

1.0 Introduction

The Armidale Dumaresq Council Local Government Area (LGA) has an area of 4200 square kilometers and a population of 25000 (ABS, 2001). The principal settlement is Armidale, with a population of over 20000, or 80% of the total. It is located approximately 520 kilometres north of Sydney and 470 kilometres south of Brisbane. The LGA also includes the villages of Ebor, Hillgrove and Wollomombi each with fewer than 100 residents.

Traditionally the land of the Anaiwan people, Armidale was established as a settlement by Europeans in 1839. It rapidly became the major commercial and administrative centre of the New England region. Armidale became a major agricultural centre specializing in wool and beef cattle production and significant regional education centre. The University of New England is the single largest employer in the City and has over 3500 locally-based and 17000 external students.

Bicycle riding is popular in Armidale Dumaresq, both as a form of transport and a recreational activity. This is evidenced by the historical pioneering role of Armidale's development of cycling facilities, the Census figures about the journey to work and the response to the Bicycle User Survey conducted for this Strategy.

Existing bicycle facilities are moderately developed within Armidale Dumaresq. However, there are significant opportunities to further develop and enhance the local cycling environment, both physically and culturally. As well as providing benefit to current cyclists, this Strategy aims to encourage more cycling trips, providing much broader benefits to the local community and environment.

2.0 Objectives

The primary objectives of the Armidale Dumaresq Bicycle Strategy are:

- To encourage and promote the use of the bicycle as a viable and effective form of transport and a recreational activity within Armidale Dumaresq.
- To establish a framework for the development of appropriate bicycle facilities.
- To develop a network strategy of key bicycle routes.
- To facilitate improved safety for persons riding bicycles.
- To raise community awareness of the benefits of increased use of bicycles.
- To provide for evaluation and review of actions identified in the Strategy.

3.0 Background

3.1 GENERAL

The bicycle is an energy efficient, low-cost human powered mode of transport. Each bicycle trip produces far less environmental impacts than equivalent trips made by motor vehicles. Noise, pollutant emissions and the potential to cause injury to other road users are much lower. Although slower than a motor vehicle in free-flowing traffic conditions, cycling is a faster and more energy-efficient form of transport than walking.

Bicycles were a crucial mode of transport in regional towns and rural areas of Australia from the 1870s, particularly since the pneumatic tyre became available in the 1890s, until shortly after WW1. Their low operating cost, energy efficiency, flexibility and speed afforded many ordinary workers such as itinerant shearer with a significant increase in mobility (Fitzpatrick, 1980). From the 1920s, and particularly after WW2, motor vehicles became affordable to an increasing number of people, resulting in widespread decline in the use of bicycles, public transport and walking.

Since WW2, the private car has increasingly become the most prominent form of personal transport throughout Australia, including Armidale Dumaresq. The additional high rate of utilisation of other motorised vehicles including light trucks, heavy trucks, buses and taxis means the road space is largely dominated by motor vehicles. This has necessitated the provision of separate paths for pedestrian movement alongside road carriageways. Bicycle riders generally share the road space with motor vehicles.

Since the 1970s there has been a resurgence in the number of adults riding bicycles in Australia, including in Armidale. Cyclists in Armidale in conjunction with the former Armidale City Council planned and constructed the first genuine off-road cycleway in regional Australia. The 3-kilometre first stage of the Failes or Creeklands cycleway was opened in 1979, with much of the construction funding raised by local cyclists.

Today, many adult car owners also own bicycles, and choose to regularly use the bicycle as transport. Yet there are other adults who do not have ready access to a car (12.5% of all households in Armidale Dumaresq have no motor vehicle). All children under 16 years cannot legally drive motor vehicles. Providing for a better environment for bicycle riding is particularly beneficial to these citizens.

3.2 STATE AND FEDERAL GOVERNMENT POLICY CONTEXT

In 1999 the New South Wales Government launched Action For Bikes – Bikeplan 2010. This is a ‘sub-plan’ under the umbrella of the Action for Transport 2010 plan, which has the primary goal of reducing demand for car travel and slowing the rate of growth in car trips undertaken across the State. Action for Bikes recognises that the bicycle offers a low-cost, flexible and low-impact alternative to the private motor vehicle.

Action for Bikes 2010 has four major objectives:

1. Improving the bicycle network.
2. Making it safer to cycle.
3. Improving personal and environmental health through increased bicycle use.
4. Raising community awareness of bicycle issues and involvement in bicycle planning.

The extension of bicycle facilities in “major rural cities” is a provision of the Statewide strategy. Armidale is listed as one of the cities where this is to occur.

In 1999 the Federal Government launched Australia Cycling – The National Strategy. On a national scale it has six major objectives:

1. Implementation and review of the Strategy to occur in a coordinated and collaborative manner.
2. Policy and planning integrates cycling as a valued element
3. Facilities exist that support increased cycling
4. Improved on- and off-road cyclist safety
5. The benefits of cycling are recognized by decision makers and the Australian community
6. Cycling is incorporated into all appropriate areas of education, training and professional development

The provisions of both the State and Federal Strategies are consistent with those of this Local Strategy.

3.2 TYPES OF BICYCLES

Generally, a *bicycle* is a two-wheeled, single occupant vehicle wholly powered by human physical labour and the force of gravity on downhill slopes.

There are various types of bicycles which have advantages in different situations.

Road Bicycles are designed for use on sealed roads and other smooth surfaces. They are generally light-weight, with thin wheel rims and tyres. Bicycles used for road racing fit into this category, although road bicycles are often used for recreational and commuter purposes. These bicycles can be particularly vulnerable to uneven surfaces in terms of both safety and damage to tyres and wheel rims.

Mountain Bicycles (MTBs) are designed for off-road riding. MTBs have wide wheel rims and are generally fitted with knobby tyres. They have a broader gear range than road bikes and many are now fitted with front-wheel suspension (some also have rear-wheel suspension). Whilst heavier and slower than road bicycles, MTBs are generally more flexible and provide a more comfortable ride (Sloane, 1995). MTBs are the most popular and best-selling type of bicycle amongst both adults and children

Hybrid Bicycles are a cross between the road bicycle and the MTB. They have lighter and thinner frames and tyres than MTBs, but are generally more robust than road bikes.

BMX or ‘bicycle motorcross’ bikes are generally small-frame, single-gear robust bicycles built specifically for off-road riding. This type is most popular with children and adolescents – it is rare to see an adult riding a BMX.

Recumbent Bicycles are actually 3 or 4 wheel, rather than 2-wheel, devices that have the rider placed low to the ground in a ‘reclined’ position. They generally fit into the bicycle family because they are self-powered by pedalling.

Tandems accommodate two riders, one behind the other, with two pedal crank sets.

All of these bicycles are presently utilised in Armidale Dumaresq. Without survey data on the topic, it is probable that mountain bikes are the most widely used in the LGA, across different types of bicycle riders.

3.3 APPLICATIONS OF THE BICYCLE

The bicycle is highly suitable for trips of up to 5kms. It is highly useful for journeys to and from:

- the workplace.
- school, university, TAFE or other places of education.
- shops.
- banks.
- the post office.
- homes of friends or relatives.
- sporting venues.
- social venues such as clubs.

Riding a bicycle can also be an activity in itself, with a trip made with no specific destination. The main purpose may be:

- exercise to improve health and fitness.
- pleasure purely from the action of riding.
- viewing scenery, landscapes, etc.
- a social activity.
- or a combination of the above .

Cycling is also a competitive racing sport.

3.4 DIFFERENT TYPES OF RIDERS, DIFFERENT TYPES OF FACILITIES

Young children, adolescents, young adults, mature adults and senior adults all ride bicycle for a great variety of reasons. They have a great range of cycling abilities and levels of confidence for riding, particularly on roads in traffic.

Primary school children should, if possible, be provided with **off-road paths** because of their level of cognitive development and understanding of traffic laws and behaviour. Off-road paths are also beneficial to other cyclists such as adults who cycle only occasionally for recreation and more-skilled 'commuter' cyclists if the path provides a direct connection.

High school students have widely varying skills. Many younger students are closer to primary school students in the skill levels, older adolescents may be no different from adults in their skill in handling on-road traffic situations.

Adult cyclists may be skilled regular riders who prefer the shortest, fastest routes, whether they are heavily trafficked **on-road** or off-road paths. Or they may be less skilled and confident cyclists, perhaps riding much less regularly, who favour riding on on-road paths and quieter streets, even if less direct.

3.5.0 BENEFITS OF INCREASED BICYCLE USAGE

Encouraging of the use of bicycles as vehicles for transport in Armidale Dumaresq is warranted by numerous advantages. This encouragement is aimed specifically at the substitution of private car trips with bicycle trips. It is not aimed at people choosing between only ever using a car or only ever using a bicycle, or replacing car ownership with bicycle ownership. The large majority of adult cyclists in Armidale Dumaresq also own motor vehicles (see Survey Results).

The bicycle is particularly suitable for able-bodied people within the population for trips of 0 - 5km. The majority of trips within the Armidale urban area are within this range.

3.5.1 Health and Fitness

As well as being a vehicle for transport to and from destinations, bicycles provide exercise that is beneficial to an individual's health. All bicycle trips provide at least some light exercise, whatever the major trip purpose. Health benefits can be gained from as little as ten minutes of exercise including bicycle riding (NSW Health, 2002).

Exercise greatly assists in the prevention of excess weight, obesity, coronary heart disease, certain cancers, and certain types of diabetes. It also increases resistance to, and permits better recovery from, disease and physical injury. Greater levels of exercise throughout the community increase the overall health of the population, reducing health system and various social costs (Austroads, 1999).

Excess body weight is a major local and national health concern. In the New England Area Health Service jurisdiction, 55% of men and 42% of women aged over 16 years are overweight or obese (there were no figures available specifically about Armidale Dumaresq). These are higher than the State averages of 50% of men and 34% of women. Obesity rates among adults are increasing. (NSW Health, 2002). National rates of child obesity are also a major concern, having doubled in the decade 1992 – 2002 (Robinson, 2002).

The widespread use of the affordable private car has been a major contributing factor to the continuing rise in obesity. It has directly caused a reduction in volume and frequency of trips undertaken by foot and bicycle to reach a destination. Encouraging the substitution of

bicycle trips for car trips to reach a destination provides 'incidental' exercise that can help reduce this major local and national health problem.

The Community Health Service at Armidale Hospital recommends exercise as essential to physical health and general well-being for all community members. Cycling is recommended as one of the many forms of exercise available locally that provides a health benefit. Cycling is specifically recommended to those that have suffered knee or ankle injuries because it is not weight-bearing.

There are many ways to exercise within Armidale Dumaresq and the community values sport, health and fitness very highly. A welcoming and tolerant environment for bicycle riding increases the diversity of opportunities available for exercise activities, both competitive and non-competitive. The more choice of exercise available, from light to heavy, passive to active, the greater the opportunity for all in the community to participate.

3.5.2 Pollution Reduction

Each car trip substituted by a bicycle trip lessens the increase in a wide range of pollution.

Greenhouse Gases

Motor vehicles powered by the combustion of fossil fuels release greenhouse gases such as carbon dioxide into the atmosphere. The increasing concentration of these gases in the upper atmosphere is leading to the release of less sunlight back from the lower atmosphere. Consequently the planet is experiencing the greenhouse effect potentially resulting in temperature rises, sea level rises, species extinction and disruption to agriculture and industries (Commonwealth Of Australia, 1996).

Transport already contributes significantly to overall greenhouse gas emissions. It is one of the fastest growing sectors, according to the Greenhouse Office of Environment Australia. Greenhouse emissions from all transport rose by 24.2% in the decade 1990 – 2000, including a rise of 3.3% in the single year 1999-2000 alone.

Passenger cars contribute 56% of total greenhouse emissions and 62.4% of emissions from road transport. Over 95% of these vehicles are privately owned. Emissions from passenger cars increased by 22.2% between 1990 and 2000, with the growth rate of these emissions increasing towards the end of the decade, including a 3.3% rise in the 12 months 1999 – 2000.

Each trip made by a private car contributes greenhouse gases and other pollutants to the atmosphere. Bicycle trips contribute none. Bicycles contribute only those produced in their manufacture, distribution to point-of-sale and manufacture of associated materials, such as lubricants.

Other Pollutants

Nitrous oxides, benzenes, a range of hydrocarbon pollutants and small particulates such as brake dust are produced by car trips. They also release lubricant oil and other pollutive substances onto road surfaces. These pollutants are most likely to flow into local waterways, contributing to their pollution. Bicycle trips may result in the release of brake dust, oil and

other lubricants onto road and other surfaces in far lesser quantities than a car trip of the same distance. They contribute no localized gaseous pollutants.

The majority of atmospheric pollutants produced by motor vehicles are released in the first 10 minutes of driving (Austroads, 1999). A significant proportion of car trips in the Armidale urban area are of a shorter duration.

3.5.3 Transport Energy

Australian residents have the second highest per capita level of energy consumption to power transport of any nation, exceeded only by the United States. It has a 20% higher transport fuel consumption rate per capita than the OECD average (SOE 1996).

Production of Australian oil peaked in 1994/95. This will continue to decline, making the nation increasingly dependant on international circumstances and events. Unlike sources for electricity, car fuel cannot be controlled as an energy source through national policy instruments. In the longer term, global oil supplies will become scarcer. The more petroleum that is saved from substitution of appropriate trips, such as the single-occupant journey to work, the more is available for needs such as heavy freight haulage

3.5.4 Traffic and Parking Congestion

The growth in the usage of urban streets for motor vehicles has meant they have become dominated by these vehicles. This has resulted in significant changes to the role of streets in Australian cities and towns, including Armidale. As vehicle traffic has grown, the resultant increases in noise, odour and safety risk have decreased the 'livability' of the street environment (Commonwealth of Australia, 1996).

The effects of increasing motor vehicle usage have been experienced most markedly in large metropolitan cities and regions. However they are not irrelevant to regional centres such as Armidale. Given that Armidale aims to grow both its population and economy, encouragement of bicycle trips to lessen the increase in traffic and parking congestion is highly desirable. Armidale has narrow road reserves and is therefore more susceptible to congestion problems arising from the continued growth in motor vehicle traffic than other larger regional centres, such as Tamworth.

3.5.5 Cost Savings

All transport trips involve both individual and community costs. Trips made by bicycle instead of a motor vehicle provide significant cost savings to the individual. Each bicycle trip made by an individual saves them and/or their family vehicle costs of fuel, maintenance and depreciation.

Each bicycle trip also costs the individual rider. Energy is needed from food to power the vehicle. Maintenance of transmission, brakes and eventually the body requires money to be spent. Bicycles also depreciate in value. However the relative costs are much less than for motor vehicles.

Cost savings in terms of reduced pollution, congestion and crash trauma accrue to the community for every kilometre travelled by bicycle instead of a car. Replacement of a short trip by car (of up to 10km in length) by bicycle instead provides a cost saving to the society of

\$0.60 per kilometre (Shayler, 1993). A large proportion of car trips are made with a single occupant (ie the driver only) over these short distances, which are ideal to be replaced by bicycle.

4.0 Strategy Development

4.1 BICYCLE USER SURVEY

During April-May 2003, a survey of individual bicycle users was conducted in Armidale Dumaresq. The Bicycle User Survey (BUS) was open to all adults and high school students. The survey was published as in an insert in a newspaper distributed free to all households in both the rural and urban areas of the LGA. 151 responses to the survey were received by Council.

The survey asked respondents to identify:

- sections of roads or cycleways important to them for riding a bicycle for any reason.
- locations of any safety concerns.
- general safety concerns.
- how often they made bicycle trips for different purposes.
- how often they made bicycle trips to access specific places.
- statements about riding habits they felt to be true about themselves.
- safety perceptions of on-road bicycle/parking lanes.
- desired locations for new bicycle parking facilities.
- desired improvements to existing bicycle routes/facilities or new bicycle routes/facilities.
- whether or not they owned a car or motorcycle.
- their gender and age grouping.

4.2.0 BICYCLE USER SURVEY RESULTS

Analysis of the response to the survey has been significant to the development of the Strategy. Some of the results are summarised below.

4.2.1 Age Groupings and Gender of Respondents

The BUS showed that persons from age 12 – 74 ride bicycles in Armidale Dumaresq. Of all responses, 81% of responses were from cyclists aged 26-64 years. Persons aged 25 years or younger represented 12%, those aged 65 years or older represented 7% of the cyclist population. No responses were received from any cyclists aged over 75 years. Of all respondents 56% stated they were male and 42% female.

4.2.2 Motor Vehicle Ownership

Of those who responded, 82% owned or jointly owned a car or motorcycle.

4.2.3 Trip Purpose and Key Destinations

Bicycles trips within Armidale Dumaresq are made for a wide variety of purposes. There was an average of 2.8 different trip purposes recorded per cyclist. Riding for “exercise/fitness” and “leisure/pleasure/touring” received the highest number of responses. However, the combined number of trips where the principal purpose was to access a destination was higher than the combined number of trips made for exercise, fitness or recreational purposes.

Table 1: Frequency of trips made for different purposes

MAIN TRIP PURPOSE	<i>% of cyclists who make trip at least:</i>		
	Daily	Weekly	Monthly
Competition Racing	0	4	5
Training for Racing	2	5	5
Exercise/Fitness	12	49	62
Leisure/pleasure/touring	2	37	49
Accessing park	3	10	17
Accessing place of work	18	38	44
Accessing place of study	8	21	25
Shopping/Banking/Post Office	7	34	39
Visiting friends/relatives	2	23	38

The major destinations accessed by bicycle according to respondents were (in descending order of response frequency):

- CBD shops/banks.
- Armidale Dumaresq Library.
- UNE (main campus).
- Sport UNE complex.
- Armidale Aquatic Centre.
- Pine Forest.
- CBD Workplace.
- Girraween Shopping Centre.
- Armidale Hospital.

Other destinations included TAFE (Beardy St campus), Centrelink, high schools (various), the Old Teachers College, Dumaresq Dam, Blue Hole and Mount Duval.

4.2.4 Important On-Road and Off-Road Routes

The survey asked participants to list the sections of roads and/or cycleways that were “important to them”, regardless of how often or for what purposes they rode on them. Thus it was hoped cyclist would not list lengths of road or cycleway they seldom rode on. From the response to this question, lengths with high volumes of cyclist use were revealed. This was vital to the determination of primary and secondary routes, in conjunction with other considerations such as available road widths.

The most popular sections in the urban areas:

- Creeklands cycleway from Elm Ave to Erskine St.
- Markham St from Lynches Rd to Donnelly St.
- Dangar St from Kentucky St to Moore St.
- Dumaresq St from Niagara St to Douglas St.
- Marsh St from Erskine St to Rusden St.
- Taylor St from Erskine St to Kentucky St.

A significant number of respondents identified roads outside the urban area as important to them for riding a bicycle. The most popular roads were:

- Rockvale Rd.
- Bundarra Rd.
- Dangarsleigh Rd.
- Kelly's Plains Rd.
- Booralong Rd.

4.2.5 Safety Concerns

Numerous safety concerns were identified by cyclists. A large majority of all concerns (65%) related to the behaviour of motor vehicle drivers, pedestrians or other cyclists, with the remainder (35%) related to physical infrastructure.

The most significant set of safety concerns were the interaction of motor vehicle drivers with cyclists on roads. Some perceived these to be the result of a deliberately poor attitude amongst some drivers towards cyclists. Others felt it to be the result of inadequate driver education about how to interact with bicycle riders on roads. There were specific concerns expressed about some motor vehicle drivers:

- not giving way to cyclists when they had right-of-way at intersections.
- not slowing and/or overtaking on approach to roundabouts.
- passing too closely.
- speeding generally.
- opening car doors in the path of travel.
- lacking awareness about the presence of cyclists on roads.

Other specific concerns included poor behaviour of pedestrians, poor behaviour of other cyclists, and the presence of unrestrained dogs.

The most common concerns about physical infrastructure were (in descending order of response frequency):

- roundabout intersections.
- poor road surfaces.
- inadequate lighting.
- absence of off-road path.
- inadequate road shoulders.

Other specific concerns included cross-intersections, roads narrowed by median strips, absence of cycle lanes, bridges, and inadequate signage warning motor vehicle drivers of the presence of cyclists.

4.2.6 Safety Perceptions of On-Road Bicycle Lanes

A question specifically concerned with on-road bicycle/parking lanes (not exclusive bicycle lanes – see Design Guidelines) was asked because Council recently installed such lanes and needed to determine whether this practice should continue. The majority of cyclists (69%) responded that they felt safer riding on roads with bicycle/parking lanes than on roads without them. Of all respondents, 21% felt no more or less safe riding in the lanes and 6% felt less safe.

4.2.7 New and Improved Facilities

Respondents were asked a broad, open question about what new and/or improved bicycle facilities they would like to see in Armidale Dumaresq. Most suggestions related to physical infrastructure, others were concerned with behavioural education, legislative changes and law enforcement.

The two most equally popular facility types nominated were new on-road bicycle lanes and signs alerting other road users to the presence of cyclists (both nominated by 31% of respondents). New off-road paths were desired by 17%, bicycle awareness education 13%, better off-road path maintenance 12% and better lighting along cycle routes (both on-road and off-road) by 12%.

Other suggestions included better road surface maintenance, railway crossings suitable for cyclists, wider shoulders on rural roads, better off-road path surfaces, improved cycle lane design and improved signage on off-road paths.

4.2.8 Parking Facility Location

The most desired general locations desired for new bicycle parking facilities were:

- supermarkets.
- CBD generally.
- local parks/sports grounds.

Specific locations where new bicycle parking facilities were most desired were:

- Central Beardy Mall (The Mall).
- K-Mart shopping complex.
- Armidale Dumaresq Council Civic Administration Building.
- New England Regional Art Museum.
- Armidale Dumaresq Library.

4.3 BICYCLE USER SURVEY CONCLUSIONS

Within Armidale Dumaresq, the bicycle is used as a transport vehicle by numerous males and females aged between 12 and 75 years. Bicycle trips are made by local residents for a variety of purposes. They access a broad range of destinations both in the urban rural areas of Armidale Dumaresq. The bicycle is utilised as a vehicle for competition sport, exercise and leisure in many different ways.

A number of on-road and off-road lengths were identified as being important routes for cyclists. Significant on-road cycle routes generally had high motor traffic volumes. However, numerous road lengths were identified by small numbers of residents, often only one, as important to them for riding a bicycle. This demonstrates that all roads in Armidale Dumaresq are potentially available as cyclist routes, even if only for local access.

The greatest set of safety concerns for Armidale Dumaresq cyclists as a group were identified as the behaviour, intended or otherwise, of motor vehicle drivers. However, the interactions of other cyclists and pedestrians also caused concern. This demonstrated the need for strategic education programs specifically aimed at all road users. Physical infrastructure was also a concern, particularly the ongoing maintenance of existing facilities.

There is clearly a need for the continued development of both on-road and off-road facilities in Armidale Dumaresq. Developing the network of bicycle lanes on important on-road routes, and more signage to alert of a cyclist presence, are the most desired improvements. They are both closely related to making other traffic aware of the need be prepared to share the road with cyclists, who want to ride on the most direct route, even in heavy traffic. Few cyclists will ride one block away from the most direct route to use cycle lanes. This underscores the need for these facilities to be installed on the most popular on-road cycle routes, despite high volumes of motor vehicle traffic.

The provision of new off-road paths, and the maintenance of those existing was also highly desired. These are essential to the overall cycle network, with the Creeklands Cycleway being easily the most utilised route in Armidale Dumaresq. Many cyclists often ride on both on-road and off-road stretches within the same trip.

4.4 ENGINEERING SURVEY

Kerb-to-kerb width measurements of road carriageways along these routes were undertaken. Although the traditional standard carriageway width in Armidale is 12.8 metres, the survey found width variation along streets and between streets. Many sections were narrower, presenting a significant constraint to the installation of on-road bicycle lanes. Even a width of 12.8 is not ideal for the installation of lanes (Austroads, 1999: 24).

Land ownership constraints were also identified through analysis of aerial photographs and Council's land information database. Few potential routes were identified on privately-owned land. Virtually all potential off-road routes have been identified on Council-owned land.

4.5. SCHOOL FACILITY AND RIDING SURVEY

An indicative 'snapshot' survey about school students riding to and from the 19 schools in Armidale Dumaresq was conducted. Questions were asked of the school Principal or other appropriate available officer were:

1. On average, how many students ride to school in favourable weather?
2. What bicycle parking facilities are available?

Any other useful information mentioned by the staff member about opportunities or constraints regarding riding to an from their school was recorded.

4.5.1 Results

Some students rode regularly to 11 schools, 3 rarely had any students ride and 2 schools reported they never did. All schools stated that the number of students that rode was highly variable and that this was not always the result of changed weather conditions. Most schools had 5 or fewer students that regularly rode. One high school reported up to 30 students rode some days, on others, none did.

Only one school provided no parking facilities. Of the 18 with facilities, only one provided secure modern facilities. The remainder are viewed as insecure, potentially damaging to bicycles and therefore discouraging cycling (Austroads, 1999).

Issues raised about students riding to school included:

- there has been a decline in the number of students riding bicycles to and from many schools over the past decade.
- the volume of traffic on streets near some schools is a safety concern.
- some schools discourage students from riding to school.
- the removal of the Statewide Department of Education officer specifically charged with providing bicycle education within schools has had a negative impact on bicycle education and promotion.

4.5.2 Previous Research

In 1998, Dr Brian Connor conducted a survey of all primary and secondary schools within Armidale the Armidale urban area. Other schools in the local government area were not included. Mr Connor found there was no coordinated approach to bicycle safety education between schools. There was no Statewide curriculum the public schools commonly followed. Dr Connor's overall impression was that teaching staff were committed to improving road safety, including aspects pertaining to bicycles. However, they were overwhelmed by existing multiple commitments.

4.6 CRASH DATA ANALYSIS

The records of crashes involving bicycles from the Roads and Traffic Authority Traffic Accident Database System (TADS) was analysed for the most recently available 10-year period.

From 1 January 1993 to 31 December 2002, 56 road crashes involving bicycles were recorded in Armidale Dumaresq. Over 90% of the crashes occurred in the urban area. Of the total, 85% of crashes occurred in daylight, 11% in darkness, and 4% at dusk (the absence of bicycle lights was not recorded as a factor in any non-daylight crash).

The majority of recorded crashes (63%) involved an intersecting movement of a motor vehicle with the road the cyclist was travelling along. Roundabout intersections were of significant concern, with 21% of all crashes. Cross-intersections accounted for 25%, driveways 11% and t-intersections 4% of the total.

One crash resulted in a cyclist fatality, 55 in a cyclist injury, with 2 injuries to passenger car occupants in separate crashes. There was no recorded pedestrian involvement or injury in any cyclist crash. Of the total recorded cyclists injured:

- 82% were males.
- 37% were males aged under 18 (no females were recorded as involved).
- 42% were adult males.
- 14% were adult females.

The actual number of crashes that occurred, including those that involved a collision with a car is certain to be much higher than the number recorded. The TADS database only records crashes that occur on public roads. A large proportion of cycling injuries are sustained by children aged 5-18. Presumably many of these injuries occur in off-road locations – cycleways, footpaths, parks and backyards. It is also likely that a number of adult cyclists are injured at off-road locations and these crashes are not recorded by the Police. There are probably also numerous on-road injuries that result in a hospital presentation by the victim without any Police involvement.

5.0 Opportunities

5.1 HIGH RATE OF BICYCLE USAGE

In the absence of more comprehensive data, the 2001 Census of Population and Housing provides an indication of the rate of bicycle use amongst adults in Armidale Dumaresq. There was a question about the mode of transport used to access the workplace on the day of the Census. Table 1 shows a significantly higher rate of journey-to-work by bicycle amongst Armidale residents than the State average. This indicates a higher general rate of bicycle usage than the State average.

Table 2: Comparison of journey to work as percentage of total journeys to work made by bicycle, Armidale Dumaresq and New South Wales

	Males %	Females %	Persons %
Armidale Urban	3.52	1.36	2.35
Rural Balance	0.88	0.00	0.49
New South Wales	1.15	0.28	0.76

5.2 COMPACT URBAN AREA

Armidale is a compact urban settlement, with virtually all residential areas within 5 kilometres of the CBD. The majority of the population lives within 2 kilometres of the CBD. The short to moderate distances between virtually all destinations within the urban area makes increased cycling rates highly viable.

5.3 EXISTING OFF-ROAD PATHS

There are some substantial lengths of quality off-road paths. There are opportunities to both extend and build branch paths at numerous locations. These paths are well-suited recreational cycling as well as trips with a destination

5.4 EXISTING PEDESTRIAN PATHS

Footpath reserves into linking roads and parkland in residential areas are well-suited to development as short link shared cyclist/pedestrian paths, or links to existing paths

5.5 SEALED SHOULDERS

Many roads in the rural and peripheral-urban areas already have quality sealed shoulders of adequate width and surface. Installation of signage and markings would create a designated facility for cyclists.

5.6 CLIMATE

The climate is temperate with warm temperatures most of the year. The average annual maximum is 20.3 degrees Celsius. The average daily maximum in the hottest month of January is 27.1 degrees, in the coldest of July it is 12.2 degrees. Winter and autumn months may be considered cool by 'typical Australian standards'. However, it is not nearly as cold as in some places where cycling is a very important mode of transport, such The Netherlands and northern China.

5.7 TOURISM POTENTIAL

The LGA has much picturesque scenery and many cultural and ecological attractions. Armidale is renowned for its historic architecture and manicured seasonal gardens. The rural area has a great variety of farmland and natural landscapes, such as 'gorge country' in the east. The niche market for 'cycle tourism' is expanding. This includes long-distance cycle touring and short-distance cycle touring at a holiday destination.

6.0 Constraints

6.1 ROAD WIDTHS

The traditional road reserve width within Armidale is 20 metres, with a 12.8 metre carriageway. This severely restricts the installation of facilities such as bicycle/parking lanes on most roads. Many road carriageways are even less wide than 12.8 metres, particularly in newer residential areas.

6.2 LAND OWNERSHIP

The provision of off-road paths is restricted by private land ownership. The existing cycleways have been constructed on land owned by Armidale Dumaresq Council. These are the Dumaresq Creek floodplain and the Kelly's Plains Rd road reserve.

6.3 PARKING FACILITIES

There is lack of parking facilities at important locations within the urban area. Many existing facilities are inadequate. The installation of facilities at locations not controlled by Council cannot be decided by Council alone. Facility installation may not be viewed as a policy and/or funding priority by a relevant organisation, although identified as highly desirable in this Strategy.

6.4 DEVELOPMENT WITHOUT OFF-ROAD LINKS

In the past, some residential development has occurred without the provision of easements for either pedestrian or shared cyclist/pedestrian paths.

6.5 INCREASING LOW-DENSITY RESIDENTIAL DEVELOPMENT

Census data suggest population in rural areas beyond but adjacent to the Armidale urban area is increasing. This may effectively make Armidale a less compact urban settlement and consequently increase dependence on passenger cars for personal transport. This may decrease the viability of bicycles for personal transport.

6.6 BRIDGES AND CAUSEWAYS

Road carriageways [generally] narrow at bridges and causeways, creating 'squeeze points' that place bicycles and motor vehicles in conflict. These may be discouraging to less confident cyclists.

6.7 ROUNDABOUTS

Numerous roundabouts have been constructed at busy road intersections in Armidale to reduce the crash rate of motor vehicles. Local crash data and other research has shown roundabouts increase the crash risk to cyclists (Allot & Lomax, 1991). As roundabout approaches also constitute 'squeeze points', they may also be discouraging to less confident cyclists.

6.8 LIGHTING

At many on-road locations, lighting is not ideal for the needs of cyclists. Virtually all sections of the off-road paths are unlit. This presents concerns for the cyclist both in terms of vehicle safety and personal security as many are isolated from effective passive surveillance. Inadequate lighting generally discourages cycling at night.

Lighting installed along an off-road path involves significant capital and operating costs. With the limited funding available for all bicycle facilities, off-road path lighting has not been proposed in this Strategy. However, it needs to be considered as a longer-term proposal to improve overall cycling conditions and encourage more cycling trips.

General improvement to the standard of on-road lighting would improve conditions for cycling.

6.9 PEDESTRIANS AND DOGS ON OFF-ROAD PATHS

The speed differential between persons on bicycle and those on foot can be a problem. Faster cyclists, for example 'commuters' can be slowed by pedestrians sharing the path, particularly if there are two or more walking abreast. This slowing can be frustrating and deter some cyclists from using shared off-road paths.

Dogs off-leash can chase and/or bite cyclists, presenting a crash risk. A long dog leash held tight between the owner and the dog can also potentially cause cyclist crashes.

6.10 TOPOGRAPHY

The topography of Armidale is variable. The City is located on the floodplain of Dumaresq Creek. North and south of this wide floodplain are long hills, with steep gradients in some sections. Therefore, some east-west roads are relatively flat over long distances, whereas many north-south roads have steep sections.

6.11 FLOODING

As much of the Creeklands Cycleway is located along the Dumaresq Creek floodplain, even minor flooding can make sections of it impassable. Flood damage can severely reduce path surface quality, increasing roughness of the ride. Repair of this damage increases maintenance costs.

6.12 FUNDING

Available funding for bicycle facilities is limited. Therefore major engineering works and other proposals of the Strategy cannot all be implemented in the short term.

7.0 Engineering Design Guidelines

7.1 GENERAL

All roads within Armidale Dumaresq are potential or actual routes for cyclists. Therefore the construction and maintenance of all roads needs to be done so in a manner that accommodates cyclists as well as other road users. For example, a proposed footpath development needs to be considered as potentially suitable as a shared pedestrian/cyclist path. Planned new road construction or existing road reconstruction should provide adequate space for cyclists to ride regardless of whether bicycle-specific treatments are to be included or if it is an identified primary or secondary bicycle route. This is particularly important at potential cyclist 'squeeze points', such as bridges, causeways and kerb projections.

The Austroads *Guide to Traffic Engineering Practice, Part 14 – Bicycles* ('the Guide') is the principal reference for the planning of bicycle facility construction and improvement. It has provided information to develop the design guidelines for Armidale Dumaresq, in conjunction with consideration of local conditions.

7.2 ADVISORY PAVEMENT SYMBOLS

Based on a combination of community consultation and technical considerations, this is the preferred treatment for most on-road routes within the Armidale urban area. Width constraints and parking demand along numerous road lengths permits only discontinuous application of exclusive bicycle lanes or bicycle/parking lanes. It is considered more desirable to have a consistent treatment application along a route.

Bicycle pavement symbols shall be marked to the right of the 2.1 metre parking at the approach to and departure of each intersection, midblock and a maximum interval of 200 metres along the route. Each symbol shall be accompanied by a 'bicycle warning' sign.

This treatment will serve the purposes of:

- highlighting a continuous route between lengths with marked lanes.
- alert motor vehicle to the presence of cyclists.
- encourage cyclists to ride more than 2 metres to the right of the kerb.

This shall be the preferred treatment for secondary on-road routes.

At locations with high demand for on-street parking, 2.1 metre wide parking bays shall be marked to encourage motor vehicle drivers to park in close proximity to the kerb. These locations shall also have pavement symbols marked at much closer intervals.

7.3 EXCLUSIVE BICYCLE LANES

This treatment provides marked on-road lanes designated for the use of cyclists only, located on the far left of the road carriageway. No parking is provided to the left of exclusive bicycle lanes.

Exclusive bicycle lanes may be provided on primary or secondary on-road cycle routes that have no or negligible demand for on-street parking. They are to have a minimum width of 1.2 metres, with a desirable width of 1.5 metres. They may be as narrow as 1.0 metres over short distances where road width is severely restricted.

Exclusive bicycle lanes are the preferred treatment for on-road primary and secondary routes on the periphery of the urban area. In the long term, this is a desirable treatment for important rural routes.

7.4 BICYCLE/PARKING LANES

This treatment provides marked on-road lanes designated for the use of cyclists only, located to the right of space available for car parking.

While exclusive lanes are safest for cyclists, this must be balanced with the community expectation for readily available on-street car parking. Within the urban area, it is assumed that there will be varying demand for car parking on both sides of most streets, which should be provided for in line with community expectation.

The Austroads *Guide* provides that the minimum width for a bicycle/parking lane is 3.7 metres in a 60km/h speed zone. Given the narrow widths of roads in Armidale, such a facility width cannot be achieved in almost all locations (see Constraints). However, the *Guide* recognises that although many urban road carriageways are only 12.8 metres wide, cyclists may benefit from the installation of bicycle/parking lanes in a 60km/h speed zone. A favourable factor for Armidale is that now all urban roads have a lower speed limit of 50km/h. Despite the restricted width of the facility, it is expected cyclists will benefit from motorists being alerted to the presence of cyclists (Austroads, 1999; p. 24). Cyclists will also benefit from drivers being compelled to park their vehicles as close to the kerb as possible.

Bicycle/parking lanes can be installed along primary or secondary on-road routes that are 12.8 metres wide or wider.

On each side of the road, the minimum treatment shall comprise of:

- 2.1 metre wide vehicle parking lane (measured from the face of the kerb), including 100mm unbroken line left of bicycle travelling lane.
- 1.4 metre wide bicycle travelling lane, including 100mm unbroken line left of the central travelling lane.
- 2.9 metre central travelling lane (may be reduced to be 2.8 metres for short lengths).

Prior to installation, each road length considered for the installation of a bicycle/parking lane will require careful consideration as to:

- total volume of motor vehicle traffic
- volume of heavy motor vehicles
- turnover of parking
- motor vehicle traffic speeds

It may be determined that advisory pavement symbols treatment are a better alternative at some locations.

7.5 ADVISORY BICYCLE/PARKING LANES

Marking one unbroken line between the central travelling and combined space for parking and bicycle travelling is not recommended. This does not legally compel motor vehicle drivers to park as close to the kerb as possible and therefore one of the major benefits of the bicycle/parking lane treatment is lost.

7.6 LANE TREATMENT AT INTERSECTIONS

All bicycle lane lines shall be broken a minimum of 30 metres on the approach side and 30 metres on the departure of any intersection.

The broken lane lines shall continue through all intersections where the road with the lanes marked has right-of-way over the intersecting road.

Where the intersecting road has right-of-way, the unbroken lane lines shall be marked to the traffic holding line, not continue through the intersection and re-commence immediately adjacent to the other side of the intersection.

The lanes shall not narrow at any intersection.

At the approach to a roundabout intersection, lane lines shall become broken a minimum of 30 metres before the road carriageway narrows to accommodate the splitter islands. The broken lines shall cease a minimum of 10 metres on the approach side of the splitter islands. No lane lines shall be marked within the roundabout intersection and the unbroken lane lines shall commence immediately after the splitter island on the departure side from the roundabout.

7.7 SEALED SHOULDERS

This treatment involves sealing an unkerbed road shoulder and marking a 100mm unbroken line to the left of the central travelling lanes (which will depend on the speed zone of length under consideration).

This treatment is appropriate for unkerbed roads on the urban peripheral and rural areas.

Bicycle pavement symbols are to be marked and bicycle warning signs installed at regular intervals.

This is the preferred treatment for important rural on-road routes. Rural road crests and curves with low sight distances are to be prioritised for this treatment.

7.8 BRIDGES AND CAUSEWAYS

Road carriageways narrow significantly at bridges and causeways, presenting a 'squeeze point' for cyclists. There is inadequate width to mark on-road cycle lanes over these locations in Armidale Dumaresq. However, most bridges in the urban area have wide pedestrian paths on both sides of the carriageway separated by a solid fence. These locations are to become shared use pedestrian/cyclist paths to provide cyclists with an alternative to riding across the narrow bridge carriageway.

The minimum width for the shared paths shall be 1.5 metres, preferably 2.0 metres or wider. The shared path shall have an unbroken separation line with pavement markings to denote that pedestrians and cyclists should keep to the left in the direction of their travel over the shared path.

Where the approach and departure to a bridge have any type of on-road cycle lane, on approach the line between the cycle lane and the central travelling lane is to become unbroken before the road carriageway narrows, on the approach to the exit ramp. This clearly presents the cyclist with the option of using the exit ramp to cross the bridge on the shared path, or moving to the right of the cycle lane to cross the bridge on the road carriageway.

On the departure side of the bridge, the unbroken lines of the cycle lane shall begin at the point where the carriageway begins to widen to encourage cyclists to merge left back into the cycle lane as soon as possible.

The entry ramp from the shared path back onto the road carriageway shall have clear signage and markings to denote right-of-way to cyclists using the bicycle lane (that is, who have crossed the bridge on the road carriageway).

Ramps are to be constructed on the approach and departure sides in accordance with section 4.5.3 of the *Guide* (Austroads, 1999; p. 36) in order to allow high-speed bicycle movements to and from these shared paths.

All bridges are to be signposted with cyclist warnings to alert motorists to the fact that they should expect to share the bridge roadway with cyclists, despite the presence of an off-road path.

7.9 ROUNDABOUT INTERSECTIONS

Roundabouts are the location of a significant proportion of the crashes involving an injury to cyclists in Armidale Dumaresq (see Crash Analysis). According to the *Guide*, single-lane roundabouts that are most common in Armidale do not warrant any specific treatment for cyclists. However the significance of the local crash problem justifies counter measures.

All approaches to roundabouts are to have a G9-57 ('Watch for Bicycles') sign installed beneath the 'roundabout' sign.

Many adult and adolescent cyclists currently (illegally) use the footpath to traverse roundabouts in Armidale. Many of these footpaths are 2.0 metres wide or wider. Therefore legal formalisation of them as shared pedestrian/cyclist paths is desirable to encourage cycling.

Along primary routes, shared pedestrian/cyclist paths should be provided. This gives the cyclist the option of exiting the road, travelling off-road through the roundabout location, and then re-entering. Or the cyclist may travel through the roundabout on the road.

The shared path shall have an unbroken separation line with pavement markings to denote that pedestrians and cyclists should keep to the left in the direction of their travel over the shared path.

At three-legged roundabouts, where possible, an off-road shared path should be provided along the continuing road for cyclists travelling straight through.

7.10 KERB PROJECTIONS AND PEDESTRIAN REFUGES

Provision for cyclists at these locations may be constrained by standard facility width requirements necessary to ensure pedestrian safety. Adequate spacing for cyclists is to be considered in the design of all road lengths with kerb projections and/or pedestrian refuges.

7.11 OFF-ROAD PATHS

All off-road paths are to be constructed and maintained in accordance with the *Guide*.

Given the moderate volumes of cyclist usage and community expectation about usage of path facilities, all off-road routes are to be unseparated shared paths with both pedestrian and cyclist access. Signage and pavement markings at key locations should be used to denote this shared-use status at key locations, for example, beyond path crossings of roads.

Primary route paths shall have a minimum of 2.5 metres, preferably 3.0 metres or wider.

Secondary route paths shall have a minimum width of 2.0 metres, preferably 2.5 metres.

On any curve with low sight distance in any direction, an unbroken centre line with directional arrows should be marked to encourage all path users to keep left.

7.12 OFF-ROAD PATH/ROAD CROSSING POINTS

Where paths meet roads a single clearly defined crossing point shall be provided. These shall have holding rails for waiting cyclists and minimal gradient kerb ramps with no lip. Kerb projections to prevent sight distance obstructions from vehicles parking adjacent to the crossing point. should be constructed.

Centre path bollards are only to be installed at crossing points where there is a demonstrated problem of motor vehicles being illegally driven onto the off-road path.

7.13 PATH/PATH INTERSECTIONS

Intersections between off-road paths shall be clearly marked and signposted to provide a clear right-of-way to the cyclist or pedestrian on the 'major' path.

7.14 PATH/RAILWAY CROSSING POINTS

Non-signalised off-road bicycle path railway crossing points are to be installed at locations identified in this Strategy, subject to approval from relevant rail authorities. They are to have curves designed to slow bicycles on both approaches to the track and signage to denote right-of-way to railway traffic (see photo on next page: example of successful installation of treatment at Fairfield, NSW).



7.15 PARKING FACILITIES

Parking facilities as specified in the *Guide* are to be installed at desirable locations. Under no circumstances are parking devices where the front wheel of the bicycle is secured between metal bars are to be installed.

8.0 Existing Route Network

8.1 ON-ROAD ROUTES

EOR1 East Armidale – UNE via Mann St

- bicycle/parking lanes along Mann St from Canambe St to Douglas St.
- bicycle/parking lanes along Douglas St from Mann St to Brown St.
- bicycle/parking lanes along Brown St from Douglas St to Faulkner St.
- bicycle/parking lanes along Faulkner St from Brown St to Mann St.
- bicycle/parking lanes along Mann St from Faulkner St to Butler St.
- bicycle/parking lanes along Butler St from Mann St to Dumaresq St.
- off-road path north from Dumaresq St, the east to connect O'Dell St branch of Creeklands Cycleway that connects with main Creeklands Cycleway.

EOR2 Erskine St to UNE via Madgwick Dr

- Exclusive cycle lanes north along Niagara St from north of roundabout intersection with Erskine St, then west along Madgwick Dr then along Trevenna Rd to UNE.

EOR3 Taylor St

- Bicycle/parking lanes from Creeklands Cycleway south to Brown St.

8.2 OFF-ROAD ROUTES

ESP1 Creeklands Cycleway

From Erskine St west of Centennial Ave to the University of New England. It largely lies less than 50m either side of Dumaresq Creek, bridging it at Taylor St, Dumaresq St, Niagara St and Elm Ave. Short links exist to Butler St, Trim St and Northcott St.

ESP2 O'Dell St Branch

From south of Donnelly St, west of O'Dell St (North), south to across Dumaresq Creek bridge, then south to north end of O'Dell St (South). Connects to East Armidale – UNE via Mann St route.

ESP3 Kentucky St – Kelly's Plains Rd

From south of Kentucky St along east side of Miller St south to Galloway St, then along south side of Galloway St to Perrott St. Along east side of Perrott St then Kelly's Plains Rd from Lynches Rd to north of Translator Rd.

9.0 Route Network Proposals

9.1.0 ON-ROAD ROUTES

9.1.1 Primary (Regional) On-Road Routes

(including some off-road links as part of some overall routes, as specified).

OR1 UNE – South Hill via Niagara St

- route connects with existing Madgwick Dr exclusive bicycle lanes.
- off-road path bypass of three-legged roundabout intersection with Erskine St for northbound travel.
- advisory pavement symbols from south of roundabout intersection with Erskine St to roundabout intersection with Queen Elizabeth Dr/Donnelly St.
- shared path treatment at roundabout intersection with Queen Elizabeth Dr/Donnelly St.
- Pavement symbols from south of roundabout intersection with Queen Elizabeth Dr/Donnelly St to McClennan St, except for shared path treatment at bridge over Martin's Gully between Donnelly St and Tancredi St.
- Advisory Pavement symbols east and south from McClennan St around curve to Miller St.
- off-road path from south of McClennan St on west side of Niagara across railway to Miller St, dependent on approval from Rail authorities.
- Exclusive bicycle lanes from south of Drew St to Miller St.
- Pavement symbols on Miller St to north of Kentucky St, with shared path at roundabout intersection with Mann St.
- off-road path along west side of Miller St to Kentucky St.
- crossing point at Kentucky St east of Miller St aligned with existing off-road path south of Kentucky St.
- connects with existing off-road path alongside Miller St, Galloway St, Perrott St and Kelly's Plains Rd.

OR2 UNE – South Hill via Shambrook Ave

- Exclusive bicycle lanes along Elm Ave to Handel St/ Queen Elizabeth Dr.
- Advisory pavement symbols to end of White Ave.
- Off-road path from end of White Ave across railway, under New England Highway overpass to Shambrook Ave.
- Exclusive bicycle lanes along Shambrook Ave to Martins Gully causeway (constrained width).
- Advisory pavements symbols from Martin's Gully causeway along Shambrook Ave and Drew St to Miller St.
- Connects to UNE – South Hill via Niagara St route.

OR3 North Hill – UNE via Duval St

- advisory pavement symbols along Gordon St and Richardson Ave to Glen Innes Rd.
- advisory pavement symbols along Chesnut Ave and Simpson Ave to off-road path from west end of Simpson Ave, which then links to Glen Innes Rd.
- off-road path along Glen Innes Rd from Gordon St to Richardson Ave.
- advisory pavement symbols along Duval St, Crest Rd and Munro St.
- off-road path from west end of Munro St to east end of Golden Cr.
- advisory pavement symbols along Golden Cr and Ash Tree Dr.

- off-road path from west end of Ash Tree Dr to connect with Madgwick Dr exclusive cycle lanes near intersection with Cluny Rd.

OR4 South Hill – UNE via Markham St

- Pavement symbols along Markham from Lynches Rd to Mossman St.
- Exclusive bicycle lanes from south of Mossman St to 20 metres north of Mann St.
- Pavement symbols from south of Mann St to Donnelly, except for shared path treatments at Barney St, Rusden St, Dumaresq St and Donnelly roundabouts intersections and Dumaresq Creek bridge between Beardy St and Dumaresq St.
- Pavement symbols along Donnelly St, west from Markham St to Niagara St, except for shared path treatment at Dumaresq Creek bridge between O'Dell St and Edward St.
- Shared path treatment at roundabout intersection with Niagara St.
- Advisory pavement symbols along Queen Elizabeth Drive from Niagara St to Golgotha St.
- Exclusive bicycle lanes from Golgotha St to Martin St.
- Advisory pavement symbols from Martin St to start of Booralong Rd to connect with Elm Ave exclusive bicycle lanes and 'triangle track' off-road path.

OR5 South Hill – CBD via Dangar St (OR5)

- Exclusive bicycle lanes along O'Connor Rd from Lynches Rd to Kentucky St.
- Shared path treatment at roundabout intersection with Kentucky St.
- Advisory bicycle symbols from north of railway overbridge (constrained width) to Moore St.

OR6 South-East Armidale – North-East Armidale (OR6)

- Sealed shoulders along Long Swamp Rd from Seaton St to Canambe St.
- Pavement symbols along Canambe St from Mossman St East to Donnelly St (north end of Canambe St), with shared path treatment at roundabout intersection with Barney St.
- Off-road path from north end of Canambe St along Erskine St and Box Hill Dr to connect with off-road path south of Rockvale Rd, including new bridge over Dumaresq Creek between Donnelly St and Erskine St.

OR7 CBD – Rockvale Rd Cycleway via Marsh St

- Advisory pavement symbols along Marsh St north of Dumaresq to Erskine St, then along Rockvale Rd to Merinda Pl (constrained width at roundabout intersection with Dumaresq St and Dumaresq Creek bridge between Dumaresq St and Kirkwood St).
- Advisory pavement symbols from Merinda Pl to Gordon St.
- Connects with Rockvale Rd off-road path.

OR8 North Hill – South Hill via Taylor St

- Advisory pavement symbols along Taylor St from Erskine St to southern end south of Kentucky St.
- Off-road path south and then west to link with Lynches Rd advisory pavement symbols, dependent on approval from rail authorities.
- Connects to Creeklands Cycleway, Dumaresq St, Rusden St and Mann St routes.

OR9 East Armidale – West Armidale via Dumaresq St (OR9)

- Advisory pavement symbols along Dumaresq St from Canambe St to Ohio St.
- Advisory pavement symbols from Ohio St to Niagara St.
- Shared path treatments at roundabout intersections with Faulkner St, Dangar St, Jessie St and Dumaresq St.
- Shared path treatments at Dumaresq St causeways between Jessie and Markham St and between Markham and Butler St (requires construction of new shared pathway on north side).
- Connects to Taylor St, Marsh St, Markham St and Creeklands Cycleway routes.

OR10 East Armidale – West Armidale via Rusden St (OR10)

- Advisory pavement symbols from Taylor St to Dangar St.
- Shared path treatment at roundabout intersection with Dangar St (constrained width at roundabout intersection with Marsh St).
- Advisory pavement symbols between Dangar St and Jessie St.
- Bicycle/parking lanes between Jessie St and O'Dell St, with shared path treatment at roundabout intersection with Markham St.
- Advisory pavement symbols between O'Dell St and Niagara St.
- Connects to Dangar St and Markham St routes.

OR11 East Armidale – West Armidale via Mann St (OR11)

- Advisory pavement symbols from Canambe St to Markham St.
- Connects to Taylor St and Dangar St routes and Butler St secondary route.

9.1.2 Secondary On-Road Routes

Install advisory pavement symbols on the following secondary routes:

- OR12 Lynches Rd from Perrott St/Kelly's Plains Rd to off-road path west of railway crossing point.
- OR13 Kentucky St from Dangar St to Long Swamp Rd. [(width constraint at Black Gully bridge)]
- OR14 Kennedy St from Galloway St to Mann St (connects Mann St primary route to Dangarsleigh Rd rural route).
- OR15 Butler St from Mann St to Dumaresq St (connects to Creeklands Cycleway branch).
- OR16 Markham St, north from roundabout intersection with Donnelly St, northwest along Glass St to Blake St.
- OR17 Northcott St from south end (connecting to Creeklands Cycleway) to Erskine St.

9.1.3 Rural On-Road Route Improvements

Sealed shoulder are to be prioritised for crests and curves with low sight distances along the following rural road lengths:

- Dangarsleigh Rd, to Dangars Falls Rd.

- Booralong Rd, to Dumaresq Dam Rd.
- Bundarra Rd, to western edge of LGA boundary.
- Waterfall Way along northbound lane of Uralla Rd.
- Kelly's Plains Rd to Platform Rd.
- Gostwyck Rd from Knobs Rd to Dangarsleigh Rd.
- Castledoye Rd from Mann St to Blue Hole

9.2 OFF-ROAD PATHS

9.2.1 New Primary (Regional) Off-Road Routes

SP1 Cookes Rd – Merinda Pl via Erskine St

From existing termination of Creeklands Cycleway on south side of Erskine St, reconstruct existing footpath east to Cookes Rd and west to Taylor St, then north along Taylor St to Merinda Pl. Provide road crossings on Douglas St, Taylor St and Erskine St.

Stage One: Merinda Pl to Macdonald Dr (west).

Stage Two: Macdonald Dr (west) to Cookes Rd.

SP2 Creeklands Cycleway – Cookes Rd south of Macdonald Dr

From Creeklands Cycleway south-west of Centennial Ave, east to Cookes Rd, then links into future residential area east of Cookes Rd to be determined. Provides links into Macdonald Dr residential area.

Stage One: East to Macdonald Dr between sports fields to meet Canambe St – Box Hill Dr cycleway. Short link to Macdonald Dr between No. 81 and No. 83.

Stage Two: East of Canambe St - Box Hill Dr cycleway to Cookes Rd below Eleanor Cl between Nos. 31 and 24.

Stage Three: East of Cookes Rd into future residential area to be determined.

SP3 Canambe St – Rockvale Rd via Box Hill Dr

From north end of Canambe St, north to Erskine St, including new bridge over Dumaresq Ck. Then along Box Hill Dr to meet Rockvale Rd cycleway.

SP4 Alahna Dr – Creeklands Cycleway via Niagara St

From north end of Alahna Dr, east along Tancredi St (west), north along Golgotha St, east to Niagara St, south of Girraween Shopping Centre. Then south along east side of Niagara St including shared path treatment over Martin's Gully bridge, east along north side of Tancredi St (east), east from Ohio St to meet O'dell St and Butler St off-road routes.

SP5 Butler St – Jessie St via Markham St

From end of Butler St branch, east along north side of Dumaresq St to Markham St crossing point of Creeklands Cycleway. Construct shared pathway crossing on Dumaresq Creek between Butler St and Markham St and cycleway south along Markham St to Beardy St, then west along Beardy St to intersection with Jessie St. Path links into proposed shopping centre to be determined.

SP6 Kelly's Plain's Rd to Kearney St via Kurrawatha Ave

From T-intersection with Kelly's Plains rd along south side of Bona Vista Rd, then along south side of Kearney St to entrance to Martin's Gully Primary School.

SP7 Miller St - Butler St via Barry St

From north side of Kentucky St north along east side of Miller St, northeast along southeast side of Barry St, east along south side of Mossman St, east, then north to connect with Stephen St. North along east side of Stephen St, then east along Mann St to Butler St.

SP8 Rockvale Rd Cycleway

Seal entire length of Rockvale Rd cycleway from Gordon St to Pine Forest.]

SP9 Kelly's Plains Cycleway

Continue Kelly's Plains Cycleway south along Kelly's Plains Rd with links into new rural residential subdivisions to be determined.

SP10 Booralong Rd – Rowlands Rd – Old Inverell Rd

Seal and formalise to cycleway standard 'Triangle Running track' existing sections along west side of Booralong Rd between Handel St and Rowlands Rd and north side of Old Inverell Rd between Handel St and Rowlands Rd. Construct new section along east side of Rowlands Rd between Booralong Rd and Old Inverell Rd.

SP11 Erskine St – Ash Tree Dr

From Erskine St north of Northcott to west end of Ash Tree Dr. With Northcott St advisory pavement symbols, connects Creeklands Cycleway to North Hill – UNE via Duval St route.

9.2.2 Improvements to Existing Creeklands Cycleway

- SP12 Construct reinforced concrete section at area subject to flooding, south of Donnelly St, west of Butler St (North).
- SP13 Replace existing structure and realign/reconstruct approaches of Dumaresq Creek bridge of O'Dell/Butler St branch, north of O'Dell St.
- SP14 Construct clearly defined road crossing points at Elm Ave, Niagara St and Markham St.
- SP15 Construct new crossing point over Dumaresq St adjacent to Aquatic Centre entrance and new parking facilities.
- SP16 Deviate path west of Taylor St over existing path space on Dumaresq Creek causeway to create new crossing point north of Dumaresq Creek.

- SP17 Improve drainage of Butler St branch.
- SP18 Re-align path to eliminate unnecessary curves west of Niagara St, north of McIntosh Cr; west of Markham St, south of Butler St (North); east of Douglas St (North), south of Erskine St.

9.2.3 Secondary Routes

Short Links To Primary Off-Road Routes

Construct short shared path to link Creeklands Cycleway with:

- SP19 Elm Ave at intersection with Meredith Rd.
- SP20 Martin St at north end.
- SP21 Bain Cr at north end.
- SP22 McIntosh Cr at north end.
- SP23 Hiddens St at north end.
- SP24 Tysoe Cr at west end.
- SP25 PG Love Ave at west end.
- SP26 Butler St north at south end (reconstruct to standard and link to kerb).
- SP27 Dumaresq St west of carpark between Faulkner St and Marsh St.
- SP28 Dumaresq St east to western edge of Belgrave Twin Cinema (to new parking facility).
- SP29 Donnelly St at east end.
- SP30 Jeffrey St at east end.
- SP31 Newton St at east end.
- SP32 Centennial Cl at west end, dependent on agreement from landowners to purchase 5m easement between No 25 and No 26 Centennial Cl.

9.2.4 Short Links Between Roads

Convert existing pedestrian only paths to shared cyclist/pedestrian paths

- SP33 Claude St – Trim St (requires construction of shared path bridge over Dumaresq Creek).
- SP34 Macdonald Dr – Eleanor Cl between Nos. 31 and 33 Macdonald Dr and Nos. 11 and 13 Eleanor Cl.
- SP35 Kirkwood St – Dumaresq St between Dangar St and Markham St.
- SP36 Butler St from Mann St to Railway Pde via bicycle accessible railway crossing, dependent on approval from rail authorities.
- SP 37 Murray Ave – Catherine St – Napier Ct – Butler St – Kentucky St across Arboretum to Armidale High School (including new link to west end of Catherine St).
- SP38 Galloway St – Kentucky St across Arboretum.
- SP39 Bishop Cr – Nathaniel Pidgeon Cl.
- SP40 Cunningham Cr – Kilkenny Cl – Carlow Cl – Winifred Pl – Merino Tce.

9.3 PARKING FACILITIES

9.3.1 Replace Existing Facilities

- PF1 East end of Central Beardy Mall – west of Faulkner St.
- PF2 West End of Central Beardy Mall – east of Dangar St.

9.3.2 Install New Facilities

- PF3 Armidale Aquatic Centre - south of Dumaresq St .
- PF4 Belgrave Twin Cinema – north of Beardy St.
- PF5 Near southwest corner of Jessie St and Beardy St.
- PF6 Beardy St between Marsh and Faulkner St.
- PF7 Armidale Dumaresq Council Civic Administration Building – north of Rusden St.
- PF8 Wicklow Oval – at clubhouse west of Taylor St and north of intersection between Taylor St and Douglas St.
- PF9 Harris Park – toilet block south of Kirkwood St.
- PF10 Elizabeth Park – north and south of Dumaresq Creek
- PF11 Central Park – north of Tingcombe Ln..
- PF12 Curtis Park – between Creeklands Cycleway and childrens playground, south of Dumaresq Creek.
- PF13 New England Regional Art Museum – south of Kentucky St.
- PF14 Aboriginal Cultural Centre and Keeping Place – south of Kentucky St.
- PF15 Girraween Shopping Centre – between Queen Elizabeth Dr and service station and other location near shops at east end.
- PF16 Moore St, closer to Dangar St.
- PF17 Near entrance to Woolworths supermarket, north of Rusden St.
- PF18 Near entrance to IGA supermarket, north of Rusden St.

Also work in conjunction with all schools, TAFE and UNE to encourage the on-site provision of secure, modern facilities as specified in the Engineering Design Guidelines.

10.0 Education and Encouragement Strategy - Overall Bicycle Program

New and improved on- and off-road physical infrastructure is proposed to improve cycling conditions and therefore encourage more cycling trips within Armidale Dumaresq. To maximise the benefits of engineering works, other actions are needed. These are:

- Encouragement and promotion of cycling within the community.
- Education of different types of cyclists about safe, effective riding and of non-cyclists about safe interaction with cyclists.
- Enforcement to ensure laws and regulations that ensure the safe interaction of road and off-road path users are complied with for the benefit of all.
- Evaluation of engineering and non-engineering activities to determine their effectiveness in order to improve performance.

All these activities, along with engineering works, need to be viewed as inter-related components of a an overall bicycle program. For example, education of less skilled cyclists about safe riding aims to increase their confidence with riding in various environments. This

will encourage them to make more trips by bicycle and more effectively utilise the physical facilities provided.

10.1 STEERING COMMITTEE

Establish new community-based Steering Committee to supervise implementation of the Strategy. This committee is to be comprised of interested individuals and organisational representatives who can offer 'expertise' and/or be positioned to be effective with regards to one or more key developmental areas of the Strategy. The Committee is to be chaired by the Road Safety or other appropriate Council officer.

10.2 PROMOTE USE OF NEW FACILITIES

Publicity in local media, through cycling organisations, schools and other relevant organizations shall provide information about all new and improved bicycle facilities at the time of construction.

10.3 BICYCLE ROUTE AND FACILITY MAPS

Cycling routes maps that clearly show the type of facilities available and other information relevant to cyclists are to be produced and updated regularly. This may include information about slope gradients, locations of parks, public toilets and taps and places of interest. All maps produced shall be suitable for tourists and not presume any local knowledge.

10.4 BIKE WEEK

Council is to work with the New England Bicycle Users Group, Armidale Cycling Club and other interested organisations to hold at least one annual RTA Bike Week event. This event shall promote to the community the benefits of cycling

10.5 EQUIPMENT

The importance of the correct utilisation of essential safety equipment, such as helmets, lights and equipment is to be promoted.

The helmet inspection station at the Armidale Bicycle Centre provides a free-of-charge community service. Any person can present their helmet and have it correctly adjusted to have the safest fit. This is to be promoted by Council through schools and the general community

10.6.0 EDUCATION

The Road Safety Officer is to provide education for the community about:

- the rights and responsibilities of cyclists riding on the road, including use of bicycle lanes.
- the need for motor vehicle drivers and cyclists to obey road rules.
- effective pedestrian and cyclist sharing of off-road paths.

10.6.1 Cyclist Education

The Road Safety Officer is to facilitate and coordinate programs for current and interested potential cyclists to Provide education about the following:

- ride on the correct side of the road.
- legal requirements of bicycle lanes.
- the need for conspicuity at all times with the use of bright clothing and effective lights when riding in darkness.
- the safety benefits of wearing helmets in reducing head injury.
- avoid 'weaving' between parked vehicles.
- the use of clear hand signals for all turns at intersections and other locations.
- high cyclist crash rate at roundabouts.
- merge into the centre of the lane on approach to a roundabout and remain in the centre of the lane until the roundabout is exited.
- keep left on shared paths.
- ring bell when approaching pedestrians from rear on shared paths.
- overtake pedestrians on the far right of the path.

10.6.2 Motor Vehicle Driver Education

Through local media the Road Safety Officer is to Provide education about the following:

- Bicycles are legal road vehicles, with cyclists having the same rights and responsibilities as motor vehicle drivers.
- Legal requirements of bicycle lanes.
- Allow cyclists to merge into the centre of the travelling lane on approach to roundabouts.
- Look carefully for cyclists at roundabouts and for cyclists turning right at any intersection.
- Look carefully for cyclists on the road and on the footpath when entering or exiting any driveway.
- It is legal for children aged 12 years or under to ride on footpaths.
- All vehicle occupants to look to the rear after parking (including any 'blind spot') for any oncoming cyclist.
- Park as close to left-hand kerb on all roads to maximize space for cyclists.

10.6.3 Pedestrian Education

Through local media the Road Safety Officer is to Provide education about the following:

- Which specific paths are shared with cyclists.
- Paths are wide enough to share comfortably with cyclists.
- Keep to the left of path, particularly when you hear a bicycle bell.
- Keep dogs on a short leash on shared paths.
- Preferable to walk dogs right on the edge or off the side of the path.

10.7 SAFE CYCLING COURSES

In conjunction with members of Steering Committee and local schools, Road Safety Officer is to short courses or sessions for riders of different abilities. It is desirable to utilise the off-road facilities of the Traffic Education Centre for this purpose. Course content should include:

- safe and effective riding on variety of road and/or off-road environments.
- roads rules.
- basic maintenance.
- basic handling skills.

These short courses or sessions are to be made available preferably free-of-charge, or for a minimal charge, to schools, other organizational groups, families and individuals.

10.8 RIDING TO SCHOOL

In consultation with NSW Department of Education and Training, Association of Independent Schools and Catholic Schools Commission:

- Explore opportunities to provide secure modern bicycle parking facilities at schools without any and to replace existing inadequate facilities.
- Emphasise the need for schools to promote the individual and ecological benefits of bicycle riding in PDHPE, environmental studies, science and other appropriate subject areas. Provide relevant information and resources to assist with this promotion.
- Explore any suggestions made by schools, parents or students for activities aimed at increasing the number of students riding to school.

10.9 LAND-USE PLANNING

Strategic planning of land usage consistent with development control is essential to enable the provision of quality bicycle facilities that are components of a viable route network. In the same manner as linkages to the existing road network are considered, impacts upon and linkages to existing on-road and off-road cycle routes are to be considered with regards to land development.

The design of new subdivisions provides opportunity to plan the development of bicycle facilities concurrently with the overall layout of all land uses in a manner that encourages cycling. At the least, new subdivisions are to include corridors for shared cyclist/pedestrian paths at the time the land is subdivided. If the land is subdivided without bicycle path corridors, this creates major difficulties for the future construction of any links to the existing network.

Developers are to construct cycle facilities in conjunction with their subdivisions and consideration should be to including cycle facilities in Councils Section 94 Contributions Plan.

10.10 EVALUATION AND REVIEW

For any new facility installed, conduct ‘before and after’ frequency counts and longer-term evaluation of crash data of sites and lengths relevant to that facility.

Review general performance of Strategy on ongoing basis with Steering Committee as the need arises.

Comprehensively review and update Strategy at least every 5 years

11. References

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APPENDIX A Facility Priority List

NO ORDER OF PRIORITY WITHIN EACH CATEGORY

On-Road

High

OR1 UNE – South Hill via Niagara
OR4 South Hill – UNE via Markham
OR9 East Armidale – West Armidale via Dumaresq St

Medium

OR2 UNE – South Hill via Shambrook
OR3 UNE – North Hill via Duval St
OR5 South Hill – CBD via Dangar St
OR6 South-East Armidale – North East Armidale
OR8 North Hill – South Hill via Taylor St
OR10 East Armidale – West Armidale via Rusden St

Low

OR7 CBD – Rockvale Rd via Marsh St
OR11 East Armidale – West Armidale via Mann St
OR12 Lynches: Perrott – East Termination
OR13 Kentucky: Dangar – Long Swamp Rd
OR14 Kennedy: Galloway - Mann
OR15 Butler: Mann - Dumaresq
OR16 Markham/Glass: Donnelly - Blake
OR17 Northcott: South Termination - Erskine

Off-Road

High

SP1 Cookes Rd – Merinda Pl via Erskine St (Stage 1 – Merinda – McDonald)
SP2 Creeklands Cycleway – Cookes Rd (Stage 1 – Exsiting Cycleway – McDonald)
SP4 Alahna Dr – Creeklands Cycleway via Niagara St
SP8 Rockvale Rd Cycleway (completed)
SP16 Taylor St deviation
SP19 Meredith short link
SP28 Dumaresq (Faulkner – Marsh) short link

Medium

SP1 Merinda – McDonald Stage 2
SP2 McDonald short links
SP3 Cannambe – Rockvale (Stage 1 Cannambe – Erskine)
SP5 Butler St – Jessie St via Markham S
SP6 Kelly's Plains – Kearney via Kurrawatha

SP7 Miller – Butler via Barry
SP11 Erskine – Ash Tree Dr
SP12 Creeklands Cycleway Concreting
SP14 Elm, Niagara, Markham St crossings
SP15 Dumaresq St crossing
SP17 Butler path drainage
SP22 McIntosh short link
SP25 PG Love short link
SP33 Claude – Trim short link

Low

SP3 Cannambe St – Rockvale Rd via Box Hill Dr
SP9 Kelly's Plains Cycleway
SP10 Booralong Rd – Rowlands Rd – Old Inverell Rd
SP18 Creekland Cycleway realignments
SP20 Martin short link
SP21 Bain short link
SP23 Hiddens short link
SP24 Tysoe short link
SP26 Butler St Nth
SP28 Dumaresq (Jessie) short link
SP34 McDonald – Elenoar
SP38 Galloway – Kentucky
SP39 Bishop Cr – Nathaniel Pidgeon Dr
SP40 Cunningham Cr – Kilkenny Cl – Carlow Cl – Winifred Pl – Merino Tce

Parking Facilities

High

PF1 Central Beardy Mall – east end
PF2 Central Beardy Mall – west end
PF3 Aquatic Centre
PF4 Belgrave Twin Cinema
PF15 Girraween Shopping Centre
PF17 Woolworths
PF18 IGA

Medium

PF6 East End Mall
PF13 New England Regional Art Museum
PF14 Aboriginal Cultural Centre
PF16 Moore St

Low

PF5 Corner Jessie & Beardy
PF8 Wicklow Oval
PF9 Harris Park
PF10 Elizabeth Park
PF11 Central Park
PF12 Curtis Park