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Airds Bradbury Urban Renewal Study

Transport & Accessibility Study

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Prepared for

Landcom

Prepared by

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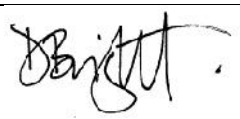
2	28-Apr-2011	Final Report with updated master plan	Dan Bright Associate Director, Strategic Planning & Advisory	

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Executive Summary

Background

This Transport and Accessibility Study has been prepared to accompany a Concept Plan Application under Part 3A of the Environmental Planning & Assessment Act, 1979 (EP&A Act) in relation to the Airds Bradbury Urban Renewal Project.

The purpose of the Concept Plan is to secure statutory approval for the overall planning framework for the site. This study has been prepared to support the Concept Plan Application and will address the potential transport impacts and to develop appropriate strategies to improve road and transport links for a socially mixed community.

This study has been produced to fulfil the Environmental Assessment Requirements issued by the Director General dated 10 December 2010 for a Concept Plan approval for the Airds Bradbury Urban Renewal Project (MP 10_0186).

Description of Overall Project Scope

In partnership with Landcom, Housing NSW is working towards the long term rejuvenation of the Airds Bradbury public housing estate to create a sustainable, mixed income community. In order to achieve this outcome, issues of urban structure, housing quality and social mix are being reviewed having regard to contextual opportunities and constraints.

The layout of the Airds Bradbury public housing area, in accordance with the “Radburn” urban design principles, has proven to be unsuitable. The renewal of Airds Bradbury is to be achieved by developing land for new private housing, redevelopment of some existing public housing for private ownership, improving road and transport links and the better utilisation of open space and the public domain. The aim of the project is to renew Airds Bradbury so that it functions like the neighbouring suburbs with a mix of public and private housing.

Based on a 70/30 percent private/public housing target, the Urban Renewal Concept Plan proposes 1,465 private dwellings (from an existing 92 private dwellings) and 629 public dwellings (from an existing 1,473 public dwellings).

The project is being undertaken using the Living Communities model, which is a model of estate renewal that pursues three equally important aims to:

- Improve services and provide residents with better opportunities.
- Support the local community to build its strengths, skills and overall capacity.
- Improve the housing and public areas by achieving better integration of social and private housing within the community.

Existing Transport Environment

A review of the existing transport network was undertaken and opportunities and constraints highlighted, which fed into the development of appropriate transport strategies in the concept plan to overcome existing transport and accessibility issues. The identified opportunities that have been addressed in the preferred concept plan include:

- Spare capacity on the surrounding regional and local road network and intersections can cater for additional traffic movements generated by the proposed development.
- The intersection of Georges River Road / Junction Road provides an opportunity for an upgrade to a four way intersection, with a direct link to Peppin Crescent as a major gateway to the study area.
- Rearrangement of road network in the master planning process to consider appropriate north-south and east-west connections to the surrounding road network would improve accessibility for all modes of transport to Airds.
- Improved signage on local and surrounding roads, particularly at key intersection, could enhance accessibility.

- Consideration to match train timetable with connecting bus services timetable and vice versa and increased frequency of buses would improve ease of transfer and encourage public transport usage.
- The design of road network needs to consider and enhance safe and efficient bus movements, the inclusion of on-road or off-road cycleways and footpaths.
- The Smiths Creek Corridor between Junction Road and Woodland Road provides an opportunity to introduce a good quality shared path.
- The need to provide sufficient pedestrian network to major generators encourages and maximises walking opportunities within the study area and to surrounding land uses such as local schools, natural reserves and playing fields and village centre in Airds.
- Urban planning of the renewal of Airds should encourage safe and efficient walking environment within and surrounding the study area.

Preferred Concept Plan

Based on a number of strategic objectives, informed by technical studies, an extensive consultation and community workshop exercise and urban design and social sustainability best practice, a preferred concept plan has been developed. The preferred concept plan has provided better accessibility to the surrounding areas by:

- Relocating the existing Riverside Drive access at Georges River Road to the west which connects to a central spine through the town centre of Airds.
- Providing a new access at Georges River Road through the extension of Deans Road.
- Providing a new direct connection to Junction Road through the extension of Peppin Crescent.
- Providing a new direct connection to Campbellfield Avenue through a new east-west collector road to the town centre of Airds.

Existing accesses at Briar Road, Akuna Avenue and Greengate Road will be retained. A number of new internal road networks have also included in the preferred concept plan to improve the connectivity of the study area including:

- A realigned Riverside Drive from the town centre to Georges River Road along the Smiths Creek Corridor. This forms part of the main collector into Airds from Georges River Road.
- A new grid road network surrounding the town centre.
- A new east-west road (extension of Campbellfield Avenue) connecting Riverside Drive to St Johns Road.
- A new north-south road connecting the new Campbellfield Avenue extension and Merino Crescent along the Smiths Creek Corridor.
- An extension of Riverside Drive to the south of Briar Road to connect with Greengate Road.
- A new road along the edge of the proposed Georges River Parkway, south of Briar Road.

An improved bus network is proposed to maximise accessibility of Airds Bradbury to the town centre, schools and other local recreational facilities (open spaces and sports grounds).

A network of off-road shared paths and on-road cycle paths are proposed within the project area. The network will link key amenities including open spaces, schools and the facilities in the town centre. New off-road cycleways are proposed along the Smiths Creek Corridor and the Georges River Reserve.

Footpaths are provided along all roads (except laneways) within Airds Bradbury to provide safe and convenient access for pedestrians to key amenities including open spaces, schools and the facilities in the town centre. Additional pedestrian refuges are proposed outside schools, major open spaces, senior living areas as well as the town centre to facilitate safe crossing opportunities for pedestrians.

Package of Transport Measures

A traffic impact assessment of the redevelopment was undertaken, and in conjunction with a review of the public transport, pedestrian and cycle networks proposed, a package of transport-related measures were prepared, and consist of the following:

- Proposed infrastructure upgrades
    - Extension of local bus services (Route 884 and 884W)
    - Provision of new bus stops (up to 10 with seating and signage only)
    - Internal footpaths, pedestrian refuges, cycle paths, road network and intersections
    - Upgrade of Georges River Road / Junction Road intersection (roundabout) with an additional approach from Peppin Crescent
    - Upgrade of Georges River Road / Bellinger Road intersection (give-way) with an additional approach from Deans Road
    - New single lane roundabout for Georges River Road / realigned Riverside Drive
    - New single lane roundabout for St Johns Road / extension of Campbellfield Avenue.

- Proposed sustainable travel initiatives:
    - Household Information Packs for the new dwelling units within Airds Bradbury
    - A local Bicycle User Group
    - School travel plans for the local schools
    - Car share scheme.

As a comprehensive package of measures, these should meet the transport needs of the residents of the renewed Airds Bradbury, while encouraging more sustainable travel.

1.0 Introduction

This Transport and Accessibility Impact Study has been prepared by AECOM to accompany a Concept Plan Application under Part 3A of the Environmental Planning & Assessment Act, 1979 (EP&A Act) in relation to the Airds Bradbury Urban Renewal Project. The site is located within the Campbelltown LGA.

In partnership with Landcom, Housing NSW is working towards the long term rejuvenation of the Airds Bradbury public housing estate to create a sustainable, mixed income community. In order to achieve this outcome, issues of urban structure, housing quality and social mix are being reviewed having regard to contextual opportunities and constraints.

The purpose of the concept plan is to secure statutory approval for the overall planning framework for the site. This study has been prepared to support the Concept Plan Application and will address the potential transport impacts and to develop appropriate strategies to improve road and transport links for a socially mixed community.

1.1 Background

The Airds Bradbury public housing area is one of five public housing areas in Campbelltown built in the 1970s and early 1980s by the then New South Wales Housing Commission. These five areas were central to the planning of Campbelltown as outlined in the “Three Cities Structure Plan” published in 1973. In common with other public housing areas of that era, significant parts of the Project are laid out in accordance with “Radburn” urban design principles, which have proven themselves unsuitable in a public housing context.

The Project Area contains significant areas of poor-quality and under-utilised open space. Parks are in locations that are not safely accessible by the community. Street access to homes is achieved via the back-door of properties. Streetscapes are often dominated by high rear-yard fencing. Free pedestrian movement through the Project Area - which was one of the driving principles of the Radburn layout – is strongly constrained by community anxiety over safety.

Also typical of the public housing areas of the era, the dwellings were built on superlots and were not intended for individual sale. Social housing policy has changed significantly since the 1970’s, with public housing now focused on those who are most in need – households on very low incomes and vulnerable households often with significant support needs. This fundamental change in the focus of public housing has resulted in social housing areas such as Airds Bradbury becoming communities with significant concentrations of disadvantage.

In a recent study[1], the suburb of Airds was identified as one of the five most deprived suburbs in New South Wales. As a result of this concentration of disadvantage, the community of Airds Bradbury shoulders a significant burden of social issues which includes high unemployment and poor health, a lack of access to educational opportunities and other services and high crime rates. Over the years, the area has become highly stigmatised, further exacerbating the social and economic issues.

The Airds Bradbury Renewal Project is a joint project by Landcom and Housing NSW that seeks to guide the long term renewal of the area via the preparation of a concept plan.

The renewal of Airds Bradbury is to be achieved by developing land for new private housing, redevelopment of some existing public housing for private ownership, improving road and transport links and the better utilisation of open space and the public domain. The aim of the project is to renew Airds Bradbury so that it functions like the neighbouring suburbs with a mix of public and private housing.

The Airds Bradbury public housing area was designed based on the Radburn urban design principles. It is typified by the backyards of homes facing the street and the fronts of homes facing each other over common yards. The current road hierarchy and network design will need to be reviewed and ‘de-Radburnised’ to improve linkages and connectivity within Airds Bradbury and the surrounding areas to bring about a better social outcome.

[1] *Suburban scars: Australian cities and socio-economic deprivation*, Scott Baum, Urban Research Program, Research Paper 15, February 2008.

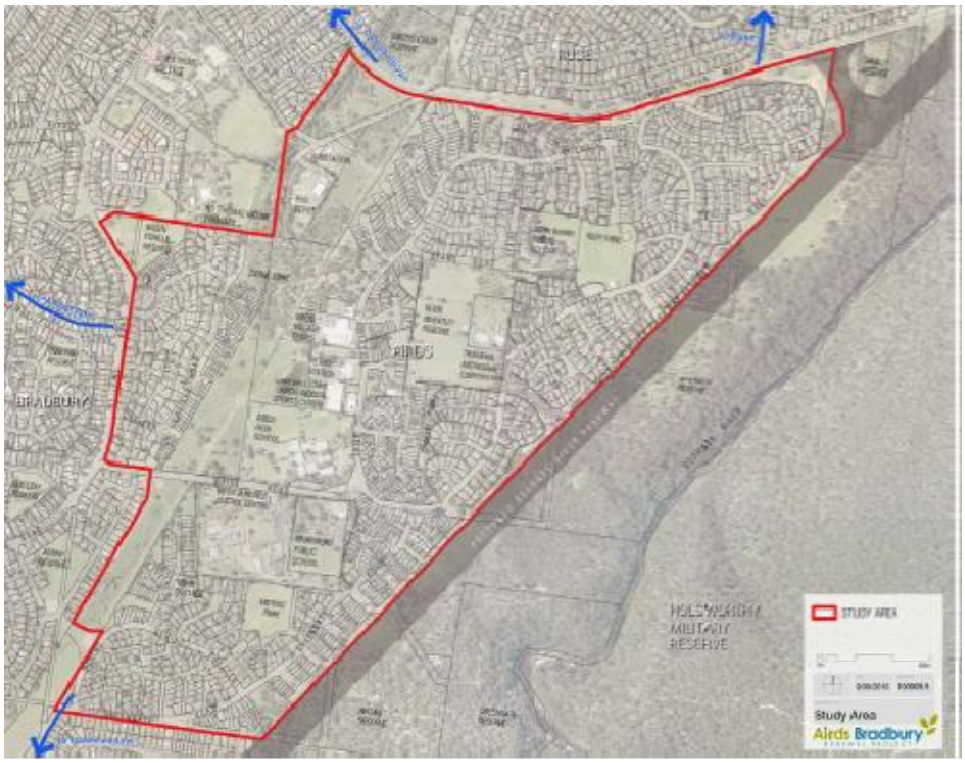
1.2 Study Area

1.2.1 Description of subject site

The study area is located in Airds and Bradbury, approximately 60 kilometres from Sydney and three kilometres south east of Campbelltown and is surrounded by mainly residential areas of Ruse to the north and the Georges River Parkway Reserve to the east. The Airds Bradbury Urban Renewal area as illustrated in **Figure 1.1**. It covers an area of approximately 200ha and is predominantly developed for residential purposes. The precinct is bounded by Georges River Road and College Road to the north, St John's Road and Kularoo Road to the west, Greengate Road to the south and the Georges River Parkway Reserve to the east.

The concept plan applies to land currently owned by Housing NSW, NSW Aboriginal Housing Office, Landcom, Department of Planning (Office of Strategic Lands) and Campbelltown City Council. Whilst there is privately owned land and land owned by the local Aboriginal Land Council within the overall renewal area, the proposed concept plan does not propose any physical changes on these lands.

Figure 1.1: The Airds Bradbury Renewal Area



Source: Urbis, 2010

The main collector road within the study area is Riverside Drive and Briar Road which connect to Georges River Road and St Johns Road. Local roads within the study area mainly consist of cul-de-sacs, connecting to the collector roads. The Smiths Creek Bypass Corridor previously identified as a land reserved for transport corridor, has been declared redundant for this purpose. The Corridor dissects the precinct in a north-south fashion, effectively dividing the suburbs of Airds and Bradbury.

The site is currently occupied by mainly residential houses in terms of public housing dwellings and open recreational areas consisting of parks, nature reserves and sporting fields. Airds also provides a number of public and private schools and a neighbourhood centre (Airds Village) that consists of a supermarket, a pharmacy and a medical centre for the local residents.

Table 1.1 shows the number, type and ownership of dwellings within the Project Area. Currently, 94 percent of the study area is public housing.

Table 1.1: Existing housing stock in Airds Bradbury

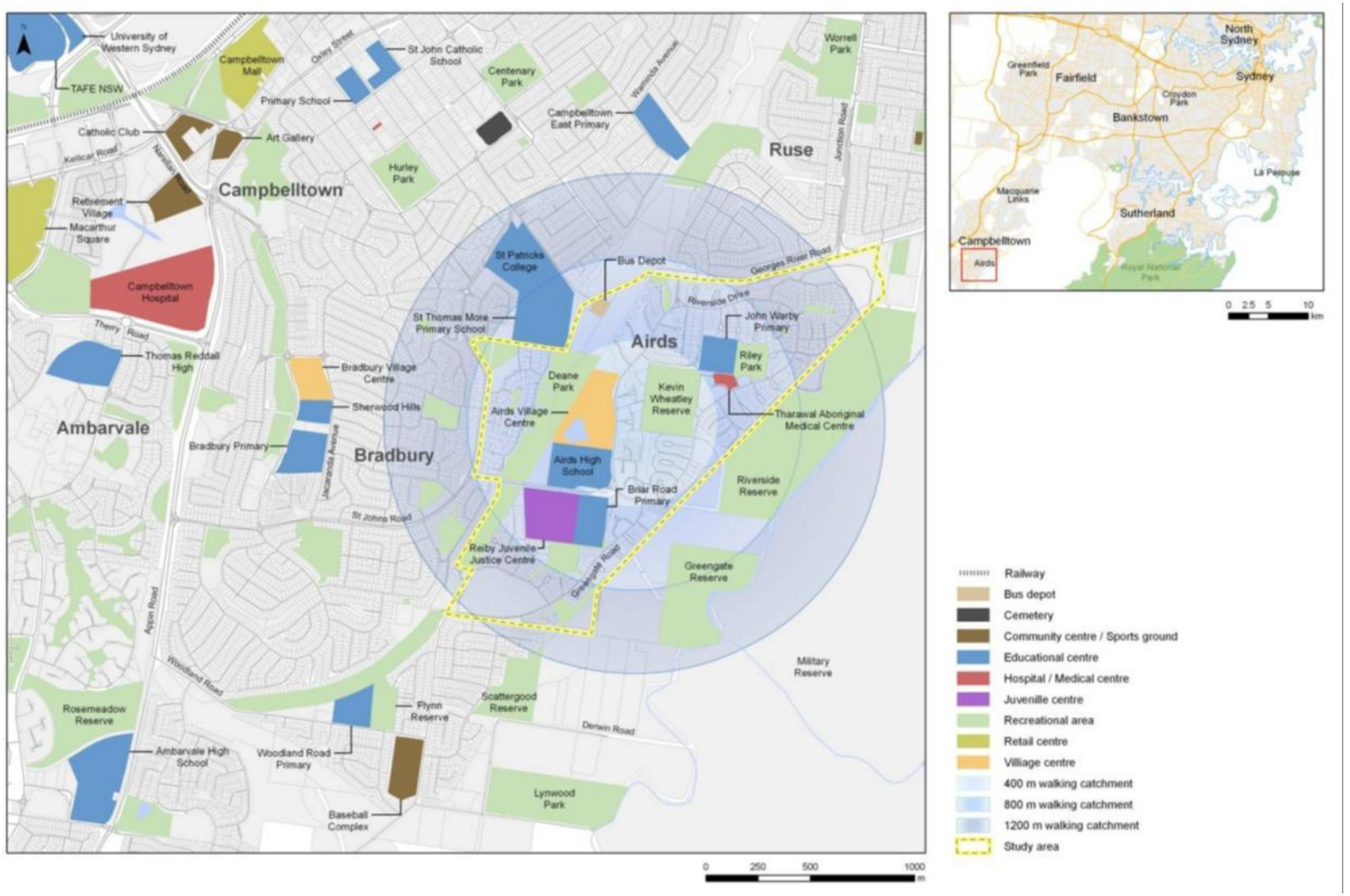
Dwelling types	Quantity
Social dwellings	1,473
Private dwellings	92
Total dwellings	**1,565**
Existing concentration of social dwellings	**94%**

Source: Housing NSW

1.2.2 Surrounding land uses

Surrounding land uses and trip attractors are important for identifying the places which people will most commonly visit and travel every day. The main trip attractors for the study area and surroundings include regional, district and local centres (commercial, retail and industrial), railway stations, schools or educational institutions, recreational areas and hospital/medical uses. The study area and existing major surrounding land uses is shown in **Figure 1.2**. It is critical that during the master planning process that all future residents will be able to access local and regional services easily via an improved road and public transport network.

Figure 1.2: Study area and surrounding land uses



Source: AECOM, 2010

1.3 Scope of study

This study has been prepared to fulfil the Environmental Assessment Requirements issued by the Director General dated 10 December 2010 for a Concept Plan approval for the Airds Bradbury Urban Renewal Project (MP 10_0186). **Table 1.2** presents the transport-related Director General's Requirements (DGRs) and AECOM's review of how the DGRs have been addressed in the study and where this is located in the report.

Table 1.2: Director General's Requirements

Item	Requirement	Reference
DGR 5	Prepare a Transport & Accessibility Study with reference to Metropolitan Transport Plan, NSW State Plan, NSW Planning Guidelines for Walking & Cycling, the Integrated Land Use and Transport policy package, NSW Bike Plan, Healthy Urban Development Checklist, Service Planning Guidelines – Sydney Contract regions and the RTA's Guide to Traffic Generating Development	These documents have been reviewed along with the background documents in **Section 2**.
DGR 5.1	Provide an analysis of the public transport provision, walking and cycling connections within the vicinity of the proposed site and determine the adequacy of the proposal to meet the likely future demand for increase public transport and pedestrian and cycle access, including the potential for improving the accessibility to and from the site and connections to the wider region via sustainable transport modes and the need / associated funding for increased bus services (if required)	The existing transport conditions are analysed in **Section 3**, while the proposed public transport, walking and cycling connections are reviewed in **Section 4**. The package of transport measures to be implemented, including sustainable initiatives, are described in **Section 6**.
DGR 5.2	Identify a hierarchy of internal road and footpath connections to support bus services and increase walking and cycling	These are identified in **Section 4**.
DGR 5.3	Daily and peak traffic movements likely to be generated by the proposed development, including the impact on nearby intersections and the need /associated funding for upgrading or road improvements works (if required). The traffic impact assessment should consider base models with future traffic generated by the proposal	A traffic impact assessment is provided in **Section 5**.
DGR 5.4	Details of the proposed access, parking provisions and service vehicle movements associated with the proposed development	The proposed road hierarchy and access arrangements to the area are presented in **Section 4.0**. Parking and service vehicle details are also discussed in this section.
DGR 5.5	Demonstrate a minimal provision of on-site car parking for the proposed development, having regard to the site's accessibility to public transport, opportunities for car sharing, local planning controls and RTA guidelines (note: the Department supports reduced parking provision, if adequate public transport is available for access to the site)	Parking provision is discussed in **Section 4.0**.

Source: Department of Planning letter, reference MP 10_0186, dated 10 December 2010

Extensive consultation has been undertaken by AECOM and Landcom to prepare the Transport and Accessibility Impact Study. The following agencies have been consulted:

- Campbelltown City Council
- Transport NSW
- Roads and Traffic Authority of NSW (RTA)
- Busways.

1.4 Report Structure

The report has been structured to present the findings in the following sections:

- **Chapter 2** provides a summary of key transport studies that are relevant to the development of transport strategies for the concept plan of Airds Bradbury.
- **Chapter 3** details the existing transport conditions and travel behaviour and highlights current opportunities and constraints.
- **Chapter 4** presents the proposed Urban Renewal concept plan and its associated traffic and transport network.
- **Chapter 5** provides the traffic impact assessment of the preferred concept plan.
- **Chapter 6** details the required package of measures to implement the concept plan.
- **Chapter 7** provides a summary of findings and conclusions of the study.

2.0 Review of Background Transport Documents & Planning Guidelines

2.1 Background Transport Documents

A number of studies have been completed in recent years that provide background information for this study. The following sections provide an outline of each document or study, including objectives, outcomes and recommendations where specified.

2.1.1 Airds Transport Study (Maunsell, October 2001)

Maunsell (now AECOM) was commissioned in 2001 by the Department of Urban Affairs and Planning (DUAP) to investigate the transport requirements in the Airds / Bradbury area and ascertain the need to retain the Smiths Creek Bypass Corridor (SCBC) for transport purposes. In addition, the purpose of the report was to:

- Research alternate public transport systems and routes to assess how the area would be best served by public transport (location, mode, etc).
- Make recommendations in regard to future easements / reservations for public transport in the Airds / Bradbury neighbourhood.

For the study, three bus transitway route options were investigated and assessed, mainly based on costs and the potential to attract commuters from outside the immediate residential areas as well as the areas in proximity of the corridor. Of the three bus transit way route options investigated, two ran along the SCBC utility reservation. At either end, both route options followed the existing road network and linked up with trip generator centres, including Campbelltown CBD, Campbelltown Hospital, and Macarthur Shopping Centre. The main outcome from the transport report was that the retention of the SCBC for transport related purposes is not warranted, for the following reasons:

- Any future transport facility within the corridor would exacerbate severance of the Airds and Bradbury Estates and encumber future residential integration.
- The corridor is a north-south oriented corridor, which serves little purpose in accommodating east-west bus services focusing on Campbelltown Station.
- Land within the corridor is not required for future road network augmentation.
- Retention of a parallel corridor in the vicinity of the Georges River Parkway is considered unwarranted in light of the patronage forecasts derived for the alternative public transport options.
- Use of the corridor to accommodate a bus transit way is not sustainable, given the significant capital costs relative to forecast patronage.
- The future public transport needs of Airds precinct can be met by a transit way passing through the area along Riverside Drive, thereby eliminating the need to retain the public utility corridor for an alternative public transport route along the SCBC.
- Neither the RTA nor the Department of Transport require the corridor for future rail, road, bus or transit way purposes.

These reasons for not reserving the corridor as a dedicated public transport corridor will be considered during the master planning process in developing the internal road, pedestrian and cycling network, as well as public transport routes to allow for all modes of transport to access Airds and Bradbury.

2.1.2 Airds Neighbourhood Renewal Master Plan Study Traffic Report (Colston Budd Hunt and Kafes, October 2002)

Colston Budd Hunt and Kafes was commissioned in 2002 to prepare a transport report as part of a master plan for future developments in Airds, comprising approximately 330 residential dwellings. Two working papers were prepared which considered overall transport aspects of the proposed master plan. The main outcomes from the transport report are summarised below:

- Riverside Drive provides the main vehicular access through Airds.
- The highest traffic flows in the area occur on Georges River Road with two-way flows of up to 1,000 vehicles per hour during peak hour.
- A large proportion of crashes in the area seem to be due to driver behaviour rather than network deficiencies. Riverside Drive / Briar Road intersection has the most crashes reported of all intersections in the area, with eight crashes.
- Improvements could be made to the frequency of buses in the area. Bus services are generally well patronised in the Airds area.
- There is a considerable number of people walking in the area, but only a small number of cyclists.
- Parking for existing retail and commercial facilities is currently under utilised.
- The proposed master plan development would generate approximately 300 to 350 vehicles per hour during peak times.
- The road network would be able to accommodate the additional traffic from the proposed master plan.

In addition, it was documented that Council has prepared a submission for funding under the Federal government's black spot program, with a proposal to install traffic calming devices in Riverside Drive, provide a cycle way and reduce pedestrian crossing distances.

One of the main recommendations following the outcomes of the study was to provide vehicular access from a new north-south access road between Georges River Road in the north and Merino Crescent in the south.

The transport context discussed in this study will be compared to the current conditions. The recommendations and proposed upgrades of this study will also be considered if they are applicable to the proposed master plan.

2.1.3 Integrated Transport Strategy Working Paper 1 and 2 (GHD, March and April 2006)

GHD was commissioned by Campbelltown and Camden Councils to prepare an Integrated Transport Strategy for the Campbelltown-Camden Region. The focus of the project was transport integration of the following three areas:

- The integration of transport strategies across the region of Camden and Campbelltown (and connections to surrounding regions).
- The integration of land use planning and transport objectives and policies.
- The integration of modes of transport.

The strategy provided a framework to plan, facilitate and implement an integrated transport system for Campbelltown and Camden that is based on the principles of sustainability. The Strategy's recommendations are in accordance with the goals of the Metropolitan Strategy and should be pursued in order to achieve an effective integrated transport system for the Camden and Campbelltown regions.

2.1.4 Campbelltown LGA Pedestrian Access and Mobility Plan (PAMP) (GTA consultants, May 2009)

In May 2009, GTA Consultants was commissioned by Campbelltown City Council to evaluate the effectiveness of the strategies within the current PAMP and prepare updated plans including strategies to ensure that both cycling and walking are viable, safe and attractive transport mode choices.

The identified areas and routes for future upgrades as an outcome of the PAMP were mainly focused around the Campbelltown and Ingleburn town centres and around each of the railway stations from Macarthur to Glenfield, west of Airds. The following recommendations for the town centre of Campbelltown are of relevance for future main pedestrian linkages to the Airds area, including:

- ***Recommendations for Moore Oxley-Bypass***

Moore-Oxley Bypass acts as a pedestrian barrier between the Campbelltown town centre and the residential area to the south and east. Crossing options are limited in that only one side of signalised intersections between Bradbury Avenue and Broughton Street have a signalised crossing provided. It is recommended that these signalised intersections be investigated with a view to providing full pedestrian crossing movements at each of these signalised intersections where feasible.

- ***Recommendations for Appin Road and Campbelltown Hospital***

Appin Road to the south of Narellan Road is not a pedestrian friendly environment and currently acts as a pedestrian barrier. It is proposed to upgrade the signalised intersection at Appin Road / Narellan Road / The Parkway.

- ***Recommendations for the Railway Line***

The railway line acts as a major east west barrier for all modes of transport, including pedestrians. There is an opportunity to provide a link between Blaxland Road and the town centre of Campbelltown between Badgally Road and Broughton Street, which could be implemented as part of the proposed future Bus / Rail interchange.

These recommendations for improving pedestrian connectivity to Campbelltown town centre and railway station will be considered during the master planning process.

2.2 Planning Guidelines

The following planning documents and guidelines have been reviewed for their relevance to the study:

2.2.1 Metropolitan Plan

Document	Metropolitan Plan for Sydney 2036
Organisation	NSW Government (Department of Planning, Department of Transport)
Date	December 2010
Purpose	This document supersedes the Metropolitan Strategy for Sydney to 2031, which was released in December 2005. This Metropolitan Plan draws on the strengths and principles of 2005's Metropolitan Strategy - City of Cities: A Plan for Sydney's Future, and the Metropolitan Transport Plan 2010: Connecting the City of Cities. It incorporates public feedback on the Metropolitan Transport Plan and the first five-yearly review of the Metropolitan Strategy to form a single, integrated Metropolitan Plan for Sydney 2036. It seeks to address the growth and development challenges facing Sydney over the next 25 years through an integrated, long-term planning framework.
Assumptions	- A population forecast to reach 6 million by 2036 - an increase of 1.7 million since 2006. - A need for 770,000 additional homes by 2036. - A need to expand Sydney's employment capacity by 760,000 to 2.85 million jobs.
Content	The metropolitan plan includes a vision for metropolitan Sydney and then provides strategic directions under the key areas of land use, transport, housing, economy, environment, social equity and delivery of the plan.
Relevance to Airds Bradbury	Airds Bradbury identified as current Housing NSW Urban Renewal Project under the Growing and Renewing Centres Strategic Direction

2.2.2 Metropolitan Transport Plan

Document	The Metropolitan Transport Plan - Connecting the City of Cities
Organisation	NSW Government (Transport NSW)
Date	February 2010
Purpose	A 25 year vision for land use planning for Sydney, and a 10 year fully funded package of transport infrastructure to support it. The Metropolitan Transport Plan has now been consolidated with the Metropolitan Strategy into one Metropolitan Plan.
Assumptions	- From 2006 to 2036, the South West sub-region is forecast to provide 179,200 additional dwellings and additional employment capacity of 105,150 jobs. - By 2036, Sydney is expected to grow by 1.7 million to a population of 6 million.
Content	Vision, approach and funding guarantees to integrate transport and land use planning.
Relevance to Airds Bradbury	- A new express rail service for Western Sydney which will help increase the capacity across the whole rail network. - A thousand new buses to be used on the network of 43 strategic bus corridors, which goes through Campbelltown. - Promotion of active lifestyle, through construction of missing links of the Strategic Cycle Network.

2.2.3 NSW State Plan

Document	NSW State Plan (Investing in a better future)
Organisation	NSW Government
Date	March 2010
Purpose	To set priorities and targets for service delivery for NSW government, in order to improve the transport system and create liveable cities; support jobs and business; improve education and health service provision, strengthen communities and support environmental objectives.
Content	The NSW State Plan (Priority Item E6) articulates the State's response to Housing Affordability. It acknowledges the impact of housing supply on affordability and recognises that there is a need to ensure competitive tension in the supply of land so there is a continuing flow of new properties to the market. The State Plan does not include specific goals for housing and land supply but refers to the goals set in the Metropolitan and Regional Strategies.
Relevance to Airds Bradbury	- Provide capacity for 640,000 new dwellings between 2004 and 2031, including 445,000 in existing urban areas. - Achieve stocks of land zoned and serviced with trunk infrastructure with potential for development of 55,000 dwellings. - Improvements to road network: an extra lane in each direction on the M5 motorway; upgrades to key roads in Western Sydney including the F5 Freeway, Camden Valley Way, Cowpasture Road, Richmond Road and Mulgoa Road. - Encouraging a healthier community through cycleways and footpaths - Increase walking and cycling - Increase the mode share of bicycle trips made in the Greater Sydney region, at a local and district level, to 5% by 2016. - Improve the public transport system - Increase the proportion of total journeys to work by public transport in the Sydney Metropolitan Region to 28% by 2016. - Increase number of jobs closer to home - Increase percentage of the population living within 30 minutes by public transport of a city or major centre in Metropolitan Sydney.

2.2.4 NSW Bike Plan

Document	The NSW BikePlan
Organisation	Premier's Council for Active Living (PCAL)
Date	May 2010
Purpose	The NSW BikePlan is a 10-year funded plan for bicycle infrastructure including: - cross-regional missing links in the Metro Sydney Bike Network - sub-regional bike networks in the western Sydney River Cities of Parramatta, Liverpool and Penrith - assistance for local councils across NSW to improve local cycleway networks. The NSW BikePlan includes a commitment for the NSW Government to fully fund construction of an average of 10 kilometres of new connections in the Metro Sydney Bike Network for each year of the ten year plan.
Content	The Metropolitan Strategy plans Sydney's future growth around its Major Centres with a focus on future public and private investment in urban development and major transport system improvements – including the Metro Sydney Bike Network, a regional network of high-quality cycle routes that connect the city's Major Centres and Regional Cities. The document includes a plan of the future Metro Sydney Bike Network, and sets out actions under the following key headings: to create connected cycling networks, to make bike-riding safe for all, to plan cycling-friendly neighbourhoods, to grow jobs in cycling, and to get organisations working together to support bike-riding.
Relevance to Airds Bradbury	- Complete missing links in the Metro Sydney Bike Network of low-stress regional routes, to connect all Metropolitan Strategy centres. - Ensure strategic planning for regions and sub-regions encourages cycling-friendly development concentrated in centres.

2.2.5 Healthy Urban Development Checklist

Document	Healthy Urban Development Checklist
Organisation	NSW Department of Health (Centre for Health Advancement)
Date	February 2010
Purpose	The purpose of the Checklist is to build the capacity of NSW Health to provide effective feedback to local councils, and other relevant organisations, on health issues in relation to urban development plans and proposals. The use of the Guidelines are intended to facilitate strengthened partnerships and collaboration between NSW Health and urban planners and developers as part of NSW Health's initiatives to promote healthy communities in NSW.
Content	The guidelines provides a checklist of questions to be asked about an urban development under a number of criteria, namely: - Healthy food - Physical activity - Housing - Transport and physical connectivity - Quality employment - Community safety and security - Public open space - Social infrastructure - Social cohesion and connectivity - Environment and health.
Relevance to	From a transport perspective, the checklist highlights the availability of public transport services, a reduction of car dependency and encouragement of active transport, with

Document	Healthy Urban Development Checklist
Airds Bradbury	opportunities for walking, cycling and other forms of active transport, access to green space and natural areas, and quality streetscapes.

2.2.6 RTA's Guide to Traffic Generating Development

Document	Guide to Traffic Generating Development
Organisation	Roads and Traffic Authority
Date	October 2002
Purpose	The RTA's Guide to Traffic Generating Developments outlines all aspects of traffic generation considerations relating to developments. The information provided gives background into the likely impacts of traffic from various types of development.
Content	The guide provides a section on various land use traffic generation and a section on interpretation of traffic impacts, relating to access, circulation and parking.
Relevance to Airds Bradbury	The impact on traffic efficiency at intersections is used in this study and intersection level of service criteria are provided in the guide.

2.2.7 NSW Planning Guidelines for Walking & Cycling

Document	NSW Planning Guidelines for Walking & Cycling
Organisation	NSW Government (Department of Infrastructure, Planning and natural Resources)
Date	December 2004
Purpose	Aim to assist land-use planner and related professionals to improve consideration of walking and cycling in their work.
Content	Guidelines focus on planning of development on private land, with a review of policy context and plan-making and then further explanations on designing cities, neighbourhoods, developer contributions, assessments and paths and trails.
Relevance to Airds Bradbury	Provides information of incorporating consideration of walking and cycling in urban renewal areas, such as Airds Bradbury.

2.2.8 Integrated Land Use and Transport policy package

Document	Integrated Land Use and Transport Policy Package
Organisation	Transport NSW / Department of Urban Affairs and Planning
Date	2001
Purpose	Integrating land use and transport to encourage development that increases access to public transport, walking and cycling, encourages people to travel shorter distances and make fewer trips, and reduces car dependency.
Content	The policy package contains a number of elements to support integrated land use and transport development, including: - The right place for business and services – planning policy on the management of travel demand by encouraging the location of appropriate trip-generating development in centres. - Improving transport choice – practice guidelines to implement the policy. - Draft SEPP ' Integration of Land Use and Transport' – draft statutory instrument.

Document	Integrated Land Use and Transport Policy Package
	- Employment and journey to work patterns in the Greater Metropolitan Region – working paper with key statistics.
Relevance to Airds Bradbury	Provides policies for the renewal of the Airds Bradbury area to improve the quality of the urban environment by creating conditions conducive to the establishment of a sustainable place to live.

3.0 Existing Transport Conditions and Planned Changes

This chapter summarises the existing travel behaviour and transport conditions in the vicinity of the study area based on recent traffic surveys, published traffic data and site visits. This section also highlights some of the planned improvements and other opportunities to improve the road and public transport networks through preliminary discussions with some of the key stakeholders of the project, including RTA and Council. These transport opportunities have been considered during the master planning process to ensure the renewal process delivers improved access to major land uses and employment opportunities, as well as local and regional services via different modes of transport.

Opportunities and constraints for each mode are provided at the end of each section with an overall summary provided at the end of the chapter.

3.1 Travel Behaviour

3.1.1 Journey to work data

Journey to work (JTW) data includes details of the origin and destination of trips, together with characteristics of the journey, such as mode of travel. The 2006 JTW data has been analysed to determine the current distribution of trips from the study area and the proportion of mode of travel.

As a comparison with surrounding neighbourhood areas with more mixed public/private residential development, JTW data was also analysed for St Helens (located south of the study area) and Ruse (located north of the study area).

The analysis shows that the three analysed areas have similar major destinations, with Campbelltown and Camden among the major destinations, suggesting that the majority of trips are undertaken locally. Other work destinations from the study area include Bankstown, Fairfield, Liverpool, Parramatta and Sydney. From the Airds study area, approximately 40 percent of all trips were made to Campbelltown, five percent were made to Camden and nine percent were made to Liverpool.

3.1.2 Mode split

Analysis of the type of mode used to travel to work from Airds revealed that the majority of residents (approximately 60 percent) used car as the mode of transport to work (either as driver or car passenger). This was followed by approximately 14 percent of journey to work trips made by train and five percent by bus. Only three precent of work trips involved walking only and cycling usage was minimal.

It should be noted that approximately 12 percent of workers in the study area did not go to work during the census day, suggesting they were absent from work for various reasons or they had a day off on their shift work or part-time work schedule. Further details of the 2006 JTW data analysis for Airds, St Helens and Ruse is presented in **Appendix A**.

3.2 Accident Analysis

Accident analysis was undertaken within and in proximity to the study area for five years between January 2004 and December 2008. During this time period, 72 accidents occurred, involving 40 injury crashes and 32 tow away crashes. The 40 injury crashes involved 48 injuries but no fatalities occurred during the analysed period. Of the 72 crashes, seven involved pedestrians and four involved pedal cycles. The majority of crashes occurred in 2004 with 16 crashes while 2007 had the least number of crashes with 13 crashes.

Some of the main characteristics of the crashes within and in the vicinity of the study area were:

- The majority (52 percent) of all crashes occurred at a T-intersection, followed by on a two lane undivided street (33 percent).
- Only one crash was a head on collision.
- Approximately 53 percent of all crashes occurred while street lights were off and 31 percent of all crashes occurred during the hours of darkness.
- Georges River Road, with 23 crashes, and Riverside Drive, with 14 crashes, had the highest number of crashes.

3.3 Road Network and Traffic Volumes

3.3.1 Existing road network

The major road network in the vicinity of the study area includes the South Western Freeway, Badgally Road, Narellan Road, and Appin Road / Moore-Oxley Bypass. These roads connect to the sub-arterial roads such as Broughton Street / Georges River Road, Junction Road and St Johns Road surrounding the study area.

Riverside Drive, which is the main collector road through the study area, connects to Georges River Road to the north and St Johns Road to the south. The majority of the roads surrounding the study area run in a north-south direction with only a limited number of roads orientated in an east-west direction.

The existing road hierarchy, intersection control, approximate two way AADT data (2005) and planned upgrades on the surrounding road network are shown in **Figure 3.2**.

South Western Freeway

South Western Freeway is a classified freeway and runs north south between the M7 and M5 in the north and the Hume Highway in the south and is a major route between inner Sydney and Campbelltown. Campbelltown and Airds can be accessed from the South Western Freeway via the Narellan Road interchange. In the vicinity of the study area, the freeway is a divided road with two trafficable lanes and an on-road cycle lane in each direction. Initial consultation with the RTA suggests that the South Western Freeway is approaching or is at capacity during peak hours. However, the RTA is currently widening the freeway to three lanes each direction between Narellan Road and Brooks Road.

Narellan Road

Narellan Road is a major arterial road that runs east-west between Camden Valley Way and Appin Road / Moore-Oxley Bypass. It has three lanes in each direction west of the South Western Freeway and two lanes in each direction to the east of the South Western Freeway. Narellan Road is one of the main east west major roads in Campbelltown that provides connection between areas on both side of the South Western Freeway. It provides access to Campbelltown town centre, the University of Western Sydney and major residential suburbs located to the north and south of the arterial road.

Initial consultation with the RTA suggests that Narellan Road is approaching or is at capacity during peak hours. Additional east-west regional links in Campbelltown such as Raby Road will be upgraded to relieve the heavy east-west traffic demand generated by the proposed development in South West Growth Centres.

Moore-Oxley Bypass / Appin Road

Moore-Oxley Bypass is a classified arterial road. It is a divided road with three traffic lanes in each direction between Queen Street to the north and Narellan Road to the south. It provides a bypass to Campbelltown town centre. Broughton Street at Moore-Oxley Bypass provides one of the main accesses from the regional road network to the study area of Airds and Bradbury. Initial consultation with Council suggests Moore-Oxley Bypass has reserve capacity to accommodate additional traffic during peak hours.

Moore-Oxley Bypass extends to the south of Narellan Road and becomes Appin Road. Appin Road is also a classified arterial road that has two lanes in each direction north of Kellerman Drive. Appin Road is currently heavily used by traffic between Campbelltown and Appin as well as Wollongong. Campbelltown Hospital and the Macarthur Regional Shopping Centre can also be accessed via Appin Road. The signalised intersection of Appin Road / St Johns Road provides the other major access from the regional network to Airds / Bradbury.

Broughton Street / Georges River Road

Broughton Street / Georges River Road is a classified sub arterial road. Broughton Road is the major connection between the study area and Campbelltown town centre as well as railway station. It is an undivided road with two traffic lanes in each direction between St Johns Road and Campbelltown railway station (with some local narrowing to one lane). Broughton Street extends to the east and becomes Georges River Road which has one lane in each direction.

St Johns Road

St Johns Road is a classified sub arterial road located along the western boundary of the study area between Broughton Street to the north and Appin Road to the south. It is a divided road with one traffic lane in each direction with a shoulder lane for parking or on-road cycling. Both intersections at Broughton Street and Appin Road with St Johns Road are signal controlled. Initial consultation with Council suggests St Johns Road has reserve capacity to accommodate additional traffic during peak hours.

Junction Road

Junction Road is an alternative north-south connection to Moore-Oxley Bypass / Campbelltown Road between the study area and Leumeah as well as Minto. It generally has one traffic lane and a shoulder / parking lane in each direction. The intersection of Junction Road and Georges River Road is controlled by a roundabout and has spare capacity during the peak hours.

Riverside Drive

Riverside Drive is a local collector loop road within Airds that connects to Georges River Road to the north and Briar Road and Greengate Road to the south. It is an undivided road with one traffic lane and an on-road cycle lane in each direction. There are numerous cul-de-sacs that connect to Riverside Drive providing accesses to local residents in Airds.

The connection of Riverside Drive with Georges River Road is the main gateway to the study area. However, there is currently lack of directional signage directing traffic into Airds through this gateway. A typical cross-section of Riverside Drive is shown in **Figure 3.1**.

Figure 3.1: Typical Cross-section of Riverside Drive

Source: AECOM, April 2010

3.3.2 Published traffic volumes

RTA Annual Average Daily Traffic (AADT) data has been obtained to determine the historical traffic growth and current two-way, mid-block traffic flows in the surrounding area between 1996 and 2005. The data shows the major increase in traffic have occurred along Narellan Road and the South Western Freeway during the analysed years with annual increases of 5.8 percent and 3.6 percent respectively in proximity to the study area. The analysis also shows that traffic along St Johns Road has decreased by an average of approximately one percent between 1996 and 2005. Further details regarding the AADT data on the surrounding road network between 1996 and 2005 is presented in **Appendix B**.

3.3.3 Surveyed traffic volumes

Traffic counts were undertaken by SkyHigh Traffic Data on Tuesday 1st December 2009 for the two hour periods between 7:00 and 9:00AM and 4:00 and 6:00PM on the local road network. The intersections that were surveyed included:

- Georges River Road / Junction Road
- Georges River Road / Riverside Drive
- St Johns Road / Broughton Street / Waminda Avenue
- St Johns Road / Hoddle Avenue
- St Johns Road / Briar Road
- St Johns Road / Akuna Avenue
- Greengate Road / Merino Crescent
- Riverside Drive / Briar Road.

The AM and PM peak hours are identified to be 8:00 to 9:00 in the morning and 4:45 to 5:45 in the afternoon. During the AM and PM peak hours, the intersection of Broughton Street / St Johns Road has the highest traffic volumes amongst the surveyed intersections.

3.3.4 Local road network and intersection analysis

All surveyed intersections were analysed for the peak hour performance using the modelling package SIDRA 3.2. With the exception of the intersection of St Johns Road / Broughton Street / Waminda Avenue which operates at Level of Service (LoS) B, all intersections function at LoS A which suggests that the road network in vicinity of the study area operates with significant spare capacity. The location of analysed intersections, intersection performance and current intersection layouts can be seen in **Figure 3.3**.

Further details regarding total peak hour volumes and performance of the analysed intersections are presented in **Appendix C**.

3.3.5 Stakeholder consultation

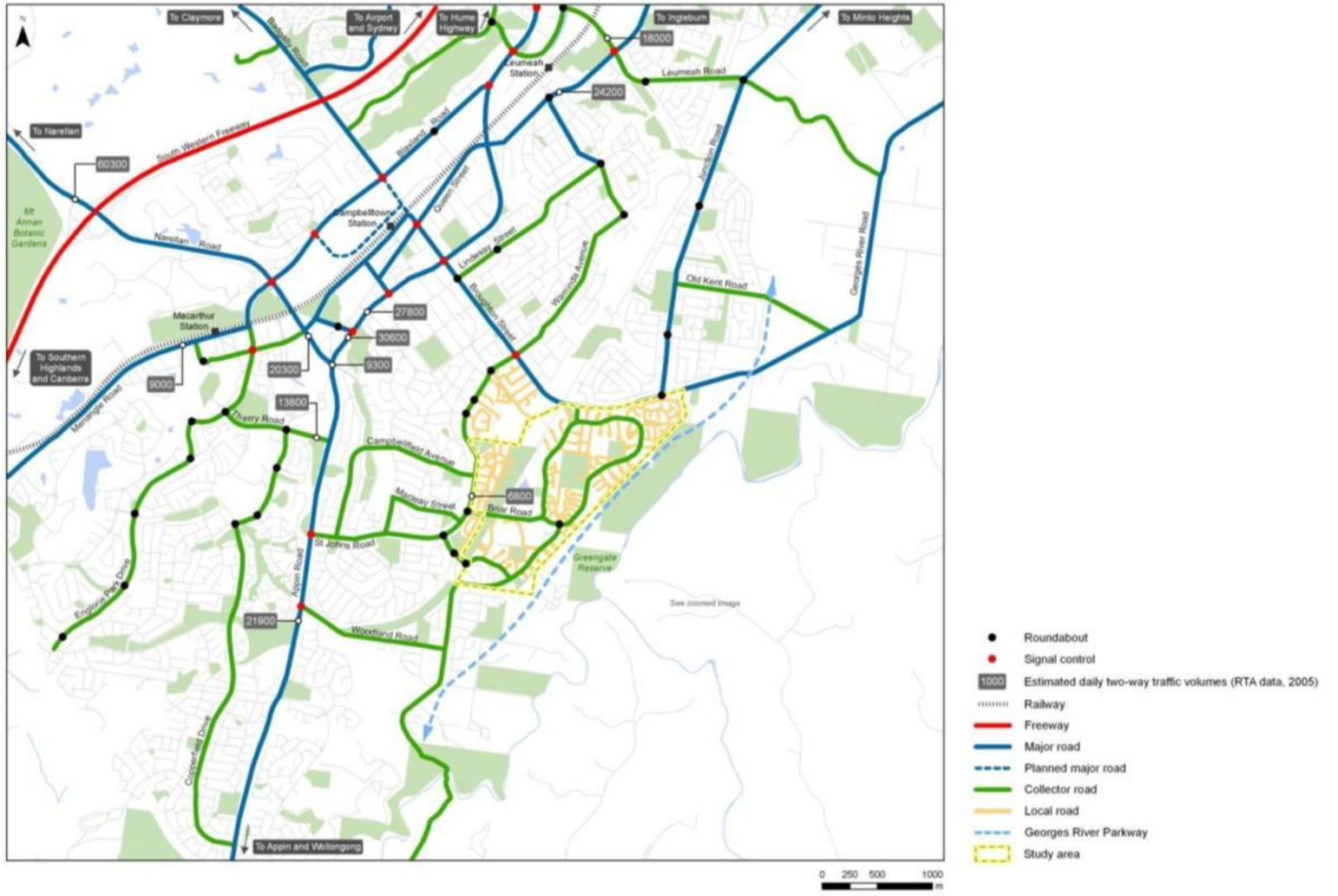
Consultation has been undertaken with Campbelltown City Council and the RTA with regards to planned and proposed transport related matters within the study area and on the wider road network. Following consultation with Campbelltown City Council on 15 April 2010, the following information for the regional network was provided:

- Approximately 700 commuter car parking spaces have recently been provided on the western side of the Campbelltown Station at Farrow Road.
- A connection from Broughton Road to Badgally Road is proposed which would improve east west connections within the road network. Badgally Road is planned to extend to the northwest to connect with the South West Growth Centre.

Following consultation with the RTA on14 April 2010, the following regional and local transport context was provided:

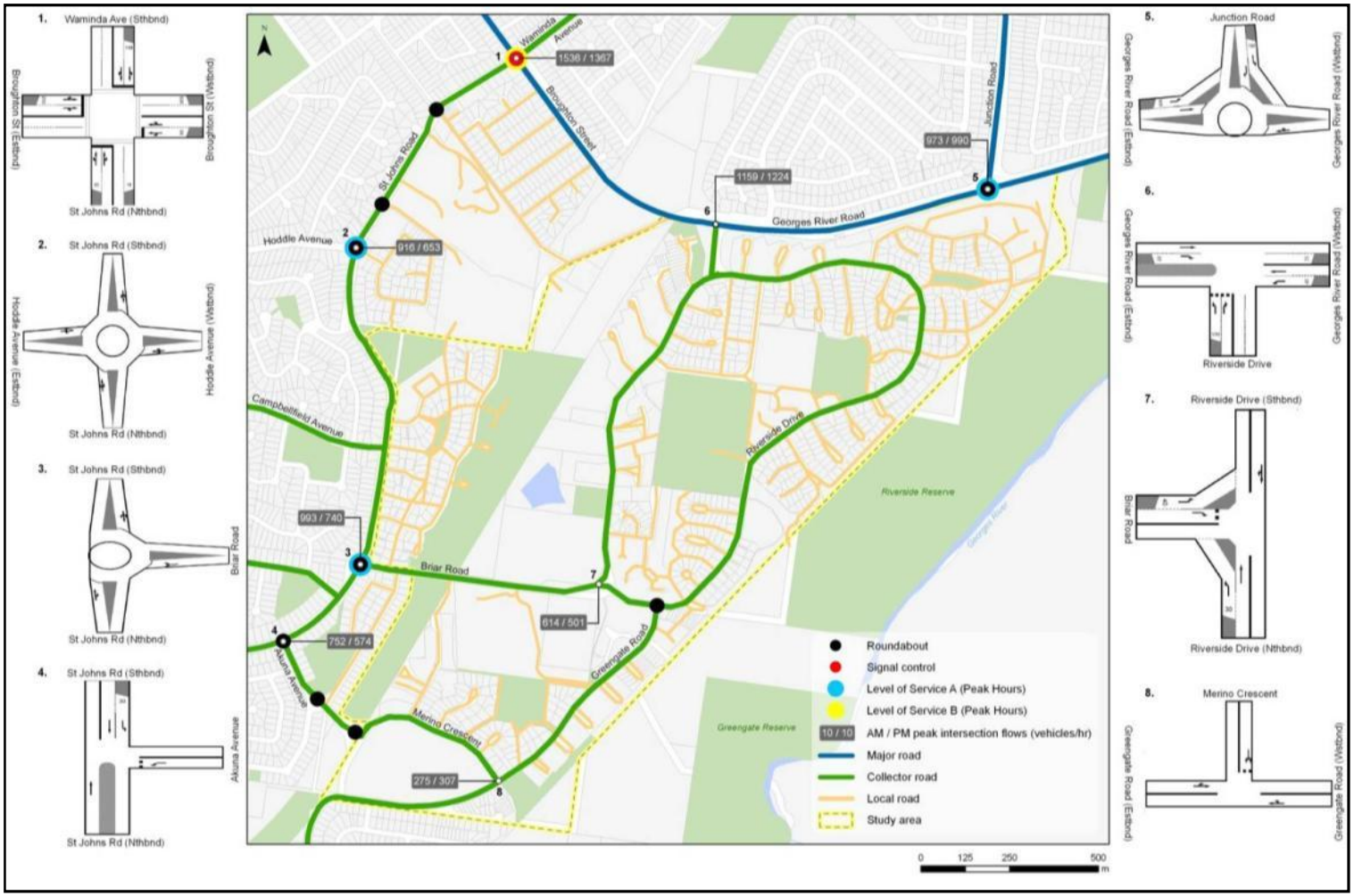
- The reserve for the Georges River Parkway will be retained in the future, even though the road is unlikely to be built in the next 30-40 years. There is also a possibility for a potential connection from the Parkway to Georges River Road, Briar Road or Woodland Road.
- The upgrade of regional east-west links in Campbelltown such as Raby Road and St Andrews Road will be dependent on the rate of development of the SW Growth Centres.
- RTA may consider grade separation of the intersection of Moore Oxley Bypass/Narellan Road/The Parkway in the long term.
- The potential to extend Farrow Road to Blaxland Road for improved access to Campbelltown Station is being considered.

Figure 3.2: Existing traffic conditions surrounding the study area (including potential road network upgrades)



Source: AECOM, 2010

Figure 3.3: Existing traffic conditions within the study area



Source: AECOM, 2010

3.3.6 Road network opportunities and constraints

Constraints

- Lack of direct east-west road connections from some major generators (such as Campbelltown Hospital, University of Western Sydney and Macarthur Square) to the study area compared to the direct connection to the centre of Campbelltown.
- Narellan Road currently performs at or near capacity which acts as a constraint to future additional traffic on the regional road network.
- Legibility of links between local and regional road network is unclear with extensive road widths on some local roads and oversized intersection arrangements (for example the Akuna Avenue / Merino Crescent roundabout).
- Poor signage creates confusion on preferred access routes to Airds.
- Lack of gateway entries to the study area makes drivers passing by the area unaware of its existence and any destinations / attractors in the area.
- The current loop road along Riverside Drive acts as a barrier to through traffic movements within the study area.
- Lack of direct east-west and north-south connections to the major road network such as St Johns Road and Broughton Street / Georges River Road confuse drivers and intimidate visitors.

Opportunities

- The proposal to connect Broughton Street to Badgally Road across the existing railway line will improve east west connections between the study area, the regional road network, major surrounding generators and to the upgraded commuter car park on the western side of Campbelltown station.
- Spare capacity on the surrounding local road network and intersections can cater for additional traffic movements generated by the proposed development.
- The intersection of Georges River Road / Junction Road provides an opportunity for an upgrade to a four way intersection, with a direct link to Peppin Crescent as a major gateway to the study area.
- The existing link from Riverside Drive to Georges River Road could be improved by providing better turning off Georges River Road and merge lanes onto Georges River Road. The intersection could be landscaped as a major entry point to the suburb.
- Two east-west connections could be provided within the suburb, one possibly extending Deans Road to the west arm of Riverside Drive. The second could be to connect Kelburn Place to Rodney and then into the Shopping Centre.
- Improvement to the intersection of Greengate and Riverside Drive would be beneficial as well as Riverside and Briar, particularly considering bus movements.
- Improved signage on local and surrounding roads, particularly at key intersections, could enhance accessibility.
- Revision of road cross-sections can assist in establishing more defined hierarchy of the surrounding road network.
- “De-Radburnise” the existing road network in the master planning process to improve linkages and connectivity within Airds Bradbury and the surrounding areas.

3.4 Public Transport

3.4.1 Rail facilities

The closest railway station to Airds is Campbelltown Station, approximately four kilometres from the study area. Therefore, Airds is located outside the walking catchment of any railway stations, typically 800m to 1km (approximately a 10-minute walk). Bus services currently provide connections from the study area to the Campbelltown Station but no other stations are served by direct bus access from Airds. Approximately 25 train services operate through this station towards the City or Blacktown between 6 and 9am during weekdays. The services that run through Campbelltown operate on the following four train lines:

- The South Line (Macarthur to City Circle via Granville)
- The Airport and East Hills Lines (Macarthur to City Circle via East Hills and Sydney Airport)
- The Cumberland Line (Campbelltown to Blacktown)
- The Southern Highlands Line (Campbelltown to the Southern Highlands).

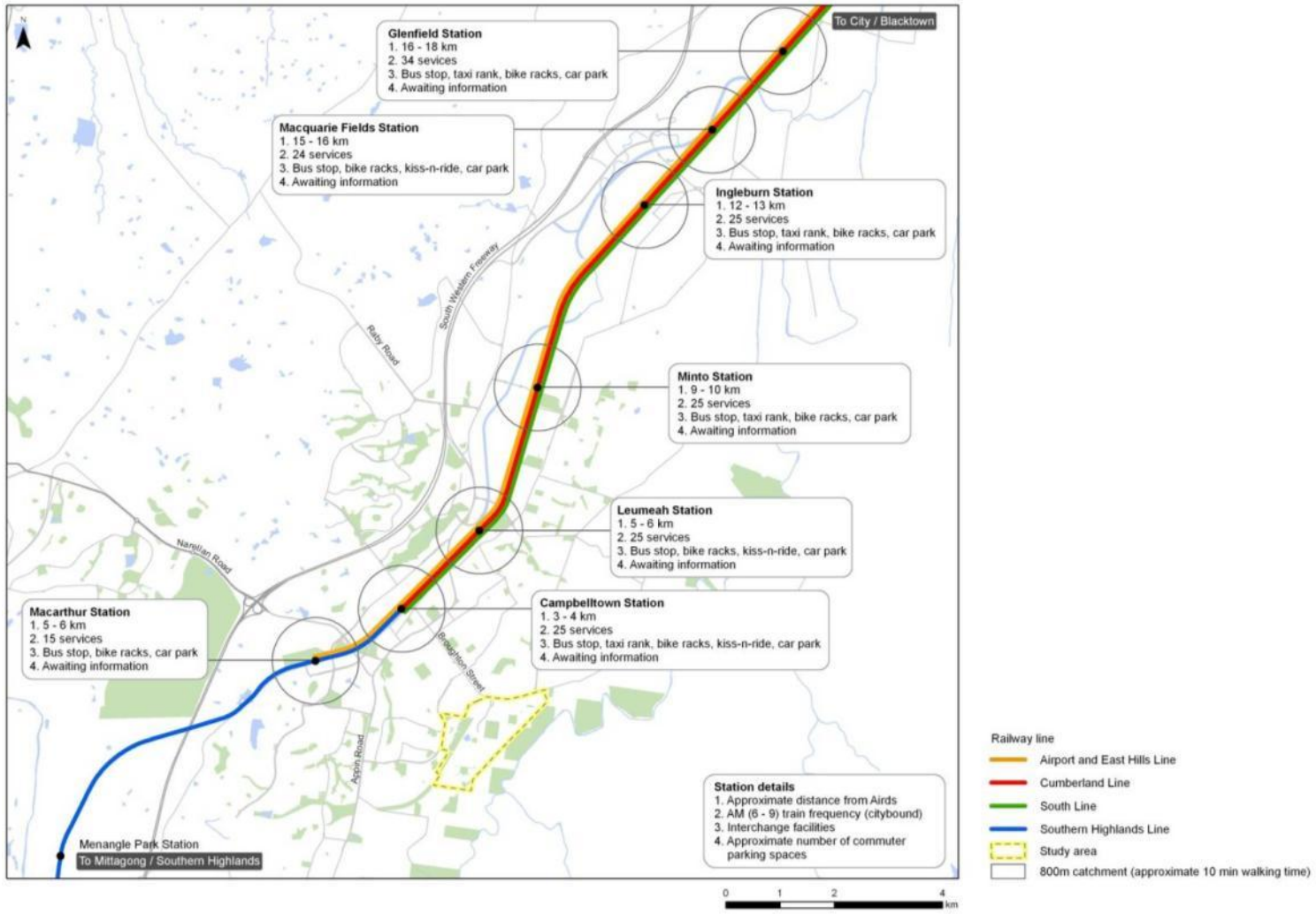
Other stations along these lines, located in proximity to the study area are Macarthur, Leumeah, Minto, Ingleburn, Glenfield and Macquarie Fields stations. Out of these stations, Glenfield station is most frequently serviced with approximately 35 city bound services between 6 and 9am running past this station. In general, services on the South and Airport / East lines operate with a 10 minutes frequency in each direction. Detailed information regarding facilities provided at each of these stations and the rail services are presented in **Figure 3.4**.

Services on the Cumberland Line generally operate with a 30 minutes frequency in each direction. The majority of the stations have car parking spaces, bus stops and taxi ranks at the interchange of the station. An additional 700 commuter car parking spaces have currently been completed on the western side of the Campbelltown Station at Farrow Road.

The upgrade of Macarthur Station and its interchange including additional commuter car park will be completed by 2010. The completion of the Rail Clearway program at Macarthur will increase the number of city bound train services to operate from Macarthur. Both of these upgrades will provide improve accessibility to train services for residents in Airds and Bradbury.

Consultation with Campbelltown City Council suggest that there will be a new rail line (East Hills Line) constructed to the east of the existing station in the 10 year plan to cater for future commuter demand.

Figure 3.4: Rail stations and facilities in proximity of the study area



Source: AECOM, 2010

3.4.2 Rail opportunities and constraints

Constraints

- Airds is located outside the walking catchment of any railway stations.
- City bound train services are approaching capacity due to the increase public transport demand in recent years.
- Limited bus route connections to stations other than Campbelltown limits access from the study area to rail as a mode of transport.

Opportunities

- The proposal to connect Broughton Street to Badgally Road across the existing railway line improves the east-west connections between the study area and the upgraded commuter car park on the western side of Campbelltown station.
- The addition of commuter car parking spaces at Macarthur and Campbelltown Stations provides further incentives for local residents to use public transport.
- Further improvements to other interchange facilities at the railway stations such as bike parking and storage facilities, bus stops and taxi ranks to encourage local residents to use public transport.
- Consideration to match train timetable with connecting bus services timetable and vice versa would improve ease of transfer.
- Consideration to improve internal road network connectivity to Appin Road, Broughton Road and Junction Road would provide direct connection to Macarthur, Campbelltown and Leumeah Stations.
- Consideration to improve cycle connections between Airds and railway stations.

3.4.3 Bus facilities

Local bus services in the study area are provided by Busways. An anticlockwise loop service is currently provided between Airds and Campbelltown (route number 884 and 884W) along St Johns Road, Greengate Drive and Riverside Drive. These bus routes provide a total of 13 services in the AM (6-9am) and 10 services in the PM (4-7pm). The existing bus services in Airds are perceived to be under-utilised due to its circuitous route and potential security issues, especially after hours.

Other bus routes such as 883, 883K and 885 also service between the neighbouring suburbs of Ruse and Bradbury and Campbelltown. However, there are no direct bus services that connect Airds to any other suburbs or major facilities, except for Campbelltown town centre and station.

All bus stops surrounding the study area are simple, with timetable information provided. The majority of bus stops within the study area currently lack facilities such as seating and shelters, as seen in **Figure 3.5** and **Figure 3.6**.

Figure 3.5: Lack of facilities at bus stop along Riverside Drive

Figure 3.6: Lack of facilities at bus stop along Greengate Road

Source: AECOM, April 2010

Details regarding the number of services for each bus route throughout the day through and in proximity of the study area can be seen in **Table 3.1** and a detailed map showing the routes in the area and frequencies during AM and PM can be seen in **Figure 3.7**.

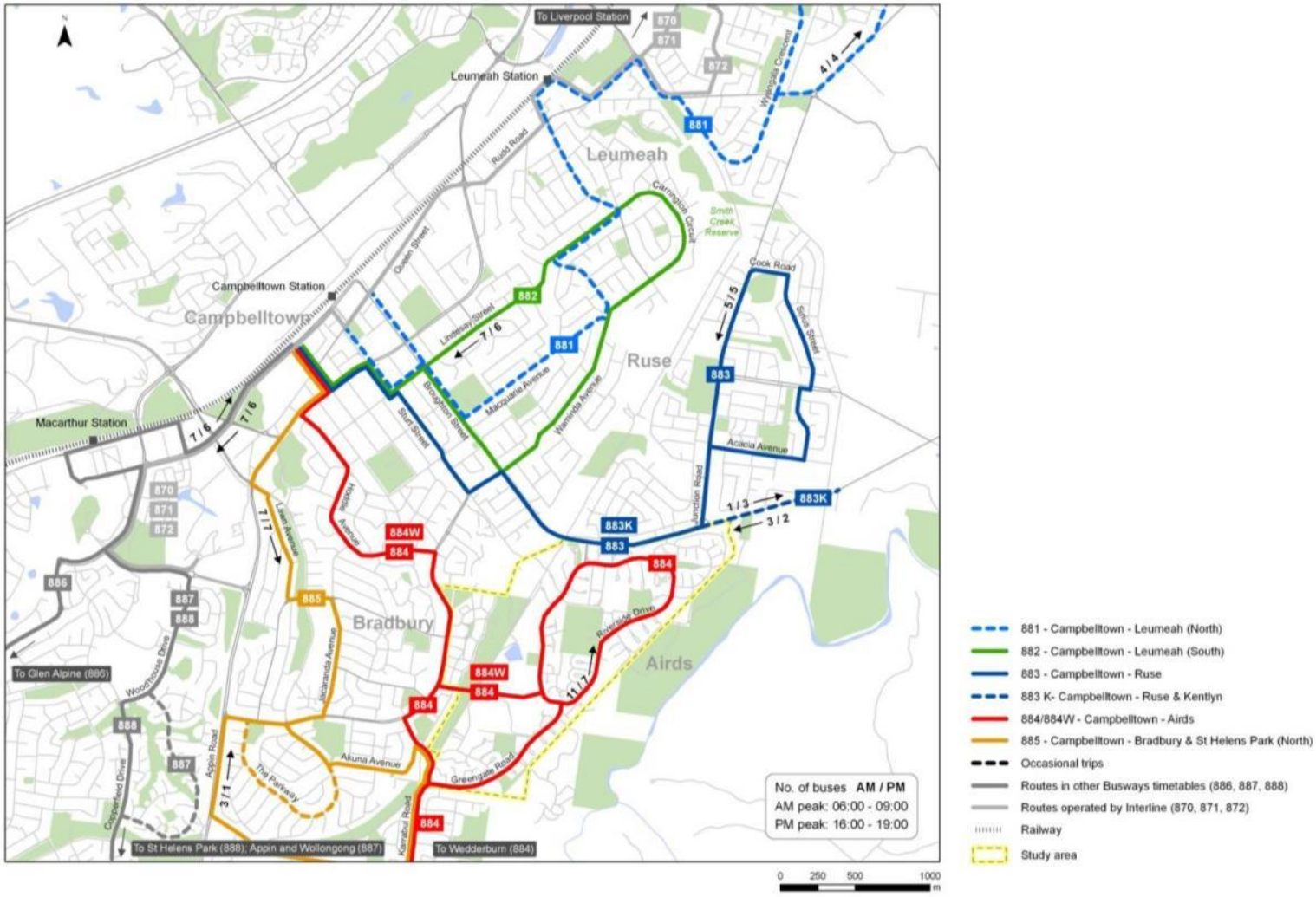
Table 3.1: Frequency of bus routes in Campbelltown

Route Number	Direction	Number of services				
		Before AM	AM (6-9am)	Inter peak	PM (4-7pm)	After PM
884	Campbelltown and Bradbury/Airds (loop service)	5	11	16	7	3
884W	Campbelltown & Airds/Wedderburn (Inbound)		2	2	1	
884W	Campbelltown & Airds/Wedderburn (Outbound)			2	2	
885	Campbelltown and Bradbury via Woodland Road (loop service)	4	7	13	7	4
883	Campbelltown & Ruse (Outbound)	3	5	14	5	4
883K	Campbelltown & Ruse/Kentlyn (Inbound)	2	3	3	2	1
883K	Campbelltown & Ruse/Kentlyn (Outbound)		1	3	3	

Source: Busways; 2010

As presented in **Table 3.1**, the majority of bus routes operate during peak hours with a limited number of early morning and evening buses.

Figure 3.7: Bus services in proximity of the study



Source: AECOM, 2010

3.4.4 Bus opportunities and constraints

Constraints

- The only bus route through the study area is a single direction loop service which is circuitous and limits accessibility between the local shopping centre and the surrounding areas.
- Limited east-west road connections to and from the study area limits the opportunities to have more direct bus access to Airds from Campbelltown through other neighbouring suburbs.
- Long journey times between Airds and Campbelltown due to circuitous bus routes (20 minute journey time for a 4km direct route) deterring residents from using the existing bus services.
- No direct services to the major employment areas of Liverpool, Camden and Bankstown from the study area.
- Limited number of bus services during late evening with only three services (route 884) and five services (route 883) to Campbelltown after 7pm.
- Lack of bus stop facilities and perceived security issues on bus and at bus stops limit the use of bus services in Airds.

Opportunities

- An increased number of bus services or more direct routes through the study area would potentially increase the number of passengers. This would provide an opportunity to upgrade current bus infrastructure and to further improve the perception of public transport.
- Consideration should be given to improve internal road network connectivity to provide more direct bus routes to key attractors such as Campbelltown Hospital, Macarthur Square, surrounding schools and neighbouring suburbs.
- The strategic bus corridor proposed between Liverpool and Campbelltown (as part of the Metropolitan Sydney Strategic Transport Corridors) provides opportunities for connection to Liverpool as a feeder route from Airds.
- The design of road network needs to consider and enhance safe and efficient bus movements in the study area.
- Consideration of a future free bus shuttle or subsidised public transport tickets to encourage public transport usage.
- Consideration to improve service level of night buses to major employment areas such as Liverpool and Bankstown to improve services for shift workers.
- Consideration to match bus timetable with connecting train services timetable and vice versa to improve ease of transfer.

3.5 Cycling

3.5.1 Cycle environment

Observation from site visits indicates that there are limited cycling activities in the area and this is confirmed by the census journey to work data. Some cycling trips were observed to be made by children travelling to and from school.

The topography within the study area is generally flat and the road corridors are wide, which are favourable conditions for cyclists. On the other hand, there are steep hills and narrow road corridor with no allowance of on-road or off-road cycling facilities on some of the surrounding roads (such as parts of Broughton Street and Appin Road), as seen in **Figure 3.8**.

3.5.2 Cycle network and facilities

The current and proposed (by Council) bicycle network features both on-road and off-road cycleways and will provide good access to the major regional services, such as Campbelltown town centre, Macarthur Square and University of Western Sydney, as well as key transport facilities including Campbelltown and Macarthur Stations, once the whole proposed cycle network is completed.

The existing and proposed cycleways with cycling catchments of 1-3 kilometres are illustrated in **Figure 3.10**. Studies[2] have shown that people are willing to cycle up to 10-15 km to reach their destination. The majority of key attractors including Campbelltown Mall, Macarthur Square and surrounding schools are within only 3-5 kilometres of the study area which is a major opportunity for increased cycle usage.

Within the study area, on-road cycle lanes are provided along Riverside Drive (as seen in **Figure 3.9**) and Briar Road and connect to the existing on-road cycle lane along St Johns Road and off-road cycle lane along Broughton Street. However, with the exception of these roads, there is only a limited number of cycleways provided on local roads through and in vicinity of the study area. On-road cycle lanes are proposed along Georges River Road and Greengate Road.

Figure 3.8: Steep gradient along Broughton Street

Figure 3.9: On road cycle lane along Riverside Drive

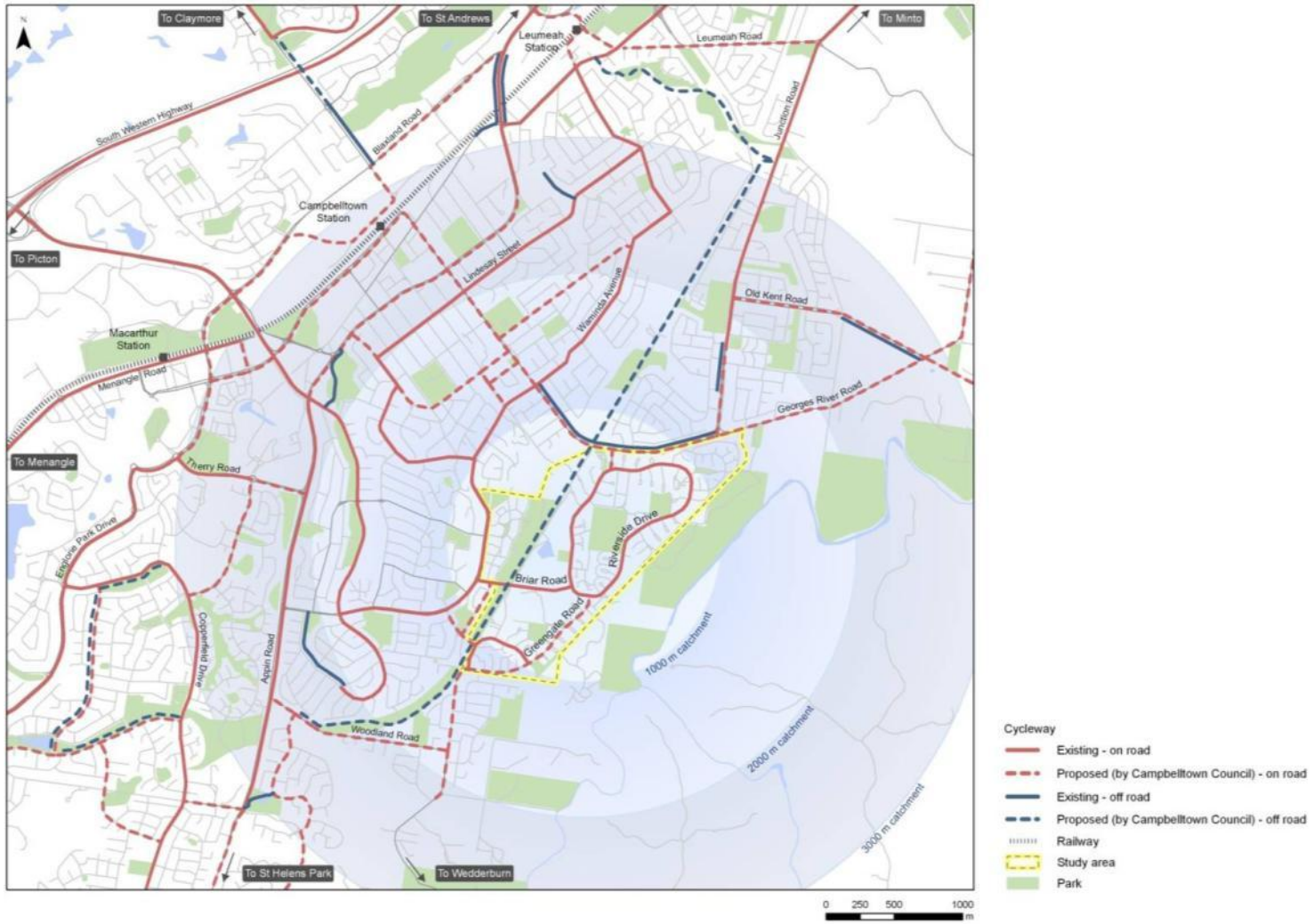
Source: AECOM, April 2010

Off-road cycleway is provided along the north side of Georges River Road between Waminda Avenue and Junction Road and partly along the west side of Junction Road. A major off-road cycleway is proposed along the Smiths Creek Reserve between Woodland Road to the south and Leumeah to the north.

There is a limited number of cycling facilities such as racks, signage and formal crossing opportunities throughout the study area. However, there are generally cycle facilities provided at key trip generators such as railway stations and shopping centres in Campbelltown and Macarthur.

[2] Cycle study for City of Sydney (AECOM, 2010)

Figure 3.10: Existing and proposed (by Council) bicycle lanes in proximity of the study area



Source: AECOM, 2010

3.5.3 Cycling opportunities and constraints

Constraints

- Lack of formal and direct cycleways within the study area has led to informal paths through open space.
- Lack of continuity of existing cycle routes to connect the study area with major services and transport facilities in Campbelltown and Macarthur.
- Steep topography of the road network surrounding the study area (including parts of Broughton Street and Appin Road) acts as a barrier for cycling movements.
- Lack of cycling facilities such as bicycle racks, signage for cyclists and existing formal crossing opportunities for cyclists currently discourages bicycle usage.

Opportunities

- The topography within the study area is generally flat which provides opportunities for cycling movements between local services and facilities.
- The proposed north-south connection along Smiths Creek Corridor between Junction Road and Woodland Road provides an opportunity to introduce a good quality shared cycle route.
- Potential to introduce formal east-west cycle connections through the study area to connect to St Johns Road and Campbellfield Avenue.
- Potential upgrade of intersections provides an opportunity for formal cycle crossings.
- The need to provide good cycle connections to major local and regional attractors (such as Campbelltown Mall, Macarthur Square and surrounding schools) to promote increased bicycle usage as they are within acceptable cycle distance from Airds.
- Any upgrade of road network should consider the inclusion of on-road or off-road cycleways.
- All cycling infrastructure upgrades should be complemented by ‘soft’ measures to promote cycling through community/healthy living programmes and school safety projects to encourage bicycle usage.

3.6 Walking

3.6.1 Walking environment

The majority of pedestrian activities within the study area occur along Riverside Drive and Briar Road, in particular around Airds village, outside Briar Road public school and Airds High School. A north-south pedestrian desire line exists from Briar Road along the Smiths Creek Reserve through Dean Park and Dorchester Park. This is evident through informal walking tracks along the Smiths Creek Reserve.

The topography within the study area is generally flat which encourages pedestrian movements, although some of the surrounding roads (such as parts of Broughton Street and Appin Road) has steep gradient.

3.6.2 Pedestrian network and facilities

Footpaths are generally provided on major collector roads surrounding the study area, including St Johns Road and Broughton Street / Georges River Road and Riverside Drive, Briar Road and Greengate Drive within the study area. There are limited formal crossing opportunities for pedestrians except at the signalised intersection of Broughton Street / St Johns Road. There are no direct east-west pedestrian links within the study area. Zebra crossings are provided for pedestrians at Deans Road, Riverside Drive and outside Briar Road public school. Two pedestrian underpasses are provided within the study area to provide grade separated movements for pedestrian at Briar Road between Airds High School and Briar Road Primary School as well as at Riverside Drive outside Airds Village. However, the underpasses are considered unsafe due to the lack of lighting and security measures. In general, the cul-de-sacs that connect to the Riverside Drive and other collector roads within the study area has limited formal footpaths.

A large number of informal footpaths are evident throughout the study area, providing an informal pedestrian network. The major informal footpath runs north-south along Smiths Creek Reserve, across Briar Road and connects to Merino Crescent and Georges River Road and east of the study area, as seen in **Figure 3.11** and **Figure 3.12**. During the site visits informal north-south footpaths were also observed east of the study area along the Riverside Reserve and Greengate Reserve, providing informal access between the cul-de-sacs and residential areas.

Figure 3.11: Informal footpath along Smiths Creek Reserve

Figure 3.12: Informal footpath east of Peppin Crescent

Source: AECOM, April 2010

Council's long term goals for the footpath network in the study area include sufficient pedestrian connectivity and accessibility at the following locations:

- along all frontages to local shopping centres and schools as well as medium and high density residential developments
- along both sides of all arterial and sub-arterial roads
- along routes through reserves that provide additional connectivity, as well as recreational opportunities
- along routes which maximise the opportunity for linking with off road cycleway routes.

Figure 3.13 illustrates the formal and informal existing footpaths and pedestrian crossing opportunities within the study area.

3.6.3 Walking opportunities and constraints

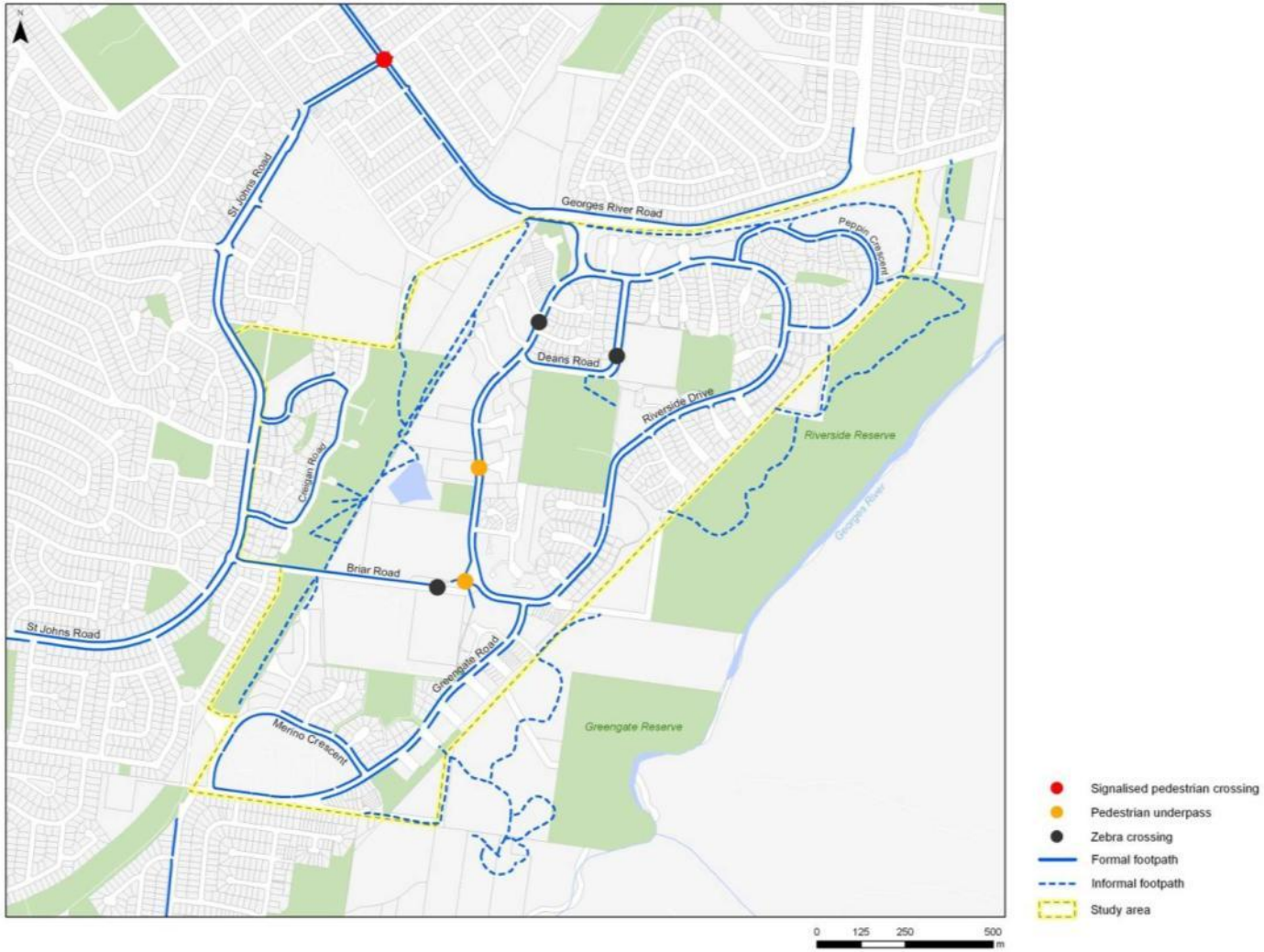
Constraints

- The topography along some surrounding roads (including parts of Broughton Street, Appin Road) is currently steep which potentially acts as a barrier for walking movements to and from the study area.
- Lack of formal and direct east-west pedestrian links within the study area and north-south links through the Smiths Creek Corridor has led to informal paths through open space.
- Lack of direct and safe pedestrian connections to local facilities including the schools, Airds Village, as well as the natural reserves and playing fields.
- Lack of formal pedestrian crossing opportunities within the study area limits safe pedestrian access to surrounding major land uses.
- Existing underpasses within the study area are currently not well lit and provides an unsafe environment for pedestrians.

Opportunities

- The topography within the study area is generally flat which provides good walking environment between local services and facilities.
- The Smiths Creek Corridor between Junction Road and Woodland Road provides an opportunity to introduce a good quality shared path.
- The need to provide sufficient pedestrian network to major generators encourages and maximises walking opportunities within the study area and to surrounding land uses such as local schools, natural reserves and playing fields and village centre in Airds.
- Potential upgrade of intersections provides an opportunity for formal pedestrian crossings.
- Any upgrade of road network should consider the inclusion of footpaths on both sides of the road.
- Urban planning of the renewal of Airds should encourage safe and efficient walking environment within and surrounding the study area.

Figure 3.13: Existing pedestrian network within the study area



Source: AECOM, 2010

3.7 Summary

The major opportunities and constraints identified are summarised in the following sections and they have been used as valuable inputs to the EBD workshop to identify three draft concept plan options and the preferred concept plan option for the renewal of Airds and Bradbury.

3.7.1 Key constraints

The identified key transport constraints are:

- Lack of east-west road connections from some major generators (such as Campbelltown Hospital, University of Western Sydney and Macarthur Square) to the study area compared to the direct connection to the centre of Campbelltown. This can limit accessibility and connectivity for all modes of transport between the study area and the regional services and facilities.
- Legibility of links between local and regional road network is unclear with extensive road widths on some local roads and oversized intersection arrangements (for example the Akuna Avenue / Merino Crescent roundabout).
- Lack of gateway entries to the study area makes drivers passing by the area unaware of its existence and any destinations / attractors in the area.
- Lack of direct east-west and north-south connections to the major road network such as St Johns Road and Broughton Street / Georges River Road confuse drivers and intimidate visitors.
- Lack of direct bus services to local services, neighbouring suburbs and Campbelltown.
- No bus services to major employment areas and transport hubs except Campbelltown.
- Lack of bus stop facilities and perceived security issues on bus and at bus stops limit the use of bus services in Airds.
- Lack of safe, formal and direct cycleways and pedestrian linkages on local roads and open areas has lead to informal paths throughout the study area.

3.7.2 Key opportunities

The identified key transport opportunities are:

- The proposal to connect Broughton Street to Badgally Road across the existing railway line will improve east west connections between the study area, the regional road network, major surrounding generators and to the upgraded commuter car park on the western side of Campbelltown station for all modes of transport.
- Spare capacity on the surrounding regional and local road network and intersections can cater for additional traffic movements generated by the proposed development.
- The intersection of Georges River Road / Junction Road provides an opportunity for an upgrade to a four way intersection, with a direct link to Peppin Crescent as a major gateway to the study area.
- Rearrangement of road network in the master planning process to consider appropriate north-south and east-west connections to the surrounding road network would improve accessibility for all modes of transport to Airds.
- Improved signage on local and surrounding roads, particularly at key intersection, could enhance accessibility.
- Consideration to match train timetable with connecting bus services timetable and vice versa and increased frequency of buses would improve ease of transfer and encourage public transport usage.
- The strategic bus corridor proposed between Liverpool and Campbelltown (as part of the Metropolitan Sydney Strategic Transport Corridors) provides opportunities for connection to Liverpool as a feeder route from Airds.
- The design of road network needs to consider and enhance safe and efficient bus movements, the inclusion of on-road or off-road cycleways and footpaths.

- The Smiths Creek Corridor between Junction Road and Woodland Road provides an opportunity to introduce a good quality shared path.
- The need to provide good cycle connections to major local and regional attractors (such as Campbelltown Mall, Macarthur Square and surrounding schools) to promote increased bicycle usage as they are within acceptable cycle distance from Airds.
- The need to provide sufficient pedestrian network to major generators encourages and maximises walking opportunities within the study area and to surrounding land uses such as local schools, natural reserves and playing fields and village centre in Airds.
- Urban planning of the renewal of Airds should encourage safe and efficient walking environment within and surrounding the study area.

Due to the nature and scope of this project, some of the regional traffic and transport constraints could not be resolved as part of this study and therefore the opportunities identified above could not be incorporated into the preferred Concept Plan.

4.0 The Airds and Bradbury Urban Renewal Project

4.1 Introduction

This section provides a brief description of the development proposal and principles, road hierarchy and access arrangements, public and active transport networks for the preferred concept plan for the Airds Bradbury Renewal Project.

4.2 Project Vision

The vision of the urban renewal project is to make Airds Bradbury a great place to live, a place with good amenity, services and facilities in a socially mixed community, offering opportunities for residents to realise their goals.

The proposed renewal of Airds Bradbury seeks to improve the quality of the urban environment by creating conditions conducive to the establishment of a sustainable place to live and with which residents are proud to be associated.

The project is being undertaken using the Living Communities model[3], which is a model of estate renewal that pursues three equally important aims to:

- Improve services and provide residents with better opportunities.
- Support the local community to build its strengths, skills and overall capacity.
- Improve the housing and public areas by achieving better integration of social and private housing within the community.

These three aims are backed by an approach which encompasses:

- Integration of all activities under one project with a common set of project aims and objectives, inclusive of social, economic and physical development.
- Clear and transparent communication and strong community engagement in all aspects of the project.
- Emphasising partnerships, with the community, local government, non-government organisations, the community housing sector and the private sector where appropriate.
- A place based approach which emphasises what is best for the place and ensures strong coordination across all activities in the place.

The vision for the project aligns itself with the desire of all project stakeholders to address the long standing social issues associated with the Airds Bradbury public housing areas and provide the framework for implementing a revitalised neighbourhood and vibrant town centre. The renewal of Airds Bradbury is to be achieved by developing land for new private housing, redevelopment of some existing public housing for private ownership, improving road and transport links and the better utilisation of open space and the public domain.

In order to achieve the necessary social outcome, it is important that there is a high level of de-concentration of public housing to achieve a sustainable social mix. A 30 percent public housing concentration is targeted, which is consistent with the target at urban renewal projects at Minto and Bonnyrigg. A suite of public housing upgrades, construction of new housing (largely for seniors), private development and sales of titled and vacant public housing properties will be accelerated in order to achieve a de-concentration of public housing.

[3] "Living Communities" is a name used within Housing NSW (HNSW) as a means of describing and communicating the model of estate renewal to internal and external stakeholders. The Living Communities model has been successfully employed within HNSW on the Bonnyrigg and Minto Renewal Projects and is based on Australian and overseas best practice.

4.3 Concept Plan Objectives and Development

There are a number of key design objectives that will underpin the development of the concept plan for Airds Bradbury. These key objectives aim to:

- Develop and deliver a holistic planning approach to focus on opportunities for rationalising some of the key public housing areas.
- Utilise the obsolete Smiths Creek Bypass Corridor.
- Create safe and attractive areas of open space, which provide good surveillance and the opportunity for recreation.
- Improve efficiency in the use of land, services and infrastructure.
- Introduce and integrate new owners and residents to contribute to the creation and sense of identity, and provide a positive influence on the existing social-demographic characteristics of the local.
- Create a vibrant town centre which becomes the 'heart of the community'.
- Achieve government objectives and HousingNSW's policy which is to introduce a mix of private ownership (approximately 70 percent of the estate) within public housing estates (retain 30 percent) to create a sustainable and safe community.
- "De-Radburnise" the Airds Bradbury estate to increase accessibility, linkages, permeability and integrate the area with surrounding suburbs, in a manner that improves safety and security, and efficiency in the land use, services and infrastructure.
- Produce new housing development opportunities, whether for affordable or private housing.
- Encourage and consult with the current community groups and stakeholders to obtain their input and support for the plan, so that through capacity building they may begin to implement the plan.
- Produce a flexible and feasible concept plan that allows development in stages or implementation of priorities, by catering for:
    - Funding opportunities available from the Federal Government
    - Market risks
    - Housing NSW tenant complexities
    - Infrastructure costs
    - Socio-economic circumstances
    - Seniors housing (It is intended that 67 dwellings will replace the demolished townhouses in the Creigan Precinct).

To date, the preparation of the concept plan has been informed by:

- Technical studies addressing key issues.
- An extensive consultation and community capacity building process including outputs of a three day Enquiry-By-Design (EBD) workshop held in May 2010. This involved consultation with Campbelltown Council, relevant agencies, stakeholders (including RTA, Transport NSW and Busways) and the community.
- Best practice urban design and social sustainability principles.

4.3.1 Community Engagement

The Urban Renewal Concept Plan has been significantly informed by a comprehensive consultation process and community capacity building that has involved key stakeholders, technical consultants, government agencies and the community. The key community capacity building events were an “Airds Out Loud” community festival held in 2009 that included opportunity for contribution of ideas to inform the master planning process. The culmination of the consultation process was a three day EBD workshop (“Design Out Loud”) held in Airds Bradbury in May 2010 that was attended by all community, Council and Government stakeholders.

4.3.2 Key Government/Non-Government Stakeholders

The urban renewal master planning process has had the benefit of the input of a range of key stakeholders including (but not limited to):

- RTA
- Transport NSW
- Sydney Water
- Integral Energy
- Busways
- Health NSW (South West Area Health Service)
- Local community service providers, including Youth off the Streets, Airds Bradbury Community Centre, Argyle Community Housing
- Department of Environment, Climate Change and Water (DECCW)
- Tharawal Aboriginal Corporation
- Department of Education and Training, including representatives of local public and high schools
- NSW Rural Fire Service
- NSW Police.

4.3.3 Preferred Concept Plan

Based on the inputs from the technical studies and the EBD workshop, an urban renewal concept plan has been developed by Urbis that provides for (in no particular order of importance):

- A new urban structure within the renewal area reflecting a new street pattern and subdivision layout based around a series of street blocks.
- Approval of land uses reflecting the new urban structure and subdivision pattern, including:
    - Renewed residential areas focusing on the staged redevelopment of existing townhouse precincts.
    - A rationalised network of open space.
    - Expanded town centre including expanded retail, commercial and community uses.
- Infrastructure provision.

The preferred urban renewal concept plan is illustrated in **Figure 4.1**.

Figure 4.1: Preferred Urban Renewal Concept Plan

Source: Urbis, 2011

4.4 Key Transport Principles

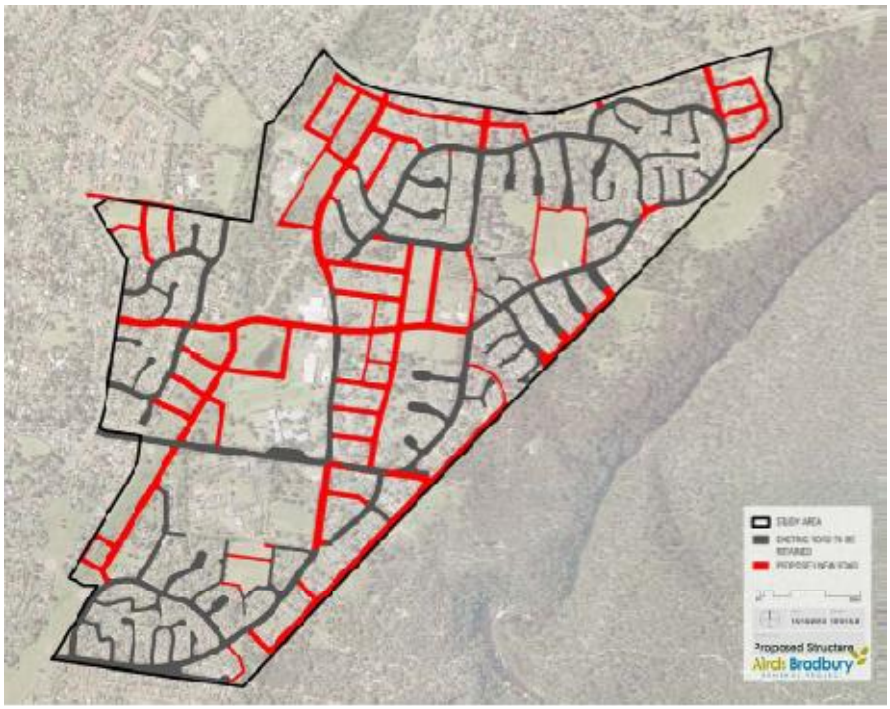
The concept plan has sought to resolve the existing traffic and transport issues and constraints (as highlighted in Chapter 3) through the new road network and increase in/rerouting of public transport services. The key traffic and transport principles used to guide the development of the preferred concept plan are to:

- "De-Radburnise" the study area by improving linkages and overall connectivity within Airds Bradbury and to surrounding areas, focused on improvements to Riverside Drive, the main circular route through the study area.
- Improve vehicular and public transport access within Airds Bradbury and to major centres and surrounding employment areas.
- Optimise the location of the town centre having regard to existing and future road network, and public transport networks.
- Identify opportunities for development of the Smiths Creek Bypass Corridor having regard to existing development constraints within the corridor e.g. transmission lines, watermains, etc.
- Remove existing pedestrian underpasses and determine implications on connectivity.
- Provide safe and direct cycleways and pedestrian linkages connecting local services, schools and open spaces in Airds Bradbury as well as to other neighbourhoods.
- Identify recommended changes to existing road network to improve connectivity and support the renewal process.
- Reinforce key internal and external east-west connections.

4.5 Proposed Access Arrangements and Road Hierarchy

As reflected in the preferred concept plan, a number of new road connections throughout the study area have been planned to improve connectivity and accessibility of Airds Bradbury internally and to the surrounding areas. The additional road network is highlighted in **Figure 4.2**.

Figure 4.2: Additional road network in preferred concept plan



Source: Urbis, 2010

The preferred concept plan has improved accessibility to the surrounding areas by:

- Relocating the existing Riverside Drive access at Georges River Road to the west which connects to a central spine through the town centre of Airds (Gateway treatment will be designed at this new intersection to reinforce the identity of Airds Bradbury).
- Providing a new access at Georges River Road through the extension of Deans Road.
- Providing a new direct connection to Junction Road through the extension of Peppin Crescent.
- Providing a new direct connection to Campbellfield Avenue through a new east-west road to Riverside Drive through the town centre of Airds.

Existing accesses at Briar Road, Akuna Avenue and Greengate Road will be retained.

A number of new internal road networks have also included in the preferred concept plan to improve the connectivity of the study area, including:

- A realigned Riverside Drive from the town centre to Georges River Road along the Smiths Creek Corridor. This forms part of the main collector into Airds from Georges River Road.
- A new grid road network surrounding the town centre.
- A new east-west road (extension of Campbellfield Avenue) connecting Riverside Drive to St Johns Road.
- A new north-south road connecting the new Campbellfield Avenue extension and Merino Crescent along the Smiths Creek Corridor.
- An extension of Riverside Drive to the south of Briar Road to connect with Greengate Road.
- A new road along the edge of the proposed Georges River Parkway, south of Briar Road.

An indicative road network layout and road hierarchy plan has been developed and is shown in **Figure 4.3**.

The improved road network has provided an opportunity for a main **north-south Collector Road** through the town centre of Airds distributing traffic to the main east-west roads including Briar Road and Campbellfield Road extension as well as Greengate Road that serves the southern portion of Airds. The collector road to the north of the Town Centre will provide on-street parking and opportunities for an off-road shared path.

The north-south Collector Road through the Town Centre provides on-street parking for the services in the town centre. An on-road cycleway will be dedicated on the eastern side of this road.

Briar Road will continue to serve as an **east-west Collector Road** with dedicated on-street parking on both side of the road and an off-road shared path.

The majority of the road network within the renewed Airds Bradbury will be **Local Streets** with on-street parking provision on both side of the road and an off-road shared path on one side of the road. Other minor local street and laneways are also designed to provide local access to new residential areas.

Figure 4.3: Proposed road hierarchy in Airds Bradbury

Source: AECOM, 2011

4.6 Proposed Road Cross-sections

Cross-sections have been designed in conjunction with the urban designers, landscape architects and road designers to ensure that all road users (such as pedestrians, cyclists, buses and cars) are catered for within the road reserve. Cross-sections of all roads within the proposed development are included in **Appendix D**.

All cross-sections are designed according to relevant guidelines including Council Development Control Plans, Landcom Street Design Guidelines, bus servicing guidelines and the RTA Road Design Guide.

The preferred concept plan has a combination of new roads and existing roads with different road reserves. **Table 4.1** summarises the details of various adopted road cross-sections for the study area.

Table 4.1: Proposed road cross-sections

Road type	Road reserve	Carriageway width	Verge width	Parking	Cycleway
Collector Road (N-S)	19.6m	11.6m	4.4m / 3.6m	Yes	Off-road
	20.6m	13.4m	3.6m / 3.6m	Yes	On-road
Collector Road (E-W)	20.2m	12.6m	3.8m / 3.8m	Yes	Off-road
Local Street *	18.3m	11.1m	3.6m / 3.6m	Yes	Off-road
Minor Local Street	14.8m	7.6m	3.6m / 3.6m	Yes	No
Minor Local Street next to reserve	12.2m	7.6m	3.6m / 1.0m	Yes	No
Laneway	8.0m	6.0m	0.5m / 1.5m	No	No

*- Adjusted from existing cross-section of local streets including Riverside Drive, Greengate Road and Merino Crescent

Source: AECOM, 2011

On-street parking is required for residents and visitors to the revitalised Airds Bradbury. Therefore, most of the road cross-sections, except laneways will have on-street parking provision on both side of the road. On some of the existing local streets such as Riverside Drive and Greengate Road, on-road cycleways will be relocated to off-road shared paths to facilitate on-street parking while maintaining the carriageway width and road reserve.

4.7 Proposed Parking and Servicing Provision

Car park provision for the new residential dwellings will be determined based on the relevant planning controls, Council DCP guidelines and RTA Guide to Traffic Generating Developments. On-street parking opportunities for visitors will also be provided on the road network across Airds Bradbury.

The car park and servicing requirements for the town centre will also be determined based on Council and RTA requirements at a later stage when the land use and floor areas within the town centre are confirmed. With regard to servicing, the cross-sections of the roads have been designed to cater for heavy vehicle movements.

4.8 Proposed Public Transport Network

The road network and intersection treatments proposed in the preferred concept plan have been designed to accommodate efficient bus movements between Airds and Campbelltown. Early consultation with Busways has been undertaken to develop an indicative bus network for Airds Bradbury. Busways is confident that the proposed bus routes will be acceptable by Transport NSW given its experience of bus route planning in the region.

The proposed bus routes are shown in **Figure 4.4**. The location of existing and proposed bus stops is also highlighted. The proposed bus catchment (400m on each side of the bus route) will cover over 90 percent of the Airds Bradbury study area.

Figure 4.4: Proposed bus routes for Airds Bradbury

Source: AECOM in consultation with Busways, 2011

The road network has provided flexibility for an improved bus network for Airds Bradbury. The proposed bus routes are determined based on the assumption that all bus services to Airds Bradbury will originate and / or terminate at Campbelltown. The current 884 loop route is proposed to be re-routed such that accessibility to the town centre, schools and other local recreational facilities (open spaces and sports grounds) is maximised. Residents in the north eastern portion of Airds will now be able to catch the bus home returning from the town centre.

Route 884W can be diverted to provide residents in the southern portion of Airds Bradbury better accessibility to the town centre.

New bus stops (with seating and signage only) are proposed at new road sections where they are not currently serviced by any bus routes. All the bus stops within Airds Bradbury are located such that the majority of residents should be within 400m of any bus stop.

Increased bus service frequency and improved bus timetabling (to match with train timetables) should also be considered to improve attractiveness of using public transport and to meet potential increase demand of bus services due to the increase population in Airds Bradbury.

4.9 Proposed Walking and Cycling Network

The Airds Bradbury walking and cycling networks have been developed with reference to a range of published guidelines and policies including the *Planning Guidelines for Walking and Cycling (Department of Planning, 2004)*. The network is intended to provide safe and efficient routes that present a viable alternative to car travel for local and regional trips. The improved road network within the study area improves cycle and pedestrian connections.

A network of off-road shared paths and on-road cycle paths are proposed within the study area. The network will link key amenities including open spaces, schools and the facilities in the town centre. The internal cycle network will also connect with the on-road cycle network along St Johns Road and Campbellfield Avenue as well as the off-road shared path link on the northern side of Georges River Road.

The proposed bicycle routes are shown in **Figure 4.5**.

As mentioned in **Section 4.6**, the majority of existing on-road cycleways will be converted to off-road shared path to provide a safer environment for cyclists and to cater for on-street parking provision. On-road cycleways are provided in the vicinity of the town centre to segregate pedestrian and cyclists.

New off-road cycleways are proposed along the Smiths Creek Corridor and the Georges River Reserve.

Footpaths are provided along all roads (except laneways) within Airds Bradbury to provide safe and convenient access for pedestrians to key amenities including open spaces, schools and the facilities in the town centre. Additional pedestrian refuges are proposed outside schools, major open spaces, senior living areas as well as the town centre to facilitate safe crossing opportunities for pedestrians. The proposed walking facilities in Airds Bradbury are shown in **Figure 4.6**. The existing pedestrian underpasses in the vicinity of the town centre will be closed and replaced by more direct on-road pedestrian crossing facilities.

Figure 4.5: Proposed bicycle routes in Airds Bradbury

Source: AECOM, 2011

Figure 4.6: Proposed walking facilities in Airds Bradbury

Source: AECOM, 2011

5.0 Traffic Impact Assessment

5.1 Introduction

The redevelopment of Airds Bradbury through the Urban Renewal Concept Plan will have an impact on the road network. While it is hoped that the redevelopment and initiatives proposed will result in more walking, cycling and public transport trips, there will still be an increase in the type and number of dwellings, and hence more trips.

Based on the proposed timing of the redevelopment and the proposed changes to the road layout, hierarchy and access arrangements in the Concept Plan, an assessment of the road network during the peak traffic hours in 2026 has been undertaken. Key intersections have been assessed, which include the new main access points into the redeveloped study area and the main internal intersections, namely:

- Georges River Road / Junction Road
- Georges River Road / Deans Road
- Georges River Road / Riverside Drive
- Broughton Street / Waminda Avenue
- St Johns Road / Hoddle Avenue
- St Johns Road / Campbellfield Avenue
- St Johns Road/Briar Road
- Greengate Road/Merino Crescent
- St Johns Road / Akuna Avenue.

5.2 Background Traffic Growth

Based on historical trends in traffic growth on the surrounding road network, a growth rate has been calculated for background traffic growth.

Table 5.1 presents the historical traffic growth on the local roads in the vicinity of the study area, which indicates an average traffic growth rate of one percent. This growth rate has been applied to the pass-by traffic at the intersections tested.

Table 5.1: Historical traffic numbers and growth on the surrounding local roads (1996-2005)

Station number	Road	Location	Year				Annual Increase (%)
			1996	1999	2002	2005	
83.092	The Parkway (Narellan Road)	East of Appin Road	7,120	10,537	11,601	9,323	3.0%
83.013	Appin Road / Oxley Street	South of Camden Road	26,648	28,923	27,617	30,561	1.5%
83.133	Appin Road / Oxley Street	North of Camden Road	27,287	25,009	24,612	27,813	0.2%
83.135	St Johns Road	South of Hoddle Avenue	7,383	7,342	6,813	6,844	-0.8%
Average Increase (%)							**1.0%**

Source: AADT data (RTA)

The traffic entering and exiting the study area has not been factored up by this growth rate, as growth is not forecast in the study area, aside from that due to the urban renewal.

5.3 Trip Generation

This assessment has been undertaken for the peak hour trips generated from the residential component of the urban renewal only – trip generation from the other land uses within the Airds and Bradbury study area are assumed to remain constant and/or internal.

Analysis of the existing trip generation rate during the peak hours was undertaken by using the latest Journey to Work (JTW) travel data for the Airds travel zone to provide the number of car trips. Based on the existing number of dwellings in Airds, this equates to an existing trip generation rate of 0.35 vehicle trips per hour (vtph)/dwelling (public housing dwelling).

For the future additional private dwellings, the proposed trip generation rates used in the Department of Housing 'Minto Renewal' Proposed Urban Regeneration study have been used, namely 0.70 vtph/dwelling, with an in/out split of 20/80 in the AM peak hour and the reverse in the PM peak hour.

The Urban Renewal Concept Plan proposes 1,465 private dwellings (from an existing 92 private dwellings) and 629 public dwellings (from an existing 1,473 public dwellings). The trip generation rates and the additional trips generated as a result of these changes are presented in **Table 5.2**.The renewed Airds Bradbury is estimated to generate an additional 666 vehicle trips during the peak hours external to the study area.

Table 5.2: Additional vehicular trips generated during peak hours

Scenario	Type of Dwellings	Change in Dwellings	Trip Generation Rate	Vehicular Trips Generated		
				In	Out	Total
AM Peak	Private	+1,373	0.70	192	769	**961**
	Public	-844	0.35	-59	-236	**-295**
	Additional Total Trips Generated			133	533	**666**
PM Peak	Private	+1,232	0.70	769	192	**961**
	Public	-810	0.35	-236	-59	**-295**
	Additional Total Trips Generated			533	133	**666**

Source: AECOM, 2010

Based on the relationship between the peak hour and daily trip generation rates for residential developments, contained within the RTA Guide to Traffic Generating Developments, the renewal is likely to generate an additional 6,000 – 7,000 daily vehicle trips external to the study area.

5.4 Trip Distribution and Assignment

The distribution of these additional future trips has been based on the existing travel patterns observed at the surveyed intersections.

With the change in road network under the proposed Urban Renewal Concept Plan, the existing trips generated on the network have had to be re-assigned from the current road network to the proposed road network with additional access points to the external network. This has been undertaken based on the following assumptions and principles:

- Vehicles from a particular route will re-assign to the nearest available route to reach the higher order roads, should their current route no longer be available.
- Vehicles will take the shortest routes to/from the higher order roads.

5.5 Projected Traffic Volumes

The additional vehicular trips generated by the redevelopment of the area have been added to the re-assigned traffic flows. The project traffic volumes for the modelled intersections were generated. The 2026 peak hour traffic volumes are illustrated in **Figure 5.1**.

Figure 5.1: 2026 projected peak hour traffic volumes

Source: AECOM, 2011

5.6 Intersection Performance

The intersections were analysed for the 2026 peak hour using the modelling package SIDRA 3.2 and the expected levels of service are presented in **Table 5.3**. The types of intersection controls were based on the existing intersection control types, the expected traffic volumes and consistency for / expectation of the driver.

Table 5.3: 2026 Intersection performance with development traffic

Intersection	Peak	Volumes (veh/hr)	Degree of Saturation (DoS)	Ave Delay (sec)	Overall Level of Service (LoS)	95% Back of Queue Length (m)	Longest Queue Approach
Georges River Road / Junction Road (roundabout)	AM	1,242	0.426	10.1	A	29	Junction Road (SB)
	PM	1,256	0.409	9.2	A	25	Georges River Road (EB)
Georges River Road / Deans Road (priority)	AM	1,274	0.840	11.3	N/A	40	Bellinger Road (SB)
	PM	1,320	0.589	7.4	N/A	20	Bellinger Road (SB)
Georges River Road / Riverside Drive (roundabout)	AM	1,352	0.549	8.9	A	46	Georges River Road (WB)
	PM	1,409	0.504	8.3	A	46	Georges River Road (EB)
St Johns Road / Broughton Street / Waminda Avenue (traffic signals)	AM	2,188	0.935	29.6	C	116	Broughton Street (EB)
	PM	1,834	0.805	18.7	B	59	Broughton Street (EB)
St Johns Road / Hoddle Avenue (roundabout)	AM	1,288	0.479	6.5	A	32	St Johns Road (NB)
	PM	956	0.346	6.3	A	22	St Johns Road (SB)
St Johns Road / Campbellfield Avenue (roundabout)	AM	1,387	0.450	10.2	A	30	St Johns Road (NB)
	PM	1,016	0.348	9.7	A	21	St Johns Road (NB)
St Johns Road / Briar Road (roundabout)	AM	1,134	0.408	8.9	A	26	St Johns Road (SB)
	PM	860	0.365	8.6	A	21	St Johns Road (SB)
Greengate Road / Merino Crescent (priority)	AM	600	0.158	1.3	N/A	9	Greengate Road (WB)
	PM	389	0.116	1.2	N/A	6	Greengate Road (WB)
St Johns Road / Akuna Avenue (priority)	AM	890	0.229	1.5	N/A	4	Akuna Avenue
	PM	730	0.162	1.6	N/A	2	Akuna Avenue

The modelling results indicate that the key intersections in the preferred concept plan road network are expected to perform at satisfactory levels of service and with acceptable average delays in the AM and PM peak hours in 2026. The proposed intersection treatment is illustrated in **Figure 5.2**.

Figure 5.2: Proposed intersection treatment at key intersections

Source: AECOM, 2011

The layouts for the upgraded or new intersections are shown in **Figure 5.3** to **Figure 5.6**.

Figure 5.3: Proposed layout for Georges River Road / Junction Road / Peppin Crescent

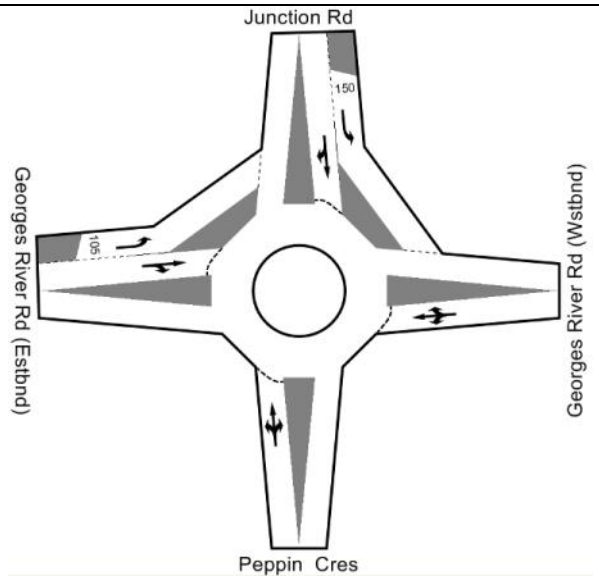


Figure 5.4: Proposed layout for Georges River Road / Bellinger Road / Deans Road

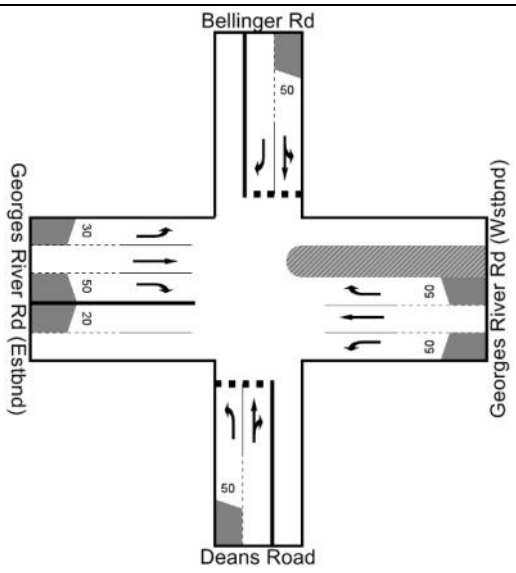


Figure 5.5: Proposed layout for Georges River Road / Riverside Drive (realigned)

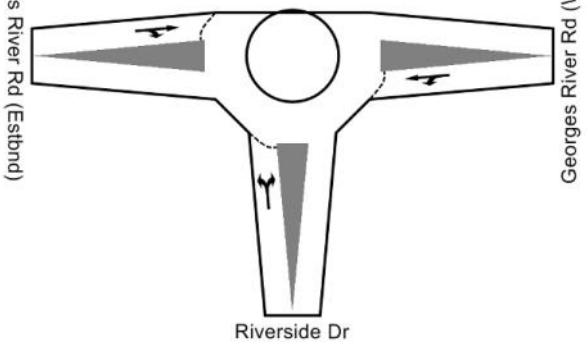
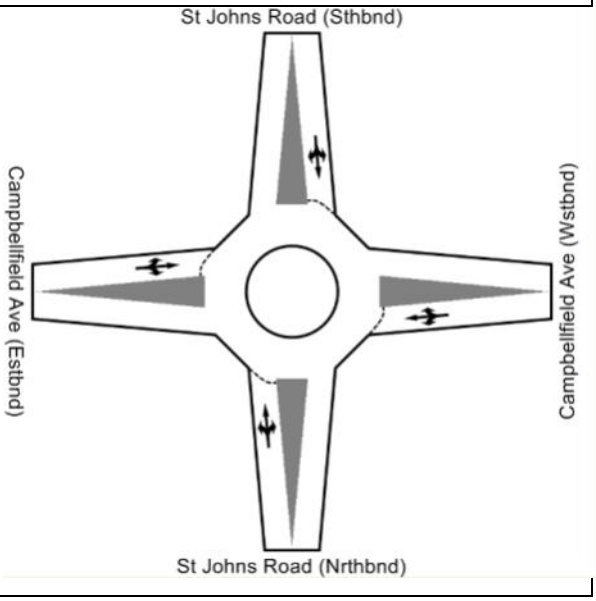


Figure 5.6: Proposed layout for St Johns Road / Campbellfield Avenue



Source: AECOM, 2011

6.0 Package of Transport Measures

6.1 Introduction

This section provides a summary of the package of transport measures recommended for the successful delivery of the proposed renewal of Airds Bradbury. The Airds Bradbury Urban Renewal Concept Plan, along with the further technical analysis and meetings held with public transport operators, have identified a package of transport-related measures to be implemented in the study area.

6.2 Proposed Infrastructure and Service Upgrades

An integrated package of measures has been identified to deliver the proposed development and to improve accessibility to and from Airds Bradbury and connections to the wider region via sustainable transport modes. **Table 6.1** provides a summary of the recommended measures that Landcom would be responsible for, as part of the proposed renewal of Airds Bradbury.

6.3 Cost

A range of infrastructure and service upgrades have been identified to meet forecast travel demands associated with the proposed development. This section outlines an opinion of strategic costs identified for each item in the package of measures.

For the bus and cycle-related measures, AECOM has formed an opinion of probable cost[4]. Mott MacDonald Hughes Trueman has provided costs for the civil and infrastructure upgrade works.

Table 6.1 provides costs for items within the package of measures that are expected to be funded by Landcom.

Table 6.1: Airds Bradbury proposed package of measures

Infrastructure Upgrade	Cost Assumptions	Probable Cost
Extension of local bus services (Route 884 and 884W)	Landcom to work with Transport NSW and the local bus service provider to deliver improved bus services to Airds Bradbury over time	N/A
Bus stops (up to 10 with seating and signage only)	$2,000 for each bus stop with seating and signage only	$20,000
Internal footpaths, pedestrian refuges, cycle paths, road network and intersections		$20,000,000
Upgrade of Georges River Road / Junction Road intersection (roundabout) with an additional approach from Peppin Crescent		$150,000
Upgrade of Georges River Road / Bellinger Road intersection (give-way) with an additional approach from Deans Road		$200,000
New single lane roundabout for Georges River Road / realigned Riverside Drive		$200,000
New single lane roundabout for St Johns Road / extension of Campbellfield Avenue		$200,000

Source: AECOM and Mott MacDonald Hughes Trueman, 2011

[4] Opinion of probable costs are made on the basis of best judgment as an experienced and qualified engineering consultant, familiar with the construction industry As AECOM is not a qualified Quantity Surveyor, nor does it employ quantity surveyors, AECOM cannot and will not guarantee that any tenders or actual costs will not vary from this opinion of probable cost.

Notes:

- All costs exclude GST.
- All costs are current year costs, no time function has been applied.
- Preliminary cost only, no design undertaken.
- Inclusive of pavement/drainage and 100m coverage on road section in all directions.
- Exclusive of excavation in rock, street lighting, project management & design costs and fee/charges.

6.4 Proposed Sustainable Travel Initiatives

In addition to the infrastructure and service upgrades proposed for public transport, walking and cycling, some other sustainable travel initiatives could also be implemented once the renewal project is more developed. These could include items such as:

- Household Information Packs for the new dwelling units within Airds Bradbury, which would incorporate public transport leaflets, route maps and timetables, pedestrian and cycle network maps including leisure maps, and information on sustainable community initiatives and other local community projects to reduce travel or encourage uptake of sustainable modes.
- A local Bicycle User Group (BUG), which the local community could be encouraged to set up or join an existing BUG which is active in the local vicinity and which works to encourage bicycle use and promotes bicycle rides and initiatives.
- School travel plans for the local schools (including a walking school bus program), which can lead to a mindset which encourages active travel throughout life for both children and parents for other journeys. Access by walk and cycle will be facilitated by continuous, high quality pedestrian and bicycle paths.
- Car share scheme, which would reduce the residents' need to own and operate their own vehicle, safe in the knowledge that they can get access to a vehicle if they require one. Campbelltown Council could consider extending the provision of established car share schemes using an established provider (such as GoGet) to set up a car sharing network for Airds Bradbury.

7.0 Summary and Conclusions

This Transport and Accessibility Study has been prepared to accompany a Concept Plan Application under Part 3A of the Environmental Planning & Assessment Act, 1979 (EP&A Act) in relation to the Airds Bradbury Urban Renewal Project.

This study addresses the potential transport impacts and develops appropriate strategies to improve road and transport links for a socially mixed community.

A review of the existing transport network was undertaken and opportunities and constraints highlighted, which fed into the development of appropriate transport strategies in the concept plan to overcome existing transport and accessibility issues.

Based on a number of strategic objectives, informed by technical studies, an extensive consultation and community workshop exercise and urban design and social sustainability best practice, a preferred concept plan has been developed, which is shown in **Figure 7.1**.

The preferred concept plan has provided better accessibility to the surrounding areas by:

- Relocating the existing Riverside Drive access at Georges River Road to the west which connects to a central spine through the town centre of Airds.
- Providing a new access at Georges River Road through the extension of Deans Road.
- Providing a new direct connection to Junction Road through the extension of Peppin Crescent.
- Providing a new direct connection to Campbellfield Avenue through a new east-west collector road to the town centre of Airds.

Existing accesses at Briar Road, Akuna Avenue and Greengate Road will be retained.

A number of new internal road networks have also included in the preferred concept plan to improve the connectivity of the study area including:

- A realigned Riverside Drive from the town centre to Georges River Road along the Smiths Creek Corridor. This forms part of the main collector into Airds from Georges River Road.
- A new grid road network surrounding the town centre.
- A new east-west road (extension of Campbellfield Avenue) connecting Riverside Drive to St Johns Road.
- A new north-south road connecting the new Campbellfield Avenue extension and Merino Crescent along the Smiths Creek Corridor.
- An extension of Riverside Drive to the south of Briar Road to connect with Greengate Road.
- A new road along the edge of the proposed Georges River Parkway, south of Briar Road.

An improved bus network is proposed to maximise accessibility of Airds Bradbury to the town centre, schools and other local recreational facilities (open spaces and sports grounds).

A network of off-road shared paths and on-road cycle paths are proposed within the project area. The network will link key amenities including open spaces, schools and the facilities in the town centre. New off-road cycleways are proposed along the Smiths Creek Corridor and the Georges River Reserve.

Footpaths are provided along all roads (except laneways) within Airds Bradbury to provide safe and convenient access for pedestrians to key amenities including open spaces, schools and the facilities in the town centre. Additional pedestrian refuges are proposed outside schools, major open spaces, senior living areas as well as the town centre to facilitate safe crossing opportunities for pedestrians.

Figure 7.1: Preferred Urban Renewal Concept Plan

Source: Urbis, 2011

A traffic impact assessment of the redevelopment was undertaken, and in conjunction with a review of the public transport, pedestrian and cycle networks proposed, a package of transport-related measures were prepared, and consist of the following:

- Proposed infrastructure upgrades
    - Extension of local bus services (Route 884 and 884W)
    - Provision of new bus stops (up to 10 with seating and signage only)
    - Internal footpaths, pedestrian refuges, cycle paths, road network and intersections
    - Upgrade of Georges River Road / Junction Road intersection (roundabout) with an additional approach from Peppin Crescent
    - Upgrade of Georges River Road / Bellinger Road intersection (give-way) with an additional approach from Deans Road
    - New single lane roundabout for Georges River Road / realigned Riverside Drive
    - New single lane roundabout for St Johns Road / extension of Campbellfield Avenue.

- Proposed sustainable travel initiatives:
    - Household Information Packs for the new dwelling units within Airds Bradbury
    - A local Bicycle User Group
    - School travel plans for the local schools
    - Car share scheme.

Appendix A

2006 Journey to Work Data for Airds, St Helens and Ruse

Appendix A 2006 Journey to Work Data for Airds, St Helens and Ruse

Table A1: Journey to work destinations from Airds travel zone (2006)

Destination LGA	Total trips	Proportion of trips (%)
Campbelltown	263	40.4%
No fixed	106	16.3%
Liverpool	58	8.9%
Camden	33	5.1%
Bankstown	31	4.8%
Fairfield	24	3.7%
Sydney	24	3.7%
Auburn	12	1.8%
Holroyd	12	1.8%
Parramatta	11	1.7%
Wollondilly	10	1.5%
Other (<1%)	67	10.3%
Total	**651**	**100.0%**

Source: Journey to work data (2006)

Table A2: Journey to work destinations from St Helens travel zone (2006)

Destination LGA	Total trips	Proportion of trips (%)
Campbelltown	325	37.0%
Unincorporated NSW	98	11.1%
Liverpool	79	9.0%
No fixed	69	7.8%
Bankstown	38	4.3%
Sydney	37	4.2%
Camden	36	4.1%
Fairfield	34	3.9%
Auburn	21	2.4%
Holroyd	18	2.0%
Botany Bay	14	1.6%
Blacktown	12	1.4%
Canterbury	11	1.3%
Penrith	10	1.1%
Other (<1%)	77	8.7%
Total	**879**	**100%**

Source: Journey to work data (2006)

Table A3: Journey to work destinations from Ruse travel zone (2006)

Destination LGA	Total trips	Proportion of trips (%)
Campbelltown	1268	38.0%
No fixed	557	16.7%
Unincorporated NSW	200	6.0%
Camden	191	5.7%
Bankstown	167	5.0%
Liverpool	164	4.9%
Sydney	155	4.6%
Fairfield	88	2.6%
Blacktown	61	1.8%
Parramatta	61	1.8%
Holroyd	56	1.7%
Auburn	42	1.3%
Botany Bay	37	1.1%
Other (<1%)	288	8.6%
Total	**3335**	**100.0%**

Source: Journey to work data (2006)

Table A4: Journey to work data by mode from Airds travel zone (2006)

Mode	Total trips	Proportion of trips (%)
Car drive	296	45.5%
Car passenger	85	13.1%
Did not go to work	79	12.1%
Train and bus	38	5.8%
Train	35	5.4%
Bus	31	4.8%
Walked only	21	3.2%
Not stated	17	2.6%
Train and Car drive	9	1.4%
Train and other mode	8	1.2%
Bus and car passenger	8	1.2%
Truck	7	1.1%
Worked at home	4	0.6%
Train and other mode	4	0.6%
Bus and other mode	3	0.5%
Train and car passenger	3	0.5%
Bicycle	3	0.5%
Total	**651**	**100%**

Source: Journey to work data (2006)

Appendix B

Historical AADT Traffic Data

Appendix B Historical AADT traffic data

Table B1: Historical traffic numbers and growth on the surrounding road network (1996-2005)

Station number	Road	Location	Year				Annual Increase (%)
			1996	1999	2002	2005	
07.737	South Western Freeway	15 km north of MR95 Interchange	26,822	30,497	33,787	36,887	3.6%
83.023	Narellan Road	South of Kellicar Road	15,416	21,794	19,914	20,342	3.1%
85.031	Narellan Road	West of F5, South Western Freeway	36,391	46,000	56,320	60,282	5.8%
83.092	The Parkway (Narellan Road)	East of Appin Road	7,120	10,537	11,601	9,323	3.0%
83.013	Appin Road / Oxley Street	South of Camden Road	26,648	28,923	27,617	30,561	1.5%
83.133	Appin Road / Oxley Street	North of Camden Road	27,287	25,009	24,612	27,813	0.2%
83.135	St Johns Road	South of Hoddle Avenue	7,383	7,342	6,813	6,844	-0.8%
Average Increase (%)							**1.8%**

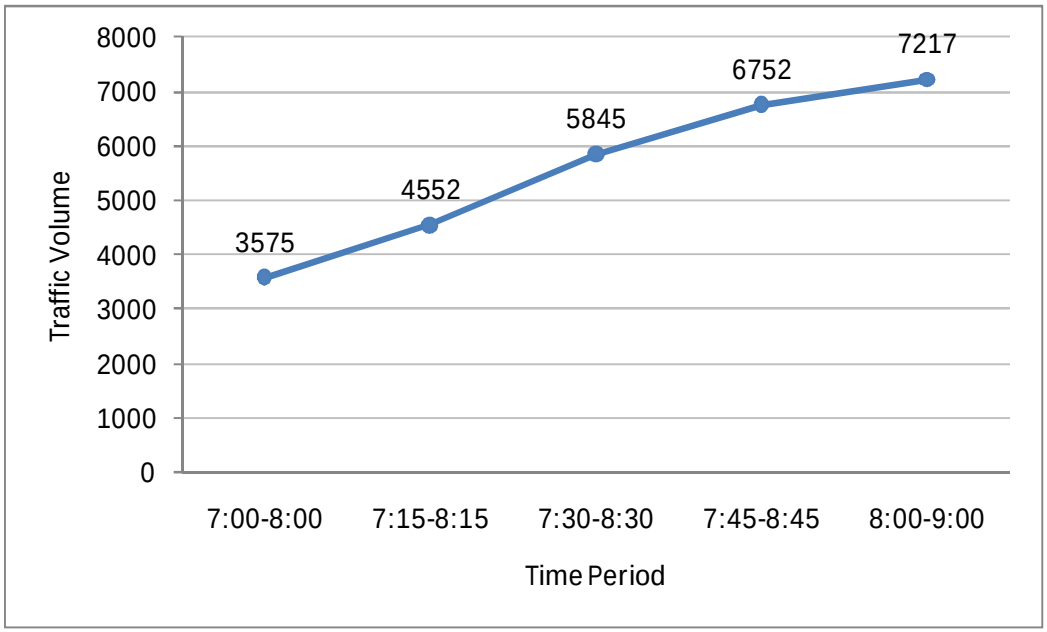
Source: AADT data (RTA)

Appendix C

Existing Peak Hour Traffic Flow Analysis

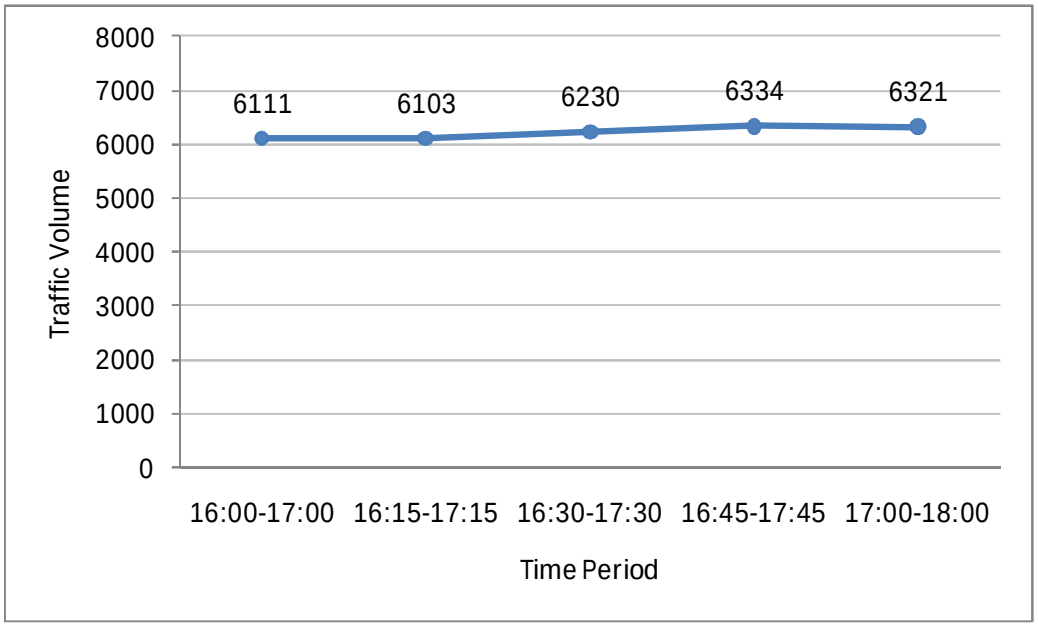
Appendix C Existing Peak Hour Traffic Flow analysis

Figure C1: AM Peak Hour Analysis on surrounding local road network



Source: AECOM, 2009

Figure C2: PM Peak Hour Analysis on surrounding local road network



Source: AECOM, 2009

Figure C3: Existing AM and PM Peak Period Intersection Performance

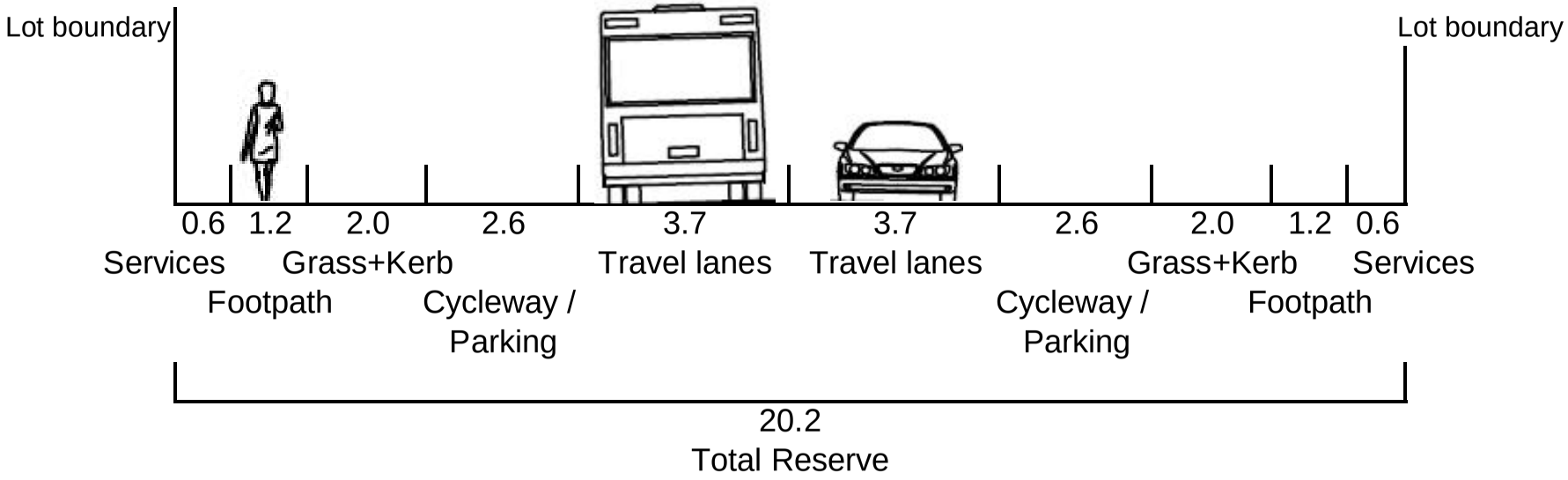
Intersection	Veh/h	LoS	DoS	95% Back of Queue	Av Delay (s)
AM Peak					
Georges River Road / Junction Road	973	A	0.345	20	9.4
Georges River Road / Riverside Drive	1159	N/A	0.253	9	4.2
St Johns Road / Broughton Street / Waminda Avenue	1536	B	0.646	60	18.3
St Johns Road / Hoddle Avenue	916	A	0.299	16	6.3
St Johns Road / Briar Road	993	A	0.333	19	8.8
St Johns Road / Akuna Avenue	752	N/A	0.167	3	1.6
Greengate Road / Merino Crescent	275	N/A	0.073	3	1.5
Riverside Drive / Briar Road	614	N/A	0.144	7	4.8
PM Peak					
Georges River Road / Junction Road	990	A	0.342	19	9.2
Georges River Road / Riverside Drive	1224	N/A	0.269	9	4.0
St Johns Road / Broughton Street / Waminda Avenue	1367	B	0.585	38	16.8
St Johns Road / Hoddle Avenue	653	A	0.212	11	6.4
St Johns Road / Briar Road	740	A	0.231	12	8.5
St Johns Road / Akuna Avenue	574	N/A	0.120	1	1.8
Greengate Road / Merino Crescent	307	N/A	0.095	5	1.3
Riverside Drive / Briar Road	501	N/A	0.130	6	5.5

Source: AECOM, 2009

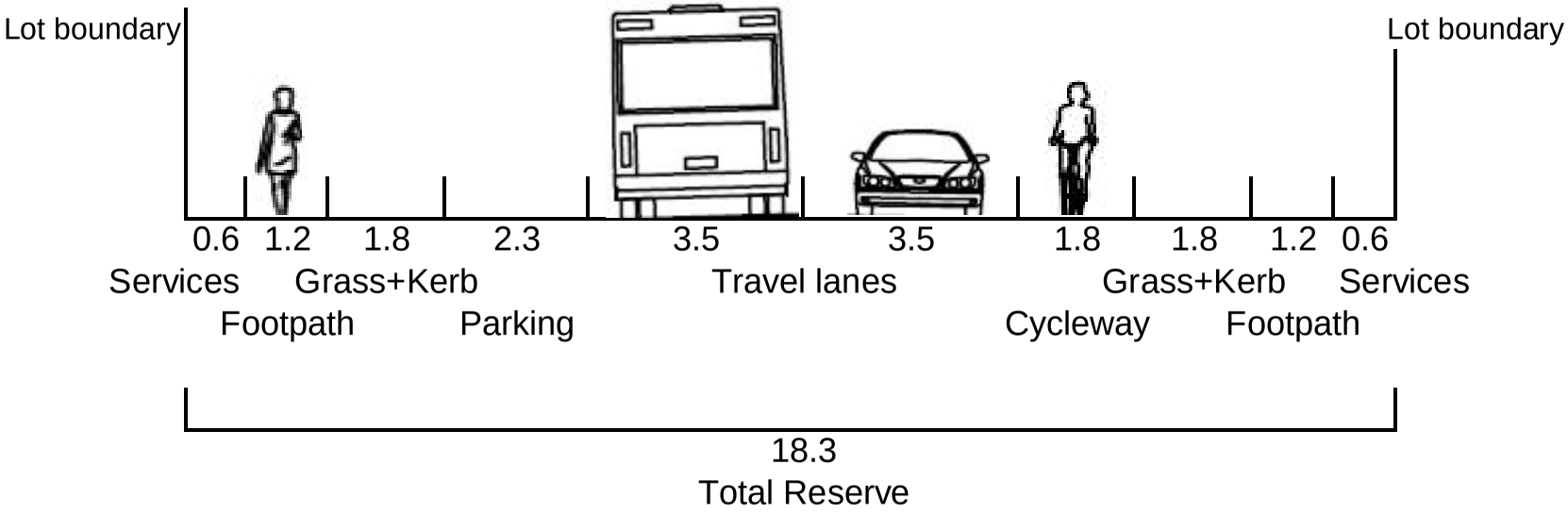
Appendix D

Existing and Proposed Road Cross-sections

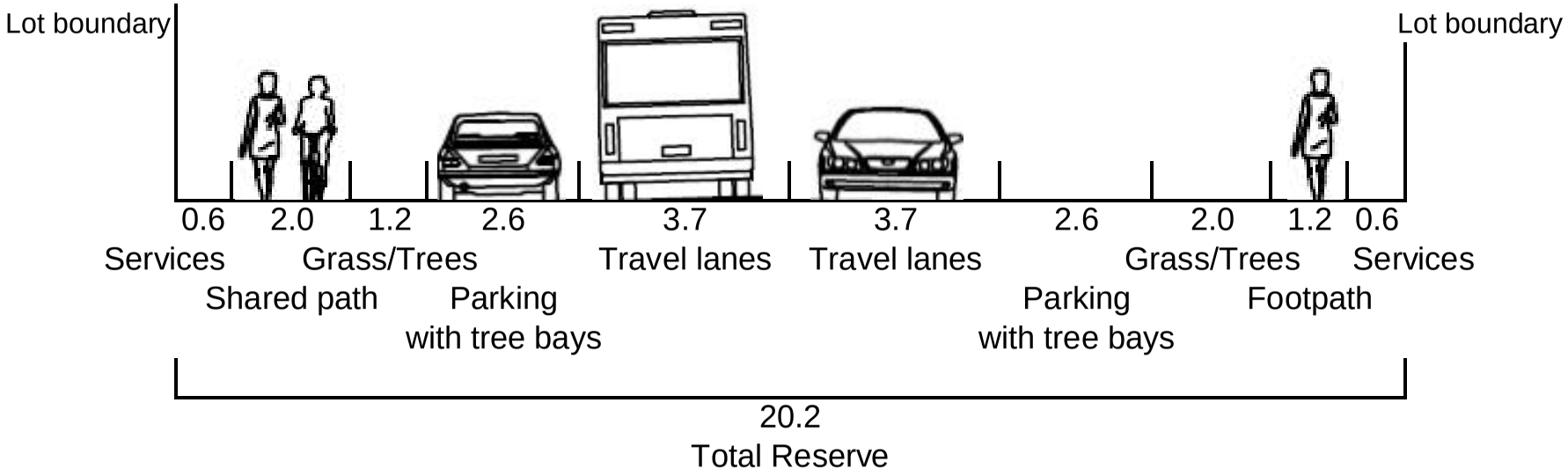
Existing Collector Road with on-road cycleway (Briar Road)



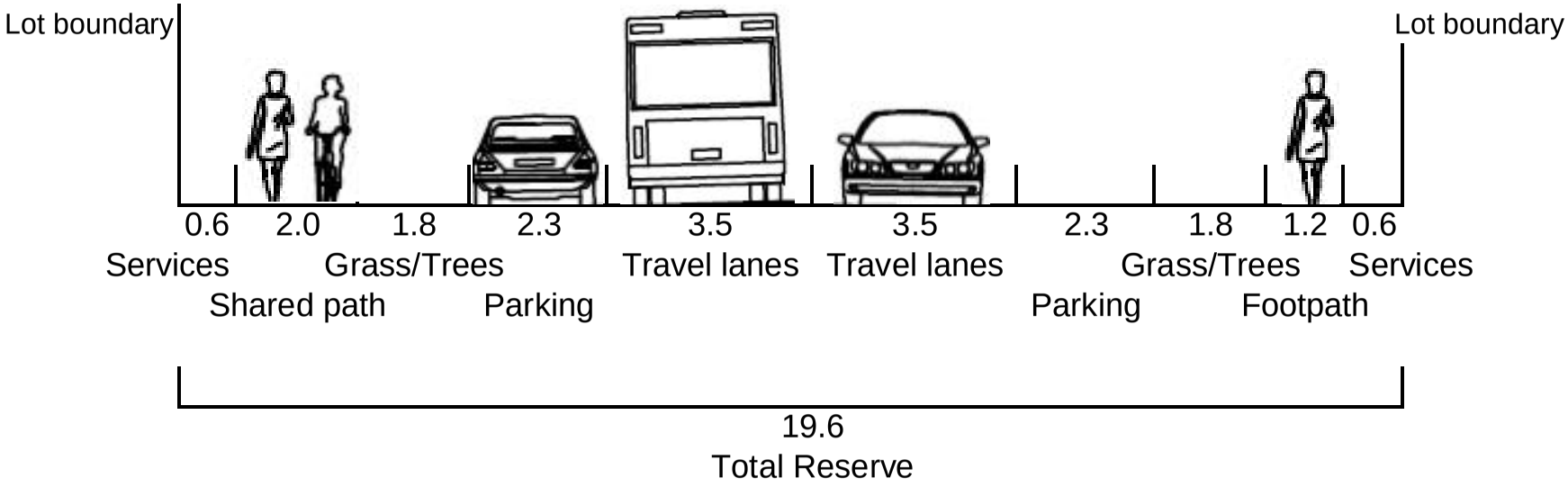
Existing Local Street with on-road cycleway (including Riverside Drive, Greengate Road and Merino Crescent)



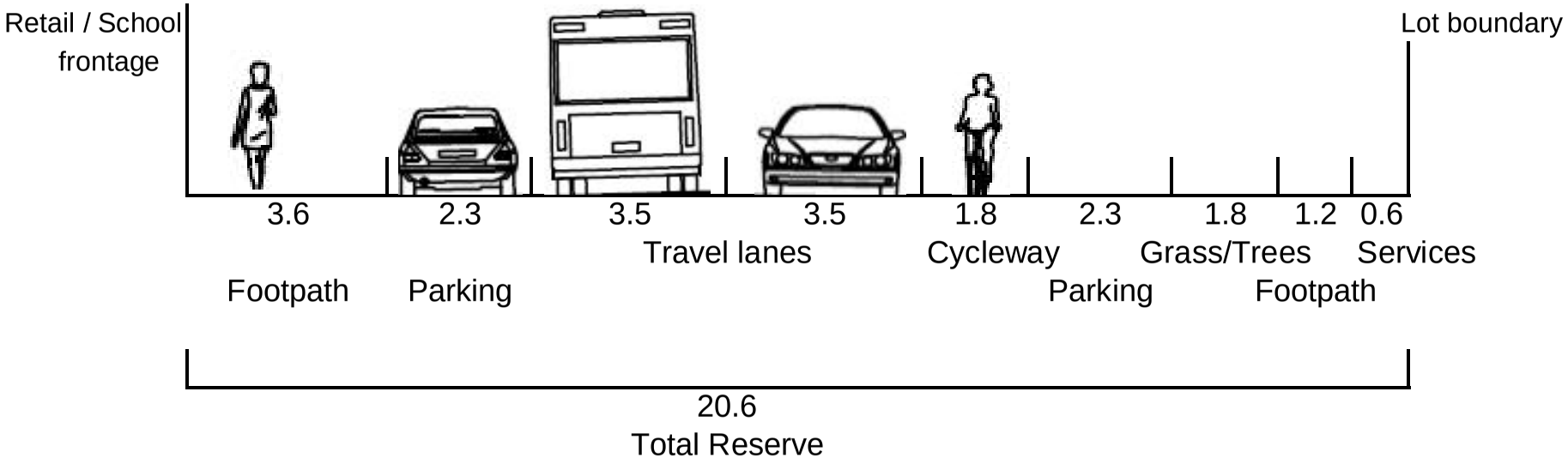
Collector Road (E-W) with shared path (Briar Road)



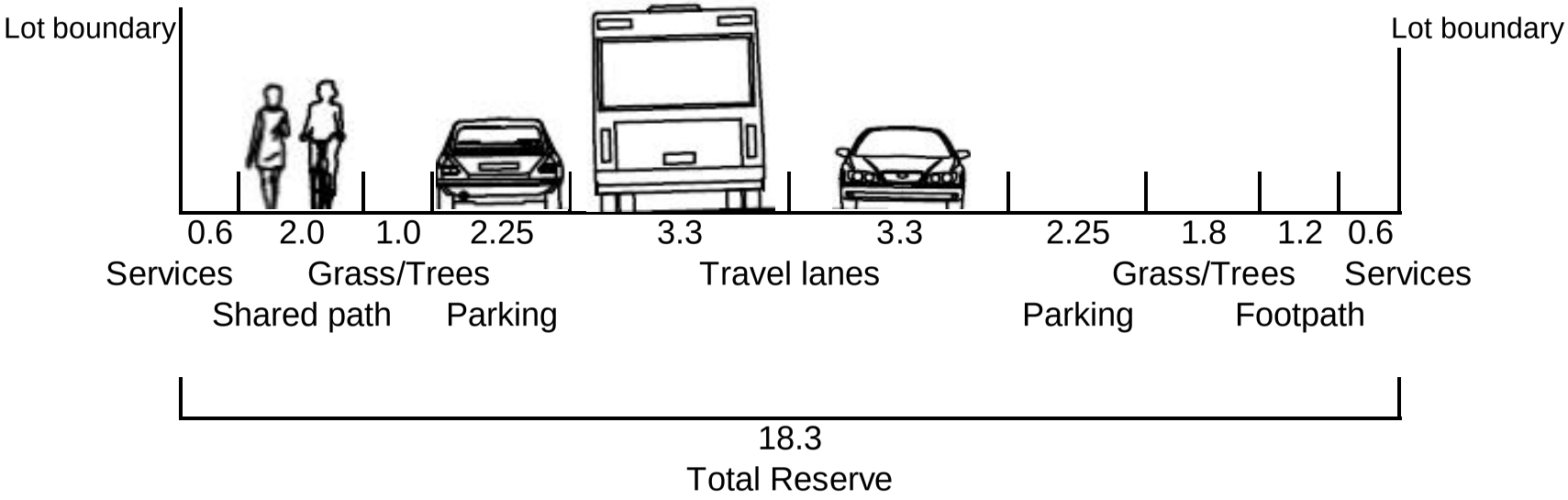
Collector Road (N-S) with shared path (Riverside Drive extension)



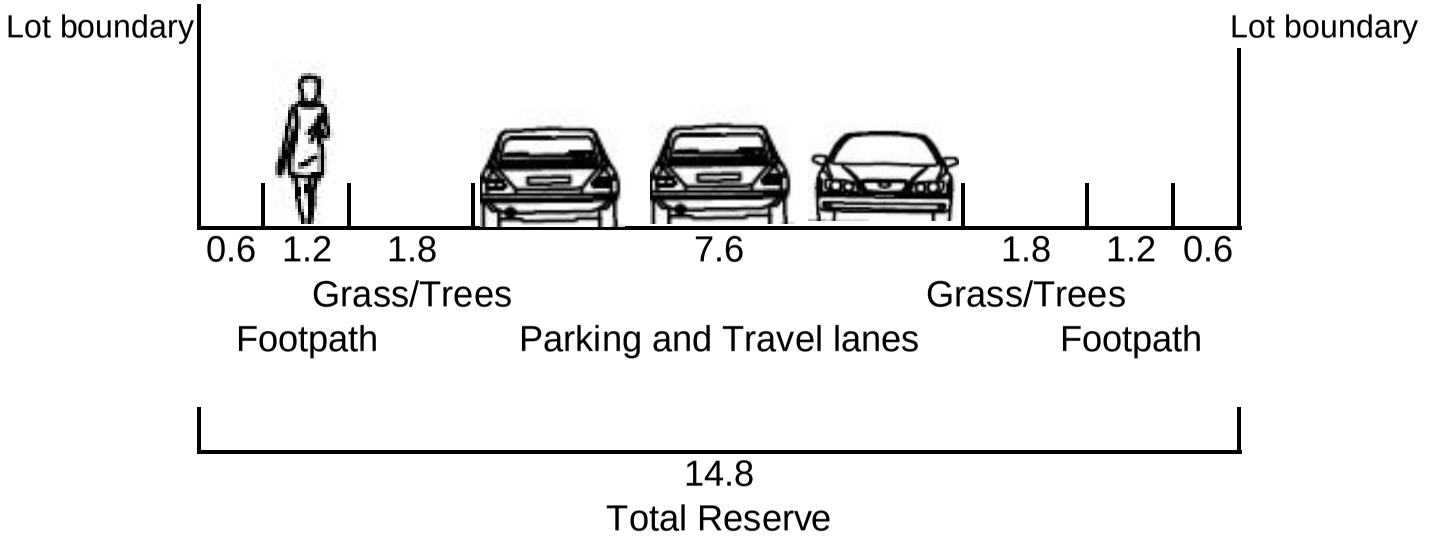
Collector Road with on-road cycleway (Town Centre only)



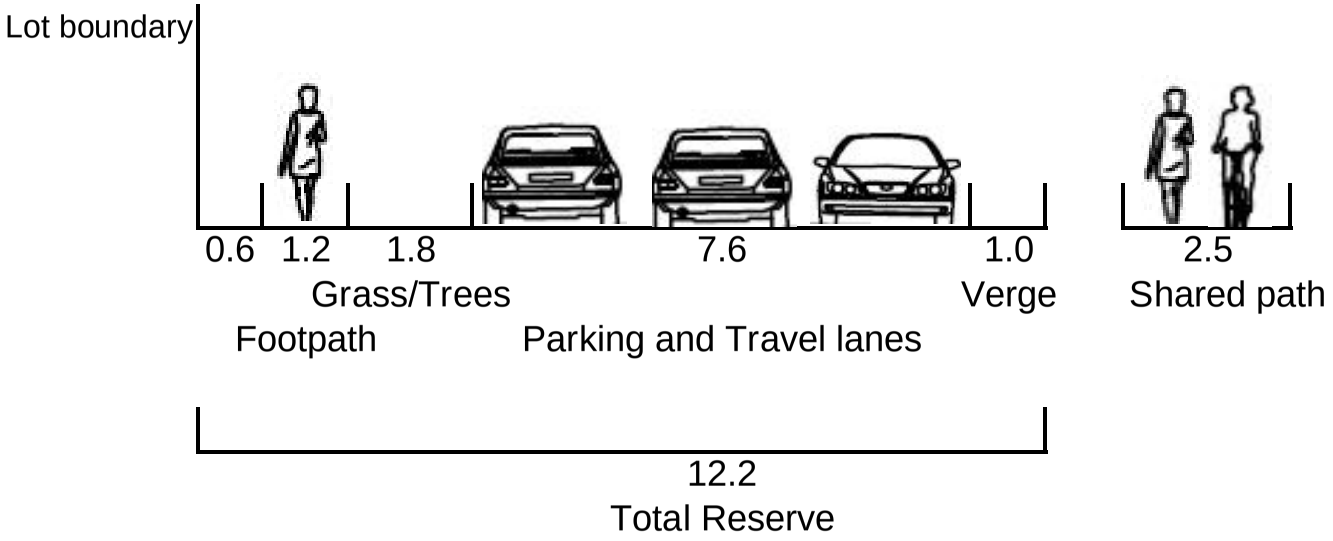
Existing Local Street with shared path (including Riverside Drive, Greengate Road and Merino Crescent)



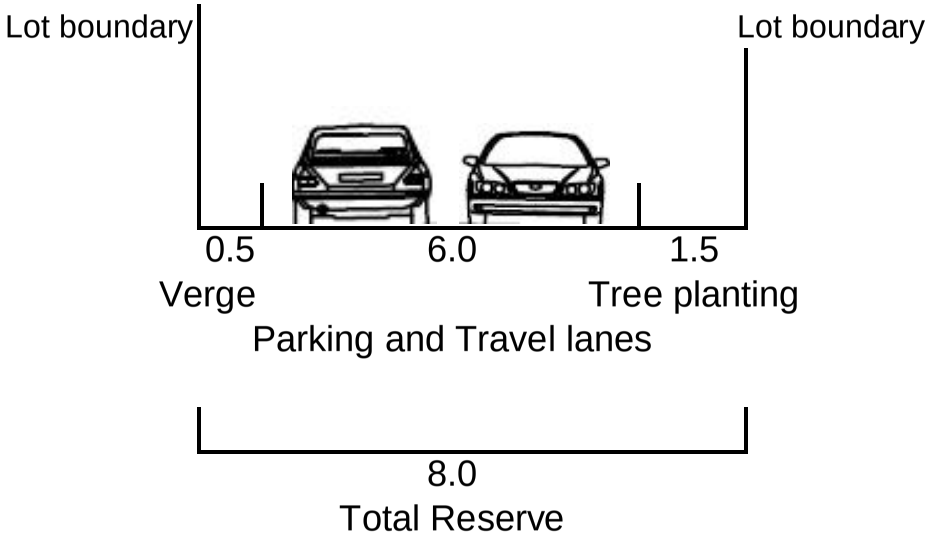
Minor local street



Minor local street next to reserve



Laneway


Lot boundary
Lot boundary
0.5
6.0
1.5
Verge
Tree planting
Parking and Travel lanes
8.0
Total Reserve