

Wyong Shire Council



On-Road Bicycle and Shared Pathway Strategy



Wyong
Shire
Council
CENTRAL COAST

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EXECUTIVE SUMMARY

On-road bicycle lanes and shared pathways play an important role in supporting Wyong Shire Council's goal of enhancing the quality of life of residents and visitors, both now and into the future. Bicycle lanes provide an efficient alternative transport route and training corridor for cyclists whilst shared pathways can be utilised by the entire community for a range of social, transport and recreational reasons.

The Wyong Shire On-Road Bicycle and Shared Pathway Strategy is a culmination of extensive research and community engagement process incorporating input from pedestrians, walking groups, social and competitive cyclists, students, community groups and the wider community.

The strategy demonstrates 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 walking and cycling activity.

The Wyong Shire On-Road Bicycle and Shared Pathway Strategy comprises three reports.

The **Wyong Shire On-Road Bicycle and Shared Pathway Strategy** sets a direction and policy framework to achieve an improved on – road cycling and shared pathway network and environment over the next 10 years. It establishes a long term vision for formed on-road bicycle routes, shared pathways and cycling activities and identifies a range of infrastructure requirements (e.g. cycle lanes, parking, etc), and behavioural requirements (e.g. education and promotional activities) necessary to deliver the vision.

The **Background and supporting information report** provides an overview of the policy context of cycling within the community, the key findings from the community engagement and key planning and design issues that are critical in establishing an effective path and connected network.

The **Action plan** identifies the key actions that are necessary to achieve this vision and the ten priority pathway projects that Council will focus on to improve the connectivity, accessibility and use of the existing network.



CHAPTER 1: INTRODUCTION

On-road bicycle lanes and shared pathways play an important role in supporting Wyong Shire Council's goal of enhancing the quality of life of residents, both now and into the future. Bicycle lanes provide an efficient transport and training corridor for cyclists whilst shared pathways can be utilised by the entire community for a range of social, transport and recreational reasons.

Bicycle lanes and shared pathways provide many benefits, including:

- Encouraging healthy lifestyles;
- Improved community health and wellbeing of residents;
- A sustainable alternative transport system;
- Contributing to reducing traffic congestion, noise, and air pollution caused by cars;
- Improved access and sociability within communities;
- An important recreational activity.

Increasing the visibility and safety of cycling and walking throughout the Shire will help to encourage the use of bicycles and shared pathways and improve the quality of life of the local community.

1.1 Purpose of the Strategy

The Wyong Shire On-Road Bicycle and Shared Pathway Strategy provides the framework for the development and coordination of formed on-road bicycle routes and off – road shared pathways and the delivery of initiatives to support their use throughout the Shire. The purpose of the strategy is to:

- Establish a vision for cycling and walking on formed paths in the Shire;
- Define the principles for a formed on-road and off-road network;
- Provide direction to support and encourage participation in walking and cycling activities and achieve a greater level of on-road bicycle and shared pathway use.

1.2 Vision

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.*

1.3 Relationship of Strategy to the Shire Strategic Vision

The Shire Strategic Vision establishes the strategic vision for Wyong Shire and the direction for the community over the next 20 years. The specific actions relating to the development and support of cycling and walking initiatives within the vision document include:

- Expanding and supporting programs that increase participation among all ages.
- Expanding and supporting programs and activities that encourage and enhance neighbourhood connections.
- Improving and linking the bicycle/shared pathway network and related facilities to encourage more cycling opportunities.
- Improving commuter parking at railway stations and commuter hubs along the freeway.
- Providing and maintaining local and regional community facilities for recreation, culture, health and education.
- Providing and maintaining a range of community programs focused on community development, recreation, culture, environment, education and other issues.
- Providing recurrent funding for community support and development services.
- Promoting community facilities to help maximise their benefits and use.
- Improving and promoting public access to environmental areas.
- Establishing and maintaining projects and programs to encourage more active participation in community based environmental activities.
- Creating and promoting a network of renowned natural trails.
- Establish shared pathways around the entire Tuggerah Lakes system that connects to Lake Macquarie to enhance a lakes focus for Wyong Shire.
(Source: Shire Strategic Vision, 2009, 32)



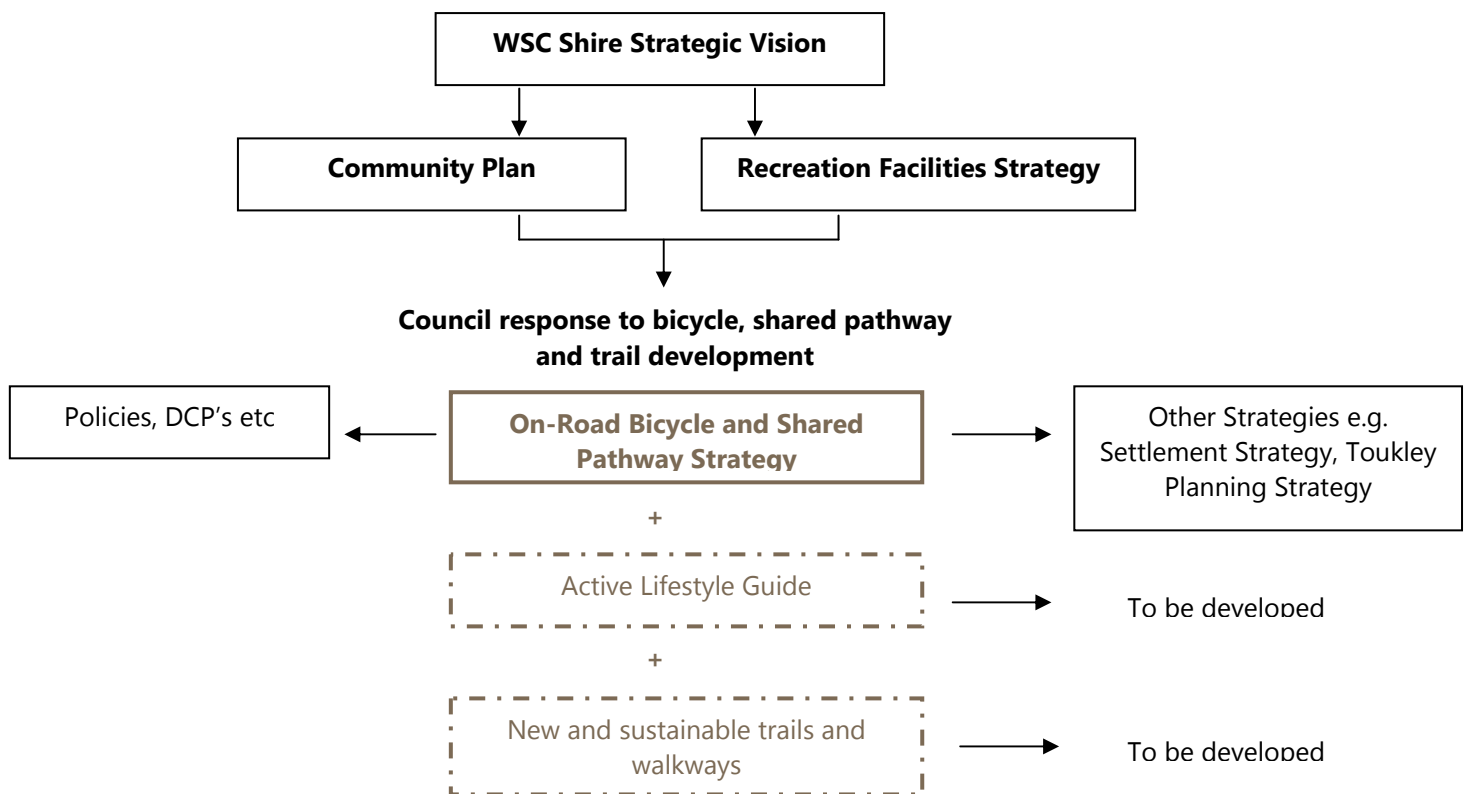
The Shire Strategic Vision also establishes Council’s Asset Management Strategy and the approach Council will take in managing existing and new assets over the next 20 years. The specific implications relating to the management of cycling and pedestrian infrastructure include;

- Community facilities, including community, sporting, and recreation areas are a priority assets;
- There will be a focus on providing higher levels of maintenance and rebuilding of community facility assets and upgrading the bicycle and shared pathway network.

(Source: Shire Strategic Vision, 2009, 32)

1.4 Context of Strategy

Within in the framework of the Shire Strategic Vision, two key strategic plans inform Council’s response to bicycle, shared pathway and trail development; The Community Plan and the Recreation Facilities Strategy. This is identified in the diagram below.



1.5 Strategic Aims

The **aims** of the On-Road Bicycle and Shared Pathway Strategy are:

- To guide the sustainable development of a connected on-road bicycle and off-road shared pathway network throughout the Shire;
- To identify facilities and infrastructure necessary to support and encourage the use of on-road bicycle lanes and off-road shared pathways; and
- To support and encourage use of on-road bicycle lanes and shared pathways throughout the Wyong Shire.

1.6 Strategic Objectives

The **objectives** of the On-Road Bicycle and Shared Pathway 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 walk and cycle;
- 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; and
- Encourage the community's use of the on-road bicycle and shared pathway network.

1.7 Methodology

The methodology adopted in developing the Wyong Shire On-Road Bicycle and Shared Pathway Strategy incorporated the following stages:

Research

- A review of key strategic planning documents and their implications for cycling and shared pathway development within Wyong Shire;
- An examination of the current and projected profile of the Wyong population and its relevance to bicycle lanes and shared pathways;
- An examination of the benefits of walking and cycling, participation levels and trends;
- An examination of existing pedestrian and cycling infrastructure within Wyong, the profile and skills of bicycle and shared pathway users and the implications for route development, supporting infrastructure, education and promotional activities.



Community Engagement

- An extensive community engagement process to understand the existing on-road bicycle and shared pathway environment, key attractors / generators and the actions necessary to support and encourage cycling and walking activities within the Shire.
- Engagement of elected Councillors to understand their aspirations for on-road bicycle and shared pathway development throughout the Shire.

Strategy Development

- The development of principles for a formed on-road and off-road network, infrastructure and social initiatives necessary to support and encourage participation in walking and cycling activities.
- The development of an assessment tool to assist Council in prioritising future routes.
- Input from elected councillors on the planning, design and management principles for on-road bicycle and shared pathway development throughout the Shire.



CHAPTER 2: STRATEGY PRINCIPLES

The On-Road Bicycle and Shared Pathway Strategy builds upon existing infrastructure and addresses the key issues and aspirations identified by the community.

The strategy aims to connect local communities to key local facilities whilst creating strategic suburban links to create an interconnected network. Actions which enhance the use of the existing infrastructure are proposed while others are aimed at encouraging and supporting new users. The end results will be a network of interconnecting bicycle and shared pathways supported by quality programs, information and infrastructure.

The following section outlines the key directions Council will take to achieve these objectives.

2.1 Network Destinations

The key attractors and generators the Wyong Shire On-road bicycle and shared pathway network will provide linkages to are identified in Table 2.1.

Table 2.1: Key Attractors + Generators of the Wyong Shire Bicycle and Shared Pathway Network

Attractors + Generators	Primary Locations Include
Open Space, Sport and Recreation Facilities	Major parks and foreshore areas, rivers, wetlands, bushland and beaches, sportsgrounds, playgrounds, BMX/skate parks, aquatic facilities and recreation centres
Community Facilities	Libraries, youth facilities and cultural/art centres, community centres
Shopping Precincts	Major shopping centres, village centres, corner shops
Medical Facilities	Local GP's, medical specialists/consulting rooms, Wyong hospital
Educational Institutions	Infant, Primary, Secondary, Tertiary schools/colleges, TAFE
Employment Zones	Major business parks, employment zones, and retail/commercial areas
Public transport Facilities	Railway stations, bus interchanges
Tourist Facilities and Attractions	Holiday parks, beaches, lakes, cafes, major parks, playgrounds, landmarks
State + Regional Road Network (Bicycle Training Routes)	Wyong Road, Central Coast Highway, Wilfred Barrett Drive, Budgewoi Road, Elizabeth Bay Drive, Scenic Road, Pacific Highway, Sparks Road, Enterprise Drive



2.2 Network Path Type

There are a number of different types of path users within the community, each of which has varying skills and expectations that need to be provided for. An indication of the variety of users includes;

- **Cyclists** - Commuters, athletes, utility riders, students, children and recreational;
- **Pedestrians** – Joggers, walkers, dog walkers, people pushing prams, elderly, families, people with a disability (visual, cognitive, hearing and mobility impaired); and
- **Other wheel vehicles** – Wheelchairs, electric scooters/gophers, inline skaters, skate boarders, roller skates, and scooters (adapted from Austroads, 1999, 69).

The bicycle and shared pathway network takes into consideration the needs of all potential users of formed paths.

Table 2.2 outlines the major categories of pathway users, their characteristics, skills and identifies the type of path treatment which best suits their ability. Table 2.3 identifies the key destinations which will form the foundation of the bicycle and shared pathway network, the users most likely to access these destinations and specifies the type of path which best suits the skills of users.

Table 2.2 a: Characteristics of Pathway Users and Recommended Path Type

Functional Category	Characteristics	Recommended Path Type
Pedestrians (Including users with restricted mobility and a disability)	Skills, ages and abilities vary greatly. A number of trip purposes and desire a range of experiences; from pleasant, passive and social to high- level recreation. Peripheral vision and visibility often limited. Require flat, safe and stable surfaces. Try to avoid highly congested routes.	Footpath
Pedestrians (Including people using wheelchairs and other wheeled vehicles)	Skills, ages and abilities vary greatly. A number of trip purposes and desire a range of experiences. Mobility often constrained, use of mobility scooters + wheelchairs. Require flat, safe and stable surfaces. Try to avoid highly congested routes.	Shared path
Recreational cyclists	Cycling skills and ages vary greatly. Desire pleasant recreational experience. Try to avoid congested and trafficked routes.	Shared path



Table 2.2 a: Characteristics of Pathway Users and Recommended Path Type (Cont'd)

Functional Category	Characteristics	Recommended Path Type
Commuter cyclist	1st type prefers low stress roads and is willing to take longer time and route. 2 nd type prefers a more direct route and is concerned with time. Usually highly skilled and can handle busy roads.	Shared path OR On-road lane On-road lane
Utility cyclist	Cycle for a variety of purposes, e.g. shopping, travel to community facilities, to visit friends. Cycle relatively short distances. Skills vary greatly.	Shared path OR On-road lane
Touring cyclist	Take long distance journeys and short trips to areas of tourist significance. Route choice is similar to visiting tourists.	On-road lane OR Shared path
Sports cyclist in training	Travel long distances Routes may involve challenging terrain. Similar needs to commuters.	On-road lane
Infant + Primary school age cyclists	Undeveloped cognitive skills. Lacking peripheral vision. Little knowledge of road traffic rules. Require adult supervision.	Shared path
Secondary + Tertiary school age cyclists	Cycling skills vary greatly. Aged 14+ years, mostly cycle on-roads as route are often faster and more direct.	On-road lane

(Adapted from Austroads Guide to Traffic Engineering Practice Part 14: Bicycles, 1999, 4-5)



Table 2.2 b: Synthesis of key attractors and generators with users

Key Attractors + Generators	Primary Users	Recommended Path Type
Open space, sport and recreation facilities	Pedestrians Recreational cyclists Touring cyclist * Infant + Primary age children * Secondary + Tertiary students*	Shared path
Tourist facilities & attractions	Pedestrians Recreational cyclists Touring cyclist * Infant + Primary age children * Secondary + Tertiary students*	Shared path
Community facilities	Pedestrians. Recreational cyclists. Infant + Primary age children. Touring cyclist*. Utility cyclists*. Secondary + Tertiary students*.	Shared path
Shopping precincts	Pedestrians. Utility cyclists. Infant + Primary age children. Secondary + Tertiary students*.	Shared path
Educational Institutions	Pedestrians. Infant + Primary age children. Secondary + Tertiary students*.	Shared path
Public transport facilities	Commuter cyclists.	On-road lane
	Pedestrians. Infant + Primary age children. Secondary + Tertiary students*.	Shared path
Employment zones	Commuter cyclist.	On-road lane
	Secondary + Tertiary students*.	Shared path
Bicycle training routes	Sports cyclist in training.	On-road bicycle lane
Medical facilities	Pedestrians. Utility cyclists*.	Shared path

* There is potential to encourage these bicycle users onto the Primary on-road bicycle network through providing a safe on-road bicycle network. This could be achieved through providing visual or physical separation of cyclists to motorists. Off-road bicycle only paths have the potential to achieve similar benefits. This will also assist to reduce congestion on the shared pathways network.



2.3 Path Catchments

The Bicycle and Shared pathway network is based upon catchment distances of 1.5 – 2.0km radius or 5 minutes ride identified in the NSW Department of Planning's Guidelines for Walking and Cycling (2004, 19).

Linkages are aimed at providing residents located within 1.5 – 2.0km (easy five – minutes ride) of key attractors with a link to that facility. Residents living outside of these immediate catchment distances will be connected primarily via low volume/low speed local feeder streets, which will be assisted through the development of local area traffic management plans.

2.4 Network Hierarchy and Development

The on-road bicycle and shared pathway network is based upon a network of linkages aimed at providing key connections throughout the Shire. They consist of both on-off road and on-road routes with the path types based upon the characteristics of key users identified in table 2.2a and 2.2b.

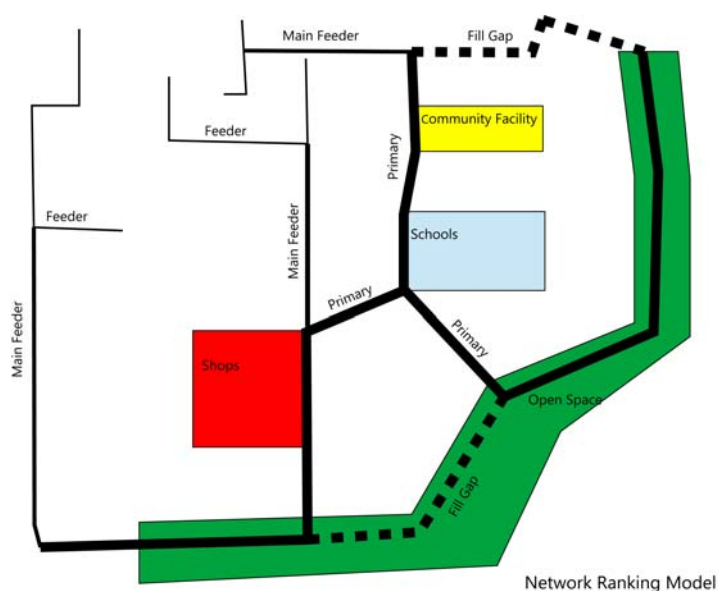
Primary links consist of high quality, high-priority routes which will generally provide the most direct means of travelling between the key attractors and generators.

Feeder links will provide connections to primary routes and in many instances may also provide an indirect means of travelling to the key attractors and generators.

Community linkages will generally provide the key connections between communities. They are essential in developing an inter-connected Shire - wide network.

The proposed bicycle and shared pathway network builds upon the existing infrastructure and where practical utilises the vast and highly developed road network located throughout the Shire. Figure 2.4 illustrates the function of paths and identifies the principles on which the network will be developed.

Figure 2.4: Path function and Network Development



2.5 Prioritisation of Network Development

The bicycle and shared pathway network aims to provide linkages to variety of destinations throughout the Shire. To facilitate the strategic delivery of the network, prioritisation of routes is essential.

The strategic criteria used to prioritise linkages are:

- **Completion** - the extent to which the link closes gaps in existing network;
- **Connectivity** - the extent to which the route provides links to key attractors / generators;
- **Safety** - the extent to which the link improves safety to path users;
- **Environmental**- the extent to which the link supports sustainable practices;
- **Economic** – the extent to which the link is financially affordable and sustainable.

The Route Prioritisation Matrix, the project assessment tool used to prioritising future linkages, is located in Section 3.11.

2.6 Path Widths and Operating Space

Cyclists are vulnerable road users compared to motor vehicles and require safe clearances from cars in order to remove potential for physical contact. Similarly, pedestrians require adequate distance from other path users in order to remove potential for physical contact and minimise feelings of intimidation. A safe and usable operating space is essential.

The width of bicycle lanes and shared pathways should be designed based upon the different type, skills and characteristics of users, the trip purpose and projected volume of use. For routes within new residential areas, this may require the allocation of additional land within road corridors and modification of Development Control Plans. For routes within existing urban areas, this may require a re-allocation of existing road space using techniques identified in Table 3.1c.

Tables 3.1a and 3.1b in Section 3 highlights the recommended path widths and clearances for shared paths and on –road separated paths and respectively. Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths, 2009 provides further guidance on path widths for a range of path types and intensities of use.

2.7 Path Surface

There are a number of factors that need to be considered when choosing a surface for formed on-road bicycle lanes and off-road shared pathways; abilities and needs of primary users; the implications of defects on use; maintenance and whole-of-life costs etc). Due to the range of abilities and needs of pathway users, asphalt and concrete are identified as the most functionally appropriate materials for most users of formed on-road bicycle lanes and off-road shared pathways.

The on – road bicycle and off-road shared pathway surfaces should be designed to accommodate the primary users identified in Table 2.2a and 2.2b.



2.8 Shared Path Locations and Flooding

As a coastal community with an extensive lake system, Wyong Shire is particularly vulnerable to flooding. There is also potential for permanent coastal inundation and increasing coastal hazards associated with changing weather patterns and extreme weather events.

Sea level rise is an incremental process and will have medium- to long-term impacts. Projections of sea level rise along the NSW coast are for a rise relative to 1990 mean sea levels of 0.4m by 2050 and 0.9m by 2100 (NSW DECCW, 2009, 1).

To minimise the risk of damage from flood inundation and coastal hazards, future foreshore shared pathways will be located outside of the 2050 sea level rise planning levels as identified by the NSW Government in "NSW Sea Level Rise Policy" 2009. This will provide adequate buffer distances between the foreshore and future development.

The location of existing foreshore pathways will be reviewed against the 2050 sea level rise planning levels as they near the end of their asset life threshold, which is calculated at approximately 30 years.

2.9 End of Trip Facilities

In addition to a network of network of safe and convenient routes, bicycle and shared pathway users need access to a range of supporting facilities.

Cyclists need a secure place to park their bicycle when they arrive at their destination, whether it is for 5 minutes or the whole day. Bicycle commuters also need convenient access to shower and change facilities at their place of employment. Pedestrians and cyclists, particularly children and the elderly need frequent access to rest stops, public amenities and drinking facilities. The lack of these supportive facilities is a major deterrent to widespread participation of walking and bicycles for everyday use.

Council will demonstrate leadership and support the provision and access to end of trip infrastructure through a range of initiatives including;

- Developing performance criteria for the provision of end of trip infrastructure;
- Incorporating infrastructure and performance criteria provision into relevant planning tools;
- Encouraging and developing partnerships with the private sector to provide infrastructure at their buildings and workplaces;
- Lobbying public authorities to provide and safely locate facilities at public transport interchanges;
- Incorporate infrastructure access and provision within Council projects;
- Providing facilities to encourage Council employees to cycle.



2.10 Maintenance of Network

The characteristics of both pedestrians and bicycles mean that minor defects are likely to present a greater safety issue to path users as compared to motorists. Pedestrians and cyclists are more easily to trip or lose control as result of cracked and lifting pavements, gaps between road joints, intruding vegetation and build-up of debris.

The maintenance of the bicycle and shared pathway network is essential to ensure safety to pathway and network users in addition to maximising community use of this infrastructure.

To support the existing and future use of the network, a comprehensive maintenance schedule incorporating the following key actions is essential;

- Route inspections;
- Route sweeping;
- Trimming of vegetation;
- Line marking

2.11 Planning initiatives

Council can influence the level of pedestrian and bicycle participation and infrastructure provision within the Shire through land use planning strategies and policies.

To support the attainment of the visions of the bicycle and shared pathway strategy, Council will revise Local Environmental Plans (LEP), Development Control Plans (DCP) and other relevant planning instruments including internal policies, with the objective of;

- Better integrating land use and pedestrian / bicycle transport;
- Providing greater transport choice and accessibility to pedestrian and cycling infrastructure;
- Encouraging more sustainable transport modes other than the private car, such as public transport, walking and cycling;
- Incorporating the Heart Foundations "*Healthy by Design*" principles;
- Incorporating '*Healthy Spaces and Places*' Design principles;
 - ◇ Provide for active transport;
 - ◇ Develop aesthetic facilities to increase and motivate people to be more active;
 - ◇ Provide connections for direct travel between destinations;
 - ◇ Provide environments that are safe and easily accessible for all members of the community
 - ◇ Support mixed density residential development
 - ◇ Support mixed land use including residential development, shops, employment community and recreation facilities and parks and open space. This makes alternative forms of transport to the car, such as public transport, walking and cycling, more viable.
 - ◇ Provide quality open space;
 - ◇ Support social inclusion;
 - ◇ Provide infrastructure that encourages and supports regular and safe physical activity



- Integrating 'Crime Prevention Through Environmental Design Safer by Design (C.E.P.T.E.D) principles into project design and development assessment;
- Developing standards for the future provision of pedestrian and cycling infrastructure including pathways, bicycle parking, bicycle storage and amenities;
- Identifying funding for the delivery of pedestrian and cycling infrastructure.

2.12 Promotion and Supporting Initiatives

The promotion of walking and cycling are integral to raising community awareness and participation of these activities, their benefits and improving and the perception of cycling in general. It is also important to increase public awareness of the pedestrian and bicycle facilities that exist within Wyong Shire, so that the community may take advantage of them.

Council will underpin the development of infrastructure through a range of initiatives including;

- Innovative programs that encourage the community and to cycle; e. g. learn to ride workshops, community bike rides
- Innovative policies and facilities that encourage Council employees to cycle;
- Developing interactive network maps;
- Participating in and supporting national cycling and walking initiatives;
- Educating the community on the benefits of cycling and walking as a way of improving their quality of life.



CHAPTER 3: DESIGN AND MANAGEMENT PRINCIPLES

For Council to support and encourage use of formed on-road bicycle lanes and shared pathways throughout the Shire, a number of design and management issues have been identified as being critical to the success and viability of the network. This section details the key matters that should be considered when developing bicycle and shared pathway facilities throughout the Wyong Shire.

As this is a strategic document, detailed design issues have not been considered comprehensively. These issues would need to be addressed at the design stage of each proposed project. The major guidance documents for the provision of bicycle facilities include:

- Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths, 2009;
- Austroads Guide to Traffic Engineering Practice Part 14: Bicycles, 1999;
- NSW RTA Bicycle Guidelines, 2005.

Interstate guidance has also been drawn on as required to give a broader range of possible solutions.

3.1 Path Widths

Tables 3.1a and 3.2 b identifies the path widths and clearances for shared paths and on –road separated paths and respectively. Table 2.5c identifies techniques for on –road bicycle route development.

Table 3.1a: Recommended Shared Pathways Widths

	Off-Road Path Width			
	Local access path	Recreation + Utility	Recreation + Commuting	Major recreation
Desirable path width	2.5m	3.0m	3.5m	4.0m
Lateral clearance	0.5m – 1.0m	0.5m – 1.0m	0.5m – 1.0m	0.5m – 1.0m
Typical features of use	Regular use	Regular use	Heavy + concurrent use in both directions	Heavy + concurrent use in both directions Low speed due to congestion

(Adapted from Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths, 2009, 44)

Table 3.1b: Recommended On-road Bicycle Lane Widths

	On – Road Bicycle lane width		
Road Speed (km/h)	60	80	100
Desirable lane width	1.5m	2.0m	2.5m
Acceptable lane width range	1.2- 2.5m	1.8 - 2.7m	2.0 - 3.0m

(Adapted from Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths, 2009, 50)

Note: There is a greater ability to reduce the widths of on-road bicycle lanes to 1.2m on low volume, low speed streets.



Table 3.1c: Methods for including bicycle operating space on roads

No.	Method	Comment
1	Removal or remarking traffic and/or parking lanes	Resizing road lanes to provide visually separated bicycle lanes.
2	Upgrading service roads	Marking service roads to include visually separated bicycle lanes/operating space.
3	Bicycle lanes on one side of road only	On uphill roads with limited width a bicycle lane is provided on the uphill side only. Bicycle riders especially need separated operating space when climbing.
4	Sealing shoulders	On rural and un-kerbed roads. Bicycle shoulder lanes can also be fitted to kerbed urban roads with parking provisions.
5	Converting footpaths to shared paths	For off – road bicycle/pedestrian route within the road corridor.
6	Indenting car parking	Where footpath space is available. Preserve parking and permits straight through kerbside bicycle lanes at intersections.
7	Car parking on one side of the road only	By removing a parking lane from one side of road only to create bicycle operating space.
8	Road – widening at medium	Move other lanes into median space to create bicycle space.
9	Road – widening at the kerb	Increased width provides for new bicycle lane or widening of existing bicycle lanes.
10	Creating an off-road bicycle path	Two-way on one side of the road or one way both sides of the road. Beneficial where traffic speeds and volumes are high.

(Adapted from NSW RTA Bicycle Guidelines, 2005, 15)

3.2 Surface treatment

Off-road shared pathway and on-road bicycle surfaces should be smoother than those acceptable for motor vehicles due to bicycles having narrow tyres inflated to high pressure, having no suspension systems and can travel at speeds over 25km/h. Hard surfaces such as asphalt and concrete are the most functionally appropriate materials to meet the different needs of the various users of formed bicycle lanes and shared pathways.

Technical advice on surface tolerances is provided in:

- Austroads 1999, Guide to Traffic Engineering Practice Part 14: Bicycles
- (Section 8.2, Construction and Maintenance of Paths, Section 8.5.2 Pavements for Bicycle Paths);
- Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths, 2009 (Commentary 9);
- NSW RTA Bicycle Guidelines, 2005 (Section 8: Surface treatments, line marking and the finishing of bicycle routes).





Figure 3.2a: Poorly surfaced on-road bicycle



Figure 3.2b: Quality surface on-road bicycle lane

A synopsis of the advantages and disadvantages of different surface materials for pathways is discussed in Section 6.1.2 of the On-Road Bicycle and Shared Pathway Strategy - Background and Supporting Information Report. Typical construction costs for different surfaces are shown in Table 3.4.

Table 3.2: Typical Construction Costs for On-road Bicycle Lane + Shared Pathways

Material	Construction Cost (per km)	Maintenance Implications
Asphalt (a)	\$120,000	High maintenance costs, easy to replace and restore heavy construction vehicles need access.
Concrete (b)	\$250,000	Minimal ongoing maintenance required, costly to repair, heavy construction vehicles need access to the trail corridor.
Concrete boardwalk (b)	\$2,000,000	Life expectancy unknown, costly to repair heavy construction vehicles need access to the trail corridor.
Recycled plastic (b)	\$2,000,000	Life expectancy unknown, costly to repair, construction vehicles will need access to the trail corridor.

(Source: WSC, 2010).

Notes:

a Assuming 1.6m wide lane, 1 km, line marking inclusive

b Assuming a 2.50m wide path, 1 km, no structures.

3.3 Line Marking

Identifying on-road and off - road operational space in a manner which is clear to motorists, cyclists and pedestrians is essential to providing a safe network. A key technique in achieving this is via line marking.

Bicycle lanes and shared pathways should be line- marked for good route coherence, connectivity, to manage use and reduce conflict (Austroads, 2009, 66). The use of a green surface for bicycle lanes which draws motorists’ attention to the presence of bicycles is recommended at busy or higher-speed locations and areas where the road layout is complex. Kerb side car parking should be line -marked to defined this operating space and reduce potential conflict with opening of car doors.



The NSW RTA Bicycle Guidelines, 2005 provides line marking guidance for both on-road and off - road pathways. Additional guidance on the locations for the application of green surface paint can also be found in Section 7 and Section 8 of the NSW RTA Bicycle Guidelines and Vic Roads Cycle notes No. 14 – Coloured surface treatments for bicycle lanes, 2005.



Figure 3.3a: Line marking on shared pathway



Figure 3.3b: On-road bicycle containing line marking and green surface paint, Brisbane

3.4 Intersections

The safe passage of cyclists on the approach and through intersections is essential in delivering a usable on-road bicycle network. Bicycle lanes should not abruptly end prior to an intersection. A clear path which is identifiable to both motorists and cyclists is required.

The use of green surface treatments is recommended to mark the preferred path through complicated intersections. Advanced bicycle waiting areas which allow cyclists to position themselves ahead of traffic vehicles at signalised intersections is a recommended.

Technical advice and design solutions are provided in:

- NSW RTA Bicycle Guidelines 2005 (Section 7 - Bicycle facilities at intersections and Section 8: Intersection of paths with roads);
- Vic Roads Cycle notes – Head start storage areas at intersections, 2000;
- Vic Roads Cycle notes No. 8 – Providing for cyclists at signalised intersections, 2001; and
- Austroads Guide to Traffic Engineering Practice Part 14: Bicycles, 1999 (Section 5 – Road intersections and Section 6.7 Intersections of paths with roads).



(a)



(b)



(c)

Figure 3.4 a and 3.4b: Advanced bicycle waiting areas, Sydney Australia
 Figure 3.4c: Green paint identifying preferred path through intersection.



3.5 Intersection of Paths with Roads

For the bicycle and shared pathway network to be connected and well utilised, safe access must be provided where pathways cross roads.

Technical advice on intersections of paths with roads and road crossings is provided in:

- Austroads Guide to Traffic Engineering Practice Part 14: Bicycles, 1999 (Section 6.7: Intersection of paths with roads);
- Austroads Guide to Traffic Engineering Practice Part 6: Intersections, Interchanges and Crossings; and
- Vic Roads Cycle notes No. 16 – *Safe road crossings for off-road paths*, 2005.



Figure 3.5 - Road crossing containing rolled kerbs, surface paint and line marking treatment linking two shared pathways

3.6 Signage and Markings

Signage and or markings should be provided throughout the entire network to guide pedestrians and cyclists use of the bicycle and shared pathway network.

Signage and/or markings should include both directional and informative information and be designed to be easily identifiable and consistent across both on-road and off-road network. They will inform users of the direction and distance to key destinations, provide warning of changing conditions (e.g. intersection) and of approaching hazards and provide clear travel pattern advice, which is particularly important at intersections.

Signage and / or markings should be provided as new on-road bicycle and shared pathways are constructed and should be progressively retro-fitted across the existing network.

Technical advice on signage and marking treatments is provided in:

- *Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths*, 2009.
- *NSW RTA bicycle Guideline (Section 9 – Signage and network information)*.
- *Vic Roads Cycle notes No. 10 – Shared path behavioural signs*, 2005.



3.7 Lighting

Where bicycle lanes and shared pathways carry a substantial number of pedestrians and cyclists during periods of darkness, consideration should be given to the provision of path lighting. Lighting will increase both actual and perceived safety along the network and should be targeted along key Primary routes (Austroads, 2009, 54).

Lighting should be placed along key routes, key crossing points, intersections and places where people congregate. Direction and height of illumination, background land illumination levels are key considerations that should be addressed within the design.

Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths, 2009 (Section 6.5 and 7) provides further guidance on the key considerations for the lighting of pathways. All path lighting should be designed in accordance with AS/NZS 1158.3.1:2005, Pedestrian area (category P) lighting – performance and design requirements and the design principles identified in *Crime Prevention through Environmental Design Safer by Design (C.E.P.T.E.D)*.

3.8 Landscape Design

Landscape works which are poorly planned and designed can have negative impact on pathway use. It is essential that landscape is designed, constructed and managed which:

- Provides clear sightlines;
- Promotes good visibility;
- Provide safe side clearances;
- Prevents intrusion into pedestrian / cycling operating space;
- Manages tree root damage to pathway;
- Provides passive surveillance and promotes an open easy – supervised environment; and
- (NSW RTA *Bicycle Guidelines, 2005, 68*)

Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths, 2009 (Section 6.3.7 Clearances and 6.3.7 Sight distance) and the *NSW RTA Bicycle Guidelines, 2005 (Section 8.3 Landscape design)* provides guidance on the key considerations for landscape design.

3.9 Supporting Infrastructure

For on-road bicycle and shared pathways to be usable, a range of supporting infrastructure is essential, including;

- Bicycle parking;
- Seating/rest stops;
- Water;
- Amenities;
- Shade; and
- Signage



Technical advice on the provision of end of trip facilities is provided in:

- NSW RTA *Bicycle Guidelines*, 2005 (Section 10: Maintenance and provision at worksites);
- Austroads *Guide to Traffic Engineering Practice Part 14: Bicycles*, 1999 (Section 10: End of trip facilities);
- Bicycle Victoria *The Bicycle Parking Handbook*, 2004

3.10 Maintenance of Network

The development of a comprehensive maintenance program which identifies key tasks and frequency of works is an important part of a quality network.

Technical advice on a hazard reporting system templates and pathway safety checklists is provided in;

- *Austroads Guide to Road Design Part 6A: Pedestrians and Cyclists Paths*, 2009 (Appendix C of Austroads report)
- The *NSW RTA Bicycle Guidelines*, 2005 (Section 10 - Maintenance and provision at worksites)

3.11 Prioritisation of Route Development

The bicycle and shared pathway network aims to provide linkages to variety of destinations throughout the Shire. To facilitate the strategic delivery of the network, prioritisation of routes is essential.

A Route Assessment Matrix has been developed as a project assessment tool to assist Council in prioritising future routes. The route assessment matrix assesses all relevant route information in a structured way that allows for comparison between proposed links. The route assessment matrix is presented in Table 3.10.



Table 3.10: Route Assessment Matrix

Objective	Sub Objective	Score
Strategic	Closes gaps in existing network	
	Completion of existing gaps < 500m	
	Completion of existing gaps > 500 -1,000m	
	Completion of existing gaps > 1,000 -1,500m	
Connectivity/ Social	Provides links to key attractors/generators	
	Open space / rec area	
	Community facilities	
	Shopping areas / precinct	
	Educational institutions	
	Employment zones	
	Public transport	
	Tourist facilities	
	Medical facilities	
	Aged care facilities	
Safety	Improves safety to users	
	Provides physical separation from vehicles	
	Provides visual separation from vehicles	
	Located on route with history of accidents	
Environmental	Promotes sustainability	
	Limited amount of investigations / issues	
	Negligible impact on the natural environment	
	Recycled materials can be used during construction	
	Provides for alternative form of transport	
Economic	Cost of project is affordable	
	Cost of construction is low	
	Whole of life costs are low	
	Alternative design costs	
	On grade versus elevated pathway design	
	Implied economic benefits to community	
Total Score		



REFERENCES

- Austroads, 1999. *Guide to Traffic Engineering Practice Part 14: Bicycles*.
- Austroads, 2009. *Guide to Road Design Part 6A: Pedestrians and Cyclists Paths*.
- Bicycle Victoria, 2004. *The bicycle parking handbook*.
- National Heart Foundation, 2004. *Healthy by Design: a planner's guide to environments for active living*.
- NSW Department of Environment, Climate Change and Water NSW, 2009, *Sea level rise policy*.
- NSW Department of Planning, 2004, *Guidelines for Walking and Cycling*.
- Wyong Shire Council Shire, 2009, *Our Shire Our Vision – Our strategic vision for Wyong Shire*.

