



ACT
Government

Transport Canberra and
City Services

FREEDOM OF INFORMATION COVERSHEET

The following information is provided pursuant to section 28 of the *Freedom of Information Act 2016*.

FOI reference: TCCSFOI 20-030

Information to be published	Status
1. Access application	Published
2. Decision notice and schedule	Published
3. Documents	Published
4. Additional information identified	n/a
5. Fees	n/a
6. Processing time (in working days)	19 days
7. Decision made by Ombudsman	n/a
8. Additional information identified by Ombudsman	n/a
9. Decision made by ACAT	n/a
10. Additional information identified by ACAT	n/a

From: [REDACTED]
To: [TCCS FreedomOfInformation](#)
Subject: Freedom of Information request: Strategic Cycle Network Plan
Date: Sunday, 3 May 2020 9:20:12 PM
Attachments: [image001.png](#)

Dear Fol Officer

The ACT Government document "BUILDING AN INTEGRATED TRANSPORT NETWORK: ACTIVE TRAVEL" (<https://www.transport.act.gov.au/about-us/active-travel?a=888712>) includes reference to a Strategic Cycle Network Plan. I understand this Plan was partially completed.

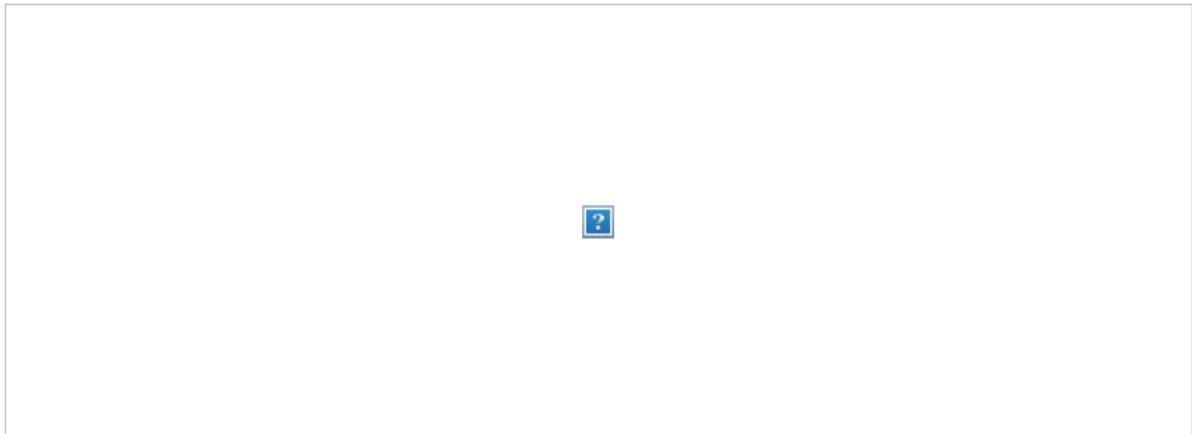
I request the following documents:

- The final consultancy report/s for the Strategic Cycle Network Plan provided by spackman mossop michael, including any proposed route network or options diagrams
- The most recent version of the Strategic Cycle Network Plan document, including proposed route network or options diagrams
- The preliminary options report released for consultation in 2012

Kind regards

[REDACTED]

Sign up for regular Assembly Greens updates [here](#) or follow Caroline on [Facebook](#) and [Twitter](#)





ACT
Government

Transport Canberra and
City Services



Dear Ms. [REDACTED]

Freedom of information request: Reference 20-030

I refer to your access application made under the *Freedom of Information Act 2016* (FOI Act), dated 4 May 2020, in which you sought access to:

- a) The final consultancy report/s for the Strategic Cycle Network Plan provided by spackman mossop michaelis, including any proposed route network or options diagrams;
- b) The most recent version of the Strategic Cycle Network Plan document, including proposed route network or options diagrams; and
- c) The preliminary options report released for consultation in 2012.

A decision on your application is due on 2 June 2020.

I am an officer authorised by the Director-General of the Transport Canberra and City Services to make decisions about access to government information, in accordance with section 18 of the FOI Act.

Transport Canberra and City Services (TCCS) have completed a search and have identified 3 records within scope of your request. A list of these records is provided in the schedule of documents at [Attachment A](#). I have decided to grant full access to these records.

Record 2 is the most recent version of the Strategic Cycle Network Plan, however the most recent cycle route network diagram is represented in the [Active Practitioners Tool](#) (activeinfrastructure.net.au) and the draft Moving Canberra: Integrated Transport Strategy which was released for consultation in 2018 and is available on the [Have Your Say webpage](#).

For completeness, I have included Record 3 in the documents at Attachment B. This record is also available online at <https://www.yumpu.com/en/document/read/44634219/preliminary-options-report-transport-for-canberra-act->.

Reasons for decision

As an Information Officer, I am required to decide where, on balance, public interest lies. As part of this process I must consider factors favouring disclosure and non-disclosure.

Favouring disclosure (Schedule 2.1):

- 2.1(i), promote open discussion of public affairs and enhance the government's accountability;
- 2.1 (ii) contribute to positive and informed debate on important issues or matters of public interest;
- 2.1 (iii), inform the community of the government's operations, including the policies, guidelines and codes of conduct, followed by the government in its dealings with members of the community;
- 2.1(iv) ensure effective oversight of expenditure of public funds; and
- 2.1 (viii) reveal the reason for a government decision and any background or contextual information that informed the decision.

Favouring non-disclosure (Schedule 2.2):

- No factors favouring non-disclosure were identified in reviewing the records.

Charges

In accordance with section 107 of the FOI Act, I have waived all associated fees as you are a Member of the Legislative Assembly.

Disclosure log

Section 28 of the FOI Act requires maintains a public disclosure log. This can be viewed at www.tccs.act.gov.au/about-us/freedom_of_information.

In this instance, I have decided that the information to be released to you is also of interest to the public. Therefore, publication will occur within 3-10 business days from the date of this letter. The publication will include your original access application, this decision notice and attached documents, with your personal information removed.

Review rights

You may apply to the ACT Ombudsman to review my decision under section 73 of the FOI Act. An application for review must be made in writing within **20 days** of my decision being published in the disclosure log.

You may submit a request for review of my decision to the ACT Ombudsman by writing in one of the following ways:

Email(preferred): actfoi@ombudsman.gov.au
Post: The ACT Ombudsman
GPO Box 442
CANBERRA ACT 2601

More information about ACT Ombudsman review is available on the ACT Ombudsman website at: <http://www.ombudsman.act.gov.au/Freedom-of-Information>.

ACT Civil and Administrative Tribunal (ACAT) review

Under section 84 of the FOI Act, if a decision is made under section 82(1) on an Ombudsman review, you may apply to the ACAT for review of the Ombudsman decision.

Further information may be obtained from the ACAT at:

ACT Civil and Administrative Tribunal

Level 4, 1 Moore Street

GPO Box 370

Canberra City ACT 2601

Telephone: (02) 6207 1740

www.acat.act.gov.au

If you have any queries concerning the directorate's processing of your request, or would like further information, please contact the TCCS FOI team on (02) 620 72987 or email tccs.foi@act.gov.au.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Daniel Childs', with a long, sweeping horizontal stroke extending to the right.

Daniel Childs
Information Officer

27 May 2020

FREEDOM OF INFORMATION REQUEST SCHEDULE

Please be aware that under the *Freedom of Information Act 2016*, some of the information provided to you will be released to the public through the ACT Government's Open Access Scheme. The Open Access release status column of the table below indicates what documents are intended for release online through open access.

Personal information or business affairs information will not be made available under this policy. If you think the content of your request would contain such information, please inform the contact officer immediately.

Information about what is published on open access is available online at www.tccs.act.gov.au/about-us/freedom_of_information

REFERENCE NUMBER		WHAT ARE THE PARAMETERS OF THE REQUEST			
20-030		Strategic Cycle Network			
Record	Description	Page Number	Date	Status	Open Access release status
1	Part A - 20120806 Background Technical Report Final#3	1 - 79	6 August 2012	Full access	To be published with personal information removed
2	Part B - 20141001_3002316 ASCNP Final Report (Rev3b)#3	80 - 176	26 September 2014		
3	Part C - 2012 SMEC Preliminary_Options_Report#3	177 - 238	13 November 2012		
Total: 3 records, 238 pages					

BACKGROUND REVIEW AND ANALYSIS OF EXISTING CYCLE NETWORK
ACT STRATEGIC CYCLE NETWORK PLAN

TECHNICAL REPORT



PREPARED BY **SPACKMAN MOSSOP MICHAELS** FOR SMEC ON BEHALF OF ESDD

6 AUGUST 2012

Background Review and Analysis of Existing Cycle Network
ACT Strategic Cycle Network Plan

Final

Report issued on 6 August 2012

Report prepared for:
SMEC
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Report prepared by:
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**SPACKMAN
MOSSOP AND
MICHAELS**

This report is intended to be viewed as a double sided document. Orientation should be portrait and double sided printing should be along the long-end spine of the document. Proper viewing and printing of this document will ensure that information is conveyed in its intended clear and logical format.

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I INTRODUCTION

I.1 PURPOSE OF REPORT

On behalf of the ACT Government, the Environment and Sustainable Development Directorate (ESDD) is continuing efforts to create a more sustainable city that meets the needs of the Canberra community. The Strategic Cycle Network Plan is intended to provide an attractive, first rate bicycle network with excellent route connectivity, safety and convenience for all cycling user groups. A key goal is to develop a bicycle friendly environment that encourages more cyclists to use the cycle network. This requires the provision of a well planned and integrated network of bicycle routes that is underpinned by long term strategic thinking. Once completed, the Strategic Cycle Network Plan will address the complete cycleway network, behavioural and infrastructure changes to improve the cycling environment. The Strategic Cycle Network Plan will develop strategies to meet and manage increased demands on the network over time. This will help the ACT Government to meet its mode share target of seven percent cycling by 2026.

The Strategic Cycle Network Plan will link with future land development and urban growth. This will create a complete, continuous network of cycleway types to, from and within town centres and major employment areas. This will also develop a commuter cycle network with high-quality cycling infrastructure that is safe and well signposted, offering direct routes to destinations and integrated with public transport.

Additionally, the Strategic Cycle Network Plan will help to promote active transport within Canberra's urban and suburban structures to ensure that cycling trips are convenient, pleasant and safe. In order to promote cycling as a viable and hopefully favoured mode of transport there needs to be a high level of amenity, especially to key destinations such as workplaces, schools and shops as well as mixed land uses, densities and choices of destinations to support active transport system.

This *Background Review and Analysis of Existing Cycle Network* (Background Review) is one of the initial steps (in Stage 1) in the development of the Strategic Cycle Network Plan and will be supported by other information inputs from the:

- Initial stakeholder consultation;
- Strategic transport modelling (with the inclusion of cycling); and
- Multi Criteria Analysis and methodology.

This Background Review will provide the context and understanding of the current conditions of the planning considerations, cycle design standards and cycleway network in Canberra. This information will be utilised in Stage 2 to develop a series of preliminary options and then a preferred option for the Strategic Cycle Network Plan.





1.2 BACKGROUND AND SETTING

Located approximately 150 km inland from the east coast, the project area is located within Canberra and its surrounding suburbs, and is in the northeastern portion of the ACT, which is illustrated on Figure 1.1. Canberra covers an area of roughly 800 km² and is located near the Brindabella Ranges. Most of the urban environs of Canberra are located in the rolling Ginninderra, Molonglo, and Tuggeranong plain.

Canberra and the surrounding urban environs are completely planned urban developments based on the garden city movement of the late 1800s, which incorporates significant areas of natural vegetation and open space into the built environment. This type of planning has resulted in the development of two distinct cycleway networks over time. The on road cycling facilities are located along arterial and major collector roadways. The off road cycling facilities meander through the open space between local suburb areas and are also often located adjacent to roadways.

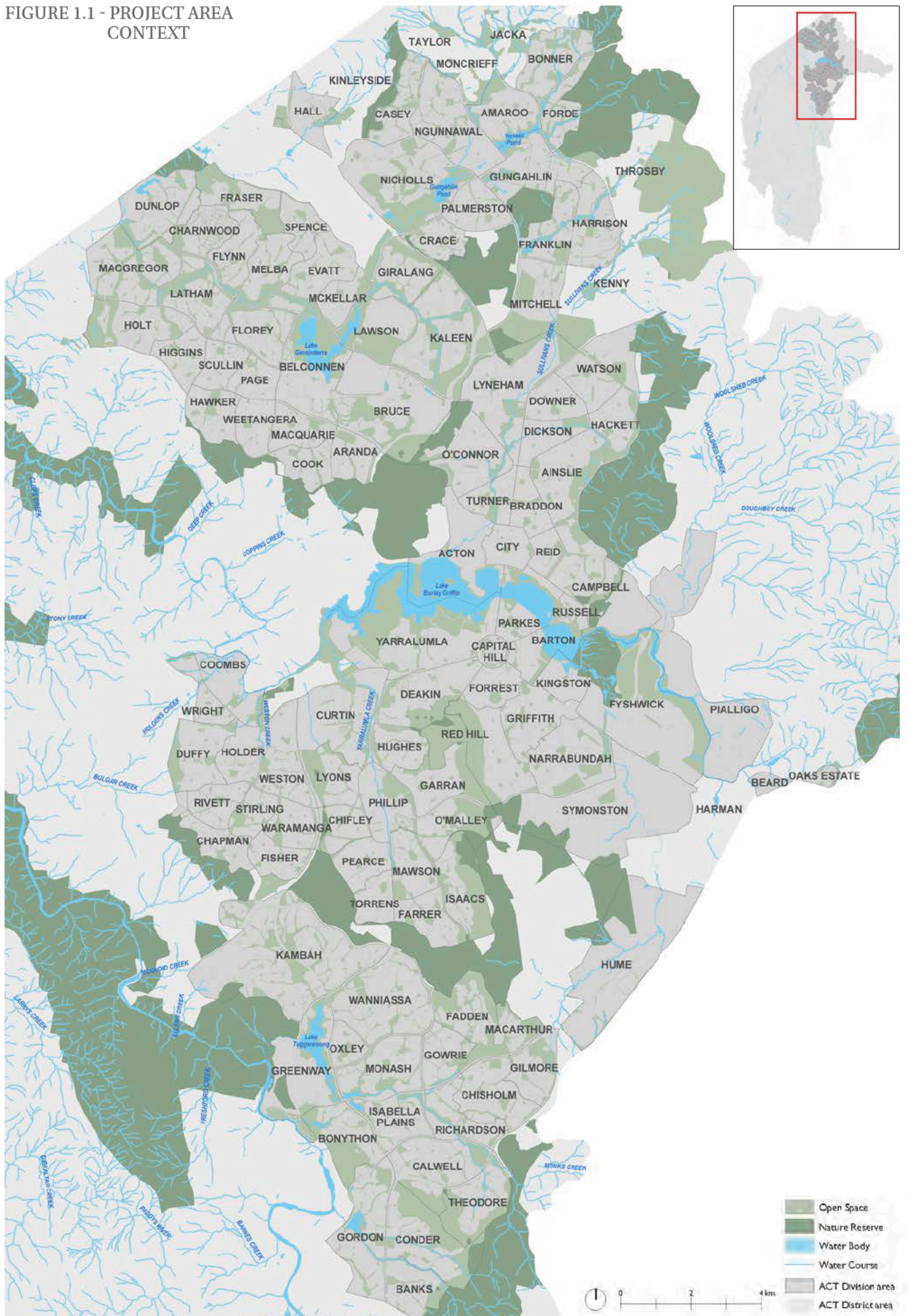
One of the key defining features of the Canberra area is that there is a substantial amount of **space**. Most major cities are struggling to find ways to retrofit confined transport corridors with pedestrian, cycle, public transit, private vehicles, transport vehicles, parking and public domain spaces. Yet Canberra does not have this same constraint and therefore does not have to rely on typical cycleway designs and treatments that are generally created for dealing with confined environments. As a result, Canberra has the potential to create a one-of-a-kind integrated on and off road cycleway network that is the envy of other metropolitan areas around the world.

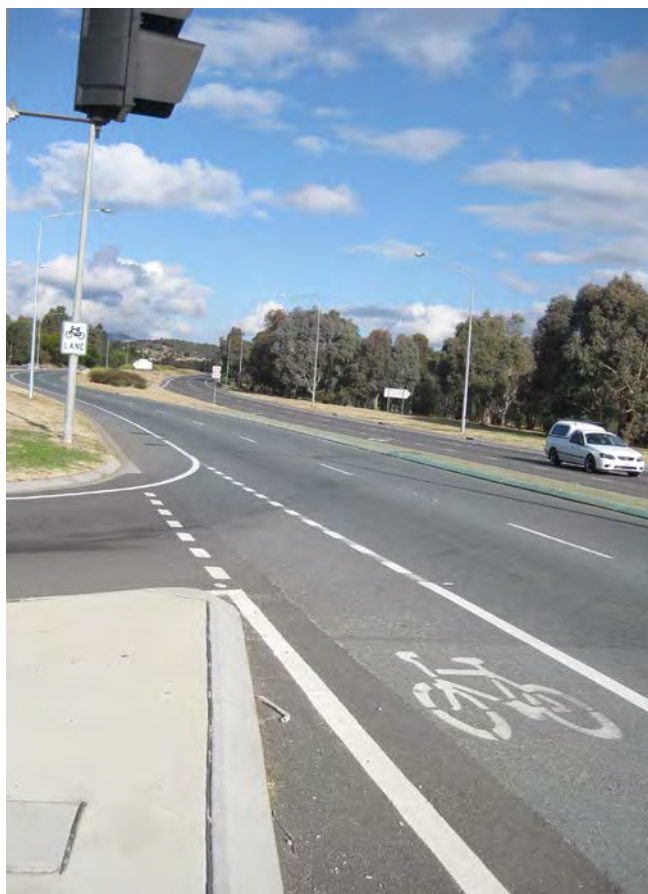
1.3 BACKGROUND REVIEW METHODOLOGY

The Background Review was conducted as a desktop review of currently available documentation and data provided by the ESDD. The Background Review does not include, or rely upon, any new data collection. The main topics addressed in this document are as follows and include the relevant sub-topics:

- Cycle and pedestrian reports and plans
 - Relevant existing ACT policies
 - Relevant Capital Works cycling infrastructure programs
 - Relevant public transport policies, including Park and Ride
 - Relevant land use policies

FIGURE 1.1 - PROJECT AREA
CONTEXT





- Design standards
 - ACT Design Standards
 - Austroads Standards
- Existing cycleway analysis
 - On and off road cycle facilities
 - Road conditions for on road facilities
 - Crash and survey data
- National and international best practice cycling strategies and infrastructure that are relevant to Canberra:
 - Successful policies in other jurisdictions
 - Cycling infrastructure initiatives
 - Behavioural, educational and promotional strategies

Whilst there are no conclusion or findings in this review, recommendations are included throughout the Background Review to identify areas where changes, updates, or additional data collection is needed or where new analysis should be conducted. These recommendations will need to be considered for further development in Stage 2 during the creation and assessment of preliminary options as well as specific application based on selection of a preferred option.

It should be noted that whilst it was intended that aspects of the existing cycle network assessment would include some level of new analysis, however, a lack of readily available spatial data limited the ability to conduct and provide this type of analysis at this time.

1.4 REPORT ORGANISATION

This Background Review is organised to reflect the methodology outlined in the previous section. Each chapter focuses on a separate element from the methodology and is presented in the following sequence:

- Existing Transport Planning Assessment
- ACT Cycleway Design Standards Assessment
- Road Corridor Assessment
- National & International Best Practices

2 EXISTING TRANSPORT PLANNING ASSESSMENT

This chapter provides a focused review and assessment of existing government plans, reports and strategies that are relevant and need to be considered in the development of this plan. All figures, graphics and maps depicted in this chapter are also included in Appendix A at full scale.

2.1 NATIONAL & ACT STRATEGY AND POLICY PLANS

National Cycling Strategy 2011-2016

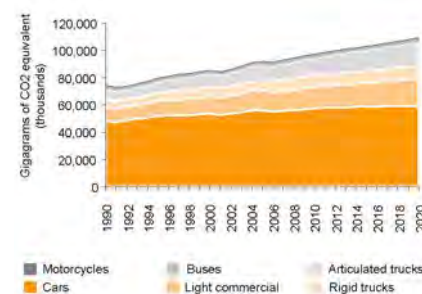
The National Cycling Strategy sets out a series of actions that are intended to result in doubling the number of people cycling in Australia over the next five years.

This Strategy promotes the idea that bicycles are considered to impose 95% less traffic congestion than an average car. Many people tend to overestimate travel times by bicycle, and when travel time is measured door to door, distances up to 5km on congested roads are often quicker on bicycle than in a motor vehicle. The Strategy highlights that increased cycling offers benefits to both society and individuals, and is a more sustainable mode of transport and provides an outline for priorities and objectives to meet the five year objective. These include:

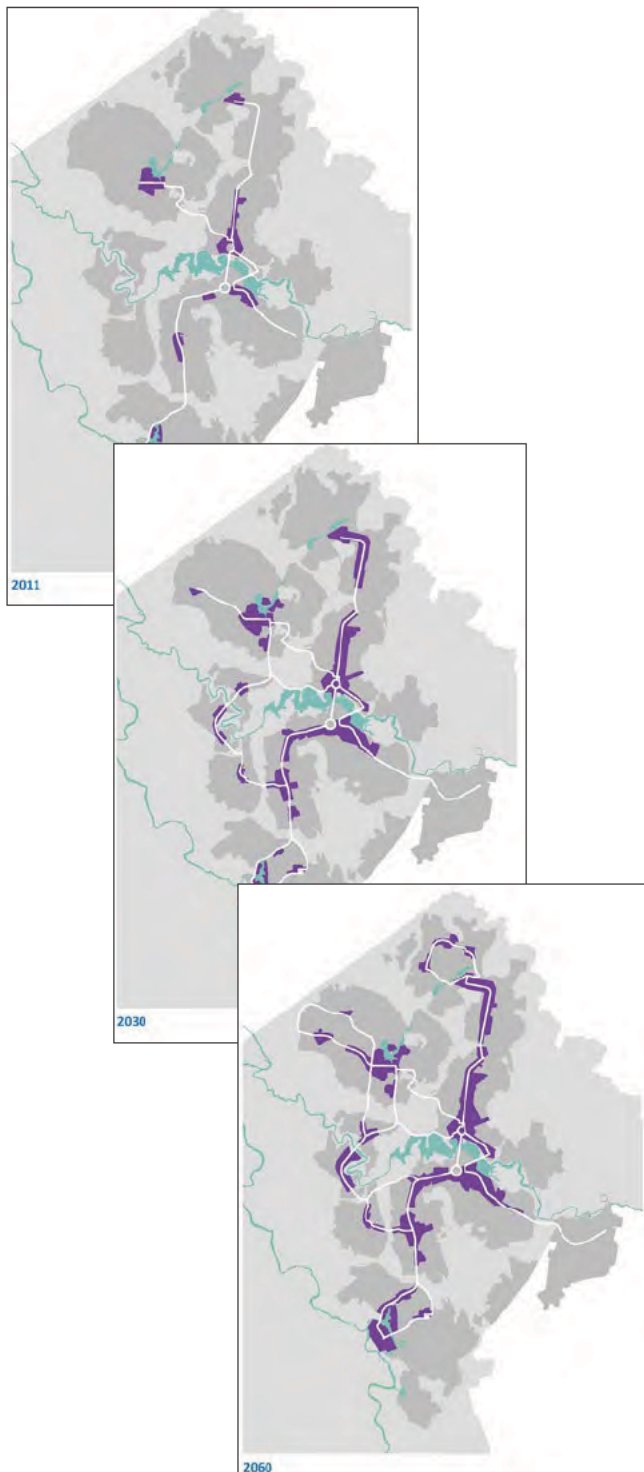
- **Cycling Promotion** – To promote cycling as both a viable and safe mode of transport and an enjoyable recreational activity.
- **Infrastructure and Facilities** – To create a comprehensive network of safe and attractive routes to cycle and end-of-trip facilities.
- **Integrated Planning** - To consider and address cycling needs in all relevant transport and land use planning activities.
- **Safety** – To enable people to cycle safely.
- **Monitoring and Evaluation** – To improve monitoring and evaluation of cycling programs and develop a national decision making process for investment in cycling.
- **Guidance and Best Practices** – To develop nationally consistent technical guidance for stakeholders to use and share best practice across jurisdictions.



Comparison of space utilisation of 60 cars, cyclists and people from the *National Cycling Strategy*



Past and projected vehicle emissions from the *National Cycling Strategy*



Map series indicates how urban intensification can occur over time in the metropolitan area from the *Draft ACT Planning Strategy*

Draft ACT Planning Strategy 2011-2012

The Draft ACT Planning Strategy 2011-2012 brings together the Canberra Spatial Plan and Sustainable Transport Plan to form the transitional planning strategy for the ACT. This strategy informs decisions on the land uses, metropolitan structure, and growth of Canberra. Key transport, lifestyle and commercial benefits from this plan are intended to include:

- The opportunity to live close to work
- Increased 'active travel' and use of public transport
- Reduced congestion and less time spent in travel
- More multi-purpose trips as people can combine work and shopping
- Lower fuel costs
- Less parking and transport infrastructure costs
- Business and service opportunities to cater for those working at the centre.

There are two primary strategies from this strategy that are relevant to this cycle network feasibility plan. Strategy 3 identifies improving everyone's mobility and creating more choices in travel by integrating investment in Canberra's transport networks with the land uses it serves. This will be done through augmenting the commuter cycle network and facilities. This is recognised and reflected in:

- Planning policies that discount parking requirements if cycling facilities are included in new developments.
- The designation of commuter cycling on roads.
- Incorporation of bike parking areas in public spaces and adjacent to public transport stops.

Strategy 5 identifies building the capacity for everyone to participate in community life by improving the quality of the public realm, access to services and information. This will be accomplished by encouraging people to walk or cycle to schools, shops or community halls as the trip will be safe and pleasant. Canberra's neighbourhood planning principles placed these services at the heart of every suburb.

Additionally, there are three principles in the Draft ACT Planning Strategy 2011-2012 that need to be considered as part of this cycle network feasibility study as well.

Principle 1: Provide for accessible and pleasant places to live, work and play.

This involves planning and designing our neighbourhoods so children can walk and cycle to school, shops, and playgrounds, and will help make them safer for everyone. This also will make our suburbs easier to walk and cycle, as well as provide a variety of open spaces, that can encourage physical activity and community interaction.

Principle 2: Design for community resilience and the lowering of natural resource consumption.

This will impact how we layout our suburbs to make them more convenient to walk or cycle. It will incorporate infrastructure such as community gardens that can create a focus for the local community. Distributing utilities and services can reduce impacts on the city's other infrastructure.

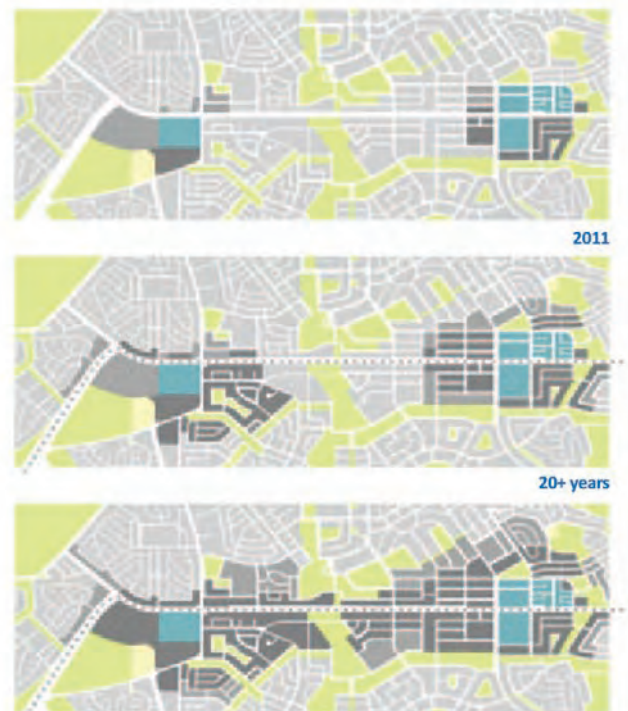
Principle 3: Provide choice in safe convenient modes of travel.

This involves planning and designing cycle infrastructure that is safe and convenient; ensuring these networks intersect with Park & Ride and ensuring new suburbs and redevelopment in our existing suburbs improves the paths to make it easier for more people to walk or cycle.

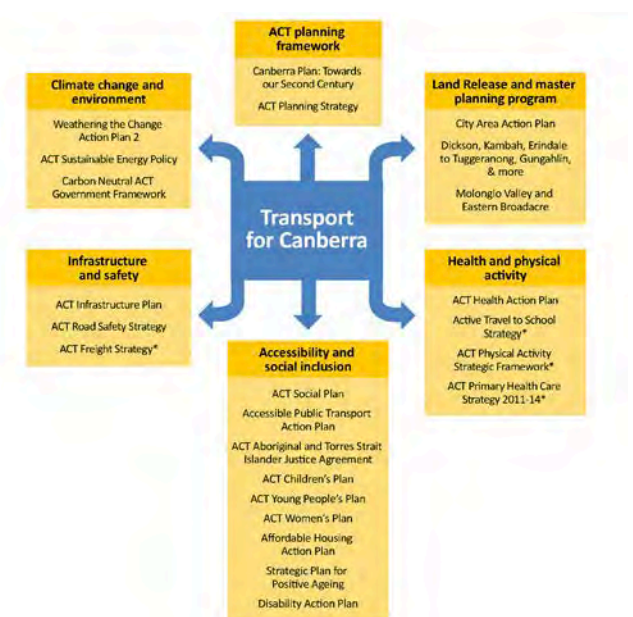
Transport for Canberra Policy 2012-2031

The actions in Transport for Canberra will help create a more sustainable city. This will be implemented through the following:

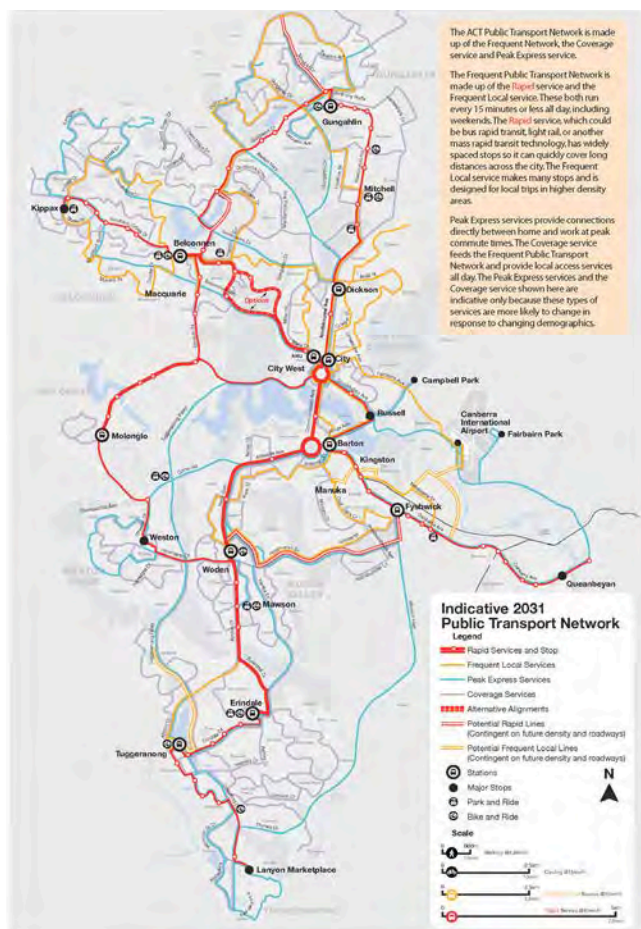
- Provision of a variety of transportation choices for the Canberra community that provides safe, comfortable frequent and reliable public transport, which connects with high quality walking and cycling networks.
- Encouraging mixed land uses to include a mix of retail, commerce and residential uses. Single-use districts make life less convenient, thereby forcing people to drive more frequently to destinations.
- Fostering walkable, compact and close knit neighbourhoods that offer opportunities for recreational walking and cycling on a convenient network of paths, as well as locations to walk or cycle to, whether it be the shops, transport, work or school. A compact, walkable neighbourhood benefits both business and safety and will help tip the choice towards active travel, particularly for shorter journeys.



Indicative of how new urban intensification can occur over time along transit routes from the Draft ACT Planning Strategy



Policy linkages from the Transport for Canberra Policy



Public transport network map from the *Transport for Canberra Policy 2012-2031*

- Promotion and education to encourage healthy and sustainable mode choices where possible.
- Continued improvements to the safety of all transport modes to reduce the number of accidents.
- Building on our existing community assets to focus on getting the most out of, and building on, the existing transport system.

Active travel objectives

Active travel is travel that involves physical activity — cycling or walking. The ACT Government has long recognised the importance of increasing the uptake of active transport in the ACT and is exploring the establishment of a task force to promote and develop physical activity and its associated health, wellbeing, economic, environmental and transport benefits. The objective is to create a city where active travel is the easy choice in which:

- More people of all ages are cycling and walking for work and other trips.
- Bike riders and pedestrians interacting safely.
- More people benefit from increased physical activity and health, reduced spending on health care.

Bike & Ride objectives

The government will continue to develop Bike & Ride facilities to encourage healthier and more active travel choices for Canberra commuters. In addition to the popular bike racks on ACTION buses, facilities and infrastructure will include Bike & Ride cages (with up to 10 to be installed by 2013), secure lockers and rails. Smaller stops will have lock up rails while the highest volume stops will have lockers or cages. Secure cages and lockers will be provided at Park & Ride facilities depending on potential demand. The ultimate goal is to provide bike rails at all Frequent Network bus stops in the peak direction.

Public transport objectives:

- Provide a frequent public transport network supported by services, planning, infrastructure, land supply and location of facilities.
- Establish a public transport system that provides accessible mobility for everyone.
- Provide a public transport network that maximises choice, with excellent options like Park & Ride and Bike & Ride.
- Develop a public transport system that is ready for the future, with smart systems (real time passenger information, journey planners and accessible information) and smart fleet, including clean buses and active consideration of light rail.

Integrated Transport Framework 2008

The need for creating the Integrated Transport Framework stems from the strong relationships between each of the components of the transport system that includes: roads, parking, public transport, cycling, walking and supporting infrastructure.

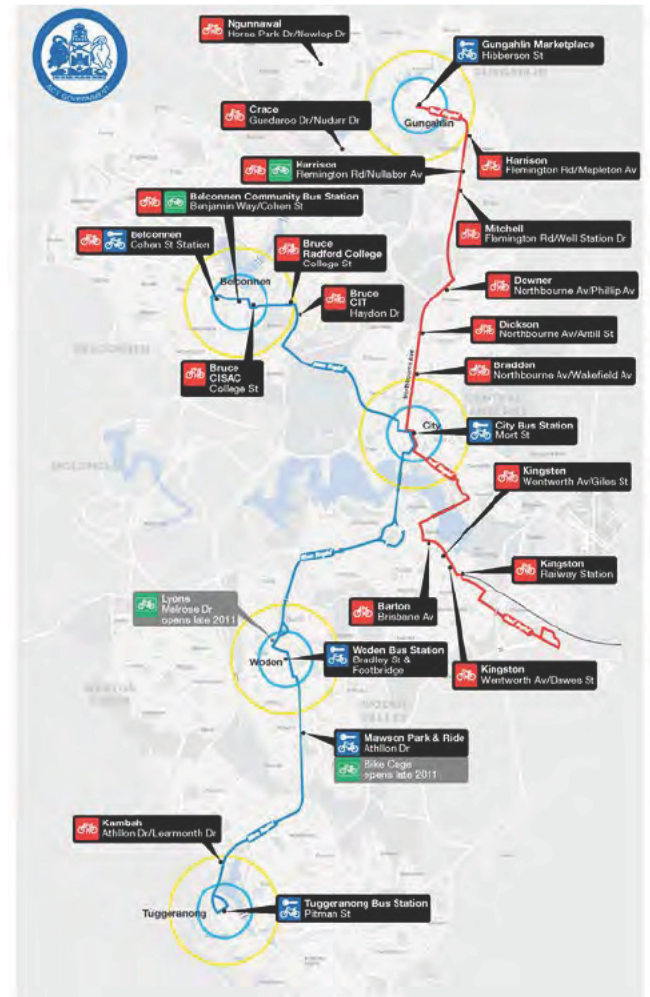
In addition to public transport, cycling and walking are key elements of integrated transport solutions. This framework builds upon the 2004 Masterplan covering the necessary infrastructure for pedestrians and cyclists, with a focus on establishing a network for use by commuting cyclists both on and off-road. This includes an on-road cycle policy has also been developed and will continue to be implemented over the coming years. Primary objectives of this framework include:

- Maintaining and extending the cycle network to meet identified demand.
- Ensuring that commercial and community centres are effectively served by cycle and walking paths.
- Continuing the integration of bus and cycling modes.
- Investing in educational programs to encourage people to walk or cycle to work.
- Ensuring that the cycling and walking networks are supported by initiatives to increase residential densities.

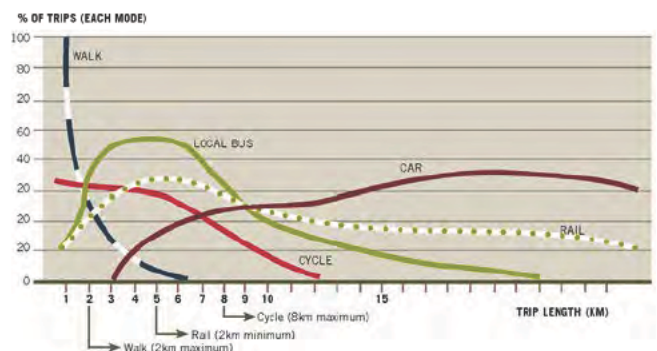
Sustainable Transport Plan 2004

Transport analysis, as part of The Canberra Spatial Plan process, indicates that the land use/transport strategies that best support sustainable transport in Canberra are:

- Ensuring the development of a more compact city structure
- Increasing population densities in and around town centres and local centres.
- Increasing population densities and locating other activities at key nodes along the main transport corridors.
- Ensuring a mix of land uses in town centres and local centres
- Integrating transport and land use to support greater use of public transport, cycling and walking.
- Ensuring that new development areas are provided with and oriented around dedicated public transport routes and high quality public transport services.
- Planning for the upgrading of the road, cycling, walking and public transport systems to support the recommended future urban structure and form of the ACT.



Bike & Ride network map from the *Transport for Canberra Policy 2012-2031*



Transport modes, threshold distances and trip lengths from the *Sustainable Transport Plan*



Transport connections map from the *Sustainable Transport Plan*

These conclusions are embodied in The Canberra Spatial Plan, which proposes intensification of the existing area creating an urban form that has shorter trips and encourage people to walk and cycle. It also encourages development at town centres and Civic and at activity nodes along transport corridors, which will support the development of public transport.

A key goal of this plan is to shift the balance of travel from private vehicles towards greater use of walking, cycling and public transport. The plan recognises cycling as an important mode for its accessibility, efficiency, health and urban liveability benefits and its minimal impacts on the environment.

The actions in the Sustainable Transport Plan are consistent with the strategic direction of the Canberra Bicycle 2000 strategy. Major projects from this plan include:

- Trunk cycle network improvements - Construct cycle and walking paths identified as 'missing links' in the network. Further on-road cycle lanes will be provided on all new and upgraded arterial roads.
- Suburban cycle and path networks - Ensure new suburbs have safe, direct walking and cycling routes for local, district and trunk trips.

2.2 ACT CYCLING AND PUBLIC TRANSPORT PLANS

ACT Cycling and Pedestrian Network Plan 2011

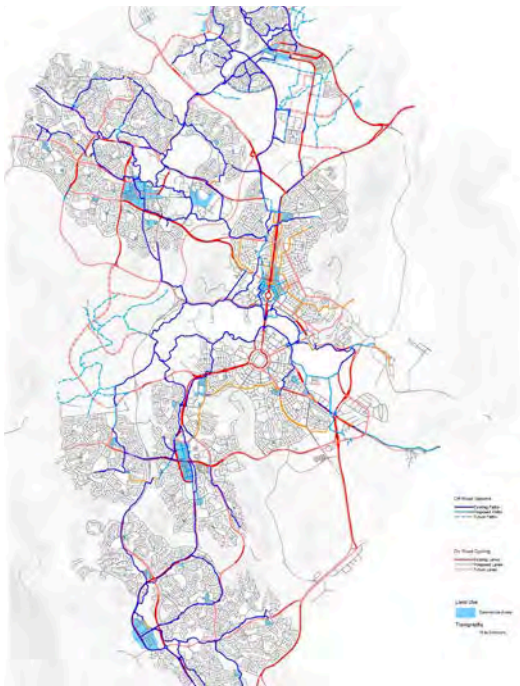
The key aims of this plan was to further enhance the walking and cycling connectivity across the ACT. This plan proposed network improvements to be developed with the intention of complementing the strategies in the 2010 Sustainable Transport Plan. This plan focused on the development of the trunk network in three key aspects:

- Reviewing of the 2007 Trunk Network and identification of missing commuter links;
- Identifying addition of major recreational links;
- Separation of proposed links into individual projects.

This plan determined that whilst many corridors were substantially complete, there were still significant barriers to cycling such as multi-lane roundabouts, short missing lengths of cycle lane or difficult road crossings that discouraged cyclists. This plan did not include a full safety and accessibility audit of all facilities in the network, and therefore does not identify all outstanding issues.



Existing and proposed trunk network maps from the ACT Cycling and Pedestrian Network Plan



Trunk cycling network from the *Commuter Cycling Network Study 2007*

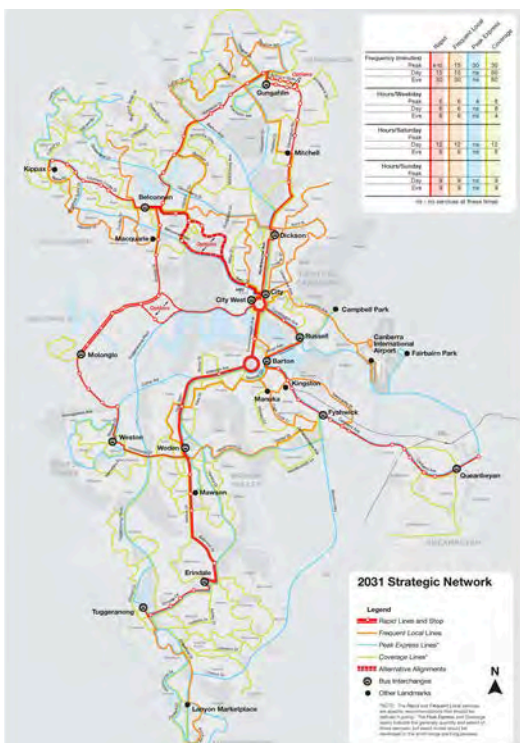
Commuter Cycling Network – Priority for Capital Works

The purpose of this 2007 report was to identify a series of projects that would improve the Trunk Commuter Cycling network to encourage modal change, and to allow Roads ACT to begin to design projects in anticipation of budget allocation.

An updated Main Cycling Network Plan was included as part of this work. The plan identified the proposed trunk network categorised into existing infrastructure, proposed infrastructure and potential future extensions.

In this plan, items categorised as existing may not be useable as they do not meet the current design standards. This report assumed that these will be upgraded to meet the standards as a part of regular maintenance, but does not priorities improvements otherwise. Other points of emphasis from this report include:

- The importance and cost effectiveness of cycle lanes being installed when resealing occurs on arterial roads and collector streets (where possible).
- The importance of connecting paths and on road lanes whenever they run close to each other to maximise the usage of both facilities.



Public transport network from the *ACT Strategic Public Transport Plan 2009*

ACT Strategic Public Transport Network Plan 2009

This report defines steps that will need to be taken over the next two decades to achieve the ACT Government’s sustainable transport goals. This plan focuses on a study year of 2031, identifying key ideas and elements that will need to be implemented over this timeframe. Major goals for this plan include:

- Providing a flexible, efficient and sustainable public transport and pedestrian and bicycle systems that reduce car dependency.
- Developing a public transport network that responds to and support a sufficient density and mix of land uses.
- Maintaining the ease and comfort of movement for a diversity of pedestrian, cycle, vehicular and public transport modes

Locations for Bike & Ride and Kiss & Ride Facilities 2009

The Sustainable Transport Plan identifies a number of key future mode share targets. Improving Bike & Ride and Kiss & Ride facilities throughout the ACT will form part of these initiatives and was the main focus of this study for the entire ACT.

This study identified a number of sites for potential Bike & Ride and Kiss & Ride locations. The study identified fifteen (15) possible locations, throughout the entire ACT, for a Bike & Ride facility that were assessed using a multi-criteria analysis. Of these locations seven (7) were recommended for implementation. Similarly, ten (10) Kiss & Ride sites were identified and evaluated, with four (4) recommended for implementation.

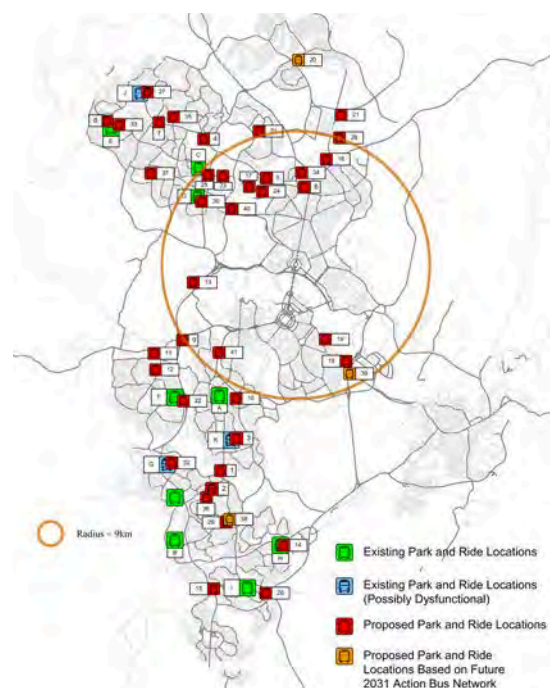


Recommended sites from the Bike & Ride and Kiss & Ride Study 2009

Park & Ride Strategy 2008

This strategy identifies policies and measures to incentives the increased usages of Park & Ride and bus facilities. The primary focus of the strategy was to make the bus system an attractive and easy option for commuting to and from work. The strategy also considered how to take into consideration the needs of bicycle and pedestrian users. Proposed Park & Ride locations with direct links for pedestrians and cyclists to adjacent neighbourhoods received the highest ratings.

The strategy also identified a series of generic components that should be included in at all Park & Ride locations. Site selection considered cycling corridors as important factors as this facilitates Bike & Ride opportunities.



Existing and proposed park and ride sites from the Park & Ride Strategy 2008



2.3 PLANNING RECOMMENDATION

It is clear from this review that there is a vast amount of high quality and thoughtful future strategy and policy planning being undertaken by the ACT Government. However, as far as can be ascertained, there is not a single comprehensive planning document that details how Canberra on and off road cycling facilities operate or how these networks should be developed to form a complementary system that is integrated into the transport network.

The *Draft ACT Planning Strategy 2011-2012* and *Transport for Canberra Policy 2012-2031*, are particularly noteworthy as they both set out a broad agenda that created linkages between all aspects of transport and land planning. Taken together, these two documents would provide a strong foundation of goals, strategies, and policies that could underpin the development of a comprehensive cycleway master plan for both on and off road cycling facilities in the ACT.

By contrast, the review of the cycling and public transport plans had limited integration of ideas or cross connection with other plans. This may have been due in part to the earlier timeframe in which these documents were produced, most of which predate the *The Draft ACT Planning Strategy 2011-2012* and *Transport for Canberra Policy 2012-2031*.

In other instances some planning documents were limited in scope to not include an integrated approach. This was the case for the *Ten Year Master Plan for Trunk Cycling and Walking Path Infrastructure 2004*, which was not reviewed in this report as the information it provided was dated and limited to “trunk” routes for on road cycle lanes only. Additionally, there are some policy recommendations that should be reconsidered. One report recommended upgrading cycleways to meet existing standards only as a part of regular road maintenance. This is inconsistent with long established cycleway planning standards.

There is a strong need for a comprehensive cycleway master plan to be developed for the ACT. This will benefit from the work already done on the *The Draft ACT Planning Strategy 2011-2012* and *Transport for Canberra Policy 2012-2031* plans. Additional aspects of information that should be included in a comprehensive cycleway master plan are included throughout this background review.



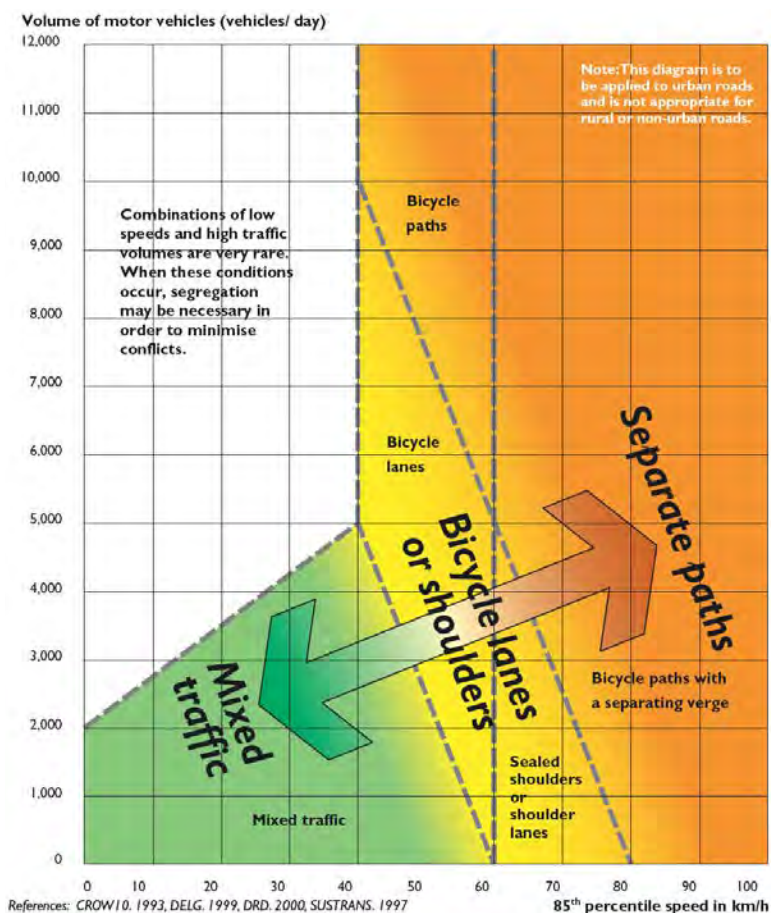
3 ROAD CORRIDOR ASSESSMENT

This chapter provides an assessment of the road corridor and existing cycle network. The intent is to provide an understanding of how cyclists and vehicles use the road corridor. This also assesses what types of cycle facilities are appropriate based on the hierarchy and use. The basis for this part of the assessment is illustrated below.

The road corridor and existing cycle network assessment is followed by a review of crash data trends over the past 15 years. Finally, this chapter begins to explore available survey data to understand the types of cycle facilities most commonly utilised by commuters.

This chapter is organised into the following sections:

- Cycleway Network
- Road Network
- Speed Zones
- Vehicle Volumes
- Bicycle accidents
- Survey Data
- Road Corridor Recommendations



Separation of bicycle and motor vehicles according to traffic speed and volumes. (Source Austroads 2009).

3.1 CYCLEWAY NETWORK

As previously mentioned, there are two distinct cycleway networks in Canberra. The on road cycling facilities are located along arterial and major collector roadways. The off road cycling facilities meander through the open space between local suburb areas and are also often located adjacent to roadways.

The recent cycling and pedestrian plan works to identify both existing and proposed cycleway facilities. A site assessment of the main on road facilities was conducted to verify the network, which has resulted in the following determinations:

- There is a lack of consistency and accuracy in the designations provided in the plan.
- Many of the existing on road facilities have gaps along the routes and several of the proposed routes have portions of the cycle network already developed.
- There is a significant amount of duplication with both on and off road facilities along the transport corridor.
- The plan does not integrate the connection between on and off road facilities.



FIGURE 4.1 - CYCLEWAY NETWORK



Source: ACT Cycling and Pedestrian Network 2011

3.2 ROAD NETWORK

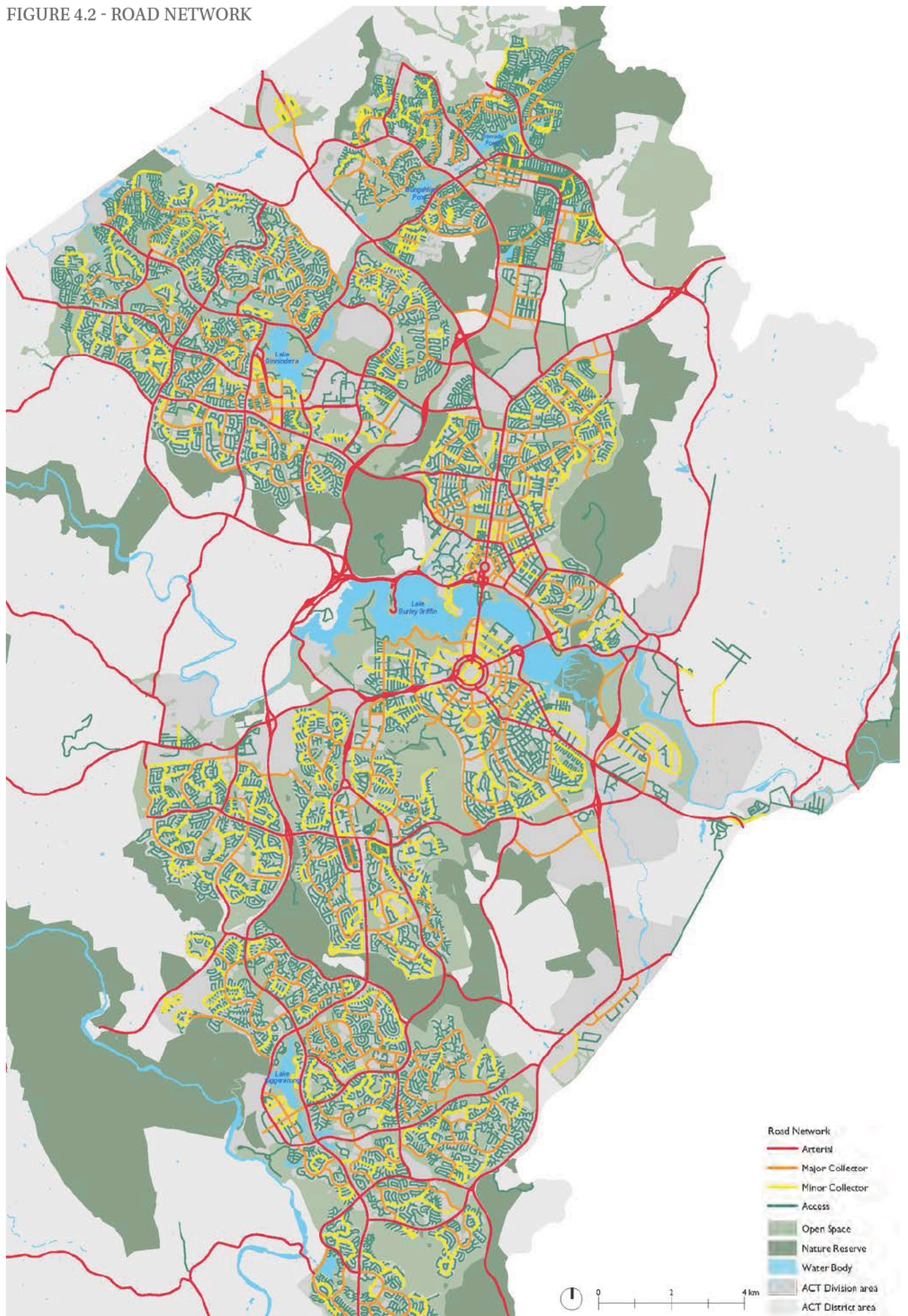
Canberra has a very clearly defined road network hierarchy. Arterials provide a regular pattern of north-south and east-west connections that facilitated vehicular access throughout the area. Major collector roads feed into this arterial network and are supported by a network of minor collectors and access roads. Typical characteristics of these roadway are as follows

- Arterial - generally 4-6 lanes of traffic with a breakdown lane or shoulder of varying width.
- Major collector roads - generally 2-4 lanes of traffic with a minimal shoulder or car park lane.
- Minor collectors - generally 2 wide lanes of traffic.
- Access roads- generally 2 standard lanes of traffic.

Canberra has a highly logical and regular road network consistent with the main planning paradigm of the area. The designated cycleway network throughout Canberra directly parallels the arterial and major collector roads. There are no provisions for cycling facilities or markings on any of the minor collector or access roads.



FIGURE 4.2 - ROAD NETWORK



Source: ESDD 2012.

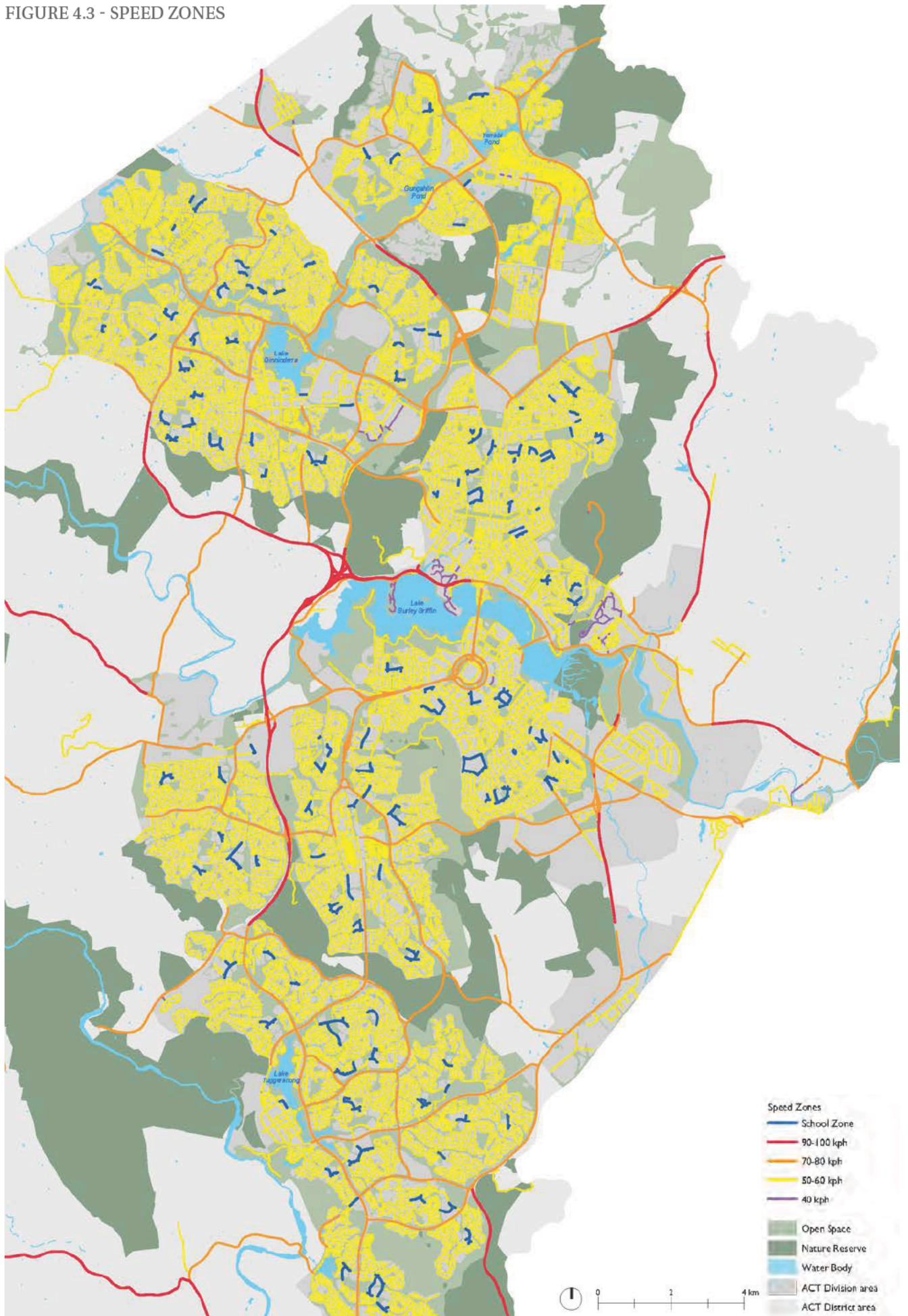
3.3 SPEED ZONES

An assessment of the speed zones indicates that these are designated based on road network hierarchy. The vast majority of roads in the Canberra area are sign posted for 50-60 kph. Arterial roads have a wider range of speed zones depending upon the design standard and number of lanes of traffic, which can range from 70-100 kph. Generally these arterials operated at speeds between 80-90 kph. There are a very limited number of roads in the Canberra area that are sign posted for 40 kph.

General design standards for cycleway networks indicate that speeds of 40 kph or below are optimal for mixed traffic environments typically found on minor collectors and access roads. Where sign posted speeds are at or exceed 80 kph, design standards for cycleway networks recommend having a separated path. Based on this standard, most of the arterial roads in Canberra should have separated paths, but do not currently have these facilities.



FIGURE 4.3 - SPEED ZONES



Source: ESDD 2012.

3.4 VEHICLE VOLUMES

Vehicle volumes on most of the Canberra road network are generally fairly low and indicate that these roads could serve as mixed traffic or bicycle lane demarcated cycleways. This is particularly true for minor collectors and access roads.

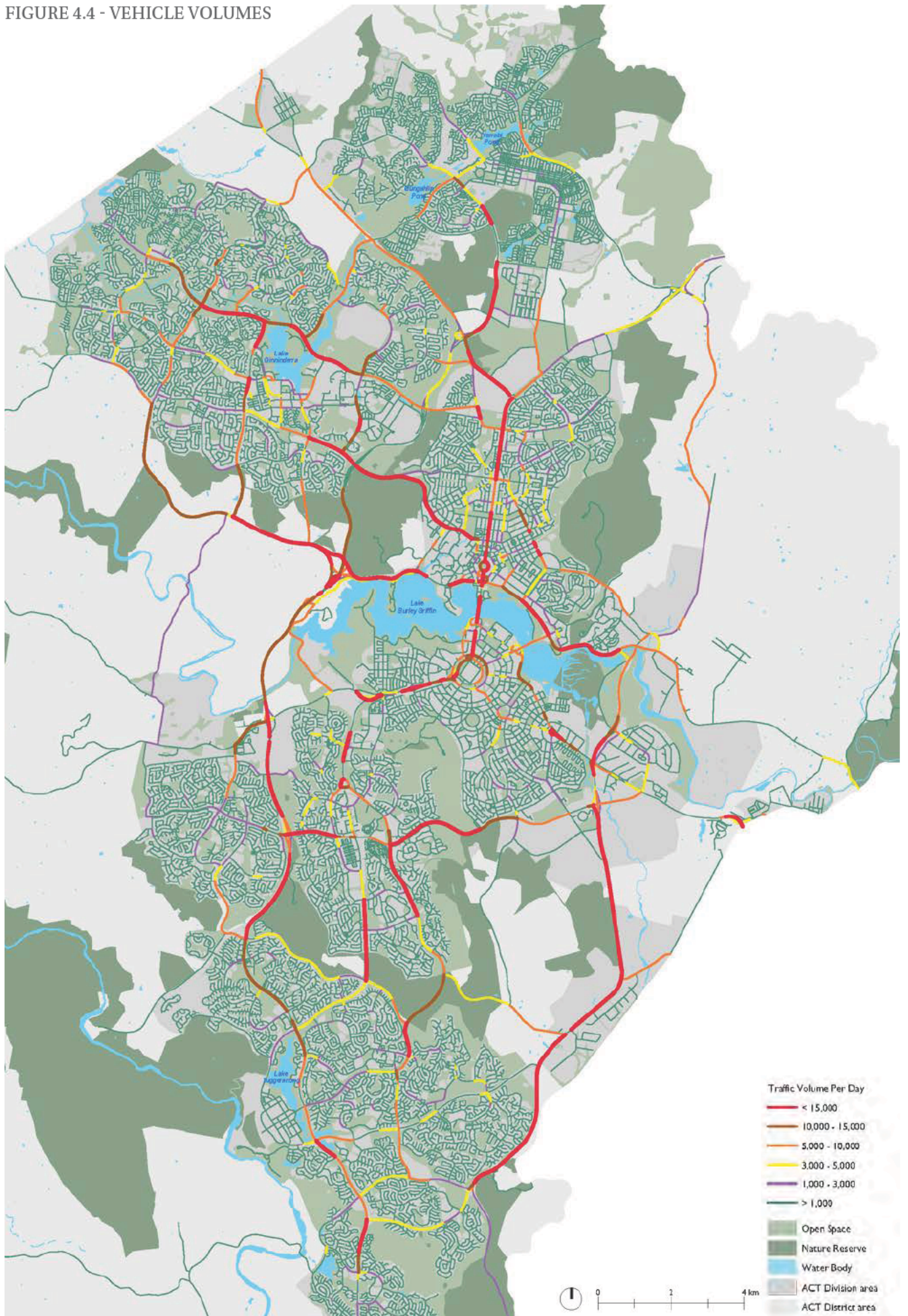
General design standards for cycleway networks indicate that volumes below 5,000 trips are optimal for mixed traffic environments typically found on minor collectors and access roads. Where volumes exceed 10,000 trips design standards for cycleway networks recommend having a separated path. Based on this standard, most of the arterial roads in Canberra should have separated paths, but do not currently have these facilities.

3.5 BICYCLE VOLUMES

Bicycle volumes were collected by Pedal Power in February 2012, for urbanised areas of Civic (31 sites), Belconnen (23 sites), Gungahlin (13 sites), Tuggeranong (8 sites) and Woden (19 sites). The information collected was point location rather than linear. Once this information has been geo-referenced, along with other bicycle volume data, it can be analysed with vehicle volume data to determine locations and routes that should be prioritised for upgrades or additional development



FIGURE 4.4 - VEHICLE VOLUMES



Source: ESDD 2012.

BICYCLE ACCIDENTS

A cursory review of crash and casualty data for on road crashes indicates that incidences resulting in property damage and fatalities have remained at fairly consistent averages over the past 10 and 15 year time frames. However, there has been an increase in the percentage of injury accidents in the past 10 years compared to the past 15 years.

Between 1996 and 2003, incidents of injury accidents was in general decline. Since 2004 the percentage of injury accidents has resulted in an increasing trend. More detailed statistical analysis and the development of crash cluster maps for cyclists could not be developed at this time as specific details of these incidents were not available.

Road network type and edge conditions of the urban environment would need to be taken into account in subsequent analyse of bicycle accident data. It would be beneficial to conduct a comparative analysis of the bicycle accident data between on and off road cycle facilities as well.



BICYCLE – CRASHES & CASUALTIES ON ROADS (1996 – 2010)

Year	Property crash	Injury - no medical treatment	Injury - got medical treatment	Injury - admitted to hospital	Injury - resulted in fatality	Total	Percent of total that resulted in physical injury	Percent of injuries that resulted in fatality
1996	112	5	49	31	3	200	44%	3.4%
1997	93	1	41	22	2	159	42%	3.0%
1998	101	0	41	15	3	160	37%	5.1%
1999	108	3	35	19	0	165	35%	0.0%
2000	82	1	29	10	0	122	33%	0.0%
2001	78	0	34	12	0	124	37%	0.0%
2002	90	0	16	16	0	122	26%	0.0%
2003	92	2	17	9	0	120	23%	0.0%
2004	79	0	28	5	0	112	29%	0.0%
2005	71	0	34	6	1	112	37%	2.4%
2006	97	0	26	15	1	139	30%	2.4%
2007	89	0	40	12	0	141	37%	0.0%
2008	116	3	51	12	0	182	36%	0.0%
2009	112	0	42	18	0	172	35%	0.0%
2010	104	0	62	11	3	180	42%	3.9%
Averages over 15 year period								
'96 -'10	94.9	1.0	36.3	14.2	0.9	147.3	35%	1.4%
Averages over 10 year period								
'01-'10	92.8	0.5	35.0	11.6	0.5	140.4	47%	1.5%

Source: ESDD 2012.

3.6 SURVEY DATA

ACT Super Tuesday Bike Commuter Survey

This survey is based on data collected on the morning of Tuesday, 6 March 2012 at 36 different sites in Canberra and the surrounding suburbs. The key findings identified in the survey include:

- Shared path, site 5712, towards Wattle St (north-east), shared path towards David St (south) and shared path towards Boronia Dr (north-west), was the busiest commuter route in the Canberra area, with a total of 488 riders.
- The survey recorded an average of 122 riders per 30 minutes at the busiest site which ranked Canberra 10th overall nationally.
- The shared path running north/south through Turner has been identified as a key north/south commuter route for riders travelling into Canberra.
- The shared path near Daramalan College has been identified as a key east/west route for riders in the Canberra area.

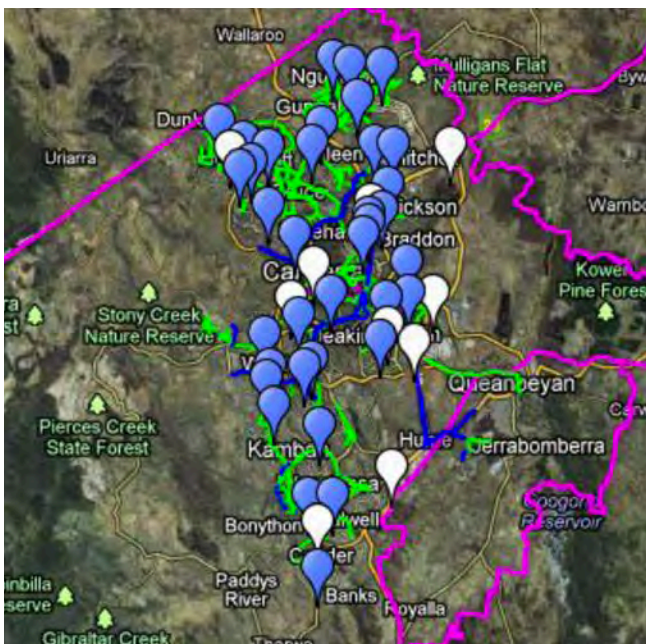
Whilst not specifically identified in the survey, there is some additional information that needs to be considered when analysing the data results:

- All locations that were on road, counted both on and off road cyclists as one and the same.
- 64% of all cyclists were counted using only off road (shared path) facilities.
- The five busiest commuter locations were all off road (shared path) facilities which accounted for 49% of all cyclists.
 - By comparison the five busiest on road locations (that counted cyclists that were both on the road and on shared paths) accounted for 18% of all cyclists.

Additional Survey Data

Additional survey data has been collected regarding the cycling and travel habits of individuals around Canberra and can be utilised to identify trends over time. Two of these more recent studies include the *Draft Report on Telephone Survey about Cycling in Canberra*, Les Winton Research (2011) and the *Analysis of the 2009 Travel Survey Analysis Report*, Bob Nairn Consultant (2012).

These surveys collect data related to travel modes selected and reasons for travel. For cycling trips the identify the purpose of the trip and average trip length and frequency. Behaviours affecting travel pattern along with age and mode choice is also established. These surveys also try to understand the barriers to cycling, factors will encourage more bike riding opportunities, and other travel pattern within age, gender and area (location) that may affect choices to cycle.



Locations for the Super Tuesday Bike Commuter Survey



Count sites in ACT, 6-3-2012

Council	Legs	Location ... sort columns by clicking on the column headings	Map ref	Map	am tot	pm tot
Uninc ACT Region	2	Horse Park Dr (north) and Horse Park Dr (south) - count on and off road as one and the same		map 5723	6	-
Uninc ACT Region	4	Shared path (south-east), shared path along Mirabella Dr (south), shared path towards Jandamarra St (west) and shared path along Mirabella Dr (north) - count on and off road as one and the same		map 5722	4	-
Uninc ACT Region	4	Mulligans Flat Rd, Horse Park Dr (south) and Horse Park Dr (north) - count on and off road as one and the same		map 5721	26	-
Uninc ACT Region	4	Gundaroo Dr (east), Gungahlin Dr (south), Gundaroo Dr (west) and Gungahlin Dr (north) - count on and off road as one and the same		map 5720	76	-
Uninc ACT Region	4	Shared path towards Evelyn Owen Cres (east), Ginninderra Dr (south), shared path (west) and Ginninderra Dr (north) - count on and off road as one and the same		map 5728	7	-
Uninc ACT Region	4	Gundaroo Dr, Barton Hwy (south-east), William Slim Dr and Barton Hwy (north-west) - count on and off road as one and the same		map 5724	56	-
Uninc ACT Region	5	Shared path (east), Ginninderra Dr (south), shared path towards bridge (west) and Ginninderra Dr (north) - count on and off road as one and the same		map 5727	31	-
Uninc ACT Region	2	Gungahlin Dr (north) and Gungahlin Dr (south) - stand between Sandford St and Wells Station Dr, count on and off road as one and the same		map 5719	105	-
Uninc ACT Region	3	William Slim Dr (north), William Slim Dr (south) and Owen Dixon Dr - count on and off road as one and the same		map 5725	63	-
Uninc ACT Region	4	Federal Hwy (north-east), Majura Rd (east), Federal Hwy (south-west) and Horse Park Dr - count on and off road as one and the same		map 5717	-	-
Uninc ACT Region	2	Flemington Rd (north) and Flemington Rd (south) - stand between Lysaght St and Wells Station Dr, count on and off road as one and the same		map 5718	77	-
Uninc ACT Region	4	Copland Dr (east), shared path (east), Copland Dr (west) and shared path (west) - count on and off road as one and the same		map 5726	51	-
Uninc ACT Region	3	Shared path towards Dalley Cres (east), shared path along river (west) and shared path along river (north)		map 5729	-	-
Uninc ACT Region	3	Shared path (south), shared path along Barnard Circuit (west) and bike path underpass (north) - count on and off road as one and the same		map 5731	23	-
Uninc ACT Region	4	Kingsford Smith Dr (north), Southern Cross Dr (east), Kingsford Smith Dr (south) and Southern Cross Dr (west) - count on and off road as one and the same		map 5730	19	-
Uninc ACT Region	2	Federal Hwy (north-east) and Federal Hwy (south-west) - stand between Phillip Ave and Barton Hwy, count on and off road as one and the same		map 5716	151	-
Uninc ACT Region	4	Shared path (north), shared path along Mouat St (east), shared path (south) and shared path along Mouat St (west) - count on and off road as one and the same		map 5715	-	-
Uninc ACT Region	2	Coulter Dr (north) and Coulter Dr (south) - stand between Lachlan St and Shumack St, count on and off road as one and the same		map 5732	5	-
Uninc ACT Region	2	Shared path towards Cowper St (east) and shared path towards Challis St (west)		map 5714	186	-
Uninc ACT Region	3	Shared path towards De Burgh St (east), shared path towards Wattle St (south) and shared path (north-west) - count on and off road as one and the same		map 5713	463	-
Uninc ACT Region	3	Shared path towards Wattle St (north-east), shared path towards David St (south) and shared path towards Boronia Dr (north-west)		map 5712	488	-
Uninc ACT Region	3	Shared path towards Bent St (south-east), shared path along McCaughey St (south-west) and shared path towards David St (north) - count on and off road as one and the same		map 5711	440	-
Uninc ACT Region	3	Bindubi St (south), shared path (west) and Bindubi St (north) - count on and off road as one and the same		map 5733	139	-
Uninc ACT Region	3	Jackson St, Fairbairn Ave (east) and Fairbairn Ave (west) - count on and off road as one and the same		map 5710	25	-
Uninc ACT Region	3	Shared path towards Parkes Way (north), shared path along Lay Denman Dr (east), shared path along Lay Denman Dr (west) - count on and off road as one and the same		map 5734	-	-
Uninc ACT Region	4	Morshead Dr (north), Pialligo Ave, Monaro Hwy and Morshead Dr (west) - count on and off road as one and the same		map 5708	-	-
Uninc ACT Region	3	Shared path along Alexandrina Dr (east), shared path towards Schlich St (south) and shared path along Alexandrina Dr (west) - count on and off road as one and the same		map 5703	168	-
Uninc ACT Region	2	Shared path along Morshead Dr (east) and shared path along Morshead Dr (west) - count on and off road as one and the same		map 5709	49	-
Uninc ACT Region	3	Shared path along Lady Denman Dr (south-east), shared path along Molonglo River (south-west) and shared path along Lady Denman Dr (north) - count on and off road as one and the same		map 5702	-	-
Uninc ACT Region	2	Shared path along Bowen Dr (north) and shared path along Bowen Dr (south) - count on and off road as one and the same		map 5704	245	-
Uninc ACT Region	4	Cotter Rd (east), shared path (south), Cotter Rd (west) and shared path (north) - count on and off road as one and the same		map 5701	144	-
Uninc ACT Region	2	Canberra Ave (east) and Canberra Ave (west) - stand on the southern side of Kingston Oval between Dawes St and Cunningham St, count on and off road as one and the same		map 5706	-	-
Uninc ACT Region	4	Cotter Rd (east), shared path along Streeton Dr (south), Cotter Rd (west) and shared path (north) - count on and off road as one and the same		map 5700	143	-
Uninc ACT Region	3	Captain Cook Cres (south), Bremer St and Captain Cook Cres (north) - count on and off road as one and the same		map 5705	46	-
Uninc ACT Region	4	Monaro Hwy (north), Canberra Ave (east), Monaro Hwy (south) and Canberra Ave (west) - count on and off road as one and the same		map 5707	-	-
Uninc ACT Region	4	Shared path along Irving St (north), Launceston St (east), shared path along Callam St (south) and Launceston St (west) - count on and off road as one and the same		map 5699	173	-
Uninc ACT Region	3	Shared path towards Chappell St (south), shared path parallel to Chappell St (west) and shared path along Melrose Dr (north) - count on and off road as one and the same		map 5698	37	-
Uninc ACT Region	4	Namatjira Dr (north), Hindmarsh Dr (east), Namatjira Dr (south) and Hindmarsh Dr (west) - count on and off road as one and the same		map 5697	62	-
Uninc ACT Region	4	Namatjira Dr (north), shared path (east, towards Waramanga District Playing Fields), Namatjira Dr (south) and shared path (west) - count on and off road as one and the same		map 5696	29	-
Uninc ACT Region	2	Shared path along Tuggeranong Pwy (north) and Shared path along Tuggeranong Pwy (south)		map 5695	50	-
Uninc ACT Region	2	Athlton Dr (north) and Athlton Dr (south) - stand on the southern side of residential area between Beasey St and Sulwood Dr, count on and off road as one and the same		map 5694	116	-
Uninc ACT Region	3	Monaro Hwy (north), Monaro Hwy (south) and Isabella Dr - count on and off road as one and the same		map 5693	-	-
Uninc ACT Region	3	Shared path towards Clive Steele Ave (east), shared path towards Isabella Dr (south) and shared path towards Isabella Pond (west) - count on and off road as one and the same		map 5691	23	-
Uninc ACT Region	4	Shared path towards Ashley Dr (north), shared path towards Isabella Dr (east), shared path along Ashley Dr (south) and shared path along Isabella Dr (west) - count on and off road as one and the same		map 5692	11	-
Uninc ACT Region	4	Johnson Dr, Drakeford Dr (south), Woodcock Dr and Drakeford Dr (north) - count on and off road as one and the same		map 5690	-	-
Uninc ACT Region	3	Tharwa Dr (north), Box Hill Ave and Tharwa Dr - count on and off road as one and the same		map 5956	15	-

Source: ACT Super Tuesday Bike Commuter Survey 2012.



3.7 ROAD CORRIDOR RECOMMENDATIONS

The following provides a list of road corridor recommendations to be considered during the development of the preliminary options:

- A comprehensive review and inventory of the existing cycle network should be conducted and captured as in a geodatabase to allow spatial analysis to be conducted.
- There should be better integration between on and off road cycle facilities.
- Wide road corridors and road reserves should be utilised for developing off road cycle facilities adjacent to arterial roads.
- The proposed cycle network should be reviewed and rationalised to reduce duplication of facilities. This will minimise confusion for users and reduce implementation and associated operations and maintenance costs.
- Based on the criteria that roads that are sign posted over 60 kph and have a daily traffic volume in excess of 5,000 trips, all arterial roads should have separated cycleways. This applies to a large number of major collector roads as well.
- A review of speed zones should be conducted to identify opportunities to implement 40 kph zones, particularly around areas that are known to be high attractors.
- Bicycle crash data should be captured in a geodatabase to allow spatial analysis to be conducted to produce cluster maps. This can also help to identify conflict areas and prioritise upgrade efforts.
- Develop a system for conducting trip counts along key on and off road cycling routes that can be used to establish a robust baseline of data and track changes in use over time.
- Investigate the feasibility of establishing a Bike Hub Facility in the Canberra City division area (preferably the City East Precinct along City Walk) as discussed in Section 5.15 of this report.

4 ACT CYCLEWAY DESIGN STANDARDS ASSESSMENT

The ACT Government's Territory and Municipal Services Directorate (TAMSD) is a member of Austroads, the association of Australian and New Zealand road transport and traffic authorities. Austroads publishes the design guidelines for the planning, design and construction of cycling facilities within Australia. In the past, the Austroads Guide to Traffic Engineering Practice: Part 14 Bicycles was the guideline document. Austroads now incorporates bicycle planning and design guidance into the following documents:

- **Austroads (2009) Guide to Road Design Parts 1 - 8**
- **Austroads (2009) Guide to Traffic Management Parts 1 - 13**
- **Austroads (2009) Guide to Road Safety Parts 1 - 9**

The *Guide to Road Design: Part 6a Pedestrian and Cyclist Paths* should be used for guidance on the planning, design and construction of paths. This document consolidates information relating to on-road bicycle facilities and provides a summary of key design information for cyclist paths, including the intersection of paths with roads. The *Guide to Traffic Management and Guide to Road Safety* also provide specific guidance on bicycle facilities.

Cycling Aspects of Austroads Guides was produced in 2011 and is a consolidated summary of the information in current Austroads Guides relating to the planning, design and construction of cycling facilities.

The TAMSD *Design Standards for Urban Infrastructure* document is the technical standards that are applicable to all infrastructure works constructed by, on behalf of, or for ultimate management by TAMSD. These Design Standards are intended for use by professionals involved in the planning, design and construction of urban infrastructure in the ACT.

Design Standard 13 - Pedestrian & Cycle Facilities (Edition 1 Revision 1) sets out the requirements to be used by practitioners in the planning and design of pedestrian and cycling facilities in the ACT. It describes the types of paths and their location within the road reservation, provides guidance on alignment, required widths, and other geometric requirements, as well as information on the design of treatments such as path intersections and terminals.

This review crosschecks information relating to the provision of cycle facilities contained in the TAMSD Design Standards against the current National Standards and Guides, in particular the Austroads *Guide to Road Design* and *Guide to Traffic Management*. A detailed knowledge of the appropriate National Standards and Guides is assumed.

It is noted that the Standard have been developed as a performance based, rather than prescription based documents. The benefit of this approach is that it allows designers to solve design problems by innovation rather than implementing standard solutions which may not always provide the best result. The risk of this approach is that a wide variety of interpretations of the standard can result in a lack of consistency and quality in the design and implementation of facilities.

Whilst the current built network in Canberra is generally coherent and of high quality, a number of issues with consistency and quality were noticed. Two examples are the varied bicycle facility treatments at roundabouts and the lack of provision for cyclists at bus stops. Despite this, there is no reason that the current performance based approach to the development of standards cannot continue, provided that those who are appointed to the planning, design and implementation of cycle facilities are experienced and knowledgeable in this area of work.

4.1 ACT CONTEXT

In describing the ACT context, the current standard identifies a number of key areas where the approach to the provision of bicycle facilities in the ACT varies from that in Austroads and NSW. An argument is presented in section 13.1.3 that seeks to justify why Figure 3.2 of the Austroads Guidelines should not apply in the ACT.

“Canberra is a planned city and has a good network of shared paths. However, for faster moving more experienced cyclists who may require a more direct route free of pedestrians and loss of right of way at road crossings, provision of on-road cycling options may be preferred. Due to topography and through design, Canberra does not have a grid or radial street pattern as in other Australian cities and arterial roads are generally the only roads to provide these direct routes. These roads generally have speed limits up to 80km/h and are designed to a high standard generally with controlled access, clearly defined intersections, good sight distances and a much lower volume of heavy vehicles compared to similar roads in other jurisdictions. This is not consistent with the NSW context and Figure 3.2 of the NSW Bicycle Guidelines does not apply in the ACT.”

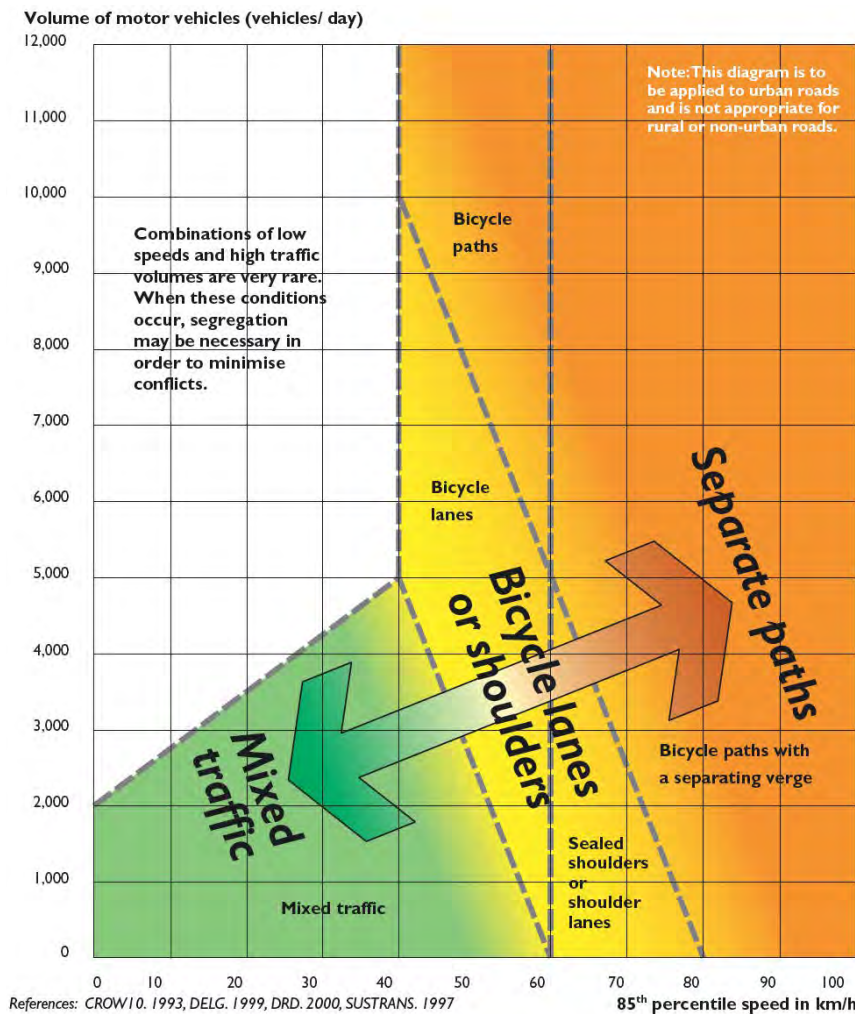
This argument is fundamentally wrong and does not take into consideration the safety and well being of the cyclist. The issue of separation is one of the most important considerations in designing bicycle facilities. When planning or designing for bicycles, the philosophy and road safety objectives covered in the Guide to Road Safety (Austroads 2006 - 2009) should be actively supported. One of these philosophies is the Safe System approach to road safety which recognises that road users are imperfect and that mistakes will be made. A Safe System design therefore reduces the number of incidences and severity of crashes so that when they do occur the consequences are generally less than death or serious injury. The Safe System approach requires, in part (Australian Transport Council 2006):

- *Designing, constructing and maintaining a road system (roads, vehicles and operating requirements) so that forces on the human body generated in crashes are generally less than those resulting in fatal or debilitating injury.*
- *Managing speeds, taking into account the risks on different parts of the road system.*

- *Improving roads and roadsides to reduce the risk of crashes and minimise harm: measures for higher speed roads including dividing traffic, designing 'forgiving' roadsides, and providing clear driver guidance. In areas with large numbers of vulnerable road users or substantial collision risk, speed management supplemented by road and roadside treatments is a key strategy for limiting crashes.*

The figure below is a key Austroads standard that defines the relationship between traffic speed, traffic volume and facility type. It is a guide for planners to employ when determining if it is safe to mix bicycles and motor vehicles on a road. It is as relevant to the planning of cycle facilities in Canberra as it is to all cities in Australian.

The view that cycle planning in the ACT should be exempt from complying with this guidance due to unique street patterns created by topography and design is fallacious and should be removed from the Design Standard.



This Austroads standard does not currently apply in the ACT.

Separation of bicycle and motor vehicles according to traffic speed and volumes. (Source Austroads 2009)

The topography of Sydney's north shore with its system of ridges and gullies, waterways and reserves has created an arguably greater reliance on arterial roads for direct access than is the case in Canberra. Yet, despite the complications created by the street pattern, the current NSW and Austroads standards can and have been applied in this area.

Epping Road for example is an important arterial road linking Sydney CBD to the north western suburbs of metropolitan Sydney. In mid-2011, work commenced on the implementation of a continuous cycleway between Mowbray Road and Pacific Highway. High traffic volume was a key factor in determining that a separated facility was required to provide a safe and comfortable facility that would encourage the uptake of cycling.

In comparison, Drakeford Drive, a similarly important arterial road linking Canberra's southern suburbs to the city centre, provides cyclists with 2.5-3.0m wide, marked and signposted shoulder lane. This is despite the current Austroads guideline indicating that a separated cycle facility is required due to the 80km/hr speed limit.



North Sydney NSW.



Central Canberra ACT.

4.2 ACT POLICIES

The Design Standard state that current ACT policy is to provide “*on-road cycling lane on all new arterial roads*” and to consider retrofitting on road cycle facilities on existing arterial roads. This policy has resulted in the installation of shoulder lanes on roads with speeds in excess of 80km/hr. This policy is not in accordance with the Safe System approach to road safety that has been adopted nationally and is the basis from which the Australian standards are set. Rather than promoting awareness and actively supporting the philosophy and road safety objectives covered in the *Guide to Road Safety* (Austroads 2006-2009), the application of this policy has resulted in the creation of facilities that increase the potential incidence and severity of crashes for cyclists in the ACT.

Perceived and actual traffic hazards are a key constraint on cycling uptake, concern about safety is one of the most significant barriers preventing people from cycling, even for those who cycle regularly.



Epping Road Sydney NSW.

The right type of infrastructure encourages more people to cycle



Drakeford Drive, Canberra ACT.

The Australian Transport Safety Bureau's (ATSB) report *Deaths of Cyclists Due to Road Crashes* (2006) investigated the circumstances of road crashes in which cyclists died. It examines the major factors in fatal crashes involving cyclists and the main crash types.

The main findings were (ATSB Road Safety Report 2006):

- *From 1996 to 2000, nearly one-third of all male cyclists and nearly half of male cyclists in the 10 to 19 age group killed in road crashes were not wearing a helmet. Similarly, nearly one-third of all female cyclists killed in road crashes in the period were not wearing a helmet. For 2001 to 2004, helmet usage in over half the cases was unknown, but in the 48 cases where it was known, 30 of the cyclists were wearing a helmet and 18 were not wearing a helmet.*
- *The most frequently assigned major factor in fatal road crashes involving cyclists in the period 1996 to 2004 was the failure of cyclists and other road users to observe each other on the road. For cyclists, their visibility remains a key safety issue.*
- *The most common type of crash in which cyclists were fatally injured was the cyclist being hit from behind by a motor vehicle travelling in the same lane in the same direction. Cyclists riding on rural roads are particularly at risk of being run over from behind. From 1996 to 2004, there were at least 58 cases where a cyclist was run over by a motor vehicle coming from behind. This kind of crash occurred in urban as well as in rural areas but 38 cases occurred on rural roads, most during the day.*
- *The next most common crash type was the cyclist riding from the footway into an intersection or onto a road and being hit by an oncoming motor vehicle.*

Another important finding was:

- *In the 46 crashes where the cyclist was run over from behind, 10 of the motor vehicle drivers failed to observe the cyclist, 5 drivers were under the influence of alcohol or drugs and the vision of 5 drivers was obscured for some reason, e.g. glare. For the other crashes, the reasons were many and varied or unknown.*

Separation of cyclists and motorists is paramount to increasing cyclists numbers. Whilst it is noted that experienced road cyclists are unlikely to use indirect shared path facilities with lower design speeds, Canberra, being a planned city, is in the unique position of having enough space to provide high speed and high quality separated facilities, dedicated primarily for use of cyclists.

The current policy which allows the provision of on-road bicycle lanes or bicycle shoulders along high volume and/or high speed roads should be amended as a matter of urgency to reflect the National standards for providing safe and comfortable riding environments. The view that cycle planning in the ACT should be exempt from the national standard because arterial roads in Canberra are designed to a higher standard compared to similar roads in other cities, cannot be justified. Additional 'cause of death' data obtained by the ATSB from the Australian Bureau of Statistics (ABS) reveal that fewer than 4 percent of cyclist deaths occur in off-road or 'non-traffic' locations (ATSB Road Safety Report 2006).



Hindmarsh Drive, Canberra ACT. Non-compliant cycle lane.



Epping Road Sydney NSW. Cycleway separated from roadway by crash barrier.

4.3 CYCLE AND PEDESTRIAN NETWORK

This section of the Design Standard describes a planning process for balancing or prioritising the competing needs of different users of the current and proposed cycle network. The Main Routes Network is proposed to have a higher level of amenity and connectivity to town centres, employment areas and other key destinations.

A unique feature of the current network is the division and duplication of the Main Routes into on-road and off-road facilities. These are described as two mutually independent networks made up of Main Community Routes (off road) and Main On-Road Routes.

The Main Community Routes are described as (13.4.3):

This network is an off-road network made up of trunk paths, and is provided for walkers and joggers as well as recreational, school and less confident cyclists. Pedestrians have right of way on these routes and with higher pedestrian volumes these paths may become unsuitable for faster moving cyclists. Maintaining right of way for the path user is an important consideration on these routes to assist in the reduction of journey times.

A higher level of amenity is to be provided on these routes including:

- Higher standard of signage (refer Section 13.7.1) including destination, location and behavioural signage as appropriate.
- Right of way to be provided at driveways and roadway accesses to leased land wherever safe and practicable refer to standard drawing DS-06 for an example of an acceptable driveway crossing treatment.
- To maximise right of way opportunities, path priority crossings should be considered where appropriate (refer Section 13.6.13).
- Lighting of higher volume routes.
- High priority given to removing any missing links in this network.

Main On-Road Routes (13.4.4) are described as:

This network is an on-road network for use by more experienced, faster-moving cyclists such as commuters, and touring and training cyclists wanting to get to a destination quickly with a minimum loss of right of way. These routes are generally on arterial roads and are suitable for more experienced cyclists comfortable with riding adjacent to vehicular traffic.

A higher level of amenity is to be provided on these routes including:

- Priority installation of bicycle lanes whenever possible to remove missing links.
- Use of marked shoulders in retrofit to promote greater connectivity (refer Section 3.6.5.3) where installation of a bicycle lane is not possible.
- Continuation of facilities including marked shoulders through intersections (refer Section 13.6.4.7).
- Removal of devices (such as off-road diversions that require cyclists to dismount), or of any other delay points from this network, where it is safe to do so.
- Provision of ramps to the appropriate standard to allow good connectivity to Main Community Routes and other off-road facilities, especially at destination nodes.

The purpose of a bicycle network is to enable cyclists of a wide range of abilities and experience to move safely and conveniently to chosen destinations via suitable desire lines (Guide to Traffic Management Austroads 2009).

The current Main Routes Network throughout Canberra contains a notable lack of provisions for inexperienced or less confident cyclists wishing to commute between town centres, employment areas or other key destinations along suitable desire lines. Provision should be made in the Main On-Road Routes standard for a range of facilities that provide separation between cyclists and motorists.



Bike Lane, Northbourne Ave, Canberra ACT.



Separated Cycleway, College St. Sydney Source: Bike Sydney

5 NATIONAL & INTERNATIONAL BEST PRACTICES

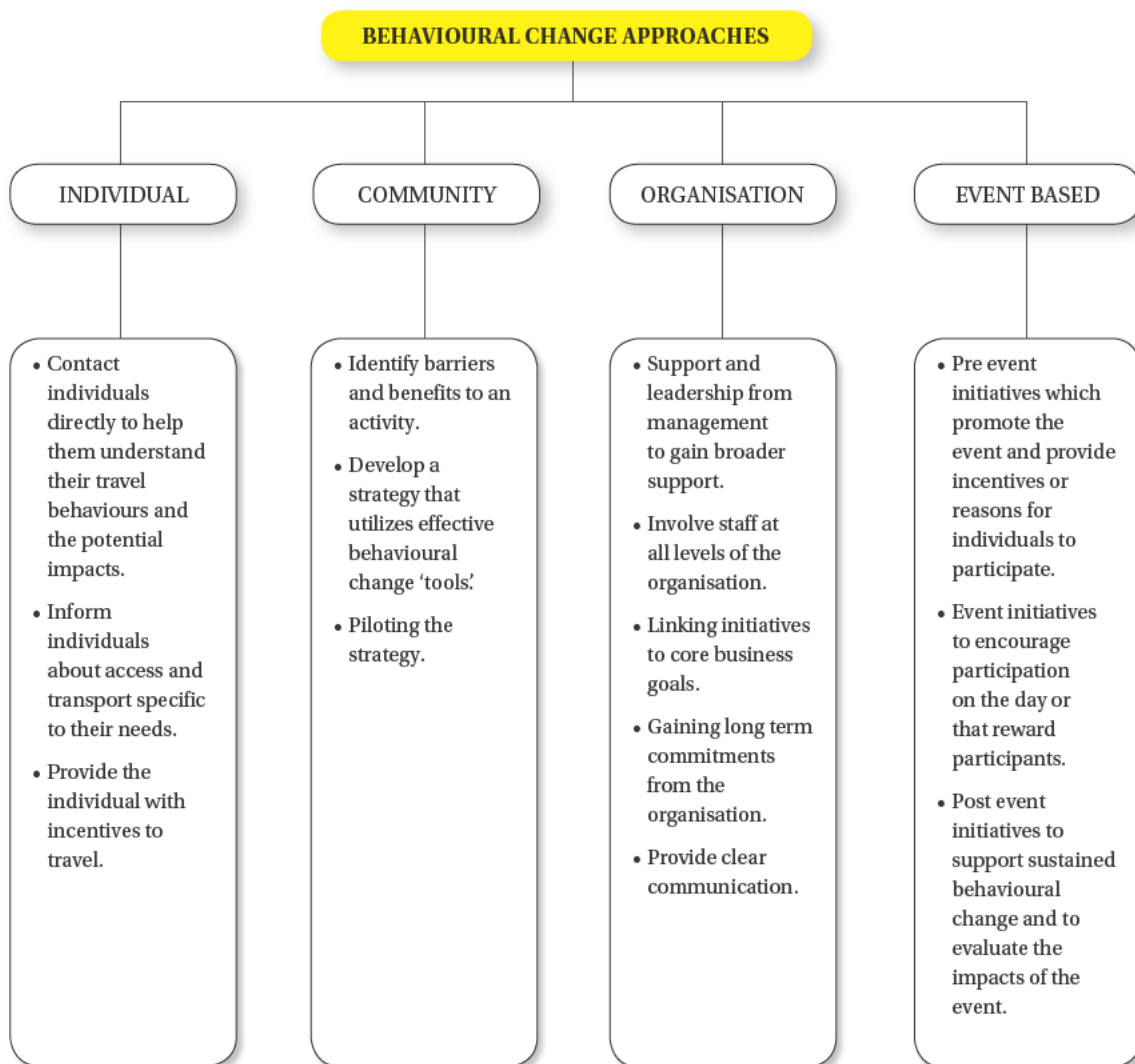
This chapter provides an overview of national and international best practices that may be applicable to the continuing development of Canberra's cycle network. These best practices are intended to provide examples of what could be considered for inclusion in the Strategic Cycle Network Plan. The topics addressed in this chapter include:

- Behavioural Change Strategies
- Separated Cycleways
- Bi-Directional Separated Cycleways - Grade Separated Cross-Section
- Bi-Directional Separated Cycleways - Median Island Cross-Section
- Bi-Directional Signalised Intersections
- Bi-Directional Non-Signalised Intersections
- Bi-Directional Shared Environment Intersection
- Bi-Directional Bus Stop Treatments
- One Way Separated Cycleways - Grade Separated Cross-Section
- One Way Separated Cycleways - Median Island Cross-Section
- One Way Separated Signalised Intersections
- One Way Separated Non-Signalised Intersection
- High Speed Off Road Facilities
- Bicycle Parking



5.1 BEHAVIOURAL CHANGE STRATEGIES

There are several successful marketing strategies that can be utilized when promoting cycling. A GHD Report* for the City of Sydney identifies the following strategies:



* Taken from a GHD report for the City of Sydney 'Enabling Cycling Strategy, Review of National and International Best Practice in Behavioural Change Programs for Cycling,' 23 September 2010



An education in etiquette for cyclists 1



Educating all road users 6



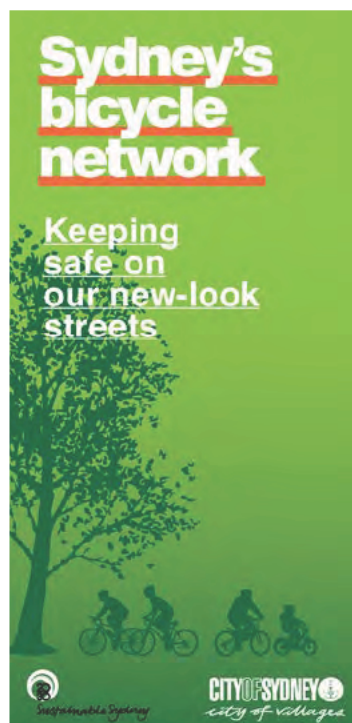
An education in etiquette for cyclists 2



Educating drivers 7



Event based change 3



Educating the community 5



Organisation based change 4



Educating the individual 8

1. City of Sydney, Promotional material
2. San Francisco, Promotional material
3. City of Sydney, Ride to Work Day
4. Fairfax Media cycle friendly ethos

5. City of Sydney, Promotional material
6. Bike Month, Canada Promotional material
7. City of Sydney, Promotional material
8. New York City, New York

5.2 SEPARATED CYCLEWAYS

Different physical separation systems between motorists and cyclists within the road corridor can result in a variety of different behavioural reactions. Typical systems that can be employed are shown on the opposite page from low impact interventions through to high impact interventions including:

- Painted buffer zone
- Rumble strip (Vibra Line)
- Surface mount lane dividers
- Raised median
- Grade separated
- Vertical barrier



Separated Cycleways: Paint buffer zone

1



Separated Cycleways: Rumble strip

2



Separated Cycleways: Surface mount lane dividers

3



Separated Cycleways: Raised median

4



Separated Cycleways: Grade separated

5



Separated Cycleways: Vertical barrier

6

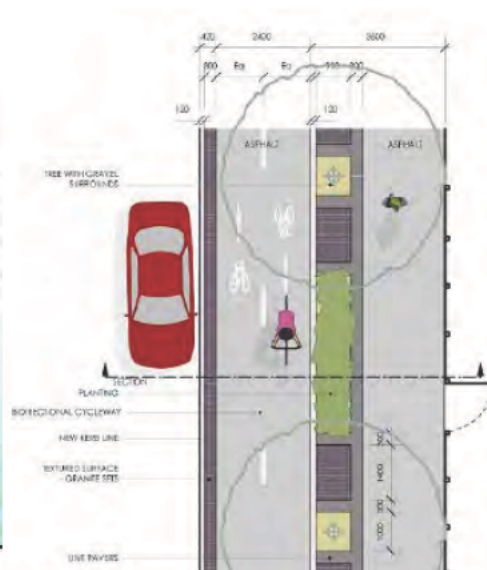
- 1. Melbourne, Victoria
- 3. Sydney, NSW
- 5. Sydney, NSW

- 2. Melbourne, Victoria
- 4. Sydney, NSW
- 6. Lane Cove Cycleway, Sydney, NSW

5.3 BI-DIRECTIONAL SEPARATED CYCLEWAYS - GRADE SEPARATED CROSS-SECTION



Bi-Directional Cycleway at grade with footpath



KEY FEATURES

- A single approximately 100mm kerb at the parking lane.
- A 800 - 1000mm wide planted nature strip section.
- Logos.
- Contrasting pavement thresholds.

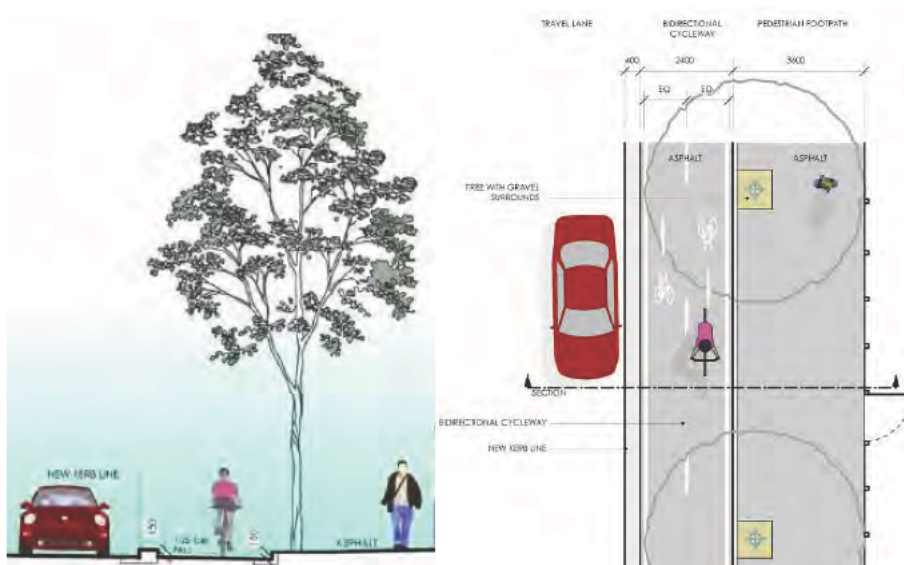
City of Sydney 'Standard Cycleway Treatments'

Typical section and plan (City of Sydney)

5.4 BI-DIRECTIONAL SEPARATED CYCLEWAYS - MEDIAN ISLAND CROSS-SECTION



Bi-Directional Cycleway with planted median island



Bi-Directional Cycleway - Typical section and plan (City of Sydney)

KEY FEATURES

- Minimum 400mm wide and 150mm high concrete or other separator to provide a physical barrier between the cycleway and traffic lane.

City of Sydney 'Standard Cycleway Treatments'

5.5 BI-DIRECTIONAL SIGNALISED INTERSECTIONS



Signalised Intersections

KEY FEATURES

- A separate cycle traffic light phase.
- Kerb extension or guidance barrier are preferred to reduce parking setbacks and provide shortened pedestrian crossing distances.
- Paved pedestrian thresholds.
- Cyclist hook turn boxes.
- Signal plans are to include details of non-standard surface treatments in the vehicle stopping zone.
- Induction loops sensitivity to be tested prior to completion of works.
- Allow 6 second bicycle phase. Test model to allow for future expansion.

City of Sydney 'Standard Cycleway Treatments'

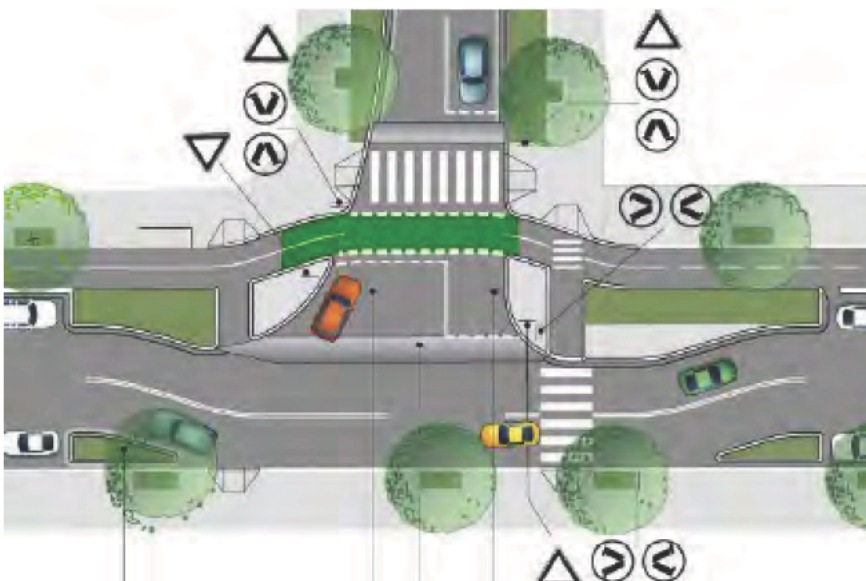


Signalised Intersection, Typical plan (City of Sydney)

5.6 BI-DIRECTIONAL NON-SIGNALISED INTERSECTIONS



Bend Out Intersections



Bend Out Intersections, Typical plan (City of Sydney)

KEY FEATURES

- Provides cyclists with priority at non-signalised cross streets.
- Raised threshold to reduce vehicle speed.
- Cycleway 'bent out' to allow motor vehicles to give way in intersection and to slow cyclist.
- Pedestrian and bicycle crossings.
- Low planting opportunities.

City of Sydney 'Standard Cycleway Treatments'

5.7 BI-DIRECTIONAL SHARED ENVIRONMENT INTERSECTION



Shared Environment Intersection



Shared Environ Intersection, Typical plan (City of Sydney)

KEY FEATURES

- Intersection defined as a 'Road Related Area'
- Raised threshold to reduce vehicle speed.
- Distinctive pavement to signify a changed environment.
- Intersection and road narrowed to reduce motor vehicle speed and control motor vehicle parking.
- Bollards or barriers to define motor vehicle route.
Note: Minimum clear gap to be 1800mm (not 1200mm).

5.8 BI-DIRECTIONAL BUS STOP TREATMENTS



Section showing a typical treatment at bus stops along cycleways (City of Sydney)

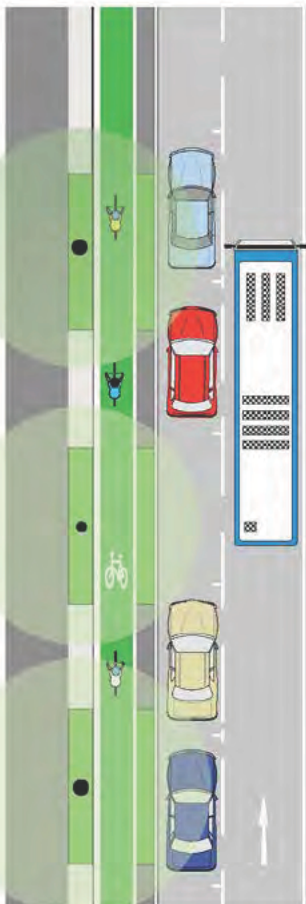
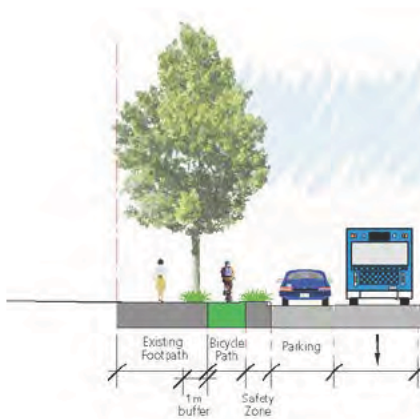


Typical plan (City of Sydney)



Example image (City of Sydney)

5.9 ONE WAY SEPARATED CYCLEWAYS - GRADE SEPARATED CROSS-SECTION



Typical section & plan

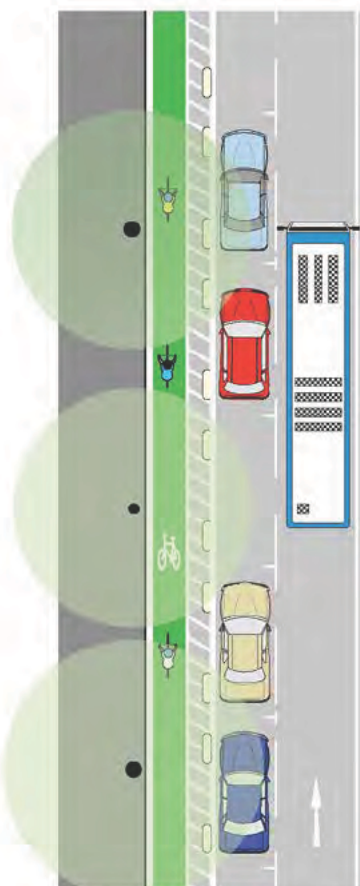
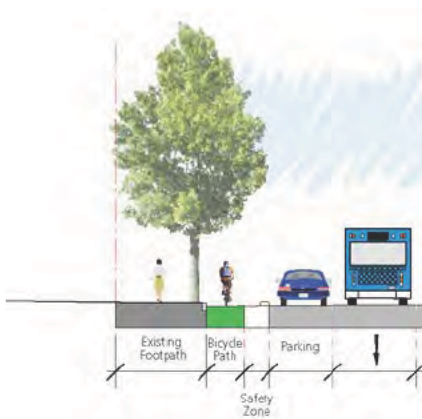


One-way separated cycleway - Melbourne, Victoria

KEY FEATURES

- A one-way facility can be provided on opposite sides of the road.
- One way lanes are typically 1500mm wide.
- The cycle lane is separated from parked cars by a 1000mm wide buffer zone and/or medians.
- The median can be planted.
- Contrasting pavement thresholds.

5.10 ONE WAY SEPARATED CYCLEWAYS - MEDIAN ISLAND CROSS-SECTION



Typical section & plan

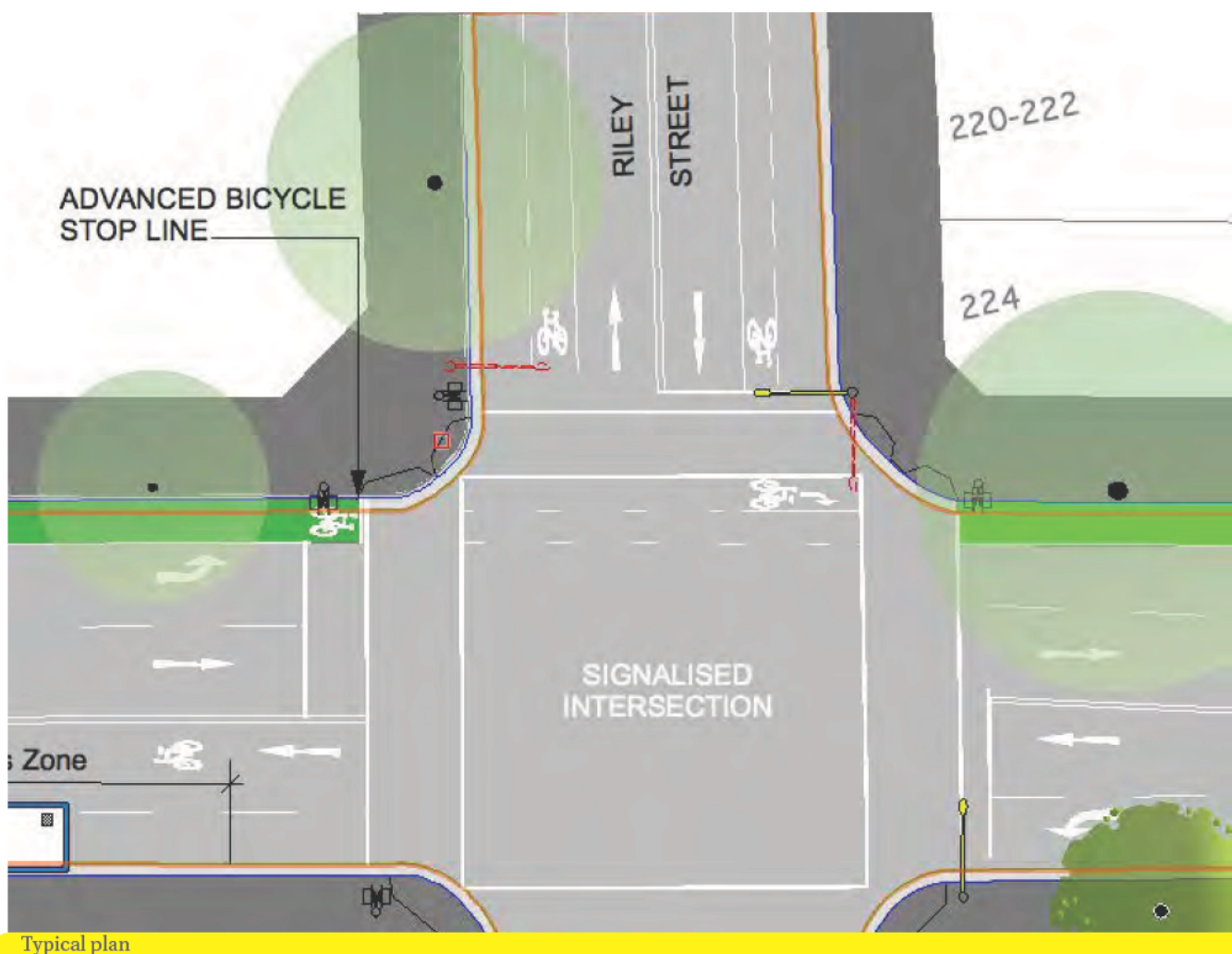


Typical one-way separated cycleway treatment

KEY FEATURES

- 400mm wide and 150mm high concrete separator to provide a physical barrier between the cycleway and traffic lane or parked cars.
- One way lanes are typically 1500mm wide.
- The cycle lane is separated from parked cars by a 1000mm wide painted buffer zone to protect cyclists from car doors.

5.11 ONEWAY SEPARATED SIGNALISED INTERSECTIONS



KEY FEATURES

- Cyclists cross with existing traffic light phase.
- Cyclist hook turn boxes.
- Pressure sensor pad to detect cyclist.
- Allow 6 second left turn hold phase for vehicles to clear queuing cyclists from the intersection.

5.12 ONE WAY SEPARATED NON-SIGNALISED INTERSECTION



KEY FEATURES

- Painted priority cycle crossing.

5.13 HIGH SPEED OFF ROAD FACILITIES

Dedicated cycleways generally feature two-directional traffic, passing lanes, service areas for repair and filling tires or relaxing and signage for safety and wayfinding. Features that set these paths apart from others are as follows:

- 1.5m wide lanes in each direction with a provision for continuance through junctions.
- Separation from roads with vegetated verges or physical barriers.
- Possible pedestrian only paths adjacent.
- Routes that activate different forms of travel (commuter, leisure or recreation) with features that cater for the varying needs and requirements of different users.



Separation from road with grass verge 1



Shared path in central median with planting either side 2



Separation from road with planting 3



Pedestrian paths adjacent 4



Additional amenity for all users along paths 5



Shared path adjacent freeway 6

- 1. Holland, Netherlands
- 3. Cowpasture Road, Sydney, NSW
- 5. Natomas, Sacramento, California

- 2. Melbourne, Victoria
- 4. American River Parkway, Sacramento, California
- 6. Perth, Western Australia

5.14 BICYCLE PARKING

There are common concerns that people have about commuting on bicycles. These are as follows:

- Lack of secure parking for their bicycles close to destination locations, be they work places or commuter transit hubs, like train and bus stations; and
- Arriving at their destinations sweaty from exercise or wet from rainy weather without provision for showering and storage of equipment.

These bicycle parking solutions can be integrated into most cycleway treatments, including bus stops , Park & Ride, Bike & Ride and multi-modal transit hubs



Colourful bicycle lockers

1



Bicycle lockers

2



Biceberg underground bicycle storage

3



Vertical bicycle umbrella storage

4



Pushbike parking station with showers

5



Bicycle commuter station

6

- 1. Halifax, Canada
- 3. Groninger, Netherlands
- 5. Penny Farthings PushBikes bike parking stations

- 2. Perth, Western Australia
- 4. Brisbane, Queensland
- 6. Perth, Western Australia

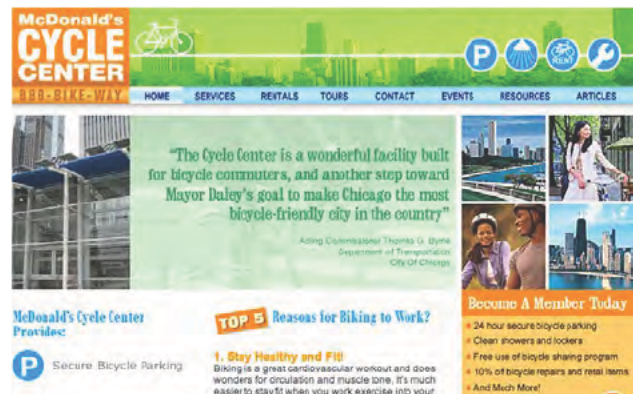
5.15 BIKE HUB FACILITIES

Bike Hub Facilities are generally located at primary transport hub and are intended to be a main feature of a Bike & Ride network. These facilities are becoming increasingly popular in major metropolitan centres around the world.

The primary function of these facilities is to provide safe, enclosed storage for bikes. Additionally, these facilities are commercial enterprises that generally include:

- Lockers
- Showers
- Gyms/Spin Classes
- Repair/Rental Shop
- Cafe

This type of facility would be a major benefit and help activate Canberra's City Walk area.



Bike Hub Facility Websites



Bikestation - Washington D.C., USA



BikePark - Melbourne, Victoria



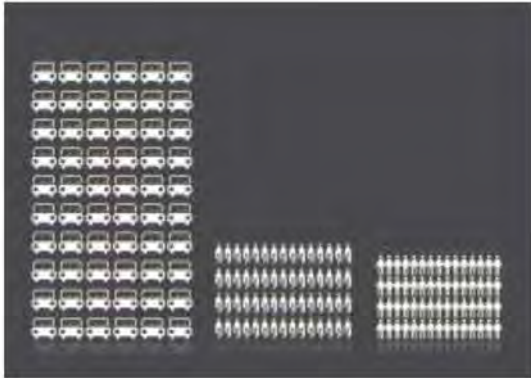
McDonald's Cycle Center - Chicago, Illinois, USA



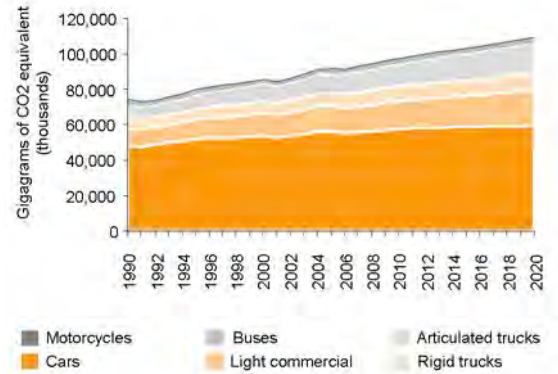
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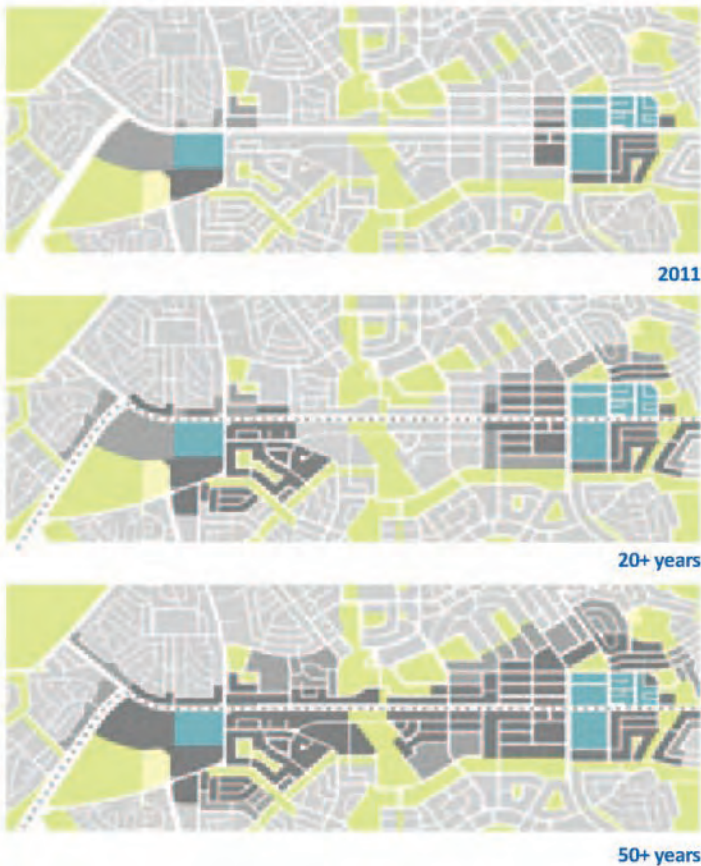
APPENDIX A



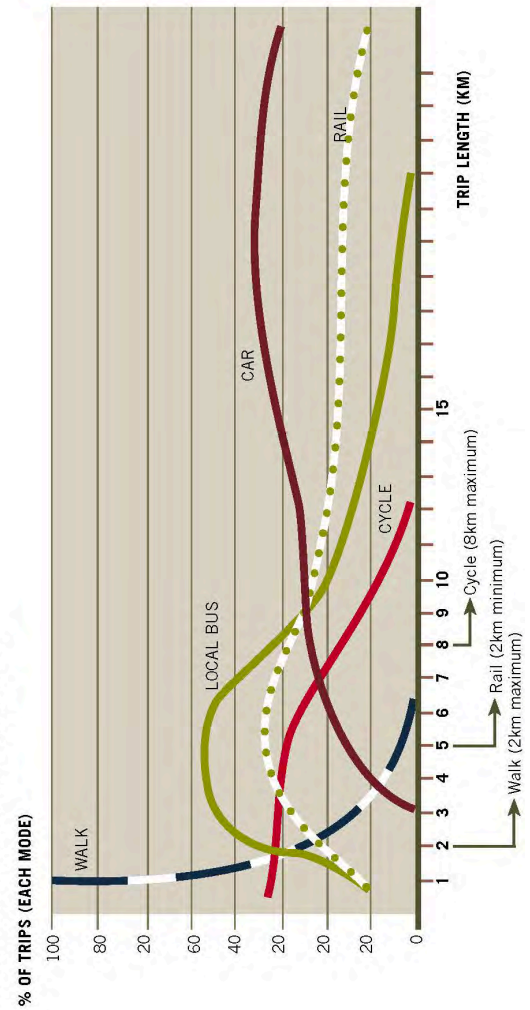
Comparison of space utilisation of 60 cars, cyclists and people from the *National Cycling Strategy*



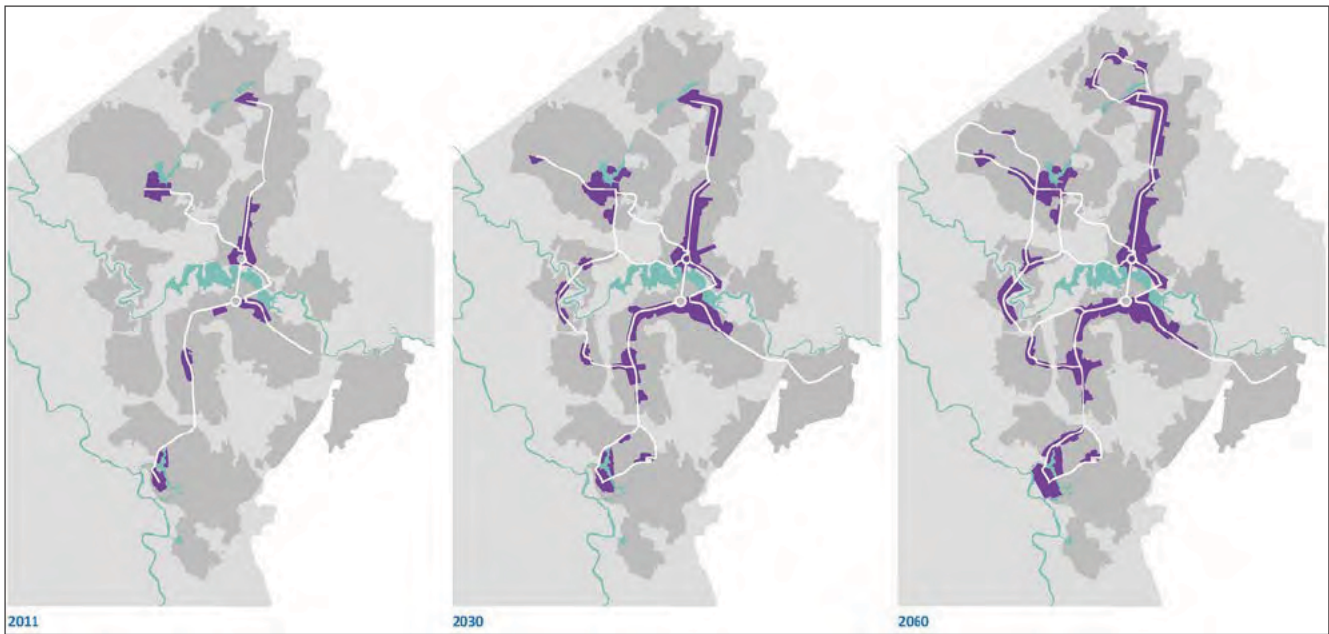
Past and projected vehicle emissions from the *National Cycling Strategy*



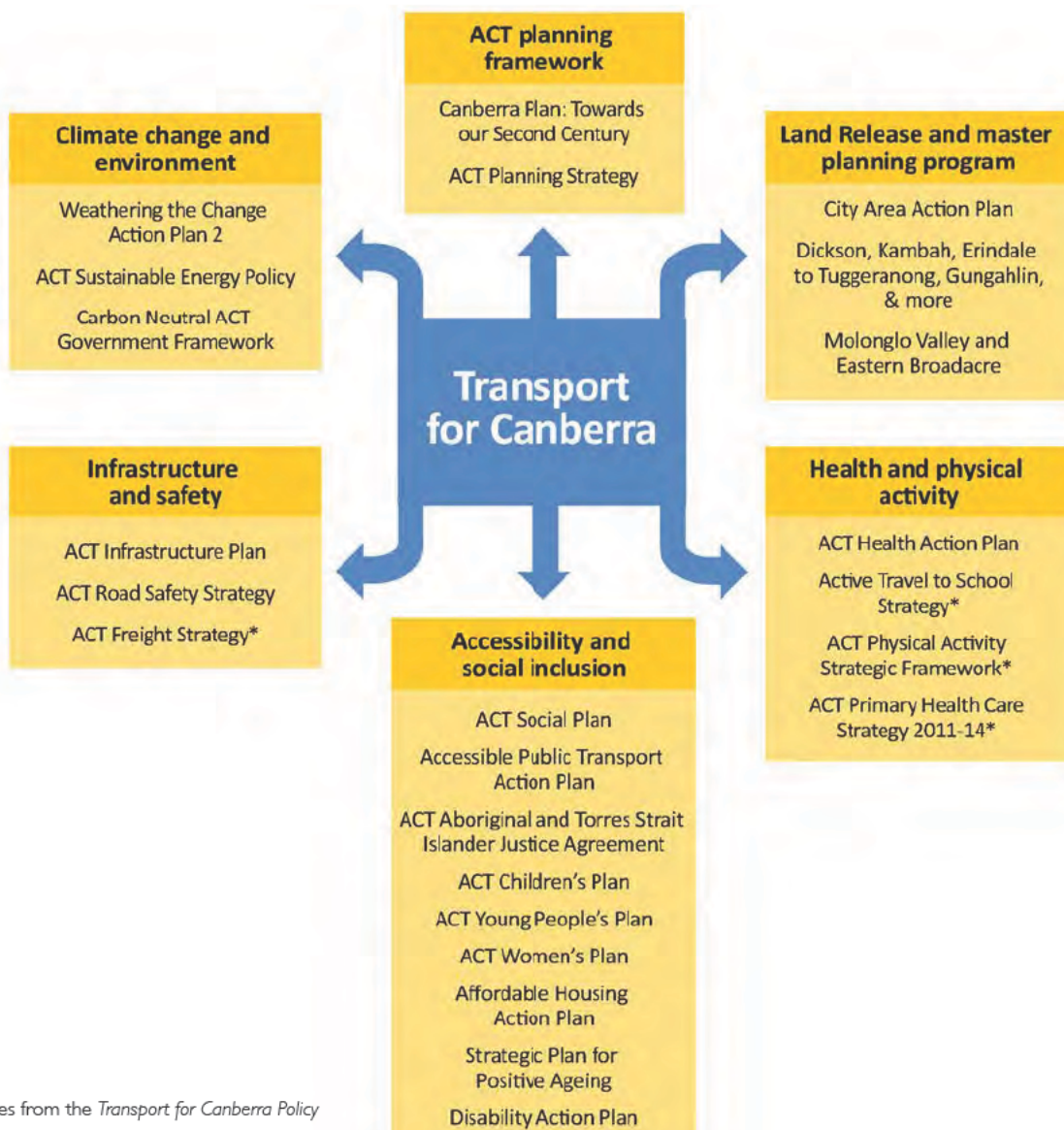
Indicative of how new urban intensification can occur over time along transit routes from the *Draft ACT Planning Strategy*



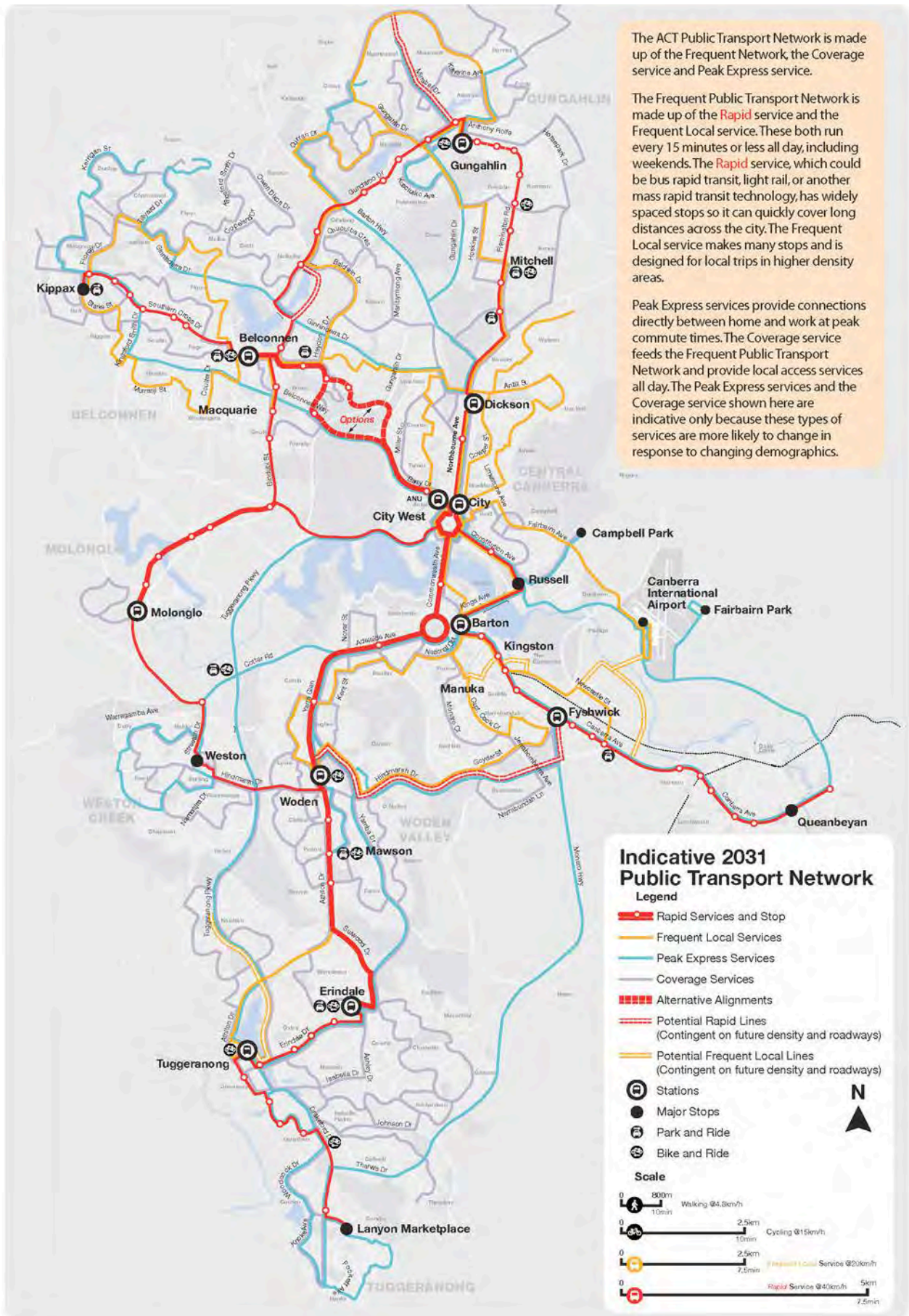
Transport modes, threshold distances and trip lengths from the *Sustainable Transport Plan*



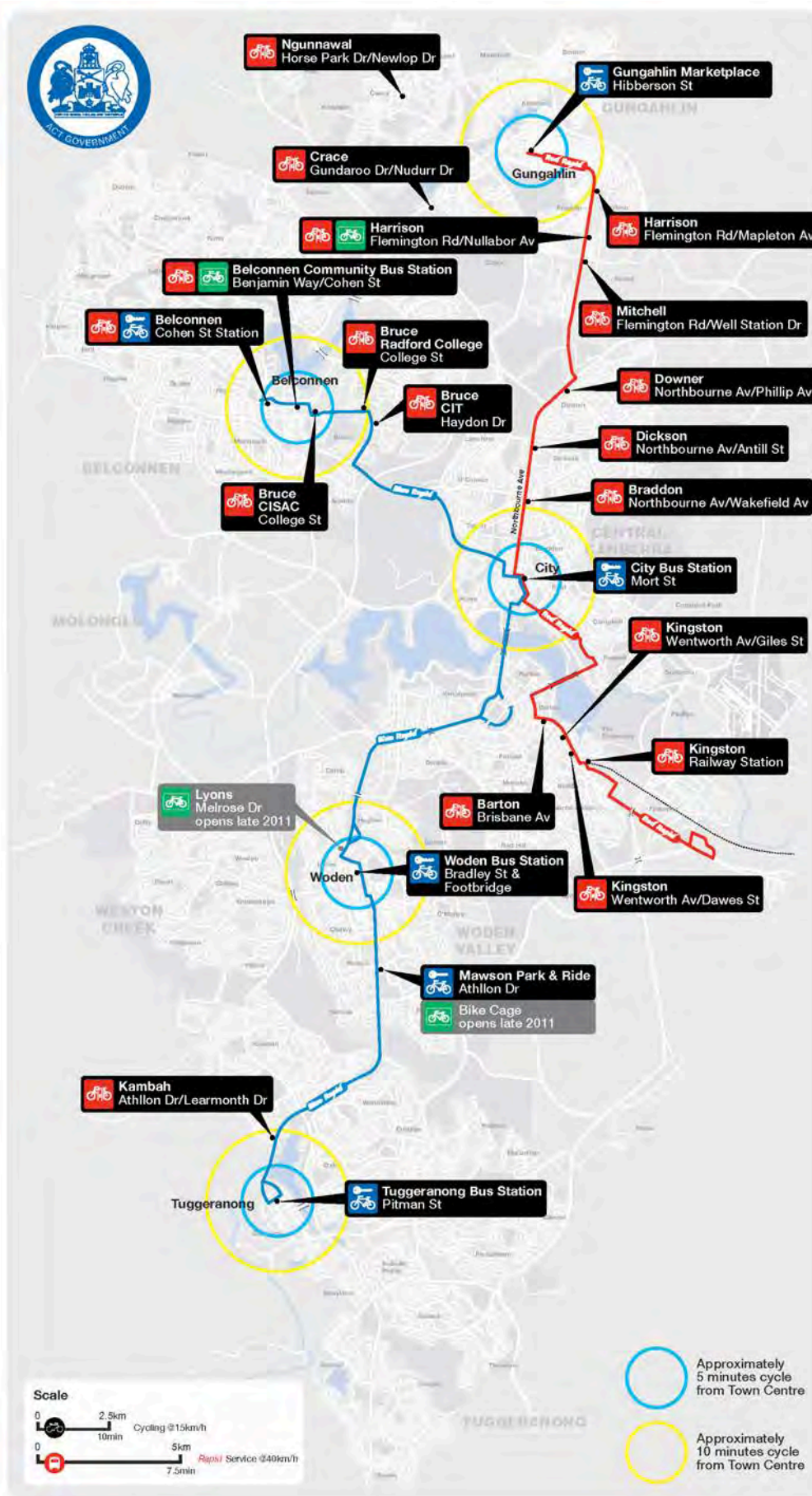
Map series indicates how urban intensification can occur over time in the metropolitan area from the *Draft ACT Planning Strategy*



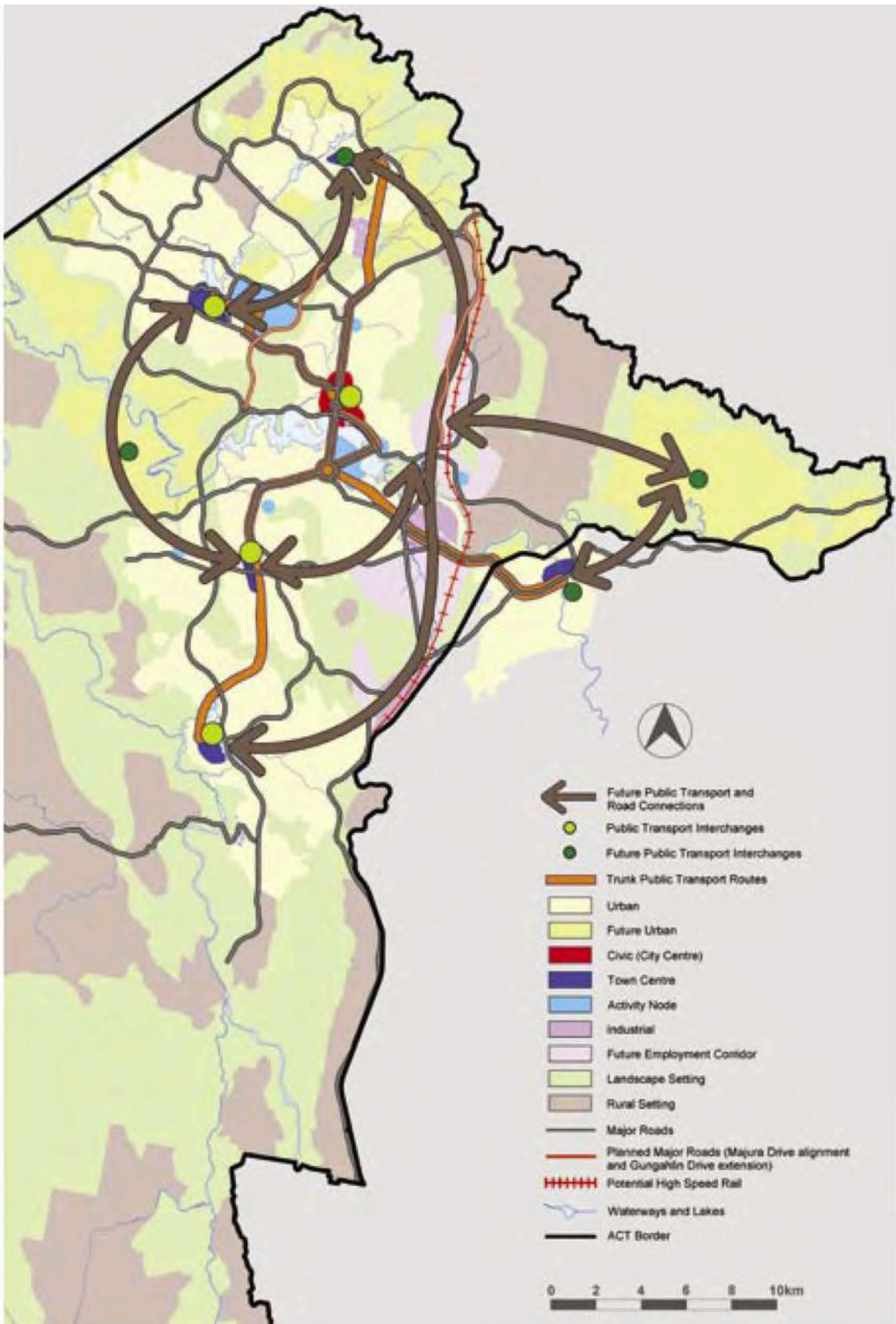
Policy linkages from the *Transport for Canberra Policy*



Public transport network map from the *Transport for Canberra Policy 2012-2031*



Bike & Ride network map from the *Transport for Canberra Policy 2012-2031*



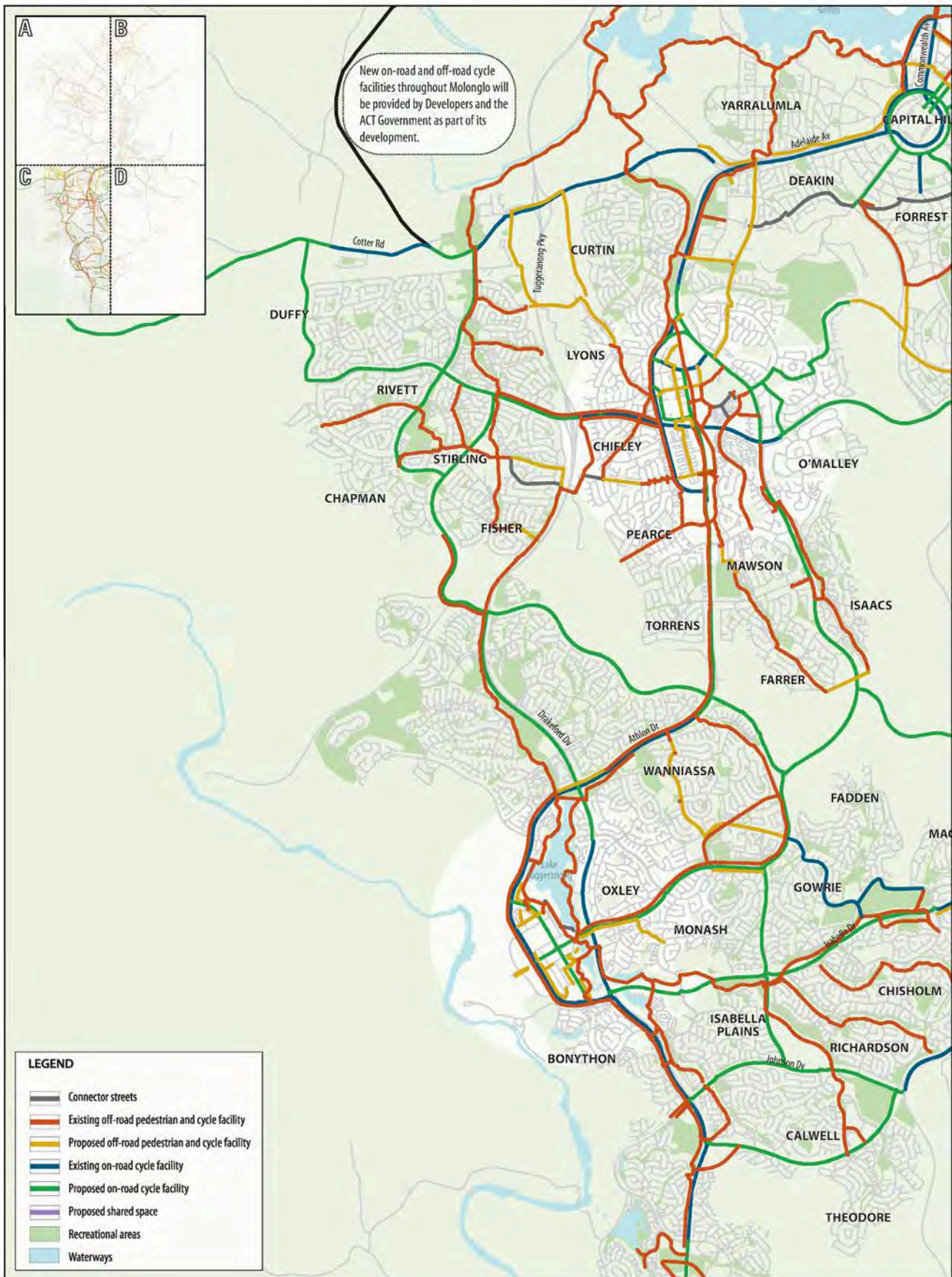
Transport connections map from the *Sustainable Transport Plan*



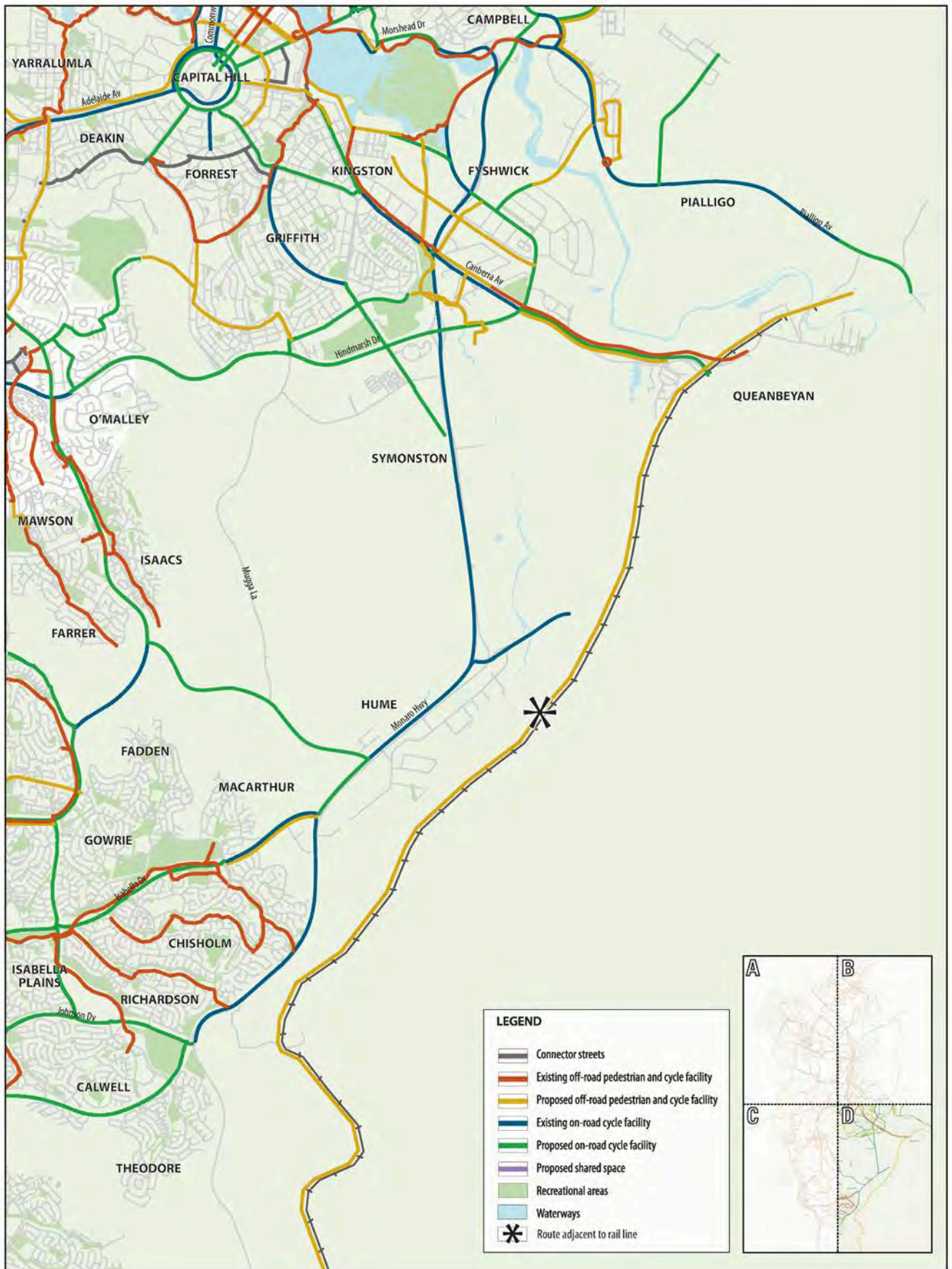
Existing and proposed trunk network maps from the ACT *Cycling and Pedestrian Network Plan*



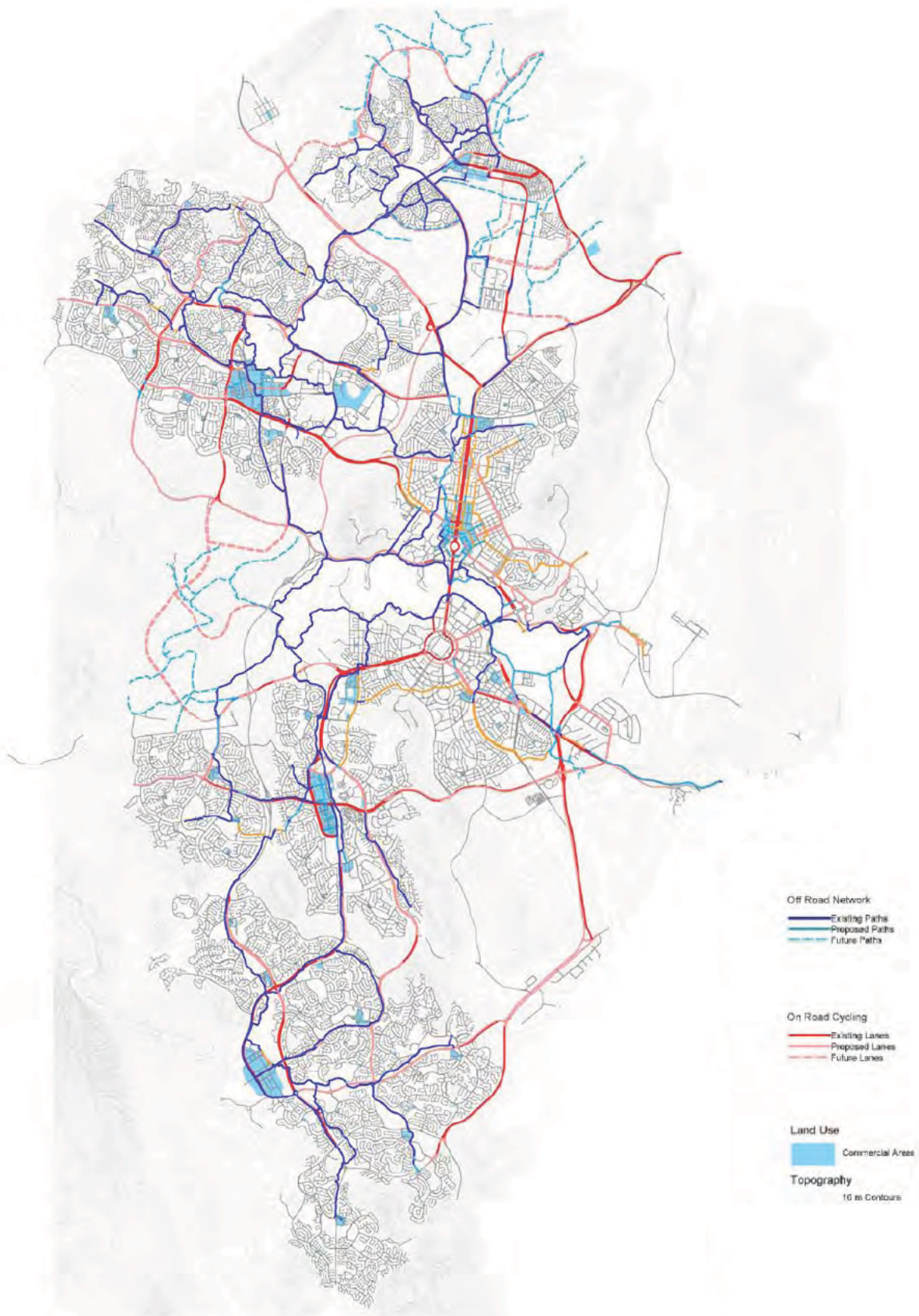
Existing and proposed trunk network maps from the ACT Cycling and Pedestrian Network Plan



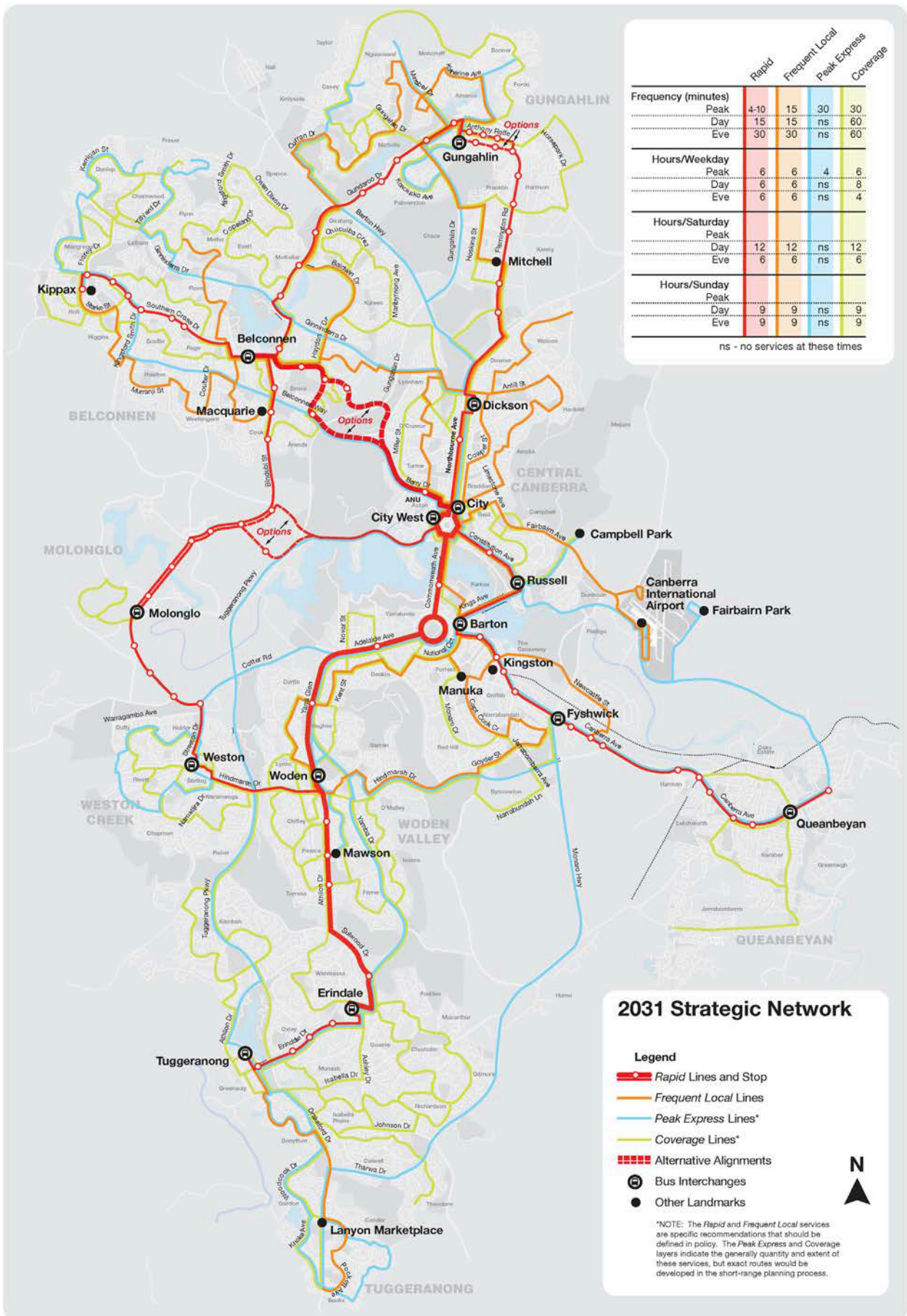
Existing and proposed trunk network maps from the ACT *Cycling and Pedestrian Network Plan*



Existing and proposed trunk network maps from the ACT Cycling and Pedestrian Network Plan



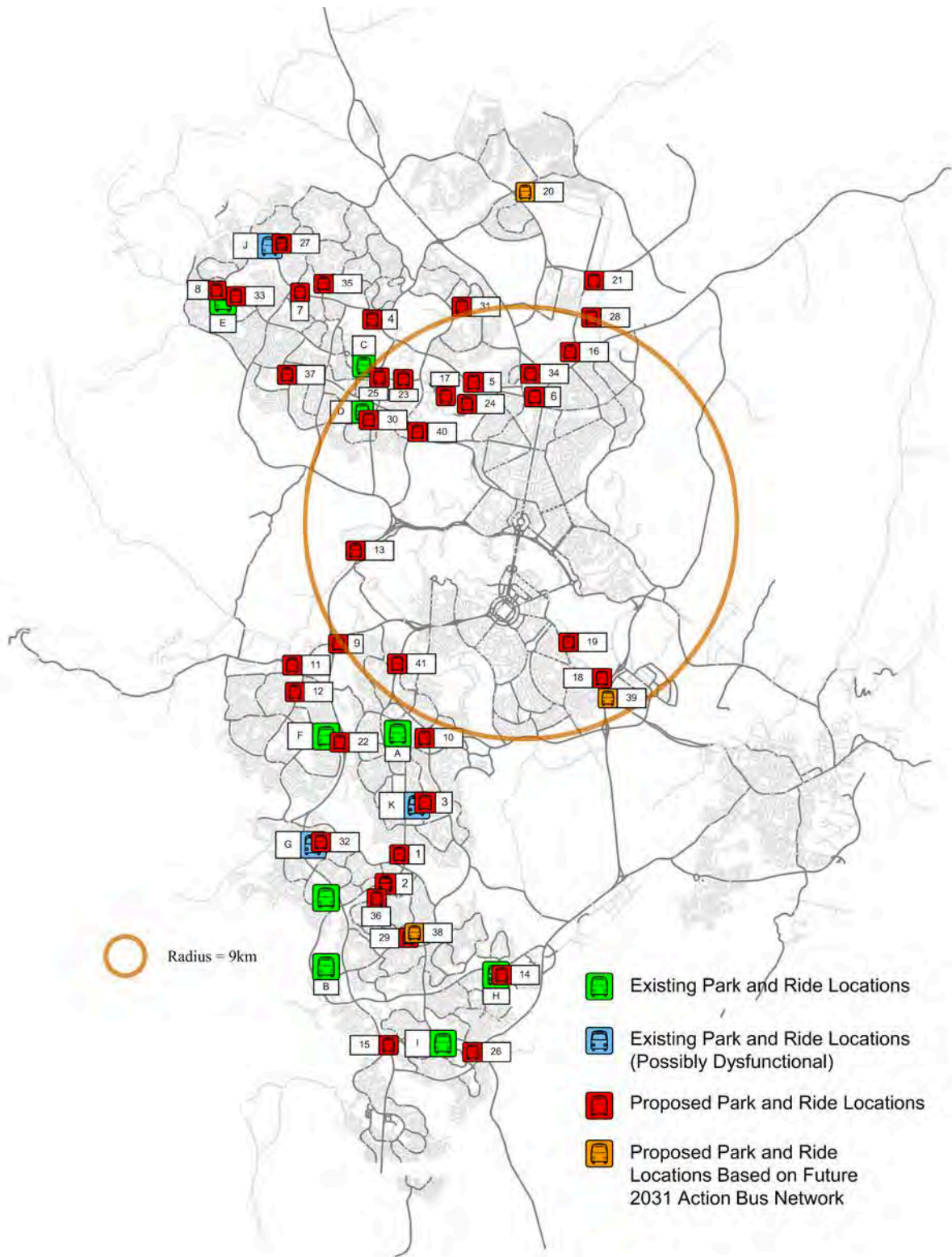
Trunk cycling network from the *Commuter Cycling Network Study 2007*



Public transport network from the ACT Strategic Public Transport Plan 2009



Recommended sites from the Bike & Ride and Kiss & Ride Study 2009



Existing and proposed park and ride sites from the *Park & Ride Strategy 2008*

**SPACKMAN
MOSSOP AND
MICHAELS**



Final Report

ACT Strategic Cycle Network Plan

26 September 2014

Ref. 3002316



Project Name:	ACT Strategic Cycle Network Plan
Project Number:	3002316
Report for:	Environment and Planning Directorate (EPD)

PREPARATION, REVIEW AND AUTHORISATION

Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
0	27/03/2014	Murray West (MRC) Steven Burgess (MRC)	Jerome Catbagan	Jerome Catbagan
1	17/04/2014	Tim Cupitt (MRC) Steven Burgess (MRC)	Jerome Catbagan	Jerome Catbagan
2	09/07/2014	Murray West (MRC) Tim Cupitt (MRC) Steven Burgess (MRC)	Jerome Catbagan	Jerome Catbagan
3b	26/09/2014	Josh Everett	Jerome Catbagan	Jerome Catbagan

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ACT Strategic Cycle Network Plan - Final Report

For: Environment and Planning Directorate (EPD)

SEPTEMBER 26, 2014

EXECUTIVE SUMMARY

ES.1 Overview

The ACT Government, through the Environment and Planning Directorate (EPD), has commissioned the *ACT Strategic Cycle Network Plan* (the Plan).

The Plan aims to deliver a safe, direct and legible bicycle network that provides a viable alternative to driving for all cyclists in the 8-80 age group. The key goal is to develop a bicycle-friendly environment that encourages more people to use the cycle network more often; this requires the provision of a well-planned and integrated network of bicycle routes that is underpinned by long-term strategic thinking. The plan is envisaged to be integrated with other policy and infrastructure plans in a cohesive strategic framework and linked with future land development and urban growth.

Following a review of background information and analysis of the existing cycle network and its integration with public transport, four network strategy options were considered based on the hierarchical network approach, which classified network routes into three levels: Primary, Secondary and Tertiary.

- Option 1 – City Centric that focuses on improving cyclists' access to the city centre from the surrounding centres by developing the Primary network to provide direct connections to major employment locations.
- Option 2 – Town Centre Centric that focuses on improving cycling in and around town centres within a 5 kilometre radius by enhancing routes in the Secondary and Tertiary networks.
- Option 3 – Combination of Options 1 and 2 that focuses on improving cycling in and around town centres as well as improving access to the city centre by developing the Primary, Secondary and Tertiary networks through predominantly filling gaps in the network.
- Option 4 – Complete Strategic Cycle Network that provides a comprehensive and complete strategic cycle network, connecting the city centre to town centres and local routes by filling gaps as well as improving the standard of the whole network.

These options were presented to ACT Government and public stakeholders and the wider community for feedback. Following this consultation and further quantitative and qualitative assessments, Option 3 was recommended as the preferred option.

Further consultations with EPD and other key stakeholders highlighted the need to provide implementing agencies (e.g. Territory and Municipal Services Directorate, TAMS) greater flexibility in prioritising and identifying future cycling infrastructure projects, and the preference for the plan to not lock in specific projects but still provide guidance on where priority areas in the network are, and when the delivery of infrastructure works needs to occur.

The preferred option was enhanced to firm up the Plan. In addition to delivering a cycling infrastructure that supports future growth and development through a mixture of radial travel to the City and local town centre/village based trips, the Plan, as shown in Figure ES.1, primarily:

- emphasises the need to upgrade Primary corridors (representing the linear travel to access the city centre and the main routes between town centres, major growth centres, areas of employment and hubs of activity)

- seeks to improve cycle access within Secondary zones (major growth centres, areas of employment and hubs of activity covering a 5 kilometre radius around town centres) and builds upon the existing cycle network

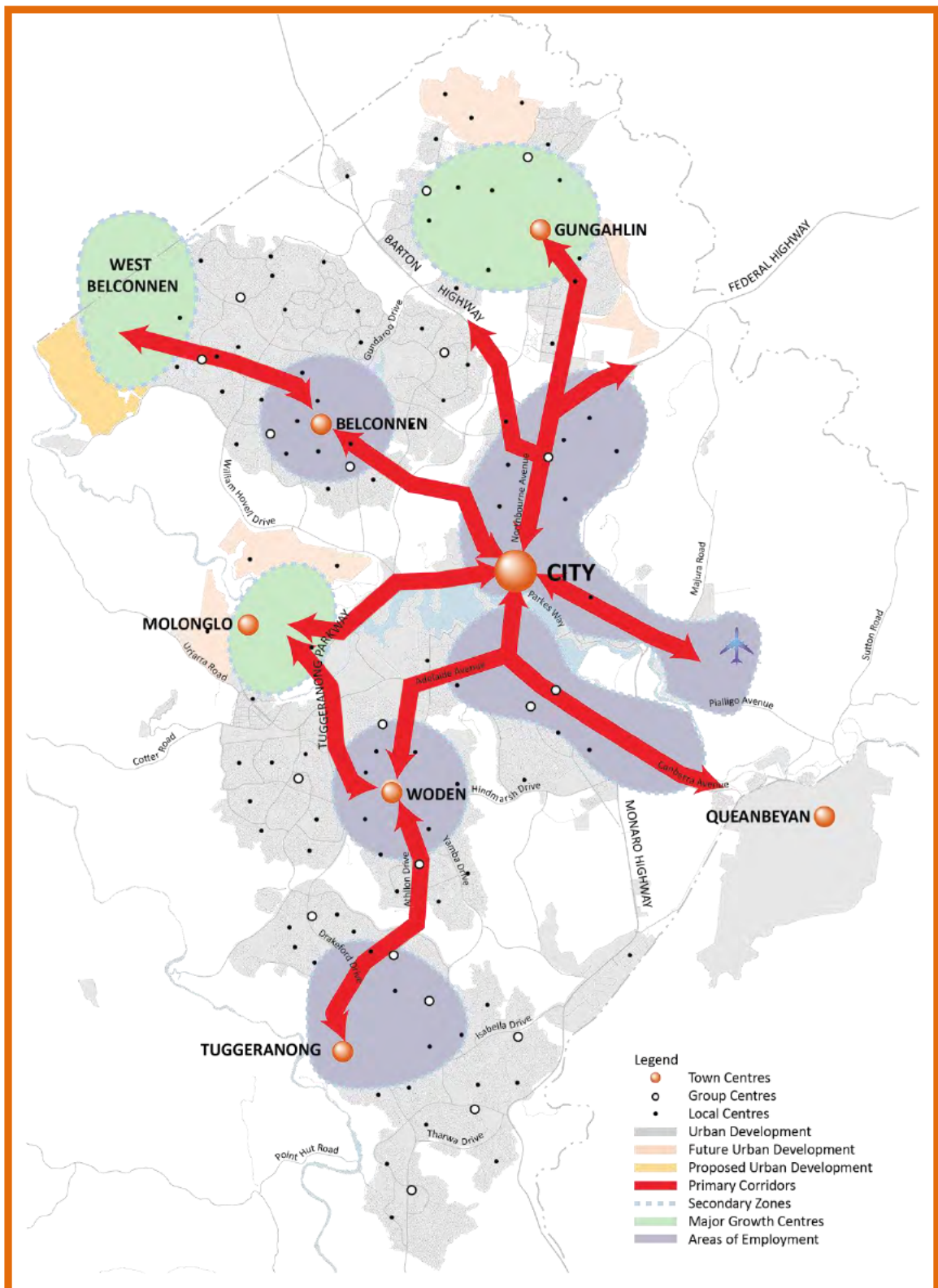


Figure ES.1: ACT Strategic Cycle Network Plan - Primary corridors and Secondary zones (major growth centres and areas of employment)

The implementation cost and forecast cycling demand of the Plan was estimated from the indicative priority cycle projects in a potential cycle network option as shown in Figure ES.2.

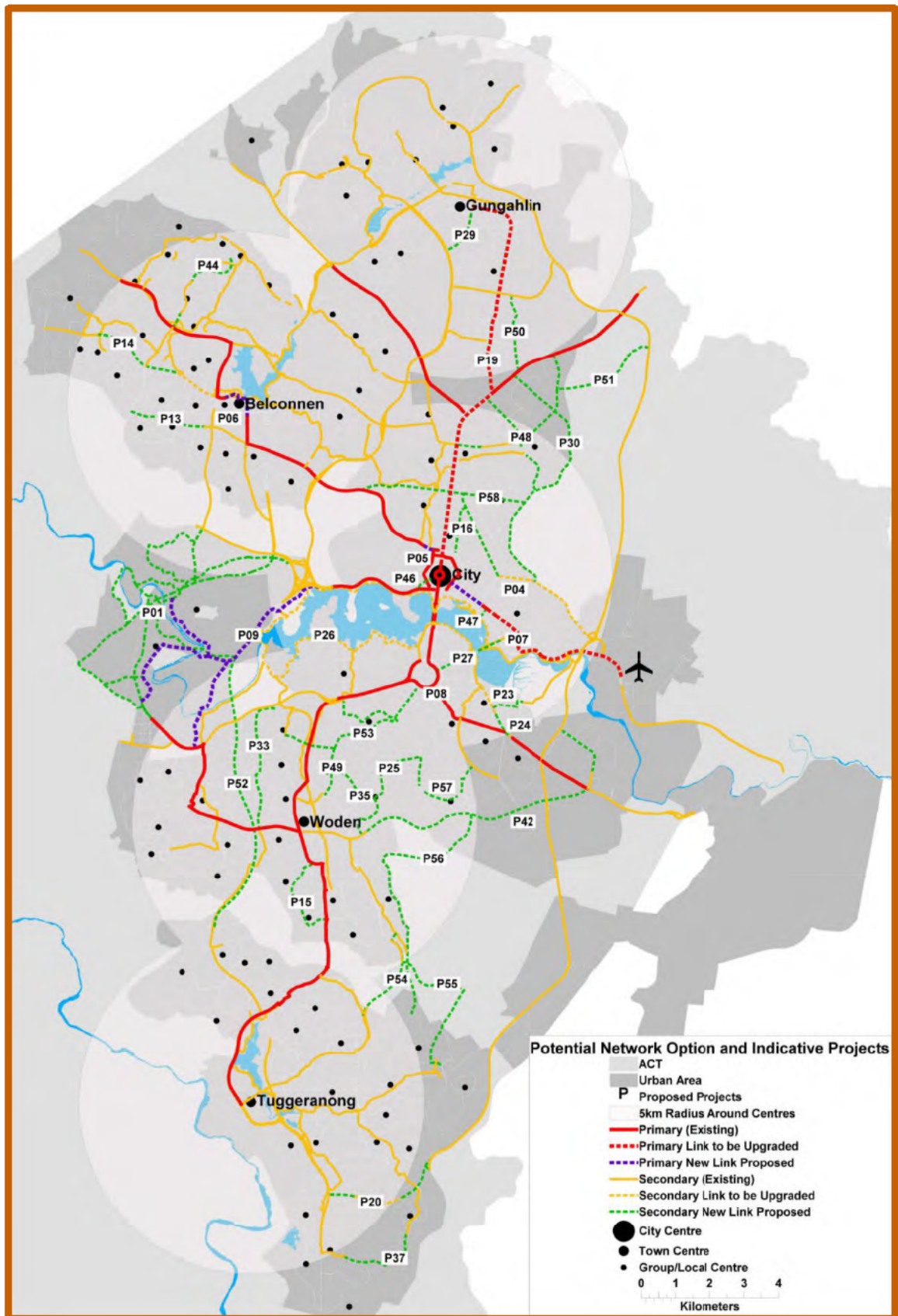


Figure ES.2: Potential network option map

Table ES.1 has a description and timeframe for all of the indicative projects shown in Figure ES.2. The indicative projects outlined in the table were identified based on their potential to:

- fill gaps in the existing cycle network to develop the Primary corridors and Secondary zones
- provide connections to the Primary corridors and Secondary zones which will cater for a wide spectrum of users

Short-term projects predominantly relate to committed projects that are included in the Primary corridors and Secondary zones. Medium-term projects relate to addressing gaps in the Primary corridors and Secondary zones. Longer-term projects in Primary corridors and Secondary Zones predominantly relate to improvements to the standard of infrastructure provided and may include, for example:

- widening shared paths
- intersection upgrades at key intersections to improve cycling priority and safety
- implementing segregated cycle lanes on road
- improving connections and integration between on and off road paths
- improving line markings and signage of on-road lanes

Table ES.1: Summary of Indicative Projects in the Potential Network Option

Project ID	Location	Project	Timeframe
P01	Molonglo Valley	On-road lanes (segregated) and off-road paths	Short term
P04	MacArthur Avenue, Limestone Avenue and Fairbairn Avenue	On-road lanes	Short term
P05	Barry Drive, between storm water culvert just west of Kingsley Street and Marcus Clarke Street	On-road lanes (segregated)	Short term
P06	Benjamin Way between College Street and Emu Bank	On-road lanes (segregated)	Short term
P07	Civic to Airport via Constitution Avenue	On-road lanes (segregated)	Short term
P08	Canberra Avenue from National Circuit to State Circle	On-road lanes (segregated)	Short term
P09	Civic to Molonglo	Cycle Superhighway	Medium term
P13	Coulter Drive to Kingsford Smith Drive along Belconnen Way	On-road lanes (segregated)	Medium term
P14	Belconnen to Kippax Group Centre via Southern Cross Drive	On-road lanes (segregated)	Medium term
P15	Beasley Street, Torrens and Hodgson Crescent to Melrose Drive, Pearce	On-road lanes	Medium term

Project ID	Location	Project	Timeframe
P16	Torrens Street, Braddon	On-road lanes	Medium term
P19	Gungahlin to Civic	On-road lanes (segregated)	Medium term
P20	Tharwa Drive	Off-road path	Long term
P23	Kingston Foreshore	Off-road path link to Lake Burley Griffin	Short term
P24	Wentworth Avenue (Bowen Park to Fyshwick)	On-road lanes (segregated)	Long term
P25	Hindmarsh Drive to Red Hill Reserve, skirting or crossing Red Hill, then connecting to existing cycleway network at Flinders Way (Canberra Hospital Connection).	Off-road path	Medium term
P26	Lake Burley Griffin Circuit	Off-road path upgrade and completion of missing links in the Lake Burley Griffin Circuit	Short term
P27	Kings Avenue cycle	On-road lanes on Kings Avenue where gaps exist	Short term
P29	Mulangari Grasslands Connection	Off-road path from Nudurr Drive to Gungahlin Town Centre	Medium term
P30	Federal Highway to Fairbairn Avenue	Off-road path from Federal Highway following Monash Drive alignment	Medium term
P33	Cotter Road to Hindmarsh Drive	Off road path from Cotter Road to Hindmarsh Drive	Medium term
P35	Hughes to Garran	On-road lanes along Kitchener Street and Gilmore Crescent	Long term
P37	Lanyon to Theodore Off-road connection	Off-road path through Canberra Nature Reserve	Long term
P42	Newcastle Street and Hindmarsh Drive	On-road lanes on Newcastle Street and off-road path along Hindmarsh Drive	Medium term
P44	Kingsford Smith Drive	On-road lanes	Long term
P46	Edinburgh Avenue	On-road lanes	Short term
P47	Wendouree Drive	On-road lanes	Short term
P48	Downer On-road lanes, Antill Street and Philip Avenue	On-road lanes	Long term

Project ID	Location	Project	Timeframe
P49	Wisdom Street Link from Yamba Drive to Carruthers Street	On-road lanes	Long term
P50	Federal Highway to Well Station Drive via Old Well Station Road alignment	Off-road path	Long term
P51	Antill Street to Majura Road	Off-road path	Long term
P52	Tuggeranong Parkway	Off-road path	Long term
P53	Capital Hill to Kent Street	Off-road path	Long term
P54	Erindale Drive through Canberra Nature Park	Off-road path	Medium term
P55	Long Gully Road to Coyne Street	Off-road path	Long term
P56	Hindmarsh Drive to Bugden Avenue	On-road lanes and off-road path	Long term
P57	Fill gaps Canberra Avenue to Adelaide Avenue	On-road lanes and off-road path	Medium term
P58	Wakefield Avenue	On-road lanes and off-road path	Short term

These identified projects are not final but simply a representation of how the Plan could be delivered. Delivery would depend on further individual feasibility studies.

The Plan includes recommendations on infrastructure and non-infrastructure works and outlines indicative timing of cycling infrastructure delivery in growth centres, employment areas and growth corridors, as shown in Table ES.2 to Table ES.4.

Table ES.2: *Indicative timing of cycling infrastructure delivery in growth centres*

Growth Centre	Infrastructure Needs Timeframe
Gungahlin	2-5 years
Molonglo	5-10 years
West Belconnen	10-15 years

Table ES.3: *Indicative timing of cycling infrastructure delivery in employment areas*

Employment Areas	Infrastructure Needs Timeframe
Belconnen	2-15 years
North Canberra and Majura (Airport)	2-10 years

Employment Areas	Infrastructure Needs Timeframe
South Canberra	2-15 years
Woden	2-5 years
Tuggeranong	2-5 years

Table ES.4: indicative timing of cycling infrastructure delivery in growth corridors

Growth Corridors	Infrastructure Needs Timeframe
Gungahlin to City	2-5 years
Belconnen to City	2-5 years
City to Airport	2-5 years
City to Fyshwick/ Queanbeyan	2-10 years
Molonglo to City	5-10 years
City to Woden	5-10 years
Woden to Tuggeranong	5-10 years

While the impacts and costs of infrastructure are, to some extent, easy to measure and cost, providing infrastructure alone will not be sufficient to achieve mode share targets. Other elements relating to cycling will need to be further considered, such as:

- land use policy
- parking strategies
- speed limits
- behavioural change and marketing campaigns
- people based street design

ES.2 Recommendations

The following are recommended to progress the Plan:

- Adopt the Plan and integrate the potential network option in land-use planning, infrastructure planning and TAMS capital works program.
- Conduct further detailed feasibility studies of identified projects and for the provision of:
 - cycle infrastructure in the Primary corridors that focuses on the separation of cyclists from other modes of travel through physical segregation, noting that car and cyclist separation measures such as rubber kerbing and 'rumble strips' are currently being trialled in six locations across Canberra

- cycle infrastructure in the Secondary zones
- additional and improved cycle infrastructure in school catchments
- Undertake a comprehensive review of the ACT vehicle parking policies and amend where necessary to ensure policies support the provision of the right amount of parking, in the right location, and at the right price so that alternative modes of transport, such as cycling, are not suppressed.
- Develop a suite of behavioural change and marketing programs that encourage greater levels of cycling amongst all sections of the community, including:
 - cycling promotion events such as Bike to Work/School week
 - development of cycling maps/multi-modal access guides identifying safe cycle routes and facilities to and from various key destinations (in addition to the existing Canberra and Queanbeyan Cycling and Walking Map)
 - personalised travel planning – this may initially be trialled in a government department and further expanded
 - Green Travel Plans (GTP) for individual workplaces
 - bicycle pool fleet in workplaces – to encourage employees to cycle to meetings, workshops and the like that involve short trips. These types of facilities are already provided in some ACT Government workplaces
 - introduction of free or low cost cycle maintenance and riding skills workshops
 - development of an online cycle route planning tool and Smartphone application
 - driver education programs to encourage drivers to ‘look out’ for cyclists and inform them of their legal responsibilities
 - cycling education and training programs for school students and other novice riders
- Investigate alternative ways of implementing network improvements such as being part of:
 - TAMS maintenance program
 - TAMS upgrade program
 - asset creation works being undertaken by EPD and the Chief Minister Treasury and Economic Development Directorate (CMTEDD) in greenfield developments where provision of cycle network routes can be integrated in developing estate development plans or in planning schools
- To ensure the needs of people who currently cycle, and those who are likely to cycle given an appropriate environment, are widely understood when they are considered in planning decisions, the following steps should be taken:
 - develop guidelines and standards for cyclist requirements in different urban environments
 - identify cycle infrastructure in plans, whether it is existing or proposed (funded or unfunded)
 - review current development codes for treatment of cyclists and integrate in the concept planning, estate development planning and development assessment processes
- Consider the needs of pedestrians, especially in centres, to create pedestrian friendly streets

- Develop a broad set of street making policies and/or design guidelines that integrate the design of streets to be better places; more suitable for both pedestrians and cyclists and overall, a more healthy place to be and enjoy

ES.3 Background

The ACT Government, through the EPD, has commissioned SMEC in collaboration with MRCagney, Talkforce Communications, Spackman Mossop and Michaels, and Glen D'Este to develop the *ACT Strategic Cycle Network Plan (ASCNP)*. The development of the Plan is a key component of the ACT Government's *Transport for Canberra* policy.

Transport for Canberra aims to increase active travel and reduce reliance on cars. According to the 2011 census data, 81.9% of Canberrans drive to work, compared to a national average of 78.2%. *Transport for Canberra* also aims to encourage greater levels of cycling in the ACT with the key objective of creating a city where active travel is the easy choice, with more people of all ages cycling and walking for work and other trips.

The ACT Government has committed to increase the share of cycle trips to and from work (journey-to-work or JTW) to 7% by 2026. This represents a significant increase in cycling mode share (ABS data indicate 2.8¹% JTW cycle trips in 2011), associated with increasing demands on the existing and future cycle network. Similarly, the mode share target for walking by 2026 is also 7%.

This study examined and developed a cycle network plan that will help deliver the JTW cycling mode share target in *Transport for Canberra* and encourage greater levels of cycling across a wide spectrum of the community for various trip purposes. The key goal is to develop a bicycle-friendly environment that encourages more people to use the cycle network more often. This requires a well-planned and integrated network of bicycle routes that is underpinned by long term strategic thinking.

ES.4 Review and Analysis

Government strategies and plans were reviewed and assessed to establish their relevance to the development of the Plan. It was clear there is a vast amount of high quality and thoughtful future strategy and policy planning being undertaken by the ACT Government. However, as far as can be ascertained, there is not a single comprehensive planning document that details how Canberra's on- and off-road cycling facilities operate or how these networks should be developed to form a complementary system that is integrated into the transport network.

Similarly, an assessment of the road corridor and existing cycle network was conducted with the intent of providing an understanding of how cyclists and vehicles use the road corridor. It also assessed what types of cycle facilities are appropriate based on the hierarchy and use.

The ACT Government's design guidelines and policies for planning, designing and constructing cycling facilities were also reviewed. When compared against Austroads and NSW guidelines and policies, a few differences were identified. The policy on the provision of on-road cycle lanes on arterial roads was found to be not in accordance with the Safe System approach to road safety that has been adopted nationally and is the basis from which the Australian standards are set. From the review findings, a number of amendments to the current guidelines and policies have been suggested.

¹ 2.8% of Journey to Work trips on census day for persons usually resident in the ACT were undertaken by bicycle, regardless of where the trip began or ended. This proportion includes only the 'Bicycle' mode defined in the census and does not include combinations with other modes (e.g. Car + Bicycle, etc).

The last part of the review and analysis process was the presentation of an overview of national and international best practices relating to the development of cycling facilities.

ES.5 Preliminary Options Development

Initial consultations with both agency and public stakeholders were undertaken prior to the development of strategic cycle network options. The consultations were highly constructive and highlighted issues in the current cycle network that need to be addressed in order to improve the safety, quality and connectivity of the network. Overall, stakeholders were very positive about development of the Plan and enthusiastic about contributing to its development.

Feedback during the initial consultations was examined to develop preliminary draft options, covering:

- design principles
- cyclists' needs
- infrastructure design hierarchy
- network components
- approaches to develop a network

The options were developed based on the hierarchical network approach, which classified network routes into three levels: Primary, Secondary and Tertiary as shown in Table ES.5, Table ES.6 and Table ES.7, respectively.

Table ES.5: Primary Network Function and Form

Function	Form	Description	Example
<p>Connect town centres and other key origins and destinations</p> <p>Provide direct, fast connections</p> <p>Carry the highest volume of cyclists</p>	Cycle Highways	High speed cycling path, dedicated to cyclists and separated from general traffic.	 <p>Cycle Highway – Twente, Netherlands</p> <p>Source: https://bicycledutch.wordpress.com/2013/03/14/f35-high-speed-cycle-route-twente/</p>




Function	Form	Description	Example
	Off-road paths (separation of cyclists and pedestrians)	Cycle paths separated from roadways and separation between pedestrians and cyclists.	 <p>Off Road Path with separation of cyclists and pedestrians – Brisbane, Australia</p> <p>Source: www.townsvillebug.com</p>
	On-road lanes (segregated lanes and shoulder lanes)	<p>Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier, can be bi-directional or one way</p> <p>On-road shoulder lanes – Cycle lanes painted on road shoulders and dedicated to cyclists, provided only where a segregated lane cannot be provided.</p>	 <p>On-road segregated lane – Sydney, Australia</p> <p>Source: theconversation.com</p>

Table ES.6: Secondary Network Function and Form

Function	Form	Description	Example
<p>Link town and group centres and lower order origins and destinations</p> <p>Provide connections to the Primary network</p> <p>Caters for multi-purpose trips</p>	On-road lanes (segregated lanes, shoulder and wide kerbside lanes)	<p>Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier</p> <p>On-road shoulder lanes – Cycle lanes painted on road shoulders and dedicated to cyclists</p> <p>Wide Kerbside Lane – general traffic lane with painted cyclist symbol to indicate the potential for their presence.</p>	 <p>On-road shoulder lane – Englorie Park Drive, Ambarvale</p> <p>Source: NSW Bicycle Guidelines</p>




Function	Form	Description	Example
	Off-road paths (shared and dedicated paths)	<p>Shared Path – Paths for the use of cyclists and pedestrians separated from roadways</p> <p>Separated Path - Paths separated from roadways and separation between cyclists and pedestrians.</p>	 <p>Shared Path – Lyneham, Australia Source: bicyclecanberra.blogspot.com</p>
	Mixed Traffic Environments (less than 3,000 vpd)	General traffic streets with low traffic volumes.	 <p>Source: NSW Bicycle Guidelines</p>

Table ES.7: Tertiary Network Function and Form

Function	Form	Description	Example
<p>Provide connections to local centres and connections within the general local area</p> <p>Provides continuity in the network</p> <p>Caters to lower volumes of cyclists</p>	Low use on road lanes and off road paths	<p>On-road lanes with low volumes of cyclists and traffic.</p> <p>Off-road paths used infrequently.</p>	 <p>Home Zone Source: www.courtyardhousing.org</p>
	Shared Zones/Home Zones	Streets which balance the needs of all road users including pedestrians, cyclists and motorists. Streets are physically altered with raised sections, plantings and surface treatments to calm traffic and provide an environment safe for, and conducive to, walking and cycling.	
	Low Speed access dominated roads	General traffic streets that provide an access function generally in residential areas. Traffic operates at slow speeds providing a non-threatening environment for cyclists.	

The following four options were conceptualised:

- **Option 1 – City Centric:** This is predominantly focused on developing the Primary network to provide direct, efficient connections between major centres and attractors that carry high volumes of cyclists. This option would cater predominantly for commuter cyclists, with the Primary network providing direct connections to major employment locations. With the extensive on-road, higher speed cycle routes, there is a risk that inexperienced cyclists are less likely to regularly use many sections of the Primary network.
- **Option 2 – Town Centre Centric:** This focuses on developing the cycle network predominantly within a 5 kilometre ring around town centres and the City centre. It involves improvements to routes in the Secondary and Tertiary network. The network will have a greater coverage although individual routes are likely to carry lower volumes of cyclists.
- **Option 3 – Combination of Options 1 and 2 (Hybrid):** This focuses on developing the Primary network by filling existing gaps (no existing route upgrades) and further development of the Secondary and Tertiary networks surrounding the town centres (predominantly filling gaps and minimal new paths). This option caters for a wide spectrum of cyclists, from providing direct connections to major centres and attractors to improving cycling conditions in local areas surrounding the town centres.
- **Option 4 – Complete Strategic Cycle Network:** This focuses on developing the complete Strategic Cycle Network (Primary, Secondary and Tertiary network) and involves filling gaps in existing routes and improving the standard of existing routes (Primary, secondary and Tertiary network). It would be the most costly to develop, yet if developed to the highest standard, have the greatest coverage for the greatest number of people and should be considered the ultimate goal for the ACT.

A number of possible immediate projects (for implementation in one to two years) were identified, as there is an opportunity to implement an ongoing program of smaller projects that will help to improve the network in general and without major capital investment. These projects are not specific to any level of the network, but mostly apply to existing infrastructure and can be implemented in conjunction with any of the options presented.

These projects include cycle parking at major bus stops and interchanges, reducing speed limits in the local network, signage, lighting, removing or changing car barriers on off-road paths and underpasses for cyclist access, improving maintenance of on and off-road paths, cycle advance mark outs at intersections, small hazards improvements and improved consideration of cyclists during construction.

Other infrastructure considerations identified for consideration in the implementation of the strategy over a longer term include:

- cycle and bus integration
- cycle treatments at intersections
- off-road paths – shared paths
- data collection for cyclists

Non-infrastructure elements were identified to maximise the potential cycling mode share. Supporting policies and development practices should be applied in conjunction with the provision of cycling infrastructure, including:

- cycle-friendly speed limits
- land use policy and new developments

- parking policies
- behaviour change and marketing

Stakeholders were consulted in September 2012 on the preliminary cycle network options. Their feedback was taken into account in the preparation of public display materials for community consultation, which was held in November 2012.

Five community information sessions to obtain feedback from the general public were held around the ACT from 1 November 2012 to 7 November 2012. This was followed by a six-week feedback period. The project website had information about the project and the options, and a survey. Written submissions were also encouraged.

Based on the feedback, Option 4 was overwhelmingly the most popular option. Nearly 70% of people who provided feedback named Option 4 as their preferred option. Respondents who chose Option 4 said it could create a comprehensive cycle network that would encourage more people to ride.

Through opportunities presented by the survey questions and the provision of written submissions, respondents were able to outline issues they had with the project or the options provided, and any additions they would like made to their preferred option.

ES.6 Preferred Option

The options were assessed using both quantitative and qualitative methods.

The quantitative assessment tries to identify value for money, which is essentially the amount of patronage increase for the money spent. The quantitative analysis, in addition to a multi-criteria analysis, was developed by the project team with EPD as necessary additional information that will provide more perspective to the traditional multi-criteria assessment evaluation. The evaluation is based on preliminary modelling data and the indicative cost for the completion of each option.

The qualitative part of the assessment is mostly based on assessment methodology developed earlier in the study. The transport network design criteria have been weighted and each option scored according to a multi-criteria assessment developed for the prioritisation of cycling infrastructure projects. It should be noted that these scores are not absolute and that the methodology is designed to compare the worth and value of one strategy in comparison to others. It is not possible to establish an absolute transferable value to each strategy with this methodology. This process involves a subjective score on a range of issues which is then weighted using a numerical scoring in order to achieve a more balanced assessment. The criteria are:

- safety
- creation of a complete network
- high quality infrastructure
- directness of route
- integration with public transport
- integration with planning and development outcomes
- accessibility for users and comfort
- recreational potential
- feasibility
- alignment with the 'Liveable Communities' program

The impact of particular network routes on natural and cultural values was not considered. This assessment will occur before the network is finalised or implementation works start and must be undertaken during further feasibility studies of specific projects. It is recognised that some of the indicative routes may be inappropriate from an environmental perspective, and that it is likely that some of the identified potential routes will be modified or, in extreme cases, possibly ruled out on environmental grounds.

In principle, the network will avoid as far as possible:

- works within conservation reserves
- significant wildlife impacts
- clearance of native vegetation

After the assessment of options, another round of stakeholder consultation was undertaken to give stakeholders an opportunity to provide feedback on the draft preferred option. Overall, stakeholders supported the proposed approach to develop an overarching optimal network but specify projects that, if undertaken in the short to medium term, are likely to increase the number of people who cycle for transport or recreation.

As a result of both assessment tools and feedback from the stakeholder consultation, it is considered, purely from the perspective of encouraging more people on bicycles, that of the four options developed, Option 3 is the option that should be pursued. It is considered the practical strategy to achieve the outcomes outlined in Transport for Canberra.

However, further discussions with EPD and other key stakeholders led to the agreement that instead of having a cycle network strategy that outlines specific projects, a preferred approach is to identify corridors and zones for cycling that will support future growth, based on the Option 3 network. Figure ES.1 identifies the Primary corridors representing the linear travel to access Canberra's CBD which will largely form the Primary network and the secondary zones surrounding major activity centres that contain either future growth areas or areas of employment. The secondary zones will mainly be serviced by the Secondary and Tertiary network. For each corridor and zone, the delivery of infrastructure would be subject to individual feasibility studies.

In order to deliver improved cycle infrastructure in the identified zones and corridors, Table ES.2 through Table ES.4 provide indicative timings of the requirements in each corridor, growth areas and employment areas.

To develop an overall business case for the proposed cycle network strategy, a potential network (i.e. with specific projects) was conceptualised to estimate the implementation cost and forecast cycling demand. The potential network option was based on Option 3 but modified with additional projects suggested by EPD and stakeholders during the consultation process. A summary of the projects included in this potential network option is at Table ES.1 and illustrated in Figure ES.2. This is not the final list of projects but a representation of how the preferred cycle network strategy could be delivered.

From a pedestrian perspective, programs should concentrate more on the centres. They should move people in and around centres and provide access to public transport to provide car-free access to Civic, and a broader range of car-free opportunities in general.

Important pedestrian objectives include:

- pedestrians must be able to feel safe and comfortable
- pedestrian access needs must be met
- pedestrian interaction with other street users must be able to be managed

- pedestrians must feel part of an environment, not an intruder in a space designed for another use
- there must be capacity for the anticipated use and users
- the pedestrian network must be permeable
- create intimate people spaces
- maintain visual connectivity
- create pedestrian priority
- maintain quality footpaths
- maintain equal access for all users
- make pedestrians a priority consideration at intersections
- provide connections to other streets and places

ES.7 Conclusions

The Plan was developed with the aim of developing a safe, direct and legible bicycle network that provides a viable alternative to driving for all cyclists in the 8-80 age group.

Four network strategy options were developed. After reviewing the options and evaluating using a modified assessment method from what has been initially proposed, an appropriate cycle network strategy for the ACT has been determined. This strategy is aimed at delivering cycling infrastructure that will promote a mixture of radial travel to Civic as well as local town centre/village based trips.

Option 3 was initially recommended as the preferred option but further consultations with EPD and other key stakeholders highlighted the need to provide implementing agencies (e.g. TAMSD) greater flexibility in prioritising and identifying future cycling infrastructure projects and the preference for the strategy to not lock in specific projects but still provide guidance on where priority areas in the network are. Therefore, the proposed cycle network strategy is to identify Primary corridors and secondary zones within the ACT network that would support future growth and development.

A potential network option, mainly based on Option 3 but with additional projects suggested by key stakeholders, has been proposed for the purposes of modelling and developing a business case. The projects included in this potential network option are not final but simply a representation of how the proposed Cycle Network Strategy could be delivered.

Whilst the impacts and costs of infrastructure provision are to some extent easy to measure and cost, the provision of infrastructure alone will not be sufficient to achieve mode share targets. Other elements relating to cycling will need to be given further consideration such as:

- land use policy
- parking strategies
- speed limits
- behavioural change and marketing campaigns
- people based street design

A key issue in the development of cycling as a genuine transport alternative is the systematic improvement of street design. The ACT Government could develop a broad set of street making policies and/or design guidelines that integrate the design of streets

to be better places; more suitable for both pedestrians and cyclists and overall, a more healthy place to be and enjoy. Current codes only deal with vehicle issues and therefore tend to create car thoroughfares that may or may not be suitable for other modes. There are suitable examples in Australia (WA Liveable Neighbourhoods) and overseas (UK Manual for Streets; NACTO Urban Street Design Guide). This design philosophy and practice will slowly reduce the need to fill in missing links and retrofit local environments to create quality pedestrian and cycling places.

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1 INTRODUCTION

The ACT Government, through the Environment and Planning Directorate (EPD) (formerly ESDD), has commissioned SMEC in collaboration with MRCagney, Talkforce Communications, Spackman Mossop and Michaels, and Glen D'Este to undertake the ACT Strategic Cycle Network Plan (ASCNP). This study is a key component of the ACT Government's *Transport for Canberra* policy. *Transport for Canberra* aims to increase active travel and reduce reliance on cars amongst all members of the community for a variety of trip purposes. According to the 2011 census data, 81.9% of Canberrans drive to work, compared to a national average of 78.2%.² High car use contributes to congestion, greenhouse gas emissions, air and noise pollution and sedentary lifestyle diseases like heart disease and type II diabetes. By getting more people to walk, ride or catch public transport to work and school, many of these challenges can be addressed.

The ACT Government has committed to increase the share of cycle trips to and from work (Journey-to-Work or JTW) to 7% by 2026. This represents a significant increase in cycling mode share (ABS data indicate 2.8³% JTW cycle trips in 2011), associated with increasing demands on the existing and future cycle network. Similarly, the mode share target for walking by 2026 is also 7%.

Implementing *Transport for Canberra* has involved the commissioning of feasibility studies to identify and progress infrastructure projects that will make it more attractive for people to cycle to work and school and ride for exercise and recreation.

1.1 Background

The ACT Government is committed to a 40% greenhouse gas emissions reduction by 2020, based on 1990 levels, and an 80% reduction by 2050.

To achieve this, *Transport for Canberra* (2012) introduced a mode share target for Journey to Work (JTW) trips as part of the broad strategic direction for an integrated and sustainable transport network for the ACT. Although only goals for JTW trips are set, other trips such as local trips are highly important in developing a cycling culture. For JTW cycling, the recommended incremental mode share targets were:

- 2006 (actual) 2.5%
- 2016 (interim) 6.0%
- 2026 (long-term) 7.0%

These targets relate to all cyclist journeys from doorstep to work. This represents an ambitious trebling of cycling's mode share, accompanied by increasing demands on the existing and future cycle network.

As part of integrated planning, the ACT Government has prepared a large suite of plans that support the overall goal. A key change to land use is proposed through the ACT Planning Strategy 2012, which aims to increase opportunities to live close to work and

² Trip proportions are based on people who actually travelled to work and exclude anyone who worked at home or did not travel to work on census day. These are a combination of 'Car, as driver' and 'Car, as passenger' modes defined in the census and do not include other 'mixed' modes that also involve cars such as Park & Ride, Car + Bicycle, etc.

³ 2.8% of Journey to Work trips on census day for persons usually resident in the ACT were undertaken by bicycle, regardless of where the trip began or ended. This proportion includes only the 'Bicycle' mode defined in the census and does not include combinations with other modes (e.g. Car + Bicycle, etc).

reduce car-based transport demands, by encouraging urban intensification in the metropolitan area.

While the ACT has an extensive network of on and off-road cycling routes, the ACT Government is seeking to understand whether the current approach to providing cycle infrastructure will be sufficient to achieve its targets, and what changes are required. In particular:

- The current network is incomplete – what are the remaining barriers and priorities for development?
- How does the current network and the planning for new development need to change with planned urban intensification?
- How does the quality of the infrastructure compare with projected needs – notably capacity and safety – and how does this need to change? Do design standards need to be updated, and if so, how? It is understood that DS13 Design Standard for Pedestrian and Cycling Facilities are currently being updated.

Overseas experience indicates that a different approach to infrastructure is likely to be required compared to the current practice in order to achieve the widespread uptake in cycling necessary to achieve the *Transport for Canberra* targets. Some examples of treatments that have led to widespread cycling amongst the populations of different cities are given below:

- Increased Cycle Parking
 - Countries and cities such as Amsterdam, Denmark, Odense, and Groningen all provide high-capacity bicycle parking facilities at their main railway stations, with lower order stations providing some level of bicycle parking. Throughout the cities bicycle parking is provided at various locations and is generally a requirement for all new developments.
- Electric Bikes
 - Many Chinese cities have historically had high levels of cycling, although cycling rates have been declining in many major cities as the Chinese economy continues to grow and more Chinese begin to drive. Cars are still costly to purchase and operate for much of the population and so for many Chinese, electric bikes represent a more affordable and practical mode of transport. More than 25 million electric bicycles were sold in China in 2011.
 - In many European countries, electric bikes are legal but legislation requires the speeds to be governed to approximately 25km/h. The availability and classification of electric bicycles as normal bicycles increases the usability and potential number of bicycle users. For example people who may have previously been physically unable to ride a traditional bicycle or may have been deterred from riding due to the topography of an area.
- Segregated Facilities
 - Safety concerns and perceptions related to cycling are often cited as deterrents to cycling for many people. The implementation of cycling facilities which are physically segregated from general traffic when widely implemented have often led to higher levels of cycling in a city by a broader cross section of the community.
 - In Seville, Spain prior to the development of 165 km of segregated bike facilities, cycling accounted for approximately 0.2% of all trips, whereas it is now 6.6%. Specific examples of increasing levels of cycling related to the upgrade of existing bike lanes to segregated facilities is in Chicago, Illinois, USA on Kinzie Street, where a 55% increase in cycling levels occurred following the

implementation of segregated facilities.

The difference in the approach to cycling from the existing, to that needed to achieve the ACT Government's goals can be best described as:

- The current approach is likely to increase cycling numbers essentially by achieving modal shift within the demographics and travel patterns of people similar to existing cyclists. While the actual cycling base is broader than just this group, insofar as the current approach does not appeal to a broad demographic base, modal shift must be very large to achieve overall targets.
- A different approach is to provide quality infrastructure that attracts and serves the widest demographic base possible. This is sometimes encapsulated by the concept of 8-80 – a network that can be used safely and independently by anyone in the 8 to 80 year age group. This approach aims to generate more modest modal shifts across a broad base in order to achieve the overall targets and is the approach that has been most successful overseas. Notably, in countries with high levels of cycling, more women than men participate as utility and commuter cyclists. The levels of women cycling in a number of northern European cities is similar to those of men with 49% of cyclists in Germany being women, 45% in Denmark and 55% in the Netherlands. However rates of utility and commuter cycling are highest amongst women; for example in Denmark 17% of men cycle to work, while 36% of women cycle to work. The 8-80 approach is consistent with Transport for Canberra's infrastructure policy to expand and improve the cycle network, particularly to encourage cycling as a genuine choice of travel to not only work and school, which are the measurable trips, but a variety of other trip types.

Treatments such as shared spaces and segregated facilities, as well as provision for electric bikes and increased cycle parking, are part of the 8-80 approach used overseas to stimulate cycle use. These treatments are of increasing interest and are used interstate, for the same reason.

The ACT is well-positioned to adopt such a change in approach due to its very solid planning. Its existing off-street cycle network provides a good base and it has generally fewer space constraints than unplanned cities such as Melbourne or Sydney, and more open space available for off-street facilities than Adelaide.

However, developing a new network approach will not be without its difficulties in the ACT as the very space that presents an opportunity also makes cycling distances longer and imposes a higher cost on development. Further, the city's historically strong design hierarchy for motorised traffic is not necessarily compatible with non-motorised traffic. Unless this changes, this mismatch has implications for network provision.

1.2 ACT Strategic Cycle Network Plan (ASCNP)

This study, as discussed in the next chapters of this report, examined and developed the ACT Strategic Cycle Network Plan (ASCNP) that will aim to help deliver the cycling mode share target in *Transport for Canberra*. The ASCNP is intended to provide an attractive, first rate cycle network with excellent route connectivity, safety and convenience for all cycling user groups. A key goal is to develop a bicycle friendly environment that encourages more cyclists to use the cycle network. This requires the provision of a well-planned and integrated network of cycle routes that is underpinned by long term strategic thinking.

The primary objective of this study is to develop a safe, direct and legible cycle network that offers a viable alternative to driving. The ASCNP will address network, behavioural

and infrastructure barriers to cycling, and develop strategies to meet and manage increased demands on the network over time. It will include strategies to meet and manage increased demands on the network over time to help the ACT Government meet its cycling mode share target of 7% by 2026.

The ASCNP will also link with future land development and urban growth. This will create a complete, continuous network of cycleway types to, from and within town centres and major employment areas. This will also develop a commuter cycle network with high-quality cycling infrastructure that is safe and well signposted, offering direct routes to destinations and integrated with public transport.

Additionally, the ASCNP will help to promote active transport within Canberra's urban and suburban structures to ensure that cycling trips are convenient, pleasant and safe. In order to promote cycling as a viable and hopefully favoured mode of transport, a high level of amenity needs to be provided (especially along routes to key destinations such as workplaces, schools and shops) as well as mixed land uses, densities and choices of destinations in order to support an active transport system.

2 BACKGROUND REVIEW AND ANALYSIS OF EXISTING NETWORK

One of the first steps into the development of the ASCNP is the *Background Review and Analysis of Existing Cycle Network* (Background Review) and this provided the context and understanding of the current conditions of the planning considerations, cycle design standards and cycleway network in Canberra. The information from the Background Review was used in Stage 2 of the study to develop a series of preliminary options and then a preferred option for the ASCNP.

This chapter of the report summarises the outcomes of the Background Review with extracts from the report prepared by Spackman Mossop Michaels (SMM) – *Background Review and Analysis of Existing Cycle Network Technical Report (August 2012)*, which is included here as Appendix A.

2.1 Existing Transport Planning Assessment

2.1.1 National and Local Strategy and Policy Plans

A number of government strategies and plans were reviewed and assessed to establish their relevance to the development of the ASCNP, and these include the following:

- National Cycling Strategy 2011-2016

The National Cycling Strategy sets out a series of actions that are intended to result in doubling the number of people cycling in Australia over the next five years.

This Strategy promotes the idea that bicycles are considered to impose 95% less traffic congestion than an average car. Many people tend to overestimate travel times by bicycle, and when travel time is measured door to door, distances up to 5km on congested roads are often quicker on bicycle than in a motor vehicle. The Strategy highlights that increased cycling offers benefits to both society and individuals, and is a more sustainable mode of transport and provides an outline for priorities and objectives to meet the five year objective.

- ACT Planning Strategy 2012

The ACT Planning Strategy 2012 brings together the Canberra Spatial Plan and Sustainable Transport Plan to form the transitional planning strategy for the ACT. This strategy informs decisions on the land uses, metropolitan structure, and growth of Canberra.

There are two primary strategies from this strategy that are relevant to this cycle network feasibility plan.

Strategy 2 identifies improving everyone's mobility and creating more choices in travel by integrating investment in Canberra's transport networks with the land uses it serves. This will be done through augmenting the commuter cycle network and facilities.

Strategy 5 identifies building the capacity for everyone to participate in community life by improving the quality of the public realm, access to services and information. This will be accomplished by encouraging people to walk or cycle to schools, shops or community halls as the trip will be safe and pleasant. Canberra's neighbourhood planning principles placed these services at the heart of every suburb.

Additionally, there are three principles in the ACT Planning Strategy 2012 that need to be considered as part of this cycle network plan as well:

- Principle 1: Provide for accessible and pleasant places to live, work and play.

- Principle 2: Design for community resilience and the lowering of natural resource consumption.
- Principle 3: Provide choice in safe convenient modes of travel.
- Transport for Canberra Policy 2012-2031

The actions in *Transport for Canberra* will help create a more sustainable city. This will be implemented through the following:

- Provision of a variety of transportation choices for the Canberra community that provides safe, comfortable frequent and reliable public transport that connects with high quality walking and cycling networks.
- Encouraging mixed land uses to include a mix of retail, commerce and residential uses. Single-use districts make life less convenient to access local facilities, thereby forcing people to drive more frequently to destinations.
- Fostering walkable, compact and close knit neighbourhoods that offer opportunities for recreational walking and cycling on a convenient network of paths, as well as locations to walk or cycle to, whether it be the shops, transport, work or school. A compact, walkable neighbourhood benefits both business and safety and will help tip the choice towards active travel, particularly for shorter journeys.
- Promotion and education to encourage healthy and sustainable mode choices where possible.
- Continued improvements to the safety of all transport modes to reduce the number of accidents.
- Building on our existing community assets to focus on getting the most out of, and building on, the existing transport system.

Transport for Canberra ideally wants Canberra to be a city where active travel is the easy choice, with more people of all ages, cycling and walking for work, school and a variety of other trips.

- Integrated Transport Framework 2008

The need for creating the Integrated Transport Framework stems from the strong relationships between each of the components of the transport system that includes: roads, parking, public transport, cycling, walking and supporting infrastructure.

In addition to public transport, cycling and walking are key elements of integrated transport solutions. This framework builds upon the 2004 Masterplan covering the necessary infrastructure for pedestrians and cyclists, with a focus on establishing a network for use by commuting cyclists both on and off-road. An on road cycle policy has also been developed and will continue to be implemented over the coming years.

- Sustainable Transport Plan 2004

The Sustainable Transport Plan, as part of the Canberra Spatial Plan, proposes intensification of the existing area creating an urban form that has shorter trips and encourages people to walk and cycle. It also encourages development at town centres and Civic and at activity nodes along transport corridors, which will support the development of public transport.

A key goal of this plan is to shift the balance of travel from private vehicles towards greater use of walking, cycling and public transport. The plan recognises cycling as an important mode for its accessibility, efficiency, health and urban liveability benefits and its minimal impacts on the environment.

The actions in the Sustainable Transport Plan are consistent with the strategic direction of the Canberra Bicycle 2000 strategy.

2.1.2 ACT Cycling and Public Transport Plans

Similarly, a number of plans, specifically focussing on sustainable transport, have also been reviewed and these include the following:

- ACT Cycling and Pedestrian Network Plan 2011

The key aim of this plan was to enhance the walking and cycling connectivity across the ACT. This plan proposed network improvements to be developed with the intention of complementing the strategies in the 2004 Sustainable Transport Plan.

This plan determined that whilst many corridors were substantially complete, there were still significant barriers to cycling such as multi-lane roundabouts, short missing lengths of cycle lane or difficult road crossings that discouraged cyclists. This plan did not include a full safety and accessibility audit of all facilities in the network and therefore does not identify all outstanding issues. It is, however, an excellent indicator to the types of issues that act as barriers to cycling in the ACT.

- Commuter Cycling Network – Priority for Capital Works

The purpose of this 2007 report was to identify a series of projects that would improve the Trunk Commuter Cycling network to encourage modal change, and to allow Roads ACT to begin to design projects in anticipation of budget allocation.

An updated Main Cycling Network Plan was included as part of this work. The plan identified the proposed trunk network categorised into existing infrastructure, proposed infrastructure and potential future extensions.

In this plan, items categorised as existing may not be useable as they do not meet the current design standards. This report assumed that these will be upgraded to meet the standards as a part of regular maintenance, but does not prioritise improvements otherwise.

- ACT Strategic Public Transport Network Plan

This report defines steps that will need to be taken over the next two decades to achieve the ACT Government's sustainable transport goals. This plan focuses on a study year of 2031, identifying key ideas and elements that will need to be implemented over this timeframe. Major goals for this plan include:

- Providing a flexible, efficient and sustainable public transport, pedestrian and cycle system that reduces car dependency.
- Developing a public transport network that responds to and supports a sufficient density and a mix of land uses.
- Maintaining the ease and comfort of movement for a diversity of pedestrian, cycle, vehicular and public transport modes

- Feasibility Study Determining Key Locations for Bike & Ride and Kiss & Ride Facilities (2009)

The Sustainable Transport Plan identifies a number of key future mode share targets. Improving Bike & Ride and Kiss & Ride facilities throughout the ACT will form part of these initiatives and was the main focus of this study for the entire ACT.

This study identified a number of sites for potential Bike & Ride and Kiss & Ride locations. The study identified fifteen (15) possible locations, throughout the entire ACT, for a Bike & Ride facility that were assessed using a multi-criteria analysis. Of these locations seven (7) were recommended for implementation. Similarly, ten (10)

Kiss & Ride sites were identified and evaluated, with four (4) recommended for implementation.

- **Park & Ride Strategy for the ACT (2008)**

This strategy identifies policies and measures to encourage increased usage of Park & Ride and bus facilities. The primary focus of the strategy was to make the bus system an attractive and easy option for commuting to and from work. The strategy also considered how to take into consideration the needs of bicycle and pedestrian users. Proposed Park & Ride locations with direct links for pedestrians and cyclists to adjacent neighbourhoods received the highest ratings.

The strategy also identified a series of generic components that should be included in at all Park & Ride locations. Site selection considered cycling corridors as important factors as this facilitates Bike & Ride opportunities.

- **Towards Zero Growth (TZG) Healthy Weight Action Plan (2013)**

The TZG Action Plan sets out a goal of zero growth in obesity in the ACT. Of particular relevance to this study, the plan includes the creation of new incentives for ACT workers and workplaces that participate in physical activity or active travel.

2.1.3 Planning Recommendation

It is clear from this review that there is a vast amount of high quality and thoughtful future strategy and policy planning being undertaken by the ACT Government. However, as far as can be ascertained, there is not a single comprehensive planning document that details how Canberra on and off road cycling facilities operate or how these networks should be developed to form a complementary system that is integrated into the transport network.

There is a strong need for a comprehensive cycleway master plan to be developed for the ACT. This will benefit from the work already done on the ACT Planning Strategy 2012 and *Transport for Canberra* Policy 2012-2031 plans. Additional aspects of information that should be included in a comprehensive cycleway master plan are included throughout this background review.

2.2 Road Corridor Assessment

An assessment of the road corridor and existing cycle network was conducted with the intent of providing an understanding of how cyclists and vehicles use the road corridor. It also assessed what types of cycle facilities are appropriate based on the hierarchy and use.

2.2.1 Cycleway Network

Two distinct cycleway networks exist in Canberra. The on-road cycling facilities are located along arterial and major collector roadways, while the off-road cycling facilities meander through the open space between the local suburb areas and are also often located adjacent to roadways.

A site assessment was conducted, and the following was found:

- There is a lack of consistency and accuracy in the designations provided in the plan.
- Many of the existing on road facilities have gaps along the routes and several of the proposed routes have portions of the cycle network already developed.
- There is a significant amount of duplication with both on and off road facilities along the transport corridor.

- The plan does not integrate the connection between on and off road facilities.

2.2.2 Road Network

Canberra's road hierarchy is clearly defined. Arterial roads provide a regular pattern of north-south and east-west connections that facilitate vehicular access throughout the area. Major collector roads feed into the arterial road network and are supported by a network of minor collectors and local access roads. Typical characteristics of these roads are as follows:

- Arterial roads - generally 4-6 lanes of traffic with a breakdown lane or shoulder of varying width.
- Major collector roads - generally 2-4 lanes of traffic with a minimal shoulder or car park lane.
- Minor collectors - generally 2 wide lanes of traffic.
- Access roads- generally 2 standard lanes of traffic.

The designated cycleway network throughout Canberra directly parallels the arterial and major collector roads. There are no provisions for cycling facilities or markings on any of the minor collector or access roads.

2.2.3 Speed Zones

An assessment of the speed zones indicated that these are designated based on road network hierarchy. The vast majority of roads in the Canberra area are sign posted for 50-60 km/h. Arterial roads have a wider range of speed zones depending upon the design standard and number of lanes of traffic, which can range from 70 to 100 km/h. Generally these arterials operated at speeds between 80 to 90 km/h. There are a very limited number of roads or streets in the Canberra area that are sign posted for 40 km/h, however a trial introduction of 40 km/h speed zones in selected town centres will soon be permanent based on advice from Roads ACT.

General design standards for cycleway networks indicate that speeds of 40 km/h or below are optimal for mixed traffic environments typically found on minor collectors and access roads. Where sign posted speeds are at or exceed 80 km/h, design standards for cycleway networks recommend having a separated path. Based on this standard, most of the arterial roads in Canberra should have separated paths, but do not currently have these facilities.

2.2.4 Vehicle Volumes

Vehicle volumes on most of the Canberra road and street network are relatively low and indicate that these roads could serve as mixed traffic or cycle lane demarcated cycleways. This is particularly true for minor collectors and access roads.

General design standards for cycleway networks indicate that volumes below 5,000 trips are optimal for mixed traffic environments typically found on minor collectors and access roads. Where volumes exceed 10,000 trips, design standards for cycleway networks recommend having a separated path. Based on this standard, most of the arterial roads in Canberra should have separated paths, but do not currently have these facilities.

2.2.5 Bicycle Volumes

Bicycle volumes were collected by Pedal Power in February 2012, for urbanised areas of Civic (31 sites), Belconnen (23 sites), Gungahlin (13 sites), Tuggeranong (8 sites) and Woden (19 sites). The information collected was point location rather than linear. This information has been geo-referenced and analysed, along with other bicycle and vehicle

volume data, to determine and prioritise locations and routes for upgrades or additional development.

2.2.6 Bicycle Accidents

A cursory review of crash and casualty data for on road crashes indicates that incidences resulting in property damage and fatalities have remained at fairly consistent averages over the past 10 and 15 year time frames. However, there has been an increase in the percentage of injury accidents in the past 10 years compared to the past 15 years.

Between 1996 and 2003, incidents of injury accidents were in general decline. Since 2004 the percentage of injury accidents has resulted in an increasing trend.

Road network type and edge conditions of the urban environment would need to be taken into account in subsequent analyses of bicycle accident data. It would be beneficial to conduct a comparative analysis of the bicycle accident data between on and off road cycle facilities as well.

2.2.7 Survey Data

The ACT Super Tuesday Bike Commuter Survey was conducted on the morning of Tuesday, 6 March 2012 at 36 different sites in the ACT. Key findings from the survey include:

- Shared path (site 5712) towards Wattle Street (north-east), shared path towards David Street (south) and shared path towards Boronia Drive (north-west), were the busiest commuter routes in the Canberra area, with a total of 488 riders.
- The survey recorded an average of 122 riders per 30 minutes at the busiest site which ranked Canberra 10th overall nationally.
- The shared path running north/south through Turner has been identified as a key north/south commuter route for riders travelling into Canberra.
- The shared path near Daramalan College has been identified as a key east/west route for riders in the Canberra area.

Whilst not specifically identified in the survey, there is some additional information that needs to be considered when analysing the data results:

- All locations that were on road, counted both on and off road cyclists as one and the same.
- 64% of all cyclists were counted using only off road (shared path) facilities.
- The five busiest commuter locations were all off road (shared path) facilities which accounted for 49% of all cyclists.
 - By comparison, the five busiest on road locations (that counted cyclists that were both on the road and on shared paths) accounted for 18% of all cyclists.

2.3 ACT Cycleway Design Standards Assessment

The ACT Government's Territory and Municipal Services Directorate (TAMS) is a member of Austroads, the association of Australian and New Zealand road transport and traffic authorities. Austroads publishes the design guidelines for the planning, design and construction of cycling facilities within Australia. In the past, the Austroads Guide to Traffic Engineering Practice: Part 14 Bicycles was the guideline document. Austroads now incorporates cycle planning and design guidance into the following documents:

- Austroads (2009) Guide to Road Design Parts 1 - 8

- Austroads (2009) Guide to Traffic Management Parts 1 - 13
- Austroads (2009) Guide to Road Safety Parts 1 - 9

The *Guide to Road Design: Part 6a Pedestrian and Cyclist Paths* should be used for guidance on the planning, design and construction of paths. This document consolidates information relating to on-road cycle facilities and provides a summary of key design information for cyclist paths, including the intersection of paths with roads. The *Guide to Traffic Management and Guide to Road Safety* also provide specific guidance on cycle facilities.

Cycling Aspects of Austroads Guides was produced in 2011 (and subsequently updated in 2014) and is a consolidated summary of the information in current Austroads Guides relating to the planning, design and construction of cycling facilities.

The TAMS *Design Standards for Urban Infrastructure* document is the technical standards that are applicable to all infrastructure works constructed by, on behalf of, or for ultimate management by TAMS. These Design Standards are intended for use by professionals involved in the planning, design and construction of urban infrastructure in the ACT.

Design Standard 13 - Pedestrian & Cycle Facilities (Edition 1 Revision 1) sets out the requirements to be used by practitioners in the planning and design of pedestrian and cycling facilities in the ACT. It describes the types of paths and their location within the road reservation, provides guidance on alignment, required widths, and other geometric requirements, as well as information on the design of treatments such as path intersections and terminals.

The Background Review cross-checked information relating to the provision of cycle facilities contained in the TAMS Design Standards against the current National Standards and Guides, in particular the Austroads Guide to Road Design and Guide to Traffic Management. A detailed knowledge of the appropriate National Standards and Guides is assumed.

It is noted that the Standard have been developed as a performance based, rather than prescription based documents. The benefit of this approach is that it allows designers to solve design problems by innovation rather than implementing standard solutions which may not always provide the best result. The risk of this approach is that a wide variety of interpretations of the standard can result in a lack of consistency and quality in the design and implementation of facilities.

Whilst the current built network in Canberra is generally coherent and of high quality, a number of issues with consistency and quality were noticed. Two examples are the varied cycle facility treatments at roundabouts and intersections and the lack of provision for cyclists at bus stops. Despite this, there is no reason that the current performance based approach to the development of standards cannot continue, provided that those who are appointed to the planning, design and implementation of cycle facilities are experienced and knowledgeable in this area of work, and take into consideration future needs due to increasing numbers of people cycling.

2.3.1 ACT Context

In describing the ACT context, the current standard identifies a number of key areas where the approach to the provision of cycle facilities in the ACT varies from that in Austroads and NSW. An argument is presented in section 13.1.3 that seeks to justify why Figure 3.2 of the NSW Bicycle Guidelines should not apply in the ACT.

“Canberra is a planned city and has a good network of shared paths. However, for faster moving more experienced cyclists who may require a more direct route free

of pedestrians and loss of right of way at road crossings, provision of on-road cycling options may be preferred. Due to topography and through design, Canberra does not have a grid or radial street pattern as in other Australian cities and arterial roads are generally the only roads to provide these direct routes. These roads generally have speed limits up to 80km/h and are designed to a high standard generally with controlled access, clearly defined intersections, good sight distances and a much lower volume of heavy vehicles compared to similar roads in other jurisdictions. This is not consistent with the NSW context and Figure 3.2 of the NSW Bicycle Guidelines does not apply in the ACT.”

This argument is not consistent with contemporary thinking on quality 8-80 access to cycling facilities. The issue of separation is one of the most important considerations in designing cycle facilities. When planning or designing for bicycles, the philosophy and road safety objectives covered in the Guide to Road Safety (Austroads 2006 - 2009) should be actively supported. It is designed to give cyclists the feeling that they are welcome to be part of the movement network, and that they will be looked after as a genuine participant in the primary movement network.

One of these philosophies is the Safe System approach to road safety which recognises that road users are imperfect and that mistakes will be made. A Safe System design therefore reduces the number of incidences and severity of crashes so that when they do occur, the consequences are generally less than death or serious injury. Safe System principles are fundamental to the design of all road spaces in the ACT, and design standards must clearly articulate that this Safe System approach must consider the road space as whole, including the interaction between vehicles, cyclists and pedestrians. The Safe System approach requires, in part (Australian Transport Council 2006):

- Designing, constructing and maintaining a road system (roads, vehicles and operating requirements) so that forces on the human body generated in crashes are generally less than those resulting in fatal or debilitating injury.
- Managing speeds, taking into account the risks on different parts of the road system.
- Improving roads and roadsides to reduce the risk of crashes and minimise harm: measures for higher speed roads including dividing traffic, designing ‘forgiving’ roadsides, and providing clear driver guidance. In areas with large numbers of vulnerable road users or substantial collision risk, speed management supplemented by road and roadside treatments is a key strategy for limiting crashes.

Figure 1 below is a key Austroads standard that defines the relationship between traffic speed, traffic volume and facility type. It is a guide for planners to employ when determining if it is safe to mix bicycles and motor vehicles on a road. It is as relevant to the planning of cycle facilities in Canberra as it is to all cities in Australia.

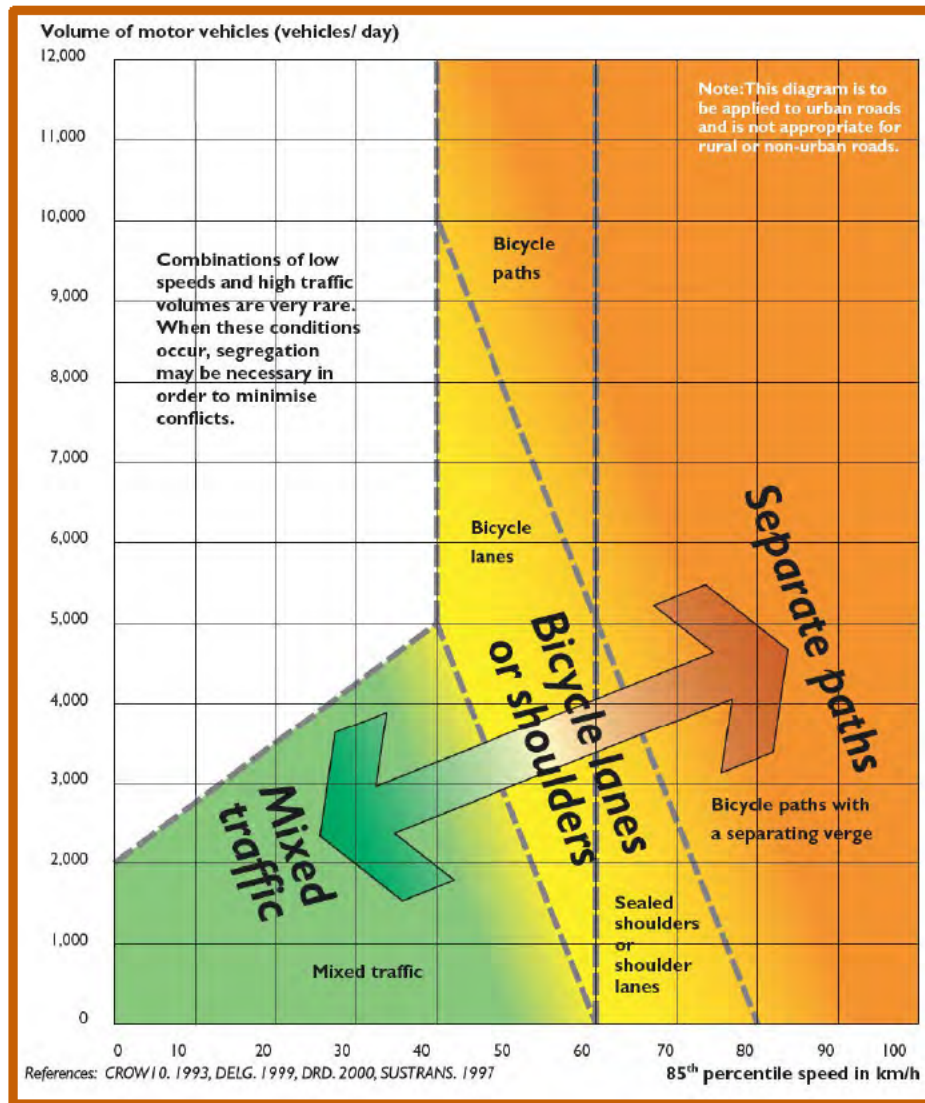


Figure 1: Separation of Bicycle and Motor Vehicles according to Traffic Speed and Volumes

We believe that more could be made of existing transport corridors, even if cycle infrastructure is physically separate from vehicle lanes. As indicated in Figure 1 for roads and streets with high volume and high speed traffic. Cycle routes in corridors are often easier to maintain, have better lighting and surveillance, have better access to land use and are more direct. The view that cycle planning in the ACT should not use this guidance due to unique street patterns created by topography and design is potentially ignoring some “low hanging fruit” in terms of high quality 8-80 cycle routes. The best and most direct transport corridors should be made safe and available to all and not just for cars and a few brave cyclists that can keep up.

2.3.2 ACT Policies

The TAMS Design Standard state that current ACT policy is to provide “*on-road cycling lane on all new arterial roads*” and to consider retrofitting on road cycle facilities on existing arterial roads. This policy has resulted in the installation of shoulder lanes on roads with speeds in excess of 80km/hr. This policy is not in accordance with the Safe System approach to road safety that has been adopted nationally and is the basis from which the Australian standards are set. Rather than promoting awareness and actively supporting the philosophy and road safety objectives covered in the *Guide to Road Safety* (Austroads 2006-2009), the application of this policy has resulted in the creation of facilities that increase the potential incidence and severity of crashes for cyclists in the ACT.

Perceived and actual traffic hazards are a key constraint on cycling uptake, concern about safety is one of the most significant barriers preventing people from cycling, even for those who cycle regularly.

The Australian Transport Safety Bureau's (ATSB) report *Deaths of Cyclists Due to Road Crashes* (2006) investigated the circumstances of road crashes in which cyclists died. It examined the major factors in fatal crashes involving cyclists and the main crash types.

Separation of cyclists and motorists is paramount to increasing cyclist numbers. Whilst it is noted that experienced road cyclists are unlikely to use indirect shared path facilities with lower design speeds, Canberra, being a planned city, is in the unique position of having enough space to provide high speed and high quality separated facilities, dedicated primarily for use of cyclists.

The current policy which allows the provision of on-road cycle lanes or cycle shoulders along high volume and/or high speed roads provides a transport option for experienced cyclists but is generally not expanding the cycling market or audience in the ACT, and is not working towards the provision of 8-80 facilities. The view that cycle planning in the ACT should be exempt from the national standard because arterial roads in Canberra are designed to a higher standard compared to similar roads in other cities, could potentially be an opportunity lost as far as an integrated 8-80 cycling city is concerned.

Additional 'cause of death' data obtained by the ATSB from the Australian Bureau of Statistics (ABS) reveal that fewer than 4 percent of cyclist deaths occur in off-road or 'non-traffic' locations (ATSB Road Safety Report 2006). In addition, not having quality 8-80 facilities on the highly visible road network only serves to worsen the "perceived" safety issues that keep a broad spectrum of the market off their bicycles. There is a significant risk that if cycling is seen to be pushed out of the most convenient direct corridors on to less direct off-road and shared paths, that there is generically a safety issue with cycling. With quality, well designed facilities we know this is not the case and cyclists should enjoy the benefits of direct, highly visible safe transport.

2.3.3 Cycle and Pedestrian Network

This section of the Design Standard describes a planning process for balancing or prioritising the competing needs of different users of the current and proposed cycle network. The Main Routes Network is proposed to have a higher level of amenity and connectivity to town centres, employment areas and other key destinations.

A unique feature of the current network is the division and duplication of the Main Routes into on-road and off-road facilities. These are described as two mutually independent networks made up of Main Community Routes (off road) and Main On-Road Routes.

The Main Community Routes are described as (13.4.3):

This network is an off-road network made up of trunk paths, and is provided for walkers and joggers as well as recreational, school and less confident cyclists. Pedestrians have right of way on these routes and with higher pedestrian volumes these paths may become unsuitable for faster moving cyclists. Maintaining right of way for the path user is an important consideration on these routes to assist in the reduction of journey times.

Main On-Road Routes (13.4.4) are described as:

This network is an on-road network for use by more experienced, faster-moving cyclists such as commuters, and touring and training cyclists wanting to get to a destination quickly with a minimum loss of right of way. These routes are generally

on arterial roads and are suitable for more experienced cyclists comfortable with riding adjacent to vehicular traffic.

The purpose of a cycle network is to enable cyclists of a wide range of abilities and experience to move safely and conveniently to chosen destinations via suitable desire lines (*Guide to Traffic Management Austroads 2009*).

The current Main Routes Network throughout Canberra contains a notable lack of provisions for inexperienced or less confident cyclists wishing to commute between town centres, employment areas or other key destinations along suitable desire lines. Provision should be made in the Main On-Road Routes standard for a range of facilities that provide separation between cyclists and motorists.

2.4 National and International Best Practices

An overview of national and international best practices was provided as part of the Background Review, and was intended to provide examples of what could be considered for inclusion in the ASCNP.

Best practice topics included the following:

- Behavioural Change Strategies
- Separated Cycleways
- Bi-Directional Separated Cycleways - Grade Separated Cross-Section
- Bi-Directional Separated Cycleways - Median Island Cross-Section
- Bi-Directional Signalised Intersections
- Bi-Directional Non-Signalised Intersections
- Bi-Directional Shared Environment Intersection
- Bi-Directional Bus Stop Treatments
- One Way Separated Cycleways - Grade Separated Cross-Section
- One Way Separated Cycleways - Median Island Cross-Section
- One Way Separated Signalised Intersections
- One Way Separated Non-Signalised Intersection
- High Speed Off Road Facilities
- Bicycle Parking

Details and illustrations of these can be found in the Chapter 5 of the report in Appendix A.

3 PRELIMINARY OPTIONS DEVELOPMENT

Following the review of background information and the preparation of the Background Review and Analysis of Existing Cycle Network Technical Report, initial consultations with stakeholders were undertaken. Feedback from these consultations was used to inform the development of preliminary cycle network options for analysis. Details of these tasks are discussed in the following sections.

3.1 Stage 1 Consultation Outcomes

Initial stakeholder consultations highlighted issues in the current cycle network that need to be addressed in order to improve the safety, quality and connectivity of the network. These meetings were held with Agency and Public Stakeholders over the period of 20 June 2012 to 26 June 2012 and were undertaken by EPD with the support of SMEC and Talkforce Media and Communication Specialists.

These initial consultation sessions were designed to seek high-level feedback on the issues and priorities that should be addressed in the development of the ASCNP.

The consultation sessions were highly constructive. Overall, stakeholders were very positive about development of an ACT Strategic Cycle Network Plan and enthusiastic about contributing to its development.

Public and Agency Stakeholders provided similar comments on a large number of issues related to this project. Common issues included:

- The need to make cyclists feel safe when riding both on-road and off-road
- The necessity for the network to cater for all types of users and future technology
- Improving connections within the existing network and ensuring any future cycling infrastructure links effectively to the network
- Removing or reducing the number of physical barriers cyclists face when riding, such as delays at intersections
- Clarification and better understanding of how cycle infrastructure is to be utilised and/or shared
- Increased investment in construction and maintenance of quality cycling infrastructure, this includes signage and lighting
- A focus on limiting the distance people need to ride to commute by bike to work or school and making these shorter journeys more attractive. This includes better integration with other transport modes
- Increased provision of end of journey facilities
- Development of a cycling infrastructure hierarchy that includes standards for infrastructure and use
- Making it safer for children to ride bikes to school
- Ensuring the needs of cyclists and cycle infrastructure planning is considered by all government departments, particularly when developing new suburbs
- Reviewing the multi-criteria analysis used for identifying cycling infrastructure priority projects
- Improving data collection to identify cycling 'black spots'
- Increasing Canberra's attraction as a destination for cycle tourism

Public Stakeholders also raised issues regarding:

- Making suburbs more cycle and pedestrian friendly
- Developing 'case studies' to test the theories raised
- Specific upgrades to the existing cycle network

Agency Stakeholders discussed only one issue that was not specifically mentioned by Public Stakeholders and that was the need for the network to cater for people with a disability.

3.2 Network Design

Feedback from stakeholders during the initial consultations was examined to develop preliminary draft options. This section provides an overview of the approach to the network options development and it covers:

- Design principles
- Cyclists' needs
- Infrastructure design hierarchy
- Network components
- Approaches to develop a network

3.2.1 Network Design Principles

The proposed options for the future development of the ACT Strategic Cycle Network are developed with consideration of the following design principles:

- Connectivity – providing cyclists with more route options to get to key origins and destinations
- Directness – providing cyclists with the quickest, yet safe route wherever possible
- Safety – providing cyclists with the safest route possible
- Integration – providing connection with end destinations, public transport and across the network
- Legibility – providing a cycle network that can be navigated with ease
- Accessibility for all users – enabling cyclists across all ages and abilities (8-80) to feel they are safe, and that their cycling activity is welcome and encouraged
- Quality – providing cyclists with quality infrastructure that is improved over time
- Clarity – providing logical and clear to follow paths
- Comfort – providing cyclist with smooth riding surface, minimum obstruction and comfortable gradient

If the network is able to apply these principles, then cycling targets are more likely to be met as cycling will become easier, more accepted and desirable.

3.2.2 Cyclists' Needs

The ACT's goals for increasing cycling numbers primarily relate to Journey to Work mode share, however there is a real need to encourage increased levels of cycling from a wide demographic for a variety of trip purposes to achieve wider community benefits (improved public health, reduced rates of obesity, reductions in traffic congestion, etc). Many short every day trips, such as picking up a few groceries or visiting friends and family can

potentially be undertaken by cycling. To encourage greater levels of participation in cycling the requirements and barriers to cycling need to be given greater consideration.

Table 1 provides an overview of some of the barriers limiting the level of cycling in communities identified by the Australian Government Department of Health and Ageing report *Cycling: Getting Australia Moving*.

Table 1: The Barriers to Cycling

Factor	Barrier
Safety	<p>Safety concerns are one of the most significant barriers preventing cycling.</p> <p>Concerns are amplified by aggressive motorist behaviour.</p> <p>The combination of speed, high volume of traffic and lack of designated riding space are also barriers.</p> <p>The perception of risk is disproportionate to actual risk, despite 7 times more likelihood of hospitalisation from playing football</p>
Infrastructure	Well designed and connected cycle infrastructure is a major factor in encouraging participation
Land Use and Urban Design	<p>Urban Design and land use planning is a major factor.</p> <p>“There is growing evidence that low density neighbourhoods with poorly connected street networks affect how much time we spend walking, cycling and our ability to use public transport” (Research Australia, 2007, p.15).</p>
Funding	Funding needs to better reflect the role and value of cycling in a range of areas including health, transport and sustainability, with support from all levels of government
Individual	Lack of skills, confidence and knowledge
Social and Cultural	<p>Short trips are usually made by motor vehicle rather than walking or cycling</p> <p>Social norms (and fears of safety) tend to exclude women, older or culturally diverse groups from participating</p>

Source: Australian Government Department of Health and Ageing

Working towards eliminating these barriers will be achieved through:

- Infrastructure – that meets the needs of different cyclists (particularly safety requirements and safety perceptions) for a variety of trips. In both greenfield locations and brownfield redevelopments
- Behavioural Change Programs – that address individual concerns regarding cycling and social and cultural barriers
- Policy – that address urban design and land use planning issues that reduce the need to travel and elevate the convenience of cycling in comparison to other transport options (this would include parking policy)
- Political Leadership and Commitment – that supports cycling as a mainstream daily mode of transport
- A ‘Cycling Champion’ – that drives change

- Funding – to ensure there is a substantial commitment to the funding of active transport

Table 2 summarises types of cyclists and their needs.

Table 2: Cyclists and their Needs

Cyclist	Needs/Types of trips
Commuters (experienced)	These cyclists are often undertaking longer trips, have the confidence and ability to choose the quickest route even if there are safety risks.
Commuters (inexperienced)	Novice riders attempting a cycle commute may not be very confident and may prefer to stick to off-road paths or on-road paths with a high degree of separation from general traffic.
Primary school children	School trips are generally short and localised. They need to be safe and off-road whenever possible (an off-road network cannot physically be provided from every school child's home to their school), where facilities are on-road they need to be segregated from general traffic.
Secondary school children	Can be very confident and able to ride longer distances, but are still best served by off-road facilities, local street routes and on-road paths with a high degree of separation from general traffic.
Recreational cyclists	These cyclists may like to take scenic trips at a leisurely pace, most likely to use the shared path network.
Sporting cyclists	Are most interested in speed and distance, should be discouraged from using shared paths.
Short utility trip cyclists	These cyclists are undertaking short trips to meet every day needs, mostly in and around their local neighbourhood.

This table forms part of the basis for consideration of how the network should be developed based on needs. Not all parts of a cycle network are suitable for every type of cyclist, and this needs to be considered in selecting an approach to develop the Strategic Cycle Network. Consideration also needs to be given to the needs of different cyclists when developing behavioural change programs and developing policy that may influence levels of cycling.

An approach that considers all these above mentioned elements is to provide a quality cycle network that attracts and serves the wider demographic base. This is often encapsulated by the concept of 8-80 – a network that can be used safely and independently by anyone in the 8 to 80 year age group. This approach aims to generate more modest modal shifts across a broad base in order to achieve the overall targets.

For example, retaining levels of cycling amongst women over the age of 18 represents a real opportunity to increase levels of cycling in the ACT. Table 3 shows the 2011 breakdown of the population that have cycled for a trip in the past 7 days. It shows that particularly beyond the age of 18 the percentage of females cycling in the ACT rapidly declines.

Table 3: Cycling Population Breakdown by Gender and Age-Group (Australian Bicycle Council Cycling Resource Centre, 2012)

Age Group	Population proportion who rode in past 7 days		
	Male	Female	All
0 – 9	48.0% (38.3% - 57.8%)	43.4% (33.0% - 54.5%)	45.8% (38.2% - 53.6%)
10 – 17	53.3% (44.5% - 61.9%)	31.3% (23.3% - 40.7%)	42.5% (36.0% - 49.2%)
18 – 39	52.2% (48.9% - 55.6%)	13.3% (9.6% - 18.0%)	18.7% (15.4% - 22.6%)
40+	18.1% (15.3% - 21.4%)	7.9% (6.1% - 10.2%)	12.8% (10.8% - 15.1%)

3.2.3 Infrastructure Design Hierarchy

The ACT's road network is well defined for motorised vehicles, but less so for cycle infrastructure. The different parameters applicable to cyclists need to be acknowledged and the implications on the design hierarchy appreciated, as part of determining appropriate infrastructure and network approaches.

Factors to be considered when designing cycling facilities and a cycling hierarchy include:

- **Different types of road users** - Cycling is an activity that can be undertaken competently by children and young people, as well as people who for other reasons do not drive. The same degree of proficiency expected of motorists cannot necessarily be assumed for cyclists.
- **Greater vulnerability of cyclists** - Compared to motorists, cyclists are not cocooned within a hard external shell designed to protect their safety. Many potential cyclists feel safer using infrastructure or routes that separate them from high-speed car traffic, rather than using infrastructure predominantly designed around cars.
- **Trip length** - Compared to car trips, cycle trips are typically shorter in length and access more local destinations than car trips (such as travel to school). Furthermore, as cycling is a human-powered activity, even short detours have a greater impact on cyclists than motorists.
- **Lower travel speeds** - While it is often noted that cycling trips can often be undertaken as quickly as by car, the maximum speed possible cycling is still lower than that achievable by car. The priority given to cars through the road hierarchy largely enables cars to travel at higher speeds on certain roads, than would be safe on other parts of the road network. This priority should also be given to cyclists.
- **Different types of trips** - Cycle trips can incorporate recreational travel and sports/fitness training. While these latter trip types are not those that would immediately contribute to the ACT's targets for cycling, and similarly for short utility trips, there is transition and cross-pollination from these types of trips to commuting. It is therefore important to support these trip types, which are not acknowledged in a traditional road hierarchy.

- **Amenity value** - At lower speeds, there is also greater opportunity to appreciate the immediate environment and amenity becomes more important for cyclists. This greater sensitivity to amenity can be part of 'reading' the route, as an element of the design hierarchy.
- **Traffic volumes and speeds** - The speed zoning and traffic volumes in the road network design hierarchy do not reflect their implications as applied to interactions with cyclists. In particular, overseas research indicates that cyclists and motorists can safely mix at car travel speeds of up to about 30 km/h, which is not currently a standard speed zone under Australian practice.

3.2.4 Network Components

A cycle network consists of various types of cycle paths and lanes. All these facilities are available to all cyclists, but generally these are considered to be the main elements of the current ACT cycle network:

- Main Routes Network that link key destinations and comprise of:
 - Main Community Routes (MCR) – off road shared use network intended for casual/recreational cyclists, pedestrians and school children and less confident cyclists
 - Main On-Road Routes (MORR) – on-road network generally on arterial roads intended for use by more confident cyclists
- Connector Routes – local access or collector streets and off-road path links

All footpaths within the ACT also form part of the cycle network as cyclists are permitted to ride on the footpath. Figure 2 shows the existing on-road and off road cycle network in the ACT. These are discussed in the context of the ACT in further detail below.

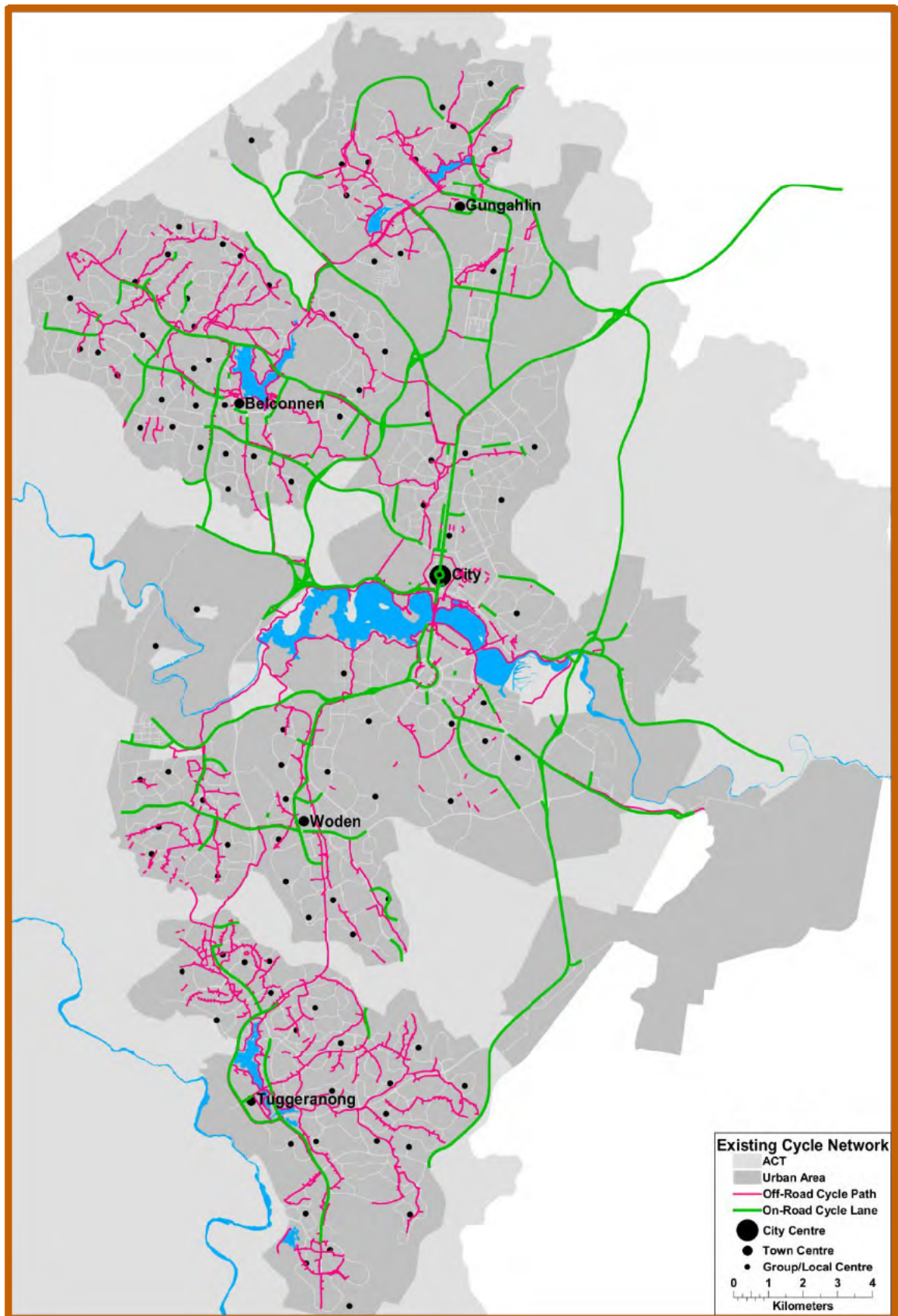


Figure 2: Current On- and Off-Road Network in the ACT

3.2.5 One Network or Two Networks

The current approach in Canberra of providing both an on-road cycle network (MORR) and an off-road cycle network (MCR) delivered in parallel is intended to provide facilities for catering for every type of bicycle rider of every age group through segregating different

types of riders. The off-road network is perceived to provide a safe riding environment for cyclists who may lack confidence and perceive the on-road network provides a higher risk environment and is for more confident cyclists.

There is however, merit in providing a single integrated network, comprised of a combination of off-road and on-road cycling routes, rather than provision of essentially two separate networks, one each for on-road and off-road users that run in parallel. Even by completely removing the economics of the argument, (a major factor in selecting which cycling projects are approved), there have been studies done that show that there is no added safety benefit from having off-road networks.

The most common argument for having separated networks is the perceived safety of having off-road cycling infrastructure. A study carried out by Henley and Harrison in 2009 showed that transportation accidents accounted for 11% of hospitalisation due to injuries in Australia. 18% of these 11%, or a total of 2% of hospitalisations due to injury are from cyclists. These figures include both traffic and non-traffic injuries. Of the traffic related injuries, 15% were cyclists, which are far disproportionate to the total road users, as cyclists do not make up 15% of road users. The study also showed that almost as many off-road cycling accidents (not involving motor vehicles) causing serious injury occurred as on-road cycling accidents.

De Rome et al (2011) also carried out a study which shows that in the ACT, a higher injury severity has been attributed to cycling accidents on shared paths. This higher rate of injuries on shared paths could possibly be due to conflicts with pedestrians or other cyclists of lower skill levels.

As cyclists typically travel at a lower speed than motor vehicles, but at a higher speed than pedestrians, it makes sense to provide separate infrastructure for cyclists, limiting the chance of collision with either a motor vehicle, which is typically more dangerous for the cyclist, or pedestrians, which shifts the risk of serious injury from the cyclist to the pedestrians.

On-road segregated lanes provide a safer riding environment for cyclists, effectively giving them their own lane in which they have limited chances for conflict with vehicles and pedestrians. By physically separating on-road cycling lanes from the roadway, car parking spaces and foot paths, and by placing kerbs, as shown in Figure 3, which allow sufficient space to allow disembarking passengers from buses and vehicles to exit and look each way before crossing the cycling lane, the impact on cyclists is minimised. These "Copenhagen" style cycling lanes are universally regarded as best practice for provision of a cycling network, due to the safety and visibility they provide to cyclists.

Concentrating investment on one high quality integrated network that has significant parts within the road network corridors is that it provides a highly visible and open invitation to cyclists. Telling them they are welcome and that all levels of cycling are catered for. They have the same well-lit, highly visible, accessible and direct routes as cars. We do anticipate locations where facilities that are suitable for all 8-80 cyclists to ride within the one corridor will not be attainable, and on road facilities supplemented with some parallel infrastructure to achieve our broad 8-80 provision will be necessary. This must be examined in detail in the design feasibility stage for each corridor.



Figure 3: Example of an on-road segregated lane concept in Melbourne that provides protection from traffic and casual surveillance from neighbouring uses and passing traffic

Generally, when a segregated on-road cycling lane exists, higher skill level or professional riders will still choose to use the road to cycle on, as they are allowed to travel at a higher speed and do not have to overtake less skilled cyclists.

Providing cycling lanes that run alongside highly visible routes provides additional safety for cyclists, as opposed to having cycling facilities that run through areas of low visibility and usage, such as underpasses and parks. The lack of visibility lowers the overall security of the routes. For a more secure route, it is much safer to have cycling routes align with heavily trafficked corridors. The lack of visibility for passers-by or surveillance increases the risk of crime occurring in these locations, an example of which is shown in Figure 4.



Figure 4: Example of off road path in Canberra with no separation between pedestrians and cyclists and no casual surveillance

Duplication of the network in the ACT is most likely not the best approach and investment should be focussed on improving the standard of the one complete and integrated network through measures such as segregation, and separating cyclists and pedestrians in other parts of the network and improving connectivity of the network.

This does not mean that all cycling routes have to mix with traffic. Cycling routes should generally be available to all cyclists, and all potential cyclists (8-80). This will mean, as suggested in Figure 1, completely separating cycling from the vehicular traffic in cases of high speed and volume of vehicle traffic. Similarly, there will be cases when feasibility will show that a route outside the road corridor would be appropriate, and in some cases as discussed above there should be both.

3.2.6 Developing a Strategic Cycle Network

This section introduces two possible network approaches that are commonly used and may be applicable in the ACT and discusses the advantages and disadvantages of each. The two approaches are:

- A Hierarchical Network – whereby different routes are provided depending on the types and volumes of trips expected. Priority is generally given to the upgrade of the Primary network.
- A Needs Based Network – facilities are added across the network where needed and connected up over time.

3.2.7 Hierarchical network (Strategic Cycle Network)

The hierarchical network consists of three levels:

- The Primary Network – main routes that carry cyclists across the city, linking key attractors, origins and destinations. This network is most suitable for commuting trips
- The Secondary Network – links between the Primary network and local areas act as main feeder routes to get people to the primary routes
- The Tertiary Network – routes within local areas, more suited for shorter trips and connecting to other parts of the network

The Primary, Secondary and Tertiary networks combined form the Strategic Cycle Network.

Table 4, Table 5 and Table 6, respectively, provide a detailed overview of the Primary, Secondary and Tertiary network function and form. The hierarchy is based on the function of the cycle route in the network, rather than its form (on or off road path etc.)

Table 4: Primary Network Function and Form

Function	Form	Description	Example
<p>Connect town centres and other key origins and destinations</p> <p>Provide direct, fast connections</p> <p>Carry the highest volume of cyclists</p>	Cycle Highways	High speed cycling path, dedicated to cyclists and separated from general traffic.	 <p>Cycle Highway – Twente, Netherlands</p> <p>Source: https://bicycledutch.wordpress.com/2013/03/14/f35-high-speed-cycle-route-twente/</p>
	Off-road paths (separation of cyclists and pedestrians)	Cycle paths separated from roadways and separation between pedestrians and cyclists.	 <p>Off Road Path with separation of cyclists and pedestrians – Brisbane, Australia</p> <p>Source: www.townsvillebug.com</p>
	On-road lanes (segregated lanes and shoulder lanes)	<p>Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier, can be bi-directional or one way</p> <p>On-road shoulder lanes – Cycle lanes painted on road shoulders and dedicated to cyclists, provided only where a segregated lane cannot be provided.</p>	 <p>On-road segregated lane – Sydney, Australia</p> <p>Source: theconversation.com</p>

Table 5: Secondary Network Function and Form




Function	Form	Description	Example
<p>Link town and group centres and lower order origins and destinations</p> <p>Provide connections to the Primary network</p> <p>Caters for multi-purpose trips</p>	<p>On-road lanes (segregated lanes, shoulder and wide kerbside lanes)</p>	<p>Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier</p> <p>On-road shoulder lanes – Cycle lanes painted on road shoulders and dedicated to cyclists</p> <p>Wide Kerbside Lane – general traffic lane with painted cyclist symbol to indicate the potential for their presence.</p>	 <p>On-road shoulder lane – Englorie Park Drive, Ambarvale</p> <p>Source: NSW Bicycle Guidelines</p>
	<p>Off-road paths (shared and dedicated paths)</p>	<p>Shared Path – Paths for the use of cyclists and pedestrians separated from roadways</p> <p>Separated Path - Paths separated from roadways and separation between cyclists and pedestrians.</p>	 <p>Shared Path – Lyneham, Australia</p> <p>Source: bicyclecanberra.blogspot.com</p>
	<p>Mixed Traffic Environments (less than 3,000 vpd)</p>	<p>General traffic streets with low traffic volumes.</p>	 <p>Source: NSW Bicycle Guidelines</p>

Table 6: Tertiary Network Function and Form


Function	Form	Description	Example
Provide connections to local centres and connections within the general local area Provides continuity in the network Caters to lower volumes of cyclists	Low use on road lanes and off road paths	On-road lanes with low volumes of cyclists and traffic. Off-road paths used infrequently.	 <p>Home Zone Source: www.courtyardhousing.org</p>
	Shared Zones/Home Zones	Streets which balance the needs of all road users including pedestrians, cyclists and motorists. Streets are physically altered with raised sections, plantings and surface treatments to calm traffic and provide an environment safe for, and conducive to, walking and cycling.	
	Low Speed access dominated roads	General traffic streets that provide an access function generally in residential areas. Traffic operates at slow speeds providing a non-threatening environment for cyclists.	

Figure 5 illustrates that the Primary, Secondary and Tertiary networks are differentiated by the speed and volume of cyclists using the paths and lanes which comprise the network. This shows whether those paths and routes provide direct connections to major attractors, or provide a coverage function with more circuitous routes. For example, the routes and paths that comprise the highest order network (Primary network) generally carry the greatest volume of cyclists at speed. Those routes and paths tend to be direct, to improve travel times.

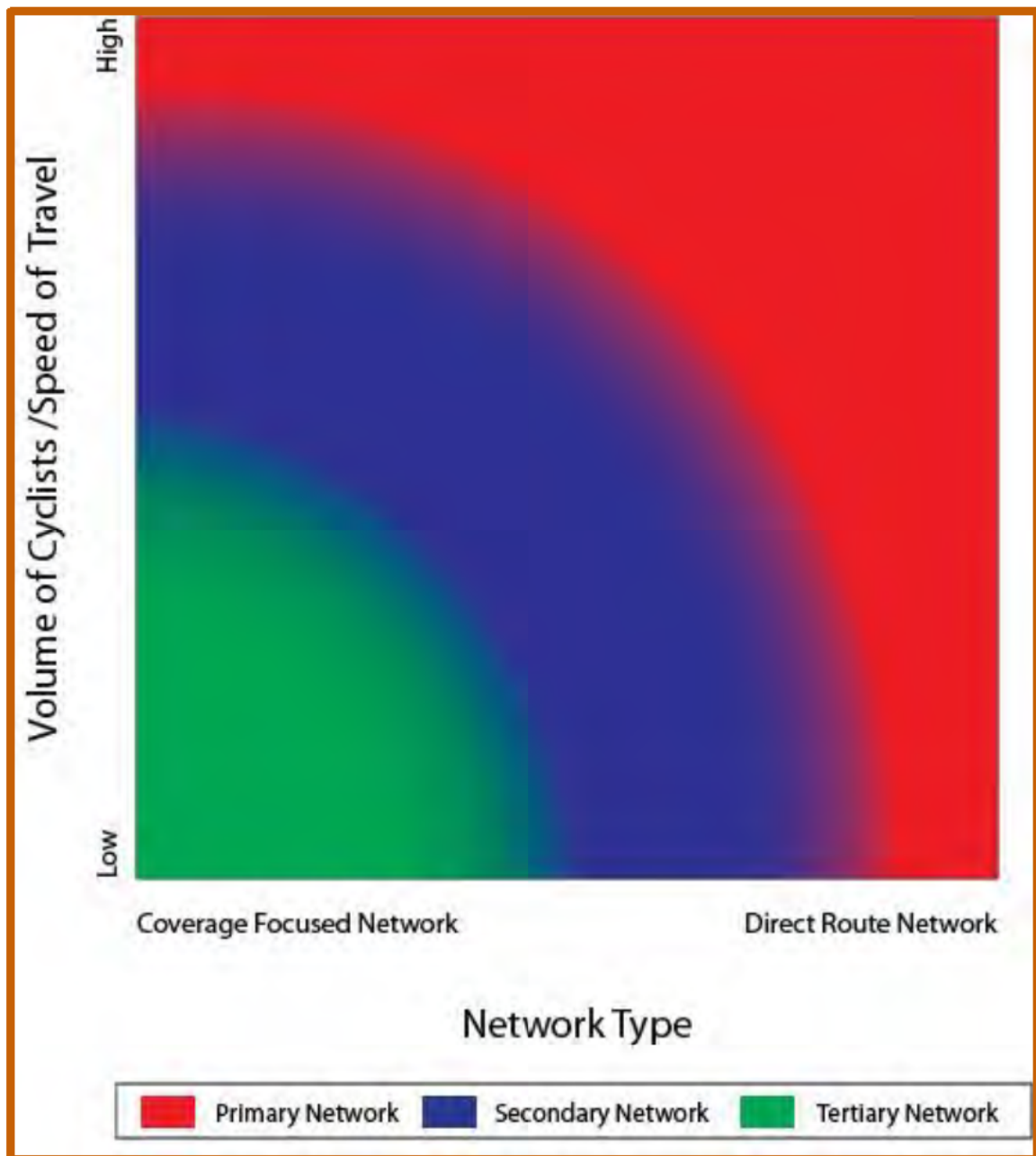


Figure 5: Primary, Secondary and Tertiary Network Concept

The concept of a three tiered functional hierarchy specific to Canberra is presented in Figure 6.

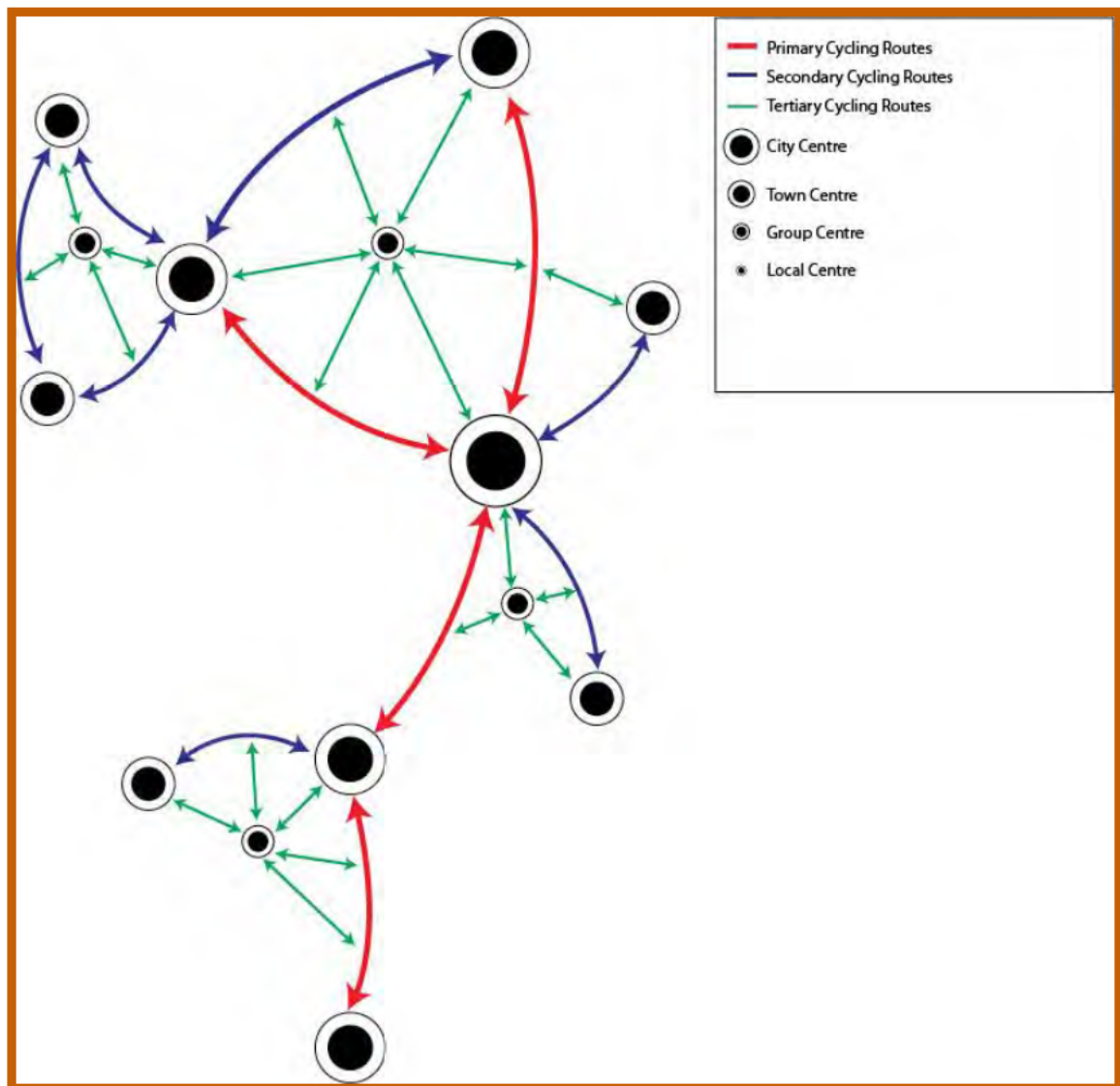


Figure 6: Concept of Canberra Three-Tiered Network

While this is a more complex approach to designing the cycle network, a very extensive and meaningful network is formed over time that is consistent with the 8-80 cycling ideal. That is, suitable for all cyclists, nominally between the age of 8 and 80 years.

Development of the network is based on hierarchy, meaning that routes on the Primary network get priority for upgrades. Then over time, the other layers of the network are built up.

This approach should be very suitable in the ACT because the basis of a strong Primary network is already in place, however gaps still exist and the quality can be improved upon.

Developing a three-tiered network will provide a legible and comprehensive network. The current ACT network has areas of duplication and the three tiered hierarchy will provide classification and an indication as to the function of parallel paths.

3.2.7.1 Primary Network Routes

These routes need to make cyclists feel prioritised and allow for safe and consistent journeys. For trafficked environments, the motor vehicle speed environment (85th percentile speed) is desirably up to 40 km/h. Above this, facilities should be separated from traffic. As these represent the 'cycle highways', capacity is an important

consideration, particularly where shared with pedestrians. Lighting, route signage and maintenance are also important.

High quality linkages that are major recreational facilities may have particular design requirements specific to the route.

3.2.7.2 Secondary Network Routes

Secondary network routes link to the Primary network, extend the zone of access for cyclists and provide route choices for shorter trips to, and around the destination areas. For trafficked environments, the motor vehicle speed environment (85th percentile speed) is desirably less than 40 km/h.

3.2.7.3 Tertiary Network Routes

Tertiary network routes cater for lower volumes of cyclists and “fill gaps” in the greater network and predominantly provide access to local areas.

Traffic treatments appropriate for these routes are:

- Low use on and off-road paths
- Local Access Streets

In many ways, these local access streets would ideally be car-free, from the perspective of pedestrians and cyclists, but this would generally not be practical, but certainly should be low volume and low speed. Shared streets or home zones are often implemented as a compromise that suits all users. For trafficked environments, routes are not through roads for motor vehicles and the motor vehicle speed environment (85th percentile speed) is desirably up to 30 km/h.

In European practice, these guidelines extend to ‘Home zones’ or ‘Woonerven’ and 20 km/h speed limited streets in residential areas and ‘play streets’ and 20 km/h speed limited streets in non-residential areas.

In practice, an environment where all levels of cyclists making all types of trips will be actively encouraged, and cyclists overtly invited to use these local routes as cycle routes. It must be obvious that these streets were made or modified to suit cycling as a genuine prime transport mode, not a fringe mode or an afterthought. The short trips that are made on these trips are the fledgling trips that will eventually spread to the wider network.

3.2.7.4 Application of the Hierarchy in the ACT

The application of this network hierarchy to the ACT’s strong pattern of arterials with a street network that consists of cul-de-sac and curvilinear streets has not lent itself to the development of a network based on this approach; with most of the network based largely on off-road paths following the line of neighbourhoods and the arterial roads that connect them.

3.2.8 Needs Based Network

A needs based approach to the development of the network would see infrastructure improvements implemented across the network with priority on addressing hot spots or problem areas identified mainly by cyclists.

The result of which is a range of infrastructure across routes, with the treatment dependent on the location and type of issue. While the quality of cycling infrastructure is likely to be high using this approach, there are some fundamental problems with this approach, mainly:

- It tends to be reactive rather than strategic and considering the long-term network
- It is difficult to prioritise projects in the short and long term
- It takes longer to create a completed network as there is no focus on implementation
- It is likely to be more costly
- The overall level of legibility of the network is compromised

This approach is not considered suitable at this stage as a more cohesive direction will likely deliver a more complete and legible network.

3.3 Proposed Options

Four options are presented based on a hierarchical approach to network development:

- City Centric Network
- Town Centre Centric Network
- Hybrid Network
- Complete Strategic Cycle Network

A summary of these options is presented in the following sections. The Preliminary Options Report, which discusses the options in more detail, is included in Appendix B.

It is noted that a significant increase in the actual number of cyclists using current cycling facilities will mean that eventually existing facilities (e.g. shared paths) will need to be widened or the network expanded in order to spread trips.

Most of the routes that make up the Primary network have a high demand for cycling (based on average weekly flow data) and should be given first consideration for improvement. However, with much of the Primary network complete, at least at a very basic level, it may be more appropriate to focus efforts on improving the Secondary and Tertiary cycle network. Alternatively, the initial focus of developing the network may be on improving the standard of the Primary network and addressing the 'pinch points' in order to complete the Primary network.

3.3.1 Option 1 – City Centric

This network option is predominantly focused on developing the Primary network to provide direct, efficient connections between major centres and attractors that carry high volumes of cyclists. This option would cater predominantly for commuter cyclists, with the Primary network providing direct connections to major employment locations. The extensive on-road, higher speed cycle routes would likely mean that inexperienced cyclists are less likely to regularly use many sections of the Primary network.

As the City Centric option provides connections to key employment locations, it is most likely the most cost efficient network for achieving the JTW mode share targets established in *Transport for Canberra*. The City Centric concept is illustrated in Figure 7.

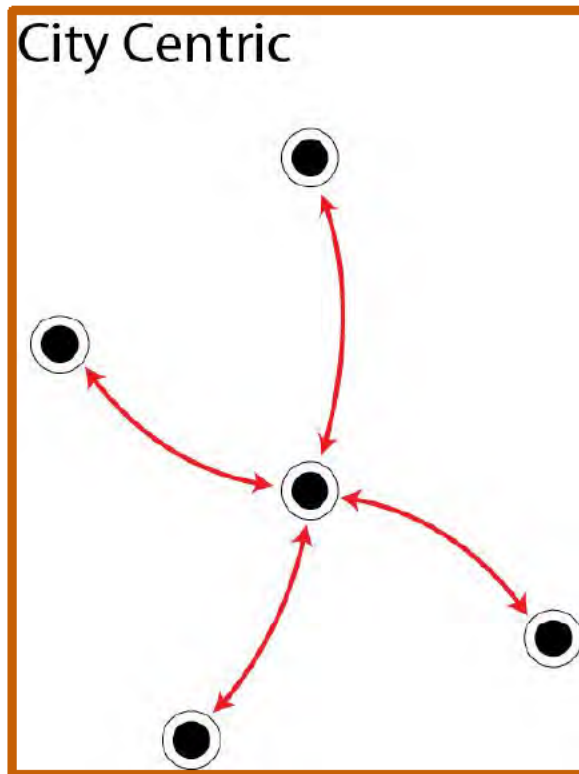


Figure 7: City Centric Option

The following key routes have been identified as part of the Primary network. In the long term, these routes will require investment and widening. In this option, gaps identified along these routes would be improved first.

Key Strategic Routes:

- Barton to Civic
- Fyshwick to Capital Hill
- State Circle
- Tuggeranong (including Curtin, Mawson and Woden) to City via Athllon Drive
- Woden to Molonglo via Weston
- Molonglo to Civic
- Canberra Airport to Civic
- Belconnen to Civic
- Hall to Northbourne Avenue via Barton Highway
- Northbourne Avenue and Federal Highway
- Gungahlin to Federal Highway via Flemington Road

A number of Primary routes overlap existing cycle facilities. These facilities would be reviewed to ensure that they are of an appropriate standard for the Primary network. If they are not, they would be upgraded. Existing routes that are not part of the Primary network would not be changed in this option.

This option is expected to primarily benefit commuters and sporting cyclists. The benefits to all cyclist types are shown in Table 7.

Table 7: Cyclists that would benefit from Option 1

Cyclist Type	Level of Benefits
Commuters (Experienced)	High
Commuters (Inexperienced)	High
Primary School Children	Low
Secondary School Children	Medium
Recreational Cyclists	Medium
Sporting Cyclists	High
Short Utility Trip Cyclists	Low

3.3.2 Option 2 – Town Centre Centric

This option focuses on developing the cycle network predominantly within a 5km ring around town centres and the city centre. It involves improvements to routes in the Secondary and Tertiary network. The network will have a greater coverage although individual routes are likely to carry lower volumes of cyclists.

Improvements at the local level in suburban areas and school catchments will be a focus of the option. One of the simplest and most effective options is to identify local routes consisting of low traffic streets and create a legible map to be marked with signs on street corners. However, due to the extensive area to be covered, and the fine grained nature of this part of the network, it will be a costly option to implement.

In the longer-term, more significant infrastructure improvements could be implemented such as changes to intersections (namely roundabouts), traffic calming measures in identified streets, blanket speed limit changes and changes in street design parameters.

Figure 8 shows a network concept for this option.

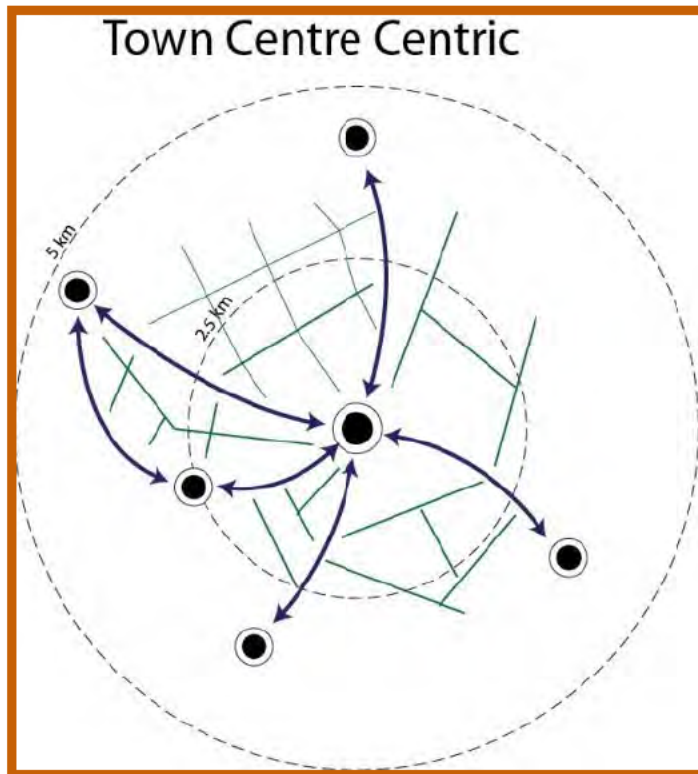


Figure 8: Town Centre Centric Option

Existing routes that are part of the Secondary or Tertiary networks would be reviewed to ensure that they are of an appropriate standard and upgraded if necessary.

This option is expected to primarily benefit primary school children and cyclists undertaking short utility trips. The expected benefits for all cyclist types are shown in Table 8.

Table 8: Cyclists that would benefit from Option 2

Cyclist Type	Level of Benefits
Commuters (Experienced)	Low
Commuters (Inexperienced)	Low
Primary School Children	High
Secondary School Children	Medium
Recreational Cyclists	Medium
Sporting Cyclists	Low
Short Utility Trip Cyclists	High

3.3.3 Option 3 – Combination of Options 1 and 2 (Hybrid)

This option focuses on developing the Primary network by filling existing gaps (no existing route upgrades) and further development of the Secondary and Tertiary networks surrounding the town centres (predominantly filling gaps and minimal new paths). This

option focuses on catering for a wide spectrum of cyclists, from providing direct connections to major centres and attractors to improving cycling conditions in local areas surrounding the town centres.

The option balances overall cost with coverage for the greatest spectrum of current or potential cyclists. It focuses on simply addressing gaps in the existing network with limited improvement to the standard of existing cycle routes.

A network concept is shown in Figure 9.

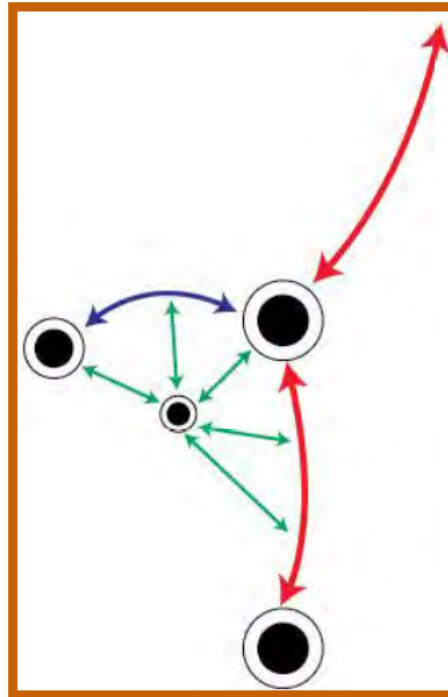


Figure 9: Combination of Options 1 and 2 (Hybrid)

As with Options 1 and 2, existing routes that are part of the network would be reviewed to ensure that they are of an appropriate standard for their defined hierarchy.

As this option does not focus on any one type of cyclist, the benefits for all cyclist types is expected to be medium, as shown in Table 9.

Table 9: Cyclists that would benefit from Option 3

Cyclist Type	Level of Benefits
Commuters (Experienced)	Medium
Commuters (Inexperienced)	Medium
Primary School Children	Medium
Secondary School Children	Medium
Recreational Cyclists	Medium
Sporting Cyclists	Medium
Short Utility Trip Cyclists	Medium

3.3.4 Option 4 – Complete Strategic Cycle Network

This option focuses on developing the complete Strategic Cycle Network (Primary, Secondary and Tertiary network). This option involves filling gaps in existing routes and improving the standard of existing routes (Primary, Secondary and Tertiary network). It would be the most costly to develop, yet would be developed to the highest standard, have the greatest coverage, for the greatest number of people and should be considered the ultimate goal for the ACT.

This option overtly reintroduces cycling as a legitimate mode of transport for all levels of cycling. This is a long term strategy towards a genuine “8-80” city. Ultimately Option 4 can provide Canberra with an opportunity to be an exemplar cycling city in Australia where all cyclists feel comfortable and that they belong or actually feel wanted, not just tolerated on the broader transport network.

A network concept map is provided in Figure 10. This option does not include all works of Options 1 and 2, but those considered most effective.

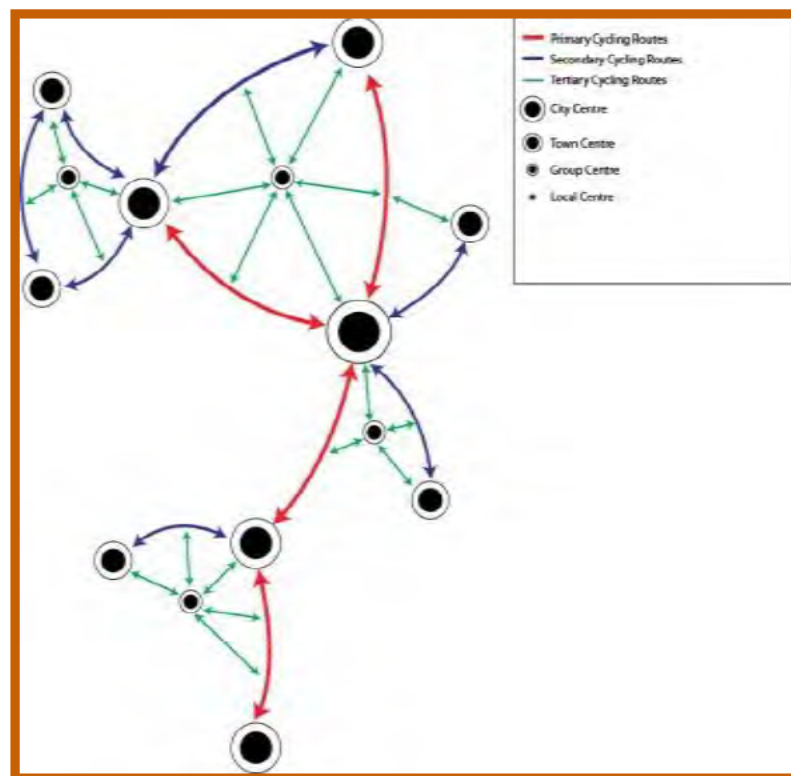


Figure 10: Complete Strategic Cycle Network Option Concept

As with the other options, existing routes that are part of the network would be reviewed to ensure that they are of an appropriate standard for their defined hierarchy.

As the most complete option, Option 4 is expected to give a high level of benefit to all cyclist types, as shown in Table 10.

Table 10: Cyclists that would benefit from Option 4

Cyclist Type	Level of Benefits
Commuters (Experienced)	High
Commuters (Inexperienced)	High
Primary School Children	High
Secondary School Children	High
Recreational Cyclists	High
Sporting Cyclists	High
Short Utility Trip Cyclists	High

3.4 Possible Immediate Projects for Investigation

In immediate projects (for implementation in one to two years), there is an opportunity to implement an ongoing program of smaller projects that will help to improve the network in general and without major capital investment. These projects are not specific to any level of the network, but mostly apply to existing infrastructure and can be implemented in conjunction with any of the options presented. Potential immediate projects are shown in Table 11.

Table 11: Summary of Potential Immediate Projects

Project	Improvement Needed
Cycle parking at major bus stops and interchanges	This program is already on-going and should be completed within the next 1-2 years on existing stops.
Reducing speed limits in the local network	The reduction of speed limits (to 40 km/h) in town centres, neighbourhoods and around schools will considerably improve cycle safety real and perceived and support the development of a local cycle network.
Signage	Improvements to way-finding and safety signage are needed on both the off-road and on-road paths to assist cyclists navigate the network and access key destinations.
Lighting	A number of sites have been identified by stakeholders as needing improvements off-road
Removing or changing car barriers on off-road paths and underpasses for cyclist access	These are a known obstacle for cyclists, slowing or hindering journeys. They could be removed or changed easily.
Improve maintenance of on and off-road paths	Regular maintenance to ensure line markings are visible, paths are free of pot holes or other obstructions. This would also include tree pruning to increase space on shared paths.

Cycle advance mark outs at intersections	Head start boxes at intersections can be provided at very little cost and give cyclists an advantage and visibility at intersections.
Small hazards improvements	Continue and improve small hazards improvement program via Fix My Street online reporting facility.
Improved consideration of cyclists during construction	The provision of alternative routes and signage when construction is underway, will allow cyclists to continue usual journeys easily.

3.5 Other Infrastructure Opportunities and Considerations

The following infrastructure treatments are a selection should be considered for implementation over a longer-term horizon.

3.5.1 Cycle and Bus Integration

It is noted that cycle lockers and facilities are being incorporated into the ACT's major stops (see Figure 11) and interchanges. In addition, other improvements should be considered:

- Way finding signage and maps should be provided at bus stop to direct cyclists.
- Development of a bike sharing programmes should be investigated within the Civic area. This type of programme is commonly used in North America and Europe and has been recently introduced in Brisbane and Melbourne.



Figure 11: Integration of Bicycle Parking with Major Bus Stops

Some buses within the ACT are currently equipped with bicycle racks. However, bicycle parking at bus stops and interchanges is considered an additional, if not more beneficial, method of integrating cycling and public transport. Bicycle racks on buses are not always appropriate as:

- The capacity of the racks is limited to only 2 bikes
- The loading and unloading of bikes extends dwell times of buses that lead to delayed services

The presence of bus stops often interrupts the continuity of cycle lanes and forms a major conflict point in cycle networks where their paths cross. The best infrastructure response at such locations is to have cycle lanes deviate around the bus stop as shown in the NSW Bicycle Guidelines (see Figure 12).

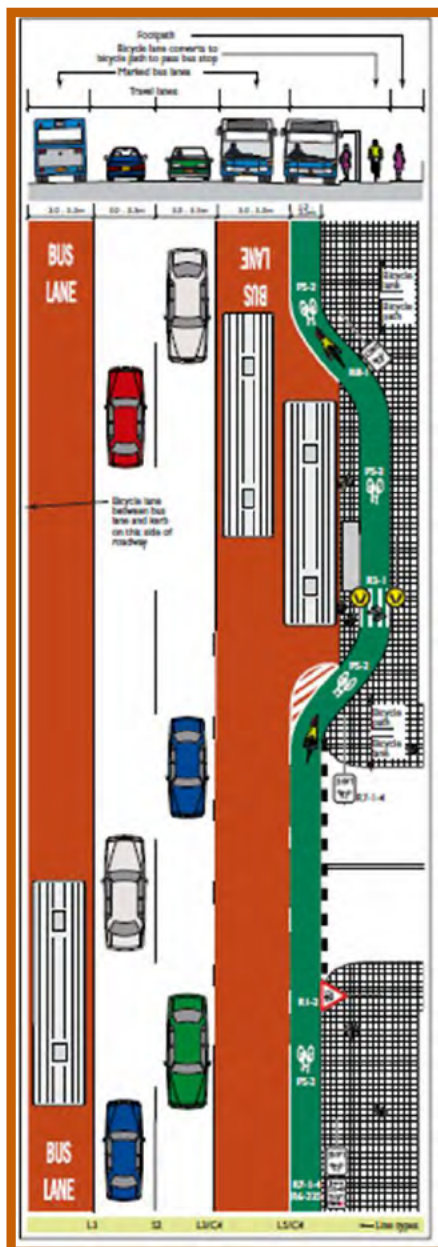


Figure 12: Deviation of Bicycle Lanes around Bus Stop

3.5.2 Intersections

Cycle treatments at intersections in the ACT are currently done in accordance to Austroads standards. However, it is noted that left-turning slip lanes are very dangerous for cyclists (and pedestrians), who may not be seen. In the long-term, it is suggested that the removal of left-turning slip lanes from intersections on the Primary cycle network will need to be seriously considered.

In Holland, a new design standard has been implemented as demonstrated in Figure 13. This style of intersection improves visibility and contact between cyclists and motorists and also allows for easier left turns across traffic. Such intersections are also commonly referred to as protected intersections. This standard could be initially incorporated into new developments, and then implemented as and where needed over the longer term.



Figure 13: Dutch Intersection Design⁴ (Note that vehicles drive on the right)

3.5.3 Off-Road Paths – Shared Paths

Ideally shared paths will be a minimum of 3 metres wide and clearly demarcated for pedestrians and cyclists. However, the cost of implementing this is recognised as being high.

Where shared facilities cannot be avoided, the following considerations will help both cyclists and pedestrians:

- Pedestrians should always have priority, reinforced by signage
- Markings should be clear. Ambiguous marking can give cyclists an incorrect sense of a dedicated cycle space
- Sufficient width to allow for evasive action and/or evading conflict (Ireland National Transport Authority, 2012)

3.5.4 Data Collection for Cyclists

There are various reasons for collecting data on cyclists, the two most common being to count the numbers of cyclists using a specific path, and to track the routes used most commonly used. The technology used in each case is different, as there is currently no single method of both counting and tracking.

To count the number of cyclists, there are various methods, from induction loops, sensors and tube counters. These devices can either be permanently or temporarily fixed in locations along the cycle path.

Induction loops are a permanent fixture, placed below the pavement. They work by using an electromagnetic signature and detect bicycles as they pass over the loop. Induction loop counters provide a high accuracy of volumes (-/+ 5%, and can also provide directional data.

⁴ Source:

http://wiki.coe.neu.edu/groups/nl2011transpo/wiki/ba51e/15_Dutch_Intersection_Design.html

Sensors work by transmitting a thermal beam, which detects changes in temperature. As a cyclist or pedestrian passes the beam, the change in temperature is detected and the device captures the number of passers-by. Sensors can also detect the various types of passer, identifying them as a pedestrian, cyclist, horse rider etc. (Eco counter, <http://www.eco-compteur.com/Eco-MULTI.html?wpid=45127>)

Tube counters have been used in traffic volume detection for many years. The method of tube counting involves placing two parallel, pneumatic tubes across a pathway, and as a cyclist passes over the top, the tube sensors detects the cycle crossing the tube. The tubes are also able to detect directional data as well as a highly accurate (-/+) 3%, volumes, even in heavy traffic conditions.

In order to track a specific cycle through the network, scanner technology is required. As the volume detection has no way of differentiating one cyclist from another, a new form of technology is used. Bluetooth Media Access Controller ID's (MAC-ID's) scanners (BMS) can be positioned throughout the network and can provide tracking data on cyclists. With BMS scanners being used to track vehicles on the roadways, the same can be implemented along cycling paths. Cyclists would be encouraged to activate the Bluetooth in their personal mobile devices, such as mobile phones, headphones, or portable music devices. The MAC-ID of these devices will be detected along the cycle path as the user passes, and then can be tracked as the user continues their journey. The data can be collated and the route can be identified. This technology is limited and cannot be used to determine the number of cyclists, due to the unreliable nature of the detection of the MAC-ID, in relation to the total number of detections and the amount of cyclists who will not have any Bluetooth enabled devices on their person during their trip.

The report provides a balanced assessment based on transport network design criteria that identify a cost effective stage (preferred option) towards the completion of a complete cycle network. In order to achieve a network that functions efficiently, a more comprehensive set of data may be required to be collected.

3.6 Non-Infrastructure Elements

Maximising the potential mode share attributed to cycling is best achieved through the provision of cycling infrastructure in conjunction with supporting policies and development practices that minimise travel requirements.

3.6.1 Speed Limits

Streets should be designed to encourage traffic speeds that are suitable for the particular context of the environment and function of the street.

Currently in the ACT, a default speed limit of 50 km/h applies in all areas except where signage indicates a higher speed limit. However, even a 50 km/h speed limit may be inappropriate for certain streets and environments. In Europe many residential areas and city centres have speed limits of 30 km/h. A review of speed limits in certain areas is likely to encourage greater levels of cycling.

Streets that provide key connections for cyclists to centres or through school zones that are unable to accommodate segregated cycling facilities are considered the ideal environment for lowered speed limits. Locations with high levels of pedestrian and cycling activity are also possible locations for credible speed limit reductions.

3.6.2 Land Use Policy and New Developments

All parts of the planning process (development of structure plans, precinct codes, estate development plans and development codes) have the ability to influence the cycling

environment of the ACT. Generally, compact mixed use development leads to shorter trip lengths leading to higher levels of cycling. Such situations also generally lead to a more active public realm that encourages cycling, attracting people and pedestrian activity. To ensure suitable cycling conditions are created in new developments a pedestrian and cyclist first planning approach, should be adopted. Under such an approach the requirements of the most vulnerable road users (pedestrians and cyclists) are considered first in all planning decisions that impact mobility.

To ensure the needs of cyclists are widely understood when they are considered in planning decisions, the following steps should be taken:

- Develop standards for cyclist requirements in different urban environments.
- Identify cycle infrastructure in plans, whether it is existing or proposed (funded or unfunded).
- Review current development codes for treatment of cyclists and integrate in the concept planning, estate development planning and development assessment processes.

3.6.3 Parking Policies

Parking policies should aim to provide the right amount of parking, in the right location, and at the right price to ensure alternative modes of transport, such as cycling, are not suppressed.

An over-supply of parking is generally an unintended consequence of minimum parking requirements. Currently in the ACT, the Parking and Vehicular Access General Code (effective 13 April 2012) stipulates minimum parking requirements for different land uses.

An abundance of no or low cost parking stimulates excessive demand for private vehicle based travel and lifestyle patterns, at the expense of other modes, such as cycling. Aside from impacting travel choices, over supply of parking can lead to:

- Economic impacts: the provision of parking is expensive and reduces the amount of land available for higher value activities
- Urban form impacts: parking takes up a significant amount of space and fragments urban form
- Environmental quality: excessive vehicle travel has negative impacts on the environment
- Social equity: the costs of parking are bundled into goods and services, meaning everyone in the community pays regardless of how often they use the parking supplied

To support greater levels of cycling, minimum parking requirements should be re-considered. Preferably, minimum requirements should be replaced with maximum requirements, which allow the market to determine the required number of car spaces for a development. However, this will only address future parking provision. Parking requirements with all centres within the ACT should be reviewed to identify opportunities to manage parking supplies in order to support the ACT's desired mode shares. This could result in a conversion of parking areas to higher yielding land uses. A public realm which is not dominated by cars and car parking will create an environment conducive to cycling and be a place that people want to visit, live and work in.

3.6.4 Behaviour Change and Marketing

Behavioural change and marketing programs are an effective method to encourage greater levels of cycling amongst all sections of the community. These programs intend to

alter the travel behaviour of communities and improve the perception of cycling as a viable mode of transport. Such programs can be targeted at different groups and scales. For example, a program may encourage school children to ride to and from school or a particular workplace to travel in a 'green' manner whereas at the other end of the scale it can be used to encourage political and institutional change.

Different psychological models of behavioural change can be employed, which include targeting the head (cognitive) and heart (emotive) decisions. Each model can also be applied at three broad levels, which include:

- The umbrella campaign – broad general awareness raising program to increase public and political awareness
- City wide campaign – may target specific audiences within the city
- Targeted individualised campaign – targets a specific group to influence/change a specific behaviour

All of the above mentioned programs follow a similar process in order to modify the travel behaviour of people. The broad steps in the behaviour modification process are as follows:

- Awareness – awareness of issues /solutions
- Acceptance – of the need to change
- Attitudes/perceptions – attitude to and perception of cycling and other transport
- Action – give cycling a try
- Consolidation – maintaining behaviour change

In the context of the ACT, potential behavioural change or marketing programs may include:

- Cycling promotion events such as Bike to Work/School week
- Development of cycling maps/multi-modal access guides identifying safe cycle routes and facilities to and from various key destinations (in addition to the existing Canberra and Queanbeyan Cycling and Walking Map)
- Personalised travel planning – this may initially be trialled in a government department and further expanded
- Green Travel Plans (GTP) for individual workplaces
- Bicycle pool fleet in workplaces – to encourage employees to cycle to meetings, workshops and the like that involve short trips. These types of facilities are already provided in some ACT Government workplaces
- Introduce free or low cost cycle maintenance and riding skills workshops
- Develop an online cycle route planning tool and Smartphone app
- Driver education programs to encourage drivers to 'look out' for cyclists and inform them of their legal responsibilities
- Cycling education and training programs for school students and other novice riders

3.7 Stage 2 Consultation Outcomes

After the development of preliminary options for assessment, stakeholders were again consulted through consultation meetings. Agency and Public stakeholders were invited to separate meetings in September 2012 to obtain feedback on the proposed options. The

feedback was then taken into account in the preparation of public display materials for community consultation, which was held in November 2012.

3.7.1 Stakeholder Engagement – Stage 2

After draft preliminary options were conceptualised, consultation sessions were organised to review and refine the options based on feedback from key stakeholders. These meetings were held with Agency and Public Stakeholders (separately) on 3 September 2012 and were again undertaken by EPD with the support of SMEC and Talkforce Media and Communication Specialists. During the consultation sessions, the background of the project and an overview of the Preliminary Options Report were provided, and participants were encouraged to ask questions about the project to clarify any outstanding issues.

Stakeholders welcomed the opportunity to provide feedback on the Draft Preliminary Options Report.

Feedback provided by stakeholders assisted in the formation of key proposals for inclusion in the Final Preliminary Options Report released for broader community consultation in November 2012.

Public and Agency Stakeholders provided comments on a number of issues related to this project, which include the following:

- The need to clarify project objectives to assist stakeholders in identifying a preferred option
- Capacity to compare options based on which types of cyclists will utilise the proposed infrastructure and how this will impact on long-term cycle commuter numbers
- Improving data collection in order to better understand how all types of cyclists access and use the network
- Reviewing descriptions of each of the main types of routes within the network – local, secondary and primary
- Including a cycle super highway in one of the options
- Removing or reducing the number of physical barriers cyclists face when riding, such as delays at intersections
- Clarification and better understanding of how cycle infrastructure is to be utilised and/or shared
- Increased investment in construction and maintenance of quality cycling infrastructure, this includes signage and lighting
- Making it cycling infrastructure safer for all types of users, including children and seniors
- Ensuring the needs of cyclists and cycle infrastructure planning is integrated with land use planning
- Reviewing the project evaluation methodology used for identifying cycling infrastructure priority projects
- Making suburbs more cycle and pedestrian friendly
- The need to consider whether a combined option would address issues raised by stakeholders

3.7.2 Community Consultation

Following the stakeholder consultations, a series of Community Information Sessions were conducted to obtain feedback from the general public. Five public information displays were held around the ACT from 1 November 2012 to 7 November 2012. These displays were visited by 129 members of the public.

Beginning on 8 November 2012, interested members of the public could visit the project website at <http://transportplanning.gov.au> and access information about the project and options, and provide feedback via a survey form or by emailing in a written submission. The feedback period was open for six weeks. Nineteen written submissions were received during this period and 143 people completed an online survey. In addition, six people filled in a feedback form at the public information displays.

The public were asked to assess four options for the ASCNP and indicate a preference. Based on the feedback received, Option 4 was overwhelmingly the most popular option. Nearly 70% of people who provided feedback named Option 4 as their preferred option. Respondents who chose Option 4 said this was their preference as it could create a comprehensive cycle network that would encourage more people to ride.

Through opportunities presented by the survey questions and the provision of written submissions, respondents were able to outline issues they had with the project or the options provided, and any additions they would like made to their preferred option.

Issues highlighted through this process include:

- The ASCNP must include all new development areas
- The need for a suburb specific focus rather than an ACT-wide approach
- The importance of defining the network/s, including level of service, and consistency in terminology
- The imperative for all transport users to feel safe and that this may require some segregation of cycling infrastructure
- The need to have a clear methodology for prioritising cycling infrastructure projects
- Improvements to intersections and crossings to ensure safe and speedy routes for cyclists
- The fact that many paths are shared by multiple users and this creates challenges that must be considered by this project. All classes of walking and cycling infrastructure should be considered
- The importance of ensuring people with a disability can also access active transport options
- The need for the current network to be completed to eliminate existing 'broken' routes
- Poor network maintenance and how this can impact on people choosing to ride bicycles
- The creation of 'home zones' or lower speed limits on certain roads that could be integral connectors within the network if more people felt safe walking or riding on them
- The fact other changes will also impact on cycling numbers including lighting and signage
- The need to encourage more children to ride and ensure the network provides safe passage to schools

- Integration with other forms of transport, particularly public transport
- The importance of having robust data and modelling regarding network usage
- The need to ensure ACT Government planning and policies are aligned to ensure an integrated approach to the cycle network
- Appropriate standards to underpin development of the ASCNP
- The importance of building on previous similar work and completing projects outlined in earlier reports
- Ensuring all transport users understand their rights and responsibilities, including car drivers
- Other factors that can help drive behavioural change
- Concerns regarding the consultation process

A large number of people also provided comments on specific projects that would help them ride more often or feel safer on their current cycling trips. Based on the feedback provided during the public consultation process, a Preferred Option Report was developed.

4 PREFERRED OPTION

4.1 Options Assessment Methodology

When assessing the relative merits of network options, it is beneficial to have an assessment methodology which consists of both quantitative and qualitative evaluation.

4.1.1 Quantitative Assessment

The quantitative assessment tries to identify value for money, which is essentially the amount of patronage increase for the money spent. The quantitative analysis, in addition to a multi-criteria analysis, has been developed by the project team with EPD as necessary additional information that will provide more perspective to the traditional Multi-Criteria Assessment (MCA) evaluation. The evaluation is based on preliminary modelling data and the indicative cost for the completion of each option. The model estimates how many additional trips would be generated in 2031 for each option compared with the business as usual (BAU) 2031 case from the model. The cost (based on the indicative costs in the Preliminary Options Report) of works for each option was then calculated, which allows the calculation of a ratio of patronage to cost. Note that pedestrian movements have not been modelled and do not form part of this quantitative assessment. A business case assessment of the preferred option (including BCR calculations) was completed in a separate Business Case Report. .

4.1.1.1 Options Modelling

The project team has modelled anticipated outcomes regarding cycling behaviour as a result of the implementation of the various options outlined in Section 3.3 using a distance-based mode choice model. This model was based on JTW data from the Australian Census and indicates that as the distance increases, the likelihood that people will choose to ride decreases. Other considerations in the model include:

- Facility type (on-road (without cycle lane), on-road cycle lane, shared path)
- Metres ascended (i.e. riding up hill, which is less desirable)
- Metres descended (i.e. riding downhill, which is more desirable)

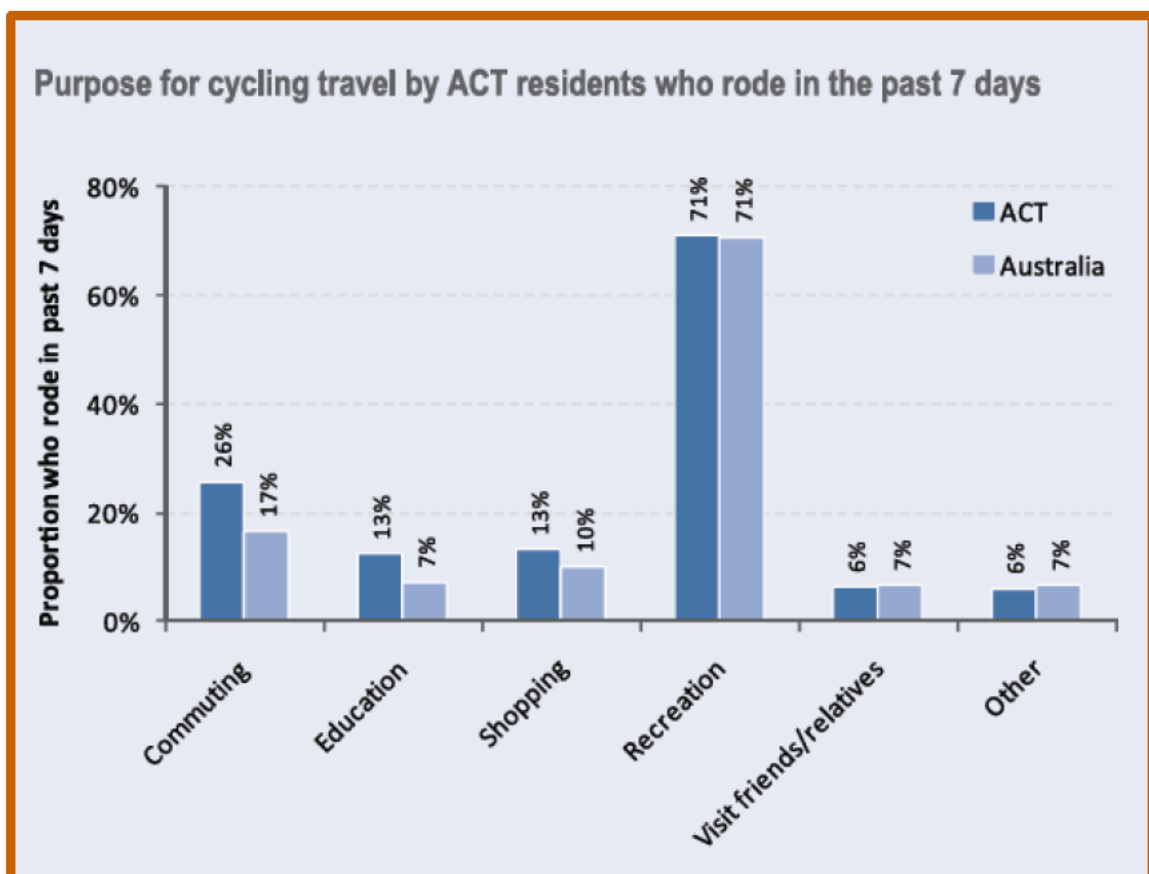
The modelling of the preliminary options was undertaken earlier in the project when the re-calibration of the 2011 Canberra Strategic Transport Model (CSTM) was still not finalised, so an earlier version of the model was used.

In carrying out the analysis of modelling results, it is worth reviewing the limitations of the information available from the model. It is only examining AM peak hour journey to work (or Home-Based Work, HBW) and journey to school (or Home-Based Education, HBE) trips. This means that the model does not identify trips generated by each option in an equitable or complete manner. Any option biased towards generating recreation, shopping or social trips will not have these trips identified, so its impact is difficult to accurately assess versus an option more biased to these more easily measured work and school trips.

The CSTM is a tool that can be used to assist in deciding what strategies can improve the mobility systems. When modelling active transport however there are several limiting factors:

- Data: only base model data is available to model persons who travel from home to work and people who travel from home to school (education) during the morning peak hour. This means the model only represents a fraction of the total trips made by cycling on any given day.

- Time and distance equating to cost is relatively robust for car travellers, however people may choose cycle routes and choose cycling over other modes for many reasons, not necessarily cost.
- Weather, scenery, recreation, social interaction, sport and other factors all play roles in peoples decisions about cycling, walking and running that are not dealt with in the modelling process.
- Trips made for other purposes (i.e. not from home to school or work) are not recognised. Trips to the corner shop, trips to a friend's house, and trips for fitness or exercise are not counted or analysed. Figure 14 shows for what purpose people in the ACT ride. It illustrates the high proportion of recreation trips that are not currently part of the model (these figures are for a minimum of once per week participation, not daily) and which are not able to be modelled using the existing model structure. The impact of these trips for other purposes may be significant.
- Measuring peak hour home based work and home based education trips are very important, as these are the trips that take cars off the network in the peak hour, which is important in extending the life of the road network.



Source: Australian Cycling Participation 2011, The Australian Bicycle Council and Austroads (2011)

Figure 14: Proportions of Different Cycling Trip Purposes in the ACT

4.1.2 Qualitative Assessment

The qualitative part of the assessment is mostly based on the initially proposed assessment methodology developed earlier in the study. The transport network design criteria have been weighted and each option scored. It should be noted that these scores are not absolute and that the methodology is designed to compare the worth and value of one strategy in comparison to others. It is not possible to establish an absolute transferable value to each strategy with this methodology.

In addition, three criteria have been included, which are:

- Recreational potential
- Feasibility
- Alignment with “Liveable Communities” program

The Alignment with “Liveable Communities” program should assist in accessing Commonwealth funding sources for future project implementation.

A Multi Criteria Assessment (MCA) has been developed for the prioritisation of cycling infrastructure projects, as part of the ACT active transport network. The MCA process was intended to be used in the selection of preferred network option as set out earlier. This process involves a subjective score on a range of issues which is then weighted using a numerical scoring in order to achieve a more balanced assessment.

The criteria developed for use in this assessment process are:

- Safety
- Creation of a complete network
- High quality infrastructure
- Directness of route
- Integration with public transport
- Integration with planning and development outcomes
- Accessibility for users and comfort
- Recreational potential
- Feasibility
- Alignment with the “Liveable Communities” program

The following sub-sections discuss each criterion in detail.

4.1.2.1 Safety

Cycle safety, real and perceived, is always identified as a major barrier to cycling (Mekuria, Furth, & Nixon, 2012; National Heart Foundation of Australia, 2012).

Significantly, 48% of respondents to the public stakeholder survey cited “feel unsafe riding a bike” as the most common barrier to cycling in the ACT.

The level of safety that might be afforded by each option is determined using the following criteria:

- Protection from Traffic

A major barrier to cycling uptake is the perception of the dangers related to bicycle collisions resulting in serious injury or death. Traffic speed also has a significant impact on perception of safety. Whilst it is acknowledged that traffic volumes are generally low in Canberra, there are peak times where higher volumes of traffic do exist, which can be a hazard for pedestrians or cyclists. However, the greatest actual issue of safety related to incidents on the off-road network and measures to improve the standard of the off-road network (such as segregation) should be afforded the highest priority.

- Intersections

Most cycling accidents occur at intersections, particularly uncontrolled intersections and roundabouts. Multi-lane roundabouts in particular are not safe, leading to

cyclists avoiding them (Cummings, 2011). Pedestrians often have trouble negotiating intersections that are heavily trafficked or are treated with roundabouts. Safety has been given the highest weighting of all the assessment criteria.

4.1.2.2 Creation of a Complete Network

This criterion relates to the coherency of the overall network. If existing treatments are fragmented and do not provide a continuously safe route, it is not likely to attract patrons, either cyclists or pedestrians. It is important that any additions to the network contribute to creating a continuous and cohesive network as opposed to a piecemeal approach. Projects should be considered for their ability to link to the existing network or ease of integration with the existing network. Schools, shopping centres, community facilities, tourist destinations, bus interchanges and work places all act as attractors and generators of traffic. The origin and destinations as generators of active transport must be considered when planning a network.

Creation of a Complete Network has been allocated a medium relative weighting of importance.

4.1.2.3 High Quality Infrastructure

Poor quality infrastructure impacts on the attractiveness of active transport, safety (real and perceived) and ease of use. Potential for improvements to infrastructure are considered a key element in attracting new users and include:

- Way finding infrastructure (signage)
- Road/pavement quality and condition (recognises that surface condition affects the safety and comfort of cyclists and pedestrians)
- Quality end of trip facilities (includes end of trip facilities at transport interchanges, public places and other major destinations)

High quality infrastructure is considered to be relatively important and is accordingly given a medium weighting.

4.1.2.4 Directness of Route

Directness of route impacts on both pedestrians and cyclists, but is more often raised by cyclists as an issue. Ideally cyclists should be able to equally access the same direct route available to vehicle traffic. However, in some instances it may be necessary to deviate a route for safety, segregation from high speed vehicle traffic and for space reasons.

The public stakeholder feedback noted that “a lack of clear and direct route” was the second most common barrier to cycling in the ACT and this criterion has been given a medium weight accordingly.

4.1.2.5 Integration with Public Transport

The geographic layout of the ACT means that in some cases active transport trips for commuting and/or shopping may be too far for some people to complete using just walking or on a bicycle. Co-location of active transport routes with public transport should help to increase the opportunities for multi-modal trips and in turn assist with increasing active transport use.

At this stage, this criterion has been assigned a moderate weighting relative to the other criteria.

4.1.2.6 Integration with Land Use Planning and Development Outcomes

Some active transport projects may link well to the development or renewal of urban areas in the ACT and to areas of future growth such as Molonglo (notwithstanding some

geographic constraints). Active transport measures are one of the real keys to the creation of vibrant and efficient mixed use centres. If people in these centres still feel they have to use their car to move around, one of the more significant relative advantages of this type of development is lost.

This is considered to be one of the most important criteria, linking people to a wider transport market, and has been assigned a high weight accordingly.

4.1.2.7 Accessibility for Users and Comfort

Cyclists can generally be categorised into two main groups (Mekuria, Furth, & Nixon, 2012):

- Confident cyclists – usually interested in travelling at high speed, very confident in traffic, and decisive.
- Children and novice (includes adults) cyclists – less confident, travel at a slower speed, may make sudden movements.

Traffic stress is a key determinant of the desirability of cycling especially for novice riders. As noted above, 48% of respondents to the public stakeholder survey cited “feel unsafe riding a bike” as the most common barrier to cycling in the ACT.

Accessibility and comfort for pedestrians is also a significant issue. Pedestrian facilities that are inclusive of shade or at least respite shade, places to rest, pavements free of interruptions and hazards, all contribute to the attractiveness and comfort of the pedestrian experience.

There was not a significant comment on this in the engagement process, however this criterion has been assigned a medium weighting.

4.1.2.8 Recreational Potential

Recreational trips make up the majority of all trips taken by bicycle in the ACT. According to the Australian Bicycle Council, of the 34,000 people who cycle at least once a week in the ACT, the main purpose for cycling was for recreation (71% of trips).

This criterion was not specifically raised by respondents to the consultation process, but from the data shown in Figure 14, recreation is one of the key purposes for making bicycle trips in the ACT. However, the targets in the *Transport for Canberra* document are destination based cycling trips and not recreational trips.

It was decided that while this is not apparently perceived as an important criterion, it should still be a consideration on the assessment and has been given a moderate weighting.

4.1.2.9 Feasibility

This criterion relates to the deliverability and constructability of the option. Obviously, options that are difficult to implement are less likely to enjoy success, even though they may theoretically appear to be able to deliver better active transport. This is quite a subjective judgement and will no doubt generate some discussion, but has been weighted as a relatively important assessment criterion and has been assigned a medium weighting.

4.1.2.10 Alignment with the “Liveable Communities” Program

The “Liveable Communities” (formerly “Liveable Cities”) program is a Federal Government initiative which seeks to fund planning and place making projects around Australia. Its primary focus is to support projects which are vital for the future sustainability of

Australia's major cities. Projects that align with this aim (such as could be argued with active transport programs) have been eligible for funding, however it is understood that the program is to be discontinued, and no new grants are available.

It has not been heavily weighted in the overall assessment, but this should still be a factor to be considered in the evaluation. It has been given a moderate weighting.

4.1.2.11 Environmental Impact

The impact of particular network routes on natural and cultural values has not been considered in this study. This assessment will occur during further feasibility studies of specific projects considered for implementation. It is recognised that some of the indicative routes may be inappropriate from an environmental perspective, and that it is likely that some of the potential routes will be ruled out on environmental grounds.

4.1.3 Assessment Outcomes

4.1.3.1 Quantitative Assessment Outcomes

A summary of the quantitative assessment outcomes is shown in Table 12 below. It should be noted again that the modelling results used here were obtained before the re-calibration of the 2011 CSTM was finalised. However, for the purposes of comparing the options, these results are considered to be suitable.

Table 12: Quantitative Assessment of Options

Quantitative Evaluation Criteria	Option 1	Option 2	Option 3	Option 4
Additional Cycle Patronage to the Network in 2031 (AM peak, HBW and HBE trips only)*	72	94	129	158
Indicative Cost (\$M)	52.3	38.9	44.5	101.2
Additional Patronage/\$M	1.38	2.42	2.89	1.56

*Difference between demand on the proposed network (options) and demand on the existing network

It should be noted that the cost estimates used for the assessment are generic (as well as very preliminary and indicative). These costs have been based on costs associated with past cycle projects and include a 40% cost contingency. However, for the purposes of comparing strategy options it is not considered that any inaccuracies will necessarily favour one option over another. These numbers are useful for this assessment only, which is to compare the proposed strategies/options against one another.

As mentioned earlier, the quantitative assessment results must be interpreted with an understanding of the limitations of the model. Off-peak trips are not analysed and there is a good case to say that off-peak trips are significant in the ACT (see Figure 14). Option 2 could potentially create the most off-peak trips and hence might "suffer" in this quantitative analysis. On this basis, it seems more appropriate to identify Option 2 and 3 as potential preferred strategies from a quantitative perspective and further examine the qualitative aspects of these options.

4.1.3.2 Qualitative Assessment Outcomes

The options have been assessed through qualitative analysis of transport network design criteria. It is understood that this analysis is not definitive, but compares the options against each other, not against any other standard. Similarly, the values and judgements

that have been assigned are relevant to this project only and are not transferable to other assessments.

The weightings for each criterion are discussed in Section 4.1.2 .

Table 13 shows the weighted scores resulting from the assessment. The more extensive options score highly with the 'complete' network options scoring highest of all.

Table 13: Qualitative Assessment of Options

Qualitative Criteria	Weight (%)	Option 1		Option 2		Option 3		Option 4	
		Raw	Weighted	Raw	Weighted	Raw	Weighted	Raw	Weighted
Safety	20	4	0.8	3	0.6	4	0.8	5	1
Completeness of Network	10	3	0.3	2	0.2	4	0.4	5	0.5
Quality of Infrastructure	10	3	0.3	4	0.4	4	0.4	5	0.5
Directness of route	10	4	0.4	3	0.3	4	0.4	5	0.5
Integration with PT	5	3	0.15	2	0.1	3	0.15	4	0.2
Integration with Land Use	15	3	0.45	3	0.45	4	0.6	5	0.75
Accessibility and comfort for users	10	2	0.2	3	0.3	4	0.4	5	0.5
Recreational Potential	5	1	0.05	3	0.15	4	0.2	5	0.25
Feasibility	10	4	0.4	4	0.4	3	0.3	2	0.2
Alignment with "Liveable Communities"	5	2	0.1	3	0.15	4	0.2	5	0.25
Total	100		3.15		3.05		3.85		4.65

Note: Range of weightings: High = 15-20, Medium = 10, Low = 5

There are several features of the assessment worth discussing specifically.

Although the safety rating is similar for all the options, it is for different reasons. Option 1 has the safety advantage of catering for cyclists travelling radially into Civic. A lot of this travel will be on routes adjacent to heavy traffic, sometimes at speed (>60km/h). Without an intervention, this is potentially the least safe of cycling journeys. This limits this travel option to all but the most accomplished of cyclists. Improving these routes, making them safer for a significantly broader range of cyclists, is considered a real benefit.

Option 2, concentrating on trips in and around centres also has safety benefits, but they are realised in a different way. Local trips are often made along a variety of street types and off-road routes due to the wider variety of destinations people seek out within a centre. Providing safer access in and around a centre will expand these local trips to a wider audience, with younger cyclists making local trips considered a key market. Expanding this market will potentially re-energise the next generation of cyclists and create lifelong habits of sustainable travel.

Options 3 and 4 are both different combinations of local and Civic-centre trips and include safety benefits of both these strategies. Option 3 is essentially a step to the completion of Option 4, which is considered the ultimate network option.

Obviously, Options 3 and 4 rate higher in the network completeness criteria, as they are in fact, more complete networks.

In assessing the quality of the infrastructure – this is not to say whether the facilities are well built, but how the infrastructure serves its user groups. Option 1 treatments are designed to get patrons to Civic. However, how users get to these key city bound routes can be somewhat of an issue. Option 2 infrastructure would involve a broader range of solutions, which would be a combination of mixed traffic, on and off street facilities. This can sometimes lead to legibility issues for first time users, and can sometimes prove frustrating for experienced commuter cyclists who just want to get to an arterial or high speed route to Civic.

The more extensive Options 3 and 4 are more wide-ranging options which provide a more comprehensive infrastructure strategy.

Another important criterion is integration with land use. This is particularly important for pedestrians. The nexus between land use and transport has been long studied; however the advantages of this integration have not been necessarily realised. Generally speaking, there is basically not enough dwelling density in enough locations that can take advantage of the broadest spectrum of transport options. Interestingly, the modelling has uncovered a travel characteristic, that there appears to be a link between propensity to cycle and income, as shown in Figure 15.

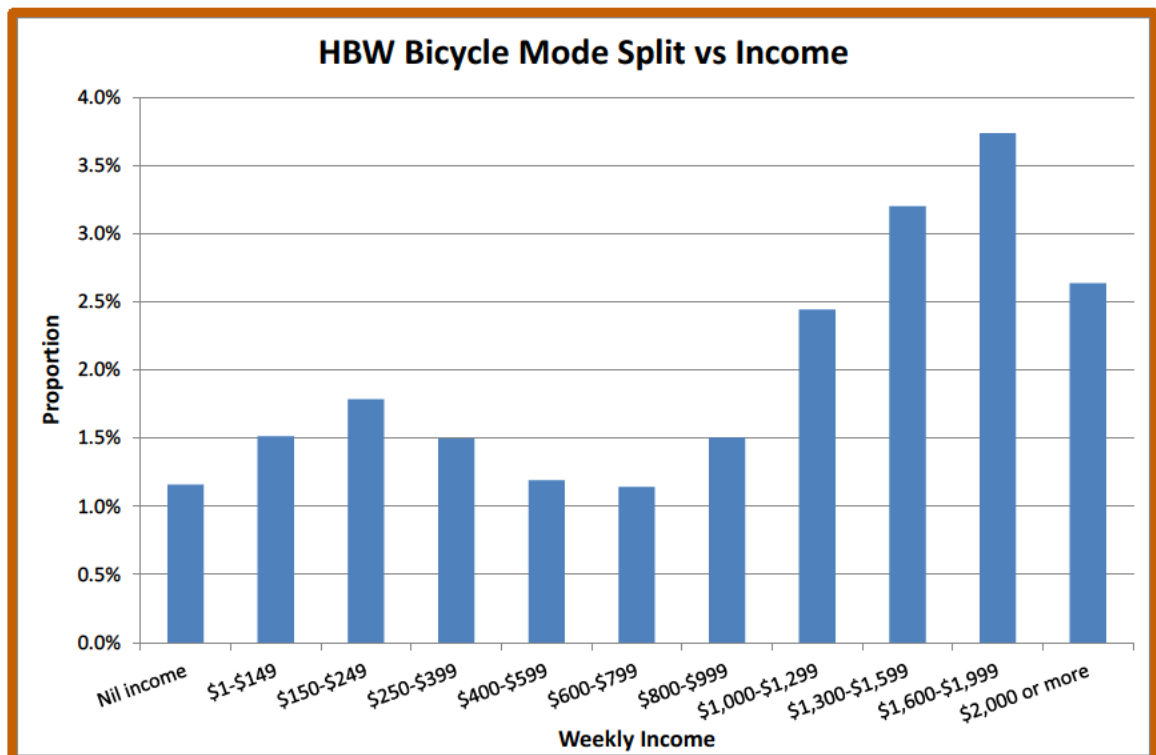


Figure 15: HBW (Home Based Work) Bicycle Mode Split vs Income

The relationship indicates that higher income groups are more likely to ride. It has been surmised that it is possible these groups may be more sensitive to environmental and health issues associated with private vehicle use and hence may be more likely to choose other modes. Another reason may also be that these high income groups can afford to live in areas that have more transport options due to location. That is, inner city suburbs that are within easy cycling and even walking distance to key destinations. This is possibly a key indicator to the importance of land use in mode shift. Perhaps even more key than infrastructure to generating active transport use is providing enough dwellings in locations that have a genuine mix of destinations (work, school, shops etc). Option 1 does have the advantage of providing a better network that may benefit some riders that travel longer distances, providing more opportunities to provide for existing land uses. Option 2 creates a better network for those already living in centres and will provide benefits for infill development in centres.

Options 3 and 4, to a certain extent, attempt to access both local trips and longer commuter style trips.

This is of course closely related to the criteria that assesses the alignment of each strategy to *Liveable Communities*.

Option 1 in this case provides infrastructure to the least preferred land use patterns. This is in a way a harsh assessment as it would be preferable for as many of these longer trips to be made by bicycle; however the preference maybe should go to the “centres” where people are more likely and more able to switch modes. For this reason, Option 2 has been rated higher than Option 1, however Options 3 and 4 have rated higher again due to their access to a greater spectrum of markets.

4.2 Stakeholder Consultation – Stage 3

A combined stakeholder consultation session was held on 13 March 2013. This meeting was very constructive and provided stakeholders an opportunity to provide feedback on the draft preferred option that resulted from the options assessment.

Overall, stakeholders supported the approach being proposed, which is to develop an overarching optimal network but specify projects that if undertaken in the short to medium term are likely to increase the number of people who cycle for transport or recreation.

Stakeholders provided comments on a number of issues related to this project. Issues included:

- How to strengthen the strategic vision contained within the ASCNP
- The need to develop a robust assessment methodology that will enable determination of priority cycle infrastructure projects
- Understanding which arm of the ACT Government is responsible for delivering on priority projects;
- Additional cycle projects that should be positioned as priorities
- Fixing broken links within the network
- Segregation of cyclists for safety reasons
- The impact implementation of other policies will have on the number of people who choose to cycle
- Integration of planning
- Making suburbs more cycle and pedestrian friendly
- Terminology of network routes

4.3 Preferred Option Recommendations

As a result of both assessment tools and feedback obtained from the stakeholder consultation, it is considered, purely from the perspective of delivering the best increase in bicycle patronage to cost ratio, that of the four options outlined in 3.3 , Option 3 is the option that should be pursued. It is considered the practical strategy to achieve the outcomes outlined in *Transport for Canberra*. However, the selection process followed in this report is not considered final and the outcomes of further stakeholder consultations in the future may lead to a change in the list of projects in the preferred option.

Although a network cost estimate has been provided for the purpose of modelling and development of a Business Case, there are a number of alternative ways in which to implement network improvements. These options include:

- First, as part of the maintenance program.
- Second, as part of asset creation in greenfield developments where provision of cycle network routes can be integrated in developing estate development plans or in planning schools.
- Third, as part of an upgrade program.

Further discussions with EPD and other key stakeholders led to the agreement that instead of having a cycle network strategy that outlines specific projects, a more preferred approach is to identify corridors and zones for cycling that will support future growth, based on the Option 3 network. This will provide implementing agencies (e.g. TAMS) greater flexibility in prioritising and identifying future cycling infrastructure projects as the strategy does not lock in specific projects but still provides guidance on where priority areas in the network are.

Figure 16 identifies the Primary corridors representing the linear travel to access Canberra's CBD which will largely form the Primary corridors and the Secondary zones surrounding major activity centres that contain either future growth areas or areas of employment. The Secondary zones will mainly be serviced by the Secondary and Tertiary

network. For each corridor and zone, the delivery of infrastructure would be subject to individual feasibility studies. The provision of infrastructure in each network (Primary, Secondary or Tertiary) is expected to be delivered generally in accordance with the structure outlined in Table 4.

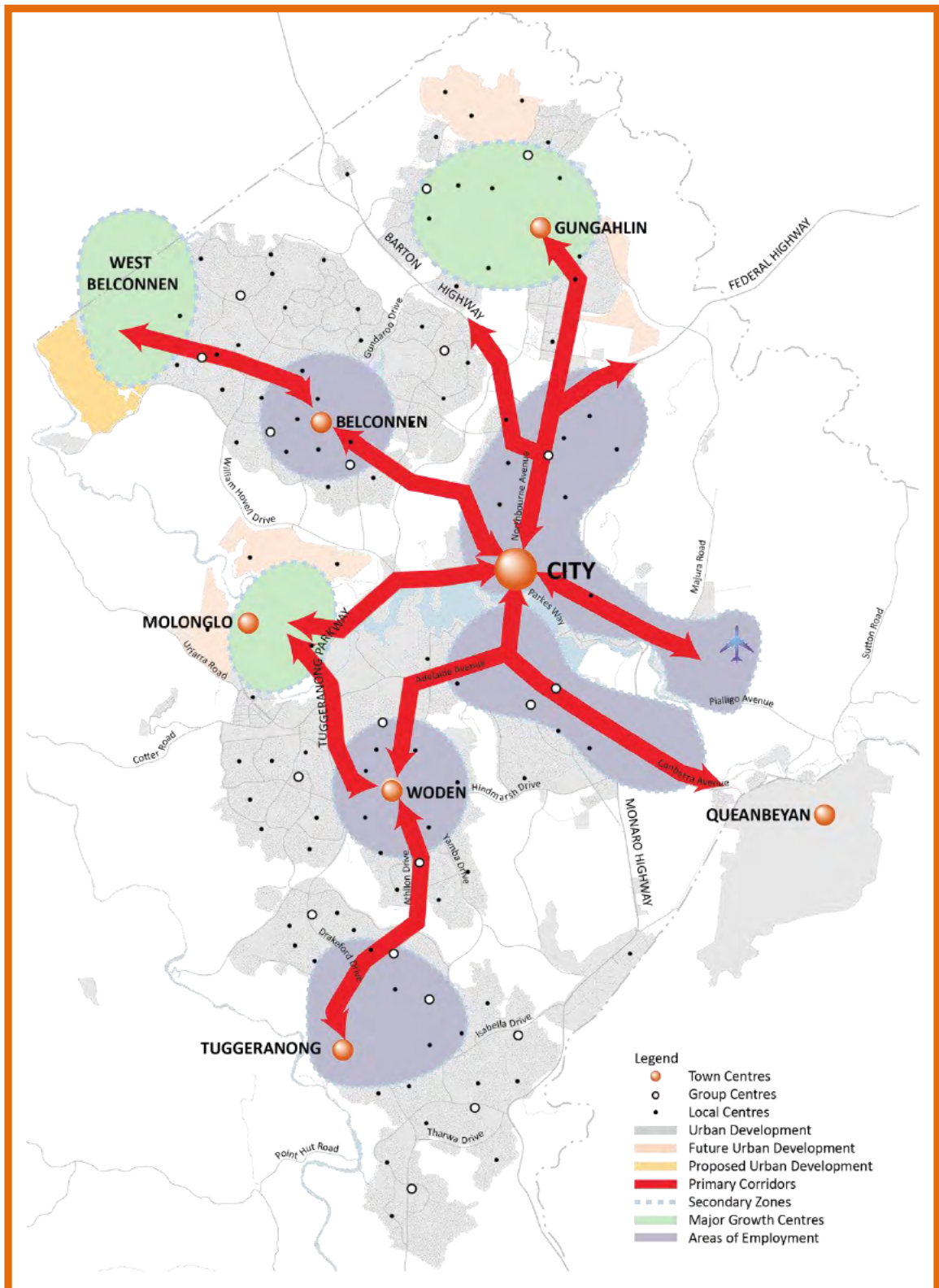


Figure 16: Primary Corridors and Secondary Zones (Growth Areas and Employment Areas)

4.3.1 Potential Network

To enable the development of an overall Business Case for the proposed cycle network strategy (please refer to the Business Case Report), a potential network (i.e. with specific projects) was conceptualised to estimate the implementation cost and forecast cycling demand. The potential network option was based on Option 3 but modified with additional projects and alterations to timing suggested by EPD and stakeholders during the Stage 3 Stakeholder Consultation process. Short term projects predominantly relate to committed projects that are included in the Primary corridors and Secondary zones. Medium term projects relate to addressing gaps in the Primary corridors and Secondary zones. Longer-term projects in Primary corridors and Secondary Zones predominantly relate to improvements to the standard of infrastructure provided and may include for example:

- Widening shared paths
- Intersection upgrades at key intersections to improve cycling priority and safety
- Implementing segregated cycle lanes on road
- Improving connections and integration between on and off road paths
- Improving line markings and signage of on-road lanes

A summary of the projects included in this potential network option is shown in Table 14 with an indicative network map shown in Figure 17. It should be noted that this is not the final list of projects but simply a representation of how the preferred cycle network strategy could be delivered.

Table 14: Summary of Indicative Projects in the Potential Network Option

Project ID	Location	Project	Timeframe
P01	Molonglo Valley	On-road lanes (segregated) and off-road paths	Short term
P04	MacArthur Avenue, Limestone Avenue and Fairbairn Avenue	On-road lanes	Short term
P05	Barry Drive, between storm water culvert just west of Kingsley Street and Marcus Clarke Street	On-road lanes (segregated)	Short term
P06	Benjamin Way between College Street and Emu Bank	On-road lanes (segregated)	Short term
P07	Civic to Airport via Constitution Avenue	On-road lanes (segregated)	Short term
P08	Canberra Avenue from National Circuit to State Circle	On-road lanes (segregated)	Short term
P09	Civic to Molonglo	Cycle Superhighway	Medium term
P13	Coulter Drive to Kingsford Smith Drive along Belconnen Way	On-road lanes (segregated)	Medium term

Project ID	Location	Project	Timeframe
P14	Belconnen to Kippax Group Centre via Southern Cross Drive	On-road lanes (segregated)	Medium term
P15	Beasley Street, Torrens and Hodgson Crescent to Melrose Drive, Pearce	On-road lanes	Medium term
P16	Torrens Street, Braddon	On-road lanes	Medium term
P19	Gungahlin to Civic	On-road lanes (segregated)	Medium term
P20	Tharwa Drive	Off-road path	Long term
P23	Kingston Foreshore	Off-road path link to Lake Burley Griffin	Short term
P24	Wentworth Avenue (Bowen Park to Fyshwick)	On-road lanes (segregated)	Long term
P25	Hindmarsh Drive to Red Hill Reserve, skirting or crossing Red Hill, then connecting to existing cycleway network at Flinders Way (Canberra Hospital Connection).	Off-road path	Medium term
P26	Lake Burley Griffin Circuit	Off-road path upgrade and completion of missing links in the Lake Burley Griffin Circuit	Short term
P27	Kings Avenue cycle	On-road lanes on Kings Avenue where gaps exist	Short term
P29	Mulanggari Grasslands Connection	Off-road path from Nudurr Drive to Gungahlin Town Centre	Medium term
P30	Federal Highway to Fairbairn Avenue	Off-road path from Federal Highway following Monash Drive alignment	Medium term
P33	Cotter Road to Hindmarsh Drive	Off road path from Cotter Road to Hindmarsh Drive	Medium term
P35	Hughes to Garran	On-road lanes along Kitchener Street and Gilmore Crescent	Long term
P37	Lanyon to Theodore Off-road connection	Off-road path through Canberra Nature Reserve	Long term
P42	Newcastle Street and Hindmarsh Drive	On-road lanes on Newcastle Street and off-road path along Hindmarsh Drive	Medium term
P44	Kingsford Smith Drive	On-road lanes	Long term
P46	Edinburgh Avenue	On-road lanes	Short term

Project ID	Location	Project	Timeframe
P47	Wendouree Drive	On-road lanes	Short term
P48	Downer On-road lanes, Antill Street and Philip Avenue	On-road lanes	Long term
P49	Wisdom Street Link from Yamba Drive to Carruthers Street	On-road lanes	Long term
P50	Federal Highway to Well Station Drive via Old Well Station Road alignment	Off-road path	Long term
P51	Antill Street to Majura Road	Off-road path	Long term
P52	Tuggeranong Parkway	Off-road path	Long term
P53	Capital Hill to Kent Street	Off-road path	Long term
P54	Erindale Drive through Canberra Nature Park	Off-road path	Medium term
P55	Long Gully Road to Coyne Street	Off-road path	Long term
P56	Hindmarsh Drive to Bugden Avenue	On-road lanes and off-road path	Long term
P57	Fill gaps Canberra Avenue to Adelaide Avenue	On-road lanes and off-road path	Medium term
P58	Wakefield Avenue	On-road lanes and off-road path	Short term

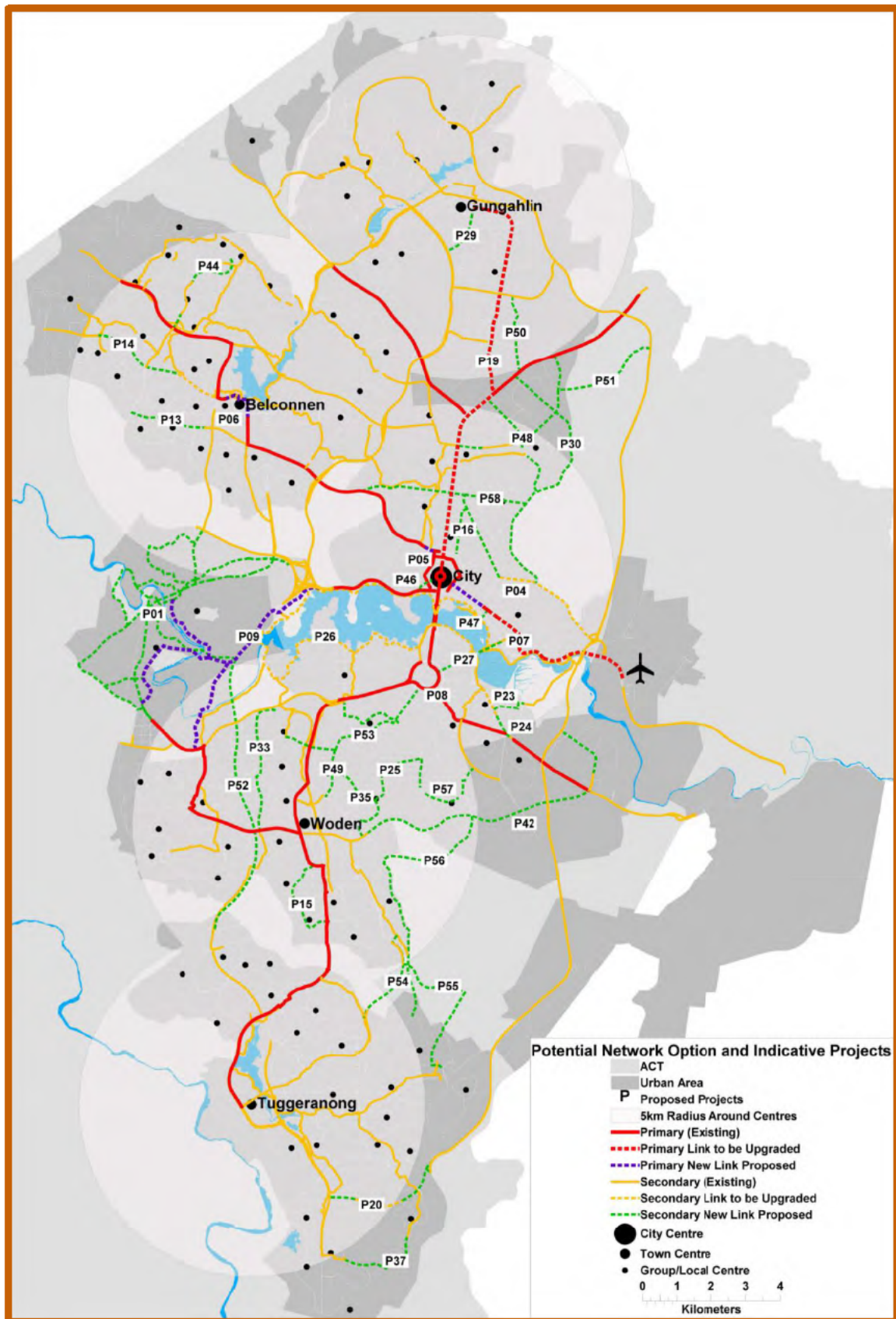


Figure 17: Potential Network Option Map

The preliminary cost estimate of delivering the projects identified in this potential network option is around \$60.2 million, excluding GST and contingency. The cost estimate does not include projects currently committed and does not consider other funding/delivery options of the network. This cost estimate comes up to \$92.8 million if GST and a cost contingency of 40% are included. As part of this option, there is no allocated budget for

intersection upgrades, cycle path or lane upgrades (only fills gaps) bicycle parking, lighting improvements, signage improvements, behavioural change programs or other supporting infrastructure, services and programs.

4.3.2 Delivering the Strategic Cycle Network

In order to deliver improved cycle infrastructure in the identified zones and corridors, the following tables provide indicative timings of the requirements in each corridor, growth areas and employment areas.

Table 15: Indicative Timing of Cycling Infrastructure Delivery in Growth Centres

Growth Centre	Infrastructure Needs Timeframe
Gungahlin	2-5 years
Molonglo	5-10 years
West Belconnen	10-15 years

Table 16: Indicative Timing of Cycling Infrastructure Delivery in Employment Areas

Employment Areas	Infrastructure Needs Timeframe
Belconnen	2-15 years
North Canberra and Majura (Airport)	2-10 years
South Canberra	2-15 years
Woden	2-5 years
Tuggeranong	2-5 years

Table 17: Indicative Timing of Cycling Infrastructure Delivery in Growth Corridors

Growth Corridors	Infrastructure Needs Timeframe
Gungahlin to City	2-5 years
Belconnen to City	2-5 years
City to Airport	2-5 years
City to Fyshwick/Queanbeyan	2-10 years
Molonglo to City	5-10 years
City to Woden	5-10 years
Woden to Tuggeranong	5-10 years

When delivering improved cycle infrastructure in the identified corridors and zones, cycle authorities should consider the following to ensure it is in accordance with the 8-80 concept:

- Direct – generally in Canberra, the most direct routes are along existing road corridors, however where there are opportunities to provide a more direct route that allows a travel time advantage, these should be pursued.
- Flat – where possible, cycle routes should follow corridors with minimal topographic variations.
- Legible – cycle routes along heavily trafficked roads are generally perceived as being more logical and easier to navigate than circuitous off road paths. Provision of way-finding signage will also assist with the legibility and anchoring paths with major landmarks.
- Uniform Design – ultimately, cycle routes and supporting infrastructure should be delivered/upgraded to be of a similar design to ensure the network/corridor is coherent.
- Safe – cycle routes should be visible from the road and neighbouring uses to ensure casual surveillance of cyclists to create a sense of security. Cycle routes should also be segregated from vehicle traffic and pedestrians where volumes warrant separation. Intersection designs should also be revised to allow for protection of cyclists as well as segregation of cycle routes that pass bus stops.
- Accessible from land uses – generally this requires cycle routes to follow road corridors that provide access to most land uses.

4.4 Pedestrians in Preferred Option

From a pedestrian perspective, programs should concentrate more on the centres. They should move people in and around centres and provide access to public transport to provide car free access to Civic, and a broader range of car free opportunities in general.

Whilst specific pedestrian projects have not been identified in this study, a number of criteria that should be used in establishing appropriate pedestrian environments for Option 3 have been outlined.

There are important objectives that must be met in the creation of successful pedestrian-friendly streets to be consistent with the objectives of Option 3:

- pedestrians must be able to feel safe and comfortable
- pedestrian access needs must be met
- pedestrian interaction with other street users must be able to be managed
- pedestrians must feel part of an environment, not an intruder in a space designed for another use
- there must be capacity for the anticipated use and users
- the pedestrian network must be permeable
- create intimate people spaces
- maintain visual connectivity
- create pedestrian priority
- maintain quality footpaths
- maintain equal access for all users
- make pedestrians a priority consideration at intersections

- provide connections to other streets and places

There are excellent streets that reflect these objectives and which successfully deal with pedestrian and people spaces – Hastings Street (Noosa, Queensland), shown in Figure 18, Mooloolaba Esplanade (Mooloolaba Queensland), Brunswick Street (Fitzroy, Melbourne, Victoria), Melbourne Street (West End, Brisbane), Victoria Street (Bunbury, Western Australia), Rokeby Road (Subiaco, Western Australia) and Salamanca Place (Hobart, Tasmania), shown in Figure 19, are some examples.



Figure 18: Hastings Street, Noosa



Figure 19: Salamanca Place, Hobart

Successful streets in centres and neighbourhoods provide a sense of 'being in a room' for pedestrians. This 'room' is created by the appropriate relationship of both vertical and horizontal space, as determined by street planting, street furniture and adjacent activity demand, an example of which is shown in Figure 20. On busy streets, the 'room' is a separate space where pedestrians feel safe and comfortable. On less busy streets the room can include the space used by other transport modes also, particularly where the space is shared. Whatever the room includes, it must be formed on a human scale and provide for people and their activities.



Figure 20: Height and Width Combine to Make a Complete Pedestrian Space on Oxford Street, Bulimba

Space for pedestrians is determined on a case-by-case basis. Consideration must be given to the number of people using the street, the type of trip and/or other activities in which people are participating, and other uses of the street. It is important that each street has some all-weather paved pedestrian space available if pedestrian activity is to be encouraged.

The risk of not having footpaths is that pedestrians will use the traffic lane which is not always acceptable and it is evident that pedestrian activity is not a priority consideration for use. Ideally, the pedestrian space should have some empathy for the surrounding land uses and activities. Too much space can be just as damaging to a pedestrian environment as too little space. Wide footpaths in less active places appear empty and detract significantly from street vitality. Narrow footpaths do not easily allow for gathering or dining space. In determining footpath space allocations, it is necessary to consider the relational aspects of the space. These aspects include, but are not limited to:

- pedestrian numbers
- adjacent built form
- traffic on adjacent roads
- street furniture and trees
- public transport waiting areas
- adjacent land use, dining and gathering opportunities
- utility services

Guidance should be taken from *Austrroads, Part 6A: Pedestrians and Cyclist Paths*, for pedestrian space requirements. The designer's role is to interpret these guidelines together with Austrroads guidelines to create a quality pedestrian space. Table 18 summarises guidance from *Austrroads, Part 6A: Pedestrians and Cyclist Paths*, regarding footpath users and the necessary footpath width required to serve them. As can be seen in the table, the width required for a shared pedestrian and cycle lane is between 2-4 meters.

Table 18: Pedestrian space width guidelines (*Austrroads, Part 6A: Pedestrians and Cyclist Paths*)

Uses	Width
Absolute minimum	1.2m
Wheelchairs to pass	1.5 – 1.8m
With high pedestrian volume	> 2.4m
Shared with bicycles	2 – 4m
With footway dining	5m
High volume, dining and gathering	6m+

It is difficult to imagine a street situation where the minimum width would be considered sufficient.

The UK Manual for Streets reproduces some pedestrian space advice from the Devon County Council concerning the generic space required for a particular activity. This information is reproduced here as Figure 21. The UK Manual for Streets recommends a

2.0 metre minimum, which is sufficient for two wheel chairs to pass. This is considered a reasonable minimum.

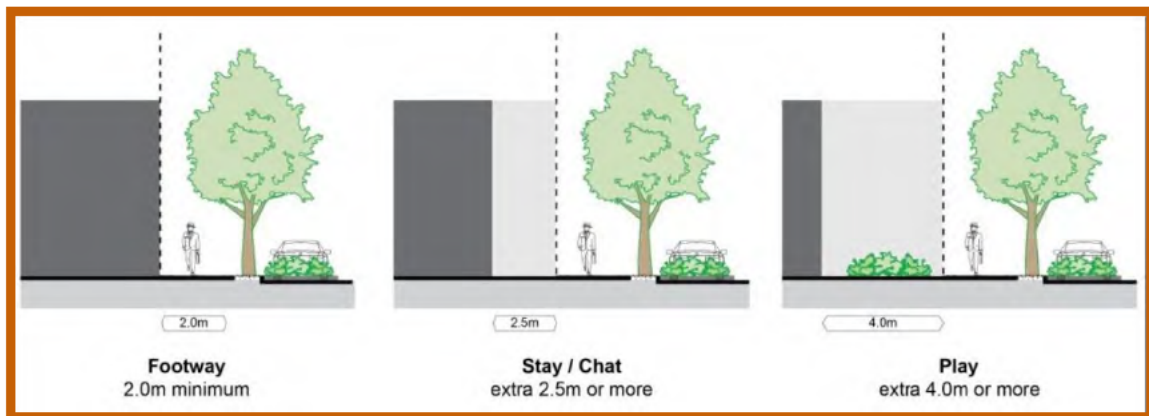


Figure 21: Advice for Pedestrian Space in Option 3

It is not sufficient to consider width alone and designers must consider all aspects of the pedestrian environment when selecting pedestrian space allocations.

4.5 Pedestrians at Intersections (and crossings)

Pedestrian movement across streets has to be facilitated. Each street type will have its own intersection design considerations which are discussed further, but all these intersection designs must provide for pedestrian movement as a genuine transport mode. Pedestrian crossing facilities that are mid-block can take several forms including pedestrian refuges, zebra crossings, pelican crossings and grade-separated crossings (over or underpasses). Additional to these is the very common practice in streets allowing pedestrians to pick their own suitable place and time to cross unaided.

When deciding how to deal with pedestrian crossings the following issues need to be addressed:

- available gaps (speed and volume) in opposing traffic
- length of crossing
- sight distance
- pedestrian crossing demand
- interaction with cyclists and bike lanes

Austrroads 2009 Part 4 Section 8 provides acceptable guidance on the design of refuges, zebra crossings and pelican crossings. The ACT Government Design Standards for Urban Infrastructure (DS13) also provide design guidance on pedestrian and cycle facilities.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The Plan was developed with the aim of developing a safe, direct and legible bicycle network that provides a viable alternative to driving for all cyclists in the 8-80 age group.

Four network strategy options were developed. After reviewing the options and evaluating using a modified assessment method from what has been initially proposed, an appropriate cycle network strategy for the ACT has been determined. This strategy is aimed at delivering cycling infrastructure that will promote a mixture of radial travel to Civic as well as local town centre/village based trips.

Option 3 was initially recommended as the preferred option but further consultations with EPD and other key stakeholders highlighted the need to provide implementing agencies (e.g. TAMSD) greater flexibility in prioritising and identifying future cycling infrastructure projects and the preference for the strategy to not lock in specific projects but still provide guidance on where priority areas in the network are. Therefore, the proposed cycle network strategy is to identify Primary corridors and secondary zones within the ACT network that would support future growth and development.

A potential network option, mainly based on Option 3 but with additional projects suggested by key stakeholders, has been proposed for the purposes of modelling and developing a business case. The projects included in this potential network option are not final but simply a representation of how the proposed Cycle Network Strategy could be delivered.

Whilst the impacts and costs of infrastructure provision are to some extent easy to measure and cost, the provision of infrastructure alone will not be sufficient to achieve mode share targets. Other elements relating to cycling will need to be given further consideration such as:

- land use policy
- parking strategies
- speed limits
- behavioural change and marketing campaigns
- people based street design

A key issue in the development of cycling as a genuine transport alternative is the systematic improvement of street design. The ACT Government could develop a broad set of street making policies and/or design guidelines that integrate the design of streets to be better places; more suitable for both pedestrians and cyclists and overall, a more healthy place to be and enjoy. Current codes only deal with vehicle issues and therefore tend to create car thoroughfares that may or may not be suitable for other modes. There are suitable examples in Australia (WA Liveable Neighbourhoods) and overseas (UK Manual for Streets; NACTO Urban Street Design Guide). This design philosophy and practice will slowly reduce the need to fill in missing links and retrofit local environments to create quality pedestrian and cycling places.

5.2 Recommendations

The following are recommended to progress the Plan:

- Adopt the Plan and integrate the potential network option in land-use planning, infrastructure planning and TAMS capital works program.
- Conduct further detailed feasibility studies of identified projects and for the provision of:
 - cycle infrastructure in the Primary corridors that focuses on the separation of cyclists from other modes of travel through physical segregation, noting that car and cyclist separation measures such as rubber kerbing and 'rumble strips' are currently being trialled in six locations across Canberra
 - cycle infrastructure in the Secondary zones
 - additional and improved cycle infrastructure in school catchments
- Undertake a comprehensive review of the ACT vehicle parking policies and amend where necessary to ensure policies support the provision of the right amount of parking, in the right location, and at the right price so that alternative modes of transport, such as cycling, are not suppressed.
- Develop a suite of behavioural change and marketing programs that encourage greater levels of cycling amongst all sections of the community, including:
 - cycling promotion events such as Bike to Work/School week
 - development of cycling maps/multi-modal access guides identifying safe cycle routes and facilities to and from various key destinations (in addition to the existing Canberra and Queanbeyan Cycling and Walking Map)
 - personalised travel planning – this may initially be trialled in a government department and further expanded
 - Green Travel Plans (GTP) for individual workplaces
 - bicycle pool fleet in workplaces – to encourage employees to cycle to meetings, workshops and the like that involve short trips. These types of facilities are already provided in some ACT Government workplaces
 - introduction of free or low cost cycle maintenance and riding skills workshops
 - development of an online cycle route planning tool and Smartphone application
 - driver education programs to encourage drivers to 'look out' for cyclists and inform them of their legal responsibilities
 - cycling education and training programs for school students and other novice riders
- Investigate alternative ways of implementing network improvements such as being part of:
 - TAMS maintenance program
 - TAMS upgrade program
 - asset creation works being undertaken by EPD and the Chief Minister Treasury and Economic Development Directorate (CMTEDD) in greenfield developments where provision of cycle network routes can be integrated in developing estate development plans or in planning schools

- To ensure the needs of people who currently cycle, and those who are likely to cycle given an appropriate environment, are widely understood when they are considered in planning decisions, the following steps should be taken:
 - develop guidelines and standards for cyclist requirements in different urban environments
 - identify cycle infrastructure in plans, whether it is existing or proposed (funded or unfunded)
 - review current development codes for treatment of cyclists and integrate in the concept planning, estate development planning and development assessment processes
- Consider the needs of pedestrians, especially in centres, to create pedestrian friendly streets.
- Develop a broad set of street making policies and/or design guidelines that integrate the design of streets to be better places; more suitable for both pedestrians and cyclists and overall, a more healthy place to be and enjoy.

APPENDIX A BACKGROUND REVIEW AND ANALYSIS OF EXISTING CYCLE NETWORK

APPENDIX B PRELIMINARY OPTIONS REPORT



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ACT Strategic Cycle Network Plan Preliminary Options Report

For: Environment and Sustainable Development Directorate

13 NOVEMBER 2012

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GLOSSARY OF TERMS

Strategic Cycle Network	The comprehensive network of bicycle paths, lanes and facilities proposed to meet the long-term transport bicycle mode share target for the ACT in 2026. The bicycle paths, lanes and streets that comprise the strategic cycle network are classified as primary, secondary or tertiary routes depending on their function.
Primary Network	Routes that carry cyclists across the city, linking the City Centre, Town Centres and other major attractors in the most direct and efficient manner, catering for high volumes of cyclists
Secondary Network	Routes that link the primary network and local areas that act as feeders. They have a greater spread over the city than primary routes but carry lower volumes of cyclists
Tertiary Network	Routes within local areas, more suited for shorter and lower volume trips and connect other parts of the network
Cycle Network	The collection of cycle routes
Cycle Route	A section of a cycle network that consists of various types of cycle paths and cycle lanes
Home Zone	Streets where pedestrians and cyclists have priority over general traffic and there is traffic calming and low speed limits e.g. 20 km/hr
Shared space	An area where pedestrians, cyclists and motor vehicles all have equal priority and share the available space
Segregated facility	A cycle path that is for use only by cyclists
Cycle Highway	High standard cycle routes designed to be direct and enable cyclists to maintain a high average speed. They are often segregated from general traffic.

1 INTRODUCTION

This study is a key component of the ACT Government's Transport for Canberra policy. Transport for Canberra aims to increase active travel and reduce reliance on cars. According to 2006 census data, 81% of Canberrans drive to work, compared to a national average of 69.7%.

High car use contributes to congestion, greenhouse gas emissions, air and noise pollution and sedentary lifestyle diseases like heart disease and diabetes. By getting more people to walk, ride or catch public transport to work and school, many of these challenges can be addressed.

The ACT Government has committed to increase the share of cycle trips to and from work to 7% by the end of 2026. This represents a trebling of cycling mode share, accompanied by increasing demands on the existing and future cycle network.

Implementing Transport for Canberra has involved the commissioning of feasibility studies to identify and progress infrastructure projects that will make it more attractive for people to cycle to work and school and ride for exercise and recreation.

The aim of this report is to introduce different options addressing the future cycling needs of the ACT. The four options focus on delivering different components of a comprehensive Strategic Cycle Network for the ACT. The Strategic Cycle Network is a comprehensive network of cycle routes with a basic structure that is characterised by the activity centres hierarchy in the ACT. The intended objectives to be achieved by the development of the Strategic Cycle Network include:

- Increasing cycling commuter numbers
- Reducing transport emissions and congestion
- Promoting an active lifestyle

The Strategic Cycle Network consists of three main components:

- The Primary Network – routes that carry cyclists across the city, linking the city centre, town centres and other major attractors in the most direct and efficient manner, catering for high volumes of cyclists.
- The Secondary Network – routes that link the primary network and local areas that act as feeders. They have a greater spread over the city than primary routes but carry lower volumes of cyclists.
- The Tertiary Network – routes within local areas more suited for shorter and lower volume trips and connect other parts of the network. They tend to be more circuitous as they provide an access function.

As a result of the work undertaken so far, three options have been identified, each fulfilling different objectives and addressing the different cyclist needs. A fourth option is a comprehensive network incorporating a large number of the initiatives identified in the other options. This option is the ultimate goal for the long term.

This study examines how the government targets could be met and provides a basis to examine the feasibility of the proposed works to try to achieve targets. The proposed projects and options are put forward to test feasibility and interest; it does not represent a commitment to implement the preferred option. This work is found on a strategic view of a possible cycle network i.e. strategic cycle network.

2 CONTEXT

The ACT Government is committed to a 40% greenhouse gas emissions reduction by 2020, based on 1990 levels, and an 80% reduction by 2050.

To achieve this, *Transport for Canberra* (2012) introduced a mode share target for Journey to Work (JTW) trips as part of the broad strategic direction for an integrated and sustainable transport network for the ACT. Although only goals for JTW trips are set, other trips such as local trips are highly important in developing a cycling culture. For JTW cycling, the recommended incremental mode share targets were:

- 2006 (actual) 2.5%
- 2016 (interim) 6.0%
- 2026 (long-term) 7.0%

These targets relate to all cyclist journeys from doorstep to work. This represents an ambitious trebling of cycling's mode share, accompanied by increasing demands on the existing and future cycle network.

As part of integrated planning, the ACT Government has prepared a large suite of plans that support the overall goal. A key change to land use is proposed through the ACT Planning Strategy 2012, which aims to increase opportunities to live close to work and reduce car-based transport demands, by encouraging urban intensification in the metropolitan area.

While the ACT has an extensive network of on and off-road cycling routes, the ACT Government is seeking to understand whether the current approach to providing cycle infrastructure will be sufficient to achieve its targets, and what changes are required. In particular:

- The current network is incomplete – what are the remaining barriers and priorities for development?
- How does the current network and the planning for new development need to change with planned urban intensification?
- How does the quality of the infrastructure compare with projected needs – notably capacity and safety – and how does this need to change? Do design standards need to be updated, and if so, how?

Overseas experience indicates that a different approach to infrastructure is required compared to the current practice in order to achieve the widespread uptake in cycling necessary to achieve the *Transport for Canberra* targets. Some examples of treatments that have led to widespread cycling amongst the populations of different cities are given below:

- Increased Cycle Parking
 - Countries and cities such as Amsterdam, Denmark, Odense, and Groningen all provide high-capacity bicycle parking facilities at their main railway stations, with lower order stations providing some level of bicycle parking. Throughout the cities bicycle parking is provided at various locations and is generally a requirement for all new developments.

- **Electric Bikes**
 - Many Chinese cities have historically had high levels of cycling, although cycling rates have been declining in many major cities as the Chinese economy continues to grow and more Chinese begin to drive. Cars are still costly to purchase and operate for much of the population and so for many Chinese, electric bikes represent a more affordable and practical mode of transport. More than 25 million electric bicycles were sold in China in 2011.
 - In many European countries, electric bikes are legal but legislation requires the speeds to be governed to approximately 25km/h. The availability and classification of electric bicycles as normal bicycles increases the usability and potential number of bicycle users. For example people who may have previously been physically unable to ride a traditional bicycle or may have been deterred from riding due to the topography of an area.
- **Segregated Facilities**
 - Safety concerns related to cycling are often cited as deterrents to cycling for many people. The implementation of cycling facilities which are physically segregated from general traffic when widely implemented have often led to higher levels of cycling in a city by a broader cross section of the community.
 - In Seville, Spain prior to the development of 165 km of segregated bike facilities, cycling accounted for approximately 0.2% of all trips, whereas it is now 6.6%. Specific examples of increasing levels of cycling related to the upgrade of existing bike lanes to segregated facilities is in Chicago, Illinois, USA on Kinzie Street, where a 55% increase in cycling levels occurred following the implementation of segregated facilities.

The difference in the approach to cycling from the existing, to that needed to achieve the ACT Government's goals can be best described as:

- The current approach is likely to increase cycling numbers essentially by achieving modal shift within the demographics and travel patterns of people similar to existing cyclists. While the actual cycling base is broader than just this group, insofar as the current approach does not appeal to a broad demographic base, modal shift must be very large to achieve overall targets.
- A different approach is to provide a quality of infrastructure that attracts and serves the widest demographic base possible. This is sometimes encapsulated by the concept of 8-80 – a network that can be used safely and independently by anyone in the 8 to 80 year age group. This approach aims to generate more modest modal shifts across a broad base in order to achieve the overall targets and is the approach that has been most successful overseas. Notably, in countries with high levels of cycling, more women than men participate as utility and commuter cyclists. The levels of women cycling in a number of northern European cities is similar to those of men with 49% of cyclists in Germany being women, 45% in Denmark and 55% in The Netherlands, however rates of utility and commuter cycling are highest amongst women; for example in Denmark 17% of men cycle to work, while 36% of women cycle to work.

Treatments such as shared spaces and segregated facilities, as well as provision for electric bikes and increased cycle parking, are part of the 8-80 approach used overseas to stimulate cycle use. These treatments are of increasing interest and use interstate, for the same reason.

The ACT is well-positioned to adopt such a change in approach due to its very solid planning. Its existing off-street cycle network provides a good base and it has generally

fewer space constraints than unplanned cities such as Melbourne or Sydney, and more open space available for off-street facilities than Adelaide.

That is not to say that developing a new network approach will not be without its difficulties in the ACT as the very space that presents an opportunity also makes cycling distances longer and imposes a higher cost on development. Further, the city's strong design hierarchy for motorised traffic is not necessarily compatible with non-motorised traffic and this mismatch has implications for network provision.

The current project examines and develops the infrastructure side of a Strategic Cycle Network Plan (SCNP) that will aim to deliver *Transport for Canberra's* targets. The ACT's SCNP will address network, behavioural and infrastructure barriers to cycling, and develop strategies to meet and manage increased demands on the network over time. The SCNP will also link with future land development and urban growth. More details of the project methodology are shown in Chapter 3.

This report follows on from the *Background Review and Analysis of Existing Cycling Network – ACT Strategic Cycle Network Plan Technical Report* prepared by Spackman Mossop Michaels and stakeholder presentation of options for network improvement.

3 PROJECT METHODOLOGY

Stage 1 of the project is focused on gathering background information and examining the existing ACT cycle network and standards. From this review and Stage 1 stakeholder feedback, the requirements for the strategic cycle network were developed. *Figure 1* shows the methodology for this study.

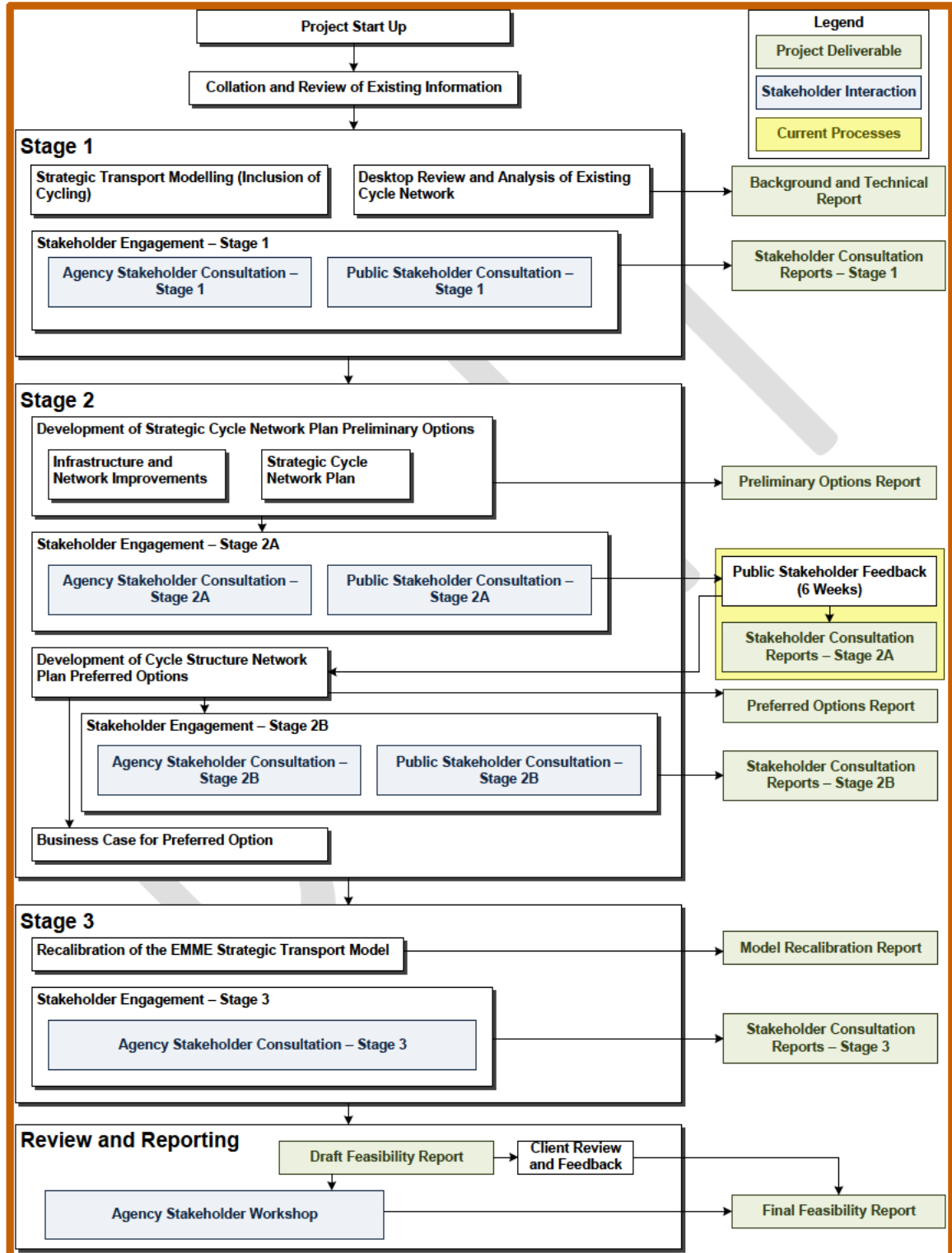


Figure 1: Study Methodology

Stage 2 of the project involves developing preliminary options and presenting these options to agency and public stakeholders – this is where the project currently stands. Based on the feedback from the stakeholders, the options will be refined and then presented to the community. The stakeholder and community feedback will then be used to inform and refine a preferred option, which will be shown to stakeholders and the community for more feedback. A business case will then be prepared for the preferred option.

The third stage of the project involves recalibrating the existing strategic transport model based on the 2011 Australian Bureau of Statistics (ABS) census. The updated model and results will be presented to agency stakeholders.

Finally, the project process and outcomes will be collated into a report. This report will be presented to agency stakeholders and, based on their feedback, will be refined into the final report for the project. This final report of the ACT Strategic Cycle Network Plan will inform progressive cycle path development during future land planning, land development and capital investment.

4 REVIEW OF THE EXISTING NETWORK

In Stage 1 of the project, the *Background Review and Analysis of Existing Cycling Network* (Spackman, Mossop and Michaels for SMEC, 2012) identified a number of key issues in the network and made recommendations that are considered in the development of the network options. The report included a road corridor assessment, review of ACT Cycleway Design Standards, a transport planning assessment and a review of international best practice in cycle network design.

In summary, the review made the following observations about the ACT Cycle Network:

- The majority of commuters were using off-road cycle facilities
- Canberra has many wide road corridors that are suitable for retrofitting cycle facilities, including increasing and improving the off-road network
- ACT policy states that on-road cycle facilities must be provided on arterial roads
- On-road cycle facilities are located on arterials and major roads. This has implications for safety.

The review made the following recommendations:

- Road corridor on wide arterials should be reserved for off-road cycle facilities
- Improvements are needed to the integration and connection between on and off-road paths
- Duplication of on and off road paths within the same road space should be removed
- All arterial roads should have separated cycleways
- A review of speed zones should be conducted to identify areas where 40 km/hr speed zones may be suitable
- Develop a system for conducting trip counts along key on and off road cycling routes that can be used to establish a robust baseline of data and track changes in use over time

The report also identified a range of infrastructure and best practice policy to be considered for implementation in ACT.

In relation to the recommendation that duplication in the network be removed, it is noted that, at present, the duplication provides more options for cyclists in choosing where to ride and cater for the varying skill levels and preferences amongst cyclists. Although the quality of the on-road cycle facilities is currently low in some cases, more confident and/or faster cyclists will likely appreciate the alternative to shared paths, where they have to compete for space with slower cyclists and pedestrians. Where duplication in the network exists, mapping and public education should indicate which cycle facilities may be unsuitable for inexperienced riders. For this reason the report supports the duplication of cycle facilities, particularly in high use corridors such as Northbourne Avenue and does not suggest the removal of duplications in any part of the network.

The introduction of reduced speed zones is supported and discussed further in Section 7.3.1.

4.1 Summary of Initial Consultation Outcomes

4.1.1 Stakeholder Consultation – Stage 1

Initial stakeholder consultation highlighted issues in the current cycle network that need to be addressed in order to improve the safety, quality and connectivity of the network.

Stakeholders provided a list of projects that need to be completed within the existing cycle network including:

- Better links needed to outlying centres, such as Queanbeyan, Curtin and Macquarie (specifically the Jamison Group Centre)
- Better connectivity to office buildings in Civic area
- Intersection improvements including changes to traffic lights and lanes
- Safer crossings and connections between off-road paths
- More lighting in the off-road network
- Specific sites mentioned included:
 - Improvements to the cycle paths around Lake Burley Griffin
 - Improvements to Northbourne Avenue or improvements to an off-road path following as an alternative
 - Improvements to the crossing at Bowen Place (scheduled)
 - Civic Cycle Loop
 - A Cycle Highway between Molonglo and the city
 - Improvements of the network between Dickson to Civic

The stakeholders also identified issues relating to conflicts between users of the shared off-road paths, namely that space is not clearly demarcated for cyclists and pedestrians and that there is not enough space for all users such as people with disabilities utilising mobility scooters and wheelchairs.

Safety on major arterial roads such as the Monaro Highway, which is a key freight corridor utilised by B-doubles, was also identified as a key issue.

4.1.2 Stakeholder Engagement – Stage 2A

Two stakeholder engagements have been planned for Stage 2. The first was for consultation on the preliminary options during Stage 2A, while the second is for consultation on the Strategic Cycle Network Plan preferred options during Stage 2B.

In the initial part of Stage 2A, stakeholder consultation was carried out in workshops, with the feedback separated into two categories; Public Stakeholders and Agency Stakeholders. Draft preliminary options for the strategic cycle network were presented. These workshops were followed by further public consultations with an ongoing six week feedback period.

4.1.2.1 Agency Stakeholders

The Agency Stakeholders discussed the need for clear project goals and objectives, otherwise it would be difficult to determine which option presented the best solution.

The Agency Stakeholders listed the primary objectives to include:

- Increasing cycling commuter numbers
- Reducing transport emissions and congestion
- Promoting an active lifestyle

Stakeholders enquired if increasing local routes would only increase recreational cycling, while investing in only the primary network may only increase commuting cyclist numbers. While the primary routes were identified to increase the number of commuting cyclists, it was also stated that this may decrease the numbers of future commuters (school aged children).

The Agency Stakeholders also expressed concern that journey data besides JTW trips was not being captured.

They also felt that safety was an issue, due to the high cost to the health system of accidents involving cyclists. It was discussed that further infrastructure must provide a safe journey, and include enforcement of speed limits on shared cycle paths.

Education of other transport infrastructure users was another issue, with the animosity between pedestrians and cyclists and cyclists and car drivers being identified.

4.1.2.2 Public Stakeholders

Public stakeholders were asked to consider the four draft options (following this consultation the proposed options were revised to provide greater clarity and respond to feedback). General comments made by stakeholders included:

- Stakeholders identified gaps in the network, particularly between Belconnen and Tuggeranong
- Topographical barriers, such as steep hills and intersections with roads, between Tuggeranong and Woden were also identified as requiring additional planning
- The shared path around Lake Burley Griffin is part of the primary network, and while improvements in the primary network are aimed at commuting cyclists, the path around the Lake attracts a wide range of users of various skill levels
- “Home Zones” were also suggested, with a reduced speed limit in residential areas, increasing the safety of cyclist to use the roadway, removing the need to use footpaths
- Stakeholders again identified the Home Zone idea of reducing on road speed limit to 30 km/hr in areas that are clearly residential. This approach could be integrated with school travel plans.
- Stakeholders asked for clarification on primary routes, to define if they are based on connecting town centres or if they are identified through volume of users. It was suggested that demand be the primary factor in determining the hierarchy of a route. It was also identified that primary routes should focus on areas of interest other than workplaces, such as shopping centres, bus stops etc.
- Stakeholders recommended pursuing some of the immediate strategies immediately
- Improvement of existing primary routes to meet new standards
- Lack of end of journey facilities, such as parking, were also identified as an issue
- Stakeholders felt that terms used in explaining types of routes should be more clearly explained

- It was suggested that the report rates options based on which cyclist groups would benefit most from each option. Stakeholders reiterated the need for not only adults to ride but for children too
- Stakeholders raised the need to increase signage. Barriers such as kerbs should be limited to encourage connectivity
- A lens approach should be taken as opposed to a one size fits all approach. Neighbourhoods should decide which projects they want to prioritise based on the budget allocated for the area.

The next stage – Stage 2B – will include consultation on the preferred options, and is yet to be conducted.

DRAFT

5 NETWORK DESIGN

As part of Stage 2A, the feedback from stakeholders was examined to develop preliminary draft options. This work has focused on network design.

This section provides an overview of the approach to the network options development, it covers:

- Design principles
- Cyclists' needs
- Network components
- Approaches to develop a network

5.1 Network Design Principles

The proposed options for the future development of the ACT Strategic Cycle Network are developed with consideration of the following design principles:

- Connectivity – providing cyclists with more route options to get to key origins and destinations
- Directness – providing cyclists with the quickest, yet safe route wherever possible
- Safety – providing cyclists with the safest route possible
- Integration – providing connection with end destinations, public transport and across the network
- Legibility – providing a cycle network that can be navigated with ease
- Accessibility for all users – enabling cyclists across all ages and abilities to feel they are safe, and that their cycling activity is welcome and encouraged
- Quality – providing cyclists with quality infrastructure that is improved over time
- Clarity – providing logical and clear to follow paths
- Comfort – providing cyclist with smooth riding surface, minimum obstruction and comfortable gradient

If the network is able to apply these principles, then cycling targets are more likely to be met as cycling will become easier, more accepted and desirable.

5.2 Cyclists' Needs

Primarily the ACT's goals for increasing cycling numbers are about Journey to Work mode share. However there is a real need to encourage new riders in order to grow overall ridership and maximise utilisation of cycling infrastructure and facilities. This includes teaching children to cycle when young, so that they become confident cyclists when older. Wider benefits such as health outcomes need to be considered as well, as cycling trips, whether short or long, contribute to daily exercise that helps to reduce the risk of obesity and related illnesses.

Many short everyday trips, such as picking up a few groceries, can be undertaken by cycling. The network is not currently designed well for these types of uses as development has mainly focused on providing core routes that are most suitable for longer trips such as commuting and recreational riding. This needs to be considered in conjunction with land use planning, to ensure that new development provides opportunities for everyday local

cycling trips with adjustments needed to the overall network required over time. *Table 1* summarises types of cyclists and their needs.

Table 1: Cyclists and their Needs

Cyclist	Needs/Types of Trips
Commuters (experienced)	These cyclists are often undertaking longer trips, will choose the quickest route even if there are safety risks.
Commuters (inexperienced)	Novice riders attempting a cycle commute may not be very confident and may prefer to stick to off-road paths or on-road paths with a high degree of separation from general traffic.
Primary school children	School trips are generally short and localised. They need to be safe and off-road whenever possible (an off-road network cannot physically be provided from every school child's home to their school).
Secondary school children	Can be very confident and able to ride longer distances, but are still best served by off-road and local street routes.
Recreational cyclists	These cyclists may like to take scenic trips at a leisurely pace, most likely to use the shared path network.
Sporting cyclists	Are most interested in speed and distance, should be discouraged from using shared paths.
Short utility trip cyclists	These cyclists are undertaking short trips to meet every day needs, mostly in and around their local neighbourhood.

This table forms part of the basis for consideration of how the network should be developed based on needs. Not all parts of a cycle network are suitable for every type of cyclist, and this needs to be considered in selecting an approach to develop the Strategic Cycle Network, especially if an 8-80 approach is desired.

5.3 Infrastructure Design Hierarchy

The ACT's road network is well-defined for motorised vehicles, but less so for cycle infrastructure. In particular, the hierarchy used for motorised vehicles is designed around different parameters of road users, travel patterns and vehicles. As these combine to form the philosophy underpinning the design hierarchy, the different parameters applicable to cyclists need to be acknowledged and the implications on the design hierarchy appreciated, as part of determining appropriate infrastructure and network approaches.

The implementation of cycle infrastructure within the network needs to be guided by different factors compared to infrastructure for motorised uses. Factors to be considered when designing cycling facilities and a cycling hierarchy include:

- **Different types of road users** - Cycling is an activity that can be undertaken competently by children and young people, as well as people who for other reasons do not drive. The same degree of proficiency expected of motorists cannot necessarily be assumed for cyclists.
- **Greater vulnerability of cyclists** - Compared to motorists, cyclists are not cocooned within a hard external shell designed to protect their safety. Many potential cyclists feel safer using infrastructure or routes that separate them from

high-speed roads, rather than using infrastructure predominantly designed around cars.

- **Trip length** - Compared to car trips, cycle trips are typically shorter in length and access more local destinations than car trips (such as travel to school). Furthermore, as cycling is a human-powered activity, even short detours have a greater impact on cyclists than motorists.
- **Lower travel speeds** - While it is often noted that cycling trips can often be undertaken as quickly by car, the maximum speed possible cycling is still lower than that achievable by car. The priority given to cars through the road hierarchy largely enables cars to travel at higher speeds on certain roads, than would be safe on other parts of the road network. This priority should also be given to cyclists.
- **Different types of trips** - Cycle trips can incorporate recreational travel and sports/fitness training. While these latter trip types are not those that would immediately contribute to the ACT's targets for cycling, and similarly for short utility trips, there is transition and cross-pollination from these types of trips to commuting. It is therefore important to support these trip types, which are not acknowledged in a traditional road hierarchy.
- **Amenity value** - At lower speeds, there is also greater opportunity to appreciate the immediate environment and amenity becomes more important for cyclists. This greater sensitivity to amenity can be part of 'reading' the route, as an element of the design hierarchy.
- **Traffic volumes and speeds** - The speed zoning and traffic volumes in the road network design hierarchy do not reflect their implications as applied to interactions with cyclists. In particular, overseas research indicates that cyclists and motorists can safely mix at car travel speeds of up to about 30 km/hr, which is not currently a standard speed zone under Australian practice.

5.4 Network Components

A cycle network consists of various types of cycle paths and lanes. These are considered to be the main elements of the current ACT cycle network:

1. Arterial road lanes
2. Off-road paths (shared)
3. Access streets and footpaths

Figure 2 indicates the existing on-road and off road cycle network in the ACT. These are discussed in the context of the ACT in further detail below.

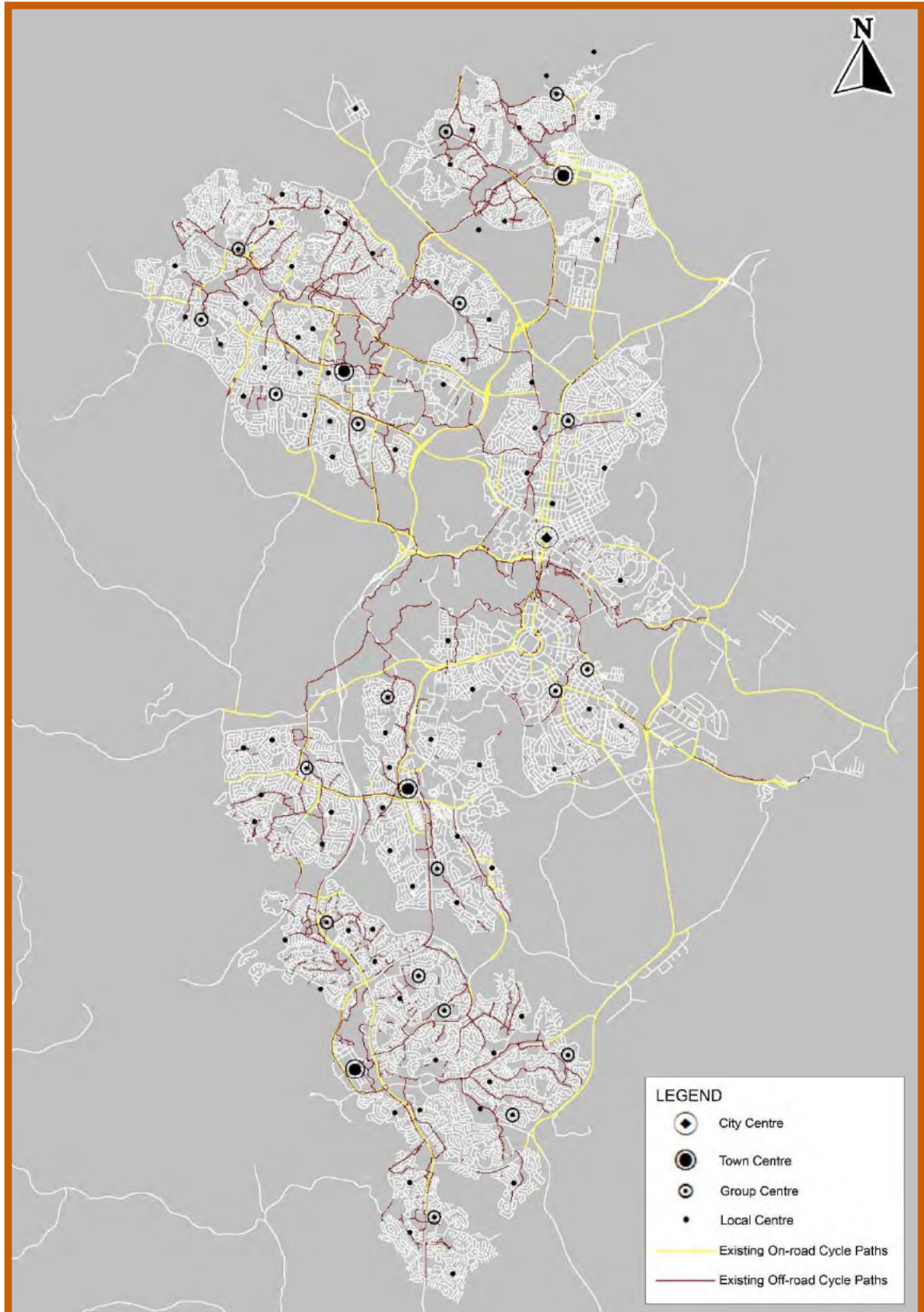


Figure 2: Current ACT on and off road network

5.4.1 Arterial Road Lanes

The ACT's existing on-road cycling infrastructure is largely made up of cycle lanes in arterials. The design and quality of this infrastructure varies, but was generally found to be in need of improvements, particularly in relation to separation of cyclists and traffic.

Currently, the ACT's policy to provide "on road cycling lanes on all new arterial roads" has led to numerous arterials with shoulder bike lanes with posted speed limits in excess of 80 km/hr. Ideally, AUSTRROADS standards should be followed in such situations with the physical separation of cyclists from general traffic where sign posted speeds are at or above 80 km/hr.

There are several advantages of the policy of arterial based lanes in the ACT. One is that, with adequate sign posting, it has created a very legible and simple network using existing road space. Most of the arterials in the ACT have wide road reserves which are very suitable to the implementation of separated cycle lanes over time. Also, because the main function of arterials is to provide through traffic access, in some parts of the network there is limited conflict with turning traffic and therefore it is easier to provide a continuous path.

There are several disadvantages and issues with arterial based lanes in the ACT, mainly conflicts with motorised vehicles and safety concerns arising from the sharing of road space.

These arterial based lanes are really only suited to more experienced cyclists undertaking longer distance trips because a higher level of skill and awareness is needed to use them and they currently offer limited connectivity to local areas. High traffic volumes, complicated intersections, including slip lanes and roundabouts also impact on the safety and comfort of the rider. These are not really pleasant cycling conditions and are therefore unlikely to be utilised by recreational and novice cyclists, or for short trips.

5.4.2 Off-Road Shared Paths

The network of off-road shared paths is already quite extensive in the ACT and well-utilised particularly by commuters wishing to avoid peak traffic flows, as well as novice and recreational riders. Off-road paths have the added advantage of being accessible to a wide range of users at different times of the day and week, effectively maximising opportunities for cycling trips. When properly managed, off road shared paths can be used by both pedestrians and cyclists.

The off-road network in the ACT provides a great opportunity for the development of high-quality routes for trips of all types as complete separation from vehicles is provided. However, given that these are shared paths the cost of widening, signage, and upgrades to provide high-quality paths for all users is likely to be very high and comparable to upgrading existing road shoulders. The fact that not only cyclists can use these paths is considered a downfall due to the potential conflicts between cyclists and pedestrians. Ideally, existing paths should be widened to create a separate pedestrian space.

Off-road paths need to provide direct routes, particularly if they form part of the primary network, or they will not be heavily utilised by commuter cyclists where route directness and speed are important. However, where alternative on-road lanes are considered unsafe by cyclists, their concerns about safety will outweigh the reluctance to travel the extra distance.

Difficulty also lies in connecting paths to roads and ensuring appropriate way-finding is in place. Lighting and path quality are also key considerations, both of which have been identified as issues in the ACT.

5.4.3 Access Streets and footpaths

Access streets, minor collector routes and footpaths in the ACT provide connectivity to cyclists to gain access to a variety of destinations and on and off-road cycle paths. In some instances access streets may not be considered appropriate due to the street

network configuration creating circuitous routes that may not provide the directness that commuter cyclists desire.

However, access streets are often preferred by novice cyclists as they are perceived to be safer due to lower traffic volumes and can be considered in most cases to be lower stress cycling environments even without the dedicated cyclist infrastructure or separation from general traffic.

Where the street network is well connected (for example a grid pattern) they can provide a coherent route for cyclists for everyday riding and can connect people more directly with destinations, for example between home and school.

Traffic calming features can be added making them safer for all users. A range of methods can be applied from speed reductions to more complex design treatments. Roundabouts and uncontrolled intersections are sometimes a hazard for cyclists in local streets and need to be carefully considered when designing local routes. Signage and way-finding can also help cyclists use local street paths to connect to the network and find the most suitable street to get to their destination, particularly if the street network is not a legible pattern.

Often there are more safety risks for cyclists due to potential conflicts with parked cars and cars pulling in and out of driveways, which also need to be considered. Also, there is not usually space for separated cycle lanes, which, while not always necessary at this level given low traffic volumes, may be an issue for children and novice cyclists.

5.5 Approaches to Developing the Network

This section introduces two possible network approaches that are commonly used and may be applicable in the ACT and discusses the advantages and disadvantages of each. The two approaches are:

- A Hierarchical Network – whereby different routes are provided depending on the types and volumes of trips expected. Priority is generally given to the upgrade of the primary network.
- A Needs Based Network – facilities are added across the network where needed and connected up over time.

5.5.1 Hierarchical Network (Strategic Cycle Network)

The hierarchical network consists of three levels:

- The Primary Network – main routes that carry cyclists across the city, linking key attractors, origins and destinations. This network is most suitable for commuting trips
- The Secondary Network – links between the primary network and local areas act as main feeder routes to get people to the primary routes
- The Tertiary Network – routes within local areas, more suited for shorter trips and connecting to other parts of the network

The primary, secondary and tertiary networks combined form the Strategic Cycle Network.

Table 2 provides a detailed overview of the three tiered hierarchy and its function and form. The hierarchy is based on the function of the cycle route in the network, rather than its form (on or off road path etc.)

Table 2: Proposed ACT Cycle Network Hierarchy and the Function and Form of Each Network Component

Cycle Network Hierarchy	Function	Form	Description
Primary	Connect town centres and other key origins and destinations Provide direct, fast connections Carry the highest volume of cyclists	Cycle Highways	High speed cycling path, dedicated to cyclists and separated from general traffic.
		Off-road paths (not shared with pedestrians)	Cycle paths dedicated to cyclists and separated from roadways.
		On-road lanes (shoulder lanes and segregated lanes)	On-road shoulder lanes – Cycle lanes painted on road shoulders and dedicated to cyclists Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier, can be bi-directional or one way
Secondary	Link town and group centres and lower order origins and destinations Provide connections to the primary network Caters for multi-purpose trips	On-road lanes (segregated lanes, shoulder and wide kerbside lanes)	Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier On-road shoulder lanes – Cycle lanes painted on road shoulders and dedicated to cyclists Wide Kerbside Lane – general traffic lane with painted cyclist symbol to indicate the potential for their presence.
		Off-road paths (shared and dedicated paths)	Shared Path – Paths for the use of cyclists and pedestrians separated from roadways Dedicated Path - Cycle paths dedicated to cyclists and separated from roadways.
		Mixed Traffic Environments (less than 3,000 vpd)	General traffic streets with low traffic volumes.
Tertiary	Provide connections to local centres and connections within the general local area Provides continuity in the network Caters to lower volumes of cyclists	Low use on road lanes and off road paths	On-road lanes with low volumes of cyclists and traffic. Off-road paths used infrequently.
		Shared Zones/Home Zones	Streets which balance the needs of all road users including pedestrians, cyclists and motorists. Streets are physically altered with raised sections, plantings and surface treatments to calm traffic and provide an environment safe for, and conducive to, walking and cycling.
		Low Speed access dominated roads	General traffic streets that provide an access function generally in residential areas. Traffic operates at slow speeds providing a non-threatening environment for cyclists.

Figure 3 illustrates that the primary, secondary and tertiary networks are differentiated by the speed and volume of cyclists using the paths and lanes which comprise the network. This shows whether those paths and routes provide direct connections to major attractors, or provide a coverage function with more circuitous routes. For example, the routes and paths that comprise the highest order network (primary network) generally carry the greatest volume of cyclists at speed. Those routes and paths tend to be direct, to improve travel times.

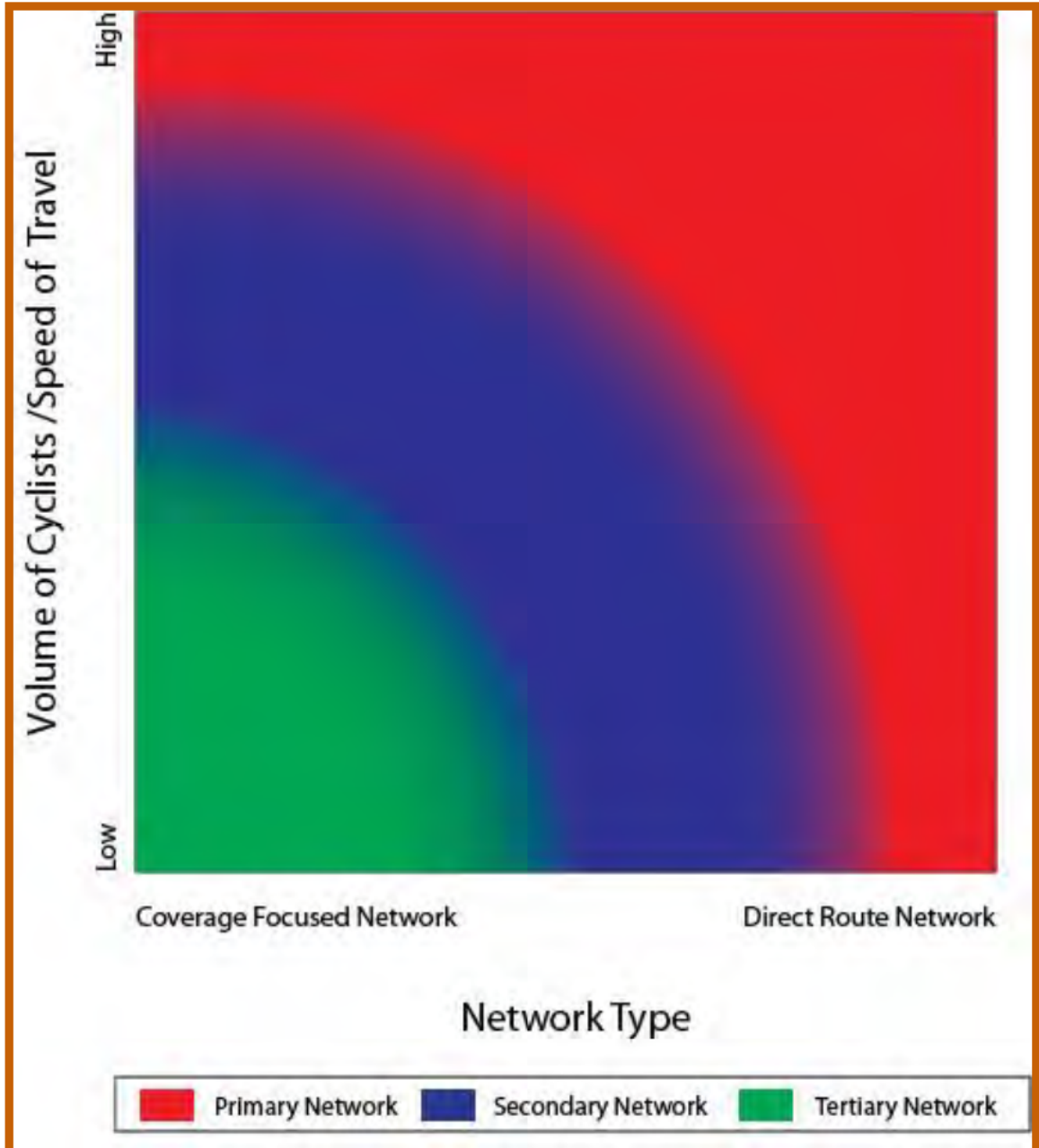


Figure 3: Primary, Secondary and Tertiary Network Concept

The concept of a three tiered functional hierarchy specific to Canberra is presented in Figure 4.

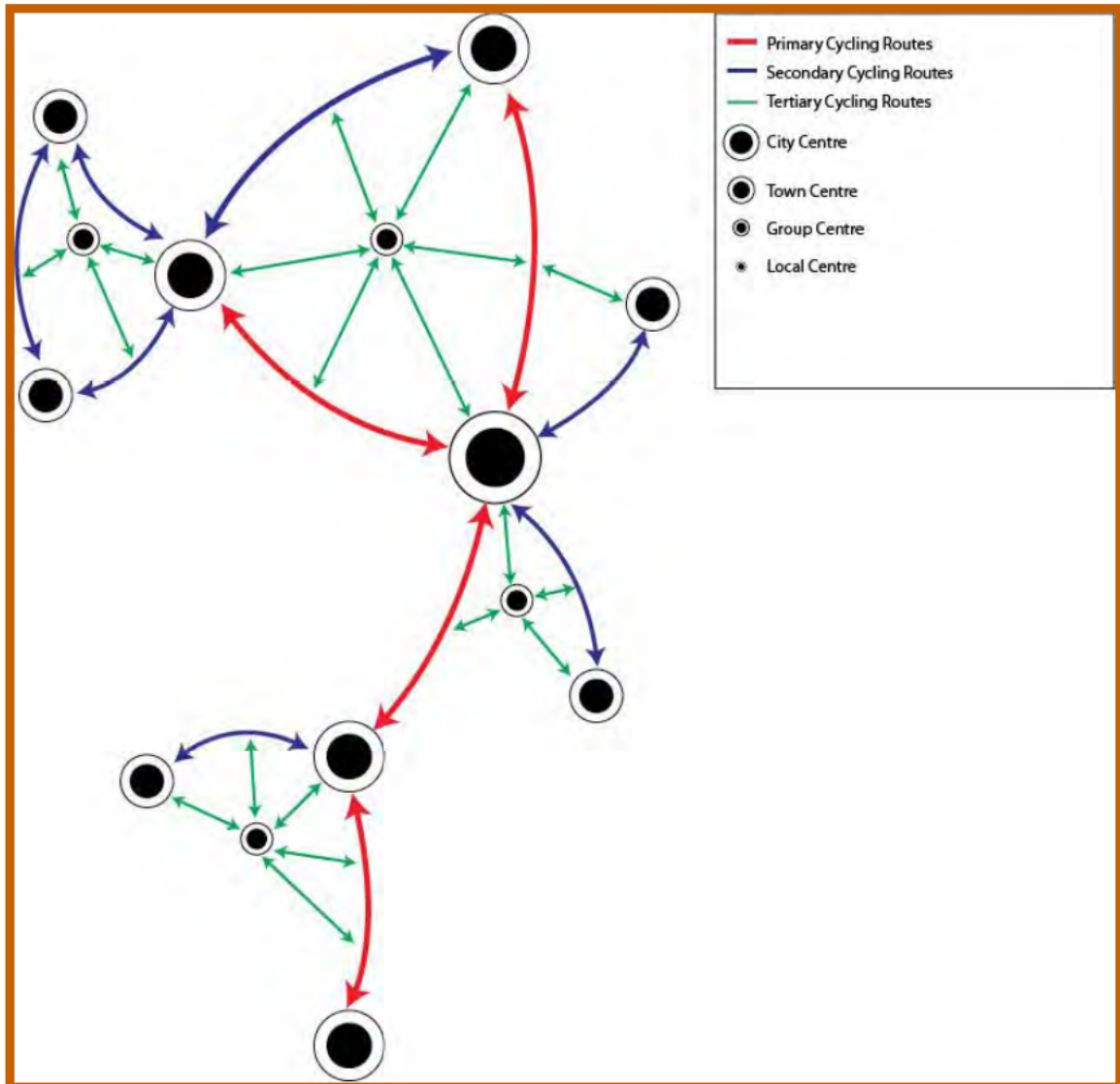


Figure 4: Concept of Canberra Three Tiered Network

While this is a more complex approach to designing the cycle network, a very extensive and meaningful network is formed over time that is consistent with the 8-80 cycling ideal.

Development of the network is based on hierarchy, meaning that routes on the primary network get priority for upgrades. Then over time the other layers of the network are built up.

This approach may be very suitable in the ACT because the basis of a strong primary network is already in place, however gaps still exist and the quality can be improved upon.

Developing a three tiered network will provide a legible and comprehensive network. The current ACT network has areas of duplication and the three tiered hierarchy will provide classification and an indication as to the function of parallel paths.

5.5.1.1 Application of the Hierarchy in the ACT

The application of this network hierarchy to the ACT's strong pattern of arterials with a street network that consists of cul-de-sac and curvilinear streets has not lent itself to the development of a network based on this approach; with most of the network based largely on off-road paths following the line of neighbourhoods and the arterial roads that connect them.

Cyclists from residential areas use either local routes to access core and/or the secondary network, to connect to the primary network. Cyclists then step back down the hierarchy at trip destinations.

5.5.2 Needs Based Network

A needs based approach to the development of the network would see infrastructure improvements implemented across the network with priority on addressing hot spots or problem areas identified mainly by cyclists.

The result of which is a range of infrastructure across routes, with the treatment dependent on the location and type of issue. While the quality of cycling infrastructure is likely to be high using this approach, there are some fundamental problems with this approach, mainly:

- It tends to be reactive rather than strategic and considering the long-term network
- It is difficult to prioritise projects in the short and long term
- It takes longer to create a completed network as there is no focus on implementation
- It is likely to be more costly
- The overall level of legibility of the network is compromised

This approach is not considered suitable at this stage as a more cohesive direction will likely deliver a more complete and legible network.

5.5.3 Developing the Strategic Cycle Network

The functional three tiered approach has been used as the basis to underpin the future cycle network for Canberra – the Strategic Cycle Network.

The development of the proposed Strategic Cycle Network, involved a review of a wide range of relevant background data relating to transport and land use in the ACT. A detailed 'evidence base' was assembled using a wide range of information including:

- Existing on and off road cycle paths
- Network gaps
- Accident black spots
- Committed projects
- General traffic flow volumes
- Cycle traffic flow volumes
- Stakeholder engagement and feedback
- Land Use Patterns and Policy:
 - Distribution and hierarchy of centres
 - Residential growth areas
 - Employment growth areas
 - Land use densities

6 IMPROVING THE NETWORK – PRIORITY PROJECTS

This section presents four options for the future development of the strategic cycle network, including key projects that should be given priority for implementation relating to each option. It also identifies a selection of immediate projects that could be easily implemented with minimal cost. The fourth option is largely a representation of a comprehensive network combining elements of options 1 and 2.

As shown in Figure 2, there is already an extensive cycle network in the ACT. The options developed here build on the existing network and develop a more defined hierarchy of facilities.

As outlined in Chapter 5, the Strategic Cycle Network would be based on a hierarchy consisting of the following:

- Primary network
- Secondary network
- Tertiary network

The approach as to how the Strategic Cycle Network will ultimately be delivered will depend on several factors including funding, land-use and availability, potential of options to increase cycling numbers and the overall feasibility of developing the network. The approach taken will also directly influence funding priorities and have an impact on who uses the network (i.e. its ability to attract new riders).

All of the options developed are focused on supporting current ACT land use policy with a focus on connecting the current hierarchy of centres and future growth areas.

The development of the Strategic Cycle Network will involve projects occurring in three broad stages, which include:

- Short Term (2016)
- Medium Term (2021)
- Long Term (2031)

Broadly, short term projects relate to the delivery of committed projects, medium term projects relate to addressing gaps in the Strategic Cycle Network and Long Term projects relate to improving the standard of cycle infrastructure.

6.1 Discussion of Options

Four options are presented based on a hierarchical approach to network development:

1. City Centric Network
2. Town Centre Centric Network
3. Hybrid Network
4. Complete Strategic Cycle Network

Illustrations of the concept of each option are presented in *Figure 5*, *Figure 6*, *Figure 7* and *Figure 8*.

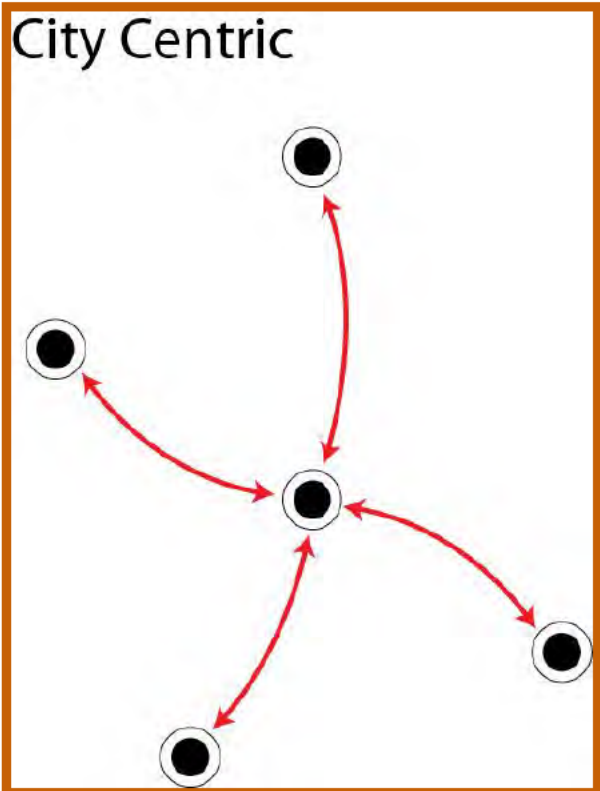


Figure 5: City Centric Concept

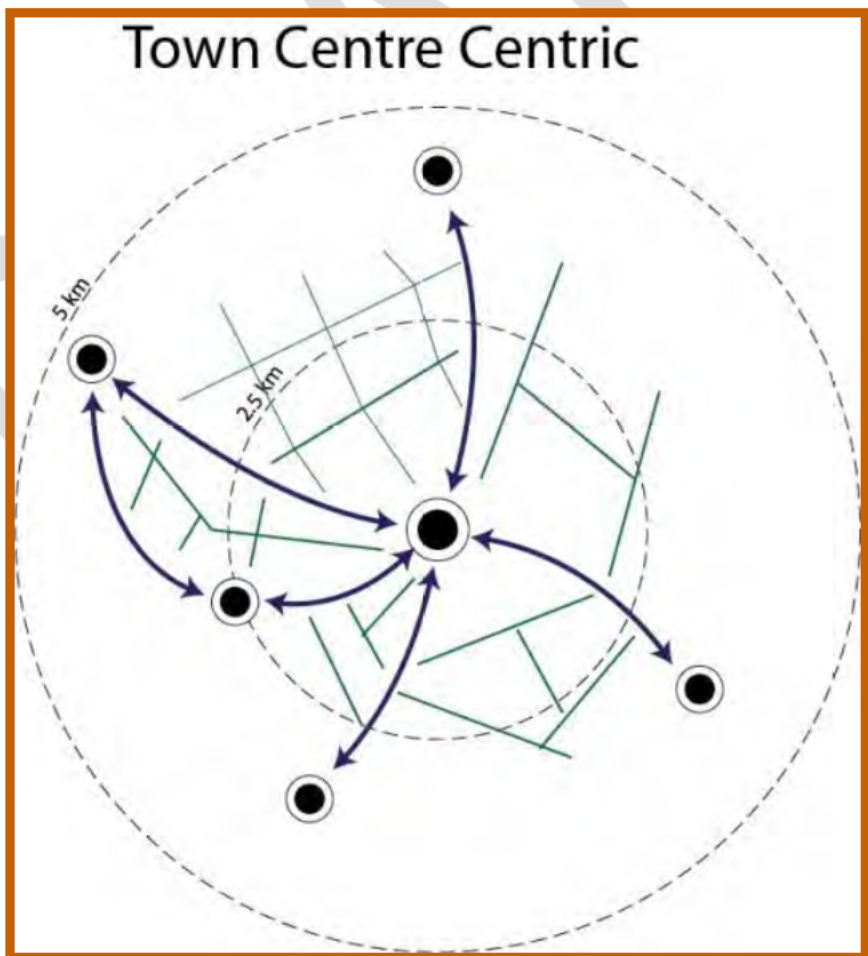


Figure 6: Town Centre Centric Concept

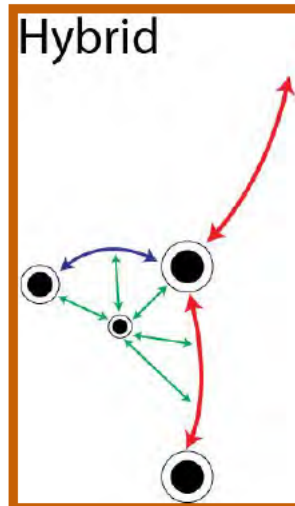


Figure 7: Hybrid Concept

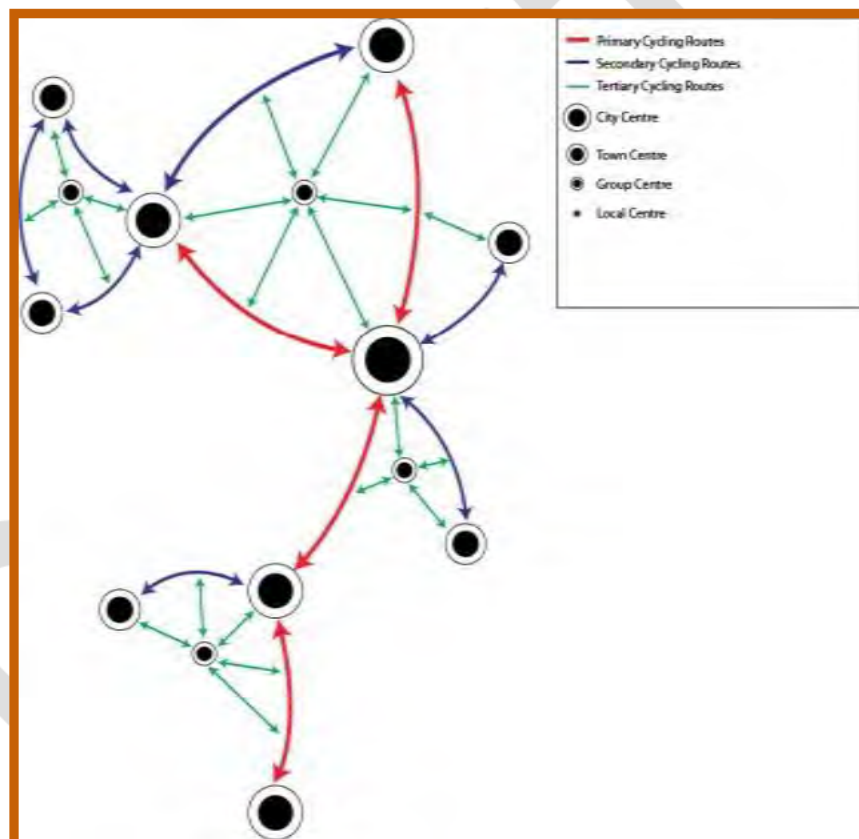


Figure 8: Complete Strategic Cycle Network Concept

It is noted that a significant increase in the actual number of cyclists using current cycling facilities will mean that eventually existing facilities (e.g. shared paths) will need to be widened or the network expanded in order to spread trips.

Most of the routes that make up the primary network have a high demand for cycling (based on average weekly flow data) and should be given first consideration for improvement. However, with much of the primary network complete, at least at a very basic level, it may be more appropriate to focus efforts on improving the secondary and tertiary cycle network. Alternatively, the initial focus of developing the network may be on improving the standard of the primary network and addressing the 'pinch points' in order to complete the primary network.

6.1.1 Option 1 – City Centric

This option focuses on developing the primary network, providing connections between Civic and the town centres and other major origins and destinations in the ACT. It involves filling gaps in the primary network and upgrade works to improve the standard of existing sections of the primary network. This network option is predominantly focused on developing the primary network to provide direct, efficient connections between major centres and attractors that carry high volumes of cyclists.

This option would cater predominantly for commuter cyclists, with the primary network providing direct connections to major employment locations. The extensive on-road, higher speed cycle routes would likely mean that inexperienced cyclists are less likely to regularly use many sections of the primary network.

As the City Centric option provides connections to key employment locations, it is most likely the most cost efficient network for achieving the JTW mode share targets established in *Transport for Canberra*.

The following key routes have been identified as part of the primary network. They are currently a mixture of on-road lanes and off-road paths, in some cases these are shared paths. In the long term, these routes will require investment and widening, if they are to continue to be used by all types of cyclists. In this option, gaps identified along these routes would be improved first.

Key Strategic Routes:

- Barton to Civic
- Fyshwick to Capital Hill
- State Circle
- Tuggeranong (including Curtin, Mawson and Woden) to City via Athllon Drive
- Woden to Molonglo via Weston
- Molonglo to Civic
- Canberra Airport to Civic
- Belconnen to Civic
- Hall to Northbourne Avenue via Barton Highway
- Northbourne Avenue and Federal Highway
- Gungahlin to Federal Highway via Flemington Road

Table 3 identifies projects necessary to address gaps in the primary network in order to complete the primary network as shown in *Figure 9*. Longer-term projects in primary network corridors may include for example:

- Widening shared paths
- Intersection upgrades at key intersections to improve cycling priority and safety
- Implementing segregated on-road lanes
- Improving connections and integration between on-road lanes and off road paths
- Improving line markings and signage of on-road lanes

It should be noted that some of these projects are identified as long term, because they would require significant investment in the network, which may not be affordable or required in the near future.

Table 3: Summary of Key Projects in Option 1

Location		Project	Timing
D	Civic Loop	Segregated Cycle Lanes	Short Term (already committed)
E	Airport Link	Cycle Lanes, connecting to shared paths	Short Term (already committed)
F	Molonglo Valley	On and off road primary paths	Short Term (under development)
L	Barry Drive, between storm water culvert just west of Kingsley Street and Marcus Clarke Street	On-road lanes	Short Term
M	Benjamin Way between College Street and Emu Bank	On-road lanes	Short term
N	Civic to Morshead Drive via Constitution Avenue	On-road lanes	Short Term
O	Canberra Avenue from National Circuit to State Circle	On-road lanes	Short Term
P	Athllon Drive near intersection of Finchman Crescent	Improve transition from on-road to off road lanes	Short Term
Q	Civic to Molonglo	Cycle Highway	Medium Term
R	Dickson to Civic	Improved Crossings for Cyclists	Medium Term
S	Athllon Drive from Finchman Crescent to Woden	On-road lanes	Medium Term
T	Civic to Curtin	Widening of shared paths	Medium Term
1	Yarra Glen	Widen existing shared path	Long Term
2	Northbourne Avenue	Replace existing cycle lanes with wider separated lanes	Long Term
	Cycle Facilities at major bus stops and interchanges	Bike lockers and racks	Short Term (already committed)
	Review Standard of all paths in the primary network	Review of path standard and interaction with bus lanes and stops and upgrade if necessary/possible. Identify locations to upgrade from on-road lanes to segregated lanes.	Long Term
<p>Note: Any new cycle paths or lanes or upgrades are to meet Austroads requirements for separation of cyclists and traffic according to traffic speed and volume</p>			

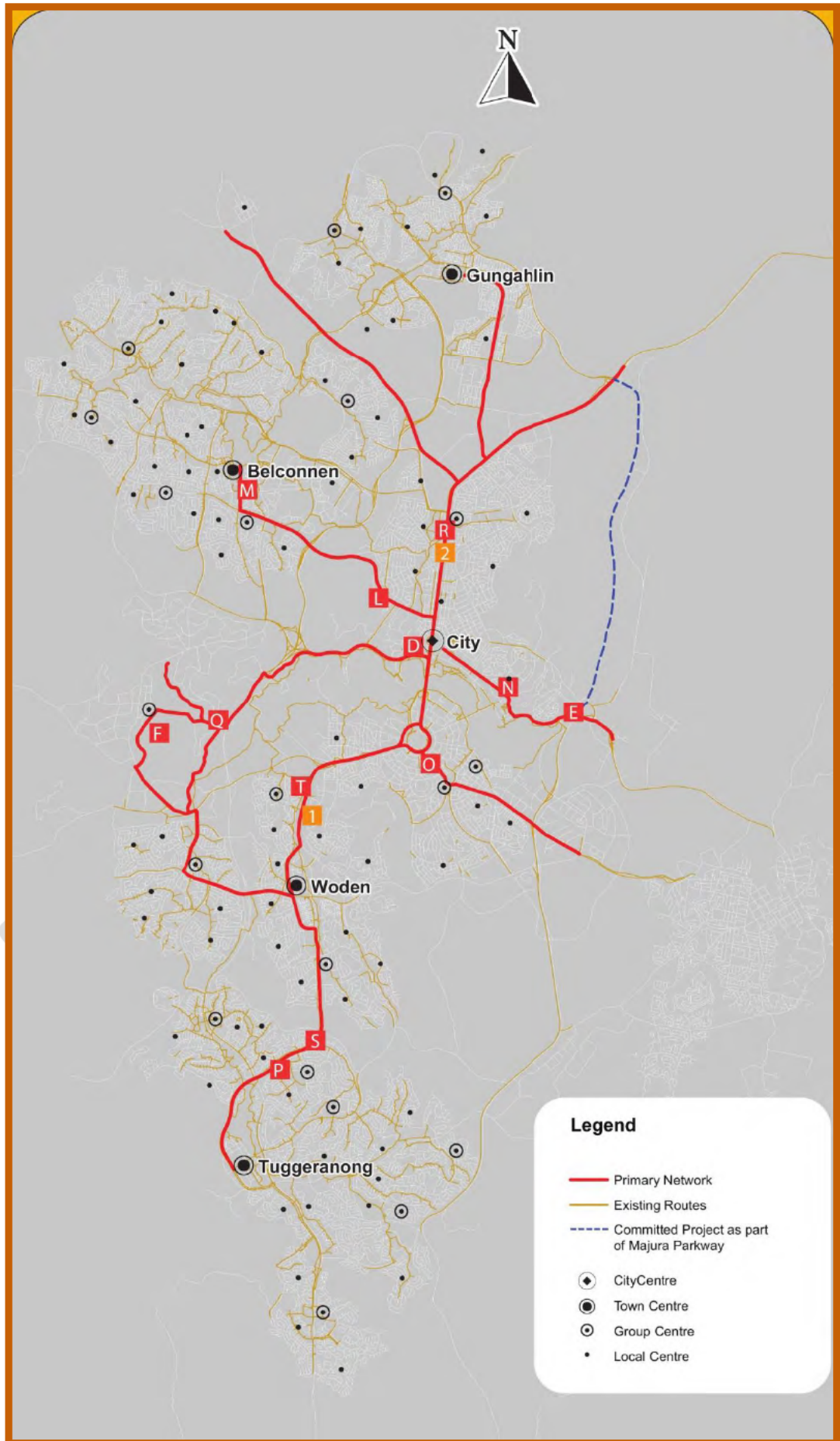


Figure 9: City Centric Option

Figure 9 includes a number of primary routes that overlap existing cycle facilities. These facilities would be reviewed to ensure that they are of an appropriate standard for the primary network. If they are not, they would be upgraded. Existing routes that are not part of the primary network would not be changed in this option.

This option is expected to primarily benefit commuters and sporting cyclists. The benefits to all cyclist types are shown in *Table 4*.

Table 4: Cyclists that would benefit from Option 1

Cyclist	Level of Benefit
Commuters (experienced)	High
Commuters (inexperienced)	High
Primary school children	Low
Secondary school children	Medium
Recreational cyclists	Medium
Sporting cyclists	High
Short utility trip cyclists	Low

Preliminary cost estimates of delivering the projects identified as part of Option 1 is approximately \$36 million. The cost estimate does not include projects currently committed. This cost estimate is inclusive of GST and a cost contingency of 40%.

6.1.2 Option 2 – Town Centre Centric

This option focuses on developing the cycle network predominantly within a 5km ring around town centres and the city centre. It involves improvements to routes in the secondary and tertiary network, through upgrades of existing routes and filling gaps in the existing network. This network option predominantly focuses on providing a comprehensive network within local catchments to cater for a variety of trip types. The network will have a greater coverage although individual routes are likely to carry lower volumes of cyclists.

This option will also cater for a variety of cyclists and trip types with extensive coverage of areas surrounding town centres. Improving the secondary and tertiary networks in a 5km network surrounding town centres will cover much of the ACT. A key benefit of this option is that people with disabilities will be able to utilise shared user paths to access the services and facilities in the local, group and town centres. Commuter cyclists however are not provided with a comprehensive network of high quality, direct and efficient connections. It will provide better user environments for novice riders who do not stray too far from their origins as well as for short trips to local destinations.

Improvements at the local level in suburban areas and school catchments will also be a focus of the option. These do not have to be major improvements. One of the simplest and most effective options is to identify local routes consisting of low traffic streets and create a legible map. The route should also be marked with signs on street corners for way-finding purposes. However, due to the extensive area to be covered, and the fine grained nature of this part of the network, it will be a costly option to implement.

In the longer-term, more significant infrastructure improvements could be implemented such as changes to intersections (namely roundabouts), traffic calming measures in identified streets, blanket speed limit changes and changes in street design parameters. Although in some cases this may require a duplication of cycle facilities, the aim is to provide safer streets and local connectivity more suitable for novice riders and young people. Therefore, the development of this network serves a different purpose to the primary network. Another long term strategy would be to introduce cycle lanes even to low volume and relatively low speed streets systematically to make an overt invitation to cyclists of all abilities that they are welcome and are a legitimate road user.

Table 5 shows a summary of the projects included in Option 2 and **Figure 10** shows a network map for this option.

Table 5: Summary of Key Projects in Option 2

	Location	Project	Timing
D	Civic Loop	Segregated Cycle Lanes	Short Term (already committed)
E	Airport Link	Cycle Lanes, connecting to shared paths	Short Term (already committed)
F	Molonglo Valley	On and off road secondary and tertiary paths	Short Term (under development)
G	Bowen Drive	Underpass to remove crossing dangers	Short term (already committed)
H	Horse Park Drive extension (Amaroo to Casey)	Cycle lanes part of road improvement project	Short term (already committed)
I	Athllon Drive	Improve connection to Mawson, possibly an underpass, or cycle priority at the intersection of Mawson Drive and Athllon Drive	Short Term
J	Local area (potentially Braddon or Turner)	Identify area to trial concept of a home zone	Short Term
K	Civic to Majura Road	On and off road path (along Fairbairn Avenue and through Reid)	Short Term
U	Fairbairn Avenue to Constitution Avenue via Campbell	On and off road path	Medium Term
V	Coulter Drive to Kingsford Smith Drive along Belconnen Way	On-road path	Medium Term
W	Southern Cross Drive to Kippax	On-road path	Medium Term
X	Hodgson Crescent to Melrose Drive, Pearce	On- road lanes	Medium Term
	Beasley Street, Torrens	On-road lanes to Athllon Drive	Medium Term
Y	Mort Street, Braddon	On-road lanes	Medium Term

Location		Project	Timing
Z	Gungahlin	Deliver on-road lanes and off road paths in accordance with Cycle Master Plan	Short/Medium/Long Term
3	Tharwa Drive	Off-road path	Long Term
4	Erindale to Tuggeranong	Widen shared off-road path	Long Term
5	Braybrooke Street/Ginninderra Drive intersection to cycleway between Shannon Court and Maribyrnong Avenue	Off-road cycleway to connect to existing cycleway at top of Braybrooke Street	Long Term
11	University of Canberra to Belconnen Way, gaps in network exist	On and off road path improvements	Medium Term
	Local Streets	Map low traffic streets suitable for cyclists	Medium Term
	Tertiary Network	Provide way-finding on the expansive tertiary network	Medium Term
	Cycle Facilities at major bus stops and interchanges	Bike lockers and racks	Short Term (already committed)
<p>Note: Any new cycle paths or lanes or upgrades are to meet Austroads requirements for separation of cyclists and traffic according to traffic speed and volume</p>			

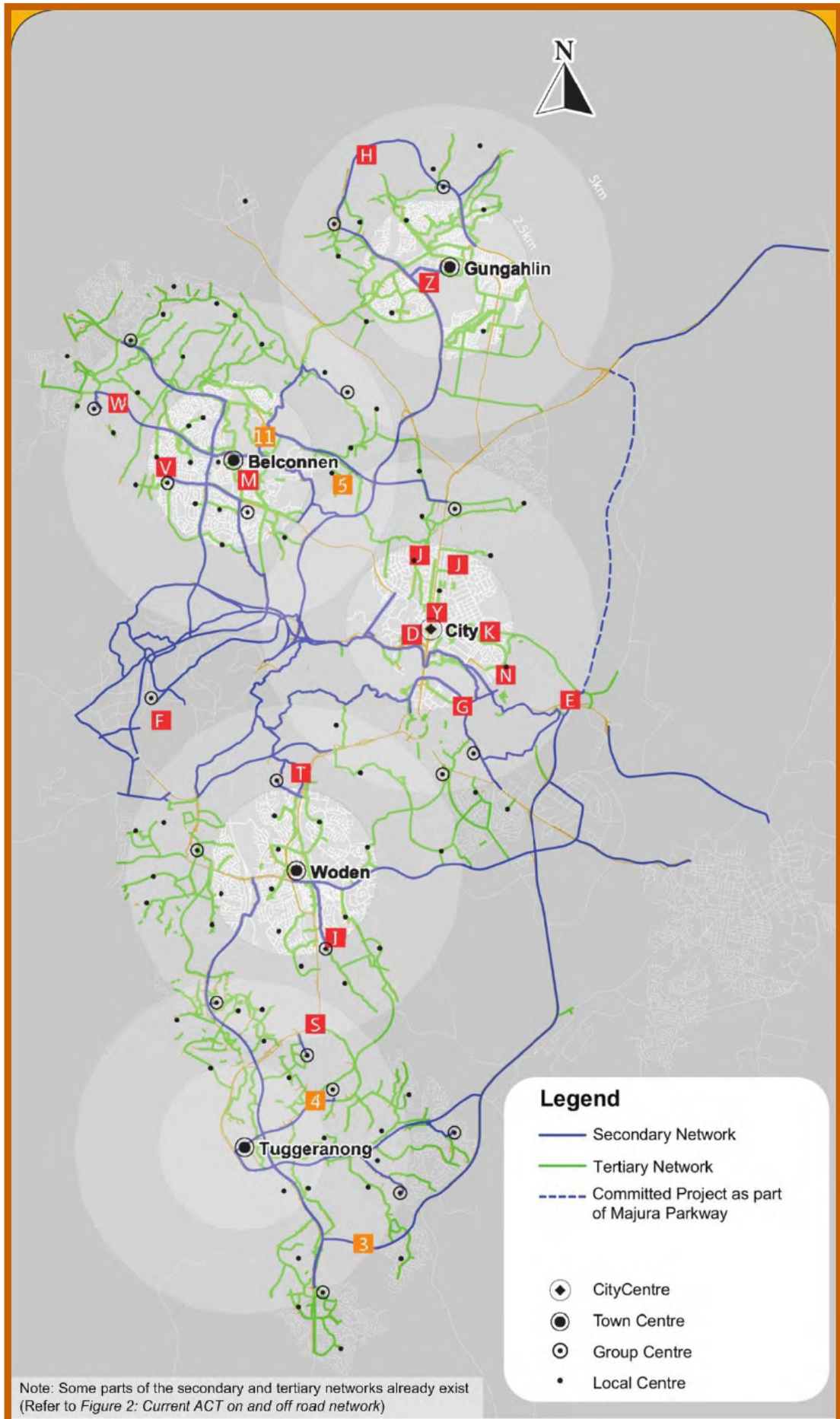


Figure 10: Town Centre Centric Option

Figure 10 shows that some parts of the secondary and tertiary networks already exist. Existing routes that are part of the secondary or tertiary networks would be reviewed to ensure that they are of an appropriate standard and upgraded if necessary.

This option is expected to primarily benefit primary school children and cyclists undertaking short utility trips. The expected benefits for all cyclist types are shown in *Table 6*.

Table 6: Cyclists that would benefit from Option 2

Cyclist	Level of Benefit
Commuters (experienced)	Low
Commuters (inexperienced)	Low
Primary school children	High
Secondary school children	Medium
Recreational cyclists	Medium
Sporting cyclists	Low
Short utility trip cyclists	High

Preliminary cost estimates of delivering the projects identified as part of Option 2 is approximately \$39 million. The cost estimate does not include projects currently committed. This cost estimate is inclusive of GST and a cost contingency of 40%.

6.1.3 Option 3 – Hybrid

This option focuses on developing the primary network by filling existing gaps (no existing route upgrades) and further development of the secondary and tertiary networks surrounding the town centres (predominantly filling gaps and minimal new paths). This option focuses on catering for a wide spectrum of cyclists, from providing direct connections to major centres and attractors to improving cycling conditions in local areas surrounding the town centres.

The option balances overall cost with coverage for the greatest spectrum of current or potential cyclists. It focuses on simply addressing gaps in the existing network with limited improvement to the standard of existing cycle routes.

A summary of the projects recommended in Option 3 is shown in *Table 7* and a network map is shown in *Figure 11*.

Table 7: Summary of Key Projects in Option 3

Location		Project	Timing
D	Civic Loop	Segregated Lanes	Short Term (already committed)
F	Molonglo Valley	On and off road primary, secondary and tertiary paths	Short Term (under development)
G	Bowen Drive	Underpass to remove crossing dangers	Short term (already committed)
H	Horse Park Drive extension (Amaroo to Casey)	Cycle lanes part of road improvement project	Short term (already committed)
K	Civic to Majura Rd Road	On and off road path (along Fairbairn Avenue and through Reid)	Medium Term
L	Barry Drive, between storm water culvert just west of Kingsley Street and Marcus Clarke Street	On-road lanes	Short Term
M	Benjamin Way between College Street and Emu Bank	On-road lanes	Short term
N	Civic to Morshead Drive via Constitution Avenue	On-road lanes	Short Term
O	Canberra Avenue from National Circuit to State Circle	On-road lanes	Short Term
U	Fairbairn Avenue to Constitution Avenue via Campbell	On and off road path	Medium Term
V	Coulter Drive to Kingsford Smith Drive along Belconnen Way	On-road lanes	Medium Term
W	Southern Cross Drive to Kippax	On-road lanes	Medium Term
X	Hodgson Crescent to Melrose Drive, Pearce	On- road lanes	Medium Term
	Beasley Street, Torrens	On-road lanes to Athllon Drive	Medium Term
Y	Mort Street, Braddon	On-road lanes	Medium Term
3	Tharwa Drive	Off-road path	Long Term
6	Majura Parkway Cycle Lanes	Off-road cycle paths	Short Term (already committed)
7	Kingston Foreshore	Cycle Paths connecting to paths around Lake Burley Griffin	Short Term (already committed)

Location		Project	Timing
8	Wentworth Avenue (Bowen Park to Fyshwick)	Widening of off-road path and/or on-road lanes	Long Term
9	Queanbeyan to Ipswich Street	Off-road cycle path	Long Term
10	Hindmarsh Drive to Red Hill Reserve, skirting or crossing Red Hill, then connecting to existing cycleway network at Flinders Way (Canberra Hospital Connection).	Off-road cycle paths	Long Term
11	University of Canberra to Belconnen Way, gaps in network exist	On and off road path improvements	Medium Term

Note: Any new cycle paths or lanes or upgrades are to meet Austroads requirements for separation of cyclists and traffic according to traffic speed and volume

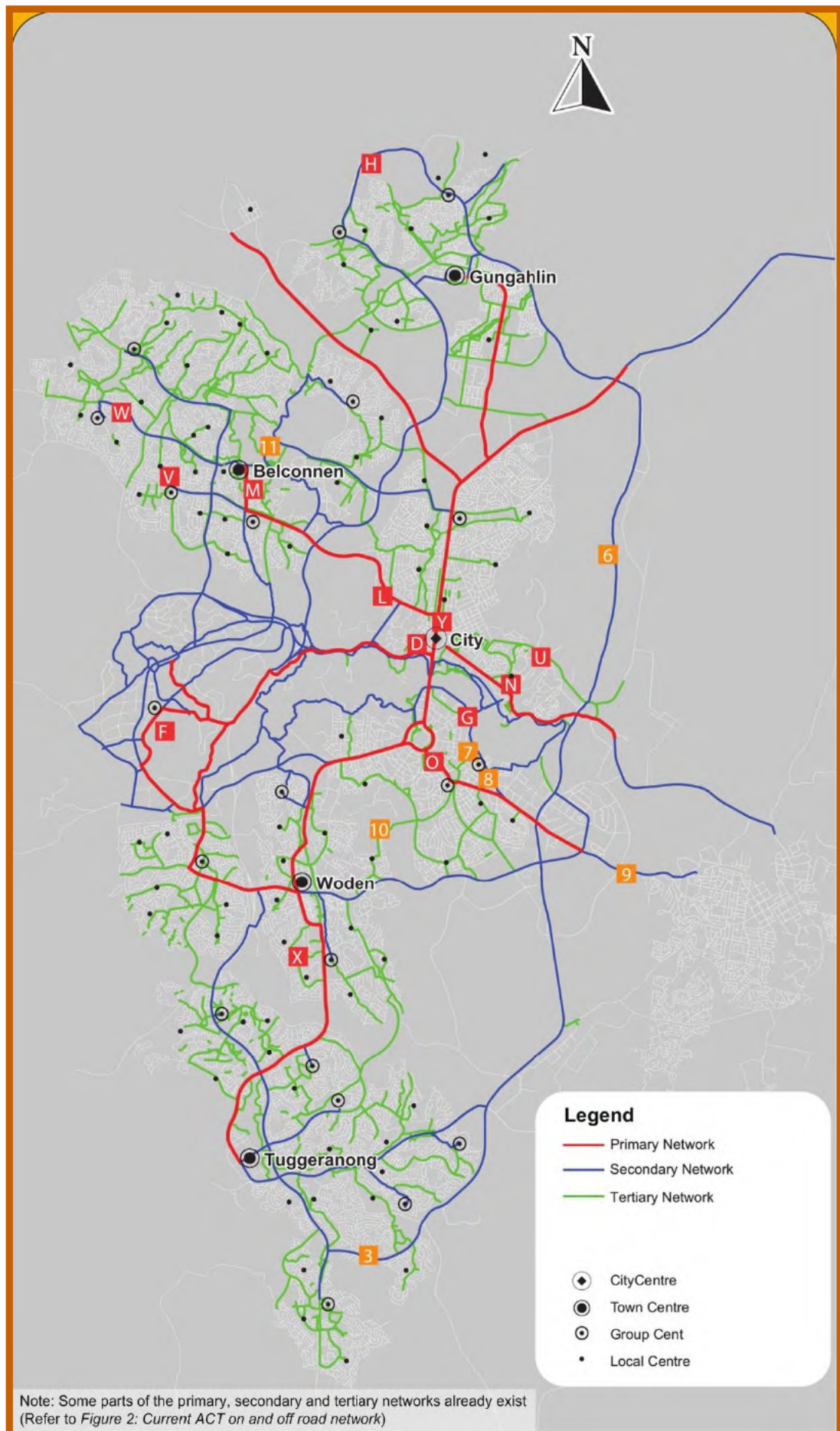


Figure 11: Hybrid Option

As with Options 1 and 2, existing routes that are part of the network would be reviewed to ensure that they are of an appropriate standard for their defined hierarchy.

As this option does not focus on any one type of cyclist, the benefits for all cyclist types is expected to be medium, as shown in *Table 8*.

Table 8: Cyclists that would benefit from Option 3

Cyclist	Level of Benefit
Commuters (experienced)	Medium
Commuters (inexperienced)	Medium
Primary school children	Medium
Secondary school children	Medium
Recreational cyclists	Medium
Sporting cyclists	Medium
Short utility trip cyclists	Medium

Preliminary cost estimates of delivering the projects identified as part of Option 3 is approximately \$44 million. The cost estimate does not include projects currently committed. This cost estimate is inclusive of GST and a cost contingency of 40%.

6.1.4 Option 4 – Complete Strategic Cycle Network

This option focuses on developing the complete Strategic Cycle Network (primary, secondary and tertiary network). This option involves filling gaps in existing routes and improving the standard of existing routes (primary, secondary and tertiary network). The network provides a comprehensive integrated and connected network throughout Canberra, providing for all types of cyclists for all types of trips.

It would be the most costly to develop, yet would be developed to the highest standard, have the greatest coverage, for the greatest number of people and should be considered the ultimate goal for the ACT. This option overtly reintroduces cycling as a legitimate mode of transport for all levels of cycling. This is a long term strategy towards a genuine “8-80” city. Ultimately Option 4 can provide Canberra with an opportunity to be an exemplar cycling city in Australia where all cyclists feel comfortable and that they belong or actually feel wanted, not just tolerated on the broader transport network.

Table 9 and *Figure 12* show a summary of projects and a network map, respectively. This option does not include all works of Options 1 and 2, but those considered most effective.

Table 9: Summary of Key Projects in Option 4

	Location	Project	Timing
A	Well Station Drive (Flemington Road to Federal Highway)	Cycle lanes part of road improvement project	Short Term (already committed)
B	Morisset Road (Flemington Road to Federal Highway)	Cycle lanes part of road improvement project	Short Term (already committed)
C	Clarrie Hermes Drive extension (Casey to Barton Highway)	Cycle lanes part of road improvement project	Short Term (already committed)
D	Civic Loop	Segregated Cycle Lanes	Short Term (already committed)
E	Airport Link	Cycle Lanes, connecting to shared paths	Short Term (already committed)
F	Molonglo Valley	On and off road primary, secondary and tertiary paths	Short Term (under development)
G	Bowen Drive	Underpass to remove crossing dangers	Short term (already committed)
H	Horse Park Drive extension (Amaroo to Casey)	Cycle lanes part of road improvement project	Short term (already committed)
I	Athllon Drive	Improve connection to Mawson, possibly an underpass, or cycle priority at the intersection of Mawson Drive and Athllon Drive	Short Term
J	Local area (potentially Braddon or Turner)	Identify area to trial concept of a home zone	Short Term
K	Civic to Majura Road	On and off road path (along Fairbairn Avenue and through Reid)	Short Term
L	Barry Drive, between storm water culvert just west of Kingsley Street and Marcus Clarke Street	On-road lanes	Short Term
M	Benjamin Way between College Street and Emu Bank	On-road lanes	Short term
N	Civic to Morshead Drive via Constitution Avenue	On-road lanes	Short Term
O	Canberra Avenue from National Circuit to State Circle	On-road lanes	Short Term
P	Athllon Drive near intersection of Finchman Crescent	Improve transition from on-road to off road lanes	Short Term
Q	Civic to Molonglo	Cycle Highway	Medium Term
R	Dickson to Civic	Improved Crossings for Cyclists	Medium Term

Location		Project	Timing
S	Athllon Drive from Finchman Crescent to Woden	On-road lanes	Medium Term
T	Civic to Curtin	Widening of shared paths	Medium Term
U	Fairbairn Avenue to Constitution Avenue via Campbell	On and off road path	Medium Term
V	Coulter Drive to Kingsford Smith Drive along Belconnen Way	On-road lanes	Medium Term
W	Southern Cross Drive to Kippax	On-road lanes	Medium Term
X	Beasley Street, Torrens	On-road lanes to Athllon Drive	Medium Term
	Hodgson Cres Crescent to Melrose Drive, Pearce	On- road path	Medium Term
Y	Mort Street, Braddon	Add cycle lanes	Medium Term
Z	Gungahlin	Deliver on and off road paths in accordance with Cycle Master Plan	Short/Medium/Long Term
1	Yarra Glen	Widen existing shared	Long Term
2	Northbourne Avenue	Replace existing cycle lanes with wider separated lanes	Long Term
3	Tharwa Drive	Off-road path	Long Term
4	Erindale to Tuggeranong	Widen shared off-road path	Long Term
5	Braybrooke Street/Ginninderra Drive intersection to cycleway between Shannon Court and Maribymong Avenue	Off-road paths to connect to existing path at top of Braybrooke Street	Medium Term
6	Majura Parkway Cycle Lanes	Off-road cycle paths	Medium Term
7	Kingston Foreshore	Cycle Paths connecting to paths around Lake Burley Griffin	Short Term
8	Wentworth Avenue (Bowen Park to Fyshwick)	Widening of off-road path and/or on-road cycle lanes	Long Term
9	Queanbeyan to Ipswich Street	Off-road cycle path	Medium Term
10	Hindmarsh Drive to Red Hill Reserve, skirting or crossing Red Hill, then connecting to existing cycleway network at Flinders Way (Canberra Hospital Connection).	Off-road cycle paths	Medium Term
11	University of Canberra to Belconnen Way, gaps in network exist	On and off road path improvements	Medium Term

Location		Project	Timing
	Local Streets	Map low traffic streets suitable for cyclists	Medium Term
	Tertiary Network	Provide way-finding on the expansive tertiary network	Medium Term
	Review Standard of all paths in the primary network	Review of path standard and interaction with bus lanes and stops and upgrade if necessary/possible. Identify locations to upgrade from on-road lanes to segregated lanes.	Long Term
	Cycle Facilities at major bus stops and interchanges	Bike lockers and racks	Short Term (already committed)
<p>Note: Any new cycle paths or lanes or upgrades are to meet Austroads requirements for separation of cyclists and traffic according to traffic speed and volume</p>			

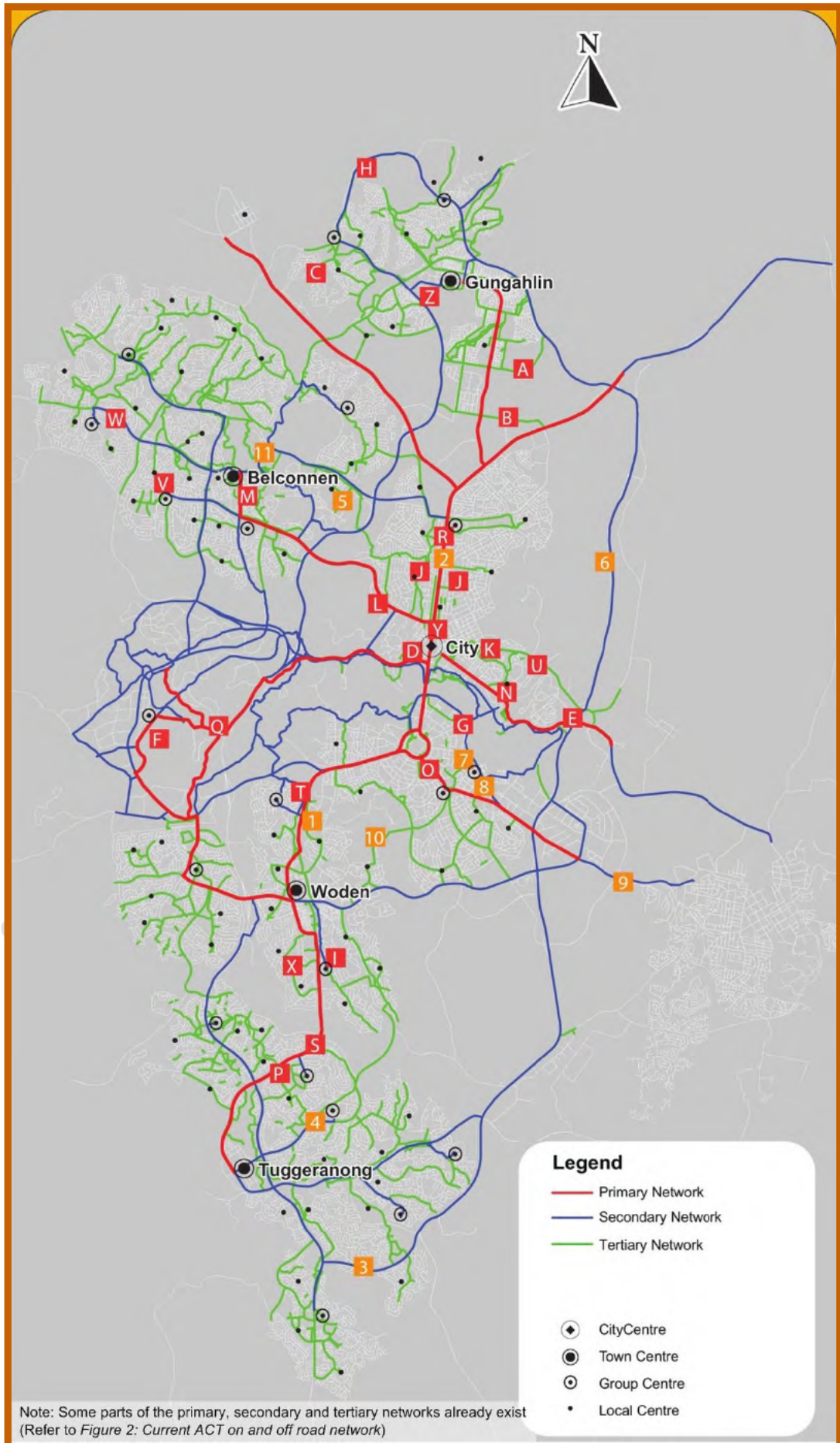


Figure 12: Complete Strategic Cycle Network Option

As with the other options, existing routes that are part of the network would be reviewed to ensure that they are of an appropriate standard for their defined hierarchy.

As the most complete option, Option 4 is expected to give a high level of benefit to all cyclist types, as shown in *Table 10*.

Table 10: Cyclists that would benefit from Option 4

Cyclist	Level of Benefit
Commuters (experienced)	High
Commuters (inexperienced)	High
Primary school children	High
Secondary school children	High
Recreational cyclists	High
Sporting cyclists	High
Short utility trip cyclists	High

Preliminary cost estimates of delivering the projects identified as part of Option 1 is approximately \$85 million. The cost estimate does not include projects currently committed. This cost estimate is inclusive of GST and a cost contingency of 40%.

6.2 Possible Immediate Projects for Investigation

In immediate projects (one to two years), there is an opportunity to implement an ongoing program of smaller projects that will help to improve the network in general and without major capital investment. These projects are not specific to any level of the network, but mostly apply to existing infrastructure and can be implemented in conjunction with any of the options presented. Potential projects are shown in *Table 11*.

Table 11: Summary of Potential Immediate Projects

Project	Improvement Needed
Cycle parking at major bus stops and interchanges	This program is already on-going and should be completed within the next 1-2 years on existing stops.
Reducing speed limits in the local network	The reduction of speed limits in town centres, neighbourhoods and around schools will considerably improve cycle safety real and perceived and support the development of a local cycle network.
Signage	Improvements to way-finding and safety signage are needed on both the off-road and on-road paths to assist cyclists navigate the network and access key destinations.
Lighting	A number of sites have been identified by stakeholders as needing improvements off-road

Project	Improvement Needed
Removing or changing car barriers on off-road underpasses for cyclist access	These are a known obstacle for cyclists, slowing or hindering journeys. They could be removed or changed easily.
Improve maintenance of on and off-road paths	Regular maintenance to ensure line markings are visible, paths are free of pot holes or other obstructions. This would also include tree pruning to increase space on shared paths.
Cycle advance mark outs at intersections	Head start boxes at intersections can be provided at very little cost and give cyclists an advantage and visibility at intersections.
Small hazards improvements	An online register could be created for cyclists to submit small hazards such as potholes, fallen trees that could be easily fixed as they arise and to help with maintenance.
Improved consideration of cyclists during construction	The provision of alternative routes and signage when construction is underway, will allow cyclists to continue usual journeys easily.

6.3 The Ultimate Goal

The ultimate goal is to have a complete Strategic Cycle Network (as defined in Option 4) through the implementation of all the previously discussed options i.e. primary secondary and tertiary networks, as indicated in *Figure 13*, plus supporting policies. This provides the opportunity for cycling to become a genuine part of the ACT Transport Network. Persons can make virtually any trip by cycling. Routes in the tertiary network at origins are cycle friendly, providing overt invitations to ride. Destinations also make a visual statement that cyclists are welcome.

In between origin and destination, the Strategic Cycle Network provides opportunities for safe and inclusive cycling through a combination of on and off-road facilities. It is envisaged that the routes that form the primary and secondary networks identified in the Strategic Cycle Network will be used as the main cycle network in ACT Government standards.

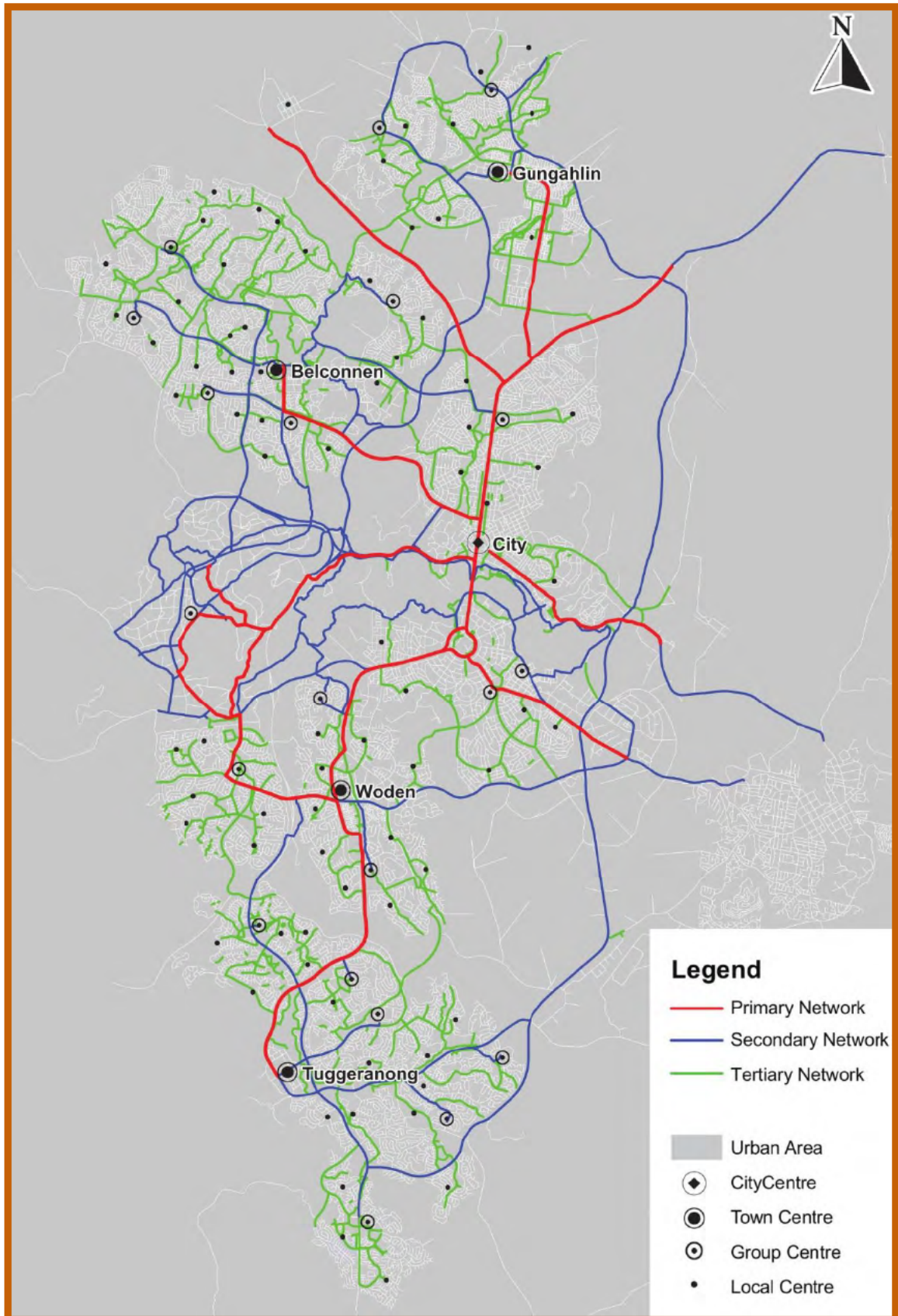


Figure 13: The Ultimate Goal – Complete Strategic Cycle Network

Figure 14 shows a schematic layout of the ultimate strategic cycle network (with the primary network in red and secondary network in blue), including major origins and destinations in the ACT and the proposed cycle network connections.

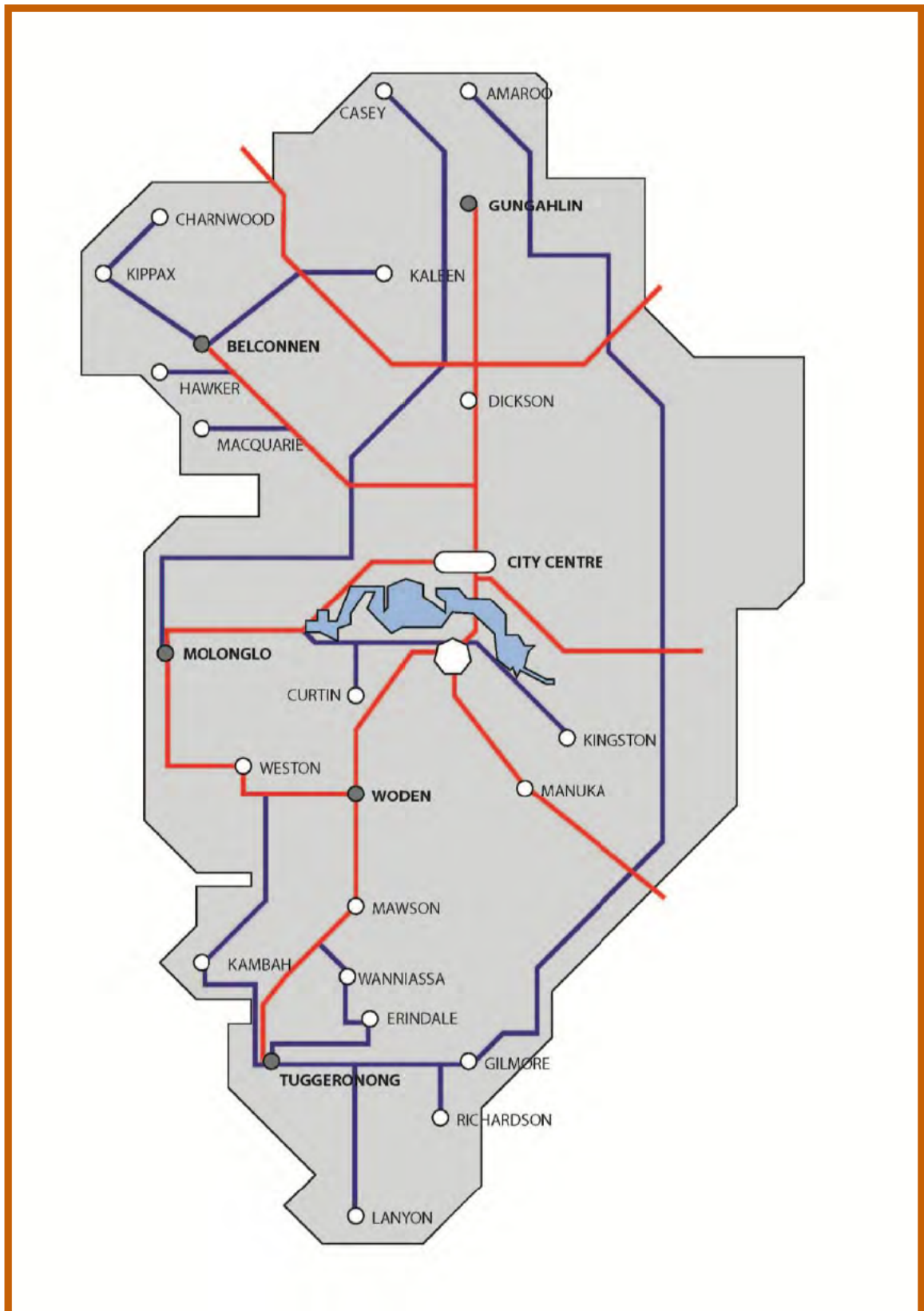


Figure 14: Conceptual Representation of the ACT Cycle Network

7 IMPLEMENTATION OF INFRASTRUCTURE IMPROVEMENTS

In order to test and validate options, their implementation needs have been considered and are discussed here.

Based on the options, this chapter identifies a design hierarchy for infrastructure requirements necessary to deliver the proposed options.

This also considers changes to ACT guidelines for pedestrian and cyclist facilities which are in accordance with Part 13 of the Design Standards for Urban Infrastructure. It is noted however that lower speeds (30-40 km/hr rather than 40-60 km/hr) are considered more appropriate for mixing cycling with car traffic. This is to encourage children and first time cyclists to access cycling as a more acceptable transport option. Using marked lanes for major collectors is preferred, instead of simply a wide combined car/cycle lane. This is permitted under the current design standards but requires authority approval. Including marked cycle lanes makes a more overt invitation to cyclists and also discourages cars taking a visual cue from an exceptionally wide lane and travelling at higher speeds.

7.1 Design Treatments for Network

7.1.1 Primary Network Routes

These routes need to make cyclists feel prioritised and allow for safe and consistent journeys. For trafficked environments, the motor vehicle speed environment (85th percentile speed) is desirably up to 40 km/hr. Above this, facilities should be separated from traffic. As these represent the 'cycle highways', capacity is an important consideration, particularly where shared with pedestrians. Lighting, route signage and maintenance are also important.

High quality linkages that are major recreational facilities may have particular design requirements specific to the route.

Table 12: Composition of the Primary Network

Function	Form	Description
Connect Town centres and other key origins and destinations Provide direct, fast connections Carry the highest volume of cyclists	Cycle Highways	High speed cycling path, dedicated to cyclists and separated from general traffic.
	Off-road paths (not shared with pedestrians)	Cycle paths dedicated to cyclists and separated from roadways.
	On-road lanes (shoulder lanes and segregated lanes)	On-road shoulder lanes - Cycle lanes painted on road shoulders and dedicated to cyclists Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier

7.1.2 Secondary Network Routes

Secondary network routes link to the primary network, extend the zone of access for cyclists and provide route choices for shorter trips to, and around the destination areas. For trafficked environments, the motor vehicle speed environment (85th percentile speed) is desirably less than 40 km/hr.

Table 13: Composition of the Secondary Network

Function	Form	Description
Link Town and Group Centres and lower order origins and destinations Provide connections to the primary network Caters for multi-purpose trips	On-road lanes (segregated lanes, shoulder and wide kerbside lanes)	Segregated Lanes – Cycle lanes segregated from general traffic via a kerb or other barrier On-road shoulder lanes - Cycle lanes painted on road shoulders and dedicated to cyclists Wide Kerbside Lane – general traffic lane with painted cyclist symbol to indicate the potential for their presence.
	Off-road paths (shared and dedicated paths)	Shared Path – Paths for the use of cyclists and pedestrians separated from roadways Dedicated Path - Cycle paths dedicated to cyclists and separated from roadways.
	Mixed Traffic Environments (less than 3,000 vpd)	General traffic streets with low traffic volumes.

7.1.3 Tertiary Network Routes

Tertiary network routes cater for lower volumes of cyclists and “fill gaps” in the greater network and predominantly provide access to local areas.

Traffic treatments appropriate for these routes are:

- Low use on and off-road paths
- Local Access Streets.

In many ways, these local access streets would ideally be car-free, from the perspective of pedestrians and cyclists, but this would generally not be practical. Shared streets or home zones are often implemented as a compromise that suits all users. For trafficked environments, routes are not through roads for motor vehicles and the motor vehicle speed environment (85th percentile speed) is desirably up to 30 km/hr.

Table 14: Composition of the Tertiary Network

Function	Form	Description
Provide connections to local centres and connections within the general local area Provides continuity in the network Caters to lower volumes of cyclists	Low use on road lanes and off road paths	On-road lanes with low volumes of cyclists and traffic. Off-road paths used infrequently.
	Shared Zones/Home Zones	Streets which balance the needs of all road users including pedestrians, cyclists and motorists. Streets are physically altered to with raised sections, plantings and surface treatments to calm traffic and provide an environment safe and conducive to walking and cycling.
	Low Speed access dominated roads	General Traffic Streets that provide an access function generally in residential areas. Traffic operates at slow speeds providing a non-threatening environment for cyclists.

In European practice, these guidelines extend to 'Home zones' or 'Woonerven' and 20 km/hr speed limited streets in residential areas and 'play streets' and 20 km/hr speed limited streets in non-residential areas.

In practice, an environment where all levels of cyclists making all types of trips will be actively encouraged, or overtly invited to use these local routes as cycle routes. It must be obvious that these streets were made or modified to suit cycling as a genuine prime transport mode, not a fringe mode or an afterthought. The short trips that are made on these trips are the fledgling trips that will eventually spread to the wider network.

7.1.4 Destination areas

There are few traffic treatments that would apply in destination areas, such as town centres, which are essentially limited to pedestrian malls and some form of limited access for vehicle servicing only. In some areas, off-road paths and plazas might be possible treatments. On-road cycling lanes are also used to reinforce the fact that cyclists are welcome to come and spend time (and money) in a particular centre. This sometimes means reallocating road space away from other users but has been successfully done in Melbourne CBD as shown in *Figure 15*.



Figure 15: Cycle Lane in a Destination Area (Melbourne CBD)

Publicly-accessible car parks should also provide cycle parking with commuter-level security. Local routes in commercial areas should have cycle parking provided at regular and convenient intervals.

From a cyclist network perspective, the following are the main implications:

- The need for cyclist access through and across destination areas. For pedestrian malls, this might be during morning and evening periods when the destination area has low pedestrian volumes. Generally, however, cyclist access should be secondary to pedestrian amenity and core routes providing access around the destination area are a more appropriate treatment
- Parking at convenient locations in and around the destination area. Parking at the periphery suits cyclists arriving and departing along the same route. Parking more centrally suits cyclists who may wish to depart in a different direction to arrival.

7.2 Other Infrastructure Considerations

The following infrastructure treatments are a selection not currently used in the ACT that may be considered for implementation over a longer-term horizon.

7.2.1 Cycle and Bus Integration

It is noted that cycle lockers and facilities are being incorporated into the ACT's major stops and interchanges. Ideally, improvements to and from the stops within catchments will also be undertaken over time.

In addition to this way-finding signage and maps should be provided at stops directing cyclists to the best cycle route between the stop and common destinations

Bike sharing programmes could be investigated at major stops within the Civic area to allow people to complete journeys by cycling. This type of programme is commonly used in North America where cycle share is co-located to public transport stops in order to allow for quick completion of the last part of trips.

In many situations in the ACT, cyclists, buses and bus passengers come into conflict with each other. Often buses have to cross cycle lanes to access bus bays and at many bus stops, passengers access the stop via paths shared with cyclists. While the options specifically relate to investigations in the network where these conflicts are specific issues, there is also the need for education of bus drivers, cyclists and bus passengers as to who to give way to and when as there is a limit to the infrastructure solutions that can resolve these conflicts across the entire ACT.

7.2.2 Intersections

Best practice for intersection design for cyclists is changing considerably in the international context. All cycle treatments at intersections in the ACT are currently done in accordance to Austroads standards. However, it is noted that dealing with cycle lanes where left-turning slip lanes exist is difficult. Left-turning slip lanes are very dangerous for cyclists (and pedestrians), who may not be seen. These users may be forced to cross traffic or be left vulnerable to turning traffic.

In the long-term (twenty years), it is suggested that the removal of left-turning slip lanes from intersections on the primary cycle network will need to be seriously considered.

In Holland, a new design standard has been implemented as demonstrated in *Figure 16*. This style of intersection improves visibility and contact between cyclists and motorists and also allows for easier left turns across traffic.

This standard could be initially incorporated into new developments, and then implemented as and where needed over a longer time period.



Figure 16: Dutch Intersection Design¹ (Note that vehicles drive on the right)

¹ Source: http://wiki.coe.neu.edu/groups/nl2011transpo/wiki/ba51e/15_Dutch_Intersection_Design.html

7.2.3 Off-Road Paths – Shared Paths

Ideally shared paths will be a minimum of 3 metres wide and clearly demarcated for pedestrians and cyclists. However, the cost of implementing this is recognised as being high.

Where shared facilities cannot be avoided, the following considerations will help both cyclists and pedestrians:

- Pedestrians should always have priority, reinforced by signage
- Markings should not be used as they give cyclists an incorrect sense of a dedicated cycle space
- Sufficient width to allow for evasive action and/or evading conflict (Ireland National Transport Authority, 2012)

Where it is not possible to increase the width of the path due to cost, physical environment constraints and other factors, other treatments can be applied.

Unsealed extensions to width such as Lilydale toppings (compacted crushed limestone) have a low initial cost and may be an acceptable interim solution to provide space for passing. Another option is to create passing bay build outs along the path. Once again, this can be done as an interim solution to create more capacity for users.

7.3 Supporting Policies

Maximising the potential mode share attributed to cycling is best achieved through the provision of cycling infrastructure in conjunction with supporting policies and development practices that minimise travel requirements.

7.3.1 Speed Limits

Streets should be designed to encourage traffic speeds that are suitable for the particular context of the environment and function of the street. The design of the street should indicate to car drivers the appropriate speed at which to travel, whether it is the width of the carriageway, the land uses and setbacks, the activity that lines the street, or the type of intersections along the street. Generally high speed environments alienate road users other than motor vehicles, whereas slower moving traffic should create safer and more pleasant conditions for cyclists, pedestrians, residents and other road users.

Currently in the ACT, a default speed limit of 50 km/hr applies in all areas except where signage indicates a higher speed limit. However, even a 50 km/hr speed limit may be inappropriate for certain streets and environments. In Europe many residential areas and city centres have speed limits of 30 km/hr. With such a speed limit, the mixing of cyclists and general traffic is considered appropriate. A review of speed limits in certain areas is likely to encourage greater levels of cycling. Specific areas that speed limits should be reviewed include:

- School zones
- The City Centre
- Town Centres
- Group Centres
- Local Centres

Streets that provide key connections for cyclists to centres or through school zones that are unable to accommodate segregated cycling facilities are considered the ideal environment for lowered speed limits. Locations with high levels of pedestrian and cycling activity are also possible locations for credible speed limit reductions.

Of course lowering speed limits cannot be done with just signs and it is considered important that all factors influencing speed will have to be addressed to achieve an active multi-modal street environment.

7.3.2 Land Use Policy and New Developments

The ACT Government supports integrated transport and land use planning and is working towards creating a compact city that is conducive to walking, cycling and using public transport. According to Littman and Steele (2012), most land use factors, such as density, mix of uses and site design have modest individual impacts on mode choice and travel demand, although together, their impacts are cumulative and synergistic.

All parts of the planning process (development of structure plans, precinct codes, estate development plans and development codes) have the ability to influence the cycling environment of the ACT. Generally, compact mixed use development leads to shorter trip lengths leading to higher levels of cycling. Such situations also generally lead to a more active public realm that encourages cycling, attracting people and pedestrian activity. To ensure suitable cycling conditions are created in new developments a pedestrian and cyclist first planning approach, should be adopted. Under such an approach the requirements of the most vulnerable road users (pedestrians and cyclists) are considered first in all planning decisions that impact mobility.

For many years now motorised traffic has taken precedence over all other modes of transport, including pedestrians and cyclists. The motor vehicle does not necessarily, and should not always, require the highest priority when considering the transport requirements of a community. Applying a hierarchy of users helps to contribute to better roads, streets and places as private vehicles are not considered to be the most important mode of transport but rather one of the modes in a transport network with the initial emphasis on walking and cycling. Such an approach will ensure new development encourages appropriate cycling conditions leading to higher rates of cycling. This type of user hierarchy is supported, in different forms in Victoria's Smart Roads initiative (<http://www.vicroads.vic.gov.au/Home/TrafficAndRoadConditions/HowWeManageTraffic/Smartroads/>) as well as Complete Streets (<http://www.engicom.com.au/products/complete-streets/>)

Not only can such a hierarchy of users be applied in land use policies and new development but also in all transport projects and studies. Cycling facilities can easily be integrated into new or road upgrade projects and other transport infrastructure projects.

To ensure the needs of cyclists are widely understood when they are considered in planning decisions, the following steps should be taken:

- Develop guidelines and standards for cyclist requirements in different urban environments
- Identify cycle infrastructure in plans, whether it is existing or proposed (funded or unfunded)
- Review current development codes for treatment of cyclists and integrate in the concept planning, estate development planning and development assessment processes

7.3.3 Parking Policies

Parking management is a key issue facing towns and cities throughout Australia. Parking has a significant influence on the individual's transport and lifestyle choices. Parking policies should aim to provide the right amount of parking, in the right location, and at the right price to ensure alternative modes of transport, such as cycling, are not suppressed.

An over-supply of parking is generally an unintended consequence of minimum parking requirements. Currently in the ACT, the Parking and Vehicular Access General Code (effective 13th April 2012) stipulates minimum parking requirements for different land uses. The city centre as well as town centres, group centres and local centres in the ACT are all generally dominated by low cost surface car parking. These are also the very environments in which high levels of cycling should be occurring as they are key destinations.

An abundance of no or low cost parking stimulates excessive demand for private vehicle based travel and lifestyle patterns, at the expense of other modes, such as cycling. Aside from impacting travel choices, over supply of parking can lead to:

- Economic impacts: the provision of parking is expensive and reduces the amount of land available for higher value activities
- Urban form impacts: parking takes up a significant amount of space and fragments urban form
- Environmental quality: excessive vehicle travel has negative impacts on the environment
- Social equity: the costs of parking are bundled into goods and services, meaning everyone in the community pays regardless of how often they use the parking supplied

To support greater levels of cycling minimum parking requirements should be re-considered. Preferably, minimum requirements should be replaced with maximum requirements, which allow the market to determine the required number of car spaces for a development. However, this will only address future parking provision. Parking requirements with all centres within the ACT should be reviewed to identify opportunities to manage parking supplies in order to support the ACT's desired mode shares. This could result in a reduction and conversion of parking areas to higher yielding land uses, altering pricing structure of parking, re-configuration of parking into structures (only viable in locations with very high land values), partial use of car parking areas for cycle parking and conversion of on street spaces into cycle lanes where suitable off street parking is provided. A public realm which is not dominated by cars and car parking will create an environment conducive to cycling and be a place that people want to visit, live and work in.

Initial steps have been taken to ensure cycle parking requirements are given greater consideration in developments with the introduction of the ACT Bicycle Parking Code. The code became effective in December 2011, requiring various types of development to provide end-of-trip cycling facilities. The code applies to all activities that require development approval under the *Planning and Development ACT 2007*, including development, redevelopment and refurbishment, for a range of land uses (see *Table 15*) that are likely to generate demand for end-of-trip cycling facilities.

Table 15: Development requiring End-of-trip cycling facilities in the ACT (Source: ACT Government <http://www.legislation.act.gov.au/ni/2008-27/copy/82877/pdf/2008-27.pdf>)

Development		
Apartment	Boarding house	Bulky goods retailing
Business agency	Chancellery	Child care centre
Civic administration	Club	Community activity centre
Community theatre	Cultural facility	Defence installation
Drink establishment	Education establishment	Financial establishment
Guest house	Health facility	Hospital
Hotel	Indoor entertainment facility	Indoor recreation facility
Motel	Multi-unit housing	Office
Outdoor recreation facility	Personal service	Place of assembly
Place of worship	Produce market	Public agency
Public transport facility	Religious associated use	Residential care accommodation
Restaurant	Retirement village	Shop
Special care establishment	Special care hostel	Special dwelling
Supermarket	Supportive housing	Take-away food shop
Tourist facility	Tourist resort	Veterinary hospital

The code articulates the required number of cycle parking spaces, the provision of showers and lockers and guidance on the type and design of facilities to be provided. The code also allows the reduction in car parking in developments where additional cycle parking spaces are provided, to a maximum of a 5% reduction. Such mandatory initiatives will have a positive impact on working towards the desired cycling mode share in the ACT.

7.3.4 Behaviour Change and Marketing

Behavioural change and marketing programs are an effective method to encourage greater levels of cycling amongst all sections of the community. These programs intend to alter the travel behaviour of communities and improve the perception of cycling as a viable mode of transport. Such programs can be targeted at different groups and scales. For example, a program may encourage school children to ride to and from school or a particular workplace to travel in a 'green' manner whereas at the other end of the scale it can be used to encourage political and institutional change.

Different psychological models of behavioural change can be employed, which include targeting the head (cognitive) and heart (emotive) decisions. Each model can also be applied at three broad levels, which include:

- The umbrella campaign – broad general awareness raising program to increase public and political awareness

- City wide campaign – may target specific audiences within the city
- Targeted individualised campaign – targets a specific group to influence/change a specific behaviour

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In the context of the ACT, potential behavioural change or marketing programs may include:

- Cycling promotion events such as Bike to Work/School week
- Development of cycling maps/multi modal access guides identifying safe cycle routes and facilities to and from various key destinations
- Personalised travel planning – this may initially be trialled in a government department and further expanded
- Green Travel Plans (GTP) for individual workplaces
- Bicycle pool fleet in workplaces – this may be initially trialled by a government department to encourage employees to cycle to meetings, workshops and the like that involve short trips
- Introduce free or low cost cycle maintenance and riding skills workshops
- Develop an online cycle route planning tool and Smartphone app
- Driver education programs to encourage drivers to ‘look out’ for cyclists and inform them of their legal responsibilities
- Cycling education and training programs for school students and other novice riders

8 SUMMARY

This report developed four strategy options for the development of the ACT Strategic Cycle Network:

- **Option 1 – City Centric**
This option focuses on developing the primary network, and involves filling network gaps and upgrade works to improve journey time reliability and safety. This is predominantly focused on developing the primary network to provide direct, efficient connections between major centres and attractors that carry high volumes of cyclists. It represents the most cost effective option in the short term to achieve the desired mode share targets for JTW trips.
- **Option 2 – Town Centre Centric**
This option focuses on improving cycling conditions in the 5km ring around town centres and involves improvements to the routes in the secondary and tertiary network through upgrades of existing routes and filling gaps. This predominantly focuses on developing a comprehensive network within local catchments to cater for a variety of trip types, which provides greater coverage although individual routes are likely to carry lower volumes of cyclists. It is a costly option but allows the development of cycling culture across for a wide spectrum of the community.
- **Option 3 – Hybrid Network**
This option focuses on developing the primary routes by filling existing gaps (no existing route upgrades) and further development of secondary and tertiary routes surrounding the town centres (predominantly filling gaps in the existing network and minimal new paths). It caters for a wide variety of cyclists from providing direct connections to major centres and attractors to improving cycling conditions in local areas surrounding the town centres. It is a balanced, cost-effective option that attempts to cater for a wide spectrum of the community.
- **Option 4 – Complete Strategic Cycle Network**
This option focuses on developing the complete Strategic Cycle Network (primary, secondary and tertiary network). This option involves filling gaps in the existing network and improving the standard of existing cycle paths (primary, secondary and tertiary routes). The network provides a comprehensive, integrated and connected network throughout the ACT, providing for all types of cyclists for all types of trips. Although highly costly to implement, it provides a true opportunity for the ACT to deliver an exemplar cycle network that caters for the entire community.

Preliminary costs for each of these options have been estimated and are shown in Table 16. These costs include 40% contingency and GST.

Table 16: Preliminary Cost Estimates

Option	Estimated Cost
Option 1	\$36 million
Option 2	\$39 million
Option 3	\$44 million
Option 4	\$85 million

The report also discussed how these options are designed to achieve the stated goals for cycling in the ACT, namely increasing mode share targets as per *Transport for Canberra* (2012):

- 2006 (actual) 2.5%
- 2016 (interim) 6.0%
- 2026 (long-term) 7.0%

Aside from infrastructure requirements, the report also discussed other elements that will improve cycling conditions and participation rates including:

- User hierarchy
- Design elements (lane widths, intersection elements etc.)
- Land use policy
- Parking strategies
- Speed limits
- Behavioural change and marketing

Ultimately, it is envisaged that the primary and secondary networks identified in the preferred option, if adopted, would then be used as the main cycle network in DS 13 – Design Standard for Urban Infrastructure for Pedestrians and Cyclists. This would then inform public and private sector developers.

8.1 Next Steps

As discussed in Chapter 3, feedback from stakeholders and the community will be reviewed and used to develop a preferred option, which will then be presented to the stakeholders and community for further feedback.

During Stage 3 of the project, the strategic transport modelling will be refined with the latest census data and the preferred option.

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