example of a destination point.

Wayfinding focal points and destination points are listed below in Table 6-2 and shown in Figure 6-4.

Table 6-2: Wayfinding Focal and Destination Points List

Focal Points	Destination Points
Liverpool CBD	Holsworthy Station
Liverpool Station	Canterbury Bankstown LGA
Liverpool Hospital	Cecil Hills
Warwick Farm Station	Hoxton Park
Chipping Norton Shops	Horningsea Park
Market Plaza – Chipping Norton	Edmondson Park Station
Moorebank Shopping Centre	Casula Station
Wattle Grove Plaza	Glenfield Station (Inter-LGA destination)
Casula Mall	Leppington Town Centre (future)
Miller Shopping Centre	
Cecil Hills Shopping Centre	
Carnes Hill Market Place	

6.5.3 Identify any Facilities that need to be named on signs

In addition to the focal points and destinations, a series of other facilities in the Liverpool LGA were identified to be named as part of the wayfinding strategy. These include but are not limited to:

- Schools
- Tertiary Education Centres
  - TAFE NSW – Liverpool College
  - TAFE NSW – Miller College
  - Evocca College
- Outdoor Recreational facilities such as large parks, sports fields, etc.
- Leisure facilities such as aquatic centres, youth clubs, etc.
  - Michael Wenden Aquatic Leisure Centre
  - Whitlam Centre
  - Carnes Hill Precinct
  - PCYC Liverpool
- Libraries
  - Liverpool City Library
  - Casula Library
  - Green Valley Library

- Moorebank Library
- Miller Library
- Carnes Hill Library

Key landmarks in adjoining LGAs should also be provided to ensure a seamless link between government areas. The Dunc Gray Velodrome, Georges River National Park and WSU Bankstown Campus are likely to be key destinations to the east, for example.

Figure 6-4 shows an example for a Focal Point map for Liverpool.

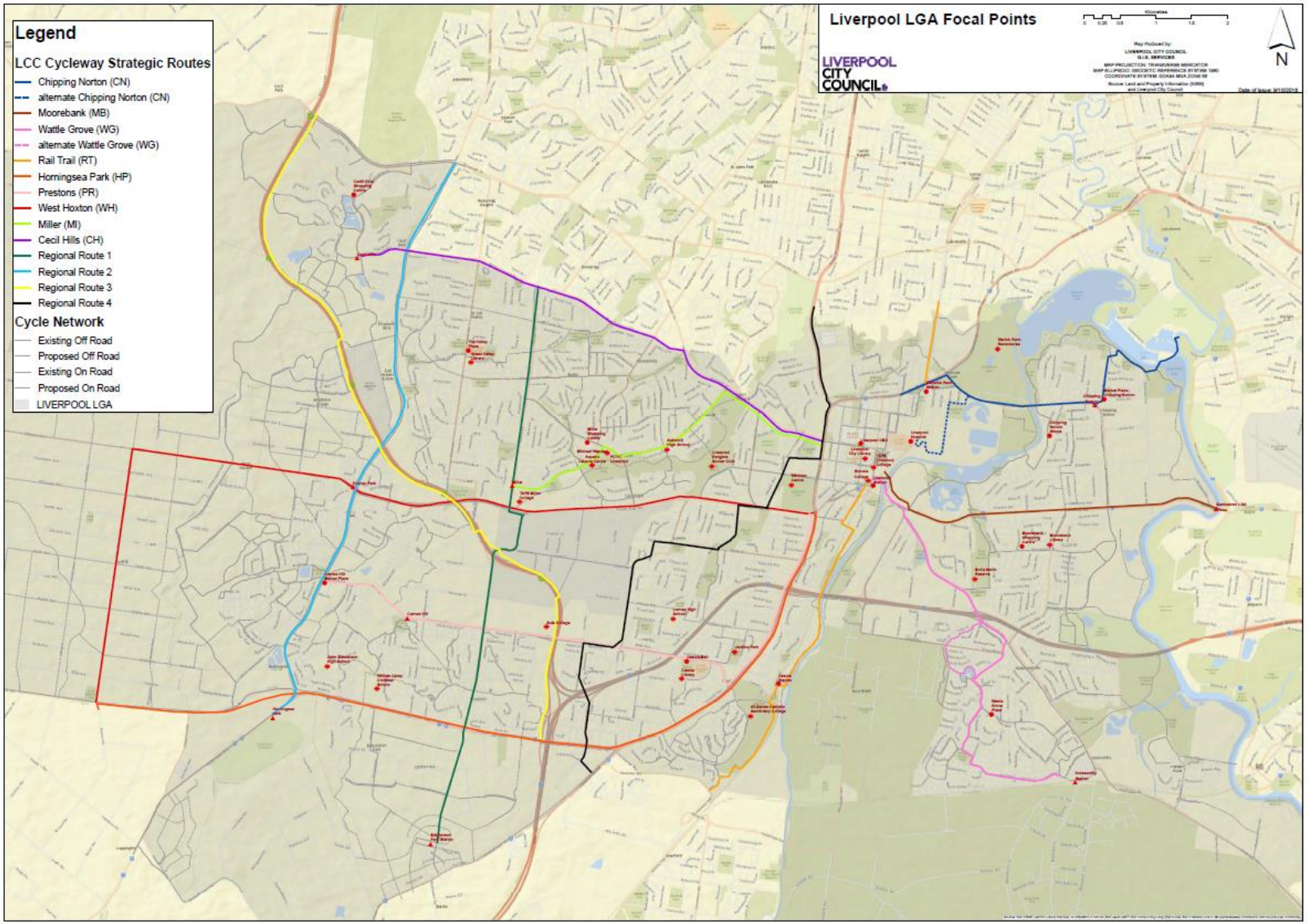


Figure 6-4: Example for Liverpool Wayfinding Focal Point Map

6.5.4 Create Route Numbering System and Branding for Routes (e.g. names, colours)

The strategic routes were numbered using a clockwise numbering convention starting with the CBD to Chipping Norton route.

The branding of each route is achieved by assigning a name and colour. Where a strategic route passed through multiple suburbs, to avoid clutter in the title the general direction of the route was adopted as a name e.g. CBD to South-West Liverpool.

The colours of the routes had the purpose of visually describing the fastest path through different sections of the cycling network. On the street level the colours would be used to quickly inform cyclists that they are on a strategic route.

The strategic routes identified were numbered, named and branded as follows:

1. CBD to Chipping Norton, dark blue
2. CBD to Bankstown, brown
3. CBD to Wattle Grove, pink
4. Liverpool to Parramatta Rail Trail, gold
5. CBD to Southwest Liverpool, orange
6. Kurrajong Road, tan
7. CBD to Leppington, red
8. CBD to Miller, light green
9. CBD to Cecil Hills, purple

RR1. Liverpool T-Way & Southern Cycleway, dark green

RR2. Cowpasture Road Cycleway, light blue

RR3. M7 Cycleway, yellow

RR4. Lurnea, black

The routes, the areas they link and the facilities they use are described in further detail in Section 5.1.

6.5.5 Identify and Document all route junctions

Route junctions are key decision points for cyclists. As cyclists will generally utilise more than one strategic route for most of their trips it is important that junctions between the routes be identified and appropriately signed.

6.5.6 Create a Sign Schedule for each Route

A sign schedule details the location, type and displayed content of each sign along a strategic route.

An example directional signage plan has been developed for Route 3. For this example, it is proposed that a sign be placed at each decision point along the route and the size of the sign reflect the importance of the decision.

Table 6-3 outlines the signs that are proposed to be placed along Route.

Table 6-3: Wayfinding Focal and Destination Points List

Point	Type of Sign	Content
A	Fingerboard	Liverpool: 0.4km Holsworthy Station: 6.3km
B	Direction Indication Sign	Liverpool: 0.6km Holsworthy Station: 6.1km
C	Fingerboard	Liverpool: 0.7km Holsworthy Station: 6.0km
D	Reassurance Sign	Liverpool: 1.4km Holsworthy Station: 5.3km
E	Fingerboard	Liverpool: 2.0km Holsworthy Station: 4.7km
F	Reassurance Sign	Liverpool: 2.5km Holsworthy Station: 4.2km
G	Direction Indication Sign	Liverpool: 3.0km Holsworthy Station: 3.7km
H	Fingerboard	Liverpool: 3.2km Holsworthy Station: 3.5km
I	Direction Indication Sign	Liverpool: 3.8km Holsworthy Station: 2.9km
J	Fingerboard	Liverpool: 3.9km Holsworthy Station: 2.8km
K	Fingerboard	Liverpool: 4.2km Holsworthy Station: 2.5km
L	Fingerboard	Liverpool: 4.6km Holsworthy Station: 2.1km
M	Fingerboard	Liverpool: 4.9km Holsworthy Station: 1.8km
N	Fingerboard	Liverpool: 5.1km Holsworthy Station: 1.6km
O	Fingerboard	Liverpool: 5.2km Holsworthy Station: 1.5km
P	Fingerboard	Liverpool: 5.6km Holsworthy Station: 1.1km
Q	Fingerboard	Liverpool: 6.1km Holsworthy Station: 0.6km
Map 1	Map Sign	Route 2: CBD to Moorebank Bankstown 5.1km Route 3: CBD to Wattle Grove Holsworthy Station: 6.7km
Map 2	Map Sign	Route 3: CBD to Wattle Grove Liverpool: 6.7km

The location and type of each sign is shown in Figure 6-5.

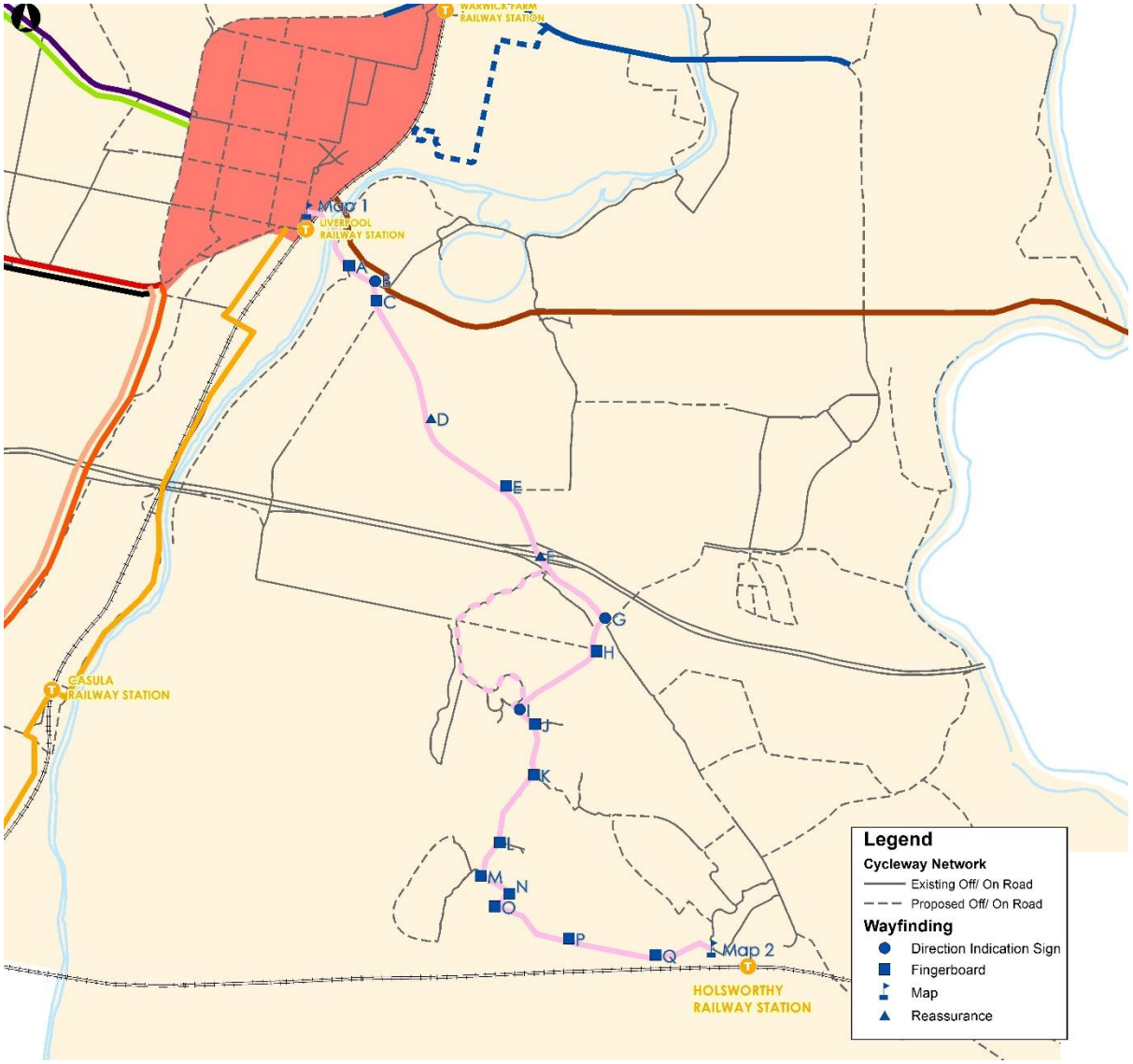


Figure 6-5: Example Directional Signage Plan

This example shows one possible arrangement of wayfinding signage along Route 3.

As shown, signs are placed only at locations where cyclists are required to make decisions. Placement of signs was limited to minimise clutter along the route. This method should be applied to all routes when considering signage and wayfinding strategies.

6.5.7 Prepare Sign Artwork for Sign Manufacturer

A preliminary example of a directional signage plan has been prepared for Route 3 – Liverpool to Wattle Grove. Example signage and planned locations for these signs are discussed below.

Figure 6-6 shows examples of possible fingerboard designs along Route 3.

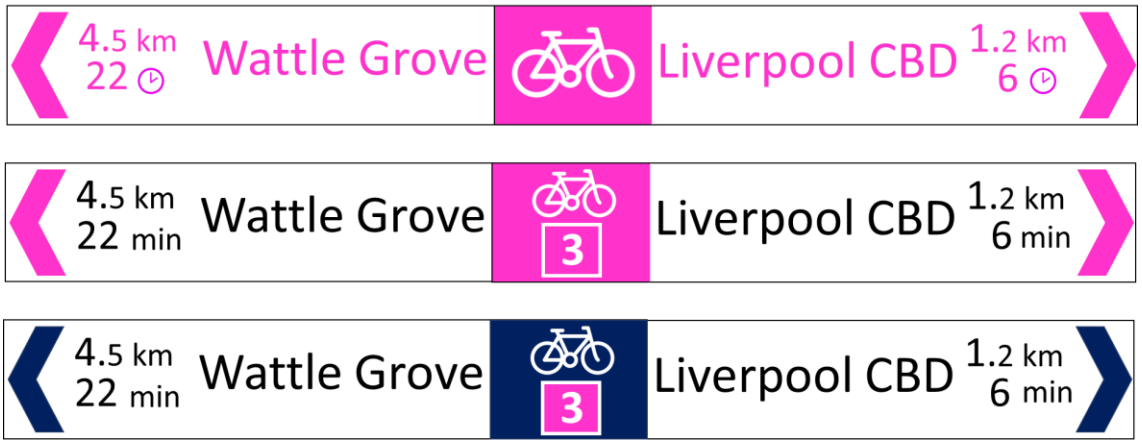


Figure 6-6: Signage Concept Design - Fingerboard

The design experiments with three possible displays. The purpose of the sign is to convey to the following information:

- Which route the rider is on
- How far to the nearest focal point
- The estimated travel time to the nearest focal point

The designs achieve this through incorporating the brand / colour of the route and very simply identifying the nearest focal points along with its distance and estimated travel time.

7 PROMOTION OF BICYCLE USAGE

There is a need to raise awareness of bike infrastructure and the benefits of riding a bike to improve community health outcomes, and encourage alternative transport choices. Council and other stakeholders have used a variety of initiatives to encourage residents to cycle and utilise existing and newly completed infrastructure. Reviewing which initiatives have and have not worked, and encouraging the trial of new promotion strategies has the potential to encourage more residents to take up cycling as a method of commute, recreation or simply to stay fit.

7.1 Bike Maps

Bike maps are a low cost and highly successful tool to encourage residents to either start cycling or cycle more. Bike maps show cyclists how to access a plethora of different locations or to highlight scenic recreational trails. It is intended that maps will be made available to the public to view or download on Council's website. Bike shops and cycling groups would have the opportunity to reproduce these maps free of charge. It is important to review bike maps on a regular basis to keep them up-to-date and maintain their relevance for cyclists.

Maps will include:

- Key routes;
- Existing routes (proposed routes should only be displayed on planning documents), including entry/exit points to M5, M7 & Western Sydney Parklands;
- Bike oriented recreation and training facilities; and
- Places of interest.

Council will provide data to the publishers of street directories to ensure appropriate and up to date cycleway information is provided. It is recognised that online services (such as Google Maps™, and opencyclemap.org) as well as mobile devices have become an integrated part of our lives. Council will work with online community groups and internet map service providers to provide online maps of Council's completed bike network.

7.2 Community Initiatives

Whilst providing bike paths and cycleways for both commuting and recreational purposes is important, equal effort must be invested into encouraging the community to use these facilities, or in some cases, raise awareness of the function of these facilities. Council, in partnership with non-government organisations, government bodies and private enterprises, has managed to hold a number of events to promote bicycle usage, and the positive

outcomes cycling provides. Some of these events are briefly described below; it is envisaged that Council will continue to attract such enthusiasm, and engage with third parties to provide more community events.

7.2.1 Cycling Connected Communities (NSW Department of Health, September 2010)

The Cycling Connecting Communities project asked the question, 'Does the promotion of cycling infrastructure increase population cycling levels and physical activity?' The project was a health promotion program designed to encourage the use of newly completed off-road cycle paths through south-western Sydney. The project succeeded in attracting more beginner and novice bike riders to utilise newly created facilities in the Fairfield-Liverpool areas. Various methods were utilised to encourage residents to take up riding as part of their commute or for recreation. This included:

- Media advertisement (local newspapers);
- Information distribution (Bike map and information leaflet);
- Free bike skills courses;
- One hour community/workplace workshops;
- Community trial ride (easy);
- Ride to Work Day;
- Spring Cycle (intermediate difficulty); and
- Promotion at Liverpool, Miller and Wetherill park TAFEs.

A number of focus groups were set-up, with an analysis showing that safety was the largest barrier to cycling; however, personal safety was also an issue (children at risk of being bullied). Many participants were either unaware of the existing bike network or believed that they were isolated, not well lit and unsafe.

Maps were distributed by Liverpool City Council, Fairfield City Council, the RTA, bike shops and local bicycle groups. Council also distributed information through council offices, libraries, local community centres and gyms. Single day promotional displays were set up at shopping centres at Bonnyrigg, Prairiewood and Carnes Hill; this was a very effective way to distribute maps and information to the infrequent and non-riding target groups.

Spring skills courses were organised, but many suffered from poor attendance, a lack of resources (no bikes available) and/or a lack of suitable facilities. However, the 'learn to ride' courses were generally successful. Scheduling was the largest problem with the 'learn to ride' program, as lessons would be one-on-one and the skills of participants varied significantly.

The study concluded that communication strategies (including maps, signposting, and media exposure) are crucial in drawing in cyclists to use cycling infrastructure.

7.2.2 LiveBUG

The Liverpool Bicycle User Group is an incorporated not-for-profit community organisation who advocate on behalf of people who ride bicycles within the Liverpool LGA. The group has an optional membership fee, which goes towards promotional material and cycling advocacy activities, however cyclists do not have to be a member to participate in their rides. The group organises many rides within the Liverpool area or nearby, usually on a fortnightly basis.

7.2.3 Happiness Cycle

The Happiness Cycle is a national program sponsored by private enterprise and Bicycle Network that provides local young people with the opportunity to get a free bicycle. The Happiness Cycle Program is an initiative to increase the physical activity level of young people by providing free bicycles, bike skills training, equipment and a digital application to motivate riders. Local schools were encouraged to sign up students aged 13-17 years who don't own a bike to attend this one day program. The program was held at the Whitlam Aquatic Centre in November 2014 where nearly 300 students from schools across the Liverpool LGA received a free bicycle. Volunteers and students would assemble their bikes, check the bikes for safety and learn to ride in a supervised environment.

7.2.4 National Ride to Work Day

The National Ride to Work Day is a behavioural change program operated by Bicycle Victoria to encourage workers with a bike to try out riding to work. Every year, thousands of people from across this country register for this event, with 60% of new riders registering in 2013 still riding five months later. Liverpool Hospital is a strong advocate of this program and provides a free breakfast for commuters.

7.2.5 Migrant Group Service (MGS)

It is recognised that the Liverpool LGA has a high proportion of recent migrants who may have limited English and no/poor understanding of Australian laws and road rules, particularly with regards to bicycles. There is an opportunity for MGSs to educate new Australians on bicycle laws/safety, and perhaps even introduce learn to cycle and basic bike maintenance workshops.

7.3 Potential Events & Opportunities

There are a number of community and government organised events and campaigns held throughout NSW that promote cycling, which could be adopted by Liverpool Council or local community groups. There are large barriers facing council and other community groups

wanting to organise events, such as the insurance/liability costs and the costs associated with high-level advertising (such as television). A greater interest will be focussed on initiatives that can prove to be highly effective with minimal or one-off operational costs.

7.3.1 Active School Travel

Of great concern is the growing number of school children who are travelling to school via a private vehicle. Since the 1970s the number of children using active forms of transport (walking or cycling) to or from school has significantly declined. A result of this is increased congestion around peak-time, as well as health and psychological effects on children themselves. Travel patterns to and from school can have an influence on patterns of childhood obesity, sedentary lifestyle and level of independence; additionally, travel patterns and choices in early childhood can also be carried into adulthood.

There are many methods that could be utilised to promote cycling as a choice for both children and their parents to travel to and from school.

A riding school bus is an initiative in which a leader from the school community (such as a member of the P&C) will ride a designated route and 'pick-up' or 'drop-off' children along the way. This is especially important for younger children, a route which may cross a busy road, or children living a far distance from the school.

Bike skills workshops could be provided to a chosen year level at local schools to teach and promote safe riding principles.

Council will also continue to advocate the appropriate positioning of schools in relation to their residential catchment; to promote siting of schools which are easily accessible by children and do not promote parents to drive students long-distances to their local school.

7.3.2 Bike Week

NSW bike week is held every year in mid-September and provides the opportunity for regular cyclists to meet or for new-comers to learn more and participate in bicycle events. An event was held in Wattle Grove in 2008 in which approximately 60 participants showed up for the day. The event included bicycle maintenance checks, cycling skills activities, a community bike ride, information on cycling within Liverpool, and free refreshments. The RMS can provide grants for councils to promote and organise events for Bike Week.

7.3.3 Bike Skills Training Facilities

A major deterrent to new cyclists utilising on-road or off-road paths near busy roads is the fear/risk of harm or injury caused by vehicular traffic. This perception is a major barrier to those who would like to cycle within and across the Liverpool LGA. Children, in particular, may not have the skills necessary to ride safely in higher traffic areas, but are often attracted

to cycling as a means of transport and recreation. A dedicated facility where workshops or events can be focussed could help resolve some of these barriers for those wanting to cycle.

Consideration will be given to the development of bike training areas to improve children's abilities on bikes away from cycle paths which may adjoin busy roads. Such facilities enable a safe learning area to improve confidence, away from the main cycleway network. It should include the various markings and signs shown along bike ways. A small-scale facility was constructed by Council at Collimore Park in 2012.

Council is currently investigating the feasibility of providing another larger facility which could become the centre of bicycle-related events and activities; a number of local parks have been shortlisted as suitable locations. It is hoped that such a facility will teach younger children how to properly interact with other cyclists and traffic on a road; and to build up confidence which will see them continue to ride into adulthood. It could also be built with or utilise an existing hall, which would be utilised for bike skills workshops. These will be aimed at older children and adults, primarily catering for inexperienced riders and providing tips for riding in a motor vehicular dominated environment.

7.3.4 Council Events

To promote bicycle usage, active transport and healthy living, Council should provide information as to how to access activities and events via safe bicycle routes. Temporary bike parking should be provided for facilities without secure bicycle parking, and heavily utilised facilities should seek to include permanent secure bike parking facilities.

7.4 Bicycle Etiquette

With the Bike Plan promoting bicycle usage, it is important that both cyclists and other street users are aware of each other’s presence and limitations. This is particularly important on shared-paths and on-street shared facilities where bicycle riders will find themselves interacting with different users.

7.4.1 Shared Paths

Under NSW law, cyclists are required to keep left on bicycle paths, including shared paths. Pedestrians are not subject to such laws, but it is also good practice for pedestrians to keep left, allowing cyclists to overtake on the right. It is important to recognise that it is not feasible to require cyclists and pedestrians to match each other’s speeds. Most pedestrians will walk at about 5km/h, while many cyclists may begin to lose stability in speeds below 12km/h.

Cyclists are required by law to have a bell fitted to their bicycle. It is good practice for cyclists to announce themselves when approaching pedestrians, particularly from the rear, by utilising a bell and calling out. Cyclists should still take care when passing pedestrians, as they may be listening to headphones, be hard of hearing, or otherwise distracted.

Cyclists, in many instances, should slow down when approaching pedestrians, particularly on narrow paths or busier areas, such as schools, shops and bus stops. Both bicycle riders and other shared path users should be aware of their surroundings and demonstrate consideration and common sense with regards to other path users' needs and mobility. Pets should be walked on-lead and to the left of the owner where possible. Pedestrians and cyclists should check behind themselves if crossing the centreline of a shared path, to ensure that they will not cause a collision.

7.4.2 On-road bike lanes and on-road riding

Under NSW law, cyclists are allowed to ride on any road, unless bicycles are explicitly excluded via bicycles prohibited signage. Marked bicycle lanes are used where a more significant volume of cyclists is anticipated, greater protection is needed, or where there is a desire to reinforce bicycle priority and wayfinding. Bicycle riders do not have to ride in bike lanes when provided when it is impractical to do so, and will often need to exit them when making turns or avoiding parked vehicles. However, in the interest of all road user's safety and to reduce potential vehicular conflicts, riders should seek to use marked bicycle lanes when it is safe to do so.

Bicycle riders are allowed to ride two abreast on public roads, but only if separated by 1.5m or less. Drivers must give bicycle riders at least 1m of clearance on roads up to 60km/h, and 1.5m on roads where the speed limit is more than 60km/h. While many bicycle riders will ride towards the left side of the road, drivers should be mindful that cyclists will often need to ride in the centre of the lane to avoid soft edges, potholes, or other hazards. It is sometimes better for cyclists to ride closer to the centre of the lane so that they can be more easily seen and to avoid being hit by swinging car doors from parked vehicles. Motorists should be careful to check for cyclists when exiting their vehicle, parking and un-parking, and when manoeuvring in slow moving traffic where bicycle riders may be able to move more quickly by riding between slow vehicles.

7.5 Public Domain Design and User Hierarchy

To achieve the Bike Plan's objectives, Council's new roads and significant works to existing roads should recognise the road user hierarchy.

Local streets and town centre streets are areas of higher pedestrian activity, where there is a desire for lower vehicle speeds, greater street activity, and improved pedestrian connectivity. On local streets and main streets through retail and employment areas, pedestrians and cyclists should be the first and second preferences in the design of the public domain, with public transport vehicles and private vehicles being the third and fourth design considerations. Designing the public domain with these principles will encourage active

travel and provide more people friendly neighbourhoods, rather than car and traffic focussed localities as has been the practice in many established areas.

While aspects of road user safety need to be implemented, it is particularly important that road crossings and footpath orientations maintain priority for, and are legible for, pedestrians and cyclists. Pedestrian barriers, narrow pram ramps, displaced pedestrian crossings, and wide intersections are all signs of a failure of design in which the road user hierarchy needs to be readdressed. Road design speed, traffic calming elements, street furniture and landscaping all contribute to creating an active transport friendly city, which will promote active transport choices. The construction of new footpath and bike paths should ensure that users can safely and conveniently cross the street, particularly to destinations such as playgrounds.

Landscaping also has a significant impact on the useability of shared paths. A lack of, or overgrown, vegetation can detract from active transportation. Generous landscaping beside shared paths not only improves visual amenity, but can also provide shade from the summer sun.

Adequate lighting is also considered as an important factor in contributing to an active transport friendly city. While many shared paths adjacent to arterial roads can borrow street lighting from the road, several bike paths through parkland are not adequately lit. It is suggested that all new high order routes are provided with lighting in accordance with Australian Standards. Established routes should also be retrofitted with street lighting where possible.

It is suggested that pedestrian and cyclist space allocation, and prioritisation of pedestrian and cyclists facilities must be considered as part of any new road design within the Liverpool LGA. New roads shall be designed in a manner that promotes active transport by the nature of the public domain design and appropriate prioritisation.

Council should consider utilising street furniture (e.g. light poles) that allow for bikes to be securely locked. Such systems mean that bicycles are parked in highly visible locations (deterring thieves) and can spread the availability of parking closer to destinations, rather than traditional bike parking structures which are more concentrated.

7.6 Bicycle Sharing Schemes

A relatively new arrival to Sydney are bike rentals or bicycle sharing schemes. These are private companies that allow users to rent a bicycle (and helmet) for a nominated fee. Some systems utilise docks, where a bike must be collected from and returned to a rack, while others utilise a lock on the bicycle, which gives users greater freedom. Council has received interest from organisations to set-up bike renting/sharing schemes in the Liverpool LGA.

Such systems will allow individuals to complete short journeys by bicycle, rather than by car or public transport. Such systems are especially relevant for built-up areas such as the Liverpool city centre, and future urbanised areas such as Edmondson Park and Leppington.

While such businesses are broadly encouraged, Council may need to develop a policy framework if any issues arise from such bike sharing schemes. This is particularly relevant for dockless systems where users could leave bicycles in unsafe locations or in conflict with pedestrian movement.

These schemes will encourage bicycle travel by making it easier and more convenient. Combined with the effort to amend Liverpool's planning controls to require end-of-trip facilities in new workplaces, bike sharing also has the ability to become a part of normal day-to-day travel.

Bike share schemes are also encouraged in significant parkland/tourism areas, where residents and visitors can use hired bikes to travel along high-quality, high-amenity routes through areas such as the Western Sydney Parklands, or the M7 cycleway.

8 IMPLEMENTATION PLAN

8.1 Funding

Funding for cycleways is generally variable due to the need to apply for funding from other State Government bodies, primarily the RMS. Funding for bicycle paths is also collected from Section 7.11 development contributions, or from footpath upgrade works. Many local routes will be provided to councils by developers upon subdivision of land or other developments where infrastructure is provided.

Various funding sources include:

- Roads and Maritime Service;
- Department of Infrastructure and Regional Development;
- Department of Planning and Environment;
- NSW Office of Sport and Recreation;
- Developer Contributions (Section 94 funds);
- Council funds
- Voluntary Planning Agreements;
- Commonwealth Department of Education; and
- Commonwealth Department of Employment.

8.2 Infrastructure Implementation Strategy

The Implementation Strategy provides guidance to Council as to the delivery of the Bike Plan objectives. This also includes generic and specific recommendations.

8.2.1 Cycleway Priorities

Cycleways will generally be constructed in order of hierarchy, where there are identified safety issues, where there is community demand, or as funding becomes available. A lower priority bike path may be constructed before a higher priority bike path if it is ancillary to proposed road works or another major redevelopment. This is because the costs associated with designing and building a cycleway can be significantly reduced if it is built in tandem with a road or other major piece of infrastructure.

It is not anticipated that all of the routes shown on maps will be constructed in the next five years before this plan is again reviewed; instead, this plan outlines what a holistic, well-connected network would look like in Liverpool. Some paths may also deviate from their location on this map, as the detailed design stage may reveal other considerations. It is recognised that connectivity within and around the Liverpool City Centre will be critical in the

next five years. There are a few high quality bike paths which currently terminate at the periphery of the city. Given the key destinations (e.g. hospital, education campuses, railway station) and the growing number of residents, adequate bike facilities are needed.

Key priorities:

- Ensure that new cycleways include the provision of broad canopy trees planted adjacent to provide summer shading (where possible) and that paths contribute to higher amenity.
- Ensure that any new road design in Liverpool prioritises the needs of pedestrians and cyclists first and second, especially local streets and high streets through retail/commercial areas.
- Review the Cartwright Avenue Route. Remove inconsistent signage and bring the on-road or off-road route up to current design standards.
- Review the Flowerdale Road and Memorial Avenue route to ensure that the on-road portions meet current design standards and can operate safely at intersections.
- Review all other on-road routes which have a recorded incident involving a bicycle within the last 5 years.
- Provide bike paths within the vicinity of train stations and bus interchanges.
- Make repairs to the Chipping Norton Lakes cycleways.
- Identify opportunities to improve cyclist safety near the Carnes Hill Shopping Centre.
- M7 cycleway links (detailed in heading 8.2.5).
- Georges River Crossing (detailed in heading 8.2.6).
- Elizabeth Street Link (detailed in heading 8.2.7).

8.2.2 Signage Priorities

Signage indicating a shared path or an on-road route is generally provided as the infrastructure is provided. Older routes or paths of adequate width that only require signage and markings have also been broadly identified. Non-compliant, vague or inconsistent signage is another issue that will need to be rectified.

The implementation of wayfinding and directional markers has not been as successful to date, especially on shorter sub-regional and local routes. Signage to facilities and points of interest is lacking. The key numbered routes provide the basis of route identification and naming. This will also assist in the construction of new routes as it identifies key missing links within the network. It is envisaged that the roll-out of directional signage will be more

successful by having a pre-determined route with focal points at either terminus. It is also anticipated that local facilities (such as corner shops, schools and community facilities) could be identified on route signage to promote local landmarks. Each route will be signposted in accordance with the program outlined in Section 6.

Key priorities:

- Audit of directional signage on the M7 cycleway, including highlighting local destinations, e.g. Cutler VC Rest Area.
- Ensure that any signage strategy incorporates points of interest, including those from adjoining LGAs.

8.2.3 Priority Amenities

Council is currently investigating the most suitable location for a bicycle training facility and is including factors such as ease of access, proximity to densely populated areas, proximity to shops/cafes, proximity to bike paths, existing facilities (toilets, halls, bubblers) and lighting. The type and number of obstacles will also need to be thoroughly investigated, to ensure that the facilities will be heavily utilised for many years.

The provision of new bicycle parking facilities at local shopping centres will need to be carried out in accordance with centre management and other stakeholders. Bike parking facilities at train stations will also need to be provided in accordance with Transport for NSW direction. The roll-out of bike parking facilities at libraries will be subject to library funding and the timing of other new facilities or retrofitting.

The types of bicycle parking infrastructure to be provided will vary depending upon the location of the facility and the duration that bicycles are expected to be parked. For commercial and medium/high density residential development, secure lockers and controlled access bike racks would be suitable within the building. For temporary parking, inverted U-rails (or circular tube rails attached to existing infrastructure, such as street lights) is more appropriate next to building entry points.

Key priorities:

- Identify a site for a bicycle training facility.
- Investigate opportunities to provide a BMX track given the closure at Powell Park Cartwright.
- Identify areas for bubblers, water refill stations and toilets to be provided on the M7 cycleway.

- Incorporate adequate lighting into any new regional or sub-regional route which does not follow a major arterial road.
- Investigate the possibility of providing lighting on the Rail Trail route (4).

8.2.4 Generic priorities

The existing cycling network has great potential for improvement through closing the gaps in missing links. The existing cycle network in the Liverpool LGA has much improved connectivity within the designated precincts. This is usually the result of cycleways being built alongside developments. Breaks in the larger LGA network appear mostly between these smaller networks.

In determining which missing links to prioritise, the following principles were used:

- Areas where there is a history of bicycle and pedestrian or vehicular conflict (accidents and injuries);
- Areas where a significant amount of growth is anticipated (e.g. Liverpool City Centre, in proximity to TAFE/University campuses);
- Inexpensive links between large, existing networks;
- Priority should be given to building links with high quality cycling facilities (e.g. M7 Cycleway, Liverpool to Parramatta T-Way);
- Priority should be given to links where expensive infrastructure (e.g. bridges, underpasses) already exists;
- Off-road cycle paths should be prioritised over on-road cycling facilities where reasonably practical to facilitate a greater number of users; and
- Desire lines (trails left by pedestrians/cyclists along grass) indicate user demand where no infrastructure exists.

8.2.5 Multiple M7 Cycle Way Links

The M7 Cycleway is an important piece of existing infrastructure within the Liverpool LGA. It provides a high quality cycling link along the western region of the LGA. Numerous smaller cycling networks exist close to the M7 cycleway. Many were found to have no formal links to the M7 cycleway and in some instances these missing links were as short as four metres. Building these links to the M7 cycleway would greatly strengthen the cycling network. An example of a missing link in Hoxton Park is shown in Figure 8-1.

Precincts Affected:

- Cecil Hills
- Austral
- Prestons
- Green Valley

Strategic Routes Affected

- Route 9
- Route 8

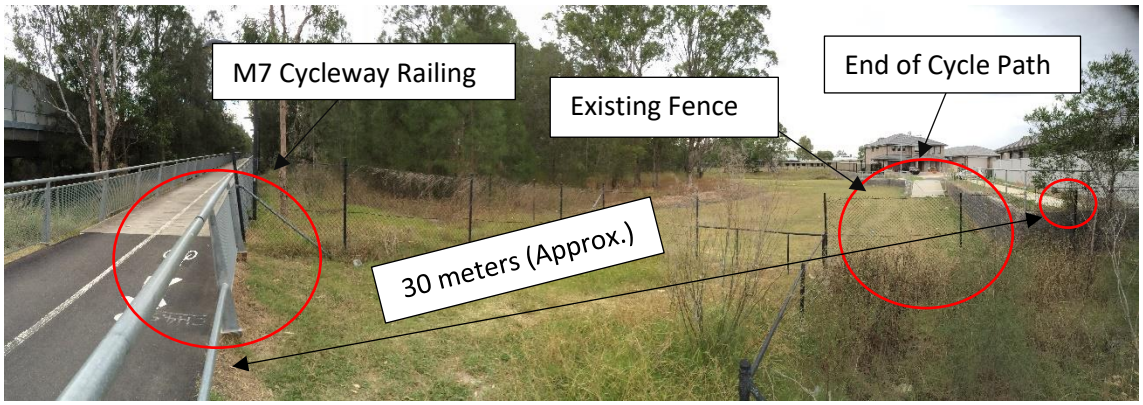


Figure 8-1: Missing M7 Link Example – Hoxton Park

A full list of missing links and other issues is provided below starting from the Camden Valley Way intersection and heading north:

Table 8-1: List of missing links to M7 cycleway

Location	Co-ordinates	Issue/Description
Near Camden Valley Way, but applicable to all	33.95624°S 150.87571°E	Build-up of water and silt causing slip hazard
Adjacent to Cutler VC Rest Area	33.95384°S 150.87577°E	Existing path is very narrow, and will need to be widened to at least 2.5m to meet shared path standards.
Skipton Lane	33.94937°S 150.87872°E	An opportunity exists to connect Skipton Lane to the cycleway
Split Close	33.94679°S 150.87783°E	An opportunity exists to connect Split Close to the cycleway
Ash Road	33.93802°S 150.87874°E	A long shared path can allow a crucial link between the M7 path and existing shared paths on Jedda Road via Ash Road
Twentieth Avenue	33.92917°S 150.86568°E	A connecting link following Cabramatta Creek would allow a connection between the M7 and 20th Ave with the potential to further extend the path following the creek to Brownes Farm Reserve.
Inverell Avenue	33.92391°S 150.85777°E	A short link and footpath widening required to link to Inverell Avenue at its eastern end. Funding for this project has been secured and the project is proceeding.
Government Road	33.92254°S 150.85538°E	A short link required to link to Government Road at its eastern end.
Hall Circuit	33.91791°S 150.85162°E	Whilst a link to the road exists, a shared path is proposed to link the M7 path to the school and Middleton Grange cycleway network.
Bird Walton Avenue	33.91467°S 150.84916°E	This link needs to be extended and Middleton Grange shared paths constructed. Delivery of this link is imminent.
Hemsworth Avenue	33.91201°S 150.84821°E	A small missing link and a fence to be removed to complete this link.
Middleton Drive	33.90626°S 150.84635°E	Removal of fence and about a metre of pavement to complete this link. It is understood that Middleton Drive and Aviation Road are to be connected which will require reconstruction of much of this path. Council continues to work with the M7 operator to progress this project, with funding secured.
Anjou Circuit	33.88696°S 150.83722°E	A link could be provided near the existing M7 overpass and Anjou Circuit

8.2.6 Georges River Crossing

Strategic Routes 1, 2 and 3 all connect the Liverpool CBD with precincts located to the east and the only crossing points of Georges River are Newbridge Road and Governor Macquarie Drive. While they both provide footpaths, neither of them offers sufficient width and facilities for cyclists. Potential crossings were reviewed in different locations including along Governor Macquarie Drive, beyond Childs Road/ Moorebank and the old rail bridge north of Newbridge Road.

Ideally, cycling facilities would be added to both bridges as they both form part of the strategic route network. Options would include widening the bridges or adding bridges adjacent.

Restoring the old bridge north of Newbridge Road would be expensive and complex as the bridge would require a crossing of Liverpool Station and the adjacent bus interchange.

Establishing a new bridge location approximately 300m south of Governor Macquarie Drive (utilising the existing water pipe structure) would also be expensive and require extensive additional infrastructure to complete the cycle network.

Precincts Affected

- Liverpool CBD
- Chipping Norton
- Wattle Grove

Strategic Routes Affected

- Route 1: CBD to Chipping Norton
- Route 2: CBD to Bankstown
- Route 3: CBD to Wattle Grove

8.2.7 Elizabeth St CBD Link

While there are multiple cycle paths proposed for the CBD, the proposed Elizabeth Street cycle path will provide a key connection between regional routes that meet in the Liverpool CBD. The proposed link is off-road and would provide access to the existing cycle path along Elizabeth Drive, the hospital precinct, Liverpool Station and act as a crucial link for all cyclists travelling east over the Georges River.

Precincts Affected

- Liverpool CBD
- Chipping Norton
- Green Valley

Strategic Routes Affected

- Route 1: CBD to Chipping Norton
- Route 2: CBD to Bankstown
- Route 3: CBD to Wattle Grove

- Route 4: Rail Trail
- Route 5: CBD to South West Liverpool
- Route 6: CBD to Hoxton Park
- Route 7: CBD to Cecil Hills

8.3 Bike Parking and amenities

There are two elements to end-of-trip facilities which are considered to be the most important aspect of all cycle trips. The first of these is secure bicycle parking. The type of cycle parking provided to cyclists should be linked to the duration of stay. Inverted U-railing cycle parking is a suitable way of providing cyclists with a short parking duration; however, storage of a more secure nature is required for all-day parking, especially where public access is restricted. Cycle parking should be provided in key centres and community nodes such as shopping centres, libraries, sporting facilities, schools, colleges, railway stations and other public buildings.

The second element is the provision of showers, changing rooms and storage for cycle equipment. This should be integrated or retrofitted into work and educational locations. The Liverpool Development Control Plan 2008 has provisions for Liverpool City Centre that one bicycle space must be provided per 200sqm of gross floor area, with a minimum 15% to be accessible to visitors. It also states that any retail or commercial development employing more than 20 people should provide lockers and shower facilities appropriate for cyclist use.

Cycle parking needs to be located in areas of high visibility and in areas of convenience. Increased education of the benefits of using the highly secure D lock for local cyclists should be encouraged. These locks may cost more but are much more secure and cheaper than a replacement bicycle; in the UK and Europe these locks are common place. The use of engraving a serial number and recording this number on the bike is also to be strongly encouraged to reduce bicycle theft.

At present there are few existing bike amenities within the Liverpool LGA. Facilities located at Warwick Farm station, Holsworthy Station and Liverpool Railway Station include both lockable secure bicycle lockers and open railings near station entrances. Edmondson Park Station and Liverpool Westfield also have short-term bicycle parking facilities. Several local shopping centres, sport facilities and schools also have some short-term bike parking available for cyclists.

Unfortunately, the location of cycle parking, where provided in Liverpool, is generally out of sight and the types of racks provided are not the most secure of designs. This adds to the

perceived risks of theft and discourages use. These issues need to be addressed for all future end-of-trip facilities provided.

As part of new retail development, appropriate short stay and where applicable long stay, bicycle parking should be provided throughout Liverpool, especially within the City Centre. These bicycle parking facilities shall be provided in areas of high passive surveillance, and in areas that are easily accessible and visible. The use of the circular tube attached to existing infrastructure is to be used preferentially to the more traditional U pole, where appropriate, as these can be attached to existing Council infrastructure, and fit more holistically into the streetscape.

Additional or new lockers should be placed at railway stations through the Liverpool LGA, at Edmondson Park and potentially Casula. Key bus stops on the Liverpool-Parramatta T-Way may also create sufficient demand to justify the provision of bicycle lockers.

The provision of traffic counters at pinch points and other areas of high volume will be investigated for provision with new infrastructure provided, to enable a better understanding of cycleway use.

8.3.1 Planning for Bike Parking

Bike parking needs to be provided in areas of high demand. It needs to be provided in conjunction with:

- Major new private developments;
- New Council facilities; and
- New State or Commonwealth facilities.

Bike parking also needs to be provided at existing Council facilities of bus stops in conjunction with the bikeway construction program. The Liverpool Development Control Plan 2008 and the Liverpool Growth Centre Precincts Development Control Plan March 2013 already require bike parking for major developments in Liverpool City Centre and growth centre precincts.

To achieve all of the above items Council will need to carry out the following actions to ensure that bike parking is provided on both public facilities and private developments:

- Review the Liverpool Development Control Plan 2008 and assess the need to include provisions which would require bike parking for development outside of the Liverpool City Centre;
- Incorporate bike parking facilities in the Council Management Plan of new and upgraded facilities; and

- Include the need to require bike parking in any new local, State or Federal facilities.

8.4 Partnerships

Liverpool Council will use and identify any possible partnerships for the promotion of cycling, events, cycleway construction and maintenance. Partnerships have previously been entered into with the RMS to build cycleway facilities with full or partial cost recovery. Voluntary Planning Agreements have also been entered into to provide for cycleway construction in Georges Fair (Moorebank), New Brighton Golf Course, Elizabeth Hills and the Warwick Farm Turf Club. The Western Sydney Parklands Trust also provides a number of cycleways within the Liverpool LGA. It is proposed that where possible partnerships should be investigated as part of cycleway construction. Ongoing collaboration with the Western Sydney Parklands Trust will also ensure key strategic links are made between Council's network and the Trust's network. Council will also listen to the needs of residents and organised bicycle groups/bodies whose members will likely express their interests in seeing new paths, or improving existing paths, around Liverpool.

8.5 Bike Plan Review

It is proposed that review of the Bike Plan be limited to the review period every five years. Any significant changes to the district or recreational routes that are proposed may result in another review, as these are the most expensive and utilised routes within the cycleway network. Additionally, if Council commits to major new facilities, annual events or large scale community events, the Liverpool Bike Plan may need to be updated to reflect the impact of these activities.

9 APPENDIX 1 – BACKGROUND DOCUMENTS

9.1 National Framework for Cycling

9.1.1 Australian National Cycling Strategy (Austroads, Australian Bicycle Council, September 2010)

The *Australian National Cycling Strategy 2011-2016* is the primary blueprint for the benefits of bicycle use and activity in Australia. The strategy recognises the achievements made since the *2005-2010 National Cycling Strategy* with an increase in the number of people using their bikes and the raft of strategies and policies published by all tiers of government which are encouraging more people to cycle. This Strategy recognises the barriers to cycling and aims to promote and facilitate increased cycling within the nation. The primary vision of the Strategy is double the number of people cycling in Australia by 2016 while improving safety for cyclists. This is envisaged to enhance the well-being of all Australians.

The main priorities of the Strategy include:

- Promote cycling as both a viable and safe mode of transport and an enjoyable recreational activity,
- Create a comprehensive and continuous network of safe and attractive routes to cycle and end-of-trip facilities,
- Consider and address cycling needs in all relevant transport and land use planning activities,
- Enable people to cycle safely,
- Improve monitoring and evaluation of cycling programs and develop a national decision-making process for investment in cycling,
- Support the development of nationally consistent guidance for stakeholders to use and share best practice across jurisdictions.

The Strategy also states that there are a range of transport, environmental and health challenges facing Australia. In particular, there is a need to:

- Provide safe, affordable and enjoyable movement of people and goods;
- Reduce environmental and health impacts of transport;
- Increase physical activity of all Australians; and
- Combat rising traffic congestion.

The Strategy outlines that these national challenges can be addressed by reducing car dependency through the provision of a transport system that promotes active transport

options, such as cycling. The statement also outlines the need to integrate pedestrian and cycle networks with public transport stops and interchanges.

9.1.2 Walking, Riding and Access to Public Transport (Australian Government, Department of Infrastructure and Transport, 2013)

Walking, Riding and Access to Public Transport outlines how the Australian Government can increase the proportion of people walking and riding for short trip, and utilising public transport when it is available. The statement outlines potential outcomes if the mode share of these active transport options are increased; including, a reduction in road congestion, greater public health outcomes, reduced demand for infrastructure, and reduced environmental impacts (air pollution, CO_2 emissions, noise reduction). This statement also provides an enlightening economic analysis about the benefits of cycling as a mode of travel, which is described in more detail in 'Economic' The statement is broken down into four steps which outline the method of providing high quality pedestrian and cycling networks, which foster greater participation of public transport use:

- Plan: Include walking and riding when planning for land use and transport
- Build: Build appropriate infrastructure for walking and cycling needs
- Encourage: Enable greater participation in walking, riding and public transport
- Govern: Coordinate across agencies and levels of government

The statement identifies the need for urban planning and transport planning to create better spaces to foster the pedestrian and cyclist environment. This includes creating strategic links and local connections, but also creating urban spaces which promote walking and cycling as an active form of transport.

9.2 NSW State Government Framework for Cycling

The NSW State Government has a multitude of policies in place relating to, and advocating increased bicycle activity within the State. These policies include the New South Wales Bike Plan, the Planning Guidelines for Walking and Cycling, NSW 2021, the NSW Metropolitan Strategy, Sydney's Cycling Future, NSW Cycling Safety Action Plan 2014-2016 and other relevant resources. These strategies are discussed as follows:

9.2.1 New South Wales Bike Plan (NSW State Government and RMS (formally RTA), May 2010)

This is the NSW Government's premier bicycle policy for the State. The Bike Plan recognises the growth in cycling over the past decade and outlines the key commitments to providing more bicycle infrastructure. Like the Commonwealth document, the plan has an

ambitious target of increasing the share of trips by bicycle in greater Sydney for all travel purposes to 5% by 2016, and to double the use of bicycle commuting from 2006 to 2016. The NSW Bike Plan will encourage more bike-riding by:

- Improving signage for cyclists, including 'time to destination' information;
- Increasing bike parking and facilities for cyclists in local centres, workplaces and public transport interchanges;
- Providing professional resources to shape sustainable, active communities;
- Developing an internet portal of cycling information via 131 500 website;
- Providing cycling skills workshops;
- Preparing teacher resources on student bike-riding skills; and
- Promoting cycling as an easy exercise and transport choice.

The document describes the Roads and Traffic Authority's (RTA) existing and proposed cycle facilities in creating a state wide cycle network and recognises the importance of connecting centres such as Liverpool. The River Cities Bike Program outlines the plan to provide better connections within 5-10 kilometres of the Liverpool centre. Local councils are identified as the main providers of infrastructure and are best placed in understanding the needs of cyclists at a local level. The state government will provide funding assistance to councils to help construct networks identified in bike plans.

9.2.2 Planning Guidelines for Walking and Cycling (NSW Department of Planning and NSW Roads and Traffic Authority, January 2005)

The NSW Government released the Planning Guidelines for Walking and Cycling to assist planners with the development of neighbourhoods and cities that facilitate and are conducive to walking and cycling. The guidelines acknowledge the benefits associated with better planning for walking and cycling, such as increased liveability through the reduction of traffic-related air and noise pollution. The overall health of the general population can be improved by integrating exercise into our day-to-day activities and the equity of access to services can be improved by reducing household travel costs and providing an alternative means of travel for those without a car. Essentially, the fundamental purpose of this document is to create healthier and more sustainable cities through an increase in walking and cycling.

9.2.3 NSW 2021 (NSW Department of Premier and Cabinet, September 2011)

The NSW 2021 Plan was prepared by the NSW Government with the aim of rebuilding the economy, renovating infrastructure, restoring accountability to government, and strengthening the local environment and communities. The plan includes 32 goals and 180 targets to make NSW the number one location in Australia to do business. An important part

of this initiative is improving accessibility into strategic centres, such as Liverpool. The following priorities are considered to be relevant to the Liverpool Bike Plan:

- *Goal 8: Grow patronage on public transport by making it a more attractive choice*

This goal aims to more than double the number of people in the Greeter Sydney Metropolitan area to choose cycling as their mode of transport at the local and district level by 2016. The NSW government will also assist local councils to complete local cycle networks, which form part of an integrated transport network.

- *Goal 20: Planning policy to encourage job growth in centres close to where people live and to provide access by public transport*

This goal aims to create vibrant, more liveable cities and centres. It has the goal of increasing the number of people living within 30 minutes by public transport to the city or another major centre. High quality cycle ways can be integrated into the existing and planned public transport network to encourage residents to utilise active transport and public transport.

9.2.4 A Plan for Growing Sydney (NSW Department of Planning, December 2014)

The Metropolitan Strategy is a strategic document that outlines a vision for Sydney to 2036. As the population of Sydney is expected to increase by 1.6 million in the next 20 years, the NSW Government is planning and managing Sydney's growth now through the Metropolitan Strategy.

This metropolitan strategy recognises the important role of providing walking and cycling facilities, particularly in areas of higher density, as an alternative means of transport. It recognises that the provision of bike facilities, cycleways and the active promotion of cycling as a viable transport method is an important function in creating a healthy built environment.

9.2.5 NSW South West Subregional Strategy (NSW Department of Planning, December 2008)

The South West subregional strategy is the strategic framework for the Council areas of Camden, Campbelltown, Liverpool and Wollondilly Councils, which builds upon the NSW Metropolitan Strategy.

The following priorities of the South West Subregional Strategy are considered relevant to the Bike Plan:

- B4.2: Support Centres with Transport Infrastructure and Services

The Bike Plan enables for alternative infrastructure to be provided to Centres within Liverpool, to increase accessibility and mobility for residents.

- D1.2: Extend Transport Networks to serve growth:

As the South West Growth Centre is developed Council will identify and plan for connections and expansion of the Cycleway network to service the Growth Centre and link into the developed parts of the Liverpool LGA.

- D3.1: Improve Local and Regional Walking and Cycling Networks

The Bike Plan provides for an increased cycleway network, which links places of employment, recreation, and housing together, as well as to major public transport infrastructure.

- E2.3: Improve Sydney's Air Quality.

Enabling for greater cycling use can reduce the amount of car trips required, especially for short journeys. This reduces car dependency, and can improve air quality through the reduced vehicular trips.

- E.3.2.1: Councils to ensure new developments and redevelopments are designed to encourage sustainable forms of transport including walking and cycling.

The Liverpool Local Environmental Plan 2008 provides for areas of higher density than the traditional detached house. The Bike Plan provides for significant connectivity through cycleway development between these areas of higher residential density and places of employment, recreation and public transport infrastructure.

- F1.1: Provide access to Regional Open Space in Western Sydney

By improving the linkages and extent of cycleways within Liverpool, as well and through green space corridors such as the Georges River, the Bike plan improves the accessibility of the regional open space areas for the majority of the established areas of Liverpool.

- F1.3: improve access to waterways and links between bushland, parks and centres.

The Bike Plan proposes new and extended cycleways along the major regional open spaces within the area. The improved connectivity between existing cycleways will improve accessibility to these areas for the majority of the established suburbs of Liverpool.

9.2.6 Draft South West District Plan (Greater Sydney Commission, November 2016)

The Draft South West District Plans sets out the Greater Sydney Commission's vision for South Western Sydney. There are a number of actions that are to result from the plan, ranging from hard-infrastructure construction, through to education strategies and to monitoring programs. The most relevant actions in relation to cycling infrastructure in Liverpool are as follows:

- P10: Encourage and support the use of public transport

The NSW government will seek to better integrate the local bus system with alternative transport options, such as bicycle connections.

- L12: Develop guidelines for safe and healthy built environments

The Greater Sydney commission sees walking and cycling connections and end-of-trip facilities as a way to improve health and wellbeing outcomes. This includes establishing Sydney's Principal Bicycle Network, where key routes would be separated from motor vehicles. Transport for NSW will also investigate initiatives to improve cycling access into and through the Liverpool City Centre. Improvements are also being investigated to improve access within two kilometres of the Liverpool transport interchange.

9.2.7 Sydney's Cycling Future (Transport for NSW, December 2013)

Sydney's Cycling Future is a strategic planning document that is part of the *NSW Long Term Transport Masterplan* and has the fundamental goal of making cycling a safe, convenient and enjoyable transport option for short trips. This plan identifies existing cycleways across the Sydney region, but also highlights that the majority of trips will be less than 5km and to local locations, such as shops, schools, universities or work.

The plan has 'three pillars of Sydney's Cycling Future':

- Connect: Investment is to be prioritised to networks within 5km of major centres, particularly missing links; also, identifying the hierarchy of prioritisation and delivering the appropriate infrastructure for the location. This includes delivering facilities around public transport interchanges and through major transport and development projects;
- Promote: use our existing infrastructure better, promote cycling as a viable transport choice by working with various stakeholders, provide bicycle education opportunities and promote NSW Bike Week;
- Engage: whole of government approach will be used to integrate cycle facilities into major urban development. Collaboration with peak bodies to provide expertise and collaboration with local councils to target missing links and problem areas.

This plan outlines the importance of completing the cycle network within the Liverpool city centre and connecting Liverpool to Glenfield. In particular, links along Bathurst Street, Campbell Street, Moore Street and Bigge Street are identified.

9.2.8 NSW Cycling Safety Action Plan 2014-2016 (Transport for NSW, May 2014)

The NSW Cycling Safety Action Plan 2014-2016 was published to highlight the importance of safety when planning cycle networks, especially as the number of people choosing to ride a bicycle is growing. Since 1955 bicycle related fatalities have been decreasing; however,

during 2013-14 the number of bicycle riders killed on NSW roads has doubled since 2012. The report also acknowledges that a number of cyclists do not report accidents to the police. Fatalities are most common on roads with a speed limit above 60km/h at mid-block locations, whilst injuries are most common at intersections on lower speed roads. This highlights that bicycle safety is an important aspect to consider in the determination of routes and the design of cycleway, not just intersection treatment. The NSW government hopes to increase bicycle safety by:

- Increasing safety awareness (including compliance with the road rules);
- Designing safer on-road and off-road paths;
- Providing road safety education and communication;
- Encouraging riders to ride at a safe speed;
- Improving the safety of intersections and mid-block locations;
- Increase visibility on roads with a posted speed limit above 60km/h;
- Encourage separated cycle ways;
- Encourage helmet use and bicycle maintenance; and
- Encourage motorists and cyclists to share the road.

9.2.9 NSW Long Term Transport Masterplan (Transport for NSW, December 2012)

The NSW Long Term Transport Masterplan heavily focuses on public transport and road links (particularly to and within the Sydney CBD), but also outlines the State Government's plan to increase funding for bicycle infrastructure. This document outlines the State Government's commitment to improving bicycle networks within 5km of urban centres (the Liverpool CBD), and improve bike parking at transport interchanges. The document also provides scope for the funding of shared paths within 10km of urban centres and creating dedicated bicycle only paths on busy routes in the long-term.

9.3 Other Resources

9.3.1 Growing Liverpool 2023

Growing Liverpool 2023 is Council's 10 year community strategic plan to encourage growth within the area and to allow Liverpool to become a regional city for south-western Sydney. By building bike paths and encouraging residents to utilise bicycles as a means of transport, and/or recreation this Bike Plan will contribute to the following directions:

- Vibrant prosperous city: to activate the city centre and grow local businesses to position Liverpool as the destination of choice to attract a diverse range of business and investment.
    - An extensive and well-connected bike network, utilised by the local population will provide a modern image for the city, reduce road congestion and increase accessibility into the Liverpool centre.
- Liveable safe city: to deliver a planning system which provides affordable housing, embraces sustainable development, and improves the community's sense of safety by providing clean and attractive spaces.
    - The provision of bicycle facilities will improve neighbourhood amenity and provide more eyes on the street. The Bike Plan will reinforce sustainable development outcomes by promoting alternative forms of transport.
- Healthy inclusive city: Create an inclusive community, celebrating our cultural diversity. Deliver high quality services, programs and facilities and improve health and well-being outcomes for the community.
    - The Liverpool Bike Plan will have a direct impact on improving the health and well-being outcomes of the community by increasing physical activity through cycling as a means of transport or for recreation. It will also foster community engagement through organised meetings and events.
- Proud engaged city: Strengthen and celebrate Liverpool's identity, and deliver a range of cultural events. Engage with the community and provide first class facilities and places, protecting Liverpool's heritage and character.
    - The provision of bike facilities and the promotion of bike related programs will engage residents to participate in cycling related events and activities.
- Natural sustainable city: Implement environmentally sustainable practices, protect areas of environmental significance and reduce adverse environmental impacts for future generations.
    - The Bike Plan will provide infrastructure and promote cycling as an alternative form of transport, reducing our carbon footprint. Providing recreational trails through bushland and parklands will encourage residents to value their local environment.

- Accessible connected city: Improve internet connectivity. Provide a safe and easy to use transport network and encourage sustainable and alternative forms of transport options.
    - The Bike Plan will provide residents with a high quality alternative transport option by outlining the extent of a bike path network, and promoting cycling as a viable form of transport.

9.3.2 Other Resources

The following publications provide the engineering solutions to address some of the safety aspects of cycling networks. This includes the safety of cyclist from other forms of vehicular traffic and the safety of pedestrians from cyclists, especially on shared paths.

- *NSW bicycle guidelines* (RTA, July 2005);
- Current versions of the Austroads Guide to Road Design;
- Guide to Traffic Management;
- Cycling Aspects to Austroads Guides and other Austroads guides as appropriate;
- Austroads Research Reports *AP-R492-15 Bicycle Wayfinding* and *AP-R475-15 Level of Service Metrics (for Network Operations Planning)* (Austroads, 2015);
- *Manual of Traffic Control Devices* (AS 1742.9-2000); and
- *Integrating Land Use And Transport, Improving Transport Choice — Guidelines for planning and development* (Department of Urban Affairs and Planning, 2001).

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