



Central
Coast
Council

Central Coast Council
Bike Plan
2019-2029

Bitzios Consulting and Zwart Transport Planning

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Central Coast Bike Plan

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Wyong Office:

2 Hely St / PO Box 20 Wyong NSW 2259

P 02 4350 5555

Gosford Office:

49 Mann St /PO Box 21 Gosford NSW 2550

P 02 4325 8222

E ask@centralcoast.nsw.gov.au

W centralcoast.nsw.gov.au

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Glossary of Terms

Active Transport: Active transport is the mix of cycling and walking, integrated with public transport, used as a mode of travel for commuting, recreation or utility purposes, instead of private motorised vehicles and taxis. Active transport promotes individual and community health and wellbeing. It can also include skating and scootering (Source: adapted from Public Health Association of Australia – Low Emissions & Active Transport Policy).

Attractors and Generators: Places that are likely to have high active transport activity, such as shopping centres, schools, train stations, bus stops, tourist centres, hospitals, medical centres, retirement villages, etc.

Bicycle: A vehicle with two or more wheels that is built to be propelled by human power through a belt, chain or gears.

Bike Crash Clusters: Any location up to 100 metres long with three or more cycle crashes over five years (Source: Roads and Maritime How To Prepare a Pedestrian Access and Mobility Plan).

Bicycle Facility: A public facility especially constructed for bicycle traffic. This term has broad use and can refer to any part of a bicycle route, bicycle path, bicycle lane, associated signage or parking equipment (Source: Roads and Maritime How to Develop a Bike Plan).

Bicycle Route: Any marked route that forms part of a bicycle network. The route may utilise different types of bicycle facilities and may be on-road or off-road in the road related area or through parks and reserves (Source: Roads and Maritime How to Develop a Bike Plan).

Bicycle User Group: A Bicycle User Group (BUG) is a group of cyclists who have a common interest in cycling together and/or improving riding conditions in their community. They are sometimes based around a workplace or geographic area, and have detailed local knowledge which makes them effective in working with planners and administrators to improve conditions for bike riding. A BUG might be part of or affiliated with a bigger organization representing cyclists' interests at City or State level.

CCC: Central Coast Council.

Cycle Tourism: Self-contained cycling trips for pleasure, adventure, and autonomy rather than sport, commuting, or exercise. Touring can range from single-to multi-day trips, even years. Tours may be planned by the participant or organised by a holiday business, a club, or a charity as a fund-raising venture.

Cyclist / Bicycle Rider: A person who is riding a bicycle.

DDA: Disability Discrimination Act.

Electric Bicycle / e-bike: Includes 250w powered 'pedelec' (pedal-assisted electric bicycles) and 200w electric bicycles which may be pedal-assisted or fitted with a throttle (meaning no pedalling is required). Both classes of e-bikes are not permitted to travel over 25km/h and are able to be ridden on all facilities that conventional bicycles can use. Under NSW legislation, electric bikes are referred to as 'power-assisted pedal cycles'.

GIS: Geographic Information System.

End-of-trip Facilities: A general term for public or private facilities located at the end of a bicycle journey that when provided can encourage higher bicycle patronage (inclusive of secure bike storage, shower, and locker facilities amongst others).

LGA: Local Government Area.

Off-road: A bicycle path or shared path is said to be off-road when it is located on a road related area paralleling a road, or through parks or reserves or within public transport corridor or other public or private land not open to motor vehicle traffic.

On-road: A bicycle facilities is said to be on-road when it forms part of the road such as bicycle land or a shoulder shared with parked vehicles.

Pedestrian: Any person walking including: a person driving a motorised wheelchair that cannot travel at over 10 kilometres per hour (on level ground), a person in a non-motorised wheelchair, a person pushing a motorised or non-motorised wheelchair, a person in or on a wheeled recreational device or wheeled toy (Source: Roads and Maritime How To Prepare a Pedestrian Access and Mobility Plan).

Roads and Maritime: Roads and Maritime Services.

Roads and Maritime Guide: Roads and Maritime Services (Roads and Maritime) Guide – How to Prepare a Bike Plan (2012).

Road Network: System of links and nodes which make up the network of roads on the ground. It includes link characteristics and turning restrictions or prohibitions (Source: Roads and Maritime How To Prepare a Pedestrian Access and Mobility Plan).

Safe System Approach: A Safe System is an approach to road safety management. It is a holistic view of the road transport system and the interactions among roads and roadsides, travel speeds, vehicles and road users. It is an inclusive approach that caters for all groups using the road system. It recognises that people will always make mistakes and may have road crashes but the system should be forgiving and those crashes should not result in death or serious injury.

Shared Bicycle Scheme: A service in which bicycles are made available to individuals on a very short-term basis for a price. Traditional bike share schemes are built on docking systems and are generally implemented by governments and transport authorities. New privately operated “dockless” shared bicycle schemes are now emerging, allowing bicycles to be accessed via smartphone apps.

Shared Path: A pathway that is designed to be used by both cyclists and pedestrians.

Sustainability: Sustainability (also known as *sustainable development* or *ecologically sustainable development*) is described as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It requires the effective integration of social, economic and environmental considerations in decision-making processes.

Universal Design Techniques: Aims to provide all-inclusive access that eliminates the need for adaptation and specialised design for mobility-impaired community members

Executive Summary

Overview

The Central Coast Council has developed two new planning documents: a Bike Plan and a Pedestrian Access and Mobility Plan (PAMP). Together, these documents guide Council's ongoing provision of an active transport network for Central Coast residents and visitors over the next ten years.

This Bike Plan outlines the policies and desired improvements required to achieve Council's vision for:

"People of all ages and abilities can cycle and walk on safe, inclusive and connected facilities."

It also outlines the research and analysis that underpins the development of this Bike Plan, and builds on the former Gosford City Council's Gosford Bike Strategy (2014) and former Wyong Shire Council's On-Road Bicycle and Shared Pathway Strategy (2010).

Bike Plan Methodology

Bike Plans in New South Wales (NSW) are typically developed according to the Roads and Maritime Service Guide – How to Prepare a Bike Plan (2012). The Roads and Maritime Services guideline identifies cycling as an important part of the transport mix and aims to increase cycling through the development of bike plans. To achieve a connected active transport network for the Central Coast, a Pedestrian Access and Mobility Plan has been created alongside this Bike Plan and aligns the two strategies.

Community Engagement and Key Issues

Located between Sydney and Newcastle, the Central Coast offers residents and visitors a diverse mix of urban and natural landscapes, and a predominant focus on lifestyle. As a result, the population of the Central Coast is growing, and is expected to reach approximately 415,000 people by 2036.

Community engagement for the inaugural Central Coast Council Community Strategic Plan (CSP) revealed that more and better cycling and walking infrastructure was a key priority for the community. The development of this Bike Plan and the associated PAMP, directly address this community priority.

As part of the development of this Bike Plan and the PAMP, community feedback was collected in relation to paths across the Central Coast Council Local Government Area. Commencing in February 2018, this engagement process captured feedback from:

- 55 community members who attended information sessions
- 19 community stakeholders who attended workshops
- 925 online survey responses
- 1305 separate pins dropped on the online interactive map

In relation to bicycle access, feedback from the community centred on:

- the need for more paths
- the need to improve existing paths, including from a safety and connectivity perspective
- the need to link up existing paths to provide continuous routes and networks

- the need to provide access to key attractors such as schools, public transport and shopping centres
- separating differing cyclists and pedestrians from road traffic

Community feedback captured during the engagement process has informed the development of this Bike Plan. It has particularly helped in prioritising the facilities to fund and implement over the next 10 years, which will provide the greatest benefit to the most community members.

Bike Plan Action Plan

A number of strategic objectives were developed to help to define how the Central Coast is going to achieve its vision for Active Transport. These objectives included:

- sustainably deliver and maintain the active transport network
- provide supporting facilities
- plan for sustainable active transport in all developments and infrastructure projects
- encourage people to cycle and walk
- promote facilities
- monitor participation in active transport

Delivering the active transport network is the top priority for increasing cycling and walking on the Central Coast as without safe, connected and inclusive infrastructure, the remaining four objectives will not be able to deliver the vision on their own. The strategic objectives also formed the basis of the Action Plan, ensuring that a combination of infrastructure and non-infrastructure solutions will be implemented to increase the cycling and walking mode share on the Central Coast. Key signature projects for each of these action areas are summarised below in Table 1.

Table 1: Strategic Objectives actions areas

Strategic Objectives action areas	Signature Projects
Sustainably deliver and maintain the active transport network	Two signature projects have been identified; the Gosford to Point Clare railway shared pathway and the Magenta shared pathway
Provide supporting facilities	Develop and implement a bicycle wayfinding signage strategy
Plan for sustainable active transport in all developments and infrastructure projects	Incorporate best practice requirements for cycling and walking friendly developments into strategic planning processes
Encourage people to cycle and walk	Support bicycle skills training and bike maintenance workshops
Promote facilities	Develop and promote interactive bicycle route planning and maps
Monitor participation in active transport	Investigate automated bicycle and pedestrian counters on key cycling routes

Priorities for Expenditure

Target markets and priority areas are important to ensure the bike plan is successful. That is, the greatest increase in cycling is achieved for the amount of money invested. This has been achieved by targeting cyclist types as well as trip types.

Five priorities for investment have been developed in response to community consultation and best practice, to encourage cycling and attract cyclists based on trip type and length. The priority routes have been identified based on:

- Priority 1: Connections to activity centres
- Priority 2: Connections to public transport
- Priority 3: Connections to schools
- Priority 4: Connections between centres
- Priority 5: Recreation and tourism routes

These are the recommended priority target markets for cycling on the Central Coast. The priority areas have been used to identify Priority Routes for investment. Refer to Appendix D for the Priority Route list and mapping.

The majority of the cycling routes considered in this plan have previously been determined under the former Gosford and former Wyong Council Bike Plans. The previously planned routes and 'missing links' plus a selection of new routes identified in the course of the development of this plan have been ranked to define the construction priorities for Council.

The Priority Routes have been used to identify and rank priority projects based on a consistent route scoring methodology. Other additional works outside the priority routes have been ranked based on cost i.e. lowest cost to highest cost. The works include a combination of new facilities and improvements to existing facilities.

In alignment with the above, the Bike Plan has identified two levels of project priorities based on the Priority Route scoring methodology:

- Level 1 Priority Projects – centre to centre and between / within centre connections
- Level 2 Other Connections – other projects outside the Priority Routes

Based on the above, the Bike Plan has identified \$338.3 million of projects comprising:

- \$32.3 million for the two signature Level 1 Priority Projects – the Point Clare to Gosford Railway Shared Path and the continuation of the Magenta Shared Path
- \$147.4 million for other Level 1 Priority Projects
- \$158.6 million for Level 2 Other Connections i.e. other projects outside the Priority Routes

Priority projects and costs have been identified at a strategic level. The exact alignment and cost of the shared paths will be refined as part of the project development process which will involve further community consultation. Refer to Appendix A for a full list of the priority projects and Appendix B for the mapping.

1. Introduction

1.1. Background

Wyong Shire Council and Gosford City Council amalgamated on 12 May 2016 to form the Central Coast Council (CCC) Local Government Area (LGA). This merger brought together five existing wards: Wyong, The Entrance, Budgewoi, Gosford West and Gosford East. Figure 1 below details the wards within the amalgamated Central Coast LGA.



Source: Google Maps

Figure 1: Central Coast Council Wards and LGA Boundary

As each former Council had separate strategic plans, a new strategic plan was created for CCC. The Community Strategic Plan (CSP) represents the highest level of strategic planning for local government. The CSP aims to identify the main priorities and aspirations of the community, ultimately leading to a set of strategies to achieve the desired vision.

The community engagement processes conducted to inform the development of the CSP identified that active transport was a key strategic planning focus for the community. This was subsequently reflected in the 'Liveable' theme contained within the adopted CSP. Active transport includes the movement of pedestrians and cyclists. This Bike Plan primarily focuses on the cyclists however the infrastructure has benefits for both cyclists and pedestrians alike.

Bitzios Consulting and Zwart Transport Planning, working together with CCC, have developed a Bike Plan that aims to achieve the strategic outcomes identified in the CSP. This document details the desired improvements, or strategic direction for improvements, of cycling infrastructure to encourage greater usage of sustainable transport modes.

Preceding this Bike Plan, the former Gosford Council adopted the Gosford Bike Strategy (2014) and Wyong Shire Council On-Road Bicycle and Shared Pathway Strategy (2010). These two strategies are still relevant and have been integrated into the Central Coast Bike Plan to provide an updated Bike Plan for the new CCC LGA.

The purpose of the CCC Bike Plan is to provide a consistent strategic planning approach for planning, prioritising and building active transport infrastructure with a focus on cycling. This Bike Plan provides CCC with a long-term strategy and an action plan to implement cycling routes to provide safe, convenient and connected local and regional networks.

1.2. The aim of this Bike Plan

This Bike Plan aims to provide a safe network for cyclists of all abilities, to increase the continuity and connectivity of existing facilities, to encourage the use of active transport and to align with the community’s desires.

A bicycle is defined by Roads Maritime Services Guide – ‘How to Prepare a Bike Plan’ (2012) as ‘a vehicle with two or more wheels that is built to be propelled by human power through a belt, chain or gears’. This Bike Plan uses this definition of a bicycle.

Due to this broad definition of a bicycle, this Bike Plan, where possible, considers the use of ‘Universal Design techniques’ for the proposed bicycle connections. Universal Design aims to provide all-inclusive access that eliminates the need for adaptation and specialised design for disabled community members.

1.3. Bike Plan development methodology

This Bike Plan was assembled in accordance with the NSW Roads and Maritime Services guidelines – How to Prepare a Bike Plan (2012). The Roads and Maritime guidelines identify cycling as an important part of the transport mix and aims to increase cycling through the development of bike plans. To achieve a connected active transport network for the Central Coast, a Pedestrian Access and Mobility Plan (PAMP) has been created alongside this Bike Plan and aligns the two strategies. Figure 2 below shows the Roads and Maritime methodology for creating a bike plan.



Source: Roads and Maritime – How to Prepare a Bike Plan (2012)

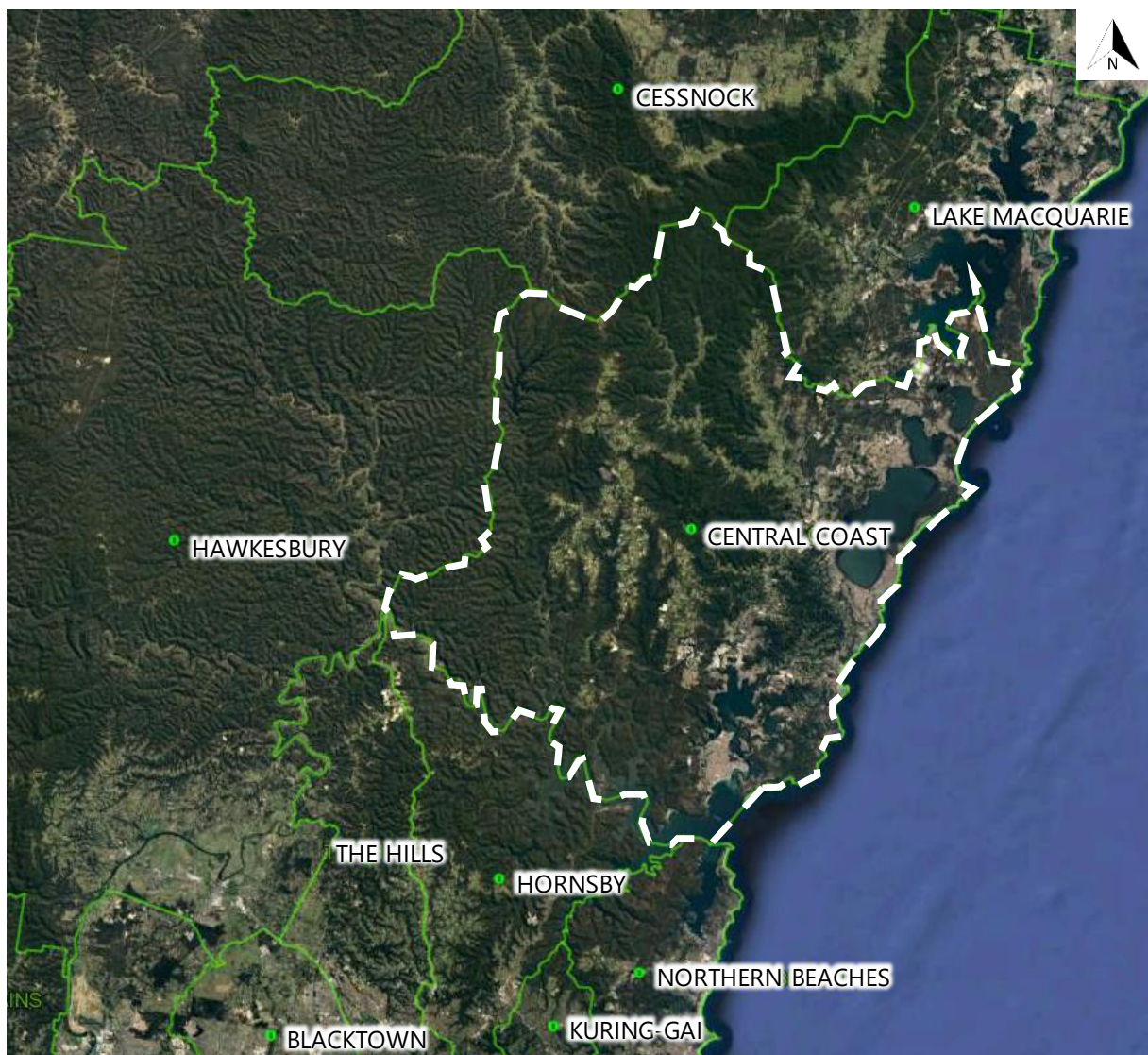
Figure 2: Bike Plan development methodology

2. Central Coast characteristics

2.1. Overview

The Central Coast LGA is located in NSW between Newcastle and Sydney, and covers approximately 1,681 square kilometres (km²). As shown below in Figure 3, the Central Coast LGA is bounded to the east by the Pacific Ocean, to the south by Hornsby and Northern Beaches LGAs, to the west by Hawkesbury LGA, and to the north by City of Lake Macquarie and Cessnock LGAs.

The Central Coast area is surrounded by a mix of urban and natural landscapes. Urban development is concentrated along the coast line between the Pacific Motorway (M1) and the Pacific Ocean.



Source: NSW Globe

Figure 3: Surrounding Local Government Area's

Approximately 60% of the Central Coast LGA is comprised of natural areas, such as national parks, state forest, bushland, open space, nature reserves and aquatic environments (i.e. beaches and waterways). The urban belt within the region is separated by green zones and a significant number of lakes and water bodies, such as Brisbane Water, Tuggerah Lake, Budgewoi Lake and Lake Munmorah.

In broad terms, people are moving from their home to a destination, from home to home on a recreation trip, or from home to public transport. The location of population density, employment density, recreational trip locations, and public transport stop locations are therefore all important 'demand drivers' when developing priority routes and when prioritising works.

2.2. Population

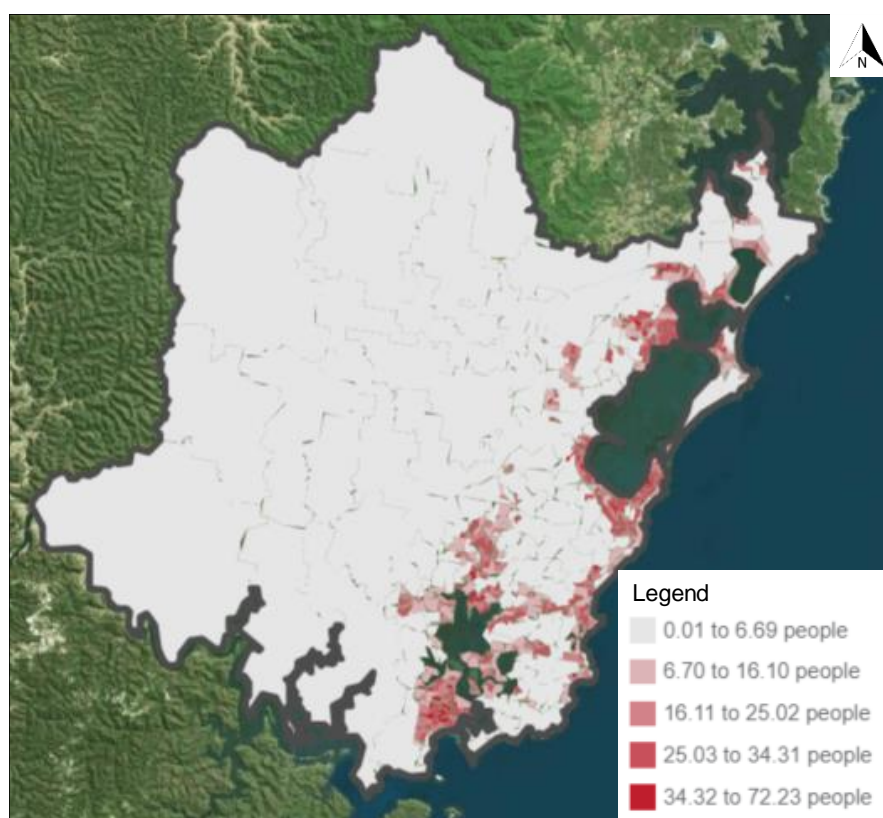
2.2.1. Overview

The Central Coast LGA has experienced steady population growth over recent years with an estimated population of 327,736 people in 2016 (ABS Census of Population and Housing, 2016). The population is dispersed across a number of centres with the most populated centres being North Gosford / Wyoming, Terrigal / North Avoca, Berkeley Vale / Chittaway Bay and Umina Beach / Woy Woy / Blackwall.

The region is characterised by low to medium density residential development and local shopping areas concentrated to the east of the M1. The area to the west of the M1 is characterised by rural land uses, national parks and state forests with a dispersed population.

2.2.2. Current demographics

The ABS defines population density as "the average number of people per hectare". Based on 2016 ABS census data, the suburbs with highest population density are Gorokan, Ettalong / Booker Bay, Blue Haven, East Gosford / Point Frederick and Watanobbi. Population density across the LGA ranges from 0.07 persons per hectare (Mountains) and 27.46 persons per hectare (Gorokan), with an average population density of 1.95 persons per hectare. Figure 4 below shows the population density across Central Coast LGA.

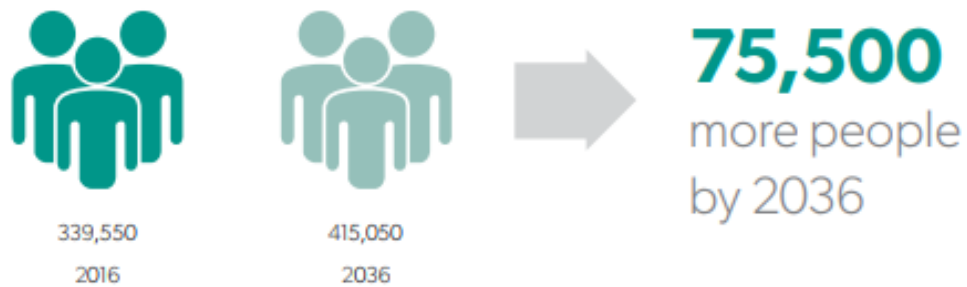


Source: Central Coast Social Atlas

Figure 4: Location and density of Central Coast population by ABS suburb

2.2.3. Potential future demographics

The population of the Central Coast is expected to grow to approximately 415,000 people by 2036, representing a rate of more than 1% (per annum compounding) over the next two decades, as shown below in Figure 5.



Source: Central Coast Regional Plan 2016 – 2036

Figure 5: Central Coast forecast population between year 2016 and year 2036

A significant proportion of the population growth is expected to occur along the north-west district belt, which is shown below in Figure 6.

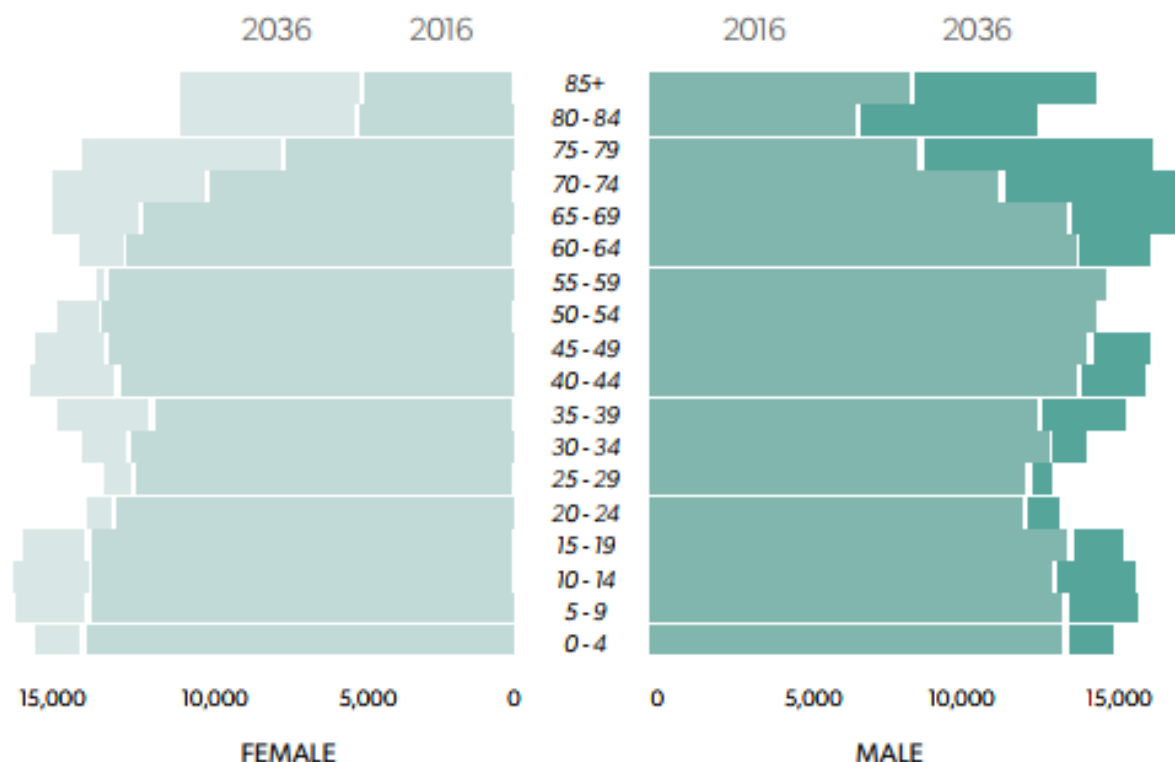


Source: Central Coast Council

Figure 6: District population projections

Between 2016 and 2036, the composition of the resident population is expected to change, with about half of this population growth being 'Seniors' (i.e. people who are 65+ years old).

Figure 7 below illustrates the forecast age distribution of the population.



Source: Central Coast Regional Plan 2016 - 2036

Figure 7: Forecast age distribution between year 2016 and year 2036

An ageing population will increase the number of retirees compared to workers, which is expected to translate into a greater proportion of recreational trips. A number of recent plans and strategies anticipate that the growing senior population will be more productive than previous generations. This may result in the senior population continuing to be engaged in the workforce in varying capacities and generally being more active.

The following key points need to be considered when planning for an ageing population:

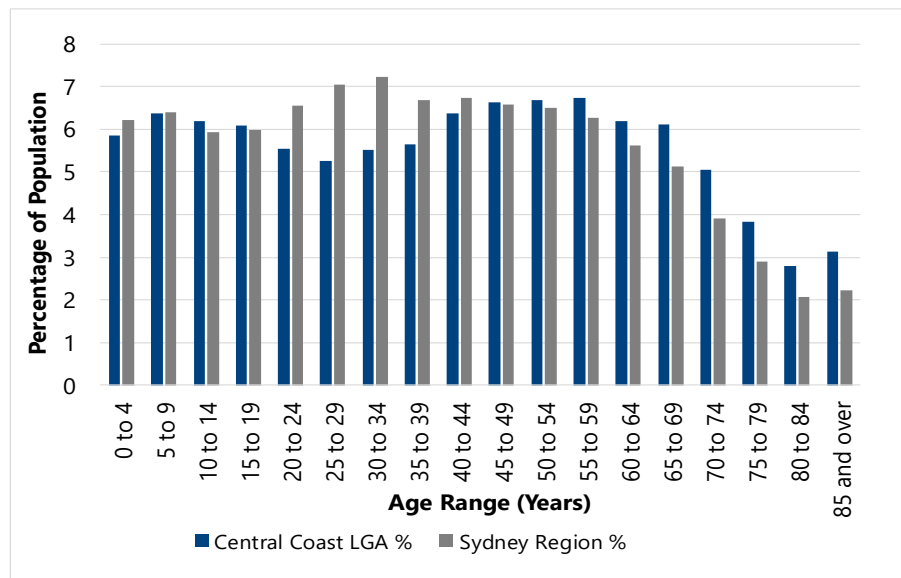
- Location: an ageing population tends to move to rural locations to escape cities
- Services: as more supported housing, health and aged care, leisure, tourism and recreation, and home services are required
- Transport mode: as there is increased pedestrian mode share for the 60+ age group, and reliance on community transport services will increase
- Reliance on public transport: these age groups typically have greater reliance on public transport (and community transport for the 65+ age group)
- Accessible facilities: as the elderly typically have reduced mobility.

Given the above, the importance of having available affordable housing in highly accessible locations will increase over the next 18 years.

The age profile for the Central Coast LGA is presented in Figure 8 p.18 with comparisons against Sydney. This comparison indicates that Central Coast has a smaller proportion of residents aged from 20–39 years and a larger proportion of residents aged 50 years and older.

The increase in elderly people living within the LGA (i.e. 60 years and older) presents increase in demand from pedestrian access and mobility perspectives. Typically, the ‘seniors’ group

require safe, accessible facilities for various reasons, including mobility impairment, decreasing fitness levels and use of mobility aids.



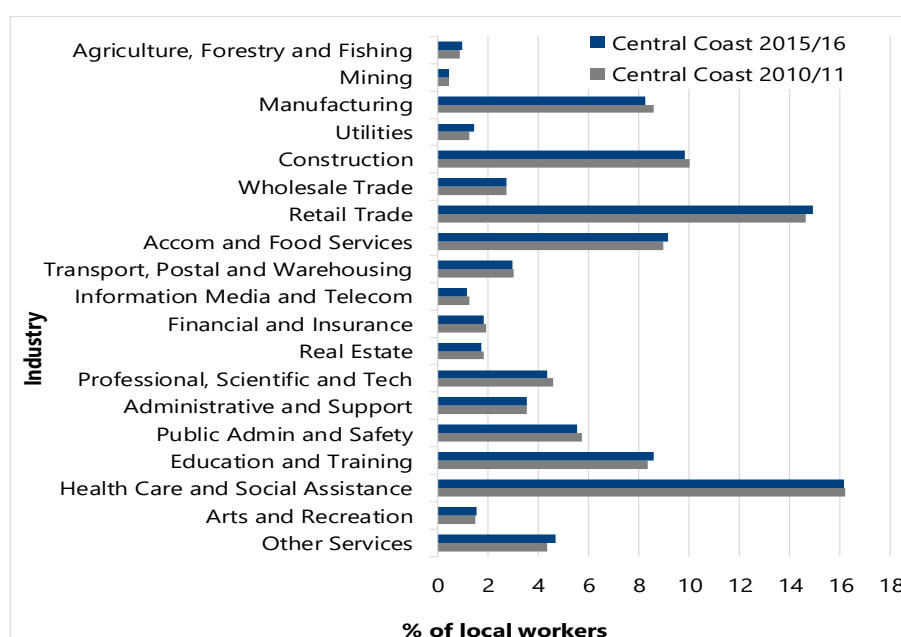
Source: Australian Bureau of Statistics

Figure 8: Age profile of Central Coast LGA compared with Sydney Region

2.3. Employment within the Central Coast

Employment within the Central Coast LGA is generally steady, with a growth rate of approximately 2% p.a. from 2011 to 2016. It is expected to experience a 22% increase in the number of jobs by 2036 (Central Coast Regional Plan 2036). This growth will be driven by increased commercial / retail development, manufacturing, construction, resource extraction and agriculture, and by reduced numbers of people commuting out of the region to work.

The six major employment sectors for residents within the LGA have not changed substantially from 2011 to 2016. As shown below in Figure 9, the Central Coast relies heavily on the health, retail, construction, manufacturing, tourism and education sectors.

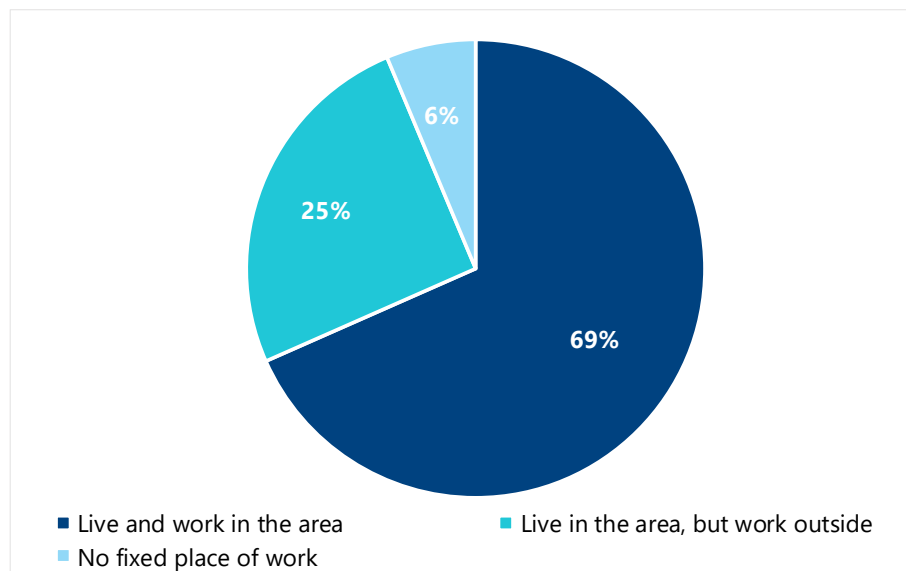


Source: Australian Bureau of Statistics

Figure 9: Types of Occupation from 2011 to 2016

2.4. Journey to Work data

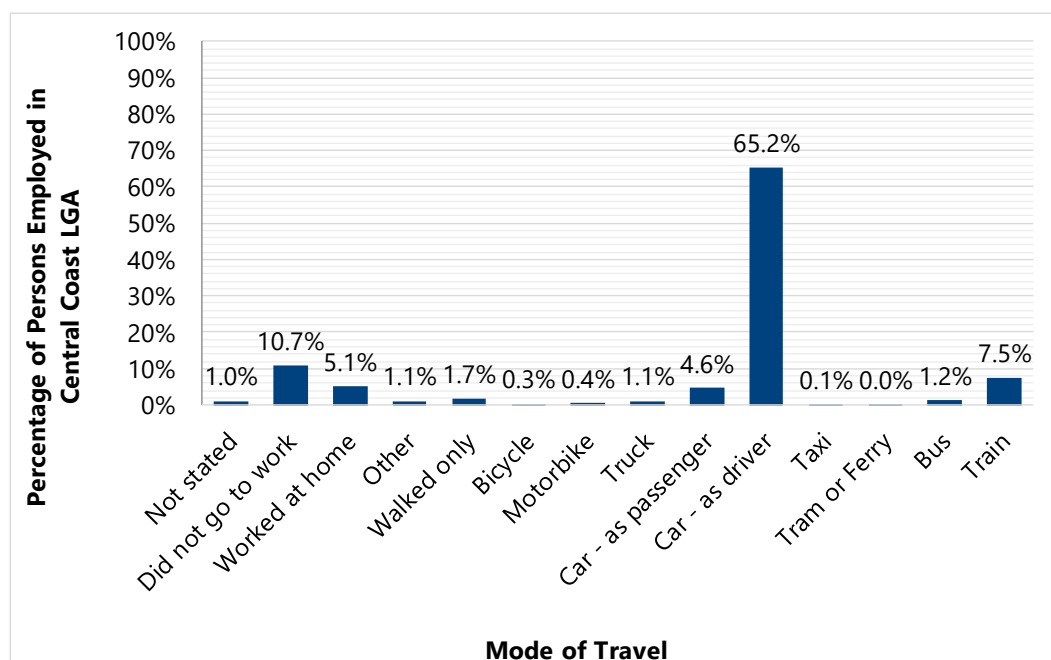
The ABS 2016 Journey to Work data provides a reasonable indication of the typical transport modal shares for the Central Coast LGA in peak periods. As shown below in Figure 10, the majority of Central Coast residents work in the Central Coast area, with a smaller proportion of people working outside the Central Coast in areas such as Sydney, Hornsby, and Lake Macquarie.



Source: Australian Bureau of Statistics

Figure 10: Employment location

The Central Coast’s main mode of transport for commuter trips (i.e. to and from work) is the private vehicle. Figure 11 below shows that approximately 70% of people travel to work via private vehicles, either as a driver or passenger and less than 1% cycle to work. Cycling as the main method of travel to work is approximately three times lower in the Central Coast LGA compared to the NSW state average.



Source: Australian Bureau of Statistics

Figure 11: Travel share mode

2.5. Cyclist categories

The Roads and Maritime Guideline defines different categories of cyclists based on rider characteristics and their preferred riding environment. In the context of the Central Coast Bike Plan, there is a focus on supporting bicycle user types who will primarily undertake trips for access purposes such as school trips, commuters and those undertaking personal business trips, however recreation and tourism related trips are also considered.

Given the increasing ageing population on the Central Coast, appropriate riding environments are important (i.e. off-road paths and facilities on low-volume roads are prioritised). These types of environments are also ideal for school aged children and less-experienced cyclists and have the greatest potential to attract new cyclists.

The cyclist user groups as defined by the Roads and Maritime Guideline are shown in Table 2.

Table 2: Types of Bicycle Riders

Category	Rider characteristics	Riding environment
Non-cyclists and potential cyclists	Do not currently ride; have potential to with effective encouragement.	Generally would begin with off-road paths, footpaths (where permitted) or very low volume residential streets.
Primary school children	Cognitive skills not developed, little knowledge of road rules, require supervision.	Similar to that of non/potential cyclists.
Secondary school children	Skill varies, developing confidence.	Generally use on-road facilities or off-road paths where available.
Recreational	Experience, age, skill vary greatly.	Desire off-road paths and quiet local streets, avoid heavily trafficked routes, more experienced will prefer to use road system for long journeys.
Commuter	Vary in age, skill and fitness, some highly skilled and able to handle a variety of traffic conditions.	Some prefer paths or low stress roads, willing to take longer to get to destination, others want quick trip regardless of traffic conditions, primarily require space to ride and smooth riding surface, speed maintenance.
Utility	Ride for specific purposes (eg shopping), short length trips, routes unpredictable.	Not on highly trafficked roads, needs include comprehensive, low stress routes, appropriate end of trip facilities.
Touring	Long distance journeys, may be heavily equipped, some travelling in groups.	Often route is similar to that of other tourists.
Sporting	Often in groups, two abreast occupying left lane, similar needs to commuters.	Travel long distances in training on arterials, may include challenging terrain in outer urban or rural areas, generally do not use off-road because of high speed and conflict with other users.

Source: NSW Roads and Maritime 'How to Develop A Bike Plan' (2012)

2.6. Key attractors and generators

Specific land-uses types are key generators of cyclist movement as defined by the Roads and Maritime Guidelines. These include:

- open space, sporting or recreational grounds
- beaches and coastal areas
- community facilities
- retail centres
- education facilities
- business and employment districts
- residential areas
- art and entertainment precincts
- public transport interchanges

The key cycling trip attractors within CCC are shown in Figure 12 to Figure 19. p.22-29

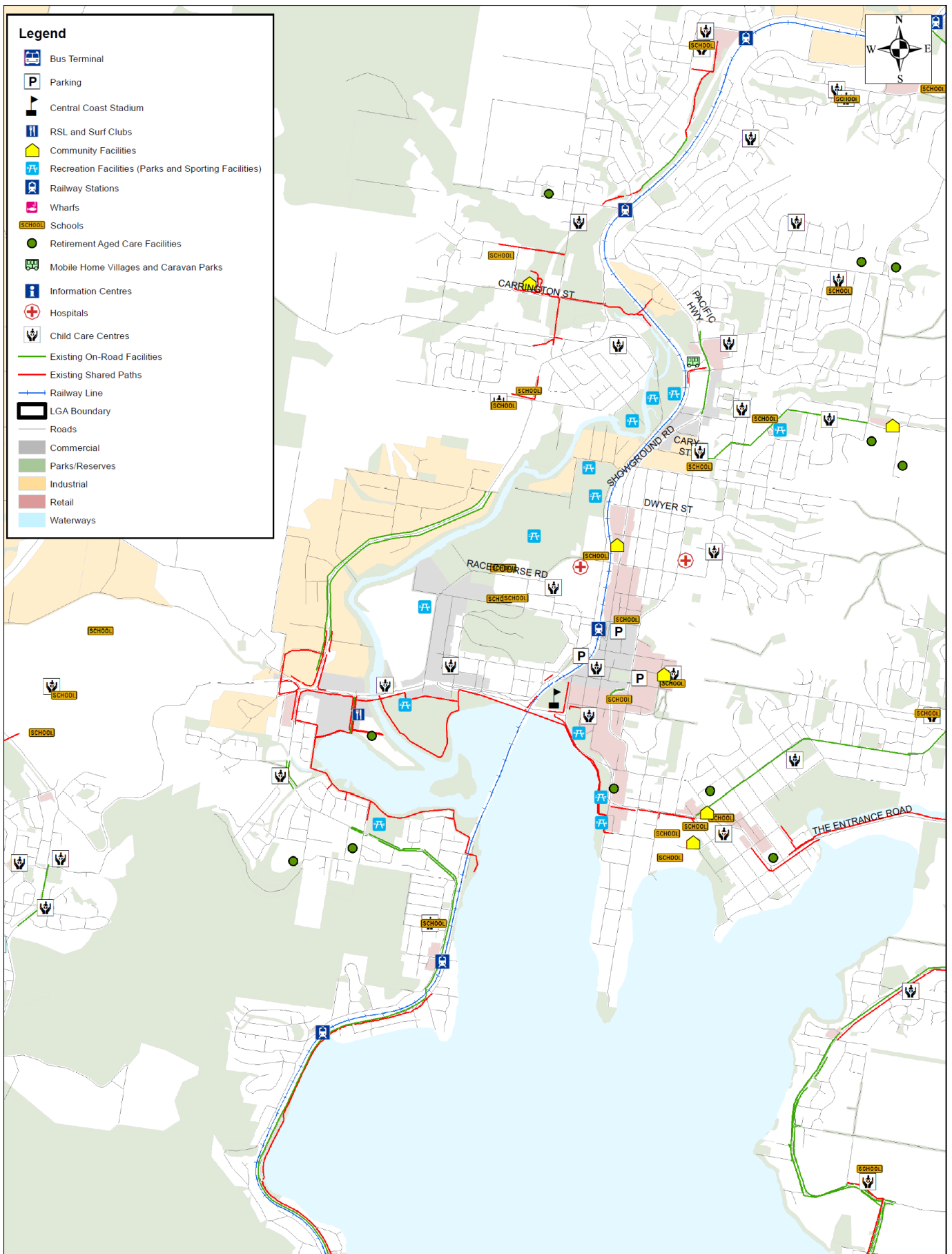


Figure 12: Gosford Attractors and Generators

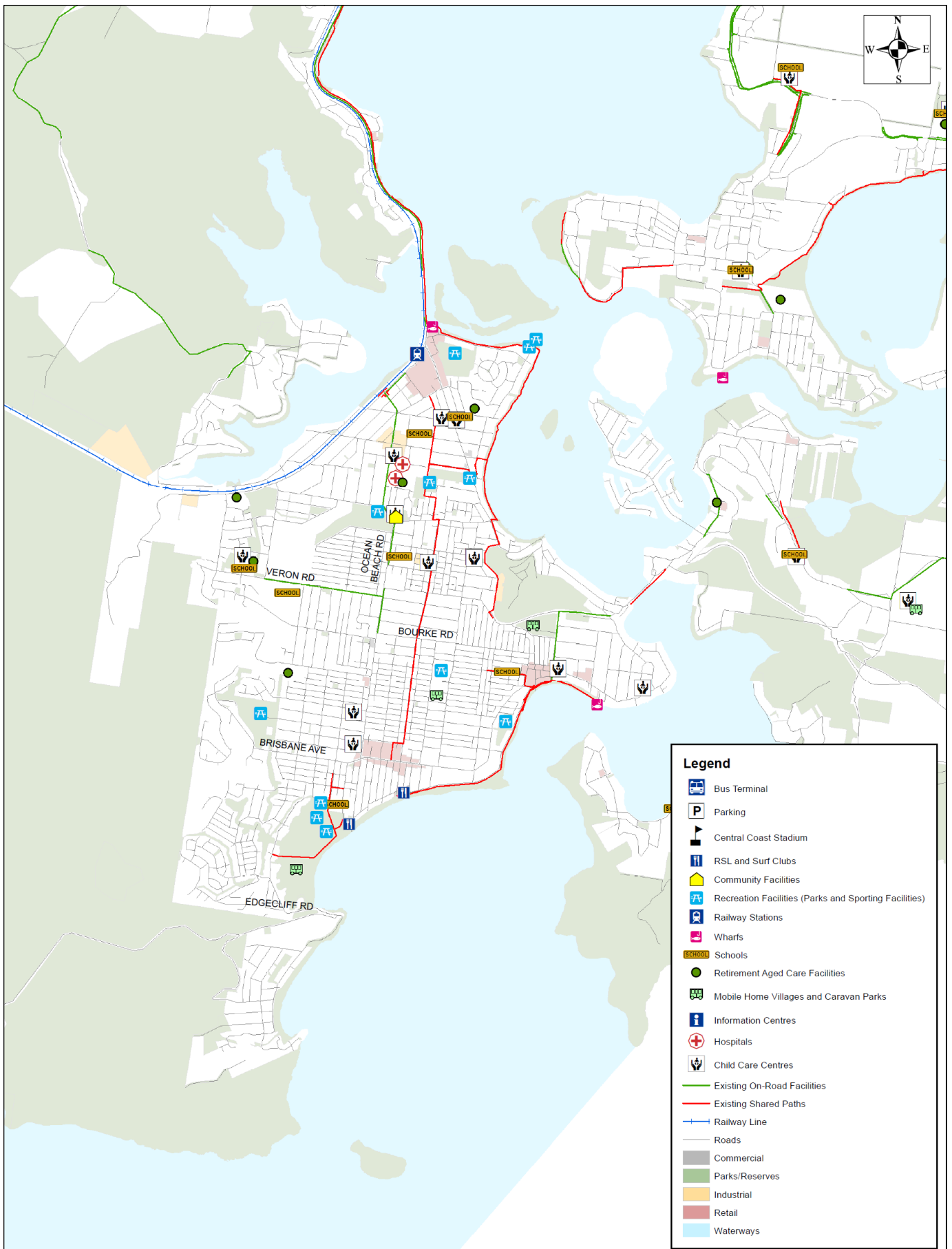


Figure 13: Woy Woy Attractors and Generators

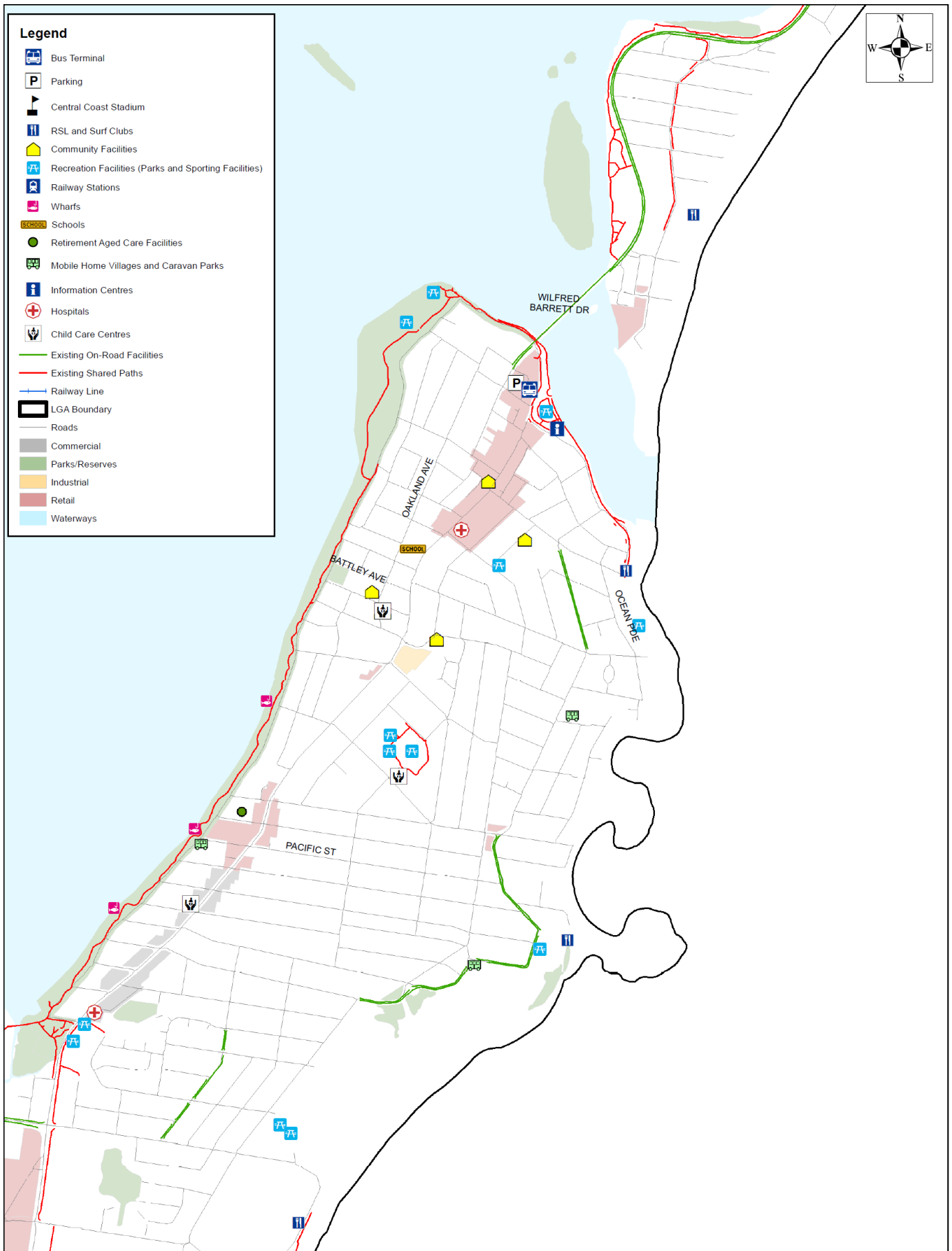


Figure 14: The Entrance Attractions and Generators

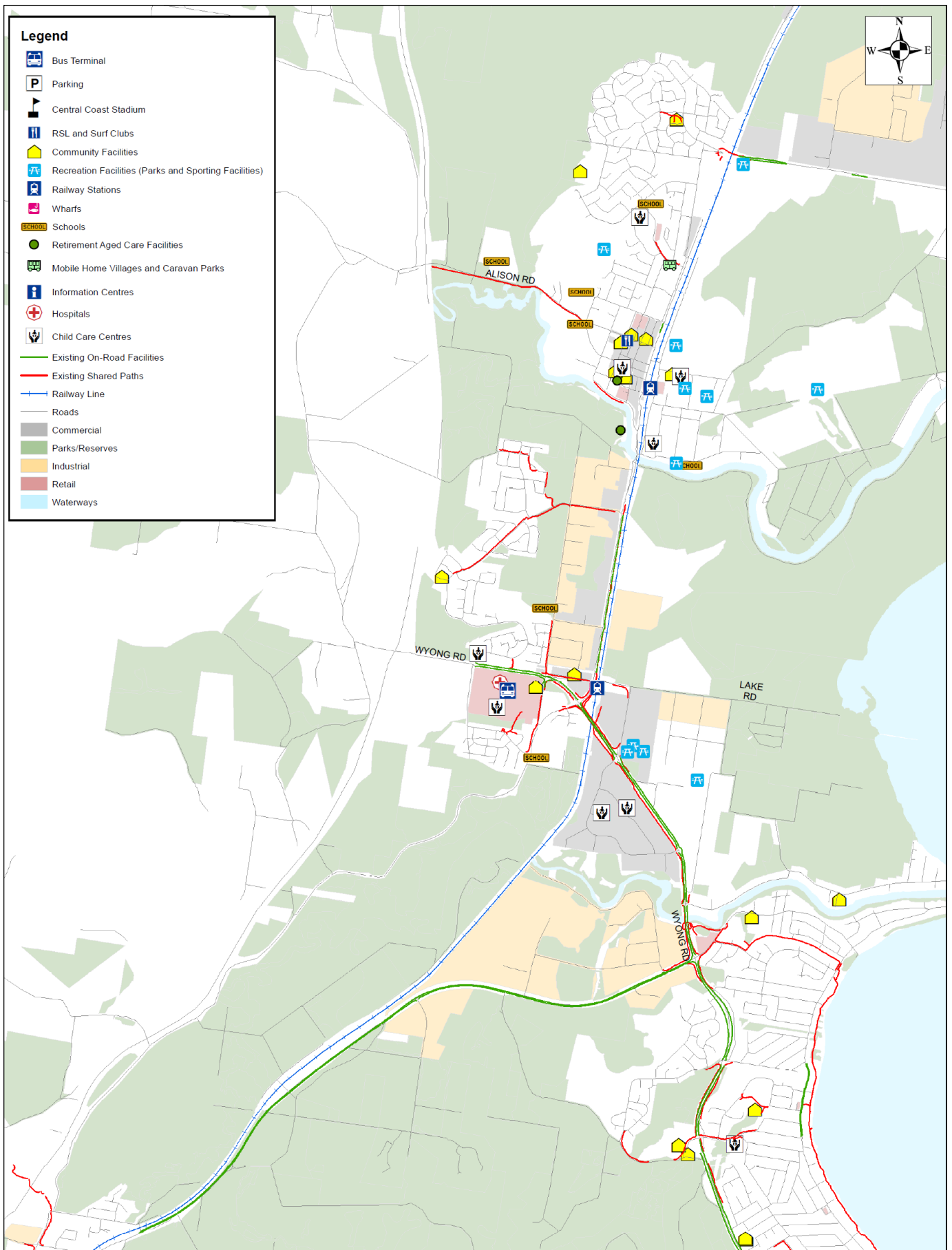


Figure 15: Wyong / Tuggerah Attractions and Generators

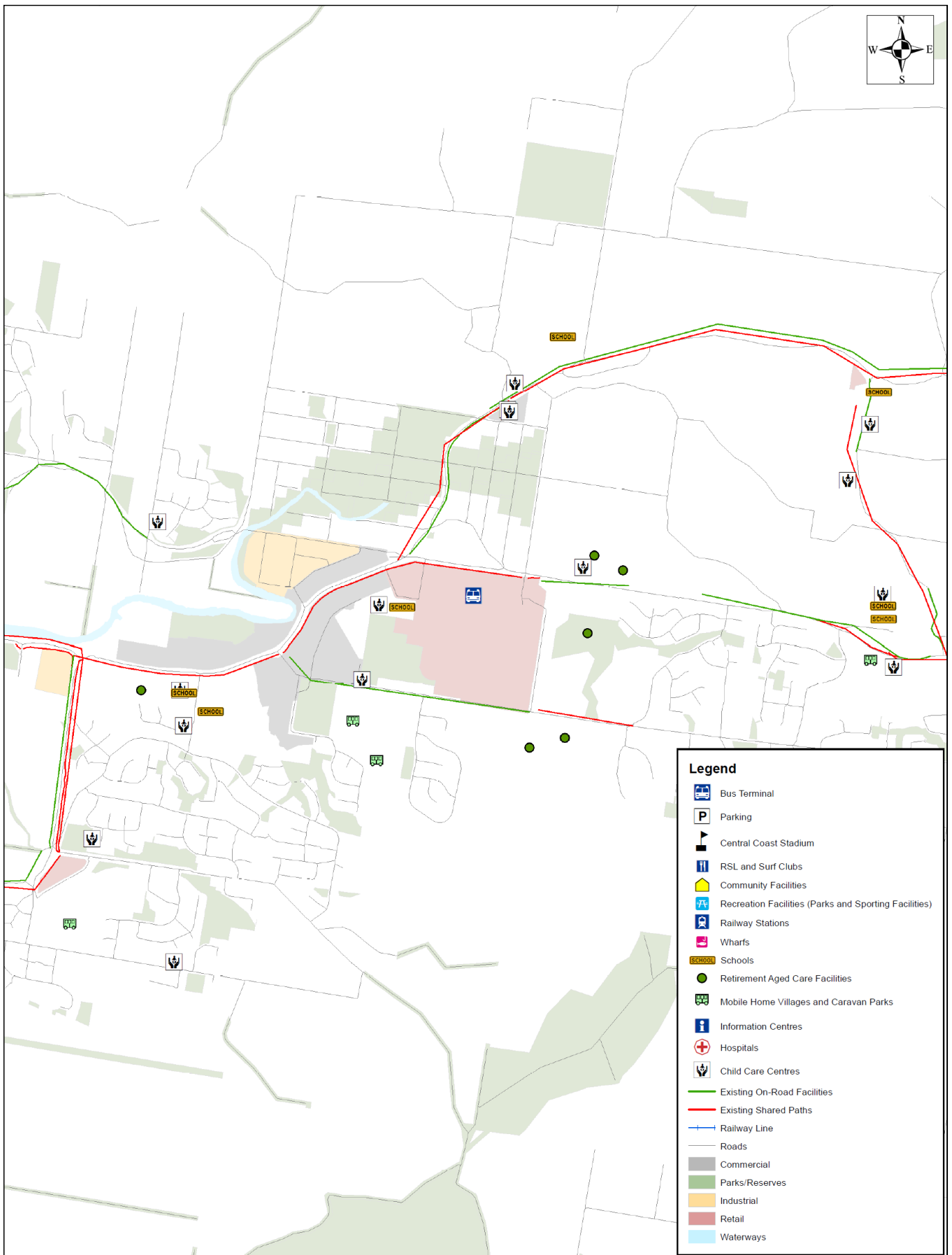


Figure 16: Erina Attractors and Generators

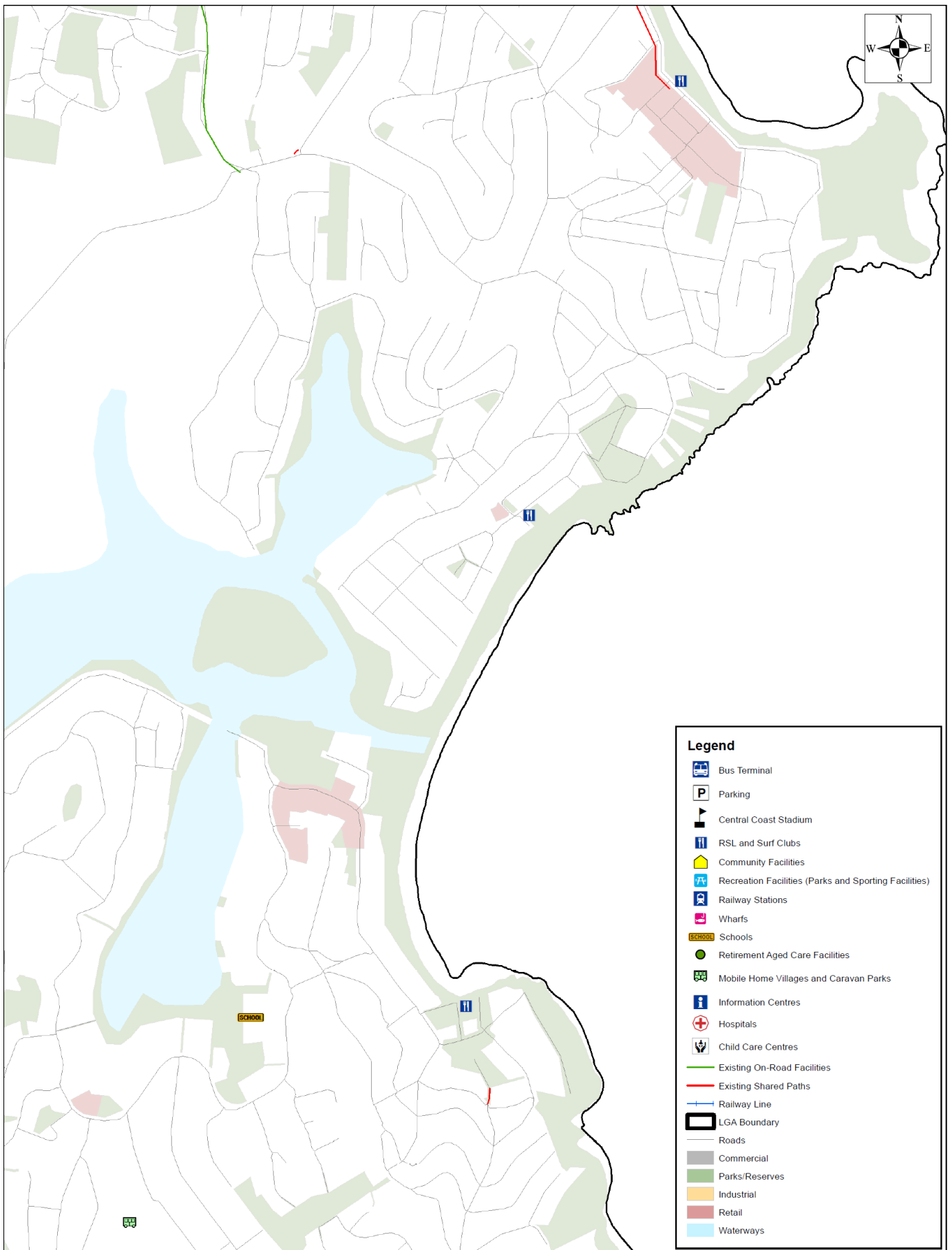


Figure 17: Avoca Beach Attractors and Generators

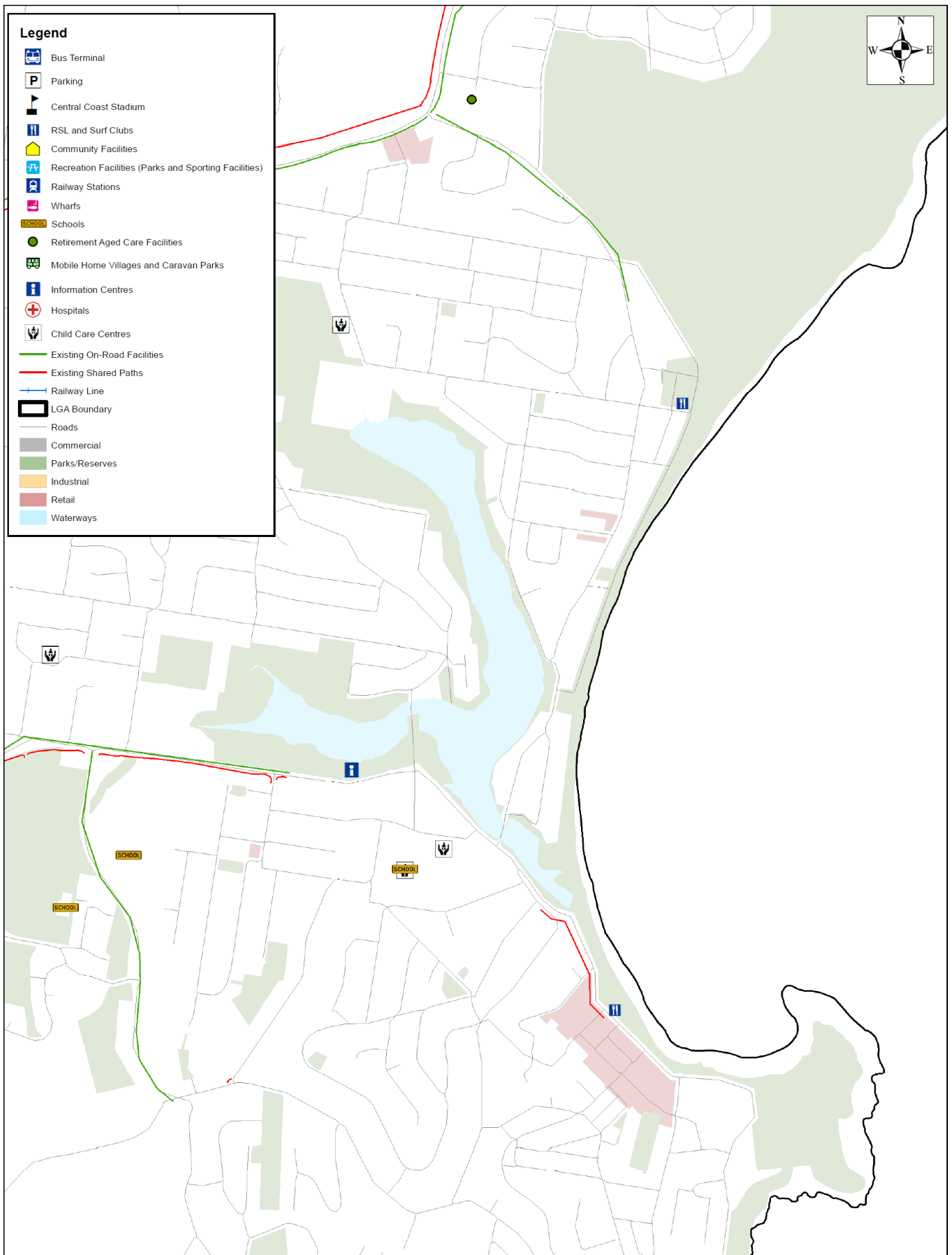


Figure 18: Terrigal Attractors and Generators

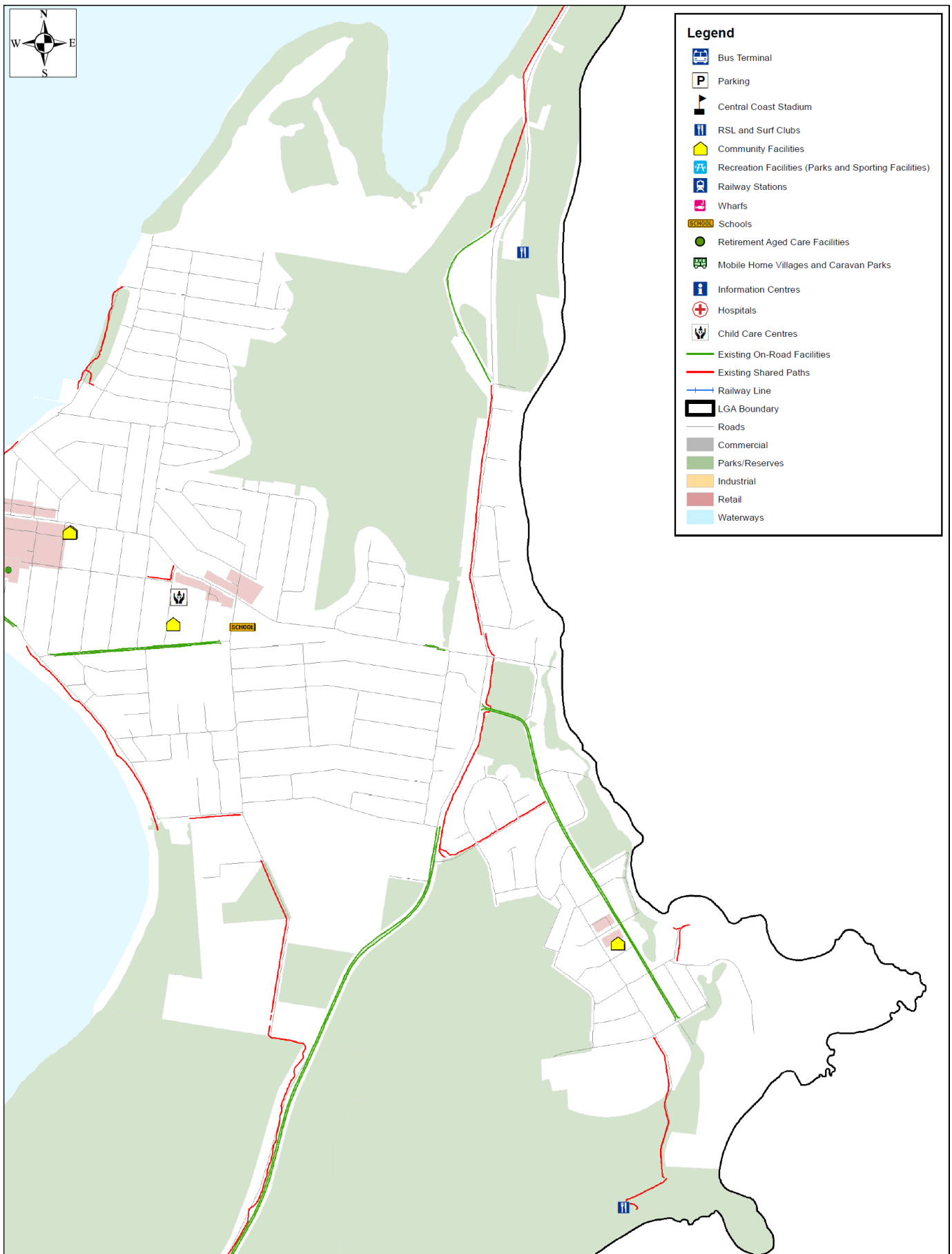


Figure 19: Norah Heads Attractors and Generators

2.7. Transport characteristics

2.7.1. Travel characteristics

As part of this Bike Plan, an online survey (delivered using Survey Monkey) was undertaken to gain an understanding of current travel characteristics. This survey was open for community comment for approximately one month from 12 February 2018 to 9 March 2018.

Consistent with the Journey to Work data, the primary mode of transport to work identified by survey participants is private vehicle. This data indicated that travel using bikes are typically either recreational trips (i.e. parks, beaches etc.) or commuter trips (i.e. from home to work). Figure 20 below summarises the results of the online survey showing primary mode of transport and trip purpose for cyclist.

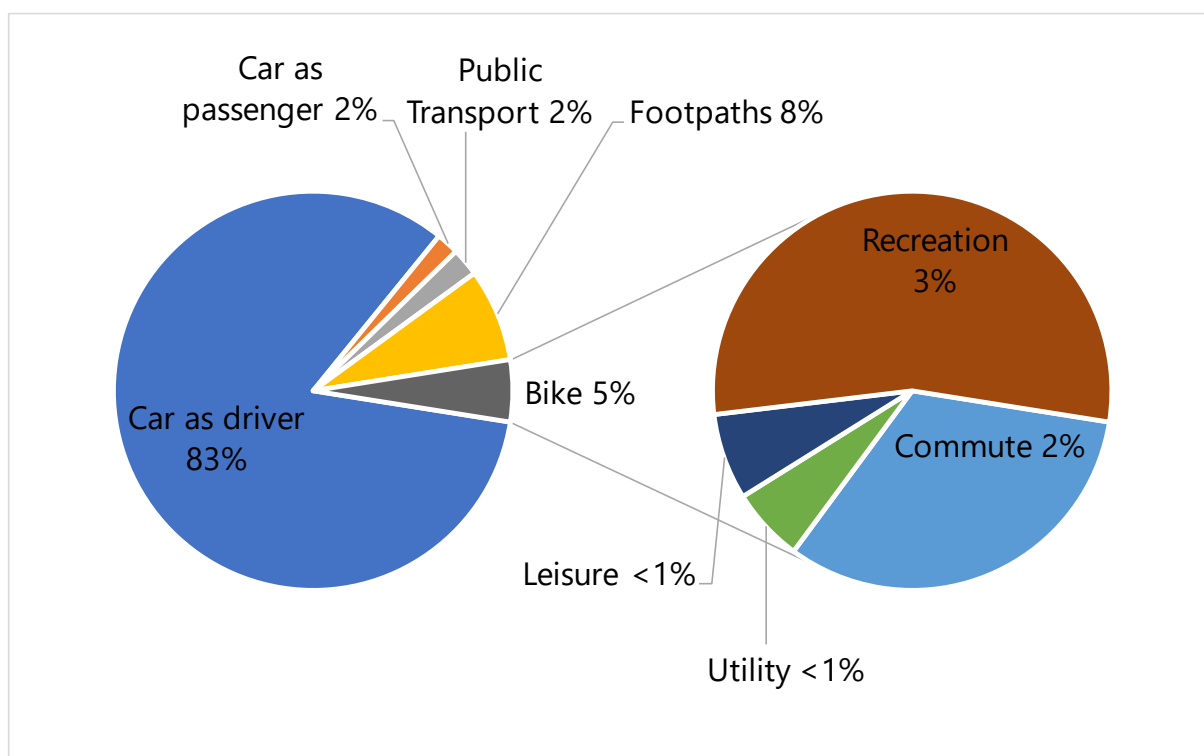


Figure 20: Weekday primary mode of transport and trip purpose for cyclists

2.7.2. Public transport

The Central Coast has an extensive public transport network with buses servicing the majority of key centres, and the rail network providing greater regional access to major destinations like Sydney and Newcastle. The rail line runs north-south through Woy Woy, Gosford, Tuggerah, Wyong and Warnervale. Typical areas of improvement for cyclists with regard to public transport use include the safe connections to public transport stations/stops and the facilities at public transport stations/stops. Public transport nodes, including major bus terminals and train stations, are shown in Figure 21 p.31.

Other public transport nodes include local ferries such as Ettalong/Wagstaffe to Palm Beach Ferry and Woy Woy to Saratoga Ferry.

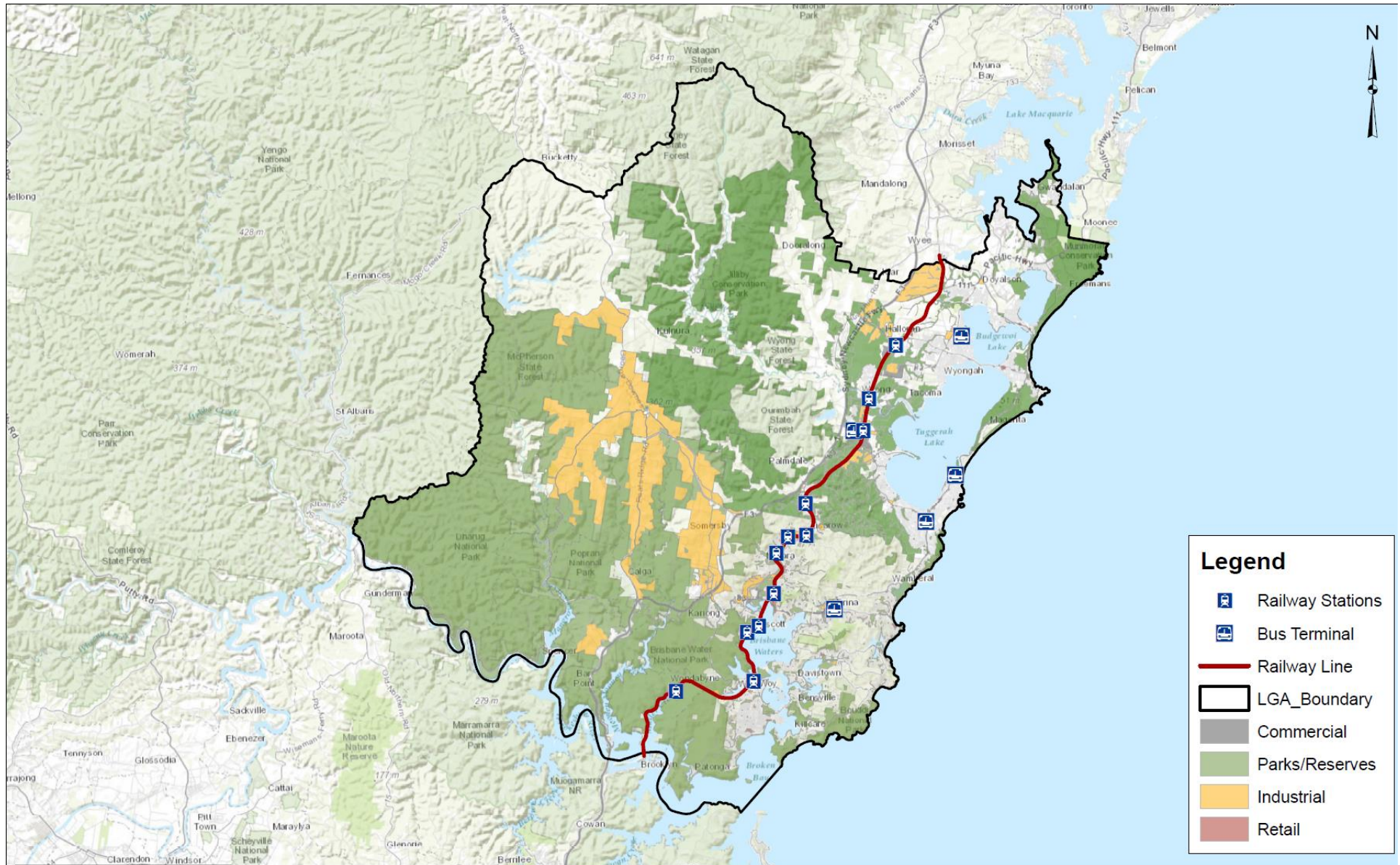


Figure 21: Central Coast Public Transport Services

2.8. Existing bike network

2.8.1. Network overview

Central Coast has an existing network of bike paths made up of on-road facilities and off-road shared paths. There are 305km of defined 'bike network' in total comprising of 105km of on-road facilities and 200km of off-road shared paths. Figure 22 p.33 shows the existing bike network for the greater Gosford area and Figure 23 p.34 shows the existing bike network for the greater Wyong area.

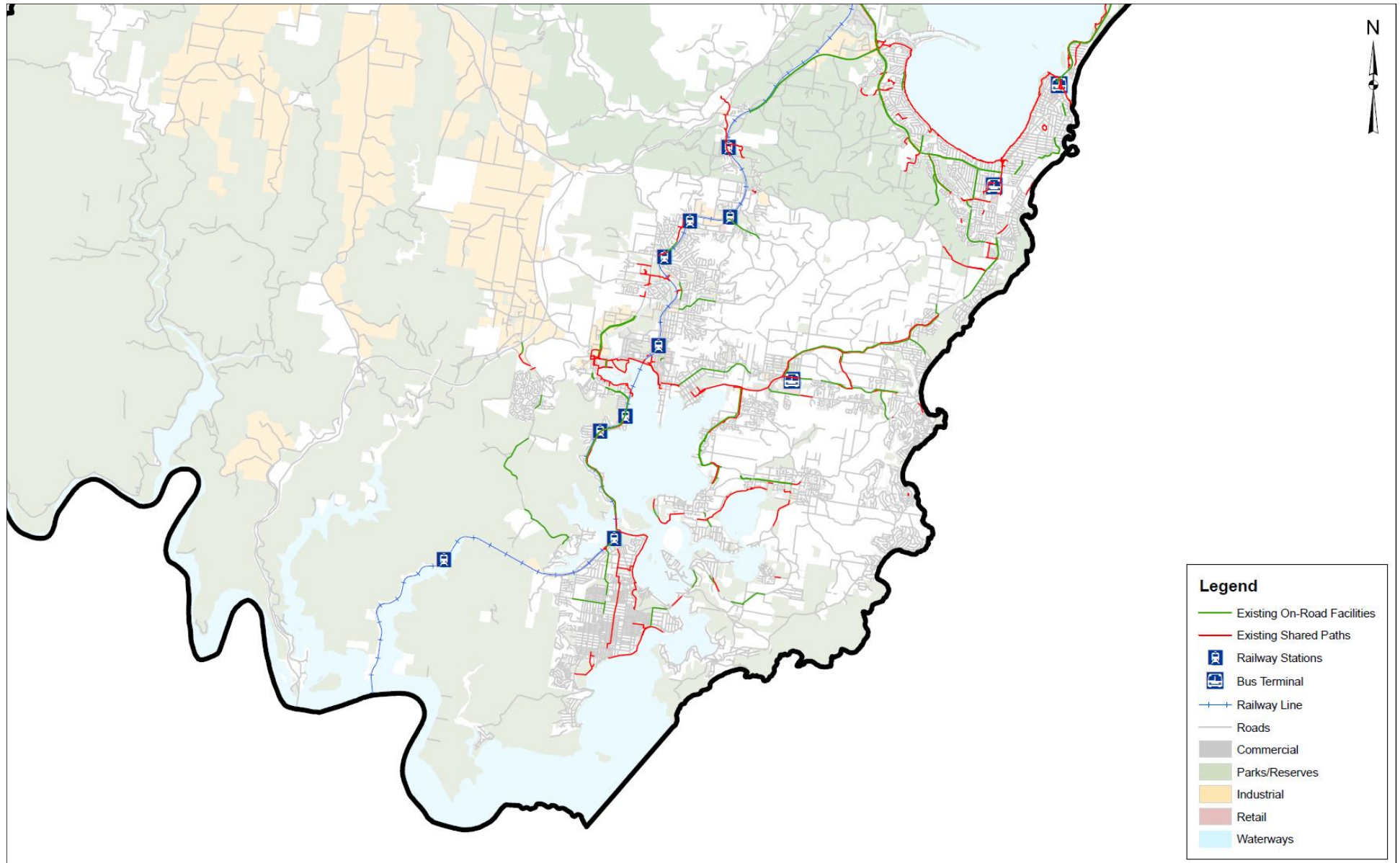


Figure 22: Greater Gosford area existing bike network

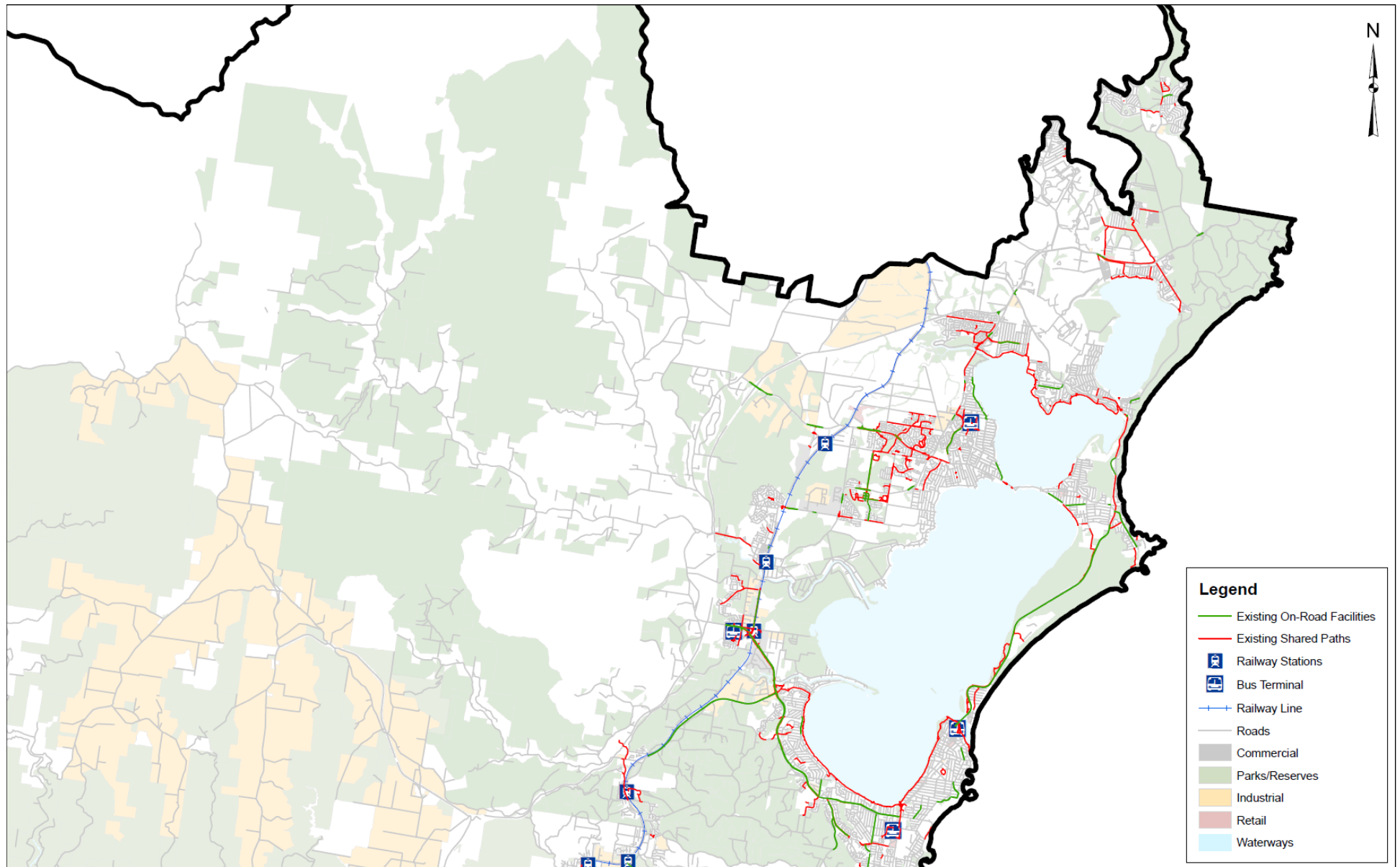


Figure 23: Greater Wyong area existing bike network

2.8.2. Bicycle route audits

Existing facility audits were undertaken on the major 'centre to centre connections' (refer Figure 49: Bike Plan Priority Route Summary p.96). Existing facility audits were undertaken to:

- identify gaps and missing links in the existing network (i.e. for 'new link' projects)
- identify issues, accessibility deficiencies or maintenance needs on existing pedestrian facilities on the major 'centre to centre connections'.

The centres of interest for this Bike Plan, as identified by CCC, are Gosford, Woy Woy, Erina, Terrigal, Avoca The Entrance, Toukley, Wyong and Tuggerah. Auditing of issues, or deficiencies, were based on criteria outlined in the Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths.



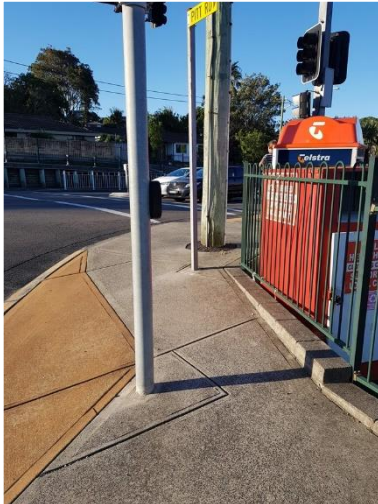
The audit considered on-road and off-road bike paths, kerb ramps, crossings, bus stops and other facilities. However, the audit was limited to high level issues that would impact on use of the paths that is, an issue with the path that would prevent access. Minor aesthetic issues like pavement cracks were not included in the audit.

A checklist was developed, based on the relevant standards, for each issue:

- Missing links:
 - path continuity
 - public transport
 - schools
 - shops
 - other.
- Maintenance issues:
 - vegetation growing over path
 - crossing condition adequate for users
 - path conditions that would inhibit accessibility
 - other.
- Obstructions to paths:
 - bollards, signs or posts
 - pinch points (narrow path, walls, etc.)
 - other.
- Crossing points:
 - signalised
 - zebra
 - refuge
 - raised
 - none.
- Other issues:
 - cars parked across paths
 - bins on path.

Some examples of issues found during the audits are shown Table 3 p.36. The full list of audit findings has been included in Appendix E.

Table 3: Example audit issues

Description	Picture
<p>Missing links:</p> <p>A shared path is located along the Wyong Road corridor. However, in some places the shared path finishes, and cyclists are either forced to travel on road, noting that Wyong Road is heavily trafficked, or dismount their bike and walk on the footpath.</p>	
<p>Maintenance issues:</p> <p>The shared path in this location includes a fence to prevent users falling down the embankment. However, the fence does not allow debris to flow down during rainfall events. This effectively reduces the width of the shared path by half as the debris are not safe to traverse.</p>	
<p>Obstructions:</p> <p>An approximately 3 metre (m) wide pathway has been maintained along the Central Coast Highway. However, in some places, during the construction other assets in the vicinity may be overlooked and thus further consideration should be given to issues such as relocation of power poles.</p>	

2.9. Cyclist crash data

2.9.1. Overview

Cyclist crash data for the Central Coast LGA was available for 2011 to 2016. Crash statistics are typically assessed over a 5-year period, so the data from 2012 to 2016 was analysed. The assessment focused on identifying any trends as well as any location clustering of crashes.

During the 5-year period there were 140 cyclist crashes recorded within the LGA. By year, the number of crashes has remained relatively stable, as shown in Figure 24 p.37

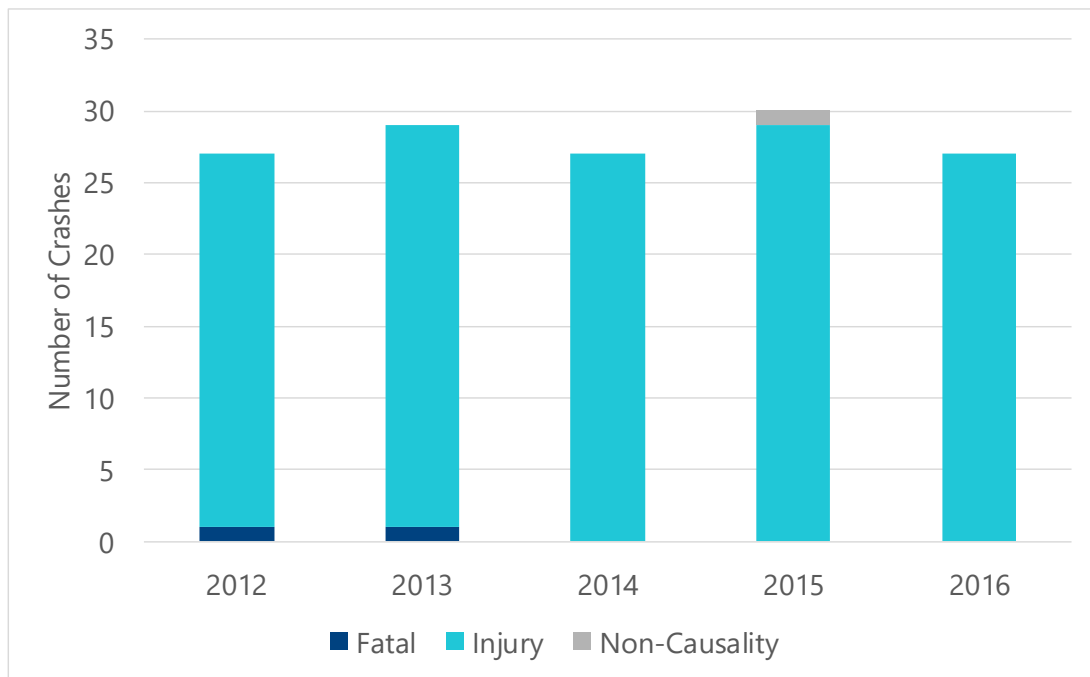


Figure 24: Total number of cyclist crashes by severity for the entire LGA

There was one fatal crash recorded in 2012 and one in 2013. The 2012 fatality occurred at The Entrance North and the 2013 fatal crash at Ourimbah. The number of injury type crashes is significant compared to other crash types. This is not unusual for cyclist crashes as they are typically vulnerable to injury if involved in a crash.

2.9.2. Crash summary by centre

The number of injury type crashes is shown clustered around the major centres within the Central Coast being Gosford, Woy Woy, The Entrance, Wyong and Toukley. The Toukley area, which includes Noraville, Norah Head and Canton Beach, is a relatively small area with the number of crashes there increasing over time, which is shown below in Figure 25.

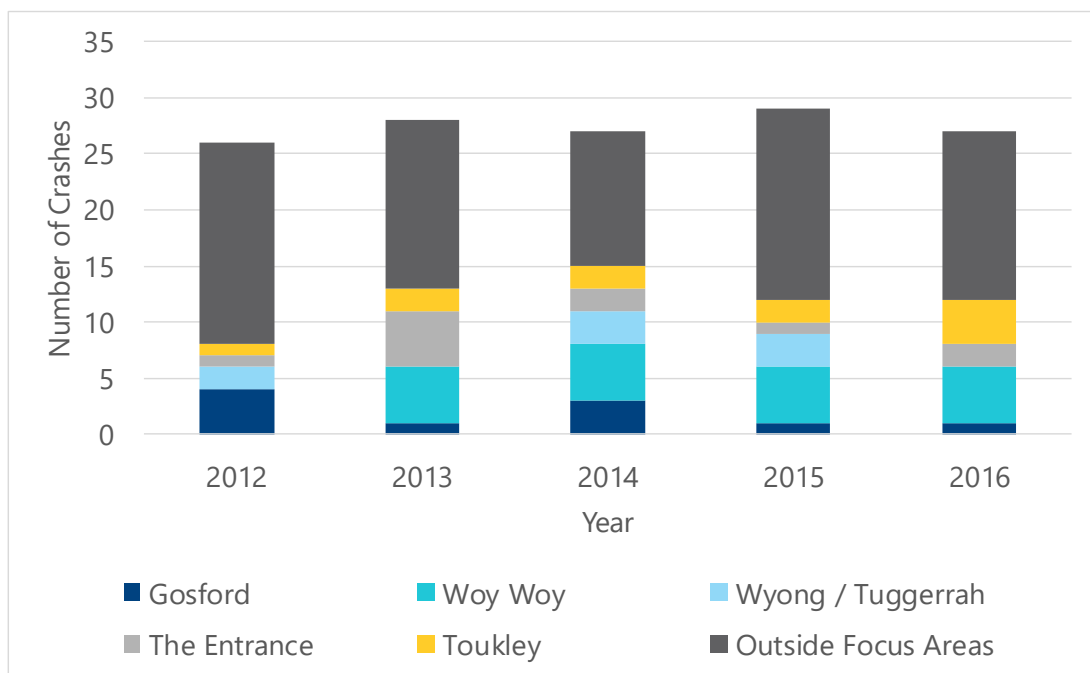
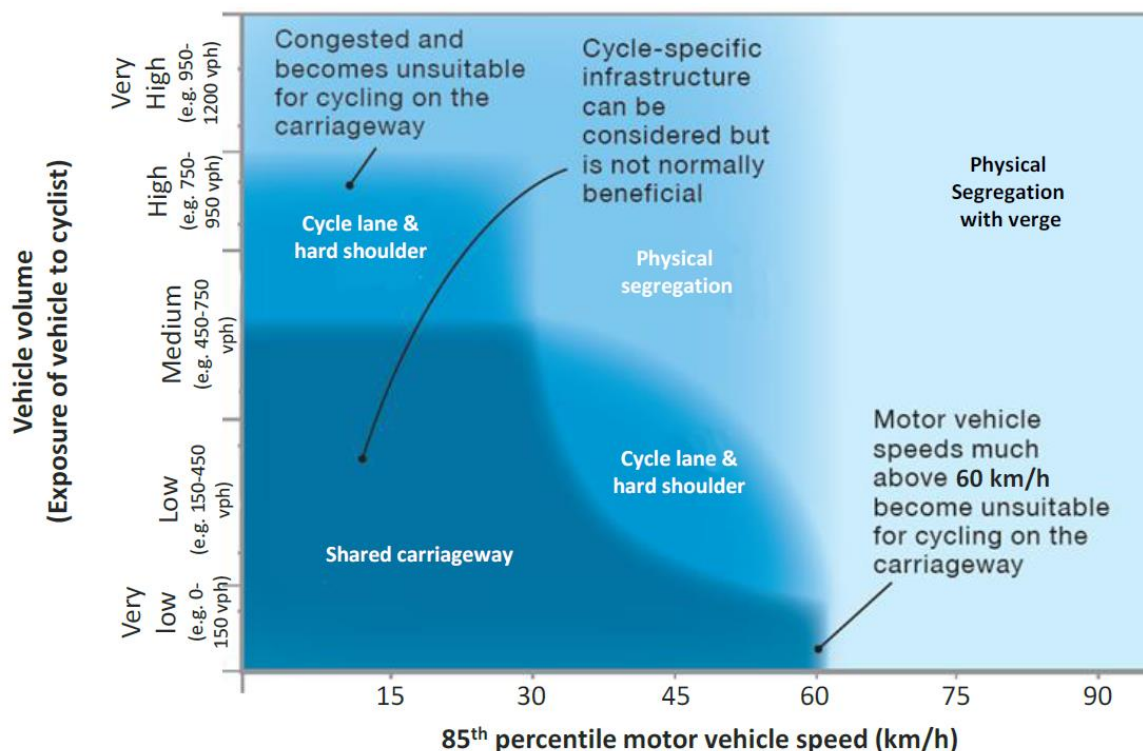


Figure 25: Total Number of Injury type Cyclist Crashes for the Entire LGA

The data identifies that the majority of injuries occurred in the Woy Woy, The Entrance and Toukley areas along main roads and at intersections. There are a number of treatments available to address crash clusters along busy roads and at intersections and the most appropriate treatment at each location would require specific investigation.

The Austroads Guide to Traffic Management Part 4: Network Management includes a chart that indicates at what stage separation between cyclists and vehicles should be implemented. This chart is shown below in Figure 26.



Source: Austroads Guide to Traffic Management Part 4: Network Management

Figure 26: Separation of cyclist and vehicular traffic based on speed and traffic volumes

The number of crashes along major roads suggests that the ongoing implementation of separation between cyclists and vehicular traffic is appropriate. The cyclist crashes for the Central Coast LGA are shown in Figure 27 p.40. The cyclist crash maps for the centres (Gosford, Woy Woy, The Entrance, Wyong and Toukley) are provided in Appendix F.

A Safe System Approach should be adopted as per the National Road Safety Strategy 2011-2020. It provides a holistic overview to developing a safe network

Key inputs to the Safe System are:

- data, research and evaluation to understand crashes and risks
- developing road rules and enforcement strategies to encourage compliance and manage non-compliance with the road rules
- managing access to the road through licensing drivers, riders and registering vehicles
- providing education and information
- being open to and seeking innovation
- developing standards for safe vehicles, roads and equipment
- good management and coordination

There are several guiding principles to this approach:

- 1.** People make mistakes. Humans will continue to make mistakes, and the transport system must accommodate these. The transport system should not result in death or serious injury as a consequence of errors on the roads.
- 2.** Human physical frailty. There are known physical limits to the amount of force our bodies can take before we are injured.
- 3.** A 'forgiving' road transport system. A Safe System ensures that the forces in collisions do not exceed the limits of human tolerance. Speeds must be managed so that humans are not exposed to impact forces beyond their physical tolerance. System designers and operators need to take into account the limits of the human body in designing and maintaining roads, vehicles and speeds.

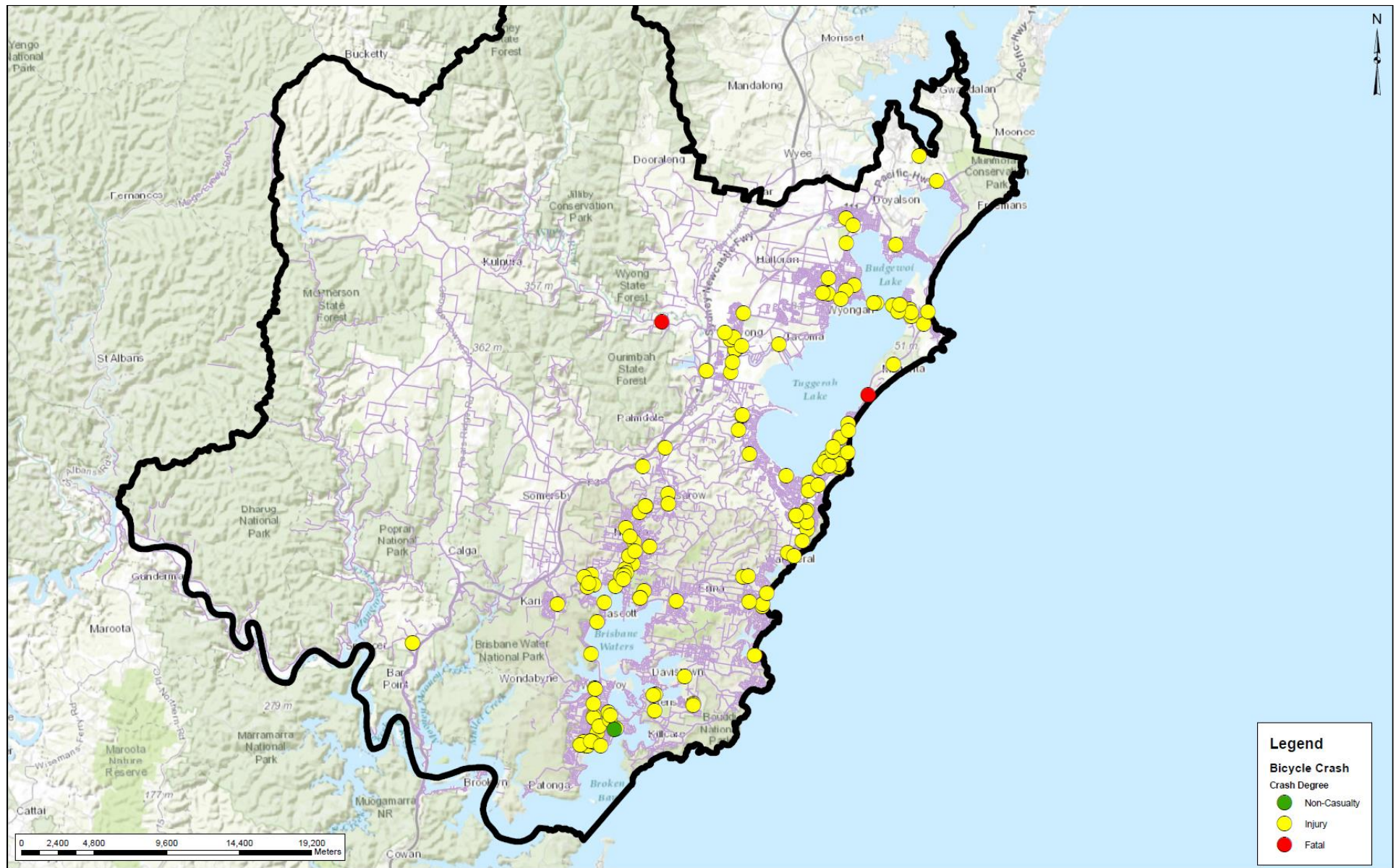


Figure 27: Central Coast LGA Cyclist Crashes

3. Research and review

3.1. State plans and strategies

The Bike Plan will be closely aligned with state, regional and local planning documents.

3.1.1. NSW Government's Long-Term Strategic Master Plan (2014)

The NSW Government's Long-Term Strategic Master Plan sets a framework for transport policy and project investment decisions for the next 20 years. The plan recognises population growth within the region, the increasing ageing population and a trend toward population concentrated urban areas. The plan also recognises the need for additional public and active transport options to complement the high demand on private vehicle use found

d in the region. Key objectives of the NSW Long-Term Strategic Master Plan include:

- improve liveability / reduce social disadvantage
- economic growth/productivity
- regional development / accessibility
- improve sustainability
- safety and security
- improve transport integration process

The Master Plan highlights that "cycling represents both a transport mode and a recreational activity. New measures relating to cycling will focus on safety (particularly around roads) and integration with public transport". Specific actions outlined in the Master Plan, relevant to this Central Coast Bike Plan study are provided in Table 4 p.42.

Table 4: Actions within NSW Long-Term Strategic Master Plan

Cycling Theme within Masterplan	Actions
Improved access to user-friendly bicycle trip information	<p>Making bike route information available on bicycleinfo.nsw.gov.au and sharing this information with third parties e.g. Google Maps.</p> <p>Incorporating bike route information on the 131 500 website.</p> <p>Incorporating bicycle routes into wayfinding information available at public transport interchanges.</p> <p>Exploring opportunities in working with local governments and bicycle user groups to establish a consistent symbology and approach to bicycle signage and maps.</p> <p>Exploring opportunities to incorporate bicycle trips in a broad individualised socialised marketing strategy.</p>
A long-term NSW Cycling Investment Program to improve the planning, management and delivery of cycleway capital programs, supported by design solutions and standards to reflect customer needs	Consulting community members who want to cycle but who are discouraged by safety and other concerns.
A program to increase and improve bike parking at public transport interchanges	<p>Investigating options to deliver bike parking through the Transport Access Program</p> <p>Minimum standards for the routine inclusion of bike racks and secure cages as part of all public transport interchange upgrades.</p> <p>Development of bike-and-ride criteria as part of the Interchange Strategy.</p>
A Connected Cycling Network that targets investment clearly defined cycleways within a five kilometre radius of major urban centres in the short term and ten kilometre larger radius of centres in the longer term	<p>Working with relevant local councils to plan and deliver priority cycling infrastructure (i.e. Nepean River Green Bridge, North Ryde to Macquarie University link, Parramatta Valley Cycleway and Prospect to Blacktown link.</p> <p>Investigation of major projects for medium-term development to feed into the busiest bicycle routes on the inner Sydney regional bicycle network.</p> <p>Enhancing and connecting cycle routes as land is released and developed in Sydney's Growth Centres.</p>
Enhanced cycling routes in regional centres to increase the number of people who cycle	Continuing to co-fund projects with local councils across NSW, to provide connected cycleway networks.

3.1.2. NSW Bike Plan

The NSW Bike Plan outlines how the NSW Government will work in partnership with local councils, communities and businesses to grow bike-riding over ten years. In relation to the Central Coast, it proposes to increase dollar-for-dollar assistance to fund local council bike plan actions, including:

- In Gosford the shared path around Brisbane Water will be completed, and the feasibility of a new connection between Point Clare and Gosford investigated along the rail line. Cycleways will be extended along the Central Coast Highway, Terrigal Drive, Avoca Drive and the Pacific Highway between Gosford and Ourimbah (refer map from Gosford Bike Strategy 2014)
- In Wyong, shared paths will be extended and connected, completing missing links such as between Tuggerah and Norah Head, and routes to the new Warnervale town centre
- Complete sections of the NSW Coastline Cycleway and market this as a premier cycle touring opportunity



Figure 4.6: NSW Bike Plan Cycling Network

Since the release of the NSW Bike Plan in 2010, various links in the State strategic network have been completed, but there are a number still to be realised.

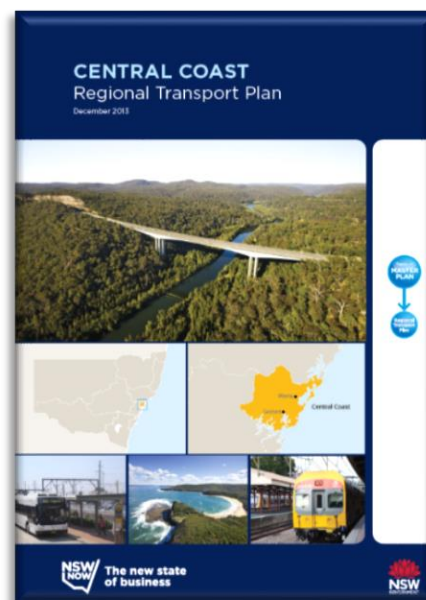
3.2. Regional plans

3.2.1. Central Coast Regional Transport Plan 2013

The Central Coast Regional Transport Plan sets the direction for Central Coast for the next 20 years. The plan was prepared with the intent of complementing key directions established in the NSW Long-Term Strategic Master Plan, which include providing better transport services, ensuring effective regulation and improving transport infrastructure. This plan outlines key themes and actions that aim to address the main transport related challenges for Central Coast, regarding issues highlighted during community consultation in 2012.

The main themes outlined within the Central Coast Regional Transport Plan include supporting travel to and from the Central Coast region, supporting travel within the Central Coast region and supporting travel in major centres and towns in the Central Coast region.

Each key theme has several actions. Those actions most relevant to the Central Coast Bike Plan relate to cycling in and between major centres and towns in the Central Coast region, and include:



- Improve Road Safety:
 - Address the safety needs of vulnerable road users through infrastructure and traffic management treatments, including lower speed limits and traffic calming measures.
- Roll out the Cycling Towns Program and the Connecting Centres Cycling Program:
 - Aims to deliver state infrastructure investments and contribute to local government initiatives to increase the amount of people that choose to walk as their mode of travel; and
 - Provision of dedicated funding to assist local councils improve walking infrastructure within two-kilometre catchments of city centres and transport interchanges.
- Improve Information about Cycling and Walking Routes and Facilities:
 - Promote the benefits of active transport, improve customer information and develop guidelines and resources for local government
 - Improve online resources (e.g. trip planning) to promote active transport
 - Sponsor events and community programs which promote active transport.
- Improve Opportunities for Cycling and Walking – City of Gosford:
 - Support the implementation of better facilities for cycling and walking; and
 - Gosford City Council has funding opportunities to seek new active transport links through funding mechanisms.
- Improve Opportunities for Cycling and Walking – Wyong Shire:
 - Support the implementation of better facilities for walking
 - Wyong Shire Council has funding opportunities to seek new active transport links through funding mechanisms.

3.2.2. Central Coast Regional Plan 2036 (2016)

The Central Coast Regional Plan aims to guide the NSW Government's land use planning priorities and decisions over the next 20 years. As the overarching framework for the region, priority actions are outlined which include detailed land use plans and infrastructure funding decisions. Active transport is identified throughout the plan as the action of achieving designated goals, this includes planning for increased road, public, pedestrian and bicycle connections along the Southern Growth Corridor.



3.2.3. Central Coast Pedestrian Access and Mobility Plan (2018)

The Central Coast Pedestrian Access and Mobility Plan aims to achieve the strategic outcomes identified in the CSP. The PAMP details the desired improvements, or strategic direction for improvements, of pedestrian infrastructure to achieve increasing use of

sustainable transport modes. This PAMP responds to issues raised by the community through a comprehensive engagement process conducted for the PAMP and Bike Plan.

The PAMP was developed according to the NSW RMS Guide 'How to Prepare a Pedestrian Access and Mobility Plan'. The community feedback captured during the engagement process informed the development of the PAMP. The aim of the PAMP was to provide a strategy that develops connected, safe and convenient active transport networks in high pedestrian demand areas throughout the Central Coast.

The focus areas of the PAMP were Gosford, Woy Woy, The Entrance and Wyong / Tuggerah. The PAMP focussed on the highest pedestrian activity areas because this is where the greatest value for investment is able to be realised, while acknowledging that investment will also be required out of these 'focus' areas over the next 10 years.

Typically, PAMPs focus on providing a schedule of prioritised new links and link upgrades on the defined PAMP priority routes. However, the PAMP also included other localised projects previously identified by Council or raised through community engagement. These were grouped into four schedules over a short, medium and long term timeframe. The funding available to implement active transport projects, particularly pedestrian paths, depends on Council budget allocations and Council's success in seeking grants from State and Federal Government programs.

3.3. Local plans

3.3.1. Gosford LEP (2014) and Wyong LEP (2013)

Both Local Environmental Plans (LEP) aim to make local environmental planning provisions and are the principle plans for guiding and encouraging responsible development. The LEP is the higher order strategic local plan in which sets direction for the Development Control Plans (DCP) however does not include any specific requirements or controls for cycling infrastructure.

3.3.2. Gosford DCP (2013) and Wyong DCP (2013)

The Development Control Plans (DCP) identifies Council's expectations and requirements for development based on the LEP. Both DCPs stipulate that developments should include bicycle parking at a geometric standard consistent with the requirement of the Australian Standards, but there is no rate or minimum requirement for the amount of bicycle parking or other cycling infrastructure to be provided.

3.3.3. Disability Inclusion Action Plan 2017 – 2021 (2017)

Ensuring all people within Central Coast have the opportunity to contribute to social, economic and environmental processes is the key driver for the Central Coast Council's Disability Inclusion Action Plan. This Action Plan aims to provide an overview of strategies and actions that will ensure people with a disability are included and accounted for within a community. The Action Plan has a time-frame of four years.

The actions within the Disability Inclusion Action Plan are categorised into four sections:

1. Attitudes and Behaviours
2. Liveable Communities
3. Employment

4. Systems and Processes.

Each section includes objectives, strategy areas and key actions. The category that is relevant to the Central Coast Bike Plan is 'Liveable Communities', which has the objective to 'continuously improve accessibility, inclusivity and liveability of the local Central Coast community'. The strategy area relevant to the Central Coast Bike Plan is 'creating and improving accessible paths of travel', with 'developing appropriate bike routes in key areas' being a key action.

3.4. Existing Bike Plans

3.4.1. Gosford Bike Strategy (2014)

The strategy is the previous Gosford City's commitment to support initiatives that encourage more people within the local government area to cycle and to promote cycling as an integral part of daily life. The Gosford City Vision for Cycling:

"To promote cycling as an integral part of daily life by building a safe, attractive and well-connected network, changing mindsets and offering a healthy, sustainable and affordable choice of travel."

The strategic objectives of the Strategy are:

- Objective 1 - Complete the cycleway network that services the town centres and railway stations at Gosford "Priority 1" and Woy Woy "Priority 2". Provision of separate cycling facilities should be aimed in the vicinity of the main trip generators.
- Objective 2 - At both Gosford and Woy Woy, develop the cycleway networks with the waterfront and railway station being major destination.
- Objective 3 - Complete the Bicycle Priority Corridors "Closure of Gaps". Priority to be given in accordance with the adopted criteria. In particular the priority corridors connecting the Regional City to Erina, Terrigal, Avoca and then along a coastal route to The Entrance.
- Objective 4 - Provide, require and encourage end-of-trip facilities at identified main trip generators, particularly major transport and employment nodes, shopping/ commercial precincts, and schools. Secure parking is argued to be a key factor influencing the decision to cycle.

The strategy outlines some particular priorities and targets:

- Increase the mode share of bicycle trips made in the local government area to 5% by 2016 consistent with the targets of the NSW State Plan 2010 and 8% by 2031
- Increase the mode share of bicycle trips as a mode of travel to work from 0.4% in 2006 to 2.0% by 2016 and 5% by 2031
- Increase the proportion of bicycle trips made to train stations: to 5% for Gosford and 8% for Woy Woy by 2031
- Increase the proportion of parking - generally 3-5% bicycle parking provision rates for a range of land use types in new developments



- Achieve good levels of safety, confidence and comfort for cyclists that ride in the city
- Promote the city as a destination for low-impact bicycle tourism.

There are six elements that form the Action Plan:

- Element 1 – Network Development and Maintenance
- Element 2 – Safety
- Element 3 – Promotion/Education
- Element 4 – Planning
- Element 5 – Integration with Public Transport
- Element 6 – Funding

The Strategy also develops network plan priorities including integration with public transport and access to town centres, proximity to main trip generators, and implementing strategic cycleway links. A preliminary list of proposed works was also included.

3.4.2. Wyong Shire Council On-Road Bicycle and Shared Pathway Strategy (2010)

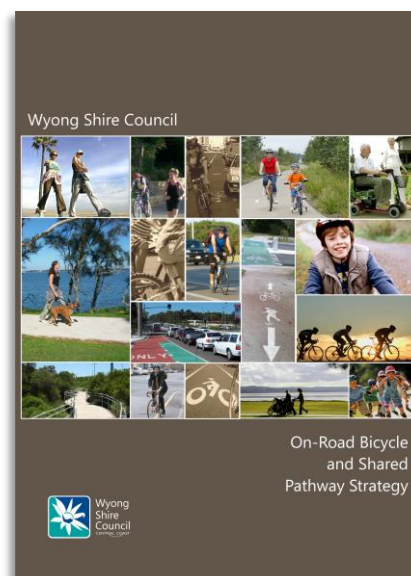
The strategy demonstrates the previous Council's desire to support healthy living and sustainable transport for all members of the community. The strategy focus is on improving the health, the environment, quality of life and wellbeing of residents and visitors to the Shire through providing connections to key destinations and initiatives which encourage and support cycling and walking activity.

The vision for cycling and walking within the Shire is:

- Wyong will be recognised as a bicycle and pedestrian friendly Shire
- The Shire will be connected by a quality formed bicycle and shared pathway network, which provides for safe, convenient and enjoyable experiences
- The community will recognise the important role cycling and walking can make to improving the quality of life, through promoting healthy lifestyles, social engagement, reduced traffic congestion and improved environmental sustainability.

The strategic objectives of the Strategy are to:

- Connect the Shire's towns and villages with a high quality and formed on-road bicycle and off-road shared pathways network
- Provide an environment in which people feel confident and safe to cycle and walk
- Provide a culture within the Shire where formed on-road bicycle and shared pathways are included as an equal consideration in the planning and design of all form of development
- Provide access for cyclists and pedestrians to high quality supporting infrastructure, such as end of trip facilities to support cycling and walking becoming a part of everyday life
- Encourage the community's use of the on-road bicycle and shared pathway network.



There are five key areas in the Action Plan:

- 1 Planning
- 2 Administrative
- 3 Maintenance
- 4 Design & Engineering
- 5 Education and Partnerships.

There are three reports documenting the strategy including a background report, strategy document and action plan. A list of 'Proposed priority shared pathway projects' and 'Proposed priority roads for bicycle lane improvements' are included in the Action Plan. Specific targets (such as mode share targets) were not developed as part of the strategy.

4. Community and stakeholder consultation

4.1. Previous engagement process

Community engagement processes were implemented as part of the development of the CSP and the Disability Inclusion Action Plan (DIAP). During these engagement processes, community members made a number of specific comments in relation to infrastructure. Specific comments shared by the community, which have been considered further in the Bike plan, related to:

- a shared path from McMasters Road to Blackwall Point boat ramp
- building a path between Ettalong and Umina
- uneven paths, missing links, the need for resting facilities and more maintenance of existing facilities were other key issues raised in the DIAP.

It is noted that a number of other concerns were raised and these have been considered within the PAMP.

4.2. Engagement process

Community and stakeholder engagement was undertaken by CCC and Leisa Prowse Consulting between 12 February 2018 and 9 March 2018. The aim of this engagement was to capture community input to help identify common issues and themes in each part of the LGA, and to inform criteria for prioritising future facilities when developing the implementation program. More broadly, the results of this engagement process informed the development of all aspects of this Bike Plan.

The community was engaged through multiple methods, including:

- dedicated Our Coast, Our Pathways page on Council's Your Voice, Our Coast online engagement platform
- online survey available through the Our Coast, Our Pathways page
- interactive map available through the Our Coast, Our Pathways page
- media release and social media posts on Twitter, Facebook and Instagram to promote the online tools and drop-in information sessions
- advertisement in the Central Coast Express Advocate to promote the online tools and drop-in information sessions
- articles in Coast Connect and Coast Matters to promote the online tools and drop-in information sessions
- radio community service announcements on Star FM and 2GO / Sea FM to promote the online tools and drop-in information session
- answers to Frequently Asked Questions posted on the Our Coast, Our Pathways page
- emails and contact from Council staff with high needs pedestrian accessibility groups, and state and private school networks
- two community drop-in information sessions
- two workshops with representatives of community groups with an interest in pedestrian accessibility, cycling and active transport.

The entire engagement process was advertised and promoted in various ways. Council issued a media release, placed advertisements and made social media posts to ensure the

community were aware of the engagement opportunities. Overall, the engagement was extremely successful with all activities receiving a large number of participants; such as:

- 55 community members attended information sessions
- 19 community stakeholders attended the workshops
- 925 online survey responses were received
- 1305 separate pins were dropped on the interactive map.

4.3. Community workshops

The two interest group workshops held on Friday 23rd February 2018 were attended by 19 community stakeholders. These stakeholders included various active transport groups and community groups from the Gosford and Wyong areas. Key themes that arose during both workshops included:

- ensuring continuity of paths by completing 'missing links', ensuring that accessible paths follow one side of the road (limiting the need to cross roads), and providing directional signage
- connectivity to key attractors such as schools, public transport and shopping centres
- separating different user groups (i.e. pedestrians and cyclists)
- providing more facilities along pathways including water fountains, toilets, and car parking at key locations

The top three objectives for the Bike Plan prioritised by workshop participants were:

- connectivity
- safety
- completing missing links

In relation to prioritising projects, workshop participants generated the following top four criteria:

- separation from road traffic (i.e. more footpaths in more places)
- safety (i.e. separated paths and better crossing facilities)
- accessibility (i.e. embed mobility impaired user needs in every aspect of the PAMP)
- continuity of routes

4.4. Online survey

The online survey captured respondent demographic information, travel behaviour, transport preferences and trip length, use of existing active transport facilities, and current challenges or limitations with facilities. A total of 925 questionnaires were completed, with 69% of participants being residents, and 28% indicating they both live and work in the Central Coast area.

Analysis of online survey responses identified common themes and issues. These included the lack of pathways, safety concerns, and the need for improvement of existing footpaths.

The accessibility and user-friendliness of the online survey ensured that a wide range of community members responded. As such, this survey captured a large proportion of the data needed to identify current infrastructure issues and potential links.

4.5. Interactive map

The interactive map allowed participants to drop a pin and leave detailed, location-specific comments, which identified the missing links, the location of 'safety hotspots', and opportunities for improvement. This information helped illustrate areas of concern and, when considered across the entire community, the highest priority areas and potential routes for the development of the Bike Plan.

A total of 1,305 pins were dropped on the interactive map. Figure 28 p.52 shows where the pins were dropped on the map, and illustrates that most community issues were nominated in the areas where most activity occurs. The locations commented on most frequently were:

- Gosford
- Woy Woy
- Wyong
- Terrigal
- Avoca Beach
- Kincumber
- Bensville
- Empire Bay
- Tuggerawong
- Mannering Park

The type of pins dropped were separated into four categories relating to accessibility, footpaths, on-road cycleways, and shared paths. The location of pins related to each category is shown in Figure 29 p.53. Approximately 22% of participants requested new or extended footpaths, 58% requested shared paths, 14% requested new or extended on-road cycleways and 6% requested additional or improved accessibility. The three most common key words used on the interactive map related to:

- 'shared path', which was mentioned 1,113 times
- 'safety', which was mentioned 768 times
- 'children/school', which was mentioned 652 times

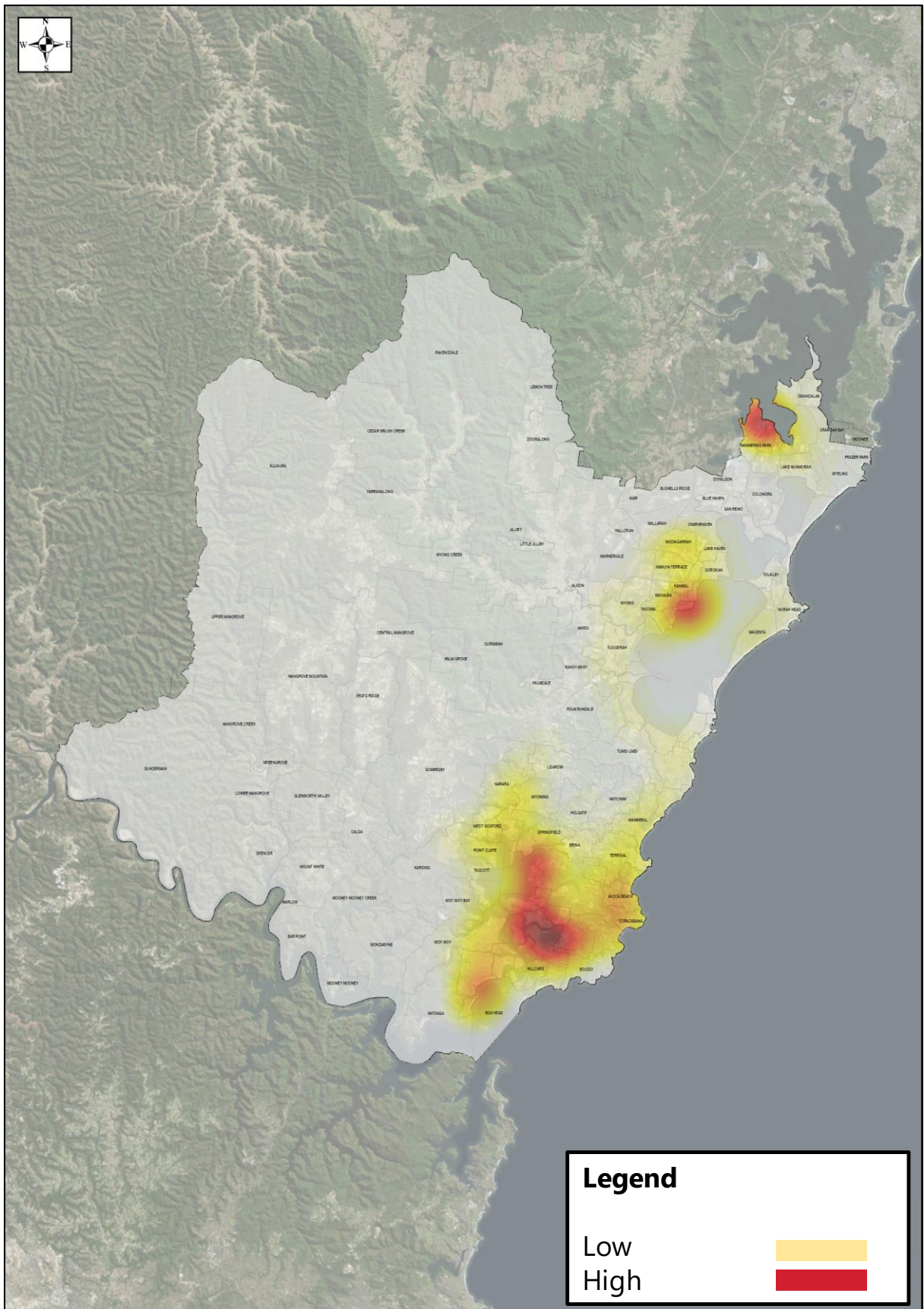


Figure 28: Heat map of Social Pinpoint

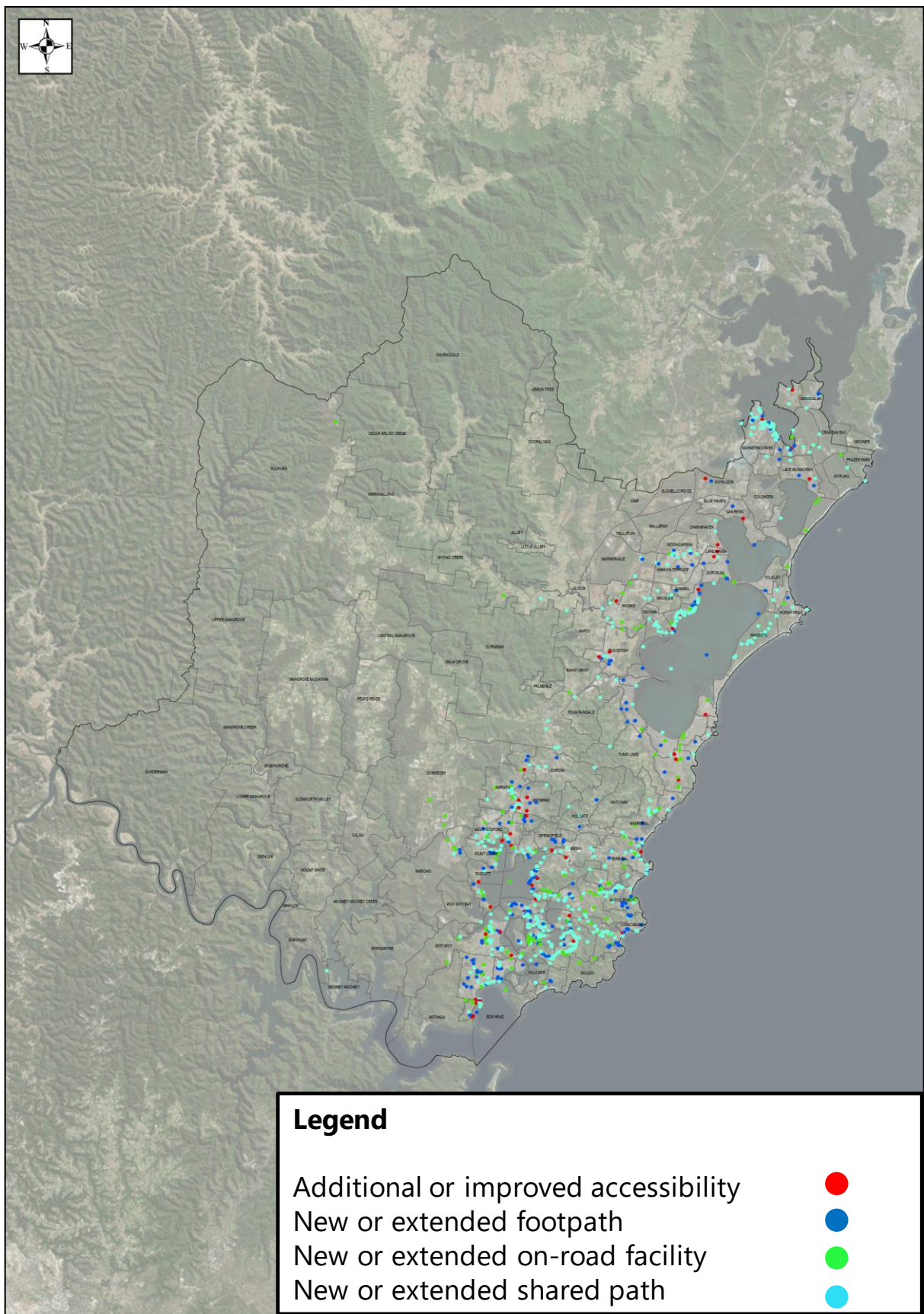


Figure 29: Social Pinpoint type of pins dropped

The pin locations and comments demonstrated the main priorities of the broader community. In relation to the criteria to be used to program pedestrian footpath projects, the following four criteria were mentioned most frequently by community members:

- separation from road traffic
- safety
- accessibility
- continuity of routes

'Separation from road traffic' and 'safety' are similar, as increasing separation from road traffic increases safety. Other important factors identified by community members, which relate to safety, included design detail. 'Accessibility' and 'continuity of routes' are also similar, as improving the continuity of routes (or filling in gaps in the network) increases accessibility for all users. Other important factors for accessibility, similar to safety, related to design detail. Figure 30 below shows the word cloud produced as a result of the community engagement comments.



Figure 30: Word cloud demonstrating common themes from the 'Our Coast, Our Pathways' interactive mapping tool

Throughout the engagement for the PAMP and Bike Plan, the DIAP was discussed and key issues were raised regarding accessibility to key attractors (e.g. restaurants) for people in wheelchairs and with reduced mobility. The lack of continuity and lack of maintenance of existing footpaths created greater concern for people with a disability.

Table 5 p.55 details a summary of the key comments by location captured on the interactive map.

Table 5: Summary of key community comments by location

Key areas	Key Issues Raised / Themes
Gosford	The majority of community comments mentioned path continuity and safety for both pedestrians and cyclists in Gosford CBD and other centres near Gosford. There were also comments about improvements to pathway accessibility for mobility-impaired users.
Woy Woy	The majority of community comments mentioned the need for new or extended pathways and links around Brisbane Water.
Wyong	The majority of community comments mentioned path continuity and safety for both pedestrians and cyclists. The need for more recreational links and improved path maintenance was also discussed.
Brisbane Water	Community comments related to new or extended shared paths to nearby centres.
Tuggerawong	Community comments related to new or extended shared paths to nearby centres. There were also comments about other recreational connections along the foreshore and to nearby lakes or lagoons.
Terrigal	Community comments related to connections to other centres including Erina and Kincumber. There were also comments about other recreational connections along the beach foreshore and nearby lakes or lagoons.
Avoca Beach	Community comments related to connections to other centres like Erina and Kincumber. There were also comments about other recreational connections along the beach foreshore and nearby lakes or lagoons.
Kincumber	Community comments related to new or extended shared paths to nearby centres.
Bensville	Community comments related to new or extended shared paths to nearby centres.
Empire Bay	Community comments related to new or extended shared paths to nearby centres.
Manning Park	Community comments related to new or extended shared paths to nearby centres. There were also comments about other recreational connections along the beach and nearby lakes or lagoons.

The key issues / themes raised have identified that the Community is focused on an improved bicycle network, primarily to the centres but also recreational routes. These key issues / themes were used to inform the priorities of this Bike Plan (refer Section 5.3).

The high level of participation in the community and stakeholder engagement process throughout the early phase of the study illustrates the importance of active transport infrastructure on the Central Coast to the community. Analysis of the data collected throughout the engagement process showed key themes and areas of interest which were used to identify the Bike Plan vision and principles.

4.6. Use of community engagement findings in the PAMP

Under the RMS Guideline, a Bike Plan is considered an important part of the transport mix and aims to increase cycling participation through the development of bike plans. The connections considered within the Bike Plan are generally long distance and so it includes the entire LGA.

The comments captured for all areas including the focus areas of the PAMP are broadly addressed in this Bike Plan. Pedestrian-related comments are related to the PAMP more than the Bike Plan, have been addressed in the PAMP. Individual comments may not be directly addressed as this Bike Plan addresses an LGA implementation plan and program. Individual comments will be addressed and prioritised in-line with the vision and principles of this Bike Plan by CCC.

Key comments also identified that the accessibility and the usefulness of infrastructure needs to be carefully considered. The Community feedback was that all residents and visitors, regardless of mobility needs, should equally be able to access these locations, and enjoy their benefits. How this is achieved has been carefully considered in this Bike Plan to prioritise the implementation of facilities that have the greatest benefits to most community members.

5. Vision and principles

The Bike Plan adopted approach to the development and maintenance of Active Transport infrastructure is based on the foundation of 3 key principles:

- Safety
- Connectivity , and
- Accessibility

5.1. Vision

A vision statement describes how things will look in the future for cyclists and pedestrians on the Central Coast. The two former Council bicycle strategies included vision statements and whilst the Gosford vision is primarily for cycling, the Wyong vision incorporates both cyclists and pedestrians. Both of the visions are still relevant for the Central Coast Bike Plan and when updated and combined with feedback received through consultation on the Bike Plan and PAMP, a proposed 'Vision for Active Transport on the Central Coast' has been developed:

"People of all ages and abilities can cycle and walk on safe, inclusive and connected facilities."

5.2. Strategic objectives

Strategic objectives help to prioritise / define / refine / outline how the Central Coast is going to achieve its vision for Active Transport. To achieve the vision that pedestrians and cyclists are safe, connected and inclusive, a number of infrastructure and non-infrastructure approaches will need to be implemented. Updating the objectives of the two former Council bike strategies and taking into account outcomes from consultation, six strategic objectives have been developed:

- sustainably deliver and maintain the active transport network
- provide supporting facilities
- plan for sustainable active transport in all developments and infrastructure projects
- encourage people to cycle and walk
- promote facilities
- monitor participation in active transport

Delivering the active transport network is the top priority for increasing cycling and walking on the Central Coast, as without safe, connected and inclusive infrastructure, the remaining four objectives will not be able to deliver the vision on their own. These strategic objectives will also form the basis of an Action Plan, ensuring that a combination of infrastructure and non-infrastructure solutions will be implemented to increase the cycling and walking mode share on the Central Coast.

5.3. Target markets

5.3.1. Overview

Target markets and priority areas are important for investment to ensure a bike plan is successful. That is, the greatest increase in cycling is achieved for the amount of money invested. This can be achieved by targeting cyclist types as well as trip types.

5.3.2. Cyclist types

Roger Geller (2009) highlights the four types of cyclists and their approximate proportion of the population. Whilst this analysis has been based on the city of Portland in the United States, various analyses have been undertaken in other cities around the world that support this view that cyclists generally fall into the following four categories and in similar proportions:

- strong and fearless (<1%) – will ride no matter the conditions/ road conditions
- enthused and confident (7%) – comfortable sharing the road with traffic but prefer to cycle on dedicated cycling facilities
- interested but concerned (60%) – like riding a bicycle but are afraid to share space with vehicles
- no way, no how (33%) – not interested in cycling at all, for various reasons such as topography, inability or a complete lack of interest

The second and third groups above equate to about two thirds of the population and provide the greatest opportunity for increasing cycling mode shares. These groups require high quality cycling facilities with appropriate separation from vehicular traffic.

A 2012 national survey, commissioned by the Heart Foundation and the Cycling Promotion Fund, found that 60 per cent of Australians have access to a bicycle, but 70 per cent of those were not considering cycling for transport in the near future, even though more than 50 per cent would like to (Heart Foundation and Cycling Promotion Fund 2012). The biggest barriers were identified as:

- unsafe road conditions
- speed or volume of traffic
- safety
- the lack of bicycle lanes or trails

This survey supports Geller's theory that there is significant opportunity to get more people cycling through the provision of safe, off-road cycling facilities away from traffic.

Throughout the consultation process for this Bike Plan, safety was a recurring theme and was continually mentioned as a high priority that, if addressed, would encourage more people to cycle. Furthermore, in the 2018 National Cycling Participation Survey undertaken for CCC, respondents were asked to prioritise actions that CCC could take to encourage bicycle riding. The most supported action was 'more off-road paths and cycleways' (76% respondents rated this a very high or high priority). In addition, the top four responses related to more and improved connections.

This information suggests that to increase cycling in the Central Coast, high quality, separated/ off-road cycling facilities will need to be delivered, as shown in Figure 31 p.59, to result in the 'enthused and confident' existing cyclists to cycle for more trips and the 'interested but concerned' potential cyclists to start cycling.



Source: Sydney's Cycling Future, 2013

Figure 31: Infrastructure to match target markets

5.3.3. Trip types

Within the 'enthused and confident' and 'interested but concerned' groups of cyclists / potential cyclists, there are also different categories of cyclists who ride for various purposes, as outlined in Section 2 – Bicycle User Types. These categories of cyclists and the types of trips they take has been assessed in the context of feedback received through the consultation phase of this bike plan and led to the development of five priority areas for investment:

- Priority 1: Connections to activity centres
- Priority 2: Connections to public transport
- Priority 3: Connections to schools
- Priority 4: Connections between centres
- Priority 5: Recreation and tourism routes

Maps illustrating these priority areas and descriptions are included in the sections below.

5.4. Priority Route Analysis

5.4.1. Priority 1: Connections to activity centres

“Transport choices are influenced by trip cost, time and convenience. Cycling for trips less than 5 kilometres and walking trips of less than 2 kilometres are the most cost-effective transport options for individuals” (Heart Foundation 2014).

The Central Coast Regional Plan 2036 identifies a hierarchy of key activity centres for the region, with Gosford identified as the ‘regional city’ and a number of established and emerging strategic centres and local centres also identified. New and improved cycling infrastructure, conveniently located end-of-trip facilities and cycling promotional activities targeting trips up to 5km from centres will make cycling for commuting and utility trips within these areas more appealing. Table 6 below outlines the types of centres and priority cycling distances for the Central Coast.

Table 6: *Priority activity centres to target increasing cycling trips*

Centre Type	Centre definition	Central Coast Centres	Priority cycling trip length / time
Regional City	A place which has the largest commercial component of any location in the region and that provides a full range of higher-order services, including hospitals and tertiary education services	Gosford	5km / 20 min
Established strategic centres	Centres of regional strategic importance	Erina, Tuggerah, Wyong	2.5km / 10 min
Emerging strategic centres	Centres that have been identified with the potential for regional strategic importance	Woy Woy, Warnervale	2.5km / 10 min
Local centres	Provide jobs and services such as shopping, dining, entertainment, health and personal services to meet the daily and weekly needs of the local community	Includes: Manning Park, Lake Munmorah, Budgewoi, San Remo, Toukley, The Entrance, Long Jetty, Terrigal, Umina, Ourimbah, Ettalong, Point Clare, Kincumber, Avoca Beach, Killarney Vale, and Lake Haven	1.25km / 5 min

Figure 32 p.61 shows Priority 1: Connections to activity centres.

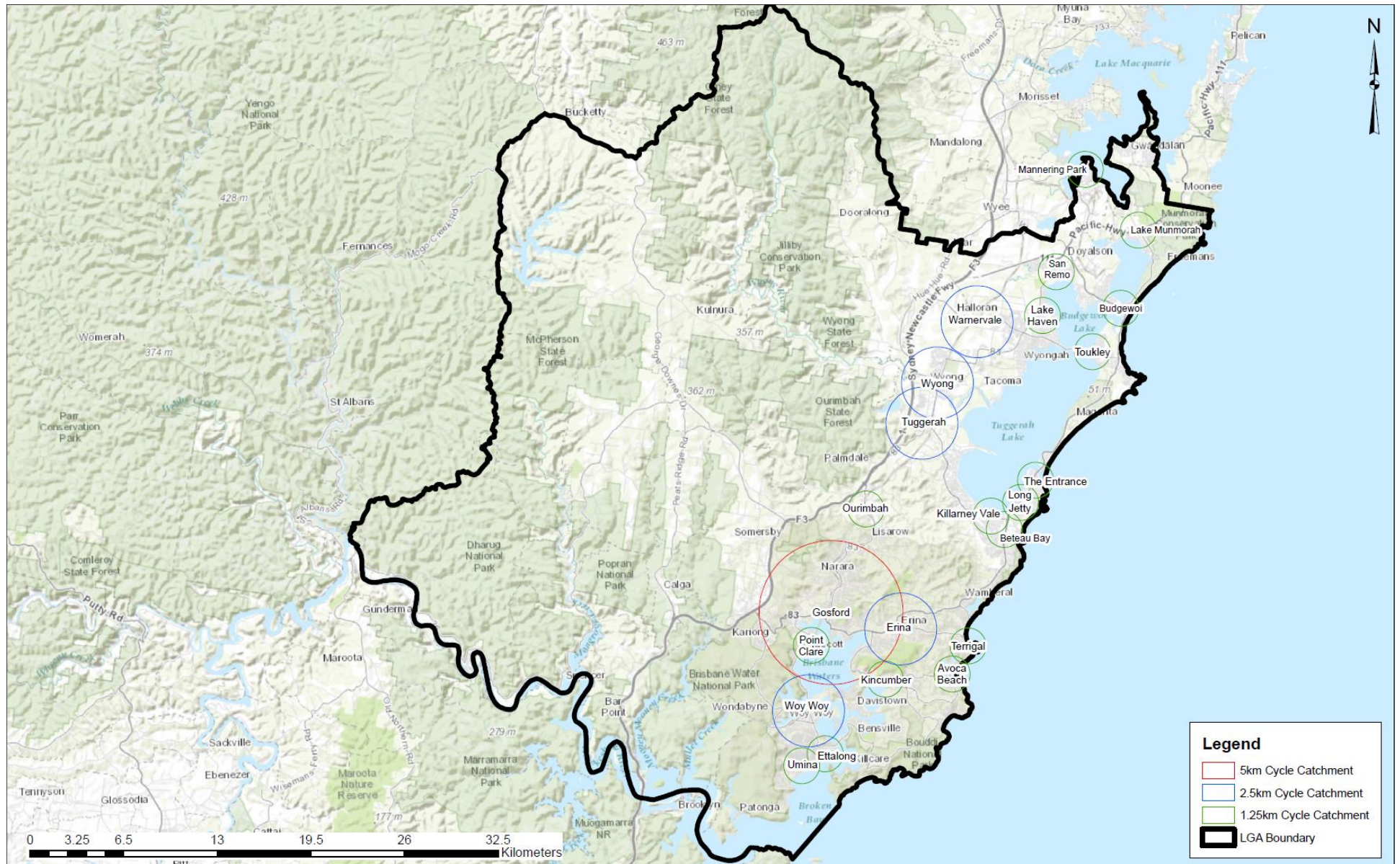


Figure 32: Priority 1: Connections to activity centres

5.4.2. Priority 2: Connections to public transport

“Cycling extends the reach and effectiveness of regional public transport, filling the gaps in the rail system or where there is limited space for car parking at rail stations” (NSW Bike Plan 2010). Whilst 800m / 10 minutes is considered a reasonable distance for pedestrian to access a public transport interchange, improving cycling access to public transport is a cost-effective way to expand its catchment. The NSW Bicycle Guidelines (2005) suggests that a 10 minute bike ride (around 2.5km) is a reasonable distance for a cyclist to ride to public transport. Coupled with conveniently located and secure bicycle parking facilities, this distance would require less time and effort compared with other transport modes.

ABS data shown in Figure 10 and Figure 11 p.19 shows that of the 69% of residents who both live and work within the Central Coast, 7.5% of these use the train as their main mode of transport to and from work. This is the second most popular transport mode to work, following ‘car as driver’ at 65.2%. Furthermore, the 2018 Cycling Participation Survey for CCC found that 11% of transport trips by bicycle within the LGA were to public transport. This is an increase compared to the 2015 Cycling Participation Survey and this data suggests that there is existing demand and increased potential for targeting cycling trips to public transport in the Central Coast.

In addition to improving connections to stations, end-of-trip facilities, such as secure bicycle parking, at stations also needs to be addressed and promoted where they currently exist. A 2009 report by Parsons Brinckerhoff into the provision and use of bicycle parking at 200 Sydney region public transport interchanges found that bicycle use to Woy Woy station was the highest of all audited train stations with 72 bicycles observed, despite the parking being remote to the interchange entrance. Interestingly, Woy Woy is classified as a ‘local’ station with fewer than 5000 daily passengers, compared to Gosford with greater than 5000 daily passengers.

Since this report, free access to new secure bike sheds has been made available at Gosford with 40 spaces and Woy Woy with 50 spaces. The Woy Woy bicycle parking area is shown in Figure 33 p.63. Rail customers are able link their Opal card through the bike lockers’ website. These facilities were delivered as part of the “Bike and Ride” initiative, which is identified in Sydney’s Cycling Future, Transport for NSW’s plan to make bicycle riding a feasible transport option. Individual bike lockers are also available for a fee at most stations on the Central Coast.



Source: *Coastal Community News, 2016*

Figure 33: Bicycle shed at Woy Woy station

Bus interchanges also provide an opportunity for improved integration between cycling and public transport, whether it be for combining bicycle and bus trips or bicycle, bus and rail trips. Five key bus interchanges in the Central Coast that are independent of the rail network to be included in this priority area are: Lake Haven, Tuggerah Westfield, The Entrance, Bay Village and Erina Fair.

Whilst new and improved cycling infrastructure within 2.5km / 10 minutes of public transport interchanges is the priority trip distance in this Bike Plan, it is worth noting that the NSW Bike Plan (2010) states that "with five kilometres [20 minutes] being a comfortable distance to ride to an interchange with good bike parking facilities, the bike catchment of public transport can be more than 20 times the area within walking distance." The 2009 Parsons Brinckerhoff report also notes that most cyclists start their journey within five to 20 minutes of transport interchanges and that:

- average cycle time is 12 minutes
- 50% of respondents cycle for less than 10 minutes
- 90% of cyclists cycle for less than 20 mins
- age was not a factor in the public transport interchange access time.

Once a comprehensive network within 2.5km of public interchanges is complete, extending these up to 5km is recommended to further increase the catchments and encourage greater use of public transport on the Central Coast.

Figure 34 p.64 shows Priority 2: Connections to public transport.

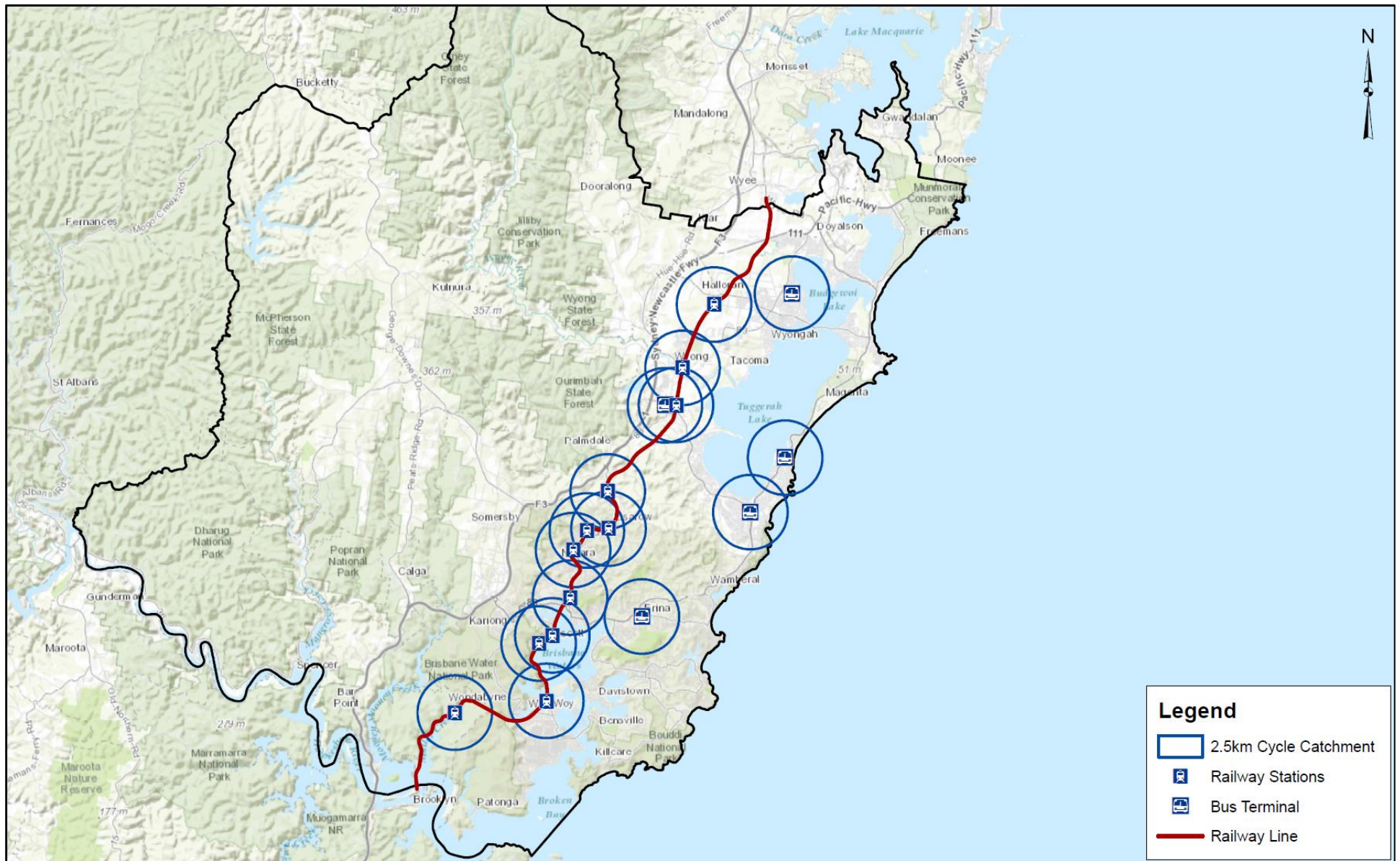
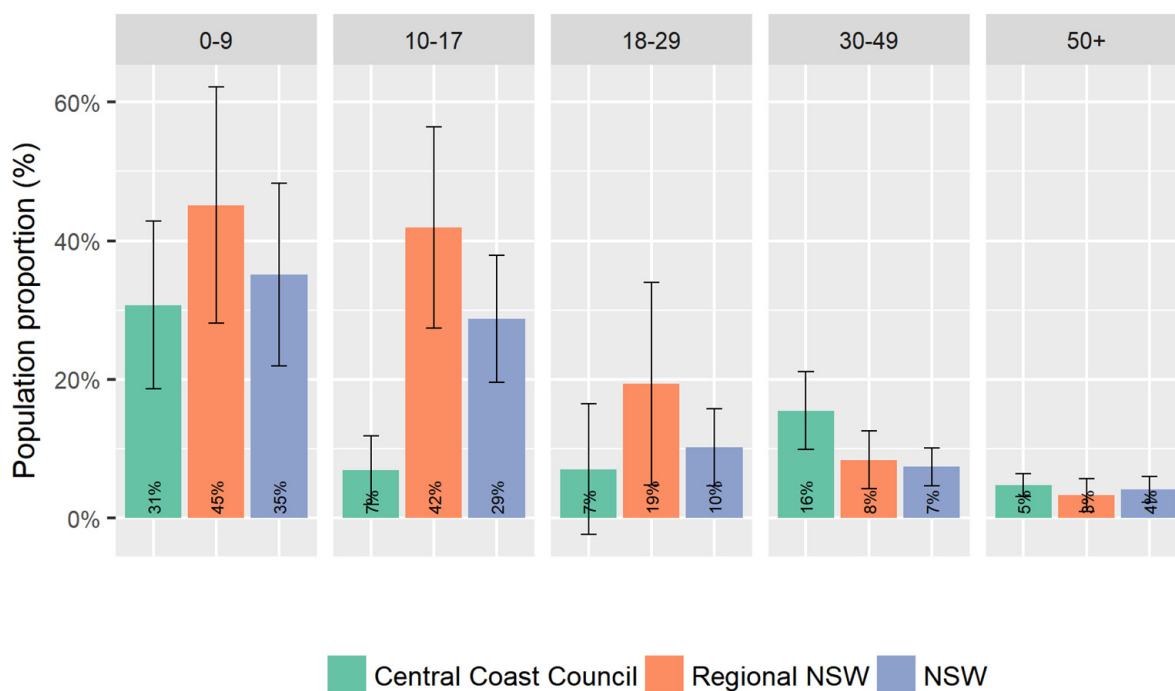


Figure 34: Priority 2: Connections to public transport

5.4.3. Priority 3: Connections to schools / education facilities

“Over 70% of children and 91.5% of young people do not meet physical activity recommendations” (Australian Health Policy Collaboration, 2018). “Only one in ten children ride to school, even though 80 per cent of parents think it would improve their children’s health. Although 80 per cent of parents surveyed nominated high traffic and a need for improved safe routes as key barriers to children being allowed to ride to schools, they agreed that cycling is a good way to get fit. Almost 60 per cent of surveyed parents drove their children to school. Since many home to school trips are relatively short, particularly to primary school, there is significant potential to increase the number of active travel trips as a way to manage network capacity, peak transport congestion and encourage active living.” (Source: Heart Foundation and Cycling Promotion Fund, 2012).

The 2018 Cycling Participation Survey for CCC found that the highest levels of cycling participation in NSW, Regional NSW and the CCC, measured as those who had ridden in the past week, was among children aged under 10. Figure 35 below shows that cycling in CCC is relatively high in the 30-49 and 50+ age brackets compared to NSW and Regional NSW area average but not for the 10-17 and 18-20 age brackets.



Sample: All persons, cycling participation in past week

Source: NCPS 2018

Figure 35: Cycling participation by age

Whilst this data is promising for the Central Coast, it does not reflect what is happening on the ground in terms of cycling trips to school. Through the community engagement activities undertaken to inform the development of this Bike Plan, many parents of school aged children commented that they didn’t think it was safe for their children to ride their bicycles to school. Figure 30 p.54 demonstrates the prevalence of comments relating to safety, children and school.

Several parents also noted that children are expected to cycle or walk to school as they live too close to be eligible for a school travel (bus) pass, yet safe facilities are not often available. This is then further exacerbated by parents then choosing to drive their children to school

and causing further increases to traffic, congestion and safety issues around schools as shown below in Figure 36.



Source: Gosford Bike Strategy 2014

Figure 36: The effects of ever increasing car use on cycling and walking to school

Transport for NSW (2016) states that for students to be eligible for a free school travel pass the student must be:

- an infant student (K–2) regardless of the distance between their home and school
- a primary student (Years 3–6) who lives more than 1.6 km (straight line distance) from school, or 2.3 km or more by the most direct practical walking route to the nearest entry point to the school
- a secondary student (Year 7–12) who lives more than 2 km (straight line distance) from school, or 2.9 km or more by the most direct practical walking route to the nearest entry point to the school.

To align with these requirements, the priority trip distances around schools to target for improved cycling infrastructure are 1.6km for primary schools and 2km for secondary schools. School students that cycle will generally require off-road shared paths and pathways and safe road crossings such as refuges, zebras or traffic lights. These types of improvements would cater for both cycling and walking. Once infrastructure improvements are completed, targeted travel behaviour change programs, such as 'Active School Travel' programs should be undertaken with schools to ensure benefits are realised.

TAFEs and universities are considerable trip generators and should also be prioritised for improved cycling connections. Given the larger catchment for higher education and that staff and students would be older and more experienced cyclists, a trip distance of up to 5km around universities and TAFEs is proposed. There are three locations on the Central Coast that fall into this category and include the TAFE campuses at Gosford, Ourimbah (which is co-located with the University of New Castle Central Coast Campus) and Wyong.

Figure 37 p.67 shows Priority 3: Connections to schools and education facilities.

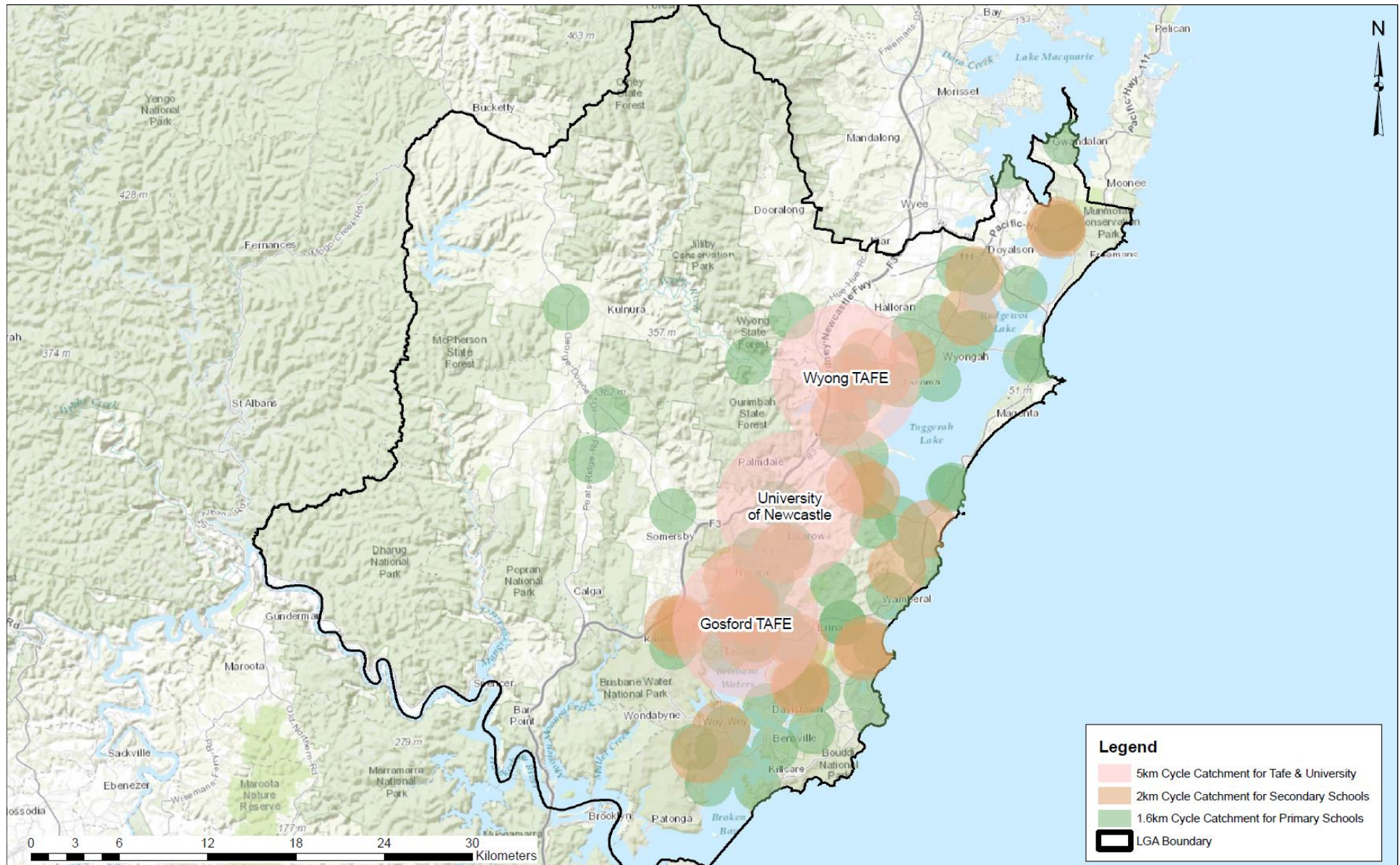


Figure 37: Priority 3: Connections to schools and education facilities

5.4.4. Priority 4: Connections between centres

The NSW Bicycle Guidelines (2005) defines a 'regional bicycle routes' as "high-quality, high-priority routes to permit quick, unhindered travel between the major regions of cities, towns or urban areas".

The Central Coast Regional Plan (2016) has identified two 'regional growth corridors' – corridors that have been strategically identified for future growth. These are the Northern Growth Corridor (connecting Tuggerah, Wyong and Warnervale centres) and the Southern Growth Corridor (connecting the Somersby Regional Gateway with Gosford and Erina centres). Outside of these two growth corridors is the 'emerging centre' of Woy Woy, which is also considered a key centre as part of this priority.

With Gosford identified as the 'regional city' for the Central Coast, a network of high quality, regional bicycle routes can radiate from this 'hub'. A second 'hub' at Wyong / Tuggerah is the focal point for trips at the northern centres of the Central Coast. Routes connecting to the north, south, east and west will in effect form the 'spokes' of the network and provide the connections between the two growth corridors as well as the strategic centres. This high-quality network, shown below in Figure 38, will connect to the major employment areas in the region and will cater for a high volume of commuting and utility trips.

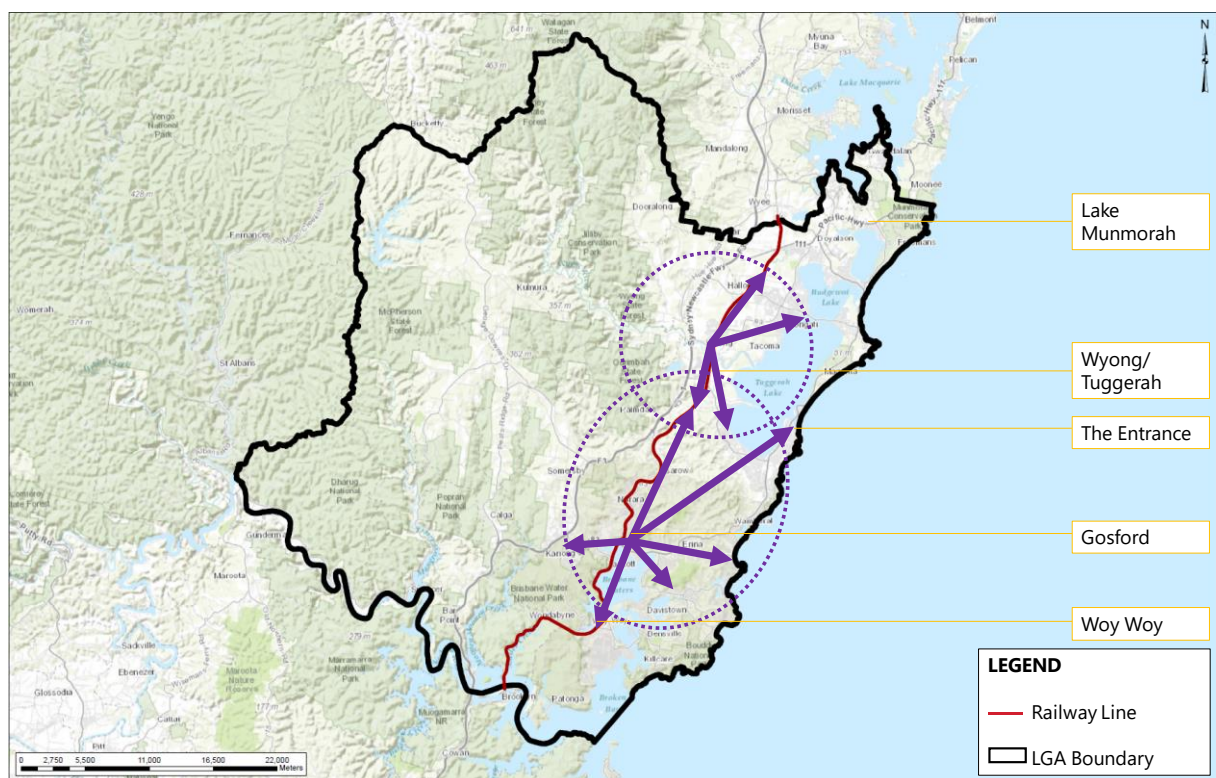


Figure 38: Gosford and Wyong / Tuggerah hub bicycle network

Given the Pacific Highway and railway corridor provide two of the most direct and flat routes between the northern and southern growth corridors, it will be essential to work with the NSW Government to realise the 15km connection between Gosford and Tuggerah and Gosford and Point Clare, a key 'missing link' in the Gosford to Woy Woy connection which is mostly complete.

Figure 49 p.96 shows Priority 4: Connections between centres.

5.4.5. Priority 5: Cycling for recreational and tourism

Cycling tourists are active contributors to regional economies and are more likely than other holidaymakers to participate in associated holiday activities like eating out, visiting art galleries and shopping (NSW Bike Plan, 2010). Many cyclists start out as recreational cyclists, building their confidence before starting to cycle for access purposes (e.g. commuting and personal business) trips.

The picturesque Central Coast already boasts a comprehensive bicycle network catering to recreational and touring cyclists, with a number of off-road pathways following natural waterways, lakes and the coastline. Cycling routes around Brisbane Water, Lake Munmorah, Budgewoi Lake, Tuggerah Lake and the Coastline Cycleway as well as links between the Brisbane Water and Terrigal / Avoca Beach, are the seven key recreation and tourist cycling routes on the Central Coast.

Whilst Terrigal and Avoca Beach are two of the Central Coast's most popular beaches, these beaches do not form part of the Coastline Cycleway route but are key recreation and tourism destinations in their own right. Being able to access them by bicycle from the Gosford CBD is seen as highly desirable under this priority area. Other popular beaches such as Toowoan Bay and Soldiers Beach (Norah Head) are accessed by the NSW Coastline Cycleway.

A number of the Central Coast recreation and tourist cycling routes form part of the NSW Coastline Cycleway.

The NSW Coastline Cycleway is a project that aims to build a 1,400km cycling route along the entire New South Wales coastline from the Queensland border at Tweed Heads to the Victorian border south of Eden. The route includes sections of off-road shared pedestrian/cycle paths as well as on-road cycle lanes along local streets. Much of the route provides coastal views and enables access for cyclists and pedestrians to a range of recreational facilities, from beaches to foreshore parks, picnic areas and playgrounds.

The Coastline Cycleway aims to avoid major roads and highways, and to provide a continuous and safe route that links together separate coastal communities. In addition, the project aims to accommodate the needs of local users in each area, by linking to existing cycle networks in each of those communities. As well as supporting active living for residents of coastal communities, the Cycleway is also intended to help boost bicycle use by tourists, by improving coastal recreation access and providing opportunities for the growth of bicycle-tourism industries (Source: Premier's Council for Active Living, 2018).

Figure 39 p.70 shows recreational and tourist cyclist routes. Note that the routes shown are not set and may change.

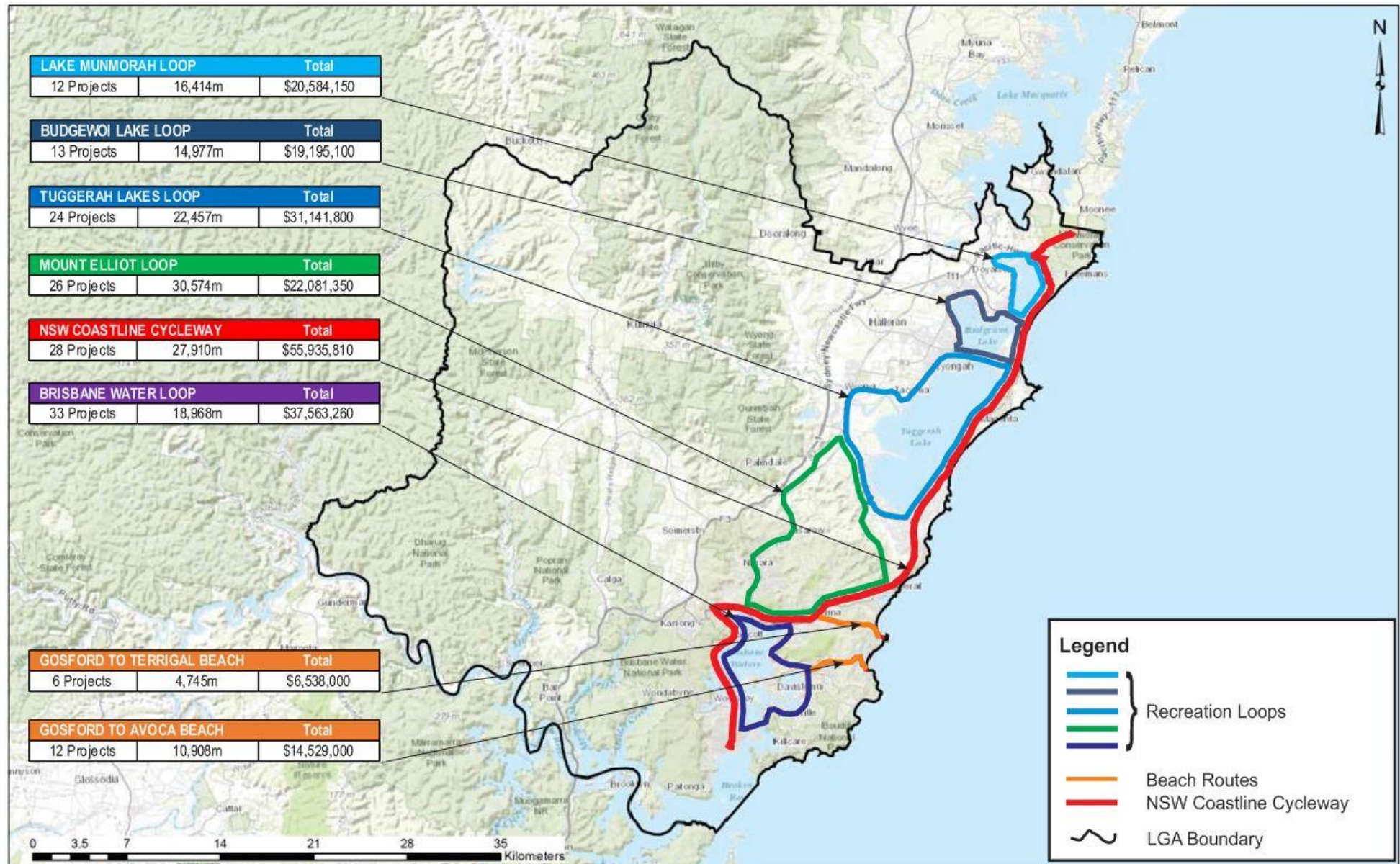


Figure 39: Priority 5: Recreation and tourism routes

5.5. Emerging issues and trends

5.5.1. Bike share schemes

The Gosford Bike Strategy 2014 states it will “investigate opportunities for a public free-bike scheme to be available at selected locations across the local government area”. Since 2014, significant advances in bike share technologies has allowed for new ‘dockless’ schemes to emerge. Traditional bike share schemes are built on docking systems and are generally implemented by governments and transport authorities. This can be quite costly and infrastructure intensive.



Privately operated dockless bike share schemes are now emerging, allowing bicycles to be accessed via smartphone apps. Whilst relatively cheaper and easier to implement, these systems come with their own set of management issues, such as accessibility impacts if bicycles aren’t parked appropriately. In Australia, only two ‘docked’ bicycle share systems are in operation (Brisbane and Melbourne, both starting in 2010), compared to seven ‘dockless’ systems (in Sydney, Melbourne, Perth and Gold Coast), all which have begun operation since 2017 (Wikipedia, 2018)

Mateo-Babiano et al. (2017) outline what can prevent a shared bike scheme from succeeding:

- Natural environment: hilly terrain and rainy/windy/cold weather
- Built environment: lack of high quality/ segregated cycling infrastructure connecting key land uses and high density residential areas
- Legal environment: helmet laws

Whilst most bike share schemes to date have been implemented in larger metropolitan cities, Christensen (2013) has found that there has been some success in smaller cities in the United States where emphasis has been placed on co-locating the schemes with universities and encouraging students to cycle.

Whilst the Central Coast has a growing network of cycling infrastructure, conducive climate and increasing population densities, the population forecasts predict around half of the Central Coast’s population will be in the 65+ age group by 2036. This is more likely to translate into a greater proportion of recreational cycling, rather than trips for transport purposes. Furthermore, accessibility requirements for the elderly and the mobility/vision impaired means that dockless bike sharing may have a greater impact on this ageing demographic if bicycle parking impacts aren’t effectively managed.



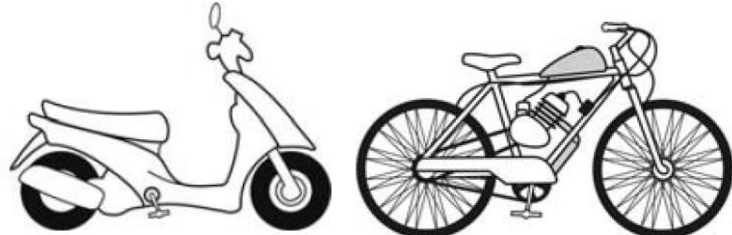
5.5.2. Electric bicycles / e-bikes / power-assisted pedal cycles / ‘pedalecs’

In 2014, Roads and Maritime released new laws and vehicle standards for mopeds and power-assisted pedal cycles. The Roads and Maritime Vehicle Standards Information sheet (2014) states that “a power-assisted pedal cycle is a bicycle that:

- is designed to be propelled solely by human power, and
- has one or more auxiliary (electric) propulsion motors attached to assist the rider.

This means that it must be possible to propel the bicycle only by the rider pedalling it. The primary driving force should be the rider, and the motor is only intended to help the rider, such as when going uphill or cycling into a headwind, or to cycle at a speed they cannot maintain solely by pedalling”. These are not to be confused with electric powered mopeds. The common different types of power-assisted pedal cycles are shown below in Table 7.

Table 7: Different types of powered cycles available on the market

Type of vehicle	Maximum power output	Typical design
Power-assisted pedal cycle	200 watts	
Power-assisted pedal cycle ('Pedalec')	250 watts	
Powered cycle fitted with pedals (moped)	Varies	

Source: Roads and Maritime Mopeds and power-assisted pedal cycles, 2014

The main differences between the two types of power-assisted pedal cycle is that the ‘pedalec’ must comply with European standard EN 15194, which includes the requirement that the motor must cut-off once the vehicle reaches 25 km/h, or sooner if the rider stops pedalling. In the third example above (moped), these vehicles are often sold as power-assisted pedal cycles but use a throttle to control speed. These vehicles are not classed as power-assisted pedal cycles and cannot be used in accordance with the road rules for bicycles in NSW.

Along with the benefits of riding a standard bicycle (health, environment, congestion etc.), power-assisted pedal cycles can significantly increase the cycling catchment area and have many additional benefits, including:

- increased mobility and freedom for the elderly and ageing
- potential to attract new cyclists due to less effort (i.e. easier to take off from a stopped position) and less sweat (i.e. less need for a shower at destination)
- viable option in hilly terrain
- opportunity to replace trips that would normally be taken by a car due to comparable time / convenience

There is also the potential for power-assisted pedal cycles to create negative impacts, including:

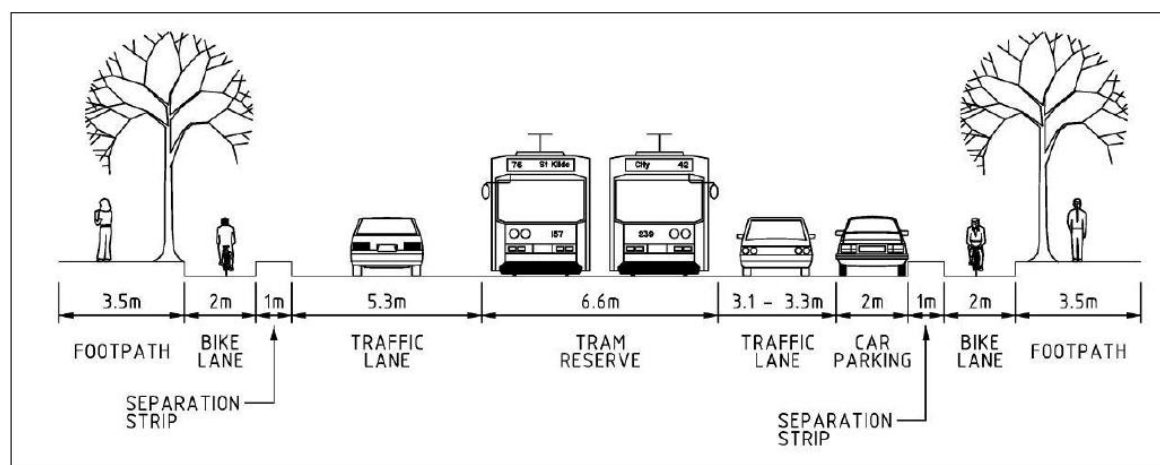
- increased pedestrian-cyclist conflict with an increase in the speed differential between shared path users, particularly for less experienced cyclists
- need for cyclists to be able to charge bicycles at their destination
- more expensive to purchase

Whilst there are both pros and cons to promoting and encouraging increased use of power-assisted pedal cycles, the benefits of encouraging new and existing cyclists to take more trips by bike would likely outweigh the negatives, which could be managed through improved facility design and education (such as bike skills training sessions) for new riders.

5.5.3. Separated bicycle lanes

Austrroads (2011) states that “the provision of a separated bicycle lane aims to improve the safety for cyclists by providing (physical) separation from other motor traffic whilst maintaining directness of travel and priority at intersections. Separated bicycle lanes are also referred to as: kerb separated bicycle lanes, and protected bicycle lanes.

Separated bicycle lanes can be either one-way / uni-directional (i.e. cycling in the same direction as adjacent traffic usually on each side of the road) or two-way / bi-directional (i.e. both directions for cycling accommodated within one facility on one side of the road). An example of a one-way / uni-directional cross-section is shown below in Figure 40.



Source: *Austrroads Guide to Road Design Part 3: Geometric Design (2010)*

Figure 40: *Typical cross-section of a separated protected bicycle lane*

This type of facility is highly attractive to the 'interested but concerned' cyclist target market and has the ability to greatly shift mode shares towards cycling.

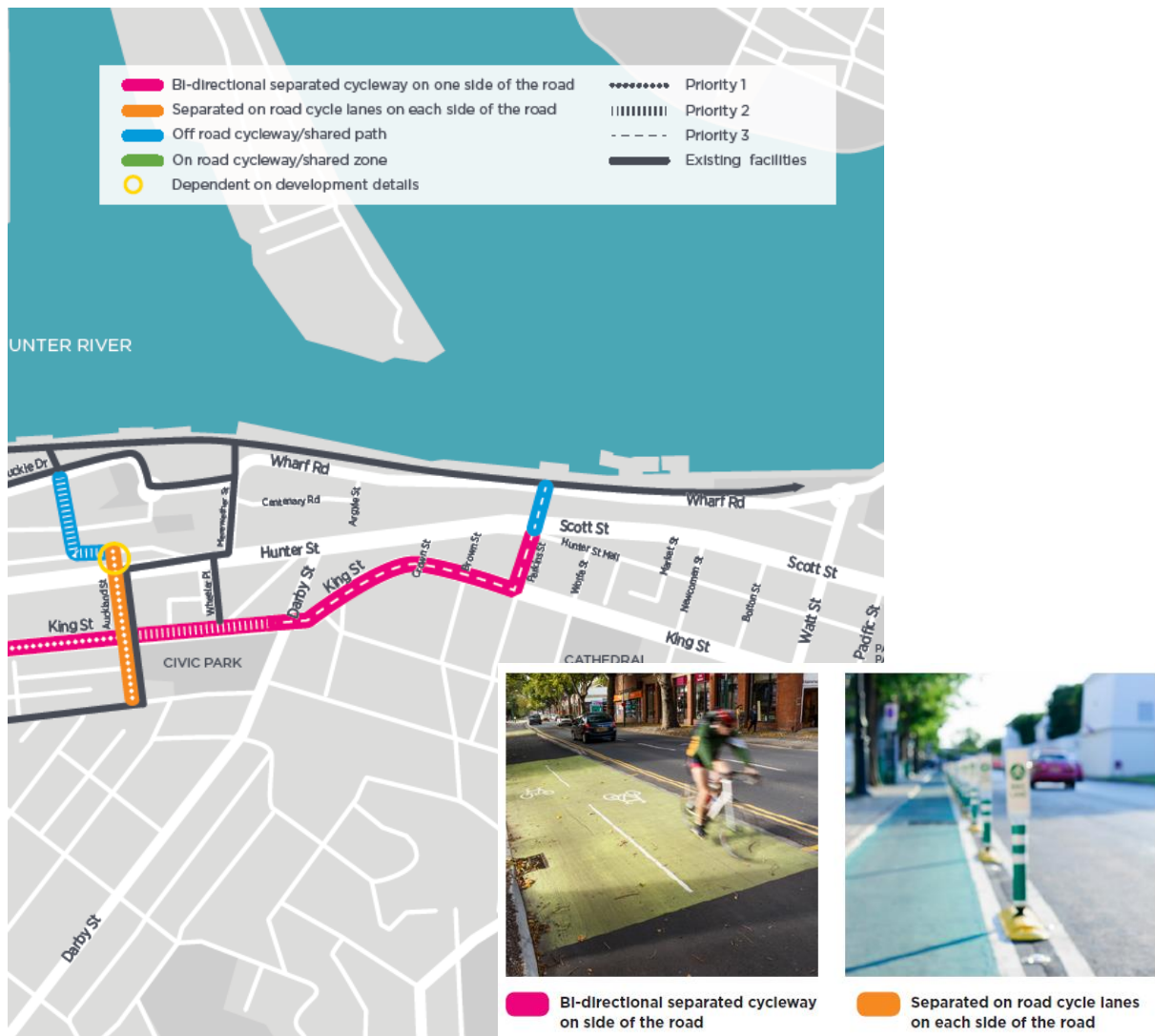


For example, the City of Sydney has created 12.8km of these facilities since 2009. Where separated facilities have been introduced, the number of bike trips have doubled and trebled in some places. Commuter periods are peak cycling times, proving that it is being used as a viable transport option for commuting to work (City of Sydney web site, 2018).

Whilst the City of Sydney has successfully retro-fitted separated bicycle lanes into inner-city streets, Austroads (2011) states that a separated bicycle lane:

- is usually considered where a substantial length of road is being widened or duplicated and where there are few driveways and intersections
- generally provides a higher level of service for cyclists and has been shown to promote increased patronage on cycling routes
- is an option to be considered where a full width off-road path with suitably high levels of directness and priority for cyclists at intersections cannot be achieved within the existing road reservation.

Despite being a relatively new form of cycling infrastructure in Australia, separated bicycle lanes are a standard form of treatment in high cycling mode share countries such as the Netherlands and Sweden. Although the implementation of separated bicycle lanes in Australia has been led by the capital cities such as Sydney and Melbourne, smaller towns and cities in Australia (such as Newcastle – refer Figure 41 p.75) are also beginning to realise the benefits and plan for this type of infrastructure.



Source: *Revitalising Newcastle (2017)*

Figure 41: *Extract from Newcastle City Centre Cycleway Network Strategy*

Whilst retro-fitting dedicated cycling facilities into urban environments in Australia comes with its share of challenges (cost, design complexities, changing negative perceptions from the business and residential community), there is an increasing need for separated bicycle lanes to become a greater part of the suite of options for cyclists if mode shifts towards cycling are to be achieved.

5.5.4. Pedestrian-cyclist conflict

“The interaction between pedestrians and cyclists is increasingly causing safety concerns, exacerbated by the use of wheeled recreational devices, including wheelchairs, powered scooters, and gophers. Some of these concerns are real and others are perceived, but nevertheless important in terms of people’s willingness to walk. The more governments are successful in increasing the amounts of cycling and walking, the greater these concerns will become – potentially limiting the extent and sustainability of such gains.

Paths and footpaths are essential spaces in the transport network to support cycling and walking activities. If they are to continue to effectively support increased usage by both groups, management of shared use, particularly where that results in actual or potential conflict, will need to be addressed.” (Austrroads 2006).

Through the community engagement processes undertaken to guide the development of this Bike Plan, comments received include the need to “manage the conflict between bikes and pedestrians. This could include more cues to advise pedestrians of cyclists such as education, centre lines and signage about the use of bells.” (Our Coast, Our Pathways Early Engagement Report Rev A 2018).

The Central Coast is home to a diverse population with pedestrians including more vulnerable user groups such as the elderly and those with mobility aids, traveling alongside cyclists of varying age, ability and speed (with potential for even higher bicycle speeds with increasing use of power-assisted pedal cycles). In developing and implementing this Bike Plan, it will be critical to consider a multi-faceted approach in preventing and addressing pedestrian-cyclist conflict, using solutions that fall within the categories of the ‘Four Es’ of:

- Engineering: separating users where possible, increasing shared path widths
- Education: signage advising of shared pathway rules
- Encouragement: promotion of desirable behaviours through the media and brochures
- Enforcement: police patrols to enforce the road rules

Nevertheless the risk of a pedestrian being injured as a result of an impact with a cyclist is a low risk event and of the order equivalent to being killed in an airline crash. (“A Safe System: Making it Happen!” Pedestrian-Cyclist Collisions: Issues and Risk: Melbourne 1-2 September 2011).

6. Bike network development

6.1. Key principles

The following key principles were adopted and modified from the previous Bike Plans into this Bike Plan for developing a bike network:

- link popular destinations with local residential areas
- be consistent and uninterrupted
- be easy to use and provide clear direction along the route
- have a consistent quality of cycling facilities along the route
- be easy to find
- avoid long detours and balance against problems of topography
- ensure bike riders are able to maintain a safe, comfortable and consistent operating speed
- safely accommodate bike riders, pedestrians and vehicles
- sustainably complement the surrounding environment and street trees
- be enjoyable and well maintained.

6.2. Shared Path hierarchy

A shared path hierarchy has been implemented to guide the bike plan implementation. The shared path hierarchy relates to the function and design of the shared pathway and does not influence the project prioritisation process:

- Primary Shared Paths - connecting higher order destinations including strategic activity centres and employment nodes, public transport interchanges and tertiary education institutions
- Secondary Shared Paths - connecting residential suburbs to primary routes serving district level land uses such as local centres, schools and district recreation and sporting areas
- Local Shared Paths- providing access to local destinations such as parks, community facilities and local shops.

Further details about the function and design characteristics of the shared path hierarchy elements are detailed in Table 8 p.78.

Table 8: Shared Path hierarchy and design characteristics

Function/Role	Characteristics	Facility Types
Primary		
Connects major regional destinations including major activity centres, major public transport hubs, employment nodes and tertiary education institutions. Also connects regional open space, beaches and waterways	<p>Primary shared path between regional and major activity centres and destinations</p> <p>Majority of destinations are work, education and utility</p> <p>Commuter/education trips are generally mid-week morning and afternoon to coincide with work day</p> <p>Utility trips occur throughout the day</p> <p>Provides connections to other LGAs</p> <p>Caters for commuter cyclists but also provides facility for potential users</p> <p>Longer distance connections</p> <p>Caters for high volumes of cyclists</p> <p>Most direct, convenient shared path</p> <p>Favourable topography</p>	<p>Separated bicycle lanes (preferred)</p> <p>Shared Paths (preferred)</p> <p>On road bicycle lanes (suitable)</p> <p>Cycle Streets (suitable)</p> <p>Bicycle Boulevards (suitable)</p>
Secondary		
<p>Connects residential suburbs to the primary shared paths</p> <p>Serves district level land uses e.g. local centres, schools, district recreation areas</p> <p>Serves as feeder shared paths for commuters and education trips</p>	<p>Distributes cyclists from primary network to residential areas and sub-destinations</p> <p>Feeder shared path to primary shared paths</p> <p>Serves education and utility cyclists and commuters accessing the primary shared paths. Should encourage new potential users</p> <p>Caters for medium volumes of cyclists</p> <p>Serve a less direct shared path to an activity centre or generator in quieter roads</p>	<p>Shared Paths</p> <p>On road bicycle lanes</p> <p>Cycle Streets</p> <p>Separated bicycle lanes (suitable)</p> <p>Bicycle Boulevards</p> <p>Bicycle Advisory Lanes</p>
Local		
<p>Connects to primary and secondary shared paths</p> <p>Provides access to local destinations such as parks, community facilities, local shops</p> <p>Serves as feeder shared paths for commuters and education trips</p>	<p>Access shared paths to local land uses or a feeder shared path from residential areas</p> <p>Serves all cyclists enabling access to other components of the network and local destinations</p> <p>Improves connectivity such as mid-block links and short cuts</p> <p>Caters for low volumes of cyclists</p> <p>Essentially all user groups</p>	<p>Shared Paths</p> <p>On road Bicycle Lanes</p> <p>Bicycle Boulevards</p> <p>Cycle Streets</p> <p>Bicycle Advisory Lanes</p>

6.3. Bike network design

The development of the Bike Plan on the Central Coast follows the five principles of good network design as detailed below in Table 9.

Table 9: Five principles of good network design

Route feature	Comments
Safe	Safely accommodate cyclists, pedestrians and vehicles Maximise opportunities for social interaction and casual surveillance
Coherent	Link popular destinations with residential areas Have a consistent quality of cycling facilities along the route Easy to find and follow Provide good signage
Direct	Based on desire lines Avoid long detours and balance against problems of topography Allow for efficient operating speeds
Comfortable	Provide smooth surfaces, gentle gradients and appropriate infrastructure and treatments Well-maintained
Attractive	Provide attractively designed and located facilities that complement the surrounding environment and enhance the riding experience Include supporting facilities such as shade, lighting and water bubblers where appropriate

Source: Austroads (2009), Roads and Maritime How to Develop a Bike Plan (2012) and Gosford Bike Strategy (2014)

6.4. Constraints and opportunities

There are a number of constraints and opportunities that impact on the development of the bicycle networks are described below:

- Topography – generally the main urban areas of the Central Coast are reasonably flat along the coastal plains, with the steeper slopes outside of the developed areas.
- Major roads and rail lines – this infrastructure forms a barrier to movement across them and they are generally not suited for cycling and walking unless well designed separated facilities are provided along them. Often however this infrastructure co-locates with the desire lines and is usually located along the flattest route creating opportunities for active transport corridors.
- Future roads and public transport – these create opportunities to include cycling and walking as part of the project delivery and achieve significant cost savings for efficient delivery, providing adequate spatial allocation can be made within existing corridor reserves or resumption boundaries.
- Waterways – similar to the roads they form a significant barrier to movement across them but can also create opportunities for pathways alongside. The series of picturesque lakes in the Central Coast area are extremely desirable for active transport as they provide an attractive setting for active transport and a destination in their own right.

- Open Space and Sport and Recreation corridors – form opportunities for provision of networks which are attractive and potentially improve connectivity for active transport through neighbourhoods. Some of these areas are also destinations. Drainage corridors form similar opportunities. Private open space such as golf courses, often form a barrier to movement.

These challenges also offer an opportunity for Council to provide innovative or iconic solutions. One example being the pedestrian and cycle bridge over Tumbi Umbi Creek, as shown below in Figure 42.



Source: Fleetwood urban "tumbi-creek-pedestrian-cycle-bridge" (2018)

Figure 42: Pedestrian and cycle bridge over Tumbi Umbi Creek

6.5. Focus Areas

6.5.1. Southern Central Coast

Key southern links surrounding the priority areas including activity centres, public transport nodes and schools are shown in Appendix D.

As detailed in section 6.3, the key opportunities to encourage more trips by cycling are to concentrate connections within 5kms of the Gosford centre where the commercial and retail attractors, employment, as well as rail station, TAFE college and schools are located. The 5km

radius allows connections from Kariong, Tascott / Point Clare, East Gosford / Springfield, Erina and North Gosford / Wyoming / Niagara Park residential areas.

Strategic cycle connections have also been identified for the lower order centres of Erina, Woy Woy, Terrigal, Kincumber, Avoca Beach, Point Claire, Umina and Ettalong. Connections between these centres have also been identified.

At a broad level, connections to school clusters have also been identified, which are a key opportunity to encourage children to cycle to school if safe off road shared paths are provided.

Completion of the cycle route around Brisbane Water would deliver on a number of the priority areas, whilst providing a recreational cycling loop in its own right. It would facilitate connections between a number of strategic and local centres and link major public transport interchanges at Gosford, Woy Woy and Erina. A number of schools could also be serviced where off-road shared pathways are delivered.

The Gosford Bike Strategy (2014) identified off road and on road cycle facilities for this area (Appendix G). This map and the Priority Route maps in Appendix D will assist in refining alignments when delivering the strategic links identified in Appendix A.

6.5.2. Northern Central Coast

Cycling route connections have been developed for the Tuggerah, Wyong and surrounding areas. These routes focus on activity centres, public transport nodes and educational facilities (including TAFE and university campuses in Ourimbah).

Tuggerah and Wyong activity centres include public transport nodes and commercial centres, as well as schools and the TAFE within a 2.5km radius of Wyong. The local centres of The Entrance, Long Jetty, Killarney Vale, Bateau Bay, Norah Head, Toukley and Lake Haven have also been identified as opportunities for short personal business trips as well as for trips to schools. The activity centre cycling links also connect to bus interchanges at Lake Haven, Tuggerah Westfield, The Entrance, and Bay Village.

Linking the strategic centres of Tuggerah and Warnervale with the local centres on the coast is also a desirable longer-term outcome. Warnervale Town Centre has also been identified as it is a future centre. Strategic bike connections have not been developed to the east and west but have been proposed, connecting to the railway station and to the Lake Haven and Toukley centres. Further connections should be investigated further as this area develops.

A 5km radius has been considered around Ourimbah TAFE and the University of Newcastle campus, with key links also provided from the rail station and bus station to these destinations. The key links to these educational facilities also provide the centre to centre connections between Gosford and Tuggerah/Wyong.

As mentioned above, connections to school clusters have also been identified but this Bike Plan recognises that further investigations and consultation with schools needs to be undertaken to develop the most important links to service each school.

Cycling connections along the southern shore of Lake Macquarie (the Central Coast Council Boundary) and around Lake Munmorah, Budgewoi Lake and Tuggerah Lake have been prioritised where they also contribute to improving access to activity centres, public transport and schools.

The Wyong Settlement Strategy (2014) Part 4 - Planning for Transport includes a map showing the existing and future on and off-road cycling network for this area (Appendix H).

This Settlement Strategy map and the Priority Route maps in Appendix D will assist in refining alignments when delivering the strategic links identified in Appendix A.

6.5.3. Centre to Centre connections

The key centre to centre strategic connections consist of the north-south route between Woy Woy in the south and Wyong / Warnervale in the north, and the east-west route between Kariong in the west and Terrigal in the east. These links encompass the two regional growth corridors.

These links can cater for the longer distance commuting trips between the centres but can also capture shorter trips to and between centres and destinations along it. These routes need to be high quality with limited delays to be attractive to cyclists.

Connections from the strategic centres along the railway line to the local centres on the coast (e.g. Tuggerah to The Entrance, Warnervale to Toukley / Noraville, Erina to Avoca Beach via Kincumber and Erina to Ettalong) should be considered as longer-term priorities, once the growth corridor centre connections are established.

Figure 49: Bike Plan Priority Route Summary p.96 illustrates these longer distance priority connections between centres whilst the maps in Appendix D show these connections on the more detailed area maps.

6.5.4. Recreational and Tourist Cycling connections

Recreational and tourist cycling connections also form a key part of the proposed network, aiming to attract new cyclists for recreational trips as well as becoming a tourist attraction in their own right. These links are typically off-road pathways following the lakes and coastlines of the Central Coast.

The priority tourist route is the NSW Coastline Cycleway, which passes through the Central Coast from Lake Munmorah in the north to Ettalong in the south, where cyclists can catch a ferry to Palm Beach. This route also incorporates the eastern parts of the Lake Munmorah Lake, Budgewoi Lake and Tuggerah Lake routes, as well as the northern and western sides of the Brisbane Water route.

The four lake / waterway routes are popular for both locals and visitors alike. There are a number of missing links along these routes and priority links would serve multiple purposes such as connecting to centres, schools and public transport as well as contributing to the completion of the NSW Coastline Cycleway. Lower priority links would be those serving recreational trips only and lower density populations.

Whilst there was considerable community feedback requesting completion of a number of missing links in the lake routes, Council's priorities should be communicated to the community so there is better understanding on what Council is trying to achieve in terms of prioritising utility and commuting trips over solely recreational trips. Further community consultation and feasibility studies would also be required to determine alignments for lakeside routes e.g. where there are environmentally sensitive areas.

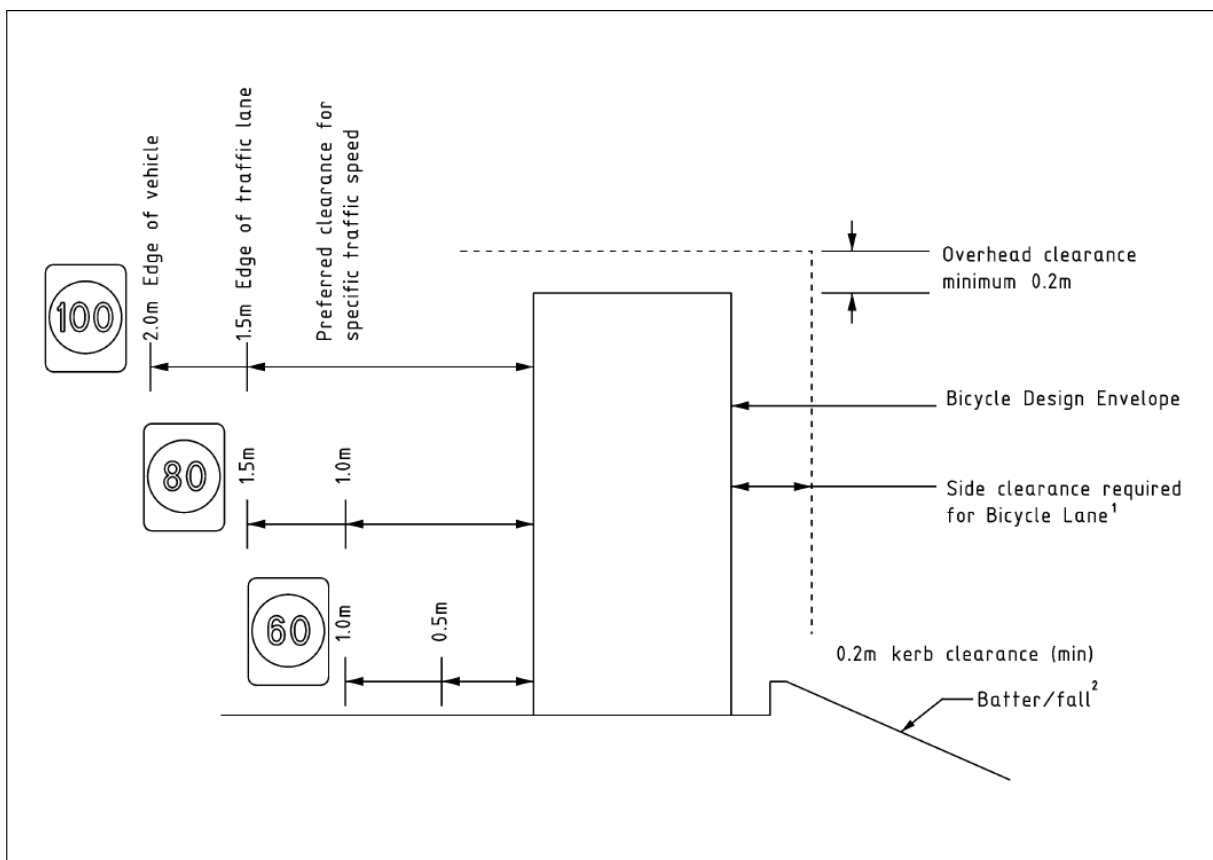
Figure 39 p.70 illustrates the key recreational and tourist cycling strategic connections proposed whilst the table and map in Appendix C show these connections in more detail.

7. Design standards

All design standards will follow the Austroads Guidelines as amended, including all relevant Technical Directions, for Cycling and Pedestrian facilities and where opportunity presents use innovative techniques to achieve the desired outcomes following the principles of safety, accessibility and connectivity.

7.1. On road bicycle treatments

On-road bicycle lanes, typically the simplest and cheapest form of treatment, are often seen as the most dangerous. The most common on-road bicycle lanes are provided on the left side of the adjacent vehicle lane separated by line marking. Austroads Guide to Road Design Part 3 (2010) includes recommended separation between cyclists and vehicular traffic, which is shown below in Figure 43. This separation is in addition to the cyclist envelope.



Source: Austroads Guide to Road Design Part 3

Figure 43: Separation between cyclists and vehicular traffic

As a minimum, the NSW Road Rules require passing distance between cyclists and vehicular traffic of 1.0m for roads with a speed limit of 60km/h and below and 1.5m for roads with a speed limit above 60km/h or more.

Issues arise at or near intersections and where car parking occurs on-street. Figure 44 p.84 shows a common situation that cyclists on the Central Coast experience where the on-road cycle lane terminates on approach to a roundabout. In this example, there is adequate space in the road reserve for the road to be widened for the cycle lane to continue through the intersection or for cyclists to be directed to the off-road shared path. For cyclists at intersections, adequate width for dedicated lanes is required as the majority of cars have a higher speed and greater acceleration.



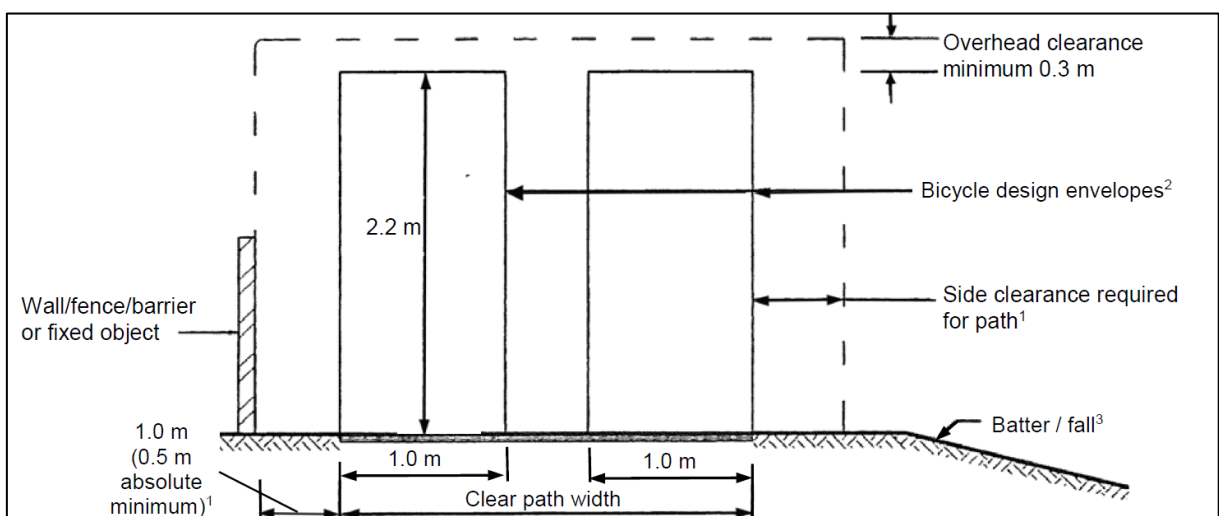
Source: Google Maps

Figure 44: Wyong Road looking north towards Beckingham Road

Adequate separation between the cycle lane and the on-street parking spaces is required to prevent conflicts between opening car doors and cyclists. Delineation between the cycle lane and the on-street parking spaces is required as Roads and Maritime does not accept the alternative option of using wide traffic lanes. The NSW Bicycle Guideline shows a separation of 1.0m between the on-street car parking spaces and the on-road cycle lane. Where adequate separation or width for both on-road cycle lanes and on-street parking cannot be provided, it is recommended to investigate removing on-street parking on one side of the road or relocating the on-road cycle lane to an off-road location.

7.2. Off road bicycle treatments

Off-road bicycle treatments can be inside or outside of the road reserve but are not constructed as part of the road pavement. These treatments include shared paths and bike only paths. Minimum widths for one-way bike paths are required to include the width for one bike 'envelope' plus the width for passing. Minimum widths for two-way bike paths are required to allow for a bike envelope in each direction of travel plus width for passing. The two-way bike path width requirements are applied to shared paths. Additional width for two pedestrians side by side should also be considered, where appropriate. Figure 45 below shows a typical cross section for a two-way off-road bicycle treatment.



Source: Austroads Guide to Road Design Part 6A

Figure 45: Two-way off-road bicycle treatment

7.3. Mixed traffic environment treatments

Cycling treatments in mixed traffic environments consider the mix of vehicular traffic with bicycles on the road pavement. These treatments are typically provided on low speed/low volume roads with a narrow cross section (e.g. local roads or CBD environments). These roads may have Local Area Traffic Management (LATM) treatments installed to reduce vehicle speeds. The NSW Bicycle Guideline recommends a maximum length of 300m for mixed traffic environment treatments and posted speeds of 40km/h or below.

Figure 46 below shows an example of a mixed traffic environment treatment or “Shared Zone” on Alison Road in Wyong. This section of Alison Road has a speed limit of 10km/h and is approximately 140m long. There are a number of LATM treatments and on-street car parking on both sides of the road.



Source: Google Maps

Figure 46: Mixed Traffic Environment on Alison Road, Wyong

7.4. Separated cycle facilities

A separated cycleway is physically separated from other traffic and pedestrians. These types of facilities are generally required where there are:

- high vehicular traffic volumes and / or speeds
- high bicycle traffic volumes and / or speeds
- high pedestrian volumes

The width of the separated cycleway needs to consider the volume of cyclists and whether passing of cyclists will be frequent and would be likely to cause safety issues.

Figure 47 p.86 shows a separated cycleway running between the rail line and the Pacific Highway in Tuggerah. This cycleway connects to Tuggerah Station however to the north terminates prior to Wyong River with no separated facilities crossing the river. The Pacific Highway carries high traffic volumes so there is a need for a separated cycleway at this location.



Figure 47: Separated cycleway on Pacific Highway, Tuggerah

Source: Google Maps

8. Action Plan

8.1. Sustainably deliver and maintain the cycling network

The draft Community Strategic Plan 2018-2028, 'One Central Coast' states Central Coast Council will 'create a regional network of interconnected shared pathways and cycle ways to maximise access to key destinations and facilities' (Central Coast Council, 2018). The provision of a safe and well-connected cycling network is the primary concern for cyclists and potential cyclists. The Central Coast has approximately 200 km of off-road and 105 km of on-road cycling facilities. Completing the missing links in the network with a focus on facilities to encourage short utility/personal business trips and longer commuting trips (in the priority areas outlined above), forms the basis for the recommended network.

Key actions to deliver and maintain the cycling network include:

- Create a priority project list – develop and implement a list of priority projects, based on the priority areas outlined in this Bike Plan. This is achieved by overlaying the future network plan on the priority areas. Links in the network that contribute to a number of priority areas will score more highly in terms of prioritisation. Auditing existing routes to ensure they meet requirements for shared use will also be necessary
- Create partnerships to deliver the network – work with and seek funding from Roads and Maritime and Transport for NSW to deliver the priority projects
- Review and improve asset and maintenance management – Review the existing program to ensure it incorporates regular maintenance of cycle facilities, such as regular sweeping road shoulders of debris and trimming overhanging branches on pathways. Promote existing channels for community members to report maintenance issues to Council.
- Research and trial the use of recycled and sustainable materials – Monitor industry trends in relation to new material and technology innovation. Identify suitable projects to trial new initiatives in order to minimise the environmental impact of shared path construction.
- Create a priority project list – develop and implement a list of priority projects whilst minimising the impact on the environment, based on the priority areas outlined in this Bike Plan. This is achieved by overlaying the future network plan on the priority areas. Links in the network that contribute to a number of priority areas will score more highly in terms of prioritisation. Auditing existing routes to ensure they meet requirements for shared use will also be necessary.

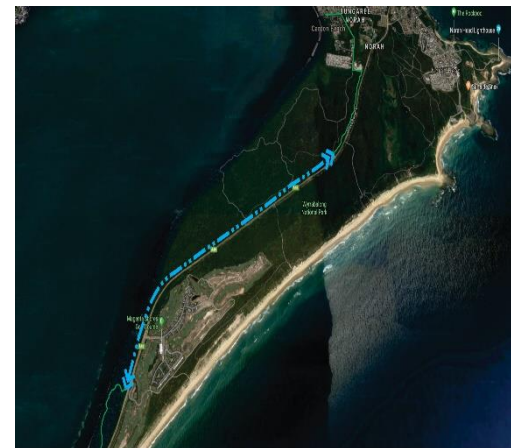
Signature Project (South): Deliver the Gosford to Point Clare Railway Shared Path

Identified in both the NSW Bike Plan (2010) and the Gosford Bike Strategy (2014), this link will reduce travel times by providing a 1km direct link alongside the northern heavy rail corridor, compared to the existing 3.5km route. It will provide a high-quality facility separated from vehicles and enhance access to the waterfront. It will encourage more cycling and walking for commuting to the Gosford City Centre and will be a drawcard for recreational and touring cyclists.



Signature Project (North): Deliver and complete the Magenta Shared Path

The Magenta shared pathway project will deliver the missing sections of the existing off-road shared pathway that runs north-south along the western side of Wilfred Barret Drive. This key link will join The Entrance in the south with Toukley to the north. It is also a section of the Tuggerah Lake loop.



Central Coast Council: Signature Projects (Construction)

8.2. Provide supporting facilities

To ensure cycling on the Central Coast is attractive, comfortable and coherent, a number of mid-journey and end-of-trip facilities should be delivered.

Key actions to provide support facilities include:

- Install bicycle racks at key destinations – review locations of existing bike racks across the LGA and develop a strategy to prioritise new installations. Priority locations may include community facilities (such as libraries, pools, parks), outside local shops and centres
- Investigate options for bike sheds at bus interchanges – investigate opportunities to provide secure bicycle parking sheds at bus interchanges. Work with Transport for NSW to link access to Opal Cards, similar to the bike sheds at Gosford and Woy Woy train stations.
- Provide end-of-trip facilities at Council offices and depots – lead by example and encourage Council employees to ride to work by providing high quality end-of-trip facilities. This may include secure bicycle parking, showers, lockers and ironing facilities.
- Provide more end-of-trip facilities for commuters across the Coast in all main CDB areas to encourage more people to cycle including ride to work, ride to school and utility riding.
- Install shared pathway lighting on key commuter routes– Consider installing lighting where shared paths carry a substantial number of cyclists during periods of darkness i.e. dawn, dusk and at night.
- Ensure other amenities to support cycling are considered in pathway planning – continue to work with the Open Space and Recreation Unit to ensure shade, water bubblers, toilets and rest areas are co-located with shared pathways.

Signature Project: Develop and implement a bicycle wayfinding signage strategy

“Directional and wayfinding signs are critical elements of any transport system to help people find their way around the network and make full use of cycle infrastructure. An effective system of bicycling directional signs can facilitate and legitimise the many and varied trips which cyclists make daily within our cities and towns” (Austroads, 2015).

As the Central Coast’s on and off-road cycling network continues to grow, so do the opportunities for more trips to be undertaken by bike for various purposes. The development of a bicycle network wayfinding strategy in accordance with recently updated standards in Austroads Research Report *Bicycle Wayfinding* (2015) would result in a consistent approach to signing the cycle network. Implementation of the signage system would raise community awareness and confidence and encourage increased bicycle travel.





8.3. Plan for sustainable active transport in all development and infrastructure projects

Cycling planning needs to be integrated into all levels of planning and delivery within Council and in planning new developments in order to achieve the Bike Plan vision and objectives.

Signature Project: Incorporate requirements for cycling and walking friendly infrastructure into all transport projects

Actions to consider for developments and for infrastructure projects include:

- Continue to deliver cycling infrastructure as part of road / intersection upgrades and road resurfacing projects where part of the strategic cycling network
- Review existing pathway network standards to ensure they meet latest Austroads and NSW Bicycle Guidelines requirements e.g. bollards in the middle of pathways mentioned in consultation, as restricts mobility for people in wheelchairs, cyclists with bike trailers etc.
- Where possible, protect the natural environment and street trees when constructing shared path and associated infrastructure.

8.4. Encourage people to choose cycling

The delivery of travel behaviour changes and education programs can be a cost-effective method of inducing more people to cycle when compared to the high cost of infrastructure. Targeted programs can be delivered to encourage people to cycle more often for more trip purposes.

Key actions to encourage more people to cycle include:

- Investigate and deliver targeted travel behaviour change programs – investigate options for delivering best-practice travel behaviour change programs to key target markets. The Switch Consortium (2016) states that the key lies in the effective combination of tried and tested behaviour change approaches and their application to specific target groups on a large scale. The core of the actions are the following four elements:
 - Undertaking personalised Travel Planning (PTP)
 - Develop arguments from a public health perspective
 - Information and Communication Technologies applications
 - Implement programs with people in a period of life change, such as moving to a new house or starting a new job.

A trial of the program could be delivered to Council staff to test its success as well as demonstrate to the community Council's commitment to encourage sustainable travel.

- Active School Travel program – implement a staged approach to active school travel with stage 1 delivering semi-structured promotion to schools tying to existing events and activities such as national Walk2School day, Ride2School days (refer Figure 48: Case Study: Examples of targeted Cycling to School from City of Sydney and Gold Coast Council:
 - Case Study: Examples of targeted Cycling to School from City of Sydney and Gold Coast Council p.92) and Bike Week. This can also include utilising and promoting existing resources and to encourage cycling to school such as those available on the NSW 'Healthy Kids' web site, as well as targeted provision of secure bicycle parking at schools
 - Investigate BikeEd to schools – investigate mechanisms to deliver annual BikeEd to schools in the LGA, in partnership with local community groups
 - Work with cycling groups to encourage new cyclists – develop a program of events to promote and encourage cycling by working with local cycling groups e.g. weekend recreational cycling, women's groups, bike buddy program, cycle recycle days or bike swaps, community challenges
 - Participate in State-wide and national events that promote cycling – similar to the Active School Travel Program utilise existing events and activities to promote cycling in the LGA e.g. NSW Bike Week festivities e.g. Bike Week Community Breakfast, National Ride2Work Day; Roads and Maritime Share the Road campaigns, Gear Up Girl community ride
 - Undertake a Ride to Work program for Council staff – lead by example and encourage staff to ride to work. Participate in State and National ride to work days, promote end-of-trip facilities to new and existing staff, investigate incentives to encourage more cycling to and between Council offices and depots.
 - Proactively promote the Minimum Passing Distance Laws (1m/1.5m) in Road Safety Driver Education Campaigns to ensure cyclist safety on the roads.

Signature Project: Support bicycle skills training and bike maintenance workshops

Riding a bike is a learned skill that improves over time. Whether returning to cycling after a lengthy absence or hopping on a bike for the first time, bicycle skills training can instil confidence in cyclists to be able to handle different on and off-road environments. Training sessions also provide the opportunity to educate cyclists on the road rules and cycling etiquette when traveling on the road and when sharing paths with pedestrians.

Cycle skills training can target different age groups and demographics, from three-year olds on balance bikes, to seniors on electric bikes. Women only, beginner adults and parent and child courses can also be delivered.

Bike maintenance workshops can cover topics such as how to change a tyre and what you should check every time you ride – brakes, tyres, wheels, gears and chain.



Source: City of Sydney (2018)

Bicycle Network is a community member-based cycling advocacy organisation. It also provides consulting services and has developed the Ride2School program with funding from several state agencies. While labelled Ride2School, the program encourages walking, scooting and cycling more often to school.



The program promotes an annual event of Ride2School day each March but it aims to support longer term change through direct engagement with schools.

The program is semi-structured in that it uses the annual Ride2School day event as an anchor for school engagement but also works with each school on a simple action plan of strategies to encourage active travel throughout the year in response to site-specific needs and issues. Strategies include small-scale infrastructure improvements such as bike racks, as well as common actions like park and walk and kiss and drop zones. Program evaluation is limited to hands up surveys from Ride2School events.

Ride2School includes a grant-based component, open to primary and secondary schools in Victoria, Tasmania and NSW. Schools can apply for grants up to \$5,000, which can be used on bike parking, Ride2School active paths, a fleet of bikes for the school, financial contributions to a new bike shed. Schools are not limited in what they can apply for, as long as they can demonstrate a willingness to support more students actively traveling to school.

The program's polished resources and event management and efficient engagement, minimising schools' effort, has enabled it to support over 2,500 schools.

Source: Gold Coast Active School Travel Program Review

Figure 48: Case Study: Examples of targeted Cycling to School from City of Sydney and Gold Coast Council:

8.5. Provide more and better information

The Central Coast boasts a wide variety of facilities and infrastructure, from a growing network of on and off-road pathways, to BMX tracks, to racing tracks to mountain bike trails. Providing this information in an easily accessible format will ensure cycling for recreation and transport becomes a simple choice for those living, working or visiting the Central Coast.

Key actions to provide more and better information include:

- Develop and launch a 'Cycling on the Central Coast' web site - develop a web site to promote all information on cycling on the Central Coast in the one place, such as:
 - Central Coast on and off-road cycle facilities and maps (hardcopy, online e.g. http://www.rms.nsw.gov.au/maps/cycleway_finder and apps, e.g. Google Maps, Bike Citizens)
 - NSW Coastline Cycleway - <https://www.nswcoastcycle.com/>
 - mountain Bike Trails (Ourimbah, Kincumber Mountain, Rumbalara and Katandra)
 - racing/ road cycling (Adcock Park Velodrome, University of Newcastle criterium track)
 - BMX Tracks (Terrigal, Umina, San Remo and Saltwater Creek Park)
 - bicycle groups (Bicycle NSW, Central Coast BUG, Central Coast Cycling Club, Central Coast MTB Club, BMX Clubs, Central Coast Touring Cycling Club)
 - bicycle businesses (bike shops, bike hire, bike tour operators)
 - bike parking at train stations
 - cycling to school and work
 - cycling safety / gear
 - report a maintenance issue.
- Promote new infrastructure once complete – to ensure the benefits of infrastructure investments are realised and become popular travel choices for the community, undertake targeted promotion of new facilities to the surrounding and broader community. This could include maps, newsletters, community events, and social media strategies to start community conversations on cycling

Signature Project: Develop and promote interactive bicycle route planning and maps

Compared to traditional hardcopy cycle maps, online maps allow for regular updates as infrastructure is completed and can also include interactive journey planners that suggest cycling routes between two or more points. Since 2012, Google maps has included cycling infrastructure and suggested routes in its highly used web site and smart phone application. More comprehensive route planners have also been developed by a number of organisations. For example, the South Australian Government 'Cycle Instead' route planner allows users to choose their route preferences, taking into account gradient, level of traffic, fastest route or to maximise off-road pathways. The 'Cycle Streets' web site in the UK has taken this approach one step further and includes information on calories burnt and CO2 emissions avoided by cycling a route compared to driving.

8.6. Monitor cycling participation

To ensure the Central Coast Council can track the effectiveness of the actions in this bike plan in achieving the vision and strategic objectives, a number of qualitative and quantitative measures should be used. These include:

- Local Government Cycling Participation Survey - Continue involvement in the annual Local Government Cycling Participation Survey (LGCPS). The LGCPS has been conducted every year since 2011 and was originally developed on behalf of Austroads to monitor progress of the National Cycling Strategy. While it is run biennially at national and state levels, it is offered annually to councils. Cycling participation rates across Australia are measured over the previous week, month and year. Central Coast Council can use their 2018 LGCPS as a baseline to monitor cycling participation and attitudes to cycling across the LGA.
- Super Tuesday / Super Sunday Bike Counts - Participate in annual Super Tuesday and Super Sunday bike counts. These counts collect data for local councils on the movements and number of people who ride bikes and can help identify areas of improvement and inform bike policy with the goal of making it easier for more people to ride every day. Super Tuesday is Australia's biggest annual commuter bike count, whereas Super Sunday is the biggest count of both cyclists and pedestrians on recreational pathways. Volunteer counters also identify whether the cyclist is male or female – this is beneficial as the number of female cyclists typically indicates how comfortable a route is. Currently, more than one fifth of all Australian councils use Super Counts to influence their bike spending and infrastructure (Bicycle Network, 2018).

Signature Project: Investigate automated bicycle and pedestrian counters on key cycling routes

Cyclist and pedestrian count data can provide transport and infrastructure planners and managers with valuable information to assist in justifying new investments. For example, counts can illustrate the types of users on a path based on usage at different times of the day, illustrate how seasonal variations can affect levels of cycling and walking and demonstrate how broader network improvements affect growth in the use of pathways.

The latest technologies are able to differentiate between cyclists and pedestrians on shared pathways and can count the number of cyclists using on-road bicycle lanes. Data is transmitted to an online server and usage patterns can be monitored on a daily, weekly, monthly or yearly basis. As opposed to costly and labour-intensive manual count data, continuous data gives a more thorough understanding of cycling activity. Real-time counters can also be used, displaying counts on electronic display boards and signs next to the pathway. This allows cyclists and pedestrians to see how their contribution counts.



Source: *Cycling Brisbane, 2018 and Eco-counter, 2018*

9. Implementation and Funding

Central Coast Council acknowledges that sustainability must be considered when developing the bicycle network and that a minimal impact approach is key to protecting the environment.

The implementation of the Action Plan will follow and be in accordance with globally recognised sustainability practices and principles. Council will ensure that all appropriate materials, resources and practices are not just cost effective but also environmentally friendly.

In return this approach will actively contribute towards place making, creating important healthy, vibrant and happy neighbourhoods and centres for everyone to enjoy.

9.1. Level 1 prioritisation criteria for new cycling routes

Two levels of prioritisation have been proposed in the development of the Bike Plan. **Level 1 prioritisation** has been applied to rank projects that are located within the Priority Routes developed in Section 5. The Priority Routes are based on:

- Priority 1: Connections to activity centres
- Priority 2: Connections to public transport
- Priority 3: Connections to schools
- Priority 4: Connections between centres
- Priority 5: Recreation and tourism routes.

The Priority Routes and resulting priority projects were identified given their potential to attract cyclists based on trip type and length. These are the recommended priority target markets for cycling on the Central Coast.

Routes which serve multiple priority areas, such as a link to an activity centre, to public transport and a connection to a school, were scored more highly than those that served a single priority area. This approach has been used to identify the routes where Council should prioritise its expenditure on shared paths infrastructure.

The Priority Route scoring methodology has been used to score each route between 1 and 5 and help prioritise the Level 1 Priority Projects required to complete each route. Figure 49: Bike Plan Priority Route Summary⁹⁶ shows the resulting strategic route priorities. A detailed list of the priority routes and their rankings has been included in Appendix A.

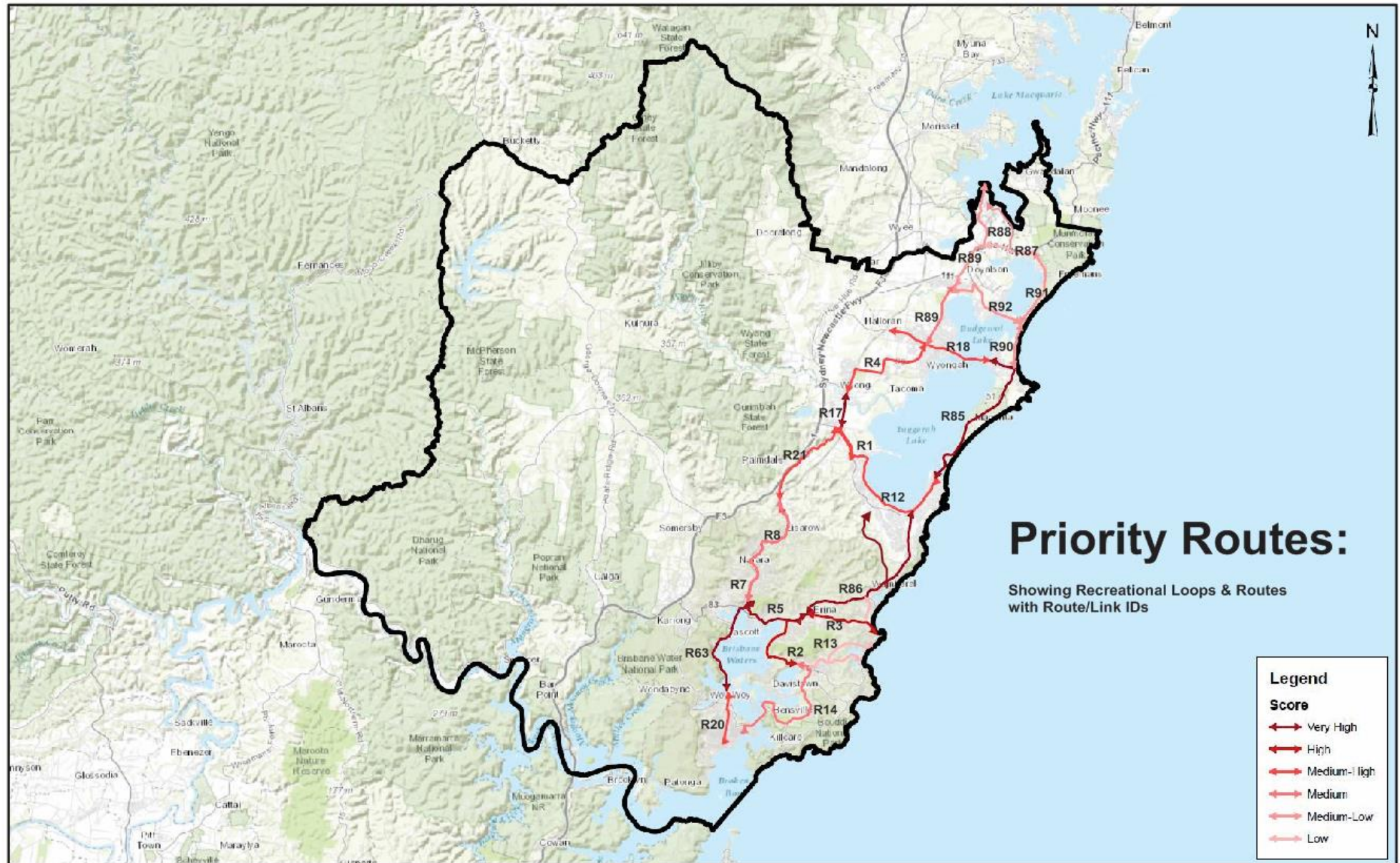


Figure 49: Bike Plan Priority Route Summary

9.2. Level 2 prioritisation criteria for new cycling routes

The Level 2 Prioritisation methodology has been developed to support evaluation of competing route locations and to assess any new projects nominated by the community or Council staff. The Level 2 criteria have been based on extensive feedback from the community and also best practice evaluation principles.

The Level 2 criteria and weighting scheme for evaluating links in the network are shown below in Table 10. This scheme has been developed in consultation with CCC.

Table 10: *Prioritisation criteria for scoring bike plan routes*

Category	Criteria	Score	Weighting
Directness	Distance	5%	10%
	Time	5%	
Safety	Separation from Traffic (%)	10%	25%
	Minimises Conflict Points	10%	
	Perceived Safety	5%	
Rider Comfort	Route Geometrical Alignment	10%	10%
Connectivity	Strategic Connectivity	10%	25%
	Latent Demand	7.5%	
	Connectivity to Attractors	5.0%	
	Legibility (i.e. deviation from most direct route)	2.5%	
Attractiveness	Quality of Infrastructure	2.5%	5%
	Attractiveness/ Aesthetics	2.5%	
Implementation	Cost	10%	20%
	Environmental Considerations	2.5%	
	Traffic Impacts	7.5%	
Tourism	Benefits all tourists	5%	5%

It is relevant to note that when developing the Level 2 criteria, a number of other strategic planning criteria were considered but ultimately excluded. For example, 'bicycle transport to improve public health' or 'increasing bicycle mode share to decrease environmental impacts from vehicle emissions' are applicable to all paths, essentially cancelling out their scores when comparing options.

9.3. Cost estimate considerations

This Bike Plan considers the construction of shared paths only. During the community engagement process on-road bike lanes were identified as being unsafe and undesirable. The average cost per metre for the construction of pathways (1.5m wide) and shared paths (2.5m wide) have been developed based on actual construction costs.

The costs used to develop the priority works plan are as follows. It is important to note that the costs should be considered a *minimum* cost:

- shared path 2.5m wide - \$450 per metre
- regional shared path 3.0m wide - \$540 per metre
- recreational shared path 3.5m wide - \$630 per metre

A number of the shared path links identified require works adjacent to main roads, connections over rivers or water bodies and / or require additional enabling transport infrastructure such as retaining walls and access crossing adjustments. For these links, the following cost factors have been applied to allow for site specific constraints:

- shared path with moderate constraints - \$1000 per metre
- shared path with significant constraints - \$2000 per metre

Note, the cost of construction for all the shared path links will be refined during project development and could be significantly more subject to topography, existing infrastructure, environmental constraints and the final alignment of each shared path link. Shared path costs are known to range up to \$6,000 per metre as a result of these impacts.

For the costs for rectification of issues identified during existing facility audits, such as renewal or maintenance works, the following costs were applied:

- vegetation clearing - \$500 per location
- crossing condition (i.e. line marking) - \$1,000 per issue location
- path condition (i.e. pavement grinding or patching) - \$400 per location
- relocating bollards, posts or signs - \$1,000 per location
- relocating power poles and telegraph poles - \$20,000 per location
- narrow paths (i.e. modifying retaining wall) - \$20,000 per location
- kerb ramp (i.e. re-build) - \$2,000 per location
- Tactile Ground Surface Indicators TGSI (i.e. re-install) - \$200 per location

As this Bike Plan was prepared alongside the PAMP, this Bike Plan only considers the rectification and renewal of shared paths and cycleways and not footpaths. The rectification and renewal of footpath issues are included in the PAMP.

9.4. Works plan

The works plan has been developed comprising Level 1 and Level 2 projects based on the Priority Route scoring methodology. The works plan includes a combination of new facilities and improvements to existing facilities. The final works schedule is provided in Appendix A.

Priority Route projects have been ranked based on the Level 1 Prioritisation methodology and its one to five scoring system. The application of the scoring resulted in a number of segments achieving the same final score. To further differentiate these segments a rank was applied based on cost i.e. lowest cost to highest cost.

The Level 2 Other Connections work plan includes all other projects outside the Priority Routes and the projects have been ranked based on cost i.e. lowest cost to highest cost.

The shared path routes contained in the works plan have been identified at a strategic level. The exact alignment of these shared paths will be refined as part of the project development

process which will involve further community consultation. The final route alignments may be subject to change as part of this process.

In total, the Bike Plan has identified approximately \$291.3 million of projects comprised of:

- \$32.3 million for two signature Level 1 Priority Projects – the Point Clare to Gosford Railway Shared Path and continuation of the Magenta Shared Path
- \$118.3 million for other Level 1 Priority Projects
- \$140.7 million for Level 2 Other Connections i.e. other projects outside the Priority Routes

During the development of the Bike Plan, Council suggested a number of specific projects for consideration which have been incorporated in the final Works Plan. These were:

- Mannering Park to Chain Valley Bay Shared Path – two options have been mapped. One, via Rutleys Road and one via the foreshore to Kingfisher Shores. The preferred alignment will be determined following further consultation and design investigations.
- Tuggerawong foreshore from Friday Street to Don Small Oval, Rocky Point
- Barrenjoey Road, Ettalong Beach from Maitland Bay Drive to Uligandi Street
- Bungary Road, Norah Head from Wilfred Barret Drive to Maitland Street
- Carrak Road, Kincumber from House Number 8 to the Avoca Drive
- Malinya Road, Davistown from Henderson Road to Coomal Avenue
- Cresthaven Avenue, Bateau Bay from Dunning Avenue to Sir Joseph Banks Drive
- Sparks Road, Woongarra from Peppercorn Avenue to Mary McKillop Drive
- Pacific Highway, Hamlyn Terrace from Louisiana Road to Craigie Avenue
- Eastern Road, Tumby Umbi from opposite Grandis Place to Sherry Street
- Kurrawa Avenue, Point Clare from the existing cycleway underpass to Alukea Avenue
- Avoca Drive, Avoca Beach from The Round Drive to Empire Bay Drive, Kincumber
- Tumby Road, Wamberal from Central Coast Highway to Bellevue Road
- Chittaway Road, Chittaway Bay from Lakedge Avenue to Kauai Avenue.

9.5. Funding options

9.5.1. Council controlled funding

In the 2018/19 financial year, Council proposed to spend \$5.8 million on shared paths and footpaths. This is approximately 7.8% of the total capital expenditure from the roads, transport and drainage budget. Expenditure on shared paths and footpaths across the Central Coast equates to approximately \$17.70 per resident. A comparison of Central Coast LGA expenditure with the expenditure of other local governments indicates that Council is spending more on bicycle facilities per annum than most other Council's:

- City of Sydney - \$30.34 / resident (2015/16 for cycling projects only)
- Newcastle LGA City Council - \$16.70 / resident (2018/19 for cycling projects only)
- Lake Macquarie City Council - \$9.00 / resident (2017/18 for footpaths and cycleways)
- Coffs Harbour City Council - \$2.18 / resident (2018/19 for footpaths and cycleways).

Committing to a dedicated annual budget and program cycling facility improvements in the LGA will be important to achieving the momentum needed to create a connected, safe and direct bicycle network and to increase overall mode share of trips by cycling.

A cost benefit analysis undertaken by Queensland Department Transport and Main Roads (2016) on cycling projects in Australia indicate that on average every \$1 invested in cycling infrastructure will return nearly \$5 in economic benefits to the local community. Benefits include health-related savings, environmental savings associated with reduced air and noise pollution and gas emissions, and lower transport costs.

The greatest benefits realised were related to health with research consistently showing that people who are less physically active are more likely to develop health problems like heart disease, cancer and type-2 diabetes. Cycling, as a form of physical activity, reduces these health risks and therefore benefits the economy. Cycling is also a low impact exercise and therefore suitable to a large the high proportion of residents on the Central Coast, resulting in potential greater health benefits for an aging demographic.

In addition to the benefits to residents realised by increased mode share to cycling, investment in cycling can also bring to the region economic benefits associated with increased tourism.

9.5.2. Roads and Maritime Services

Roads and Maritime will generally fund works on State Roads. State roads are 100% funded by Roads and Maritime, whereas works on Regional and Local Roads are Council responsibility. Figure 50: Central Coast State & Regional Roadsp.101 shows the Central Coast State & Regional Road network.

Within the study area, the following classifications apply for funding purposes:

- State roads – Pacific Motorway (M1), Pacific Highway (A1), Central Coast Highway (A49) Wyong Road (B74), Sparks Road (B70), Wallarah Road (B70), Main Road (B70), Terrigal Drive (MR505), Avoca Drive (MR504)

All other roads are considered local roads and are under the jurisdiction of CCC. Cycling and Walking Program Guidelines 2018-19 includes the following funding sources:

- Connecting Centres Council Partnership Program – funding available up to 50% for construction and up to 75% for non-infrastructure, planning, design and evaluation projects. Aims to connect local bicycle networks to key destinations such as schools, workplaces, public transport and the shops. Infrastructure (including bike parking) and non-infrastructure projects can be funded.
- Priority Cycleways Program – available to Councils and state government with funding available for up to 100% of project on local, regional or state roads to major generators such as universities, public transport interchanges and commercial centres. Projects must be part of an identified Priority Cycleways or cycleways on state owned assets and aim to connect major generators.
- Cycling Towns Program – available to Councils and state government within 5kms of a town centre with funding available for up to 100% of project on local, regional or state roads. Councils must demonstrate supporting complementary cycling promotion initiatives to encourage infrastructure use and can also include bike parking. Gosford and Wyong are eligible under this funding program.

9.5.3. Federal Government

The Federal Government has a number of funding programs that are applicable for this Bike Plan, which include:

- Roads to Recovery Program
- Black Spot and Safer Roads Program
- Active Transport Program
- Local road grants
- Financial assistance grants to local government
- Nation Building Program
- Infrastructure Australia funding or advice.

9.5.4. Section 7.11 and 7.12 Contributions

The Environmental Planning and Assessment Act 1979 contains provisions which allow a consent authority to impose a contribution requiring the dedication of land free of cost or the payment of a monetary contribution, or both, for the provision of public amenities or public services.

Council may seek contributions for new cycling facilities or upgrade existing facilities to cater for increased demand by new developments provided a contributions plan is in place.

9.5.5. Other funding sources

Other potential funding sources include:

- opportunities may exist for local community groups to assist Council in implementing some of the works particularly the minor works
- works associated with specific services, such as broken or sunken Telstra pits, are usually carried out by the respective service providers

9.6. Implementation plan and monitoring and evaluation

The next stages in the Bike Plan are to:

- pursue funding sources to establish an ongoing budget
- establish an implementation program over the next 5 years (within the 10 year horizon)
- monitor the implementation of the Bike Plan and its outcomes against its objectives

A monitoring and evaluation program works is recommended. This monitoring program should include:

- a record of all proposed works
- analysis of crash statistics (pre and post implementation)
- cyclist count information (pre and post implementation)
- cycling participation survey outputs

This bike plan is recommended to be reviewed every 2-3 years and updated accordingly.

10. Conclusions and recommendations

The Community Strategic Plan (CSP) identified that active transport was a key strategic focus for the community. This Bike Plan has been developed to achieve the strategic outcomes identified in the CSP. The Bike Plan follows Roads and Maritime methodology and combines the previous Bike Plans prepared for the former Gosford Council and former Wyong Council.

Community engagement through community drop-in sessions, workshops and online engagement achieved high participation rates. The online survey and interactive map attracted more than 900 and 1300 respondents respectively.

The key themes that arose from the engagement process include; continuity of paths and routes, connectivity to key attractors, accessibility, safety and the provision of signage and facilities. These factors have been used as the basis for development of the Bike Plan.

The design standards adopted by CCC are consistent with state and national standards with a few exceptions that have been recommended to be updated. For the purpose of this Bike Plan, the design standards would apply to the construction of new pathways.

The prioritisation of routes was based on connections to: activity centres, public transport, schools, between centres, and to recreational and tourist cycling. Each identified candidate route was scored based on how many criteria it achieved. Refer to Appendix D for the Priority Route list and mapping.

The Priority Routes were also used as the basis for detailed audits of the network to identify existing issues. The key audit criteria were missing links, maintenance issues, obstructions to paths, crossing points and other critical issues. Refer to Appendix E for the Audit list and map.

The costing of works for the Bike Plan only considered off-road shared path links based on the overwhelming feedback received during the community engagement regarding a clear preference for off-road routes. Refer to Appendix A for the full list of the priority projects and Appendix B for the associated project mapping.

Application of the adopted rates to the prioritised routes resulted in the following total costs:

- rectifying existing maintenance issues and improvements: \$0.5 million
- constructing two signature Level 1 Priority Projects: \$32.3 million
- constructing all other Level 1 Priority Projects: \$147.4 million
- constructing all Level 2 Other Connections: \$158.6 million

A number of additional recommendations of this Bike Plan are:

- once a comprehensive network within 2.5km of public transport interchanges is complete, extending these up to 5km is recommended to increase route quality in these catchments and encourage greater use of cycling access to public transport on the Central Coast
- initiate separate studies for each school in the LGA to investigate their catchments for new shared paths
- when a new bike route is planned, the Level 2 Prioritisation methodology is recommended to be applied to rank the project and assess the route options

It is further recommended that a monitoring and evaluation plan is implemented to determine the effectiveness of the projects in achieving the objective stated in this plan.