NEW PARRAMATTA RD

Parramatta Road Precinct Transport Report

September 2015

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UrbanGrowth NSW

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1. Introduction

1.1 OVERVIEW

Over the next 20 years, Sydney's population will grow by 1.6 million people. Sydney will need to provide more diverse and affordable housing, a broader range of job opportunities aligned with our changing economic structure and easier and more sustainable ways for people and goods to move around the city. As the city grows, we must look to the renewal of our existing urban areas to provide a sustainable way of meeting increasing demand for housing, transport and services.

The Parramatta Road Corridor (the Corridor) is identified in *A Plan for Growing Sydney* as an urban renewal corridor that will be the focus for increased housing, economic activity and social infrastructure. The Corridor is proposed to be transformed through the implementation of the Draft Parramatta Road Urban Transformation Strategy over the next 30 years. In 2050, the Corridor will have an estimated resident population of 70,000, approximately 40,000 new dwellings and 30,000 new jobs.

Whilst Parramatta Road connects employment areas and nearly ten per cent of the metropolitan population of Sydney, the current road and rail systems to, through and within the Corridor are often congested. They operate above design capacity for many hours of the day, with limited alternatives available. Sections of Parramatta Road are recognised as some of Sydney's most congested traffic routes, with traffic volumes high and speeds low during peak times, resulting in longer journey times for car users, bus passengers and vehicles delivering goods. At the same time, properties along parts of Parramatta Road show the effects of proximity to heavy traffic with degraded land uses resulting in part from the high volume of movement.

Realising the Corridor's full potential is important to the future productivity and liveability of metropolitan Sydney. At present, multiple land use and transport projects are underway or about to start, which will address many current issues and concerns both within and external to the Corridor. These transport projects are identified in the *Sydney CBD to Parramatta Strategic Transport Plan*. Substantial areas of under-utilised land also represent significant opportunities for redevelopment and revitalisation.

The construction of WestConnex will allow for significant improvements to local amenity by reducing through-traffic on surface roads, and allowing for enhanced north-south local connectivity. The Government is investigating the feasibility of rapid transit options along Parramatta Road for the length of the corridor.

The corridor will be a focus for increased housing, economic activity and social infrastructure, especially around centres with good public transport access and amenity. An Urban Renewal Strategy is being prepared to guide development in selected precincts in the Parramatta Road Corridor and to bring new life to local communities. Burwood, Sydney Olympic Park and Rhodes will continue to be a particular focus for employment.

A Plan for Growing Sydney

1.2 THE STUDY AREA

The Corridor sits in the heart of metropolitan Sydney, extending for approximately 22 kilometres between the Sydney CBD to the east and Parramatta to the west, thereby linking the region's two CBDs. In this report, a clear distinction is made between the Study Area and the Parramatta Road Corridor.

The **Study Area** covers the 10 local government areas (LGAs) which the Corridor spans and includes the geographical area between Sydney CBD and Parramatta and the Parramatta River in the north to the Western Rail Line in the south.

The **Parramatta Road Corridor** is the continuous length of Parramatta Road, and includes land with direct frontage to Parramatta Road, as well as the eight Precincts.

Change and growth along the Corridor is proposed to occur in eight **Precincts** which have been chosen for their ability to support growth, and their access to public transport, services, and jobs. The Precincts have been informed by a range of factors including natural features or barriers, built form or land use change, and subdivision patterns. In some cases, the Precincts straddle LGA boundaries.

Frame Areas are portions of the Corridor located between the Precincts with direct frontage to Parramatta Road, and typically capture the land to the first street/laneway running parallel to the north or south of Parramatta Road. The Frame Areas form important links that may experience some change, but at a lower intensity than that anticipated in the Precincts. The Parramatta Road Urban Transformation Program should not be seen as the redevelopment of Precincts alone, but rather the combined renewal of Precincts and Frame Areas that will collectively deliver a transformational effect along the Corridor.

Figure 1 identifies the extent of the Parramatta Road Study Area, Corridor, Precincts, and Frame Areas and also illustrates the extent of the Strategic Transport Plan Study Area used by TfNSW (refer to section "**Sydney CBD to Parramatta Strategic Transport Plan**"). **Table 1** identifies the LGAs that the Precincts are located within.

Table 1: Precinct and corresponding LGAs (Source: AECOM, 2015)

Precinct	Corresponding LGA
Granville	Parramatta City Council Holroyd Council
Auburn	Auburn City Council
Homebush	Strathfield Council City of Canada Bay
Burwood	Burwood Council City of Canada Bay
Kings Bay	Burwood Council City of Canada Bay Ashfield Council
Taverners Hill	Leichhardt Council Marrickville Council Ashfield Council
Leichhardt	Leichhardt Council Marrickville Council
Camperdown	Leichhardt Council Marrickville Council City of Sydney

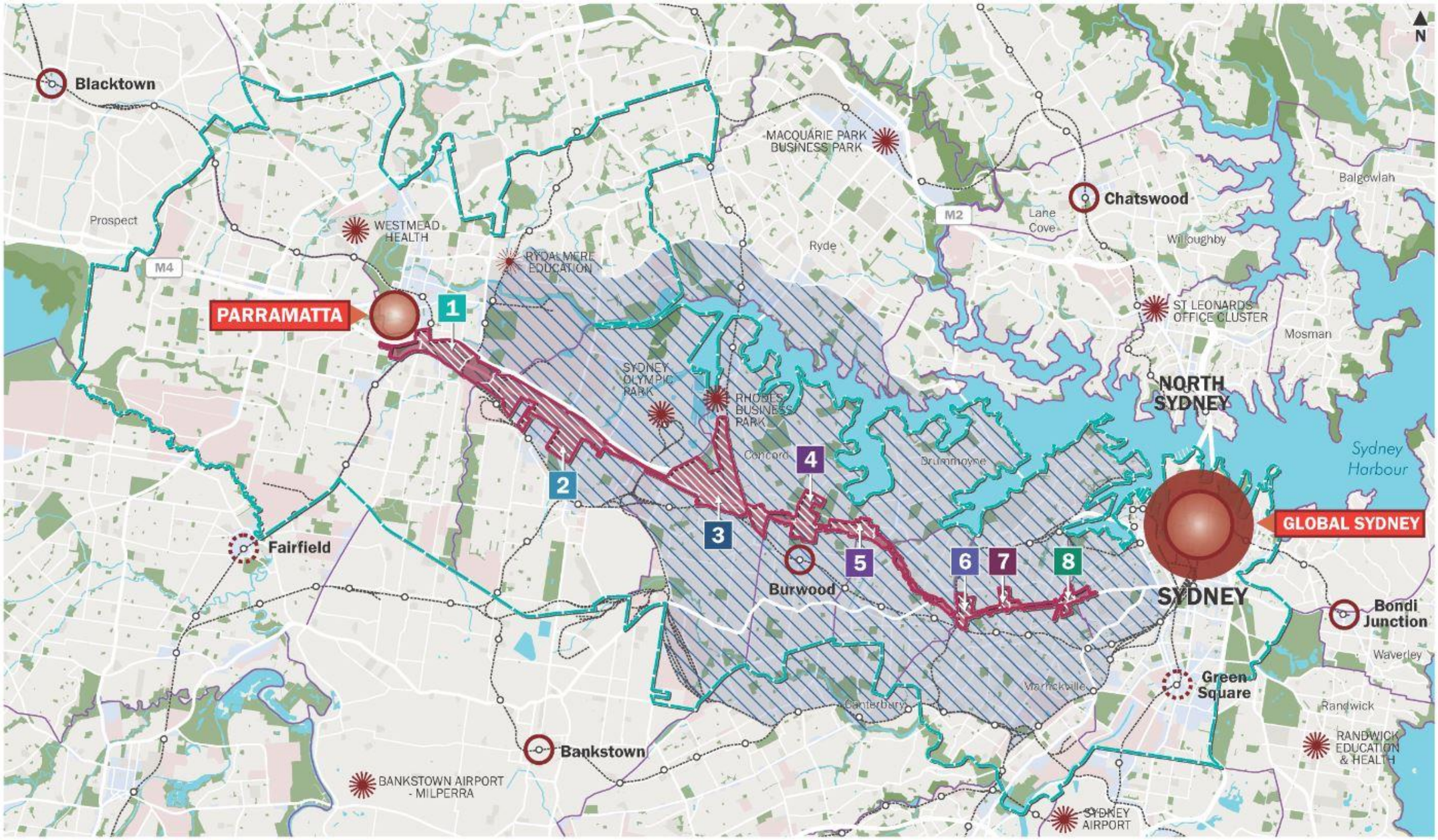

Figure 1: Parramatta Road Study Area and Corridor (Source: UrbanGrowth NSW, 2015)

1.3 CHALLENGES ALONG THE STUDY AREA

Current Challenges

The Study Area currently faces a number of challenges. These include:

- **Capacity:** the M4 Motorway and Main Western Line are at or near capacity and experience congestion, particularly during peak periods.
- **Congestion**: congestion is present throughout the majority of each weekday and during peak periods on weekends.
- **Service limitations**: the lack of dedicated bus priority lanes west of Leichhardt impacts travel reliability. In addition, bus network congestion also potentially contributes to low bus occupancy/usage rates.
- **Limited north-south connections**: Parramatta Road, Parramatta River, the Western Railway Line, and the Bankstown Line impede north-south connectivity for all transport modes.
- **Impediments to development**: Parramatta Road is a hostile environment and has poor amenity; the quality of neighbourhoods and businesses fronting Parramatta Road are in a state of decline.
- **Physical constraints**: heritage listed buildings, subdivision patterns, land ownership and existing building lines are potential constraints to urban transformation.

Future Challenges

The Study Area is expected to face a number of future challenges. These include:

- **Population and employment growth**: increased population growth and economic activity will gradually shift the population and employment centroids further west. An ongoing challenge will be planning for and delivering an efficient and effective public transport network that enhances the efficiency and effectiveness of existing infrastructure and makes best use of new infrastructure as it becomes available.
- **Freight movements**: local services and goods, delivery routes and servicing/loading vehicles will need to continue to use Parramatta Road to access local business and facilities.
- **Regional and intermediate rail demand**: reconfiguration of the rail timetable and services between Parramatta and the Sydney CBD may impact on current services and affect travel demand on Parramatta Road.

1.4 THE CATALYST - WESTCONNEX

The strategic importance of Parramatta Road in the structure and on the functioning of metropolitan Sydney is clear, connecting the two main economic hubs of the Sydney CBD in the east and the Parramatta CBD in the west. However, traffic congestion and associated poor amenity have placed the road under increasing pressure to the point where its many other attributes, including its role as a high street or focus for shopping and trade, have been significantly eroded. This is evidenced by the declining economic vitality of traditional strips of shops, high levels of vacancy in commercial space and an overall degradation of the quality of the street environment over time. From a planning perspective, multiple jurisdictions and levels of Government mean that planning decisions are not easily coordinated. Planning controls are inconsistent and restrict how the land can be used, diminishing incentives for an improved urban environment.

The WestConnex Motorway represents an opportunity to deliver the largest integrated land use and transport project in Australia – a 33km motorway and a 20km urban transformation corridor. It will change traffic volumes, divert traffic and, in particular, provide an alternative route for trucks and heavy vehicles. This will free up road space for better public transport, while also encouraging walking and cycling. Better transport options and improved urban amenity will enable urban transformation to occur that can optimise the Corridor's well-established retail and service centres and help to provide significant volumes of diverse, well-located housing and jobs. A map of the WestConnex Project is shown in **Figure 2**.

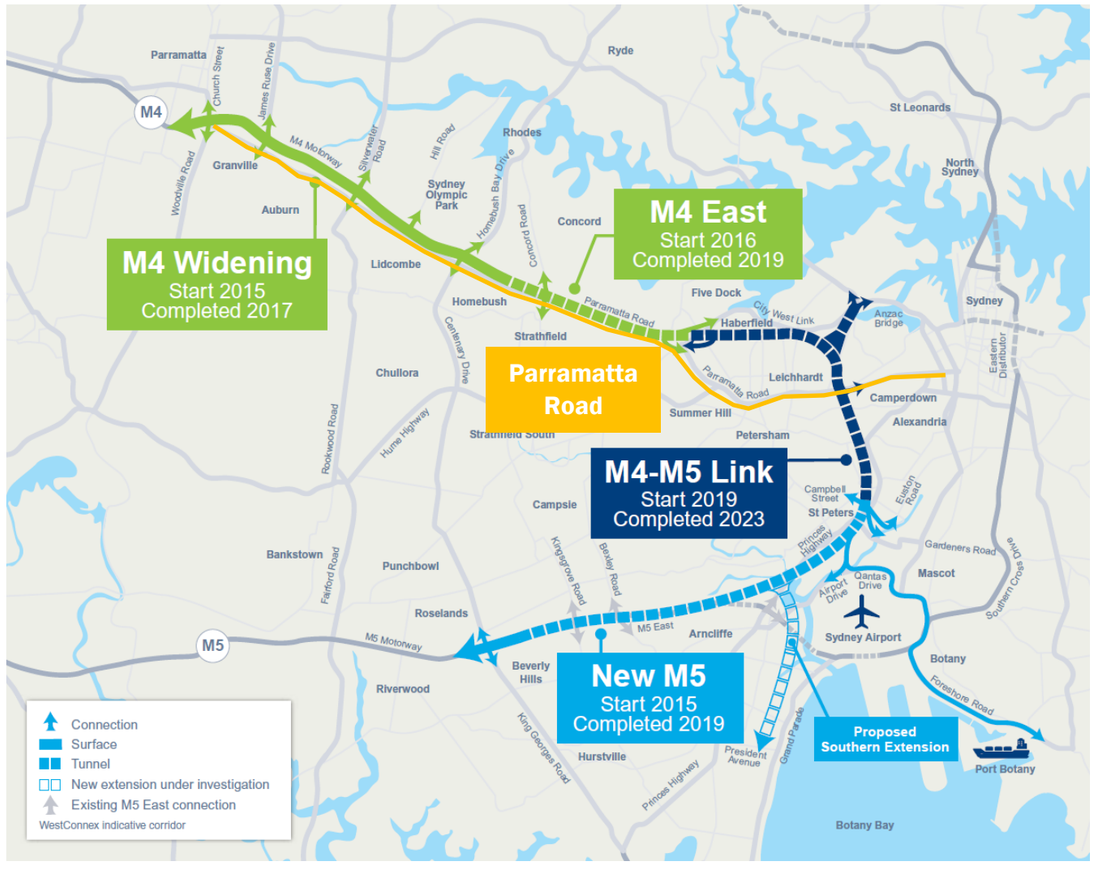

Figure 2: WestConnex Project (Source: WDA, 2015)

1.5 PARRAMATTA ROAD URBAN TRANSFORMATION PROGRAM

The Parramatta Road Urban Transformation Program (PRUTP) is the integrated, cross-agency project established by the NSW Government in 2013 to explore, capture and deliver on opportunities for urban transformation along the Corridor resulting from the WestConnex Motorway and in line with *A Plan for Growing Sydney*.

The PRUTP incorporates three key deliverables, each of which are further explained below:

- An Urban Transformation Strategy for the Corridor to establish a framework for the future growth and development of the Corridor. This document is known as the *Draft Parramatta Road Urban Transformation Strategy*.
- A transport infrastructure program for the Study Area. This document is known as the *Sydney CBD to Parramatta Strategic Transport Plan.*
- A $200 million[1] program of local urban amenity improvement works to deliver tangible public domain improvements to the Corridor aligned with its staged redevelopment. This document is known as the *Draft Parramatta Road Urban Amenity Improvement Program.*

The PRUTP is led by UrbanGrowth NSW, the NSW Government's urban transformation delivery organisation. UrbanGrowth NSW leads an Integrated Project Team (IPT) that includes Transport for NSW, Roads and Maritime Services, WestConnex Delivery Authority, the Department of Planning & Environment (DPE), and the Councils along the Corridor.

The Draft Parramatta Road Urban Transformation Strategy

The *Draft Parramatta Road Urban Transformation Strategy* (Draft Strategy) articulates the long term vision for the Corridor. The purpose of the Draft Strategy is to facilitate the coordinated transformation of the Corridor by integrating land use and built form with transport initiatives and public domain improvements. This integrated approach recognises the importance of the Corridor as a single strategic entity, by combining the benefits of applying a subregional response to 'big picture' issues with the depth of local knowledge required to plan for existing and future communities.

More specifically, the Draft Strategy contains:

- A long-term vision for the transformation of the Parramatta Road Corridor.
- An Integrated Land Use and Transport Concept Plan that includes land use and development intensity, public and active transport initiatives, green space and links, key infrastructure and eight growth Precincts.
- Guiding land use, transport and public domain principles that will apply to all land within the Corridor.
- Structure plans and associated building envelopes for each Precinct, providing more detailed principles and targets for growth and development, and actions for implementation.
- An action-oriented framework for implementation and delivery including a high level program that should be considered in the assessment of land use and development proposals across the Corridor.

The vision for the Parramatta Road Corridor is:

A high quality multi-use corridor with improved transport choices, better amenity and balanced growth of housing and jobs.

The Draft Strategy will build on five principles to meet this vision:

- Plan for a diversity in housing and employment to meet existing and future needs.
- Reshape and better connect places and associated movement networks to better serve customers and encourage sustainable travel.
- Promote quality places and built form outcomes to transform the Corridor over time.
- Create liveable local Precincts along the Corridor that are sustainable, resilient and make Sydney a better place.
- Establish an effective implementation, governance, monitoring and reporting framework.

The urban transformation of the Corridor to 2050 in line with the Draft Strategy will deliver far-reaching benefits for Sydney:

- Significant volumes of diverse, well located diverse and affordable housing.
- A total development value in the order of $28 billion to the State arising from new residential development over the next 20 years.
- A productive business environment supporting a range of viable and prosperous businesses and a variety of employment opportunities.
- More efficient and reliable public transport connecting people and places from east to west and from north to south.
- A series of well-serviced and well-connected communities where people will want to live and visit.
- Diverse spaces, places and links for people to visit, connect with and enjoy.

[1] In 2015 dollars

The Draft Urban Amenity Improvement Program

The *Draft Urban Amenity Improvement Program* (Draft UAIP) is a $200 million initiative under the Draft Parramatta Road Urban Transformation Strategy to stimulate the transformation of the Corridor.

The Draft UAIP identifies a suite of early local amenity improvement works to help realise the vision of the Corridor. The Draft UAIP recognises that the Precincts and existing communities along the Corridor must respond to population growth and change. It also recognises that some existing infrastructure is ageing or unable to respond to the needs of communities as they grow and change. Local amenity infrastructure is therefore required to be delivered quickly to achieve positive social and economic outcomes.

UrbanGrowth NSW has jointly prepared the Draft Urban Amenity Improvement Plan with the collaborating councils along the Corridor: the City of Sydney, Marrickville Council, Ashfield Council, City of Canada Bay, Burwood Council, Strathfield Council, Auburn Council, Parramatta Council and Holroyd Council.

Sydney CBD to Parramatta Strategic Transport Plan

Overview

The *Sydney CBD to Parramatta Strategic Transport Plan* (Transport Plan) sets the strategic context for current plans, proposals and interventions in the Sydney CBD to Parramatta Corridor[2]. It is a transport plan that considers a holistic view of growth and renewal, as well as metropolitan, regional and local influences on future transport, housing and employment. To guide future investment and to meet these changing demands, the Transport Plan identifies future transport requirements and appropriate interventions at regional, intermediate and local levels. The Transport Plan also indicates how transport investment can further reinforce land use decisions to achieve outcomes such as Parramatta as Sydney's Second CBD and encouraging more balanced travel choices by appropriate travel modes. Accordingly, the Transport Plan has informed the Draft Strategy.

Policy Context

The Transport Plan fits within a larger context of other State Government plans and policies. It takes its strategic direction from *NSW 2021 - A Plan to Make NSW Number One* and the *State Infrastructure Strategy - Update 2014 (Rebuilding NSW)*. NSW 2021 is the Government's 10-year plan for the State, and is based on five overarching strategies of rebuilding the economy, returning quality services, renovating infrastructure, strengthening local environment and communities and restoring accountability to government. NSW 2021 contains goals for improvements to transport in the State, including improving the efficiency of the road network, reducing travel times, growing patronage on public transport, improving customer experience and improving road safety.

The *State Infrastructure Strategy (Rebuilding NSW)* identifies an opportunity to accelerate infrastructure investment based around three critical priorities:

- Maintaining a competitive, global Sydney.
- Supporting population and economic growth in metropolitan Sydney.
- Ensuring a competitive and connected regional economy.

Priorities relevant to the Study Area include the modernisation of the metropolitan rail network, expedited major motorway programs and optimisation of existing road infrastructure to meet population and freight volume growth.

The *NSW Long Term Transport Master Plan* brings together land use planning with transport planning, and it integrates planning for freight and passenger movements, as well as all modes of transport. It includes actions for road, rail, bus, ferries, light rail, cycling and walking.

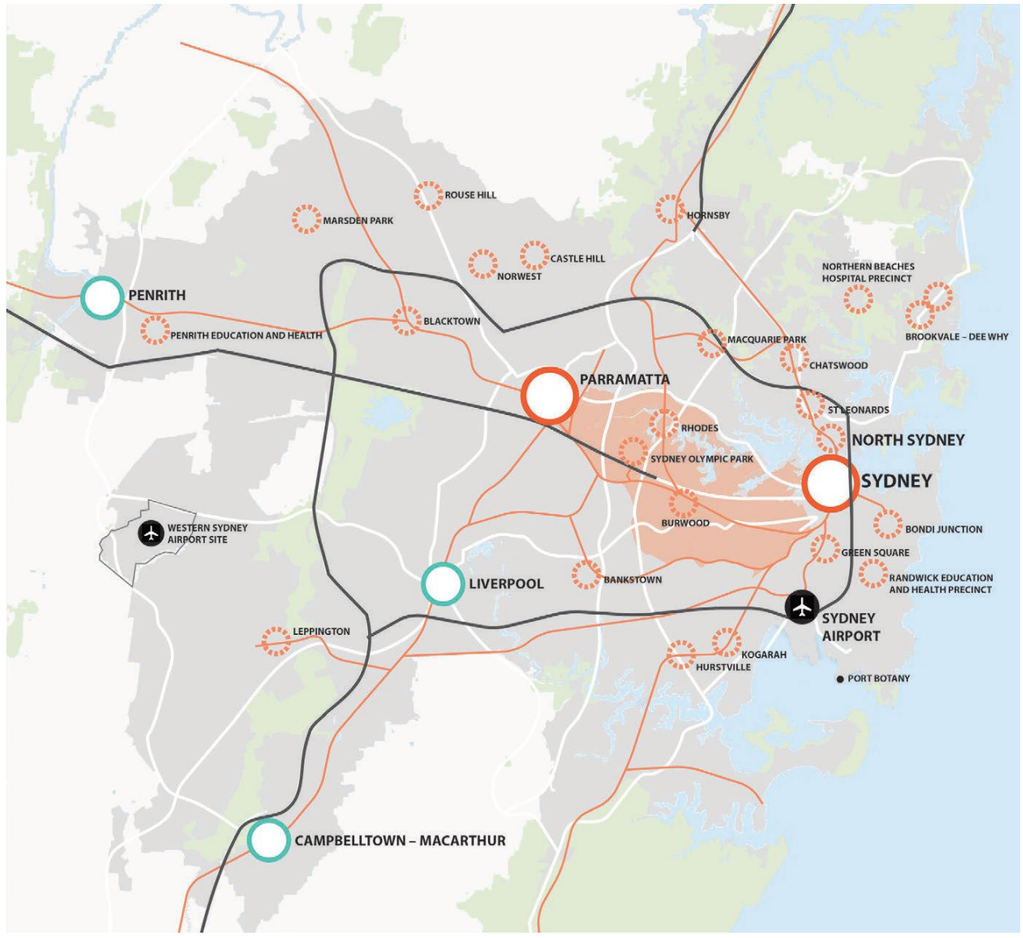

Figure 3: **The Sydney CBD to Parramatta Strategic Transport Corridor within metropolitan Sydney context (Source: Sydney CBD to Parramatta Strategic Transport Plan, 2015)**

[2] The Draft Transport Plan Corridor Is referred as the PRUTP Study Area and is highlighted in Figure 1.

A Plan for Growing Sydney guides land use planning decisions for accommodating Sydney's future population growth over the next 20 years. It provides a framework for strengthening Sydney's global competitiveness and delivering strong investment and jobs growth in Western Sydney, and seeks to improve land use and transport planning to better connect homes, jobs, education and recreational facilities. It confirms the growth of Parramatta as Sydney's Second CBD, by connecting and integrating Parramatta, Westmead, Parramatta North, Rydalmere and Camellia. It also establishes a new priority growth area from Greater Parramatta to the Olympic Peninsula.

The suite of transport "Futures" documents also inform this Plan. Correspondingly, this document will help guide the implementation of several of the proposed transport "Futures," and the subregional plans and precinct plans being prepared across the Study Area.

The *NSW Freight and Ports Strategy* is a road map that will ensure freight is at the forefront of the NSW economy and policy, infrastructure and land-planning initiatives to deliver a freight network where capacity and performance can meet demand. The objectives of the Strategy are to deliver a freight network that efficiently supports the projected growth of the NSW economy and to balance freight needs with those of the broader community and environment.

The Transport Plan acknowledges in conjunction with WestConnex, the long term vision for how the Study Area will grow and develop to 2050 by capitalising on WestConnex to develop new housing and employment opportunities. It integrates land use and built form with public domain initiatives to meet Parramatta Road's future population, housing and employment needs. The Precinct Transport Plans have been developed under the visions, directions and initiatives developed as part of the Transport Plan.

The Vision of the Transport Plan:

Future growth and development will enhance the Sydney CBD to Parramatta Corridor as an important social, economic and functional spine, supporting and structuring metropolitan Sydney. Linking the Sydney CBD and Parramatta, the Corridor will be a great place to live, work, play and visit.

The Sydney CBD and Parramatta Corridor will:

- *Provide efficient access to strategic centres*
- *Enable a network of multi-modal transport options for local, intermediate and regional trips*
- *Facilitate less infrastructure-intensive travel behaviour*
- *Strengthen regional transport resilience*
- *Enhance the overall sustainability of metropolitan Sydney.*

Transport Principles – the Study Area

The Transport Plan outlines the following guiding principles for the Study Area and the Corridor to achieve an integrated and balanced transport outcome for the Corridor:

Improve transport and land use integration: Decisions about the movement of people and goods must incorporate the impacts, positive or negative, on adjacent land uses. Similarly, land use decisions, particularly those pertaining to employment, must incorporate the ways in which people and goods will need to move to, through and within the Study Area. A key part of this is to plan appropriate land uses that promote less travel.

Provide transport options: People should have access to multiple modes of transport, providing a greater degree of flexibility. Ideally, these modes will comprise an integrated network of options, with easy access to and along the network throughout the Study Area.

Support multi-modal trips: People should enjoy effective and efficient interchanges between one mode and the next where the physical, functional and temporal interfaces between different modes function as smoothly and efficiently as each of the individual modes.

Take advantage of available capacity for the existing transport system: Adjusting land use decisions to locate growth, particularly in employment, towards the Study Area's west, could smooth out peak-hour travel movements and take advantage of existing capacity resources in the counter-peak direction without entailing new capital or operational expenses.

Promote multi-purpose infrastructure: Infrastructure investments should address multiple transport needs instead of individual functions. For example, cycle paths can serve as recreational resources on weekends and as transport routes during the week. Road corridors can be designed to carry the full range of mobility options, while remaining aesthetically pleasing public spaces.

Promote mixed-use development: Mixed-use developments reduce the development footprint and remove the need to move from one use to another, dramatically impacting the need for transport infrastructure. The greater the physical and functional integration of adjacent uses, the less need for expensive infrastructure to tie these uses together.

Manage travel demand: People can alter their travel behaviour to optimise the effort it takes to move from one location to another. Placing land uses close to one another reduces the effort of moving between them. Similarly, approaches such as park-once districts, effective trip chaining and variable tolling, among others, can influence the way people use locations within the Study Area and the infrastructure that provides access to them.

Encourage behavioural solutions: People may modify their travel behaviour in ways that optimise the capacity of transport resources. For example, given the flexibility to arrive at or depart from work at different times, people can select when to travel, implicitly enhancing the peak-hour capacity of infrastructure systems.

Protect freight functions: Protecting the capacity for industrial development from urban encroachment to freight precincts and intermodal terminals is vital to service future growth.

Coordinate travel distance and mode: Infrastructure should support the modes most appropriate to travel demands – for example, footpaths linking population centres to transport hubs, stations and stops, or interconnected bike facilities that provide access to key destinations.

Redefinition of the Transport Network

As Sydney grows and the core of the region densifies, future trips will increasingly rely on combinations of modes – car to bus, bus to heavy rail, bike to light rail, etc - to provide effective connectivity to, through and within the Corridor. A key element of the Transport Plan is a shift from a focus on mode to a focus on accessibility and connectivity, working across modes and across individual elements of the overall transport system. This shifts the concept of public transport as a series of parallel but unrelated movement systems – walking, cycling, bus, rail, light rail, etc – to an integrated and interrelated transport network.

Integrated Transport Plan - the Study Area

When modes and demands are coordinated, and desire lines are taken into consideration, a transport future for the Study Area begins to emerge. While demand for trips to, from, through and within the Study Area will continue to increase, enhanced integration between current and future modes of transport will improve the capacity and efficiency of the network. In short, connectivity and accessibility can both improve, even as the Study Area adds population and jobs.

A number of transport initiatives / projects have emerged as key opportunities to support / manage growth in the centres and Precincts along the Corridor:

- **Sydney Metro**
  - To have the capacity for trains every two minutes, and will allow the rail network across greater Sydney to carry an additional 100,000 customers an hour during peak times.
  - To attract customers currently travelling on existing heavy rail services (including the T1 Western line), which would reduce crowding and allow more customers to be carried on existing heavy rail services.

- **WestConnex**
  - To improve access to the inner west and Sydney CBD and to key regional destinations such as Sydney Airport and Port Botany from both Western Sydney and within the Study Area.
  - To reduce existing traffic congestion on the M4 and M5 Motorways, Parramatta Road and the wider road and rail network.
  - To remove thousands of daily vehicle trips from Parramatta Road, including up to 3,000 daily truck movements.
  - To facilitate urban transformation and improved public and active transport along Parramatta Road and its immediate surrounds.

- **Potential introduction of the Parramatta to Strathfield Light Rail line**
  - To enhance access to Sydney Olympic Park throughout the day.
  - To facilitate the addition of both jobs and housing in this key regional location.
  - To provide additional network capacity to the transport corridors between Parramatta to Strathfield including Parramatta Road.

- **Parramatta Road on-street Rapid Transit** between Strathfield / Burwood and the Sydney CBD.
  - To support efficient and reliable public transport, manage travel growth in the longer term and support urban renewal.

- Rail and road transport options to improve north-south linkages to Macquarie Park and the Global Economic Corridor including fast and frequent bus routes and potential introduction of light rail.

- **Western Sydney Rail Upgrade** to improve east-west accessibility.

- Additional services and new infrastructure (ferry wharves) for Parramatta River Ferries.

- **Homebush Bay Bridge**
  - To provide access across Homebush Bay between Rhodes and Wentworth Point for buses, pedestrians and cyclists.
  - To connect the emerging communities of Rhodes and Wentworth Point, and significantly improve access between Rhodes and Sydney Olympic Park.

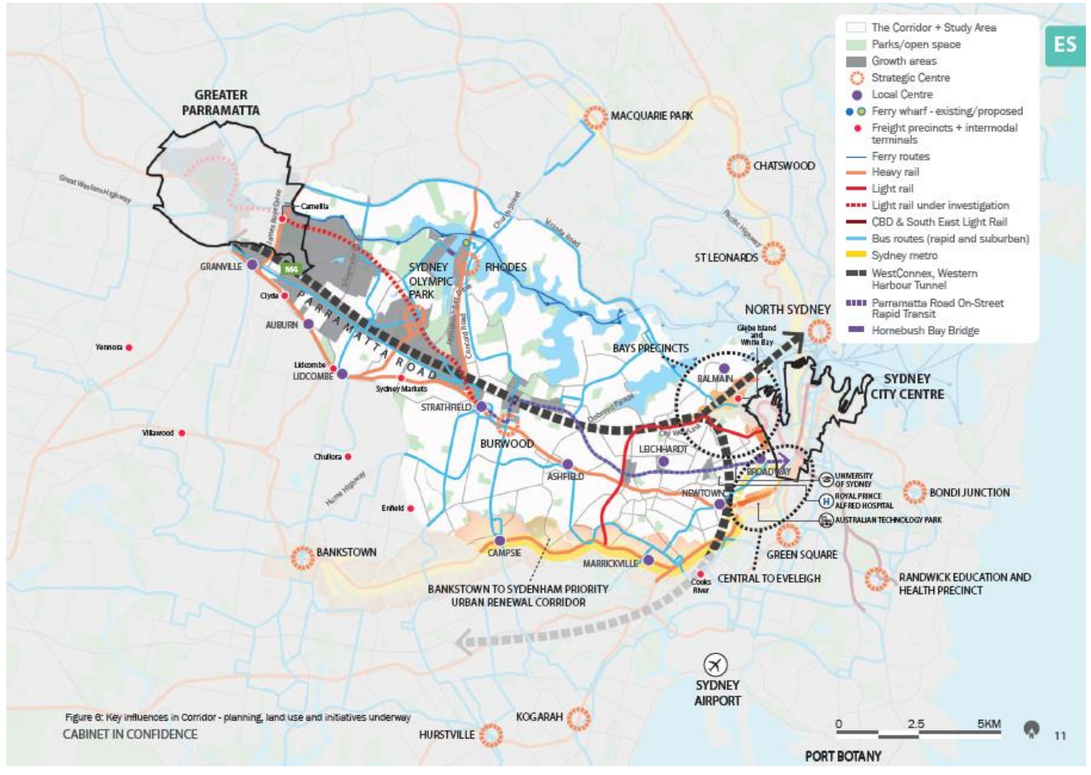

Figure 4: The Sydney CBD to Parramatta Strategic Transport Corridor Integrated Plan (Source: Sydney CBD to Parramatta Strategic Transport Plan, 2015)

Managing travel demand can make the system more efficient by focusing on non-infrastructure initiatives such as encouraging visitors to use non-car modes of travel to help alleviate congestion. Key elements include:

- Modifying or altering the timing of trips, shifting from peak to off-peak periods.
- Reducing the need for trips, by undertaking several tasks as part of a single trip.
- Changing modes, such as taking a bus or cycling instead of using a private vehicle.
- Changing trip routes, to avoid areas of congestion.

1.6 PURPOSE OF REPORT

This Report is one of a suite of technical documents prepared for UrbanGrowth NSW as part of the Draft Parramatta Road Urban Transformation Strategy. It has informed, and should be read in conjunction with, the following documents:

- Draft Parramatta Road Urban Transformation Strategy
- Draft Parramatta Road Infrastructure and Open Space Schedule
- Draft Parramatta Road Urban Amenity Improvement Program
- Draft Parramatta Road Urban Design Guidelines
- Sydney CBD to Parramatta Strategic Transport Plan
- Supporting specialist reports
  - Open Space and Social Infrastructure Report
  - Precincx (Sustainability) Strategy
  - Economic Analysis Report.

This *Precinct Transport Plans* Report has been informed by TNSW's Transport Plan and UrbanGrowth NSW's Draft Strategy, to develop transport plans for each of the eight Precincts along the Corridor.

This Report represents the commencement of investigations into the traffic and transport movements that will be required to support urban transformation in the Corridor over the short, medium and long term.

It is acknowledged that further traffic modelling and analysis will need to be undertaken to support the on-going development and delivery of these Precincts. The transport plan for each Precinct aims to establish a strategic transport framework and an indicative infrastructure plan to guide development of the Precincts to achieve sustainable, targeted, social and economic outcomes for all stakeholders. This Report presents the following for each Precinct (shown in **Figure 5**):

- An assessment of existing land use, traffic and transport conditions
- A review of the likely future character of the Precinct
- A benchmarking review of similar precincts
- Transport directions for the Precinct
- Recommendations for future parking controls and transport infrastructure provision and service improvements for the Precinct.

The key tasks undertaken to prepare this Report have included:

- Consideration of feedback received from stakeholders during public display of the preliminary version of the Draft Parramatta Road Urban Renewal Strategy, exhibited between November 2014 and February 2015.
- A policy and literature review to understand existing transport and traffic controls and requirements across the Study Area and the Corridor.
- Consultation with local and State Government to better understand existing and future challenges facing the Study Area and the Corridor.
- Participation in workshops with local Council staff to discuss traffic and transport trends and pressures.
- Examination of benchmark precincts to identify the behaviours and trends in places that have already undergone renewal to understand what lessons have been learnt and could be applied to the Corridor.
- Identification of a strategic transport framework that should be considered by relevant authorities and developers when making land use and planning decisions; and will help inform the community on what is required to achieve successful transformation of the Corridor and Precincts.
- Identification of future transport and infrastructure upgrades required to support the long term vision for the Corridor and Precincts.

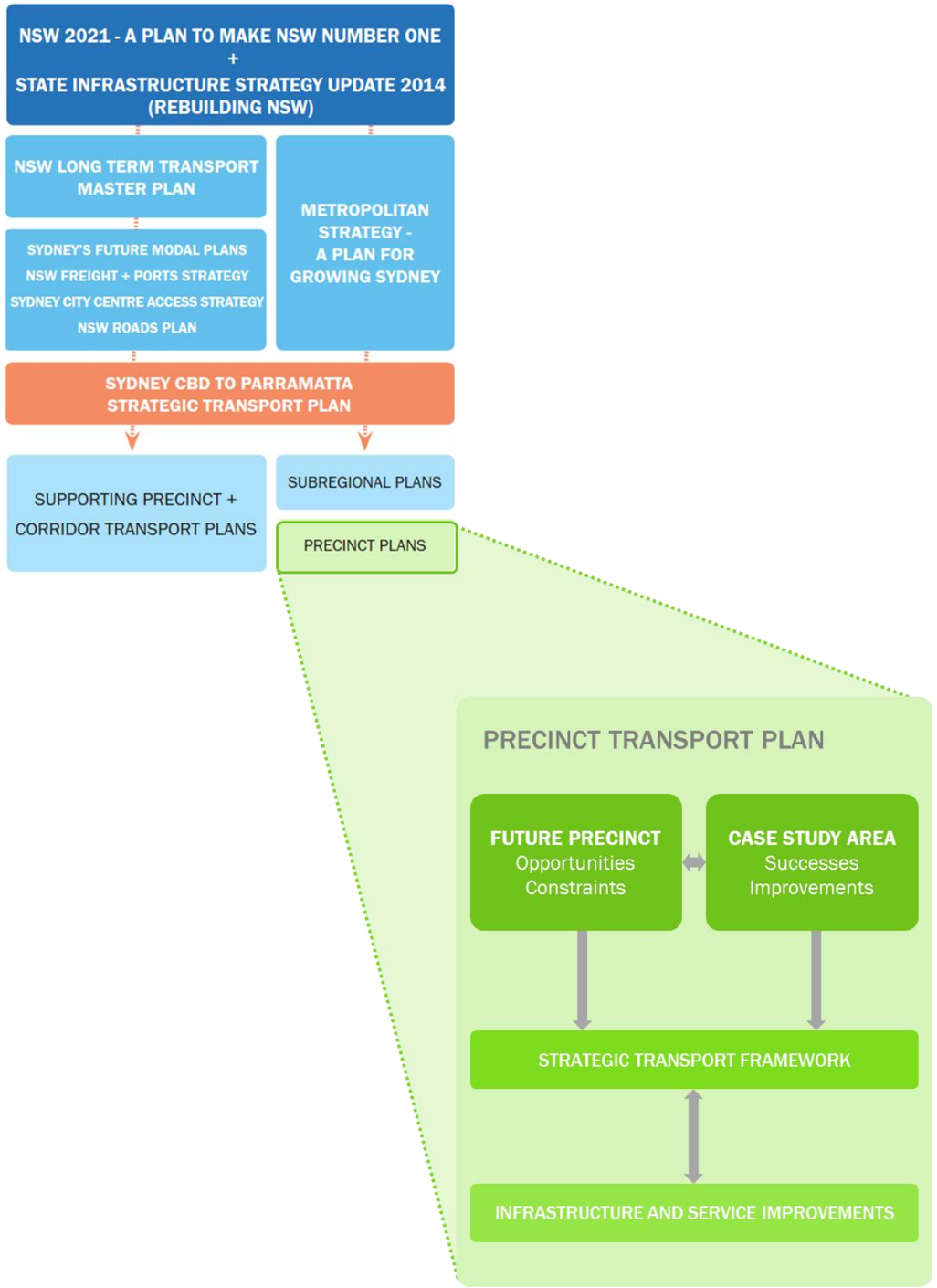

Figure 5: **Precinct Transport Plan Report in context of other relevant documents (Source: Sydney CBD to Parramatta Strategic Transport Plan modified by AECOM, 2015)**

2. Granville

2.1 EXISTING LAND USE

The Granville Precinct is located along the western end of the Parramatta Road Corridor, bounded by the T1 Western rail line, the T2 Inner West and South rail line and the M4 Western Motorway. Granville Station and Harris Park Station are located adjacent to the Precinct. The Granville Precinct boundary is outlined in **Figure 6**.

The southern portion of the Precinct, north of the railway line and south of Parramatta Road, is characterised by quiet retail / commercial uses supported by light industrial and limited residential uses. Residential uses are also located north of Parramatta Road, with wide streets and good connections to Harris Park and Parramatta CBD. Open spaces are present throughout the Precinct with FS Garside Park, Holroyd Sports Ground and the M4 Motorway regional cycleway. The existing Granville Town Centre is located south of the railway line, and is currently the core of activity. Access to the Town Centre is limited across the railway line.

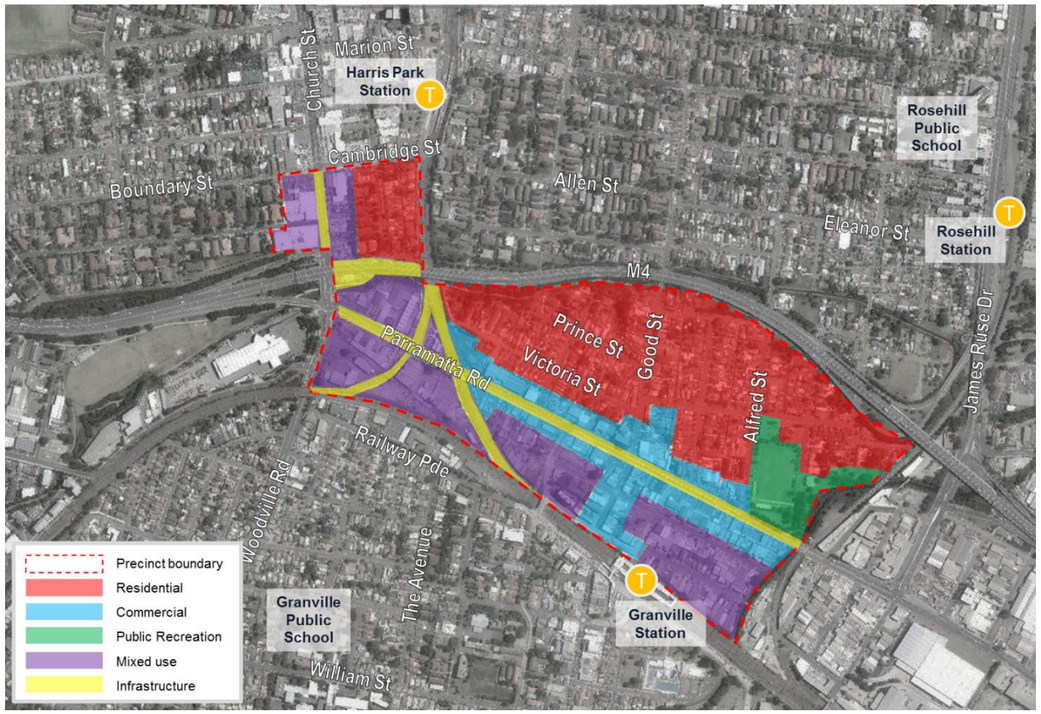

Figure 6: **Granville Precinct Boundary**
(Source: Holroyd LEP 2013 and Parramatta LEP 2011. Base map: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

The Granville Precinct is located within two local government areas (LGAs): the majority of the Precinct is located within the City of Parramatta while the western portion is located within the City of Holroyd. A review of the Parramatta Local Environmental Plan (LEP) 2011, Holroyd Local Environmental Plan (LEP) 2013 and aerial photography indicates that the majority of lots in the Granville Precinct are consistent with their specified land zones.

It is evident that the land surrounding the rail corridor is zoned primarily as Mixed Use and Local Centres. The Parramatta Road Corridor is zoned as an Enterprise Corridor, which is developed as caryards. The land north of Parramatta Road is currently developed as low to medium density residential properties.

2.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing road network

The existing road network in the Granville Precinct is illustrated in **Figure 7**, highlighting the key road connections, including the M4 Western Motorway and Parramatta Road. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of the current road function and operational roles.

Table 2 identifies some of the key roads within the Granville Precinct along with their classification based on both the Austroads functional system and Roads and Maritime's administrative system. Parramatta Road serves as the primary east-west arterial for the Precinct, with north-south connections to sub-arterial and collector roads. There are a number of roads that connect Parramatta Road to the north including Harris Park and Parramatta. Bold Street is the only connection to the southern sector of Granville across the Western Line (T1). Local roads only provide access and circulation to local areas within the Precinct.

Table 2: **Regional and state roads in the vicinity of the Granville Precinct (Source: AECOM, 2015)**

Road	Functional Classification	RMS Classification
Alfred Street	Collector	Local Road
Bold Street	Collector	Regional Road
Church Street / Woodville Road	Arterial	State Road
Good Street	Collector	Local Road
James Ruse Drive	Arterial	State Road
Parramatta Road	Arterial	State Road
Western Motorway (M4)	Motorway (Arterial)	State Road

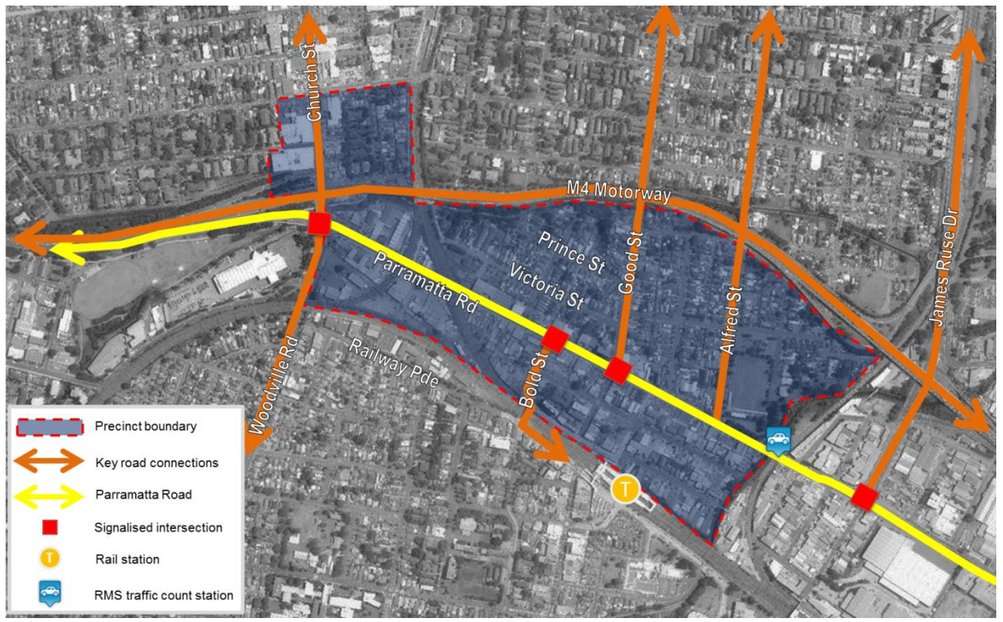

Figure 7: **Road network and major connections in the vicinity of the Granville Precinct**
(Source: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

Traffic volumes

Table 3 highlights the volumes from the permanent Roads and Maritime traffic count station located within the Granville Precinct in 2012. While there is only a single traffic count station present, it is considered an appropriate reference point as it is representative of the scale of traffic volumes on Parramatta Road within the Precinct. Based on the counter, Parramatta Road experiences two-way volumes over 50,000 vehicles per day. According to the Roads and Maritime Road Network Management Hierarchy, based on the given description of the road and speed limit, the section of the Parramatta Road running through Granville Precinct would be classified as a Class 5 Urban road (5U). Characteristics of a Class 5U road involve moderately high traffic volumes, including freight, public transport and commercial vehicle travel. (RMS Network and Corridor Planning, 2008).

Table 3: Traffic counting stations near the Granville Precinct (Source: RMS traffic counts, 2012)

Road Name	Station Description	Westbound*	Eastbound*	Total*
Parramatta Road	Between Alfred and Kemp Streets, Granville	25,800	26,000	51,800

*Weekday counts for 2012

Key intersections

Key intersections on Parramatta Road that are in close proximity to the Precinct are:

- Church Street / Woodville Road / M4 Motorway ramps
- Bold Street (main entry to Granville with road connection over railway)
- Good Street (one of the main entries to Harris Park and area north of M4 Motorway)
- James Ruse Drive / Berry Street (main north-south route which connects with M4 Motorway and Victoria Road across the Parramatta River, access to Clyde Station).

Constraints

The main road network constraints in and around the Precinct are due to a lack of permeability and connectivity due to the barrier of the rail line and a lack of north-south roads crossing Parramatta Road. The pinch-points of the road network include:

- Good Street, James Ruse Drive and Woodville Road along Parramatta Road
- At-grade level rail crossing of T6 Carlingford Line on Parramatta Road
- Limited vehicular crossing over the T1 Western Line (currently only at Bold Street)
- Limited vehicular connections across the M4 Motorway
- Limited vehicular connections across Parramatta Road.

Existing parking conditions

Parking conditions across the Granville Precinct are varied. Clearways are in operation along Parramatta Road during weekday peak hours. Time restricted on-street parking is concentrated in the mixed use and local centre areas. Unrestricted on-street parking is more commonly found north of Parramatta Road, throughout the residential areas. On-street parking conditions in key areas of Granville Precinct are:

- Town centre parking around Granville Station and the main street (South Street) with predominantly short stay parking (0.5/1P)
- Residential streets near Granville Station, with a combination of time restricted (2P) with residential permit-excepted and unrestricted parking. Streets further away from the station have no parking restrictions
- 142 commuter parking spaces around Granville Station.

It should be noted that Granville Station is currently listed under the Roads and Maritime *Schedule of Nominated Train Stations.* As a result, on-street parking is controlled by Roads and Maritime within a one kilometre radius of the station.

Public off-street parking within the Precinct includes a 60-space car council park provided on Cowper Street between Good Street and Rowell Street. New developments are required to provide off-street parking to service the anticipated demands of the proposed land use. A summary of off-street parking rates in the Granville Precinct is presented in **Table 4** and **Table 5**.

Table 4: Off-street parking rate summary – Parramatta LGA (Source: Parramatta DCP 2011)

Land use	Parking rate		
Dwelling	1 space per dwelling <125sqm; 2 spaces per dwelling >125sqm		
Residential flat buildings (within 400m of a railway station)	Studio	0.6 spaces per dwelling	Visitors: 0.25 spaces per dwelling.
	1 bedroom unit	1 space per dwelling	
	2 bedroom unit	1 space per dwelling	
	3+ bedroom unit	1.2 spaces per dwelling	
Residential flat buildings (NOT within 400m of a railway station)	1 bedroom unit	1 space per dwelling	Visitors: 0.25 spaces per dwelling.
	2 bedroom unit	1.25 space per dwelling	
	3+ bedroom unit	1.5 spaces per dwelling	
Business premises	Min: 1 space per 70sqm of GFA; Max: 1 space per 50sqm of GFA		
Retail	Min: 1 space per 60sqm of GFA; Max: 1 space per 30sqm of GFA		

Table 5: Off-street parking rate summary – Holroyd LGA (Source: Holroyd DCP 2013)

Land use	Parking rate		
Residential flat buildings	Studio	0.8 to 1 spaces per dwelling	Visitors: 0.2 to 0.5 spaces per dwelling.
	1 bedroom	1 to 1.5 space per dwelling	
	2 bedroom	1.2 to 2 space per dwelling	
	3 bedroom	1.2 to 2 spaces per dwelling	
	4+ bedroom	1.5 to 2 spaces per dwelling	
Business premises	Min: 1 space per 50sqm of GFA; Max: 1 space per 15sqm of GFA		
Retail	Min: 1 space per 50sqm of GFA; Max: 1 space per 15sqm of GFA		

Public transport provision

Public transport services are based around the Granville Station and Bus Interchange, including services to the north, west and south west. There are six bus routes provided in and around the Precinct which provide connections to the major centres to the north, south and east of the Precinct. The impact of this high concentration of public transport facilities is evident when comparing the train mode share of the Precinct to the wider LGA.

Rail services

Granville Station is located on the southern boundary of the Precinct. The station is located close to residential areas, therefore walking and cycling are the most common modes of transport to access the Station. Based on station barrier counts, Granville Station was ranked the 43rd busiest station on the Sydney Trains network, recording approximately 12,160 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014).

Granville Station is serviced by three lines: the T1 North Shore Line which connects the Precinct to the centres to the north east of the Precinct (e.g. Sydney CBD and Rhodes), the T1 Western Line which connects the Precinct to Inner West areas as far as Emu Plains and the T2 Inner West and South Line which provides a route to both the Sydney CBD and South West Sydney (**Figure 8**).

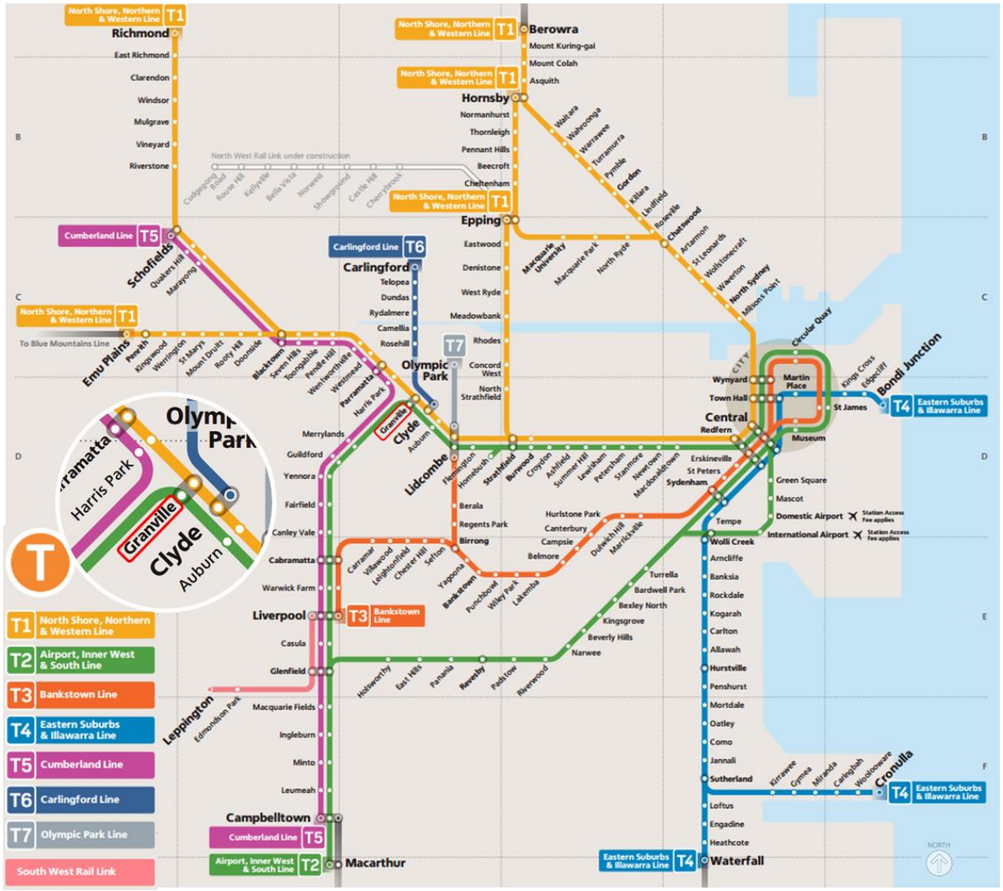

Figure 8: Location of Granville Station on the Sydney Trains network (Source: Sydney Trains, 2015)

The number of services provided at Granville Station during the AM and PM two-hour peak periods is shown in **Table 6**.

Table 6: Rail service frequencies at Granville Station (Source: Sydney Trains, 2015)

Services	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T1 North Shore Line		
Berowra to City via Gordon, Hornsby to City via Macquarie University	13	14
City to Berowra via Gordon, City to Hornsby via Macquarie University	8	8
T1 Western Line		
Emu Plains to City, Richmond to City	7	8
City to Emu Plains, City to Richmond	14	14
T2 Inner West & South Line		
City to Campbelltown via Granville	8	8
Campbelltown to City via Granville	14	9

Bus services

The Granville Precinct is currently serviced by six main bus routes, providing connections to major centres in South West Sydney, Parramatta, Hurstville and Bankstown.

Table 7 provides the peak hour frequencies for services accessible from the Granville Precinct. The frequencies for routes travelling to / from South West Sydney (such as Fairfield and Merrylands) are much less frequent when compared to other services. This is likely due to the presence of rail connections to this region via Granville Station and the T2 Inner West and South Line.

Table 7: Bus services in the vicinity of the Granville Precinct (Source: Transport NSW – Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
906	Fairfield to Parramatta via Guildford Station and Excelsior Street	30 minutes	60 minutes
907	Bankstown to Parramatta via Yagoona, Bass Hill, Villawood & Guildford	< 20 minutes	< 20 minutes
908	Bankstown to South Granville & Merrylands	60 minutes	60 minutes
909	Bankstown to Auburn & Parramatta	30 minutes	60 minutes
M91	Hurstville to Parramatta via Padstow, Bankstown & Chester Hill	10 minutes	10 minutes
M92	Sutherland to Parramatta via Bangor, Menai, Padstow, Bankstown, Lidcombe, Auburn & Rosehill	15 minutes	10 minutes

Figure 9 presents the bus routes in and around the Granville Precinct. Routes 906, 909 and M91 are all accessible within the Precinct with stops along Parramatta Road. Routes 906 and 909 also have stops along Good Street at the centre of the Granville Precinct residential area. These routes provide connectivity between Parramatta and other centres including Fairfield, Bankstown, Auburn, Hurstville and Sutherland.

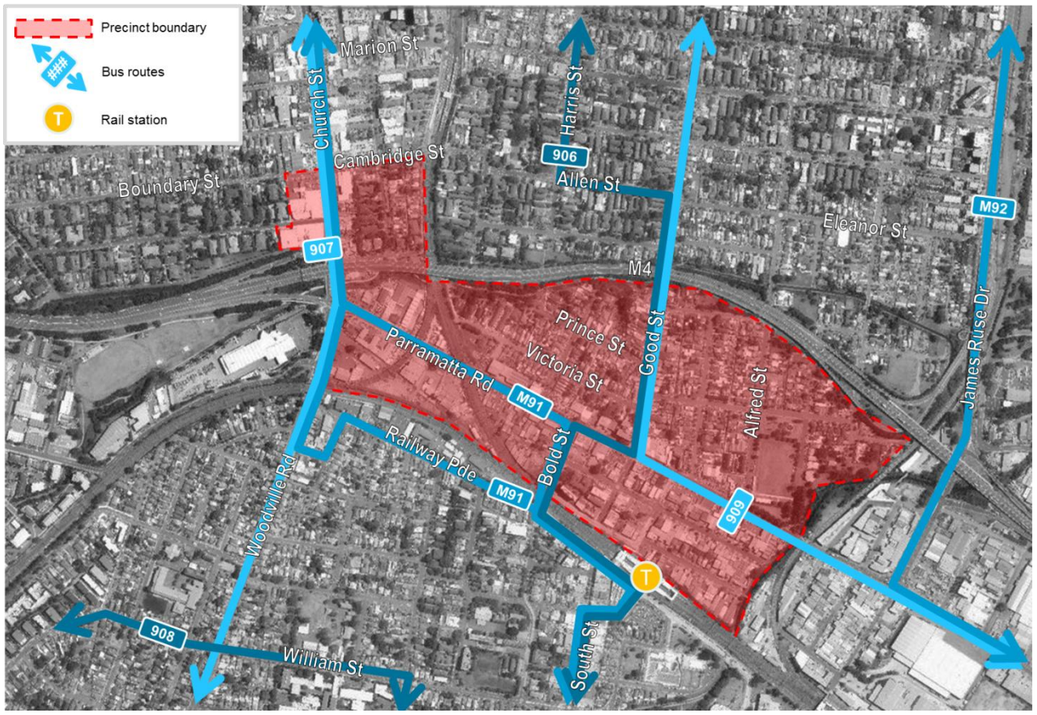

Figure 9: Bus services in the vicinity of Granville Precinct
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Active transport provision

The Precinct offers extensive connections for pedestrians, with paved footpaths provided on most roads. Accessibility across Parramatta Road is limited due to the presence of only two signalised crossings within 200 metres of each other (at Bold Street and Good Street intersections) across the 1.2 kilometre length of the Precinct. The primary movements within the Precinct can be attributed to pedestrians moving from residential areas in the north of the Precinct, towards the mixed use and public transport facilities near Parramatta Road and Granville Station.

The Granville Precinct contains extensive cycle facilities, including a shared off-road pedestrian and cycle paths along Parramatta Road and the Western Motorway (M4) off-road cycleway. These two cycle routes serve as the key east-west cycle connections for the Precinct. North-south cycleways crossing Parramatta Road are limited to one on-road cycleway on Good Street. This connection provides access from areas within the Precinct to Granville Station in the south. Formal bicycle storage facilities are currently provided at Granville Station, but are not present at Harris Park or Rosehill Station, north of the Precinct.

Active transport provision in the Precinct is illustrated in **Figure 10**, which highlights key attractors in the Precinct as well as features such as the key cycle routes and signalised pedestrian crossings along Parramatta Road.

Figure 10: Active transport facilities and desire lines in the vicinity of the Granville Precinct
(Source: NSW Land & Property Information – SixMaps modified by AECOM, 2015)

Travel patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 reveals that a comparable number of residents in the Granville Precinct work in the major centres of the Sydney Inner City, Parramatta and Merrylands - Guildford. Excluding the Sydney Inner City area, the main mode of transport to work is by car for all other destinations, with an overall mode share of 59 per cent. The high level of car dependency within the Precinct is considered to be attributed to the low frequency of bus routes and alternative transport modes servicing these destinations. This indicates that there is a need for improved public transport facilities and connections.

Table 8: Granville Precinct workforce travel destinations

Source: BTS Journey to Work – Travel Zones (1220, 1274)

Workforce destinations		Train	Bus	Car	Walked only	Other	Total^*
1	Sydney Inner City	143	0	31	0	0	174
2	Parramatta	30	14	102	22	0	168
3	Merrylands - Guildford	9	6	117	12	15	159
4	Auburn	18	0	57	0	4	79
5	Ryde - Hunters Hill	15	3	36	0	0	54
Other		131	3	301	3	18	456
Total		**346**	**26**	**644**	**37**	**37**	**1,090**
Mode share		32%	2%	59%	3%	3%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

The majority of workers in the Granville Precinct start their travel in the Merrylands-Guildford area. The top five places of residence of people working in the Granville Precinct are to its west. Similar to outbound trips, the majority of inbound trips to Granville are made by car with a mode share of 84 per cent. Only nine per cent of workers travel by train and less than 0.5 per cent of workers travel by bus, indicating that there is a lack of competitiveness of public transport services to private vehicle travel into the Granville Precinct. The high car mode share may also be a reflection of the nature of employment in Granville Precinct primarily outside of the core business hours when public transport is limited.

Table 9: Granville Precinct Employment Travel Origins

Source: BTS Journey to Work – Travel Zones (1220, 1274)

Employee origins		Train	Bus	Car	Walked only	Other	Total^*
1	Merrylands - Guildford	6	3	201	27	10	247
2	Parramatta	7	0	99	12	9	127
3	Fairfield	8	0	70	3	3	84
4	Blacktown	13	0	70	0	0	83
5	Penrith	0	0	78	0	0	78
Other		93	3	703	0	38	837
Total		**127**	**6**	**1221**	**42**	**60**	**1456**
Mode share		9%	0%	84%	3%	4%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

Table 10 shows the existing mode share for the Granville Precinct, Parramatta LGA and Holroyd LGA. It is evident that proximity to public transport infrastructure has a clear impact on mode share with the Precinct having both a higher public transport and lower private vehicle mode share compared to the individual LGAs. It is evident that while train is the preferred travel mode for the Precinct, bus mode share is lower in the Precinct than the LGAs. This may be attributed to commuters taking advantage of the convenient location of Granville Station just south of the Precinct, instead of opting to travel by bus. However, the data also suggests that there may be underlying deficiencies in facilities, routes and frequencies for bus services in the Precinct.

Active forms of transport were slightly lower for the Precinct than the average LGA mode shares, potentially due to pedestrian barriers such as limited crossing opportunities on Parramatta Road. The mode share for active transport is quite low, indicating that Granville Precinct is currently car dependent in terms of travel. However, it should be noted that the JTW data is based on the primary mode of travel used for each trip, indicating active transport mode shares may be underestimated due to people walking or cycling to their primary mode of rail travel.

Table 10 Granville Precinct: Mode share for the Precinct compared to Parramatta LGA and Holroyd LGA (2011)

Mode	Existing Granville Precinct mode share	Existing LGA mode shares	
		Parramatta LGA	Holroyd LGA
Vehicle driver	53%	61%	66%
Vehicle passenger	6%	5%	6%
Train	32%	22%	19%
Bus / Ferry / Tram	2%	5%	3%
Walked only	3%	4%	2%
Other mode	2%	1%	1%
Mode not stated	2%	2%	2%

Source: BTS Journey to Work – Travel Zones

2.3 FUTURE CHARACTER OF GRANVILLE PRECINCT

The Granville Precinct possesses great development potential, as it benefits from convenient access to heavy rail, with the entire Precinct located within 800 metres of either Granville or Harris Park Station. Granville Precinct is well positioned, located only two kilometres south of the Parramatta CBD and 22 kilometres west of the Sydney CBD. The planned improvements to the streetscape will encourage new development and create a live-work neighbourhood with access to major services, shops and employment. Future development will enable the Granville Precinct to transition towards achieving the vision for the Precinct.

The vision for the Granville Precinct is:

A vibrant mixed use town centre with a high quality public domain, open space networks and transport links, with close connections to Sydney's second CBD.

Future land use context

To achieve the vision for the Precinct, the following planning measures have been proposed as outlined in **Figure 11**:

- Transformation of the north side of Granville by creating a vibrant, high density, mixed use centre along Church Street (Auto Alley corridor) and areas between Parramatta Road and the Western Line, with a strong focus at Granville Station.
- A continuation of mixed use development along Church Street that supports the prosperity of the Parramatta CBD.
- Growth in the residential community north and south of Parramatta Road, through the introduction of medium-high density development.

Collectively, the proposed measures could have the following potential transport implications:

- Improvement to pedestrian and cycle connectivity is required as a result of the proposed development, with the plan aiming to address the divide of the railway line and Parramatta Road.
- Rail service frequencies may need to be increased, as the high density mixed use zone near Granville Station is likely to increase rail trips into and out of the Precinct.
- Changes in existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

Review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and service improvements to be delivered, as discussed in the Transport Plan. There upgrades not only address existing deficiencies but also cater for future growth of the Granville Precinct. The proposed transport improvements are expected to reduce dependency on private vehicles and also provide alternative transport options for future residents and employees of Granville Precinct.

Figure 11 Granville Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Granville Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 13**. These identified opportunities and constraints serve as the basis for the strategic transport framework for Granville Precinct.

In addition to the identified issues, the WestConnex project currently in progress is expected to impact on the existing traffic conditions in each Precinct, including Granville. The modelling undertaken as part of the WestConnex M4 Widening EIS Traffic and Transport Working Paper (2014) assessed the anticipated impacts of the M4 Widening on nearby intersections in 2021. In Granville, the paper outlined that the modelling outputs based on the projected morning peak demands associated with the M4 Widening scenario, indicate deteriorating performance at the Parramatta Road intersections due to increased traffic volumes. This can be explained by road users seeking to use Parramatta Road as an alternative to the tolled M4 Motorway.

Similarly in the evening peak, the forecast demand indicates an increase in traffic along Parramatta Road, including the intersections of Parramatta Road/Good Street and Parramatta Road/Bold Street. Modelling of these intersections indicates improved performance at the Parramatta Road/Bold Street intersection offset by the deteriorating performance at the neighbouring Parramatta Road/Good Street intersection. The paper also stated that under the Full WestConnex scenario the trip time from Church Street in the western end of the Precinct to Homebush Bay Drive (outside of the Precinct) reduces substantially, which demonstrates that travel time savings are achieved by the M4 Widening in the long term.

2.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Granville Precinct's Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example of where urban renewal has occurred and comparing it to the characteristics of the proposed Granville Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Granville Precinct.

This assessment enables the identification of infrastructure needs for the Granville Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Granville has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar Precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Granville Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW, Parramatta Council and Holroyd Council for their feedback. This helped to inform the selection of the Sydney suburb of **Rhodes** as an ideal benchmark Precinct for what the future Granville Precinct might look like.

Characteristics that Rhodes shares with the future Granville Precinct include:

- Its functional nature and role within Sydney. Like Granville, Rhodes is a centrally located suburb within Sydney, with a similar travel time to the Sydney CBD.
- Rhodes has seen recent growth in mixed use, commercial and residential development to a similar extent to what might be expected from the future Granville Precinct.
- It is relatively similar in size to the proposed scale of the future Granville development.
- Rhodes is located on a rail corridor, with Rhodes Station providing a similar function to the future role of Granville Station as a focal point for the suburb.
- Rhodes is transected by strategic road corridors (Concord Road / Homebush Bay Drive) reflecting the nature of Granville (Parramatta Road, M4 Motorway, James Ruse Drive, Church Street), in terms of possessing a significant strategic road network.
- Concord Road and Homebush Bay Drive are heavily trafficked and act to divide the area, in a similar fashion to Parramatta Road within Granville Precinct.
- Rhodes has good public transport connections in all directions, including its location on the rail network as well as relatively frequent peak hour bus services.
- Existing active transport infrastructure connects to adjacent suburbs through leisure routes, and further opportunities exist to enhance these connections.

A review of Rhodes is described further in **Figure 13** that identifies the success and improvements identified for Rhodes that would be useful for establishing transport directions for the Granville Precinct.

Figure 12 Rhodes Streetscapes (Source: AECOM, 2015)

a) Granville Precinct Opportunities and Constraints

Significant Opportunities

O1 – Enhancing north-south connections to increase accessibility of employment, recreation and cultural opportunities in Parramatta CBD

O2 – Creating a series of new laneways and through links between Parramatta Road and the railway line to increase the permeability of long blocks.

O3 – Enhancing pedestrian connectivity and safety across Parramatta Road and over the Granville Railway line

O4 – Improving active transport connections to regional recreation and open space facilities

O5 – Reducing car dependency by lowering parking rates in areas with good access to public transport.

Primary Constraints

C1 – High traffic volumes on the strategic road network

C2 – Overcoming vehicular access barriers created by major roads and the railway line

C3 – Pedestrian permeability, particularly across major road and rail corridors

C4 – Existing small lot sizes and land fragmentation may limit desired through-site links

C5 – Addressing deficiency and access to open space within the Precinct

C6 – Critical linkages not well serviced by train.

b) Case Study: Rhodes

Success of Rhodes

- Rhodes has a relatively high public transport mode share for residents as it has strong connections via rail, bus and ferry
- It has strong connectivity to open space, particularly at the periphery and adjacent to the Parramatta River on all sides of the development
- Having dense residential development around a strong public transport network has enabled Rhodes to support a culture of outdoor living, cafes and services to give a strong community feel
- The central location of Rhodes has enabled it to support a demographic of young professionals who are able to commute easily and efficiently to their places of work, whether that be Parramatta of the Sydney CBD which can both be reached in under 30 minutes.

Potential Further Opportunities for Rhodes

- Enhancing active travel across the rail line in a north south direction along the eastern side of the rail line and across the Homebush Bay Bridge to Wentworth Point
- Improving commercial / retail and mixed use density around the railway station to provide transit oriented development
- Creating new public transport links to neighbouring suburbs separated by the Parramatta River such as Wentworth Point via the Homebush Bay Bridge and enabling a circular bus route connecting to key neighbouring locations
- Initiatives to reduce traffic around pinch points, particularly around the existing commercial / retail precinct
- Refocusing future shopping centres and mixed use development closer to Rhodes Station.

c) Strategic Transport Framework for the Granville Precinct

	Opportunities and constraints addressed
D1 – Leverage and focus on existing public transport infrastructure such as Granville Station and Bus Interchange to minimise car mode share	*O5, C1*
D2 – Improve public transport services and enhance priority for public transport (physical segregation and intersection priority)	*O5, C6*
D3 – Improve pedestrian and cyclist infrastructure across the Precinct with a focus on connecting to the rail stations and active travel network outside the Precinct	*O3, O4, C2, C5*
D4 – Revising the street network to calm traffic around town centre and minimise vehicle circulation	*O2, C4*
D5 – Increase north-south links for all modes of transport, particularly across the railway line and Parramatta Road	*O1, O3, C2, C3*
D6 – Reduce the need for on-site parking for new developments near public transport nodes and locate parking away from active surface routes (preferably underground)	*O5*
D7 – Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians	*O3, C1*
D8 – Improve / enhance connections to Parramatta via rail, bus, walking and cycling modes.	*O1*

d) Transport Infrastructure and Service Improvements

- Intersection upgrades or road capacity enhancements
- Street extensions and connections.
- Provision of active transport facilities and streetscape improvements
- Improve public transport services provision and bus priority measures
- New public transport infrastructure (e.g. Light Rail or Rapid Transit)
- Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 13 Granville Precinct Transport Plan Framework (Source: AECOM, 2015)

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired land use and transport planning outcomes.

2.5 FUTURE TRANSPORT PROVISION FOR GRANVILLE PRECINCT

Precinct strategic transport framework

The strategic transport framework for the Granville Precinct is presented in **Figure 13**. The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure and service improvements

In the future Granville Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government, Parramatta Council and Holroyd Council, during policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Granville Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

The directions have been addressed with the following improvements, shown schematically in Figure 14 and summarised in **Table 11**.

Table 11 Granville Precinct: Transport Infrastructure and Service improvements

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Intersection Upgrades or road capacity enhancements						
G1	✓			Pinch-point works to improve traffic efficiency – Road and traffic management investigations/improvements at Parramatta Road / Woodville Road / M4 westbound on-ramp / Church Street.	S	D5, D7
G2	✓			Pinch-point works to improve traffic efficiency – duplication of eastbound right turn bay into Bold Street.	S	D5, D7
G3	✓			Pinch-point works to improve traffic efficiency – construction of additional third right turn into James Ruse Drive.	S	D5, D7
G4	✓		✓	Investigation to appropriately resolve safety / operational concerns at the Cowper Street / Bold Street intersection.	S	D3, D4, D5, D7
Street extensions and connections						
G5*	✓		✓	Investigate new north-south street connection extending Alfred Street from Parramatta Road to East Street inclusive of new traffic lights at Parramatta Road / Alfred Street.	S	D3, D4, D5, D7
G6	✓		✓	Investigate extension of Bold Street north of Parramatta Road to Victoria Street.	M-L	D3, D4, D5, D7, D8
Provision of active transport facilities and streetscape improvements						
G7*			✓	Upgrade to general streetscape and north-south connections along part of Good Street and Bridge Street to connect to Parramatta River and Parramatta CBD.	S	D3, D5, D7, D8
G8			✓	Improvement of Parramatta to Bankstown Primary north-south regional cycleway via Granville (across Railway Line and Parramatta Road) at Bold Street.	M-L	D3, D5, D7
G9			✓	Provision of cycle lockers at the northern side of Granville Station.	S	D1, D3
G10*			✓	Public domain improvements along Parramatta Road from the Y-link to Duck Creek.	S	D3, D5, D7
Improve public transport service provision and bus priority measures						
G11		✓		Investigate bus priority measures along Parramatta Road.	M	D2, D7, D8
G12		✓		Investigate new suburban bus route from Parramatta to Burwood along Parramatta Road.	M	D2, D7, D8
New public transport infrastructure						
G13		✓		Potential introduction of the Parramatta to Strathfield Light Rail line (as part of the Western Sydney Light Rail Network)	M	D2, D7, D8
G14		✓		Delivery of Rouse Hill to Hurstville Rapid Transit via Parramatta	M	D2, D7, D8

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Granville | Transport Improvements

ID	Potential Improvements
G1	Pinch-point works to improve traffic efficiency – Road and traffic management investigations/improvements at Parramatta Road / Woodville Road / M4 westbound on-ramp / Church Street.
G2	Pinch-point works to improve traffic efficiency – duplication of eastbound right turn bay into Bold Street.
G3	Pinch-point works to improve traffic efficiency – construction of additional third right turn into James Ruse Drive.
G4	Investigation to appropriately resolve safety / operational concerns at the Cowper Street / Bold Street intersection.
G5 *	Investigate new north-south street connection extending Alfred Street from Parramatta Road to East Street, inclusive of new traffic lights at Parramatta Road/Alfred street.
G6	Investigate extension of Bold Street north of Parramatta Road to Victoria Street.
G7 *	Upgrade to general streetscape and north-south connections along part of Good Street and Bridge Street to connect to Parramatta River and Parramatta CBD.
G8	Improvement of Parramatta to Bankstown Primary north-south regional cycleway via Granville (across Railway Line and Parramatta Road), at Bold Street.
G9	Provision of cycle lockers at the northern side of Granville Station.
G10 *	Public domain improvements along Parramatta Road from the Y-rail link to Duck Creek.
G11	Investigate bus priority measures along Parramatta Road.
G12	Investigate new suburban bus route from Parramatta to Burwood along Parramatta Road.
G13 ^	Potential introduction of the Parramatta to Strathfield Light Rail line (as part of the Western Sydney Light Rail Network)
G14 ^	Delivery of Rouse Hill to Hurstville Rapid Transit via Parramatta

Legend			
	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Approximate Location of Future Bus Stop		

^ Routes shown are indicative & final alignments are subject to further investigation.

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

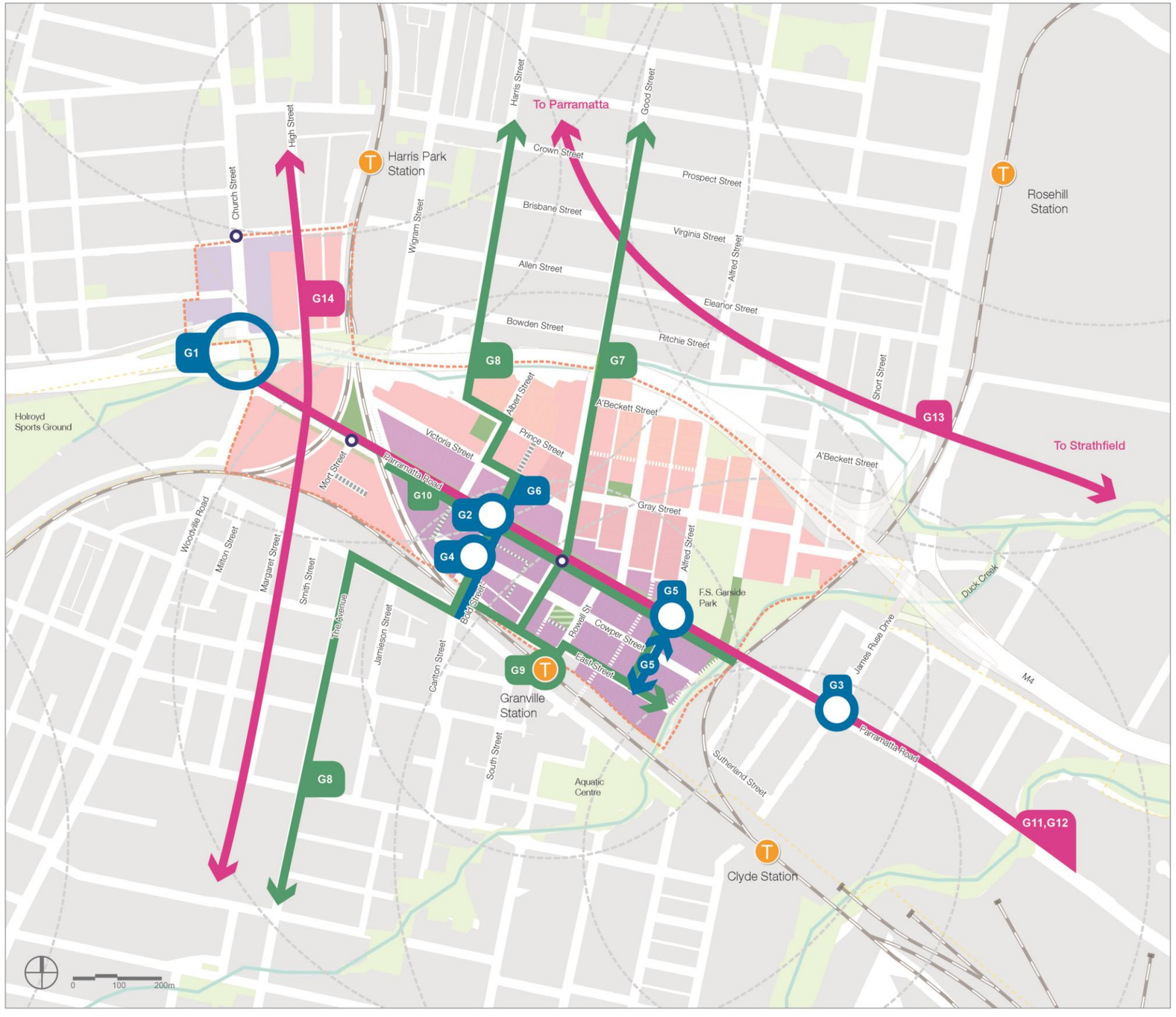

Figure 14 Granville Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure, whereby developments are permitted to provide a lower rate of on-site parking close to public transport, while developments further away would need to provide a higher rate of parking provision. This approach has been adopted by Parramatta City Council which has separate parking rates for development within 400m of a rail station. In contrast, Holroyd Council provides parking rates with no consideration for the distance from public transport nodes. However, unlike Parramatta City Council, Holroyd Council sets maximum rates for residential units as a method to reduce excessive off-street parking provision.

The proposed parking rates for the Granville Precinct consider elements of both the Parramatta DCP and Holroyd DCP, adopting an approach which considers the radial distance to a rail station and provides maximum parking rates, as opposed to minimums. Due to their proximity to rail stations, residents and workers within these zones are more likely to use public transport. Based on the accessibility, density and mix of land uses proposed for Granville Precinct and considering that the entire Precinct lies within 800 metres of a train station, it is considered appropriate that the existing parking rates be scaled down to encourage mode shifts to non-vehicular travel and reduce vehicular impacts on surrounding road network. The 400m and 800m walking catchments for Harris Park Station and Granville Station are illustrated in **Figure 15**.

The proposed parking rates for the Granville Precinct are outlined in **Table 12** and **Table 13.** The refined parking rates attempt to address Precinct Transport Direction 'D6' outlined in, by reducing parking availability and thereby reducing parking.

While the goal of the reformed parking rates is to reduce car dependency for short trips, with an existing vehicle ownership of 1.3 vehicles per household[3], the reduced off-street parking rates may have implications on the Precinct in the short term. To minimise these impacts, decoupled parking is proposed along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

[3] ABS Census, 2011

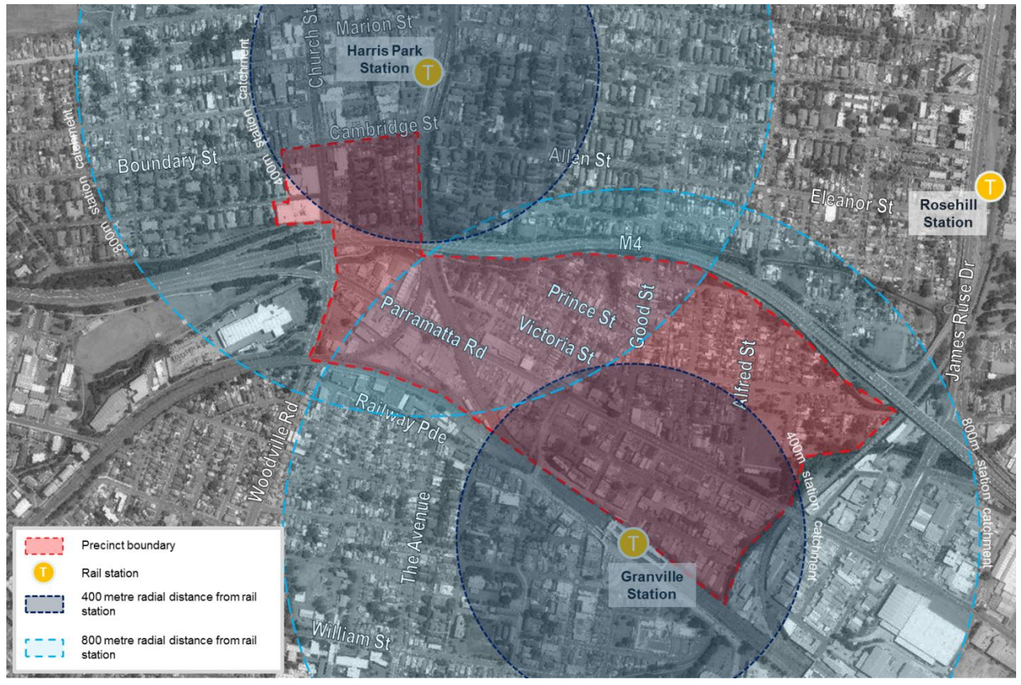

Figure 15 Granville Precinct: Station catchments
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Table 12 Proposed parking rates within 400m of a rail station (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom		
	3+ bedroom		
Business premises	1 space per 70sqm of GFA		
Retail	1 space per 60sqm of GFA		

Table 13 Proposed parking rates NOT within 400m from a rail station (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1.2 spaces per dwelling	
Business premises	1 space per 50sqm of GFA		
Retail	1 space per 50sqm of GFA		

3. Auburn

3.1 EXISTING LAND USE

The Auburn Precinct is located east of the Granville Precinct, bounded by the T1 Western rail line, T2 Inner West and South rail line and the M4 Western Motorway. Auburn Station is located 100 metres south of the southern border of the Precinct and provides convenient access to rail services to Sydney CBD for nearby residents. North of the railway line and south of Parramatta Road is primarily comprised of residential dwellings. The Precinct also contains a large number of industrial developments and bulky goods retailers such as furniture stores and wholesalers. The Auburn Precinct boundary is outlined in **Figure 16**.

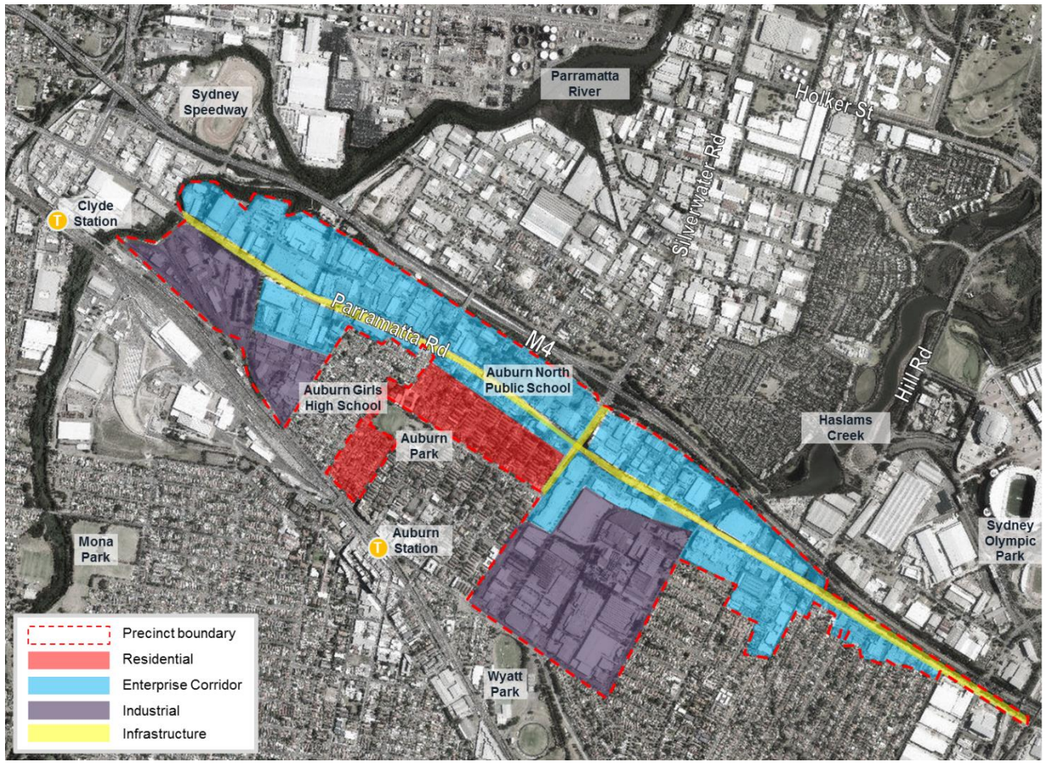

Figure 16 Auburn Precinct Boundary
(Source: Auburn LEP 2010. Base map: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

The Auburn Precinct is located within the City of Auburn local government area (LGA). A review of the Auburn Local Environmental Plan (LEP) 2010 and aerial photography indicates that the majority of lots in the Auburn Precinct are consistent with their designated land use zones. It is evident that the core of the Precinct contains a general industrial zone surrounded by residential, commercial and public recreation zones. The land adjacent to Parramatta Road is zoned as an Enterprise Corridor containing primarily bulky goods retailers and offices.

3.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing Road Network

The existing road network in the Auburn Precinct is illustrated in **Figure 17**, highlighting the key road connections including the Western Motorway (M4), Silverwater Road and Parramatta Road. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of the current road function and operational roles.

Table 14 identifies some of the key roads within the Auburn Precinct along with their classification based on both the Austroads functional system and Roads and Maritime's administrative system. Parramatta Road serves as the primary east-west arterial corridor for the Precinct, with north-south connections to sub-arterial and collector roads. There are a number of roads that connects Parramatta Road north past the M4, including Silverwater Road and Stubbs Street. Local roads only provide access and circulation to local areas within the Precinct.

Table 14 Key roads in the vicinity of the Auburn Precinct (Source: AECOM, 2015)

Road	Functional Classification	RMS Classification
Hill Road	Collector	Regional Road
Parramatta Road	Arterial	State Road
Rawson Street	Collector	Regional Road
Silverwater Road / St Hilliers Road	Arterial	State Road
Station Road	Collector	Local Road
Stubbs Street	Collector	Local Road
Western Motorway (M4)	Motorway (Arterial)	State Road

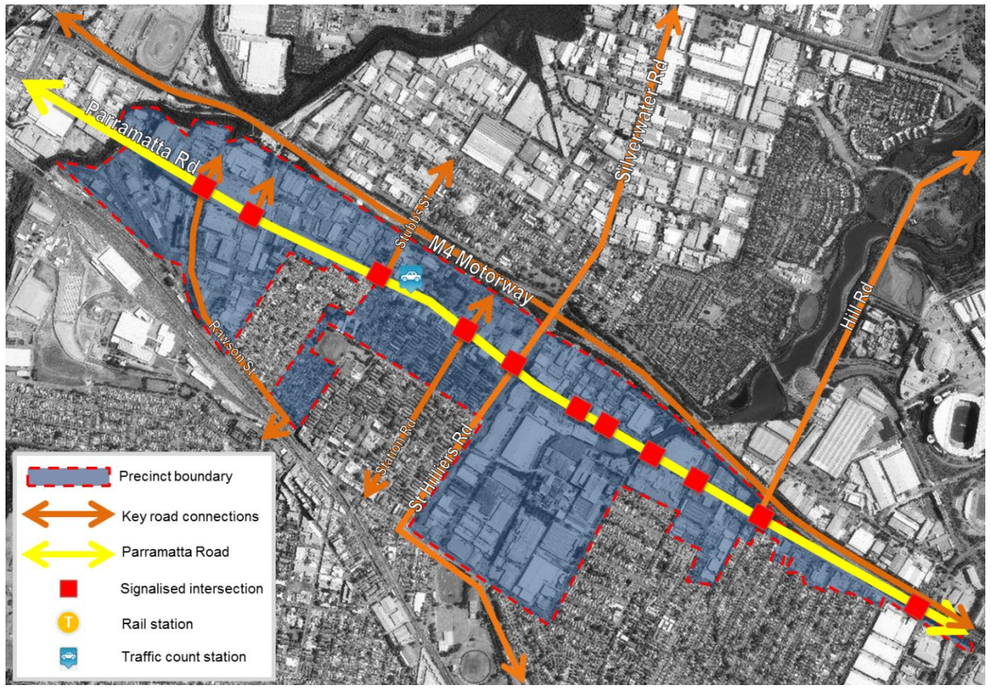

Figure 17 Road network and major connections in the vicinity of the Auburn Precinct
(Source: NSW Land & Property Information – SixMaps modified by AECOM, 2015)

Traffic volumes

The Roads and Maritime Services *Traffic Corridor Planning for Parramatta Road Corridor - Granville to North Strathfield* report provides volumes for Parramatta Road within the Precinct based on traffic counts in 2011. **Table 15** highlights the volumes experienced on Parramatta Road of over 25,000 vehicles per day. According to the Roads and Maritime Road Network Management Hierarchy, based on the given description of the road and speed limit, the section of the Parramatta Road would be classified as a Class 4 Urban road (4U). Characteristics of a Class 4U road involve moderately high traffic volumes, including freight, public transport and commercial vehicle travel (RMS Network and Corridor Planning, 2008).

Table 15 Traffic counting stations near the Auburn Precinct (Source: RMS, 2011)

Road Name	Station Description	Westbound	Eastbound	Total
Parramatta Road^	West of Macquarie Road, Auburn	-	-	28,000

^2011 AADT counts from Roads and Maritime Services Traffic Corridor Planning for Parramatta Road Corridor - Granville to North Strathfield

Key Intersections

Key intersections on Parramatta Road that are in close proximity to the Precinct are:

- Parramatta Road / Duck Street / Rawson Street, connecting Parramatta Road with Auburn Railway Station and areas south of western railway line.
- Parramatta Road / Newton Street / Hampstead Road, providing access to Rawson Street and Auburn Railway Station.
- Parramatta Road / Stubbs Street / Braemar Avenue, connecting to Silverwater to the north and Auburn Girls High School, Auburn Park and indirect access to Auburn Railway Station to the south.
- Parramatta Road / Station Road, providing one of the main accesses to Rawson Street and Auburn Railway Station with overpass across railway line.
- Parramatta Road / Silverwater Road is state route A6 which provides a major north-south route with connections across Parramatta River and the railway line with interchange at the M4 Motorway and access to Lidcombe Railway Station.
- Parramatta Road / Hill Road / Bombay Street, connecting Wentworth Point, Sydney Olympic Park and residential areas of Lidcombe.

Constraints

The main road network constraints in the Precinct are due to a lack of permeability and connectivity due to the barrier of the rail line south of the Precinct and a lack of north-south roads crossing Parramatta Road. The key constraints of the road network include:

- Limited access to Silverwater Road from Parramatta Road, with access currently via Stubbs Street only.
- Limited access to the growth areas of Sydney Olympic Park and Wentworth Point, creating pinch points at Hill Road and Birnie Avenue.
- Parramatta Road / Silverwater Road, with limited movements and being in proximity to the M4 Motorway interchange as well as the intersection of two state roads, is often congested.
- Conflicts between local traffic and commercial traffic servicing local trades and businesses.

Existing parking conditions

Parking conditions across Auburn Precinct are varied. Clearways are in operation along Parramatta Road during weekday peak hours. Limited on-street parking is permitted along Parramatta Road, near bulky goods retailers during off-peak periods or on weekends. The Precinct provides unrestricted on-street parking on either side of most local roads within the Precinct. Time restricted on-street parking is present along Northumberland Road and Station Road near Auburn Station with time restrictions of 1P and 2P. On-street parking within the Auburn Precinct includes:

- Unrestricted parking on most local streets.
- 2P parking on Northumberland Road between Rawson Street and Hall Street.
- 1P parking on Station Road, closer to its intersection with Rawson Street.

There are no publicly operated off-street parking facilities provided within the Precinct. However a number of privately operated off-street car parks are present. New developments are required to provide off-street parking to service the anticipated demands of the proposed land use. A summary of off-street parking rates in the Auburn Precinct based on the Auburn DCP 2013 is presented in **Table 16** and **Table 17**.

Table 16 Off-street parking rate summary outside of 1km of Auburn Station – Auburn LGA (Source: Auburn DCP 2013)

Land use	Parking rate		
Residential flat buildings	1 bedroom unit	1 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom unit	1 space per dwelling	
	3+ bedroom unit	2 spaces per dwelling	
Business premises	2.5 space per 100 sqm of GFA		
Retail	2.5 space per 100 sqm of GFA		

Table 17 Off-street parking rate summary within 1km of Auburn Station – Auburn LGA (Source: Auburn DCP 2013)

Land use	Minimum parking rate		
Residential flat buildings	1 bedroom unit	1 space per dwelling	Visitors: 0.1 to 0.25 spaces per dwelling.
	2 bedroom unit	1.2 to 3 space per dwelling	
	3+ bedroom unit	1.5 to 6 spaces per dwelling	
Business premises	1.7 to 10 spaces per 100 sqm of GFA		
Retail	1.7 to 10 spaces per 100 sqm of GFA		

Public Transport Provision

Public transport services are based around the Auburn Station, including services connecting the Precinct to centres such as the Sydney CBD, Macquarie Park, Hornsby and Liverpool. There are also four bus services travelling in and around the Precinct. The impact of the nearby train station is evident when comparing the public transport mode shares of the Precinct to the wider LGA.

Rail services

Auburn Station is located approximately 100 metres from the southern boundary of the Precinct, in an area comprised of primarily residential and mixed use land uses. Based on station barrier counts Auburn Station was ranked the 22nd busiest station on the Sydney Trains network recording approximately 21,120 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014).

Auburn Station is serviced by three lines: the T1 North Shore Line which connects the Precinct to the centres to the north east of the Precinct (e.g. Sydney CBD and Rhodes), the T1 Western Line which connects the Precinct to inner west areas as far as Emu Plains and the T2 Inner West and South Line which provides a route to both the Sydney CBD and south-west Sydney (**Figure 18**).

The number of services provided at Auburn Station during the AM and PM two-hour peak periods is shown in **Table 18**.

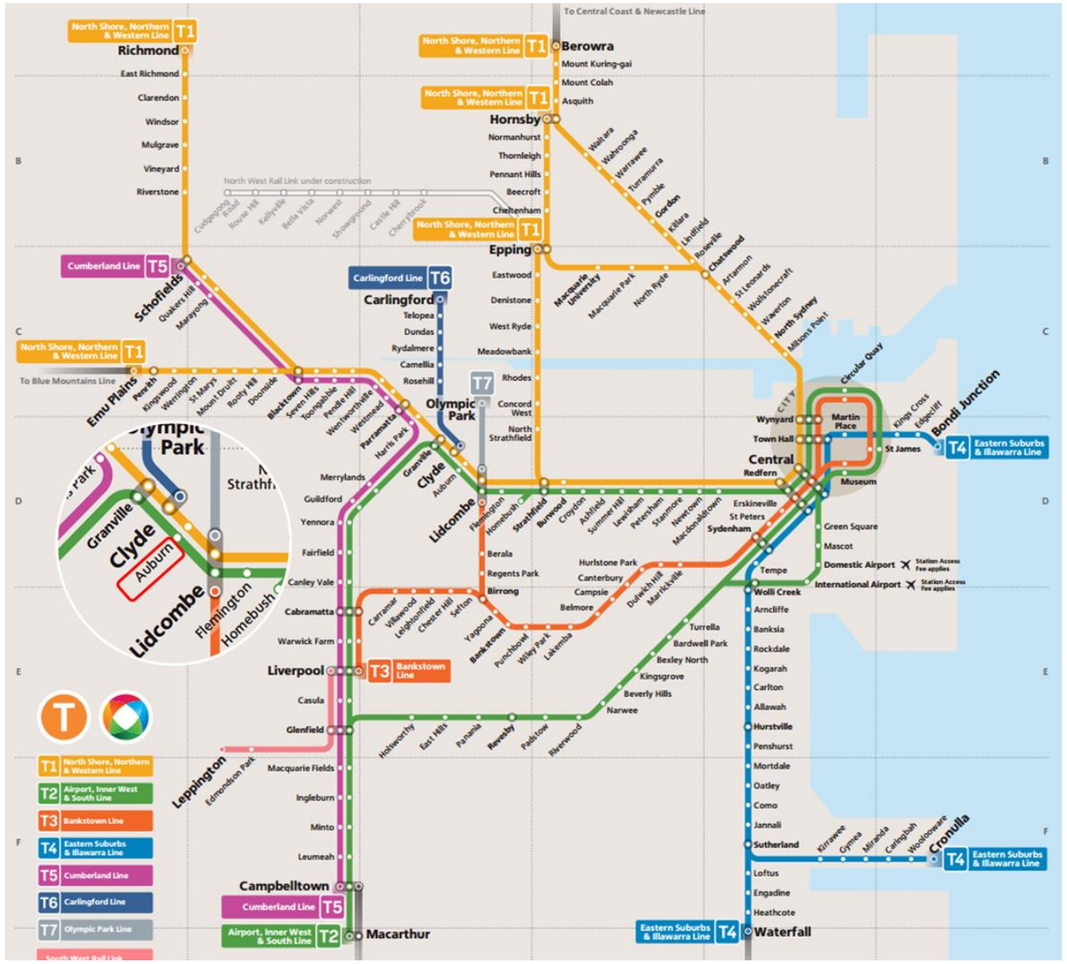

Figure 18 Location of Auburn Station on the Sydney Trains network (Source: Sydney Trains, 2015)

Table 18 Rail service frequencies at Auburn Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T1 North Shore Line		
Berowra to City via Gordon, Hornsby to City via Macquarie University	9	8
City to Berowra via Gordon, City to Hornsby via Macquarie University	7	8
T1 Western Line		
Emu Plains to City, Richmond to City	7	8
City to Emu Plains, City to Richmond	9	8
T2 Inner West & South Line		
Campbelltown to City via Granville	14	8
City to Campbelltown via Granville	8	10

Bus services

The Auburn Precinct is currently serviced by four bus routes connecting to major centres such as Parramatta, Bankstown, and Macquarie Park. **Table 19** provides the peak hour frequencies for services accessible from the Auburn Precinct. It is evident that bus services in Auburn Precinct provide strong connectivity to Parramatta.

Table 19 Bus services in the vicinity of the Auburn Precinct (Source: Transport NSW – Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak frequency (07:00-09:00)	PM Weekday Peak frequency (16:00-18:00)
909	Bankstown to Auburn & Parramatta	30 minutes	30 minutes
M92	Sutherland to Parramatta	10 minutes	10 minutes
540, 544	Auburn to Newington and Macquarie Centre	15 minutes	< 30 minutes

Figure 19 presents the bus routes in and around the Auburn Precinct. Bus routes are accessible from stops on key roads in the Precinct including Parramatta Road, Station Road and Northumberland Road.

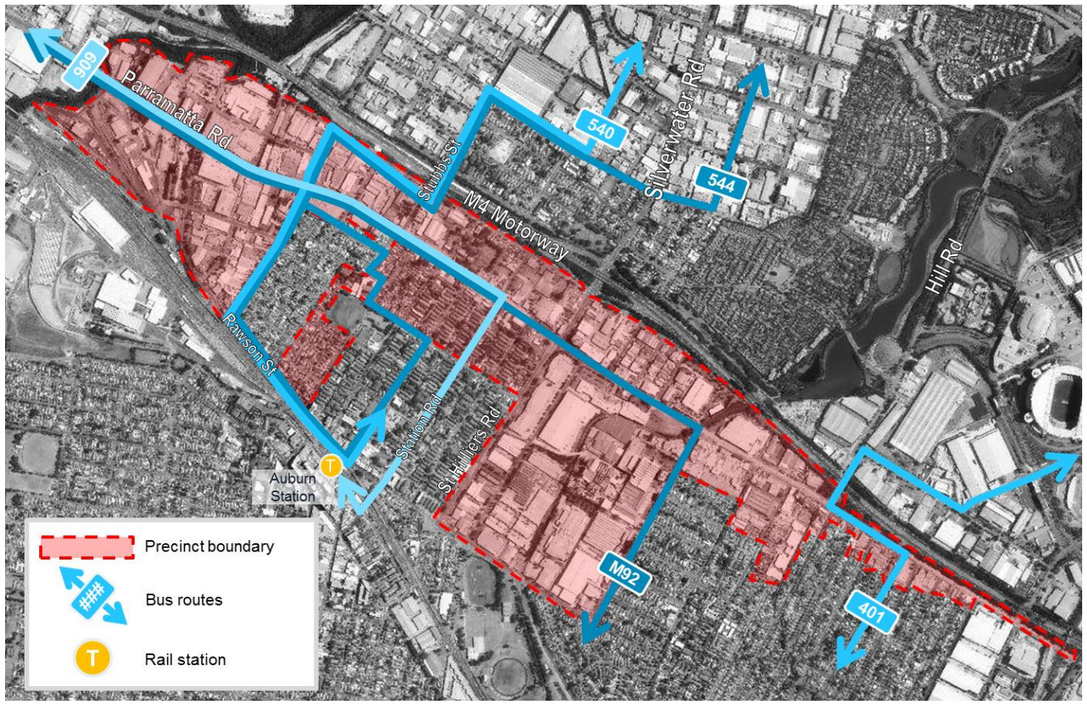

Figure 19 Bus services in the vicinity of the Auburn Precinct
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Active transport provisions

The Precinct offers extensive connections for pedestrians, with paved footpaths provided on either side of most roads and signalised pedestrian crossings are present along several intersections on Parramatta Road. The primary pedestrian movements within the Precinct can be attributed to pedestrians moving from residential areas south of the Precinct, towards retailers, industrial facilities and bus stops near Parramatta Road. Cycle facilities in the Precinct are limited, with minimal east-west routes through the Precinct, which forms a significant constraint to active transport connectivity. However, off-road cycle links are provided north-east of the Precinct near Sydney Olympic Park and north-west of the Precinct along the M4 Motorway viaduct.

Active transport provision in the Precinct is illustrated in **Figure 20**, which highlights key attractors in the Precinct as well as features such as the key cycle routes in the Precinct and signalised pedestrian crossings along Parramatta Road.

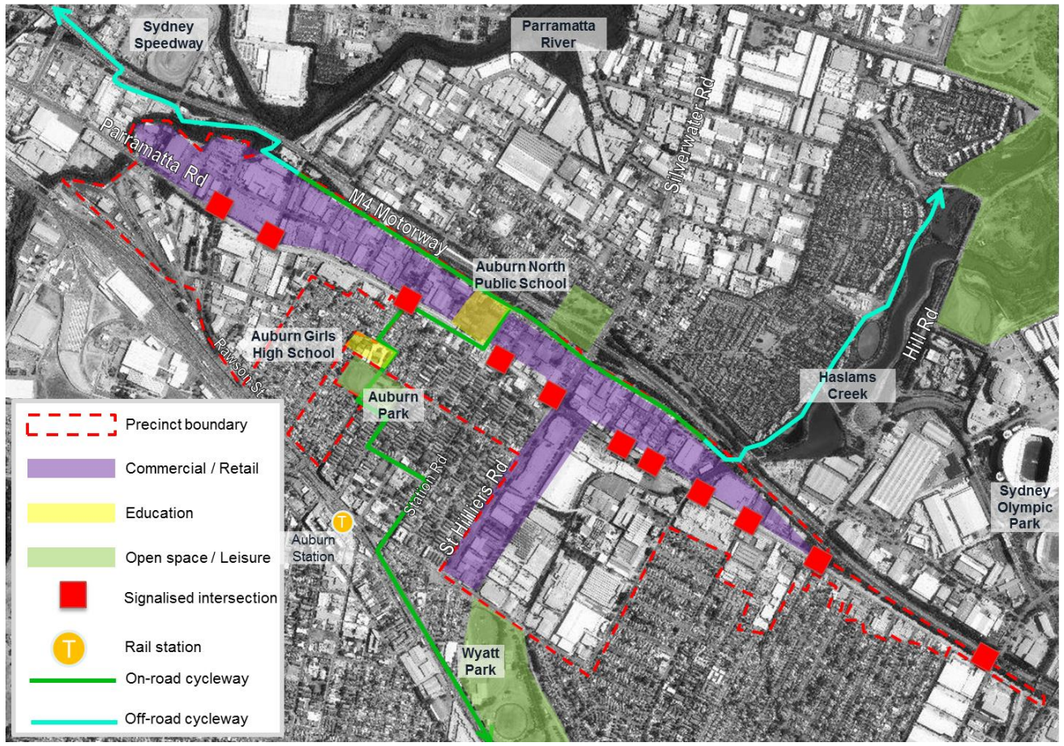

Figure 20 Active transport facilities and desire lines in the vicinity of the Auburn Precinct
(Source: NSW Land & Property Information – SixMaps modified by AECOM, 2015)

Travel Patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 reveals that a comparable number of residents in the Auburn Precinct work in the major centres of Auburn (south of the Precinct) and Sydney Inner City. Excluding the Sydney Inner City area, the main mode of transport to work is by car for all other destinations, with an overall mode share of 52 per cent. The high level of car dependency within the Precinct is considered to be attributed to deficiencies in public transport facilities or connections.

Table 20 **Auburn Precinct workforce travel destinations**
Source: BTS Journey to Work – Travel Zones (1303, 1304)

Workforce destinations		Train	Bus	Car	Walked only	Other	Total^*
1	Auburn	28	7	150	60	33	278
2	Sydney Inner City	178	0	35	4	10	228
3	Parramatta	27	3	55	0	6	91
4	Strathfield - Burwood - Ashfield	26	0	53	0	0	79
5	Bankstown	8	3	57	0	3	71
Other		220	5	360	7	32	624
Total		**487**	**18**	**710**	**71**	**84**	**1371**
Mode share		36%	1%	52%	5%	6%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

The majority of workers in the Auburn Precinct start their travel in the Auburn area (south of the Precinct). The top five places of residence of people working in the Precinct are west of Sydney. Similar to outbound trips, the majority of inbound trips to Auburn Precinct are made by car with a mode share of 76 per cent. Only 11 per cent of workers travel by train and one per cent of workers travel by bus, indicating that there is a lack of competitiveness of public transport services to private vehicle travel into the Auburn Precinct.

Table 21 **Auburn Precinct Employment Travel Origins**
Source: BTS Journey to Work – Travel Zones (1303, 1304)

Employee origins		Train	Bus	Car	Walked only	Other	Total^*
1	Auburn	8	4	92	23	28	155
2	Merrylands - Guildford	14	0	42	0	6	62
3	Bankstown	0	0	43	3	0	46
4	Parramatta	5	3	27	0	3	38
5	Fairfield	3	0	26	0	0	29
Other		32	0	214	0	12	258
Total		**62**	**7**	**443**	**26**	**48**	**586**
Mode share		11%	1%	76%	4%	8%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

Table 22 shows the existing mode share for the Auburn Precinct and the Auburn LGA. It is evident that proximity to public transport infrastructure has an impact on mode share with the Precinct having both a higher public transport and lower private vehicle mode share compared to the LGA. It is evident that while train travel is the preferred mode for the Precinct, with a mode share higher than the overall LGA, bus mode share is low and consistent with the LGA at one per cent. This may be attributed to commuters taking advantage of the convenient location of Auburn Station south of the Precinct, instead of opting to travel by bus. However, the data suggests that there may be underlying deficiencies in facilities, routes or frequencies for bus services in the Precinct.

Active forms of transport were slightly higher for the Precinct than the average LGA mode share, potentially due to the level of footpath and crossing provision for the Precinct. However, the mode share for active transport is quite low when compared to private vehicles, indicating that Auburn Precinct is car dependent. However, it should be noted that the JTW data is based on the primary mode of travel used for each trip, indicating active transport mode shares may be underestimated due to people walking or cycling to their primary mode of rail travel.

Table 22 **Auburn Precinct: Mode share for the Precinct compared to Auburn LGA (2011)**
Source: BTS Journey to Work – Travel Zones

Mode	Existing Auburn Precinct mode share	Existing LGA mode share
		Auburn LGA
Vehicle driver	46%	57%
Vehicle passenger	6%	6%
Train	36%	29%
Bus / Ferry / Tram	1%	1%
Walked only	5%	3%
Other mode	3%	1%
Mode not stated	3%	3%

3.3 FUTURE CHARACTER OF AUBURN PRECINCT

The Auburn Precinct is a well-positioned Precinct, located only four kilometres south-east of the Parramatta CBD and 18 kilometres west of the Sydney CBD. Auburn contains a mixture of industrial, commercial, retail and residential uses. The development pattern in the Auburn Precinct has been influenced by historical land use patterns and access to transport, with smaller scaled residential development within the walking catchment of Auburn Station and business and employment uses directly fronting Parramatta Road and the M4. The Precinct is known primarily as a bulky goods retail hub, with a thriving weekend economy. Future development and the proposed improvements will allow Auburn Precinct to achieve the vision.

The vision for the Auburn Precinct:

An evolving employment corridor with a unified and welcoming streetscape.

Future land use context

To achieve the vision for the Precinct, the following planning measures have been proposed as illustrated in **Figure 21**:

- Important employment zone - industrial, commercial and retail, leverage potential from Sydney Olympic Park.
- Heavy and specialised industry in the corridor supported by wholesale trade and transport, postal and warehousing premises.
- Bulky goods retail centre for a large residential catchment.
- An alternative location for employment uses that relocate from elsewhere along the Corridor.

Collectively, the proposed measures could have the following potential transport implications:

- Improvement to pedestrian and cycle connectivity is expected as a result of the proposed development, with the plan aiming to address the divide of Parramatta Road.
- Rail and bus service frequencies may need to be increased, as the residential, employment and commercial zones located within the Precinct are likely to increase public transport trips into and out of the Precinct.
- Changes in existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

Review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and improvements to be delivered, as discussed in the Transport Plan. There upgrades not only address existing deficiencies but also cater for future growth of the Auburn Precinct. The proposed transport improvements are expected to reduce dependency on private vehicles and also provide alternative transport options for future residents and employees of Auburn Precinct.

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Auburn Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 23**. These identified opportunities and constraints serve as the basis for the strategic transport framework for Auburn Precinct.

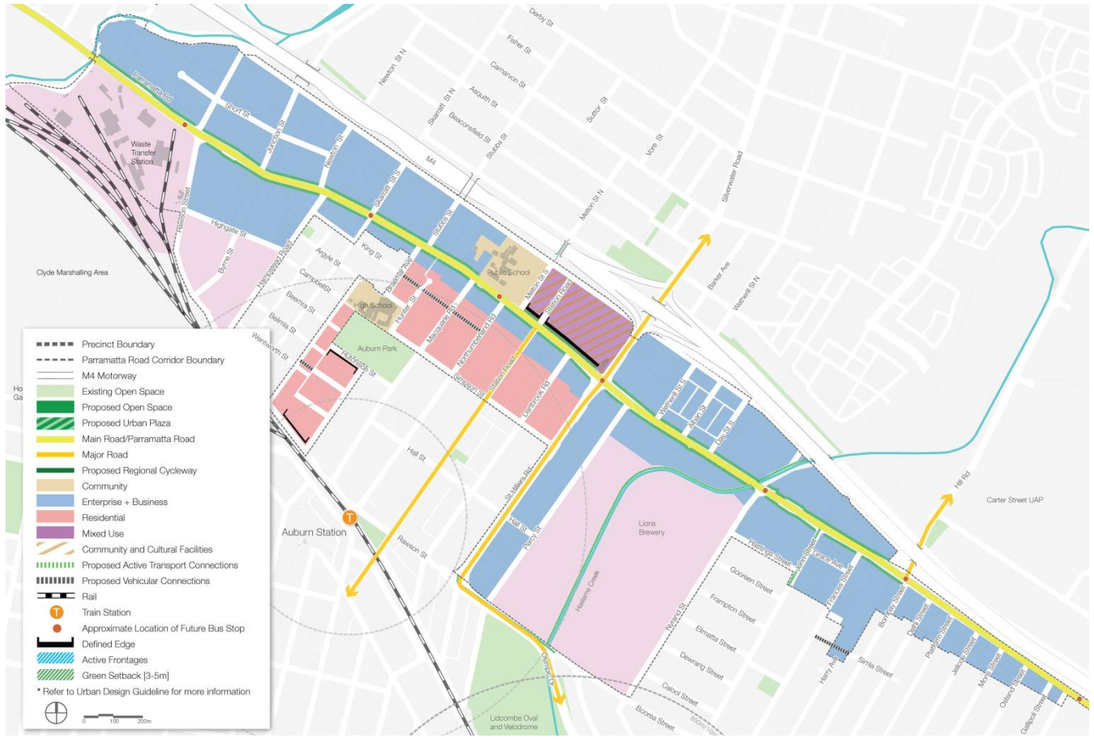

Figure 21 **Auburn Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)**

In addition to the identified issues, the WestConnex project currently in progress is expected to impact on the existing traffic conditions in each Precinct, including Auburn. The modelling undertaken as part of the *WestConnex M4 Widening EIS Traffic and Transport Working Paper* (2014) assessed the anticipated impacts of the M4 Widening on nearby intersections in 2031. In Auburn, the paper outlined that the modelling outputs based on the projected peak demands associated with the M4 Widening, indicate little change in performance at the Parramatta Road intersections when compared with the 'do minimum' scenario.

Under the full WestConnex scenario, with increased traffic, the intersection of Parramatta Road/Rawson Street/Duck Street is expected to operate above capacity in the AM Peak. This is slightly improved when compared to the Future 'do minimum' scenario despite higher traffic volumes. However, the additional traffic in the Full WestConnex scenario is primarily on the through movements on Parramatta Road, with right turn volumes having decreased in comparison to the Future 'do minimum' scenario. This allows better optimisation of the signal timings at the intersection, explaining the improved performance in comparison to the Future 'do minimum' scenario. In the PM peak, Parramatta Road/Rawson Street/Duck Street shows decreased performance in the evening peak Full WestConnex scenario, due to the increased volume of traffic attempting to traverse the intersection. Under this scenario, the intersection is expected to operate over capacity, with queuing particularly on the eastern and western approaches of Parramatta Road.

Due to the increased demands projected under all scenarios it is anticipated that infrastructure improvements would be required on the Silverwater Road corridor to bring the modelled network below capacity. These modifications could take the form of a revised lane configuration on Silverwater Road between the M4 Motorway and Parramatta Road in the medium to long term.

3.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Auburn Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example of where urban renewal has occurred and comparing it to the characteristics of the proposed Auburn Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Auburn Precinct.

This assessment enables the identification of infrastructure needs for the Auburn Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Auburn has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar Precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Auburn Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW and Auburn City Council for their feedback. This helped to inform the selection of the Sydney suburb of **Alexandria** as an ideal benchmark precinct for what the future Auburn Precinct might look like.

Characteristics Alexandria shares with the future Auburn Precinct include:

- Its location along a key transport corridor. Like Auburn, Alexandria is located along a key transport corridor. Auburn is a key commercial area between Parramatta and the Sydney CBD, while Alexandria is an important commercial area between Sydney Airport and the Sydney CBD.
- Alexandria / Mascot has experienced recent growth in mixed use, commercial and residential development to a similar extent to what might be expected from the future Auburn Precinct.
- The area observed (between Doody Street and Mascot Station) is relatively similar in size to the proposed scale of the future Auburn development.
- The commercial area observed within Alexandria is a similar distance to Mascot Station when compared to the location of the future Auburn commercial area in relation to Auburn Station.
- The Alexandria commercial area observed is transected by a single strategic road corridor (O'Riordan Street) reflecting the nature of Auburn (Parramatta Road) in terms of being primarily based along a single road corridor.
- O'Riordan Street is heavily trafficked, in a similar fashion to Parramatta Road.
- Alexandria has relatively frequent peak hour bus services.
- Existing active transport infrastructure includes dedicated cycleways that act to separate cyclists from the high proportion of heavy goods vehicles in the area.

A review of Alexandria is described further in **Figure 23** that identifies the success of Alexandria and improvements identified (for Alexandria) that would be useful for establishing transport directions for the Auburn Precinct.

Figure 22 Alexandria Streetscapes (Source: AECOM, 2015)

a) Auburn Precinct Opportunities and Constraints

Significant Opportunities

O1 – Enhancing north-south connections, particularly those that provide a links to Auburn Station or cross Parramatta Road and / or to the M4 Motorway

O2 – Creating a series of new laneways and through links to increase the permeability of long blocks and provide active and inviting streetscapes

O3 – Enhancing pedestrian connectivity and safety across Parramatta Road

O4 – Improving active transport connections to regional recreation and open space facilities

O5 – Reducing car dependency by lowering parking rates in areas with good access to public transport.

Primary Constraints

C1 – High traffic volumes on the strategic road network

C2 – Overcoming the north-south barrier created by Parramatta Road

C3 – Poor pedestrian amenity and streetscapes

C4 – A high proportion of heavy goods vehicles creating additional hazards for other road users, particularly cyclists.

C5 – Addressing deficiency and access to open space within the Precinct

C6 – High vehicles dependency for access to bulky goods and employment services.

b) Case Study: Alexandria

Success of the Alexandria

- Alexandria has pockets of active streetscapes and laneways that provide services to the workers within the commercial area and have become destinations in their own right
- Alexandria has strong pedestrian permeability within commercial areas away from major public roads, particularly between Doody Street and Gardeners Road
- A separated on-road cycleway has minimised conflict between cyclists and heavy vehicles in the area
- The central location and accessibility of Alexandria has enabled it to support a diverse commercial industry aligned to service provision and entertainment.
- Infrastructure provision for non-car modes of travel have acted to minimise private vehicle use.

Potential Further Opportunities for Alexandria

- Enhancing active travel connections across O'Riordan Street in the east and the Alexandria Canal in the west
- Improving connectivity to Mascot Station and surrounding precincts
- Implement changes to parking policy to dissuade workers from parking on-street
- Initiatives to increase the permeability of the precinct as development occurs.

c) Strategic Transport Framework for the Auburn Precinct

	Opportunities and constraints addressed
D1 – Enhance the streetscape throughout the Precinct, particularly along Parramatta Road	*O2, C3*
D2 – Improve public transport services and enhance priority for public transport (physical segregation and intersection priority)	*O4*
D3 - Improve pedestrian and cyclist infrastructure across the Precinct with a focus on connecting to the rail stations and active travel network outside the Precinct	*O3, O4, C3, C4*
D4 – Provide additional east-west routes though the precinct for locally circulating traffic in order to avoid reliance on Parramatta Road	*O2, C1*
D5 - Increase north-south links for all modes of transport, particularly across Parramatta Road	*O1, C2*
D6 - Locate parking away from active surface routes (preferably underground), while ensuring that on-street parking restrictions enable access to streetscapes throughout the day.	*O5, C6*
D7 - Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians	*O3, C1, C4*
D8 – Enhance connections to Auburn town centre and Sydney Olympic Park for all modes of travel, particularly active transport	*O1, C5*
D9 – Ensure conflicts between the active travel network and heavy goods vehicles are minimised.	*O4, C4*

d) Transport Infrastructure and Service Improvements

- Intersection upgrades or road capacity enhancements
- Street extensions and connections.
- Provision of active transport facilities and streetscape improvements
- Improve public transport services provision and bus priority measures
- New public transport infrastructure (e.g. Light Rail or Rapid Transit)
- Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 23 Auburn Precinct Transport Plan Framework (Source: AECOM, 2015)

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services in order to reach the desired land use and transport planning outcomes.

3.5 FUTURE TRANSPORT PROVISION FOR AUBURN PRECINCT

Precinct strategic transport framework

The strategic transport framework for the Auburn Precinct is presented in **Figure 23**. The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure and service improvements

In the future Auburn Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government and Auburn Council, during policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Auburn Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

The directions have been addressed with the following improvements, shown schematically in **Figure 24** and summarised in **Table 23**.

Table 23 Auburn Precinct: Transport Infrastructure and Service improvements

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Intersection upgrades or road capacity enhancements						
A1	✓			Pinch point works at intersection of Rawson Street with Parramatta Road	S	D5, D7, D8
A2	✓			Potential realignment of Braemar Avenue to form a four-leg intersection with Stubbs Street	M	D5, D7, D8
A3	✓			Provision of right turn bay on the western approach of Station Road / Rawson Street	S-M	D5, D7, D8
A4	✓			Upgrade intersection of Rawson Street and Hampstead Street	S-M	D5, D7, D8
A5	✓			Implementation of clearways on Parramatta Road.	S	D5, D6, D7
Street extensions and connections						
A6	✓		✓	Investigate additional east-west connections south of Parramatta Road.	S	D1, D3, D4, D7
Provision of active transport facilities and streetscape improvements						
A7			✓	Investigate active transport connections along Haslams Creek between M4 Motorway and Parramatta Road	M	D3, D5, D7, D8, D9
A8			✓	Improve north-south cycle corridor between Auburn Railway Station, Auburn North Public School and Silverwater (across Parramatta Road)	S	D3, D5, D7, D8, D9
A9*			✓	Streetscape and public domain improvements to Parramatta Road	S	D1, D3, D4, D7, D9
A10*			✓	Upgrade pedestrian bridge over the M4 Motorway at Melton Street to a shared pedestrian and cycle path.	S	D3, D5, D9
Improve public transport service provision and bus priority measures						
A11		✓		Deliver bus priority measures along Parramatta Road.	M	D2, D7, D8
A12		✓		Investigate new suburban bus route from Parramatta to Burwood along Parramatta Road.	S-M	D2, D7, D8
New public transport infrastructure						
A13		✓		Potential introduction of the Parramatta to Strathfield Light Rail line (as part of the Western Sydney Light Rail Network).	M-L	D2, D7, D8

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Auburn | Transport Improvements

ID	Potential Improvements
A1	Pinch point works at intersection of Rawson Street with Parramatta Road
A2	Potential realignment of Braemar Avenue to form a four-leg intersection with Stubbs Street
A3	Provision of right turn bay on the western approach of Station Road / Rawson Street
A4	Upgrade intersection of Rawson Street and Hampstead Street
A5	Implementation of clearways on Parramatta Road.
A6	Investigate additional east-west connections south of Parramatta Road.
A7	Investigate active transport connections along Haslams Creek between M4 Motorway and Parramatta Road
A8	Improve north-south cycle corridor between Auburn Railway Station, Auburn North Public School and Silverwater (across Parramatta Road)
A9 *	Streetscape and public domain improvements to Parramatta Road
A10 *	Upgrade pedestrian bridge over the M4 Motorway at Melton Street to a shared pedestrian and cycle path.
A11	Deliver bus priority measures along Parramatta Road.
A12	Investigate new suburban bus route from Parramatta to Burwood along Parramatta Road.
A13 ^	Potential introduction of the Parramatta to Strathfield Light Rail line (as part of the Western Sydney Light Rail Network).

Legend

	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Approximate Location of Future Bus Stop		

^ Routes shown are indicative & final alignments are subject to further investigation.

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

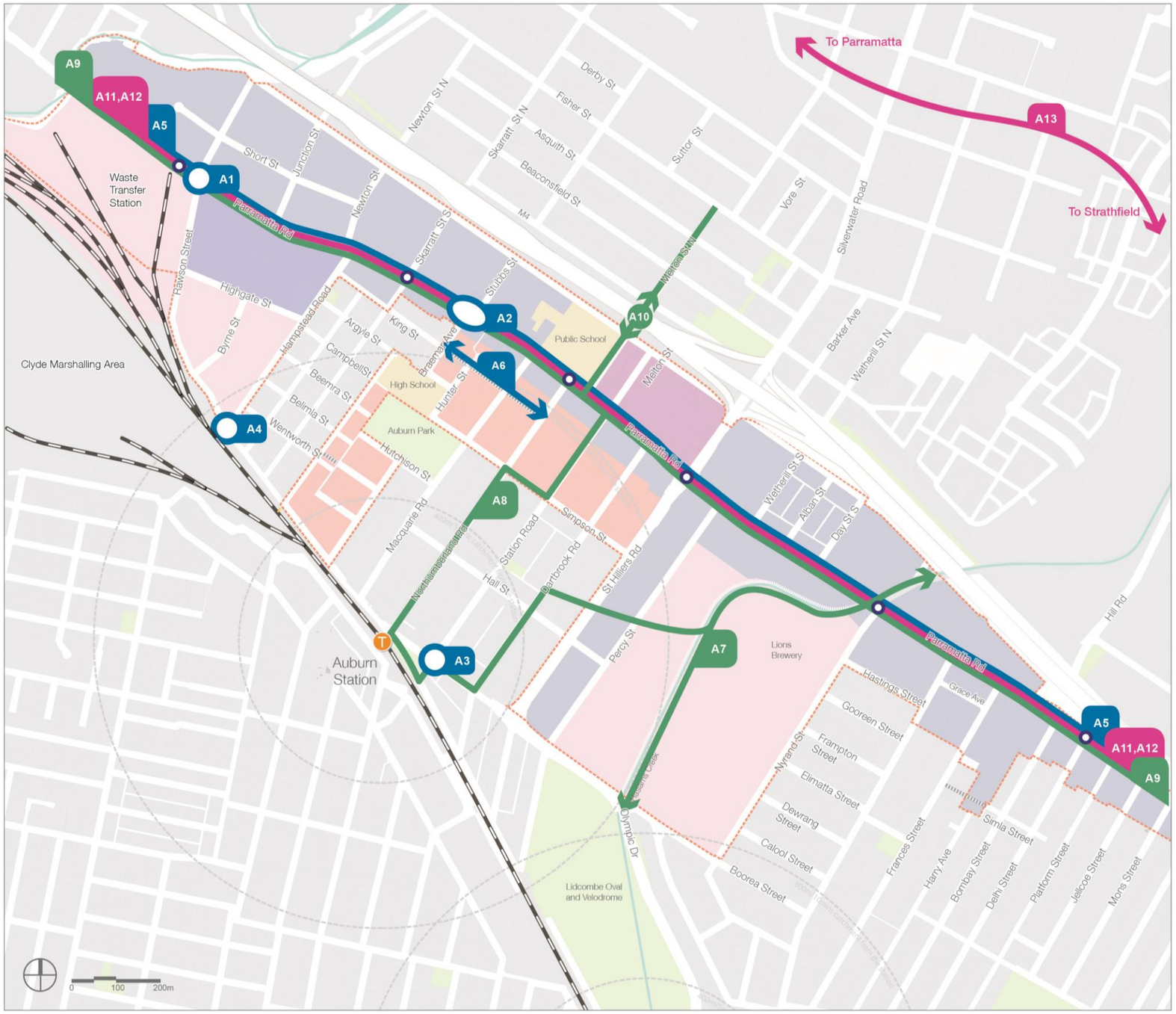

Figure 24 Auburn Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure whereby developments are permitted to provide a lower rate of on-site parking close to public transport, while developments further away would need to provide a higher rate of parking provision. Under the current Auburn Council DCP, developments within one kilometre of the rail station are permitted to provide a lower rate of on-site parking, while developments outside this radius provide a higher rate of parking provision.

The proposed parking rates for the Auburn Precinct adopt the approach of the Auburn DCP, while reducing the threshold radial distance from a rail station from one kilometre to 800 metres. The proposed rates provide maximums only for areas within 800 metres of the rail station, with a range provided for land outside of this distance. Due to their proximity to rail stations, residents and workers within these zones are more likely to use public transport. It is unlikely scaled down parking rates will be viable outside of the 800 metre range, unless there is significant intervention with the provision of additional transport infrastructure. The 400m and 800m walking catchments for Clyde Station and Auburn Station are outlined in **Figure 25.**

The proposed parking rates for the Auburn Precinct are outlined in **Table 24** and **Table 25**.The refined parking rates attempt to address Precinct Transport Direction 'D6' outlined in, by reducing parking availability and thereby reducing parking.

While the goal of the reformed parking rates is to reduce car dependency for short trips, with an existing vehicle ownership of 1.3 vehicles per household[4], the reduced off-street parking rates will have implications on the Precinct in the short term. To minimise these impacts, decoupled parking is proposed along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

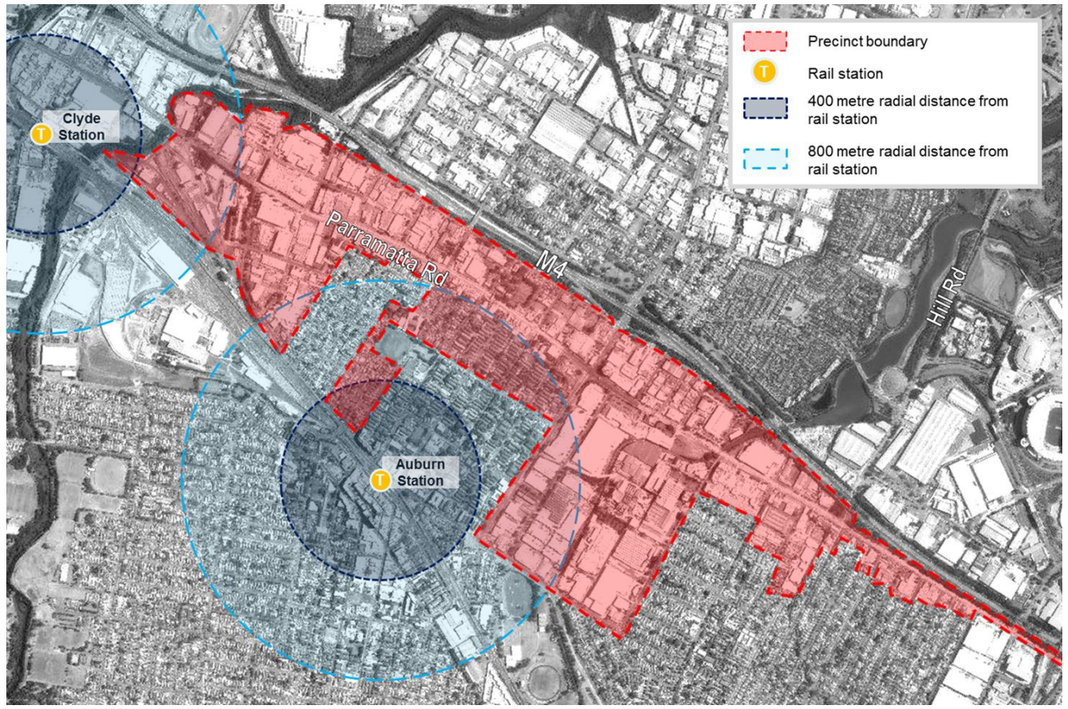

Figure 25 Auburn Precinct: Public Station catchments
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Table 24 Proposed parking rates within 800m of a railway station (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1.2 spaces per dwelling	
Business premises	1 space per 70sqm of GFA		
Retail	1 space per 60sqm of GFA		

Table 25 Proposed parking rates NOT within 800m from a railway station (Source: AECOM, 2015)

Land use	Parking rate		
Residential	1 bedroom	1 space per dwelling;	Visitors: 0.1 to 0.25 spaces per dwelling.
	2 bedroom	1 to 2 space per dwelling;	
	3+ bedroom	1.5 to 3 spaces per dwelling;	
Business premises	1 space per 50sqm of GFA		
Retail	1 space per 50sqm of GFA		

[4] ABS Census, 2011

4. Homebush

4.1 EXISTING LAND USE

The Homebush Precinct is an active town centre located around multiple transport interchanges, acting as a focal point of a diverse and growing community. The area is surrounded by residential heritage areas with access to multiple transport options. The Homebush Precinct covers a large area along the corridor between Homebush Bay Drive and the M4 Motorway interchange at Parramatta Road, bounded by the T2 Inner West & South rail line to the south and the T1 Northern rail line to the north-east. Due to its location at the crossing point of key rail lines, several rail stations are present, with Concord West Station, North Strathfield Station, Homebush Station and Strathfield Station all located along the Precinct boundary.

The Homebush Precinct is located within two local government areas (LGAs): the City of Canada Bay east of Powells Creek and land bounded by Parramatta Road, Swan Avenue and Cooper Street, whilst the remainder of the Precinct is located in Strathfield LGA. A review of the Strathfield Local Environmental Plan (LEP) 2012, Canada Bay Local Environmental Plan (LEP) 2013 and aerial photography indicates that a majority of lots in the Homebush Precinct are consistent with their specified zones. It is evident that the Precinct contains primarily medium and high density residential properties at the core with a small industrial zone to the north. The land adjacent to the Parramatta Road is zoned as Mixed Use and Enterprise Corridor, characterised by retail outlets and other commercial land uses. The Homebush Precinct boundary and existing land use zones are summarised in **Figure 26**.

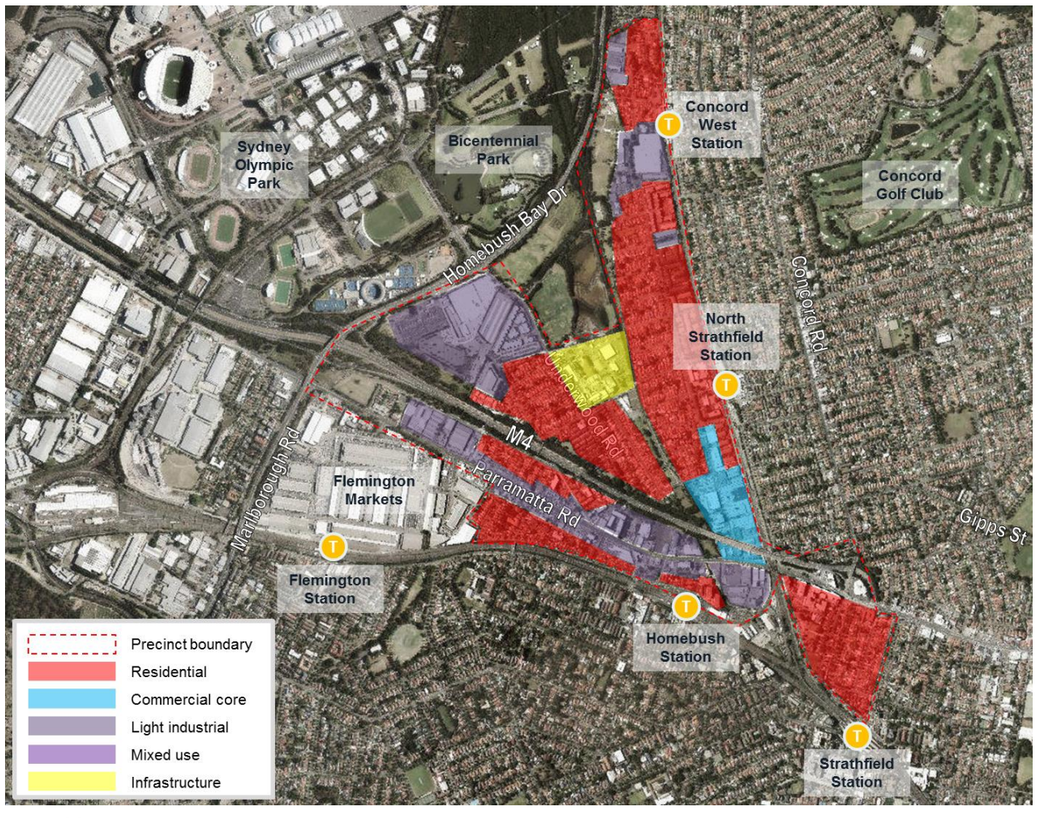

Figure 26 Homebush Precinct Boundary
(Source: Strathfield LEP 2012 and Canada Bay LEP 2013. Base map: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

4.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing Road Network

The existing road network in the Homebush Precinct is illustrated in **Figure 27**, highlighting the key roads connections including Parramatta Road, Homebush Bay Drive and Underwood Road. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of the current road function and operational roles.

Table 26 identifies some of the key roads within Homebush Precinct along with their classification based on both the Austroads functional system and Roads and Maritime Services administrative system. Parramatta Road and the M4 Motorway serve as the primary east-west arterial corridors for the Precinct. While multiple intersections along Parramatta Road are signalised, Underwood Road serves as the key north-south connection and provides a link through the Precinct to Homebush Bay Drive near the eastern boundary.

Table 26 Key roads in the vicinity of the Homebush Precinct (Source: AECOM, 2015)

Road	Functional Classification	RMS Classification
Concord Road / Leicester Avenue	Arterial	State Road
Homebush Bay Drive	Arterial	State Road
Parramatta Road	Arterial	Motorway
Queen Street	Collector	Regional Road
Underwood Road	Collector	Regional Road
Western Motorway (M4)	Motorway (Arterial)	State Road

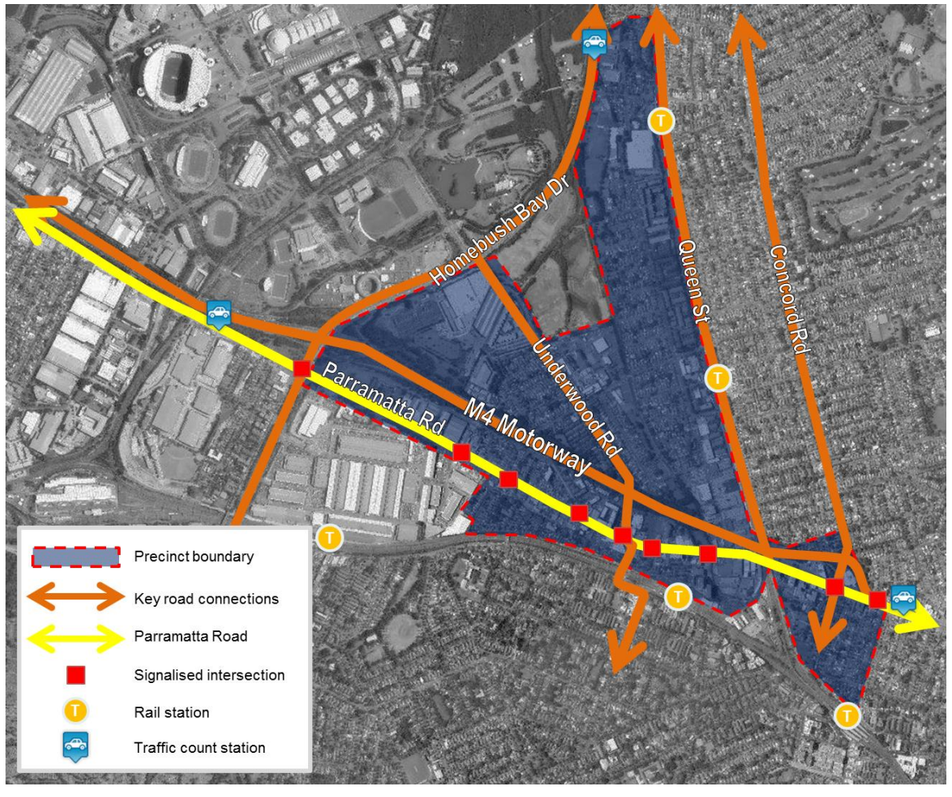

Figure 27 Road network and major connections in the vicinity of the Homebush Precinct
(Source: NSW Land & Property Information – SixMaps modified by AECOM, 2015)

Traffic volumes

Table 27 presents the volumes from Roads and Maritime traffic count stations located on Homebush Bay Drive (2012) and on Parramatta Road (2011). In addition, the *WestConnex M4 East EIS Draft Traffic and Transport Assessment* provided volumes for Parramatta Road at the eastern end of the Precinct obtained from automatic traffic count surveys completed between 2012 and 2014. These three locations are considered to be representative of the scale of traffic volumes travelling through the Precinct.

It is evident that the two way volumes experienced on Parramatta Road (east of the M4 Motorway) and Homebush Bay Drive are over 80,000 vehicles per weekday. According to the Roads and Maritime Road Network Management Hierarchy, based on the description of the road and speed limit, these sections of road would be classified as a Class 6 Urban road (6U). Class 6U roads are principal State Roads and with high traffic volumes, including freight, public transport and commercial vehicle travel. The lower volumes on Parramatta Road west of Telopea indicate that the section would be classified as a lower level Class 4 Urban road (4U), typically considered as important State Roads with moderately high traffic volumes (RMS Network and Corridor Planning, 2008).

Table 27 Traffic counting stations near the Homebush Precinct

Road Name	Station Description	Westbound	Eastbound	Total
Parramatta Road*	West of Telopea Avenue	-	-	34,000
Parramatta Road^	East of M4 Motorway	49,700	53,500	103,200
Homebush Bay Drive~	Concord West – South of Concord Road, MR200	42,800	42,900	85,700

* RMS Traffic Corridor Planning for Parramatta Road Corridor - Granville to North Strathfield, AADT counts, 2011

^ WDA automatic AADT traffic counts, 2012-14

~RMS weekday traffic counts, 2012

Key Intersections

Key intersections on Parramatta Road within and in close proximity to the Precinct include:

- Bridge Road, north-south bridge crossing of rail line.
- Park Road, signalised entry to residential area between Parramatta Road and M4 Motorway.
- Underwood Road, north-south underpass crossing of M4 Motorway as well as one of the main accesses to the Sydney Olympic Park Precinct.
- Subway Lane, north-south underpass crossing of rail line and access to Homebush south of the rail line.
- Knight Street and Station Street accesses to Homebush Station.
- George Street, north-south underpass crossing of M4 Motorway into Bakehouse Quarter as well as one of the main accesses into Concord West.
- Queen Street, north-south underpass crossing of M4 Motorway into North Strathfield.
- Concord Road / Leicester Ave, existing M4 Motorway interchange and underpass crossing of rail line access to Strathfield Station and town centre.

Constraints

The main road network constraints to the Precinct are due to barriers created by the rail line to the south and east of the Precinct. Some of the constraints of the road network include:

- Underwood Road, George Street and along Parramatta Road.
- Pomeroy Street between Wentworth Road and George Street.
- Limited crossing opportunities over both the Western Rail Line and Northern Rail Line.
- Subway Lane underpass crossing rail line has a 3.6 metre height restriction.
- “Arnott’s famous Biscuits” overpass has a 4.3 metre height restriction.

Existing parking conditions

The Homebush Precinct contains an extensive local road network with minimal on-street parking restrictions. Most local streets permit unrestricted parking on one or both sides of the road. Clearways are in operation along Parramatta Road between 6am – 7pm weekdays and 8am – 8pm weekends. During off peak, one hour parking is permitted along Parramatta Road within the Precinct. Currently there are no public off-street car parks within the Precinct.

A summary of private off-street parking rates in the Homebush Precinct for each LGA is provided in **Table 28** and **Table 29**.

Table 28 Off-street parking summary – Strathfield LGA (Source: Strathfield DCP 2005 / Parramatta Road Corridor DCP)

Land use	Parking rate		
Residential flat buildings	Dwelling house	1 to 2 spaces per dwelling	
	1 bedroom unit	1 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom unit	1 space per dwelling	
	3+ bedroom unit	1.5 spaces per dwelling	
Office / Business	Min: 2.5 space per 100 sqm of GFA or 1 space per 100 sqm of GFA along Parramatta Road Corridor.		
Retail premises	Min: 6.2 space per 100 sqm of GFA or 2 space per 100 sqm of GFA along Parramatta Road Corridor.		

Table 29 Off-street parking summary – Canada Bay LGA (Source: Canada Bay DCP 2013)

Land use	Minimum parking rate		
Residential	Detached	1 space per dwelling	
	1 bedroom unit	1 space per dwelling	Visitors: < 5 dwellings, 1 space per dwelling > 5 dwellings 0.5 spaces per dwelling
	2 bedroom unit	1.5 space per dwelling	
	3+ bedroom unit	2 spaces per dwelling	
Office/Business	1 space per 40sqm of GFA.		
Restaurants / cafes	The greater of: 1 space per 6sqm of serviced area or 1 space per 4 seats.		

Public Transport Provision

Public transport services are based around the numerous train stations located on / near the Precinct boundary. These stations provide services to south western and inner western centres of Sydney, as well as major attractors to the north of the Precinct. While there are several rail stations in close proximity to the Homebush Precinct, there are currently only limited bus routes throughout the Precinct. The impact of the cluster of train stations is evident when comparing the public transport mode shares of the Precinct to the wider LGA.

Rail services

The Precinct is bordered by four stations along the T1 Northern Line and the T2 Inner West and South Line: Homebush (T2), North Strathfield (T1), Concord West (T1) and Strathfield (T1 & T2). Flemington Station is located outside the Corridor, however its proximity influences travel patterns through Homebush as discussed in **Section 4.2 – Travel Patterns**. The five stations near Homebush Precinct are highlighted on the Sydney Trains network as shown in **Figure 28.**

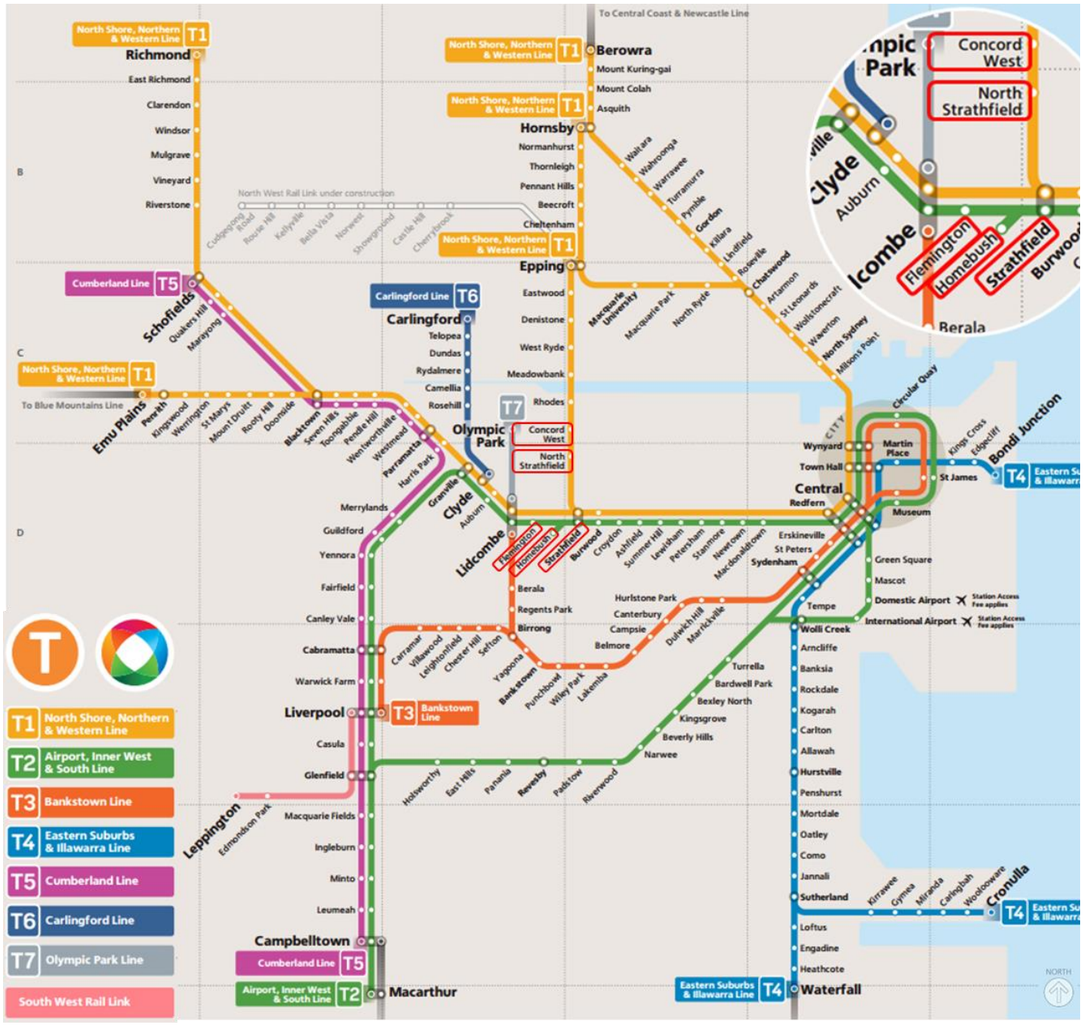

Figure 28 Location of Concord West, Flemington, Homebush, Strathfield and North Strathfield Station on the Sydney Trains network (Source: Sydney Trains, 2015)

Strathfield Station is located at the south-east corner of the Precinct, serving as the key interchange point between the T1 and T2 rail lines and providing services for both lines. As a result, Strathfield Station has high patronage, ranked the 9th busiest station on the Sydney Trains network with approximately 40,560 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). The approximate numbers of suburban rail services stopping at Strathfield Station during peak periods is shown in **Table 30**. It should be noted that Intercity Trains on the Blue Mountains Line and the Central Coast and Newcastle Line service Strathfield Station, providing links to regional NSW in west and north of Sydney.

Table 30 Rail service frequencies at Strathfield Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T1 North Shore, Northern & Western Line		
Berowra to City via Gordon, Hornsby to City via Macquarie University	29	28
City to Berowra via Gordon, City to Hornsby via Macquarie University	29	30
Hornsby and Epping to City via Strathfield	18	12
City to Epping and Hornsby via Strathfield	13	16
Emu Plains to City, Richmond to City	28	26
City to Emu Plains, City to Richmond	23	27
T2 Inner West & South Line		
Campbelltown to City via Granville	23	18
City to Campbelltown via Granville	19	18

Homebush Station is located at the southern boundary of the Precinct near largely residential and mixed use land uses. Flemington Station is located approximately 400 metres from the south western boundary of the Precinct located near the Flemington Markets. Both Homebush Station and Flemington Station are serviced by the T2 Inner West and South Line, connecting to the Sydney CBD and South West Centres such as Liverpool and Campbelltown.

Based on station barrier counts, Homebush Station was ranked the 119th busiest station on the Sydney Trains network, recording approximately 1,910 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). Barrier counts suggest Flemington Station serviced more commuters, ranked the 84th busiest station on the network, recording approximately 2,930 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). The approximate number of peak period rail services stopping at Homebush Station and Flemington Station are shown in **Table 31**.

Table 31 Rail service frequencies at Homebush Station and Flemington Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T2 Inner West & South Line		
Campbelltown to City via Granville	8	9
City to Campbelltown via Granville	9-10	8-9

Both North Strathfield Station and Concord West Station service the T1 Northern Line and provide a connection to Hornsby to the north and the Sydney CBD to the east. Based on station barrier counts, North Strathfield Station was ranked the 96th busiest station on the Sydney Trains network, recording approximately 2,590 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). The volumes are at a similar level at Concord West Station, which was ranked the 104th busiest station, recording approximately 2,350 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). The approximate number of peak period rail services stopping at North Strathfield Station and Concord West Station are shown in **Table 32**.

Table 32 Rail service frequencies at North Strathfield Station and Concord West Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T1 Northern Line		
Hornsby and Epping to City via Strathfield	8	8
City to Epping and Hornsby via Strathfield	8	8

Bus services

There are currently a limited number of bus routes passing through the Precinct. The Precinct is currently serviced by one main bus route, Route 525, providing a connection to major centres including Parramatta and Burwood. Two further bus services, Routes 458 and 408 pass through or across the Precinct, providing connections to Strathfield and Macquarie University. **Table 33** gives the peak hour frequencies for services accessibly to residents of the Homebush Precinct. Bus routes in and around the Precinct are illustrated in **Figure 29**.

Table 33 Bus services frequencies for Homebush Precinct (Source: Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak frequency (07:00-09:00)	PM Weekday Peak frequency (16:00-18:00)
408	Burwood to Rockwood via Strathfield	Services operate off-peak only	Services operate off-peak only
458	Macquarie University to Burwood	< 30 minutes	< 30 minutes
525	Parramatta to Burwood	< 15 minutes	<30 minutes

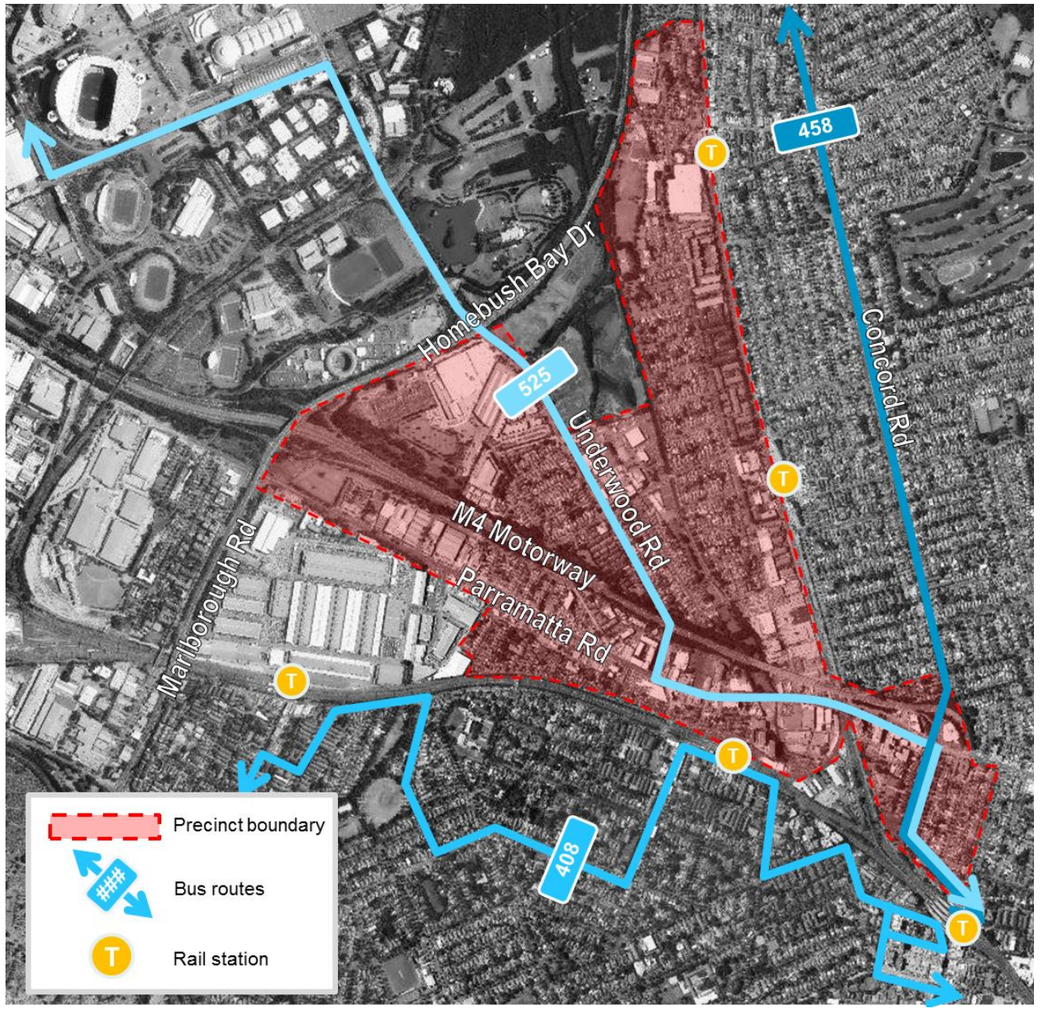

Figure 29 Bus services in the vicinity of the Homebush Precinct (Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Active Transport Provisions

Active transport provisions in the Homebush Precinct are illustrated in **Figure 30**. Paved footpaths are provided on either side of most roads. Signalised crossings on Parramatta Road are provided at several major intersections at regular and frequent intervals except the western end outside the Flemington Markets. However, there are very few crossings of the rail lines, which form a barrier for active transport. Shared off-road pedestrian and cycle paths are provided through and around the Precinct at parks and via the Western Motorway (M4) viaduct. Currently there are no formal cycle links to key stations such as Strathfield, from the core of the Precinct.

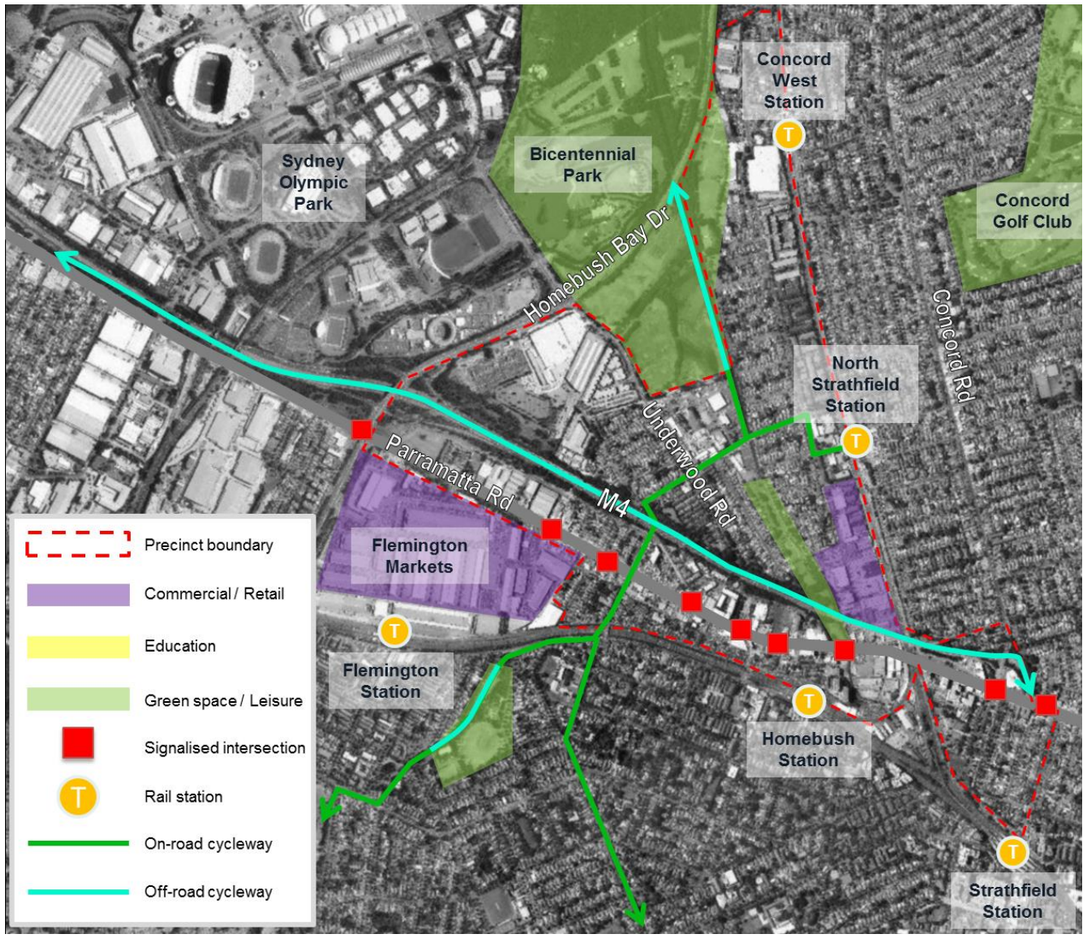

Figure 30 Active transport facilities and desire lines in the vicinity of the Homebush Precinct
(Source: NSW Land & Property Information – SixMaps and Strathfield Council Bay to Bay Cycle Map and Canada Bay Council Bike Plan modified by AECOM, 2015)

Travel Patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 revealed most residents in the Homebush Precinct are employed in the Sydney Inner City (31 per cent) than any other destination. While residents travelling to Sydney Inner City predominately travel by rail, private vehicle travel is the dominant mode to all other destinations, with an overall mode share of 52 per cent. This may be a reflection of the frequent rail services available to access Sydney Inner City, and lack of and infrequent public transport services to other areas of workforce destinations. The high level of car dependency within the Precinct could be attributed to the lack of bus routes servicing the Precinct and the low frequencies for the available services. This indicates that there is a need for improved public transport service provisions as well as improved connections to the train stations by all modes.

Table 34 Homebush Precinct Workforce Travel Destinations
Source: BTS Journey to Work – Travel Zones (717, 719, 720, 958, 961, 963, 969)

Workforce destinations		Train	Bus	Car	Walked only	Other	Total^*
1	Sydney Inner City	1030	0	299	8	40	1377
2	Strathfield - Burwood - Ashfield	72	10	319	60	32	493
3	Canada Bay	59	18	244	69	22	412
4	Auburn	21	37	185	3	0	246
5	Ryde - Hunters Hill	50	3	174	0	9	236
Other		578	13	1099	16	24	1730
Total		**1810**	**81**	**2320**	**156**	**127**	**4494**
Mode share		40%	2%	52%	3%	3%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

The majority of workers in the Homebush Precinct start their travel in the neighbouring areas of Strathfield - Burwood - Ashfield. The next four places top places of residence for people working in Homebush are Canada Bay, Bankstown, Merrylands - Guildford and Auburn. Similar to outbound trips, the majority of inbound trips to the Homebush Precinct are made by car with a dominant mode share of 82 per cent. Only 12 per cent of workers travel by train and one per cent of workers travel by bus, indicating that the employment areas may not be directly accessible to the train stations or there is a good supply of off-street and on-street parking available to the employees.

Table 35 Homebush Precinct Employment Travel Origins
Source: BTS Journey to Work – Travel Zones (717, 719, 720, 958, 961, 963, 969)

Employee origins		Train	Bus	Car	Walked only	Other	Total^*
1	Strathfield - Burwood - Ashfield	104	46	514	84	26	774
2	Canada Bay	32	9	461	72	17	591
3	Bankstown	10	3	455	0	12	480
4	Merrylands - Guildford	41	3	415	0	12	471
5	Auburn	81	9	344	11	20	465
Other		899	42	5476	23	172	6612
Total		**1167**	**112**	**7665**	**190**	**259**	**9393**
Mode share		12%	1%	82%	2%	3%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

Table 36 shows the existing mode share for the Homebush Precinct compared to the Strathfield and Canada Bay LGAs. It is evident that proximity to public transport infrastructure has a clear trend on mode share with the Precinct having both a much higher public transport and lower private vehicle mode share when compared against the LGAs. It is evident that while train mode share is substantially higher in the Precinct than at LGA level, bus mode share is lower in the Precinct than in the broader Canada Bay LGA. This may be attributed to commuters taking advantage of the convenient location of the five nearby stations, instead of opting to travel by bus.

Active transport modes are slightly lower in the Precinct than Canada Bay LGA, most likely due to the barriers created by Parramatta Road and the rail lines, as well as the high amenity, facilities and access to cycling infrastructure along Canada Bay's foreshores. The mode share for active transport is quite low, indicating that Homebush Precinct is currently car and rail dependent in terms of travel. However, it should be noted that the JTW data is based on the primary mode of travel used for each trip, indicating active transport mode shares may be underestimated due to people walking or cycling to their primary mode of rail travel.

Table 36 Homebush Precinct: Mode share for the Precinct compared to Strathfield LGA and Canada Bay LGA (2011)
Source: BTS Journey to Work – Travel Zones

Mode	Existing Homebush Precinct mode share	Existing LGA mode share	
		Strathfield LGA	Canada Bay LGA
Vehicle driver	48%	54%	62%
Vehicle passenger	4%	5%	4%
Train	40%	33%	14%
Bus / Ferry / Tram	2%	5%	12%
Walked only	3%	3%	3%
Other mode	2%	1%	2%
Mode not stated	1%	2%	1%

4.3 FUTURE CHARACTER OF HOMEBUSH PRECINCT

The Homebush Precinct benefits from convenient access to five rail stations near the Precinct boundary, allowing residents to travel north towards Epping and Hornsby, west towards the Parramatta CBD or east towards the Sydney CBD. Homebush is a mixed use Precinct characterised by a combination of office/business park type developments, a diverse range of wholesale and retail activities, industrial sites, recent residential flat developments, shop top and individual dwelling houses, and open space. Future development will allow Homebush to become a major high-density mixed-use Precinct, strategically located between Parramatta and Sydney CBD. Future development will build upon the existing character to achieve the vision set out for the Homebush Precinct.

The vision for the Homebush Precinct:

A major high-density mixed-use precinct strategically located between Sydney's two main CBDs focused on providing employment and housing opportunities supported by an extensive open space network and efficient vehicular, active, and public transport linkages.

Future land use context

To achieve the vision for the Precinct, the following measures are proposed as outlined in **Figure 31**:

- A new high density residential and mixed-use Precinct close to transport nodes and regional and local open space.
- An employment and retail focus in and around Flemington Markets, which is an important catalyst for adjoining employment lands (to immediate north and west).
- An entertainment hub that builds on the Bakehouse Quarter to form a new town centre.

The following potential transport implications have been identified:

- Improvement to pedestrian and cycle connectivity is required as a result of the proposed development.
- Potential for improvements to bus connections to existing rail stations and a range of other destinations.
- Rail service frequencies may need to be increased, as the higher density zones near each station is likely to increase rail trips into and out of the Precinct.
- Changes in existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

Review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and service improvements to be delivered, as discussed in the Transport Plan. These upgrades not only address existing deficiencies, but also cater for future growth of the Homebush Precinct, in a sustainable manner. These proposed infrastructure upgrades are expected to reduce dependency on private vehicles and also provide alternative transport options future residents and employees in the Homebush Precinct.

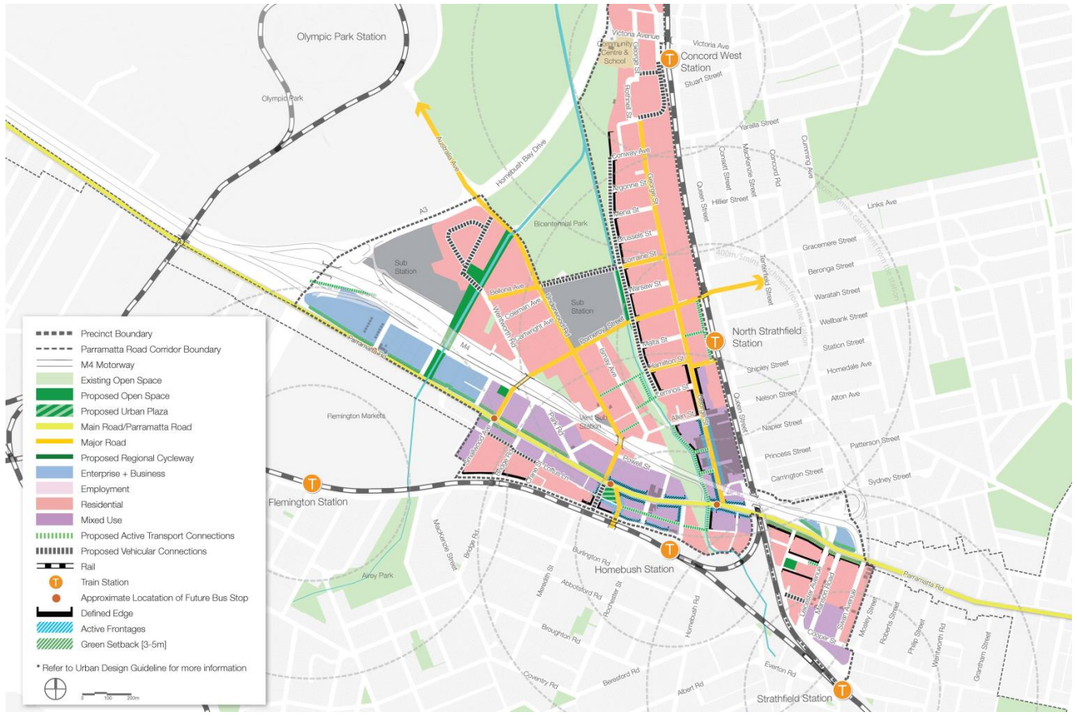

Figure 31 Homebush Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Homebush Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 33.** These identified opportunities and constraints serve as the basis for the strategic transport framework for Homebush Precinct.

In addition to the identified opportunities and constraints, the WestConnex project currently in progress is expected to impact on the existing traffic conditions in each Precinct, including Homebush, as described below:

WestConnex is the largest integrated transport and urban revitalisation project in Australia, linking Sydney's west and south-west with the CBD, airport and port in a continuous 33 km motorway that is completely free of traffic lights.

It will be the trigger for urban transformation providing new opportunities for residential and commercial development along the Parramatta Road Corridor, beautifying streetscapes, adding green corridors and parkland and making it a more attractive place to live, work and socialise. It will transform Sydney by making it easier for cars and trucks to move between employment hubs and the vast residential suburbs and growth centres that house millions of people.

Delivered in three stages over the next decade, the WestConnex motorway project will augment and extend the M4 to the inner city, duplicate the existing M5 East and provide an airport link for journeys to Sydney's international gateways. WestConnex is a critical part of an integrated transport solution that includes roads and public transport. WestConnex will facilitate improved public transport services and revitalise local communities.

It will take around 10 years to deliver in stages. The M4 Widening will open to traffic in 2017 and the M4 East (Homebush Bay Drive to Parramatta Road and City West Link) will follow in 2019. Stages 2 and 3 are due to open in 2019 and 2023 respectively.

4.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Homebush Precinct's Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example where urban renewal has occurred and comparing it to the characteristics of the proposed Homebush Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Homebush Precinct.

This assessment enables the identification of infrastructure needs for the Homebush Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Homebush has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Homebush Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW, Strathfield Council and City of Canada Bay for their feedback. This helped to inform the selection of the Sydney suburb of **Rhodes** as an ideal benchmark for what the future Homebush Precinct might look like.

Characteristics that the existing Rhodes Precinct shares with the future Homebush Precinct include:

- Its functional nature and role within Sydney. Like Homebush, Rhodes is a centrally located suburb within Sydney, approximately equidistant between the Sydney CBD and the edge of the Sydney metropolitan area.
- Rhodes has seen recent growth in mixed use, commercial and residential development to a similar extent to what might be expected from the future Homebush Precinct.
- It is relatively similar in size to the proposed scale of the future Homebush development.
- Rhodes is located only a short distance to the north of the Homebush Precinct.
- Rhodes is transected by strategic road corridors (Concord Road / Homebush Bay Drive) reflecting the nature of Homebush (Parramatta Road, M4 Motorway), in terms of possessing a significant strategic road network.
- Concord Road and Homebush Bay Drive are heavily trafficked and act to divide Rhodes in a similar fashion to Parramatta Road within Homebush.
- Rhodes has good public transport connections in all directions, including its location on the rail network as well as relatively frequent peak hour bus services.
- Existing active transport infrastructure connects to adjacent suburbs through leisure routes, and further opportunities exist to enhance these connections.

A review of Rhodes is described further in **Figure 33** that identifies the success and improvements identified (for Rhodes) that would be useful for establishing transport directions for the Homebush Precinct.

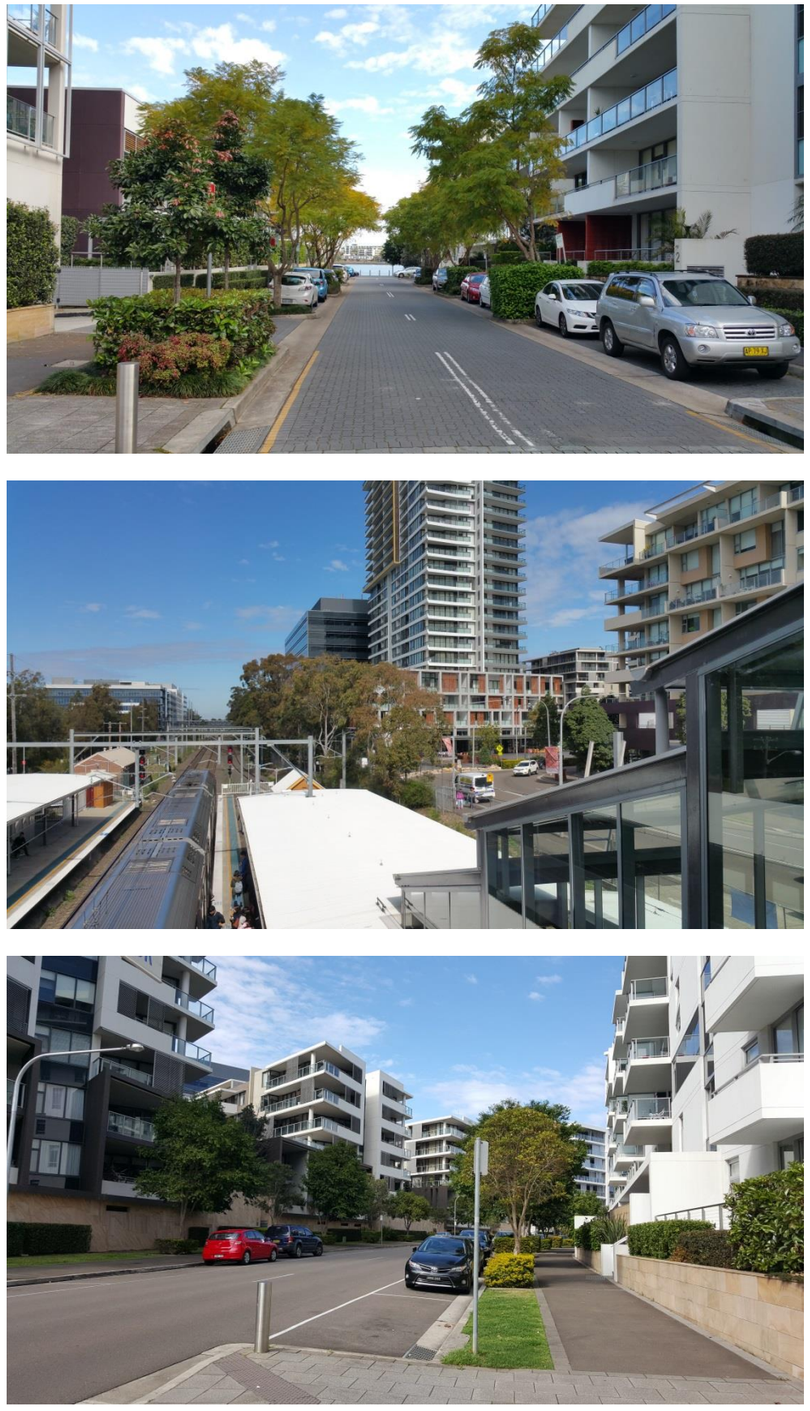

Figure 32 Rhodes Streetscapes (Source: AECOM, 2015)

a) Homebush Precinct Opportunities and Constraints

Significant Opportunities

O1 – Enhancing road connections for all modes of transport within the precinct to increase accessibility of employment, recreation and cultural opportunities currently separated by riparian corridors and road / rail infrastructure

O2 – Improving connectivity to the four rail stations bordering the precinct at Concord West, North Strathfield, Homebush and Strathfield

O3 – Enhancing pedestrian connectivity and safety across Parramatta Road, the M4 motorway and railway lines whilst improving connections to Flemington Markets and the Bakehouse Quarter

O4 – Improving active transport access to regional recreation and open space facilities with a focus on connecting to the existing recreational routes around Olympic Park

O5 – Reducing car dependency by lowering parking rates in areas with good access to public transport.

Primary Constraints

C1 – High traffic volumes on the strategic road network

C2 – Overcoming access barriers for all modes of transport created by major roads, the railway line and riparian corridor

C3 – Pedestrian permeability within the Precinct

C4 – Addressing high parking demand throughout the Precinct

C5 – Integrating fragmented communities within the Precinct.

b) Case Study: Rhodes

Success of Rhodes

- Rhodes has a relatively high public transport mode share for residents as it has strong connections via rail, bus and ferry in addition to direct access to a major arterial road.
- It has strong connectivity to open space, particularly at the periphery and adjacent to the Parramatta River on all sides of the development
- Having dense residential development around a strong public transport network has enabled Rhodes to support a culture of outdoor living, cafes and services to give a strong community feel
- The central location of Rhodes has enabled it to support a demographic of young professionals who are able to commute easily and efficiently to their places of work, whether that be Parramatta of the Sydney CBD which can both be reached in under 30 minutes.

Potential Further Opportunities for Rhodes

- Enhancing active travel across the rail line in a north south direction along the eastern side of the rail line and across the Homebush Bay Bridge to Wentworth Point
- Improving commercial / retail and mixed use density around the railway station to provide transit oriented development
- Creating new public transport links to neighbouring suburbs separated by the Parramatta River such as Wentworth Point via the Homebush Bay Bridge and enabling a circular bus route connecting to key neighbouring locations
- Initiatives to reduce traffic around pinch points, particularly around the existing commercial / retail precinct
- Refocusing future shopping centres and mixed use development closer to Rhodes Station.

c) Strategic Transport Framework for the Homebush Precinct

	Opportunities and constraints addressed
D1 – Capitalise on convenient access to Homebush, Flemington, North Strathfield, Concord West and Strathfield rail stations and enhance priority for public transport	*O2, O5, C1*
D2 – Improve public transport services and enhance priority for public transport (physical segregation and intersection priority)	*O2, C1, C5*
D3 – Improve pedestrian and cyclist infrastructure across the Precinct with a focus on connecting to the rail stations and active travel network outside the Precinct	*O2, O3, O4, C3, C5*
D4 – Create new east-west connections within the Precinct to allow for greater permeability within the precinct for all modes	*O1, C1, C2, C3*
D5 – Revise the street network to improve north-south connections and improve active transport crossing opportunities at Parramatta Road	*O1, C2, C5*
D6 – Enhance connections across the barriers of rail lines, Powell's Creek, the M4 Motorway and internally on George Street and Pomeroy Street.	*O1, O2, O3, O4, C2, C3, C5*
D7 – Reduce the need for on-site parking for new developments near public transport nodes and locate parking away from active surface routes (preferably underground)	*O5, C4*
D8 – Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians.	*O1, O3, C1*

d) Transport Infrastructure and Service Improvements

- Intersection upgrades or road capacity enhancements
- Street extensions and connections.
- Provision of active transport facilities and streetscape improvements
- Improve public transport services provision and bus priority measures
- New public transport infrastructure (e.g. Light Rail or Rapid Transit)
- Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 33 Homebush Precinct Transport Plan Framework

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services in order to reach the desired land use and transport planning outcomes.

4.5 FUTURE TRANSPORT PROVISION FOR HOMEBUSH PRECINCT

Precinct strategic transport framework

The strategic transport framework for the Homebush Precinct is presented in **Figure 33**. The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure upgrades

In the future Homebush Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government, Canada Bay Council and Strathfield Council, during policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Homebush Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

The directions have been addressed with the following improvements, shown schematically in **Figure 34** and summarised in **Table 37**.

Table 37 Homebush Precinct: Transport infrastructure upgrades

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Intersection upgrades or road capacity enhancements						
H1	✓			Investigate signalisation of the Subway Lane / Parramatta Road intersection and linking with Parramatta Road / Underwood Road	S	D3, D5, D6, D8
H2	✓			Investigate widening signalised intersection of Bridge Road / Parramatta Road	S	D5, D8
H3	✓			Investigate new East-West connection between Underwood Road and Lorraine Street.	M-L	D4, D5, D6, D8
H4	✓			Implementation of clearways on Parramatta Road.	S	D7, D8
Street extensions and connections						
H5	✓			Investigate extension of Loftus Lane providing rear access for properties on Parramatta Road	S	D4, D8
Provision of active transport facilities and streetscape improvements						
H6*			✓	Improve open space and active transport connections along Powell's Creek from Sydney Olympic Park, Bicentennial Park to Parramatta Road and then Station Street to Homebush Station	S	D1, D3, D4, D6, D8
H7*			✓	Public domain improvements and streetscape upgrade to Parramatta Road to create a distinct Precinct	S	D5, D8
H8*			✓	Upgrade to active transport connection from Powell's Creek to Airey Park via Pomeroy Street (part of Bay to Bay regional cycleway)	M	D3, D5, D6, D8
H9*			✓	Public domain improvements to Station Street & entrance to Homebush Station.	S	D5, D8
H10*			✓	New pedestrian/cycleway bridges over Powells Creek at Hamilton Street and Lorraine Street.	S	D3, D6, D8
H11			✓	Public domain and wayfinding improvements for active transport to Concord West and North Strathfield Stations	S	D1, D3, D8
Improve public transport service provision and bus priority measures						
H12		✓		Deliver bus priority measures along Parramatta Road.	M	D2, D8
H13		✓		Converting of existing route to Suburban bus route between Parramatta and Burwood via Homebush.	S-M	D1, D7
New public transport infrastructure						
H13		✓		Delivery of Hurstville to Macquarie Park Rapid Transit via Burwood including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.	M-L	D2, D8
H14		✓		Potential introduction of the Parramatta to Strathfield Light Rail line (as part of the Western Sydney Light Rail Network).	M	D2, D8
H15		✓		Investigate new suburban bus route from Parramatta to Burwood along Parramatta Road.	M-L	D2, D8

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Homebush | Transport Improvements

ID	Potential Improvements
H1	Investigate signalisation of the Subway Lane / Parramatta Road intersection and linking with Parramatta Road / Underwood Road
H2	Investigate widening signalised intersection of Bridge Road / Parramatta Road
H3	Investigate new East-West connection between Underwood Road and Lorraine Street.
H4	Implementation of clearways on Parramatta Road.
H5	Investigate extension of Loftus Lane providing rear access for properties on Parramatta Road
H6*	Improve open space and active transport connections along Powell's Creek from Sydney Olympic Park, Bicentennial Park to Parramatta Road and then Station Street to Homebush Station
H7*	Public domain improvements and streetscape upgrade to Parramatta Road to create a distinct Precinct
H8*	Upgrade to active transport connection from Powell's Creek to Airey Park, via Pomeroy Street (part of Bay to Bay regional cycleway)
H9*	Public domain improvements to Station Street & entrance to Homebush Station.
H10*	New pedestrian/cycleway bridges over Powells Creek at Hamilton Street and Lorraine Street.
H11	Public domain and wayfinding improvements for active transport to Concord West and North Strathfield Stations.
H12	Deliver bus priority measures along Parramatta Road.
H13^	Converting of existing route to suburban bus route between Parramatta and Burwood via Homebush.
H14^	Delivery of Hurstville to Macquarie Park Rapid Transit via Burwood including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.
H15^	Potential introduction of the Parramatta to Strathfield Light Rail line (as part of the Western Sydney Light Rail Network).
H16	Investigate new suburban bus route from Parramatta to Burwood along Parramatta Road.

Legend

	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Approximate Location of Future Bus Stop		

^ Routes shown are indicative & final alignments are subject to further investigation.

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

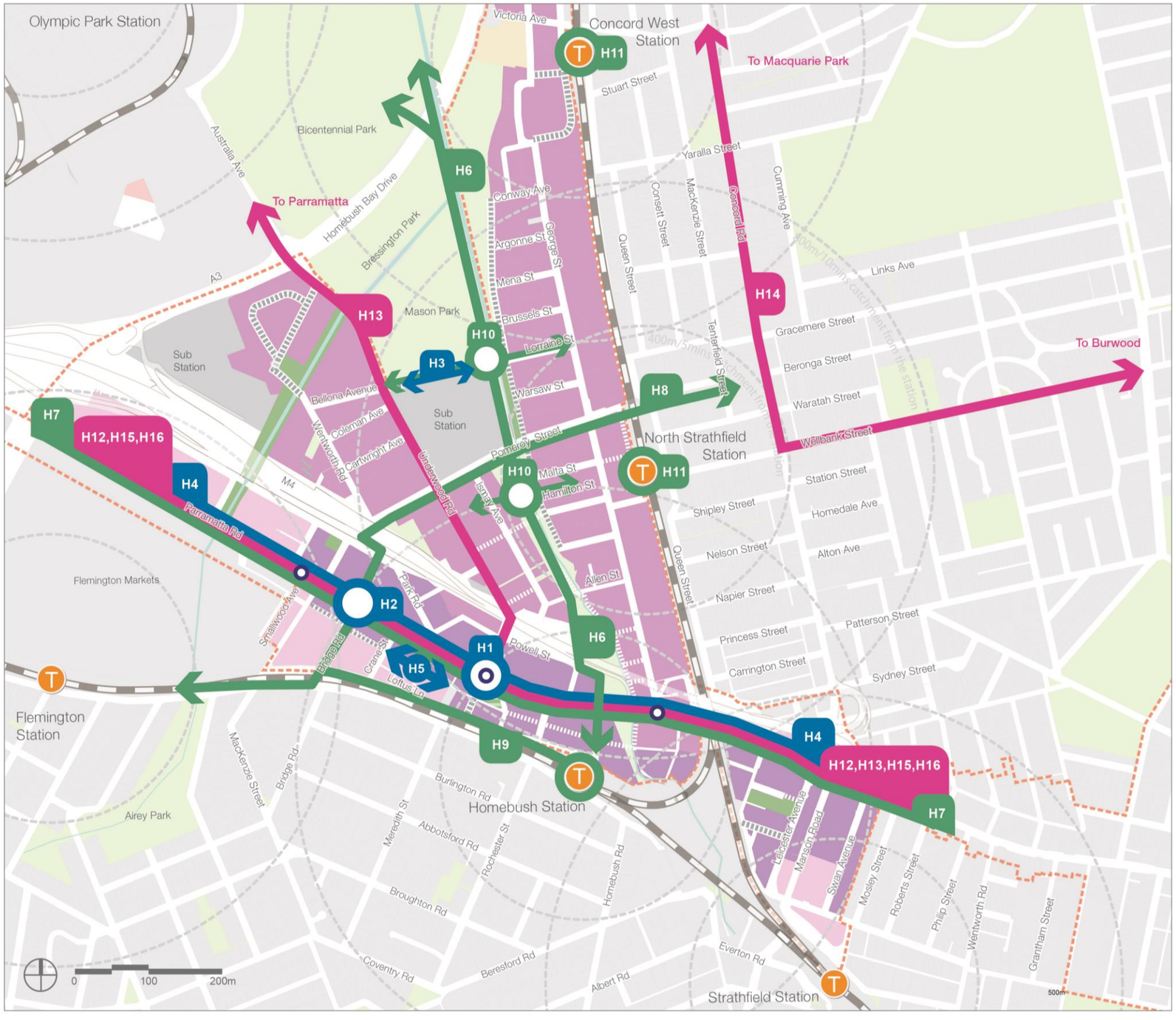

Figure 34 Homebush Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure whereby developments are permitted to provide a lower rate of on-site parking close to public transport, while developments further away would need to provide a higher rate of parking provision. Canada Bay and Strathfield Councils' parking rates do not currently consider the distance from public transport nodes.

The proposed parking rates for the Homebush Precinct consider elements of the Canada Bay DCP and Strathfield DCP, while also adopting an approach to provide parking based on the radial distance to a rail station. The proposed rates provided are maximum parking rates, as opposed to minimums. Due to their proximity to rail stations, residents and workers within these zones are more likely to use public transport. Based on the good accessibility to public transport, density and mix of land uses proposed for Homebush Precinct, it is considered appropriate that existing parking rates may be scaled down to encourage mode shifts to non-vehicular travel and reduce vehicular impacts on the surrounding road network. The 400m and 800m walking catchments for each rail Station are illustrated in **Figure 35**.

The proposed parking rates for the Homebush Precinct are outlined in **Table 38** and **Table 39**. The refined parking rates attempt to address Precinct transport principle 'D7' outlined in **Figure 33**, by reducing parking availability and thereby reducing parking.

While the goal of the reformed parking rates is to reduce car dependency for short tips, with an existing vehicle ownership of 1.3 vehicles per household[5], the reduced off-street parking rates may have implications on the Precinct in the short term. To minimise these impacts, decoupled parking has been recommended along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

[5] ABS Census, 2011

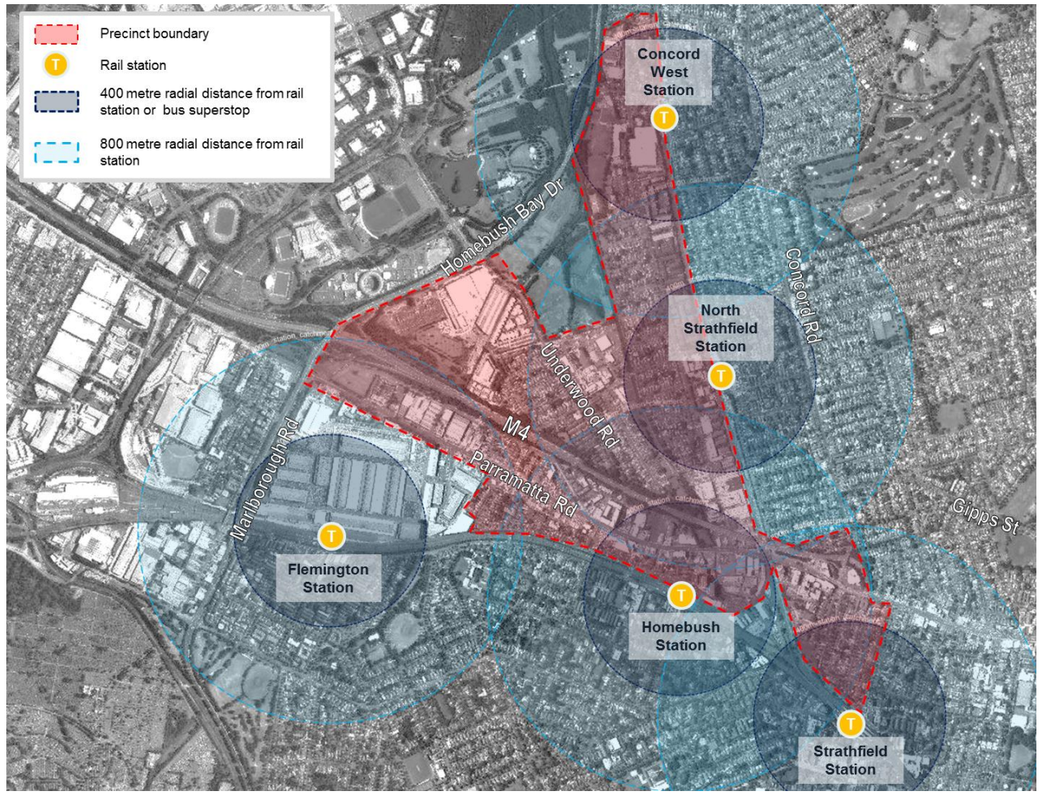

Figure 35 Homebush Precinct: Station catchments
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Table 38 Proposed parking rates within 400m of a railway station (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom		
	3+ bedroom		
Business premises	1 space per 100sqm of GFA		
Retail	1 space per 100sqm of GFA		

Table 39 Proposed parking rates NOT within 400m from a railway station (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 space per dwelling;	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling;	
	3+ bedroom	1.2 spaces per dwelling;	
Business premises	1 space per 70sqm of GFA		
Retail	1 space per 60sqm of GFA		

5. Burwood

5.1 EXISTING LAND USE

The Burwood Precinct is a vibrant and active town centre located around a rail and bus transport interchange to the south of the Precinct, acting as the focal point of a diverse and growing community.

The Burwood Precinct is located within two local government areas (LGAs): the City of Canada Bay north of Parramatta Road and City of Burwood south of Parramatta Road. A review of the Canada Bay Local Environmental Plan (LEP) 2013, Burwood LEP 2012 and aerial photography indicates that a majority of land uses in the Precinct are consistent with their specified zone. The land adjacent to the Parramatta Road is zoned as an Enterprise Corridor, characterised by retail outlets and other commercial land uses. The Precinct is bordered by large Public Recreation zones consisting of primarily parklands and open space areas. A mixed use zone is present along Burwood Road, south of Parramatta Road. The Town Centre borders the southern boundary of the Burwood Precinct, with a series of parklands providing a greener edge of the Precinct, as shown in **Figure 36**.

Burwood Station is located just outside the Precinct boundary but is readily accessible. Burwood Road forms the north-south spine of the Precinct, providing connectivity between the transport interchange, Town Centre and parklands.

Figure 36 Burwood Precinct Boundary
(Source: Canada Bay LEP 2013 and Burwood LEP 2012. Base map: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

5.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing Road Network

The existing road network in the Burwood Precinct is illustrated in **Figure 37**, highlighting the key road connections including Parramatta Road and Burwood Road. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of the current road function and operational roles.

Table 40 identifies some of the key roads within the Burwood Precinct along with their classification based on both the Austroads functional system and Roads and Maritime's administrative system. Parramatta Road serves as the primary east-west arterial corridor for the Precinct. While multiple intersections along Parramatta Road are signalised, Burwood Road serves as a key north-south connection and forms a link to Burwood Station, Burwood Plaza, Town Centre and community parks south of the Precinct. Other east-west connector roads such as Gipps Street / Queens Road provide access to centres such as Kings Bay to the east and Concord to the west.

Table 40 Key roads in the vicinity of the Burwood Precinct (Source: AECOM, 2015)

Road	Functional Classification	RMS Classification
Broughton Street	Collector	Regional Road (north of Parramatta Road) / Local Road (south of Parramatta Road)
Burwood Road	Collector	Regional Road (north of Parramatta Road) / Local Road (south of Parramatta Road)
Crane Street	Collector	Regional Road
Gipps Street / Queens Road	Collector	State Road
Loftus Street	Local	Local Road
Parramatta Road	Arterial	State Road
Shaftesbury Road	Collector	Local Road

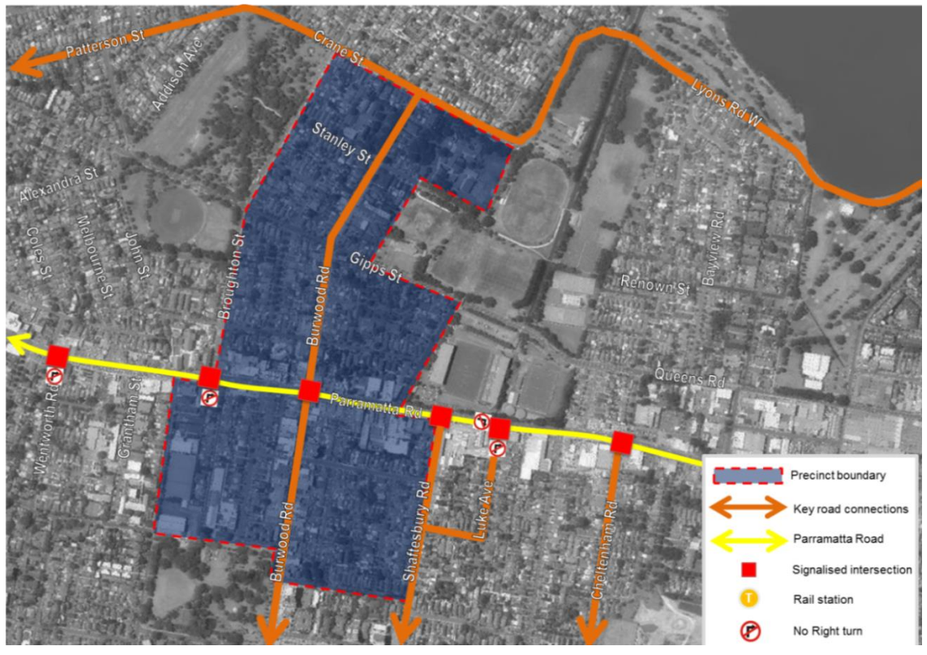

Figure 37 Road network and major connections in the vicinity of the Burwood Precicnt
(Source: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

Traffic volumes

There are no Roads and Maritime Services traffic count stations located within the Burwood Precinct, however a counting station is present approximately three kilometres east of the Precinct in Ashfield along Parramatta Road. It is considered that these volumes would provide an indication of the scale of traffic passing through the Precinct. **Table 41** shows the traffic count station east of the Burwood Precinct, with volumes over 50,000 vehicles per day in 2012. According to the Roads and Maritime Road Network Management Hierarchy, based on the given description of the road and speed limit, the section of the Parramatta Road would be classified as a Class 5 Urban road (5U). Characteristics of a Class 5U road involve moderately high traffic volumes, including freight, public transport and commercial vehicle travel (RMS Network and Corridor Planning, 2008).

Table 41 Traffic counting stations near the Burwood Precinct (Source: RMS traffic counts)

Road Name	Station Description	Westbound*	Eastbound*	Total*
Parramatta Road	Ashfield - East Of Dalhousie Street	27,800	29,400	57,200

*Weekday counts for 2012

Key Intersections

Key intersections on Parramatta Road within and in proximity to the Precinct include:

- Parramatta Road / Burwood Road, providing access to Burwood Railway Station, Burwood Town Centre and north residential areas.
- Parramatta Road / Broughton Street, connecting to Concord, Cabarita and Breakfast Point.
- Parramatta Road / Shaftesbury Road, providing alternate access to Burwood Town Centre.
- Parramatta Road/ Cheltenham Road, providing alternate access to Burwood Town Centre and Burwood Railway Station.
- Parramatta Road/ Luke Avenue, proving access to Shaftesbury Road and thus access to Burwood Town Centre.
- Parramatta Road/Wentworth Road, providing access to Strathfield Station.
- Gipps Road/Burwood Road, providing access to Burwood Station, Burwood Town Centre and to south residential areas.

Constraints

The main road network constraints to the Precinct are caused by the barrier created by the rail line south of the Precinct. The constraints of the road network include:

- Burwood Road underpass of railway line.
- Shaftsbury Road bridge crossing railway line.
- Road network around Burwood Town Centre and associated retail traffic.
- High traffic volumes on Parramatta Road.

Existing parking conditions

Parking conditions across the Burwood Precinct are varied. Clearways are in operation along Parramatta Road between 6am – 7pm weekdays and 8am – 8pm weekends. Time restrictions are present throughout the Burwood Precinct, particularly towards the activity centre at the southern end, near Burwood Station and Town Centre. The presence of mixed use developments particularly along Burwood Road, results in high demand for on-street parking along the road and other nearby streets.

On-street parking within the Burwood Precinct includes:

- The majority of residential streets south of Parramatta Road have restricted parking (1P/2P) near Burwood Town Centre and Burwood Station south of the Precinct.
- Short term parking 0.5P – 2P is provided along the Burwood Road, particularly near the mixed use developments.
- Residential streets north of Parramatta Road are largely unrestricted.

Public off-street parking is provided by Burwood Council at the southern boundary of the Precinct, on Meryla Street. The car park is free on Sunday and during off-peak periods Monday to Saturday, with fees present during peak periods. New developments are required to provide off-street parking to service the anticipated demands of the proposed land use. A summary of off-street parking rates in Burwood Precinct is provided in **Table 42** and **Table 43**.

Table 42 Off-street parking rate summary – Canada Bay LGA (Source: Canada Bay DCP 2013)

Land use	Minimum parking rate		
Residential	Detached	1 space per dwelling	
	1 bedroom unit	1 space per dwelling	Visitors: < 5 dwellings, 1 space per dwelling > 5 dwellings 0.5 spaces per dwelling
	2 bedroom unit	1.5 space per dwelling	
	3+ bedroom unit	2 spaces per dwelling	
Office/Business	1 space per 40sqm of GFA.		
Restaurants / cafes	The greater of: 1 space per 6sqm of serviced area or 1 space per 4 seats.		

Table 43 Off-street parking rate summary – Burwood LGA (Source: Burwood DCP 2013)

Land use	Parking rate		
Residential	Studio	0.5 space per dwelling	Visitors: 0.2 spaces per dwelling.
	1 bedroom unit	0.5 space per dwelling	
	2 bedroom unit	1 space per dwelling	
	3+ bedroom unit	1.2 spaces per dwelling	
Business	1.5 spaces per 100 sqm of GFA		
Retail	1.5 spaces per 100 sqm of GFA		

Public Transport Provision

Public transport services are based around the Parramatta Road strategic bus corridor, with seven bus routes on this corridor within 400 metres of the Precinct and an additional 12 bus routes within 800 metres. Several bus services connect to Burwood Station, located south of the Burwood Precinct boundary, which provides an attractive public transport option for commuters travelling east towards Sydney CBD or west towards Parramatta.

Rail services

Burwood Station lies approximately 500 metres south of the Precinct, accessible from Burwood Road. Based on station barrier counts Burwood Station was ranked the 15th busiest station on the Sydney Trains network recording approximately 29,040 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014).

Burwood Station is serviced by the T2 Inner West & South Line and the T1 North Shore, Northern & Western Line. These lines connect the Burwood Precinct to several centres including the Sydney CBD, Parramatta and Liverpool.

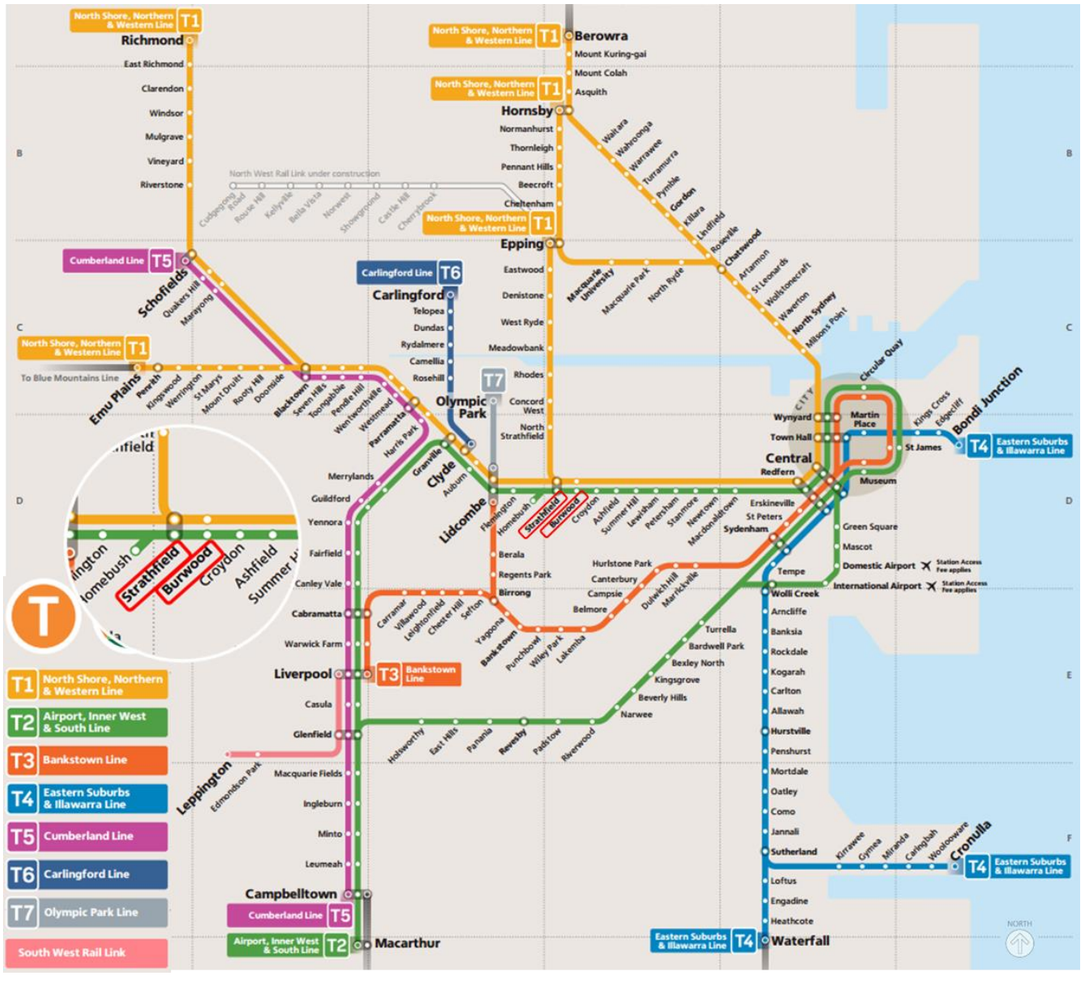

Figure 38 Location of Burwood Station on the Sydney Trains network (Source: Sydney Trains, 2015)

The number of rail services stopping at Burwood Station during peak periods are shown in **Table 44**.

Table 44 Rail service frequencies at Burwood Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T1 North Shore, Northern & Western Line		
Berowra to City via Gordon, Hornsby to City via Macquarie University	25	16
City to Berowra via Gordon, City to Hornsby via Macquarie University	16	19
Hornsby and Epping to City via Strathfield	8	8
City to Epping and Hornsby via Strathfield	8	8
Emu Plains to City, Richmond to City	8	11
City to Emu Plains, City to Richmond	17	8
T2 Inner West & South Line		
Campbelltown to City via Granville	8	9
City to Campbelltown via Granville	11	8

Bus services

The Burwood Precinct is currently serviced by several main bus routes connecting to the major centres of: Canada Bay, Sydney CBD, Campsie and Ashfield. Bus routes operate along Gipps Street, Parramatta Road, Burwood Road and Crane Street. The Precinct is currently served by the following bus routes (operated by Sydney Buses):

- Route 415 (Campsie to Chiswick via Strathfield and Burwood) passes through the Burwood Precinct along Parramatta Road and into Burwood Road, south of the Precinct.
- Route 439, L39 (Mortlake to City via Leichhardt) passes through the Burwood Precinct via Burwood Road, Gipps Street, Crane Street and Burwood Road, into Bayview Road.
- Route 460 (Five Dock to Concord Hospital) passes along Queens Road, Gipps Street and Broughton Street, into Crane Street.
- Route 461 (Burwood to Domain via Parramatta Road and City) passes along Parramatta Road.
- Route 462, 464 and 466 (Ashfield to Mortlake via Burwood) passes along Burwood Road and into Gipps Street.

Figure 39 presents the bus routes in and around the Burwood Precinct.

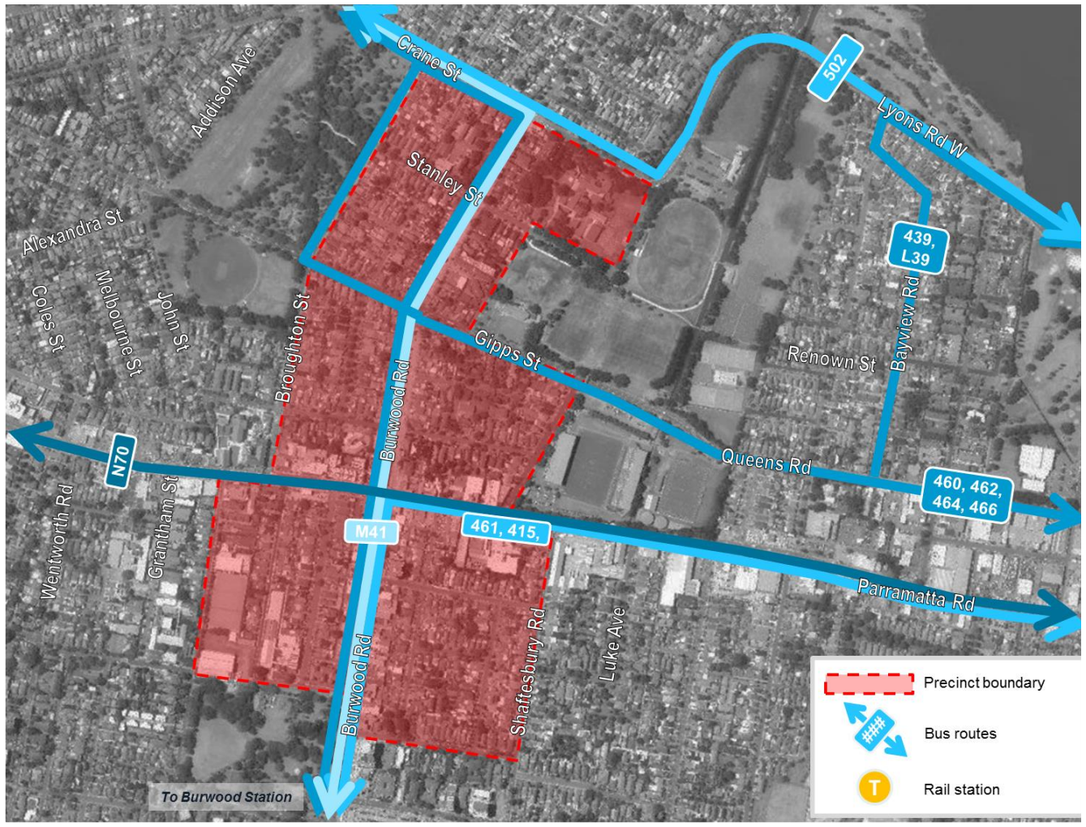

Figure 39 Bus services in the vicinity of the Burwood Precinct
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Table 45 provides a summary of peak bus service frequencies for routes operating in the vicinity of the Precinct.

Table 45 Bus service frequencies for the Burwood Precinct (Source: Transdev and Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
415	Chiswick to Campsie	30 minutes	30 minutes
439, L39	Five Dock and Rozelle to City via Leichhardt	<10 minutes	<10 minutes
461	Burwood to the Domain	<10 minutes	10 minutes
462, 464, 466	Ashfield to Cabarita & Mortlake	<10 minutes	<15 minutes

* Route 460 and N70 have been excluded from the table as they do not provide peak period services. Route 460 operates during weekday off-peak periods only, with six services per day (60 minute frequency). Route N70 provides hourly NightRide (late night) services between midnight to 5am.

Active Transport Provisions

Active transport provisions are illustrated in **Figure 40**. Paved footpaths are provided on either side of the road and signalised pedestrian crossings are present along several intersections of Parramatta Road. Additionally a shared pedestrian and cyclist bridge is provided at the Broughton Street / Parramatta Road intersection. Cycle facilities are limited, with no formal north-south cycle routes in the Precinct or leading to Burwood Station, which forms a significant constraint to active transport connectivity. Cycling provisions are present as on-road cycle routes only, with the exception of a short shared path along Parramatta Road. East and west of the Precinct boundary, parklands provide off road shared pedestrian and cycle paths. Cycle routes south of Parramatta Road have not been well established, with minimal routes providing access to residential areas in the south.

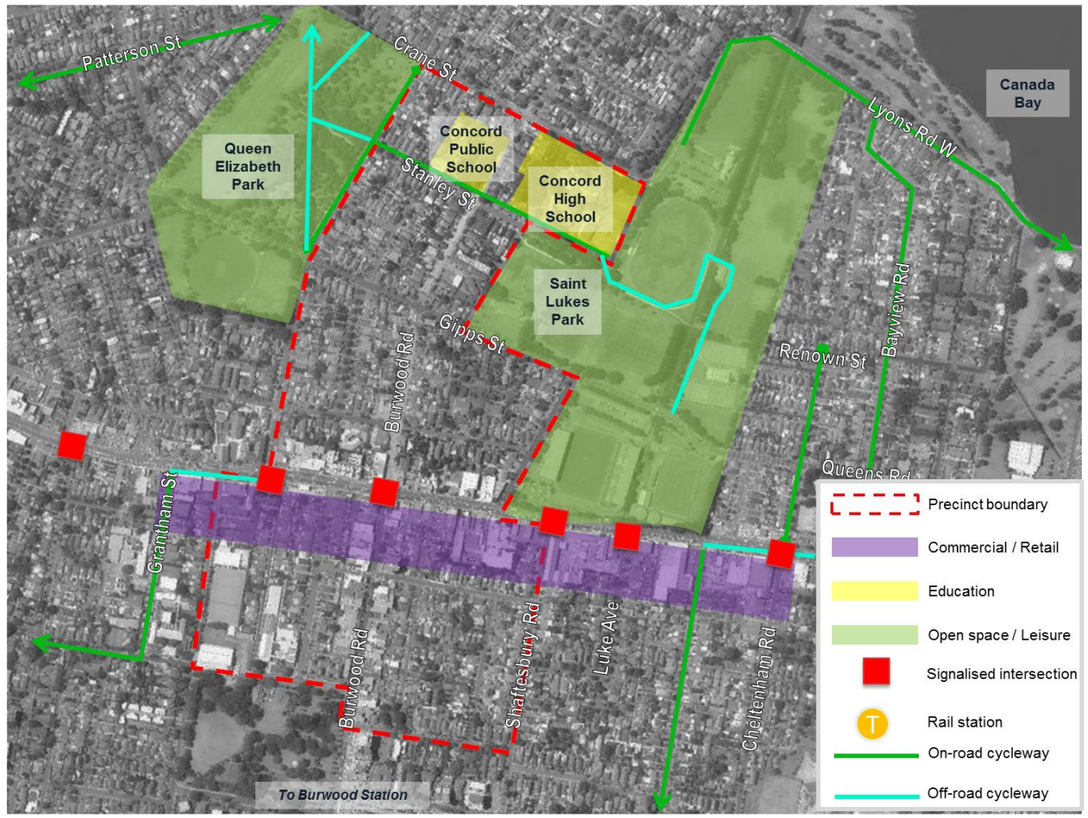

Figure 40 Active transport facilities and desire lines in the vicinity of the Homebush Precinct
(Source: NSW Land & Property Information – SixMaps, 2015)

Travel Patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 revealed that more residents of Burwood Precinct are employed in Sydney Inner City (29 per cent) than any other destination, as shown in **Table 46**. While residents travelling to North Sydney - Mosman and Sydney Inner City predominately travel by rail, private vehicle travel is the dominant mode overall, with a mode share of 48 per cent. This may be a reflection of the numerous rail and bus connections available to access Sydney Inner City and North Sydney - Mosman, but lack of / infrequent public transport services to other top workforce destinations.

Table 46 Burwood Precinct Workforce Travel Destinations
Source: BTS Journey to Work – Travel Zones

Workforce destinations		Train	Bus	Car	Walked only	Other	Total^*
1	**Sydney Inner City**	2,095	185	610	7	102	**2,999**
2	**Strathfield-Burwood-Ashfield**	187	58	769	479	83	**1,576**
3	**Canada Bay**	81	83	571	66	30	**831**
4	**Auburn**	79	41	273	4	14	**411**
5	**North Sydney-Mosman**	252	9	112	0	9	**382**
	Other	1,275	155	2,625	18	114	**4,187**
	Total	**3,969**	**531**	**4,960**	**5,74**	**352**	**10,386**
		38%	5%	48%	6%	3%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

A majority of workers in the Burwood Precinct start their travel in the neighbouring areas of Strathfield - Burwood – Ashfield as shown in **Table 47**. The next four top places of residence for people working in Burwood included Canada Bay, Canterbury, Bankstown and Auburn. Similar to outbound trips, the majority of inbound trips to the Burwood Precinct are made by car with a dominant mode share of 64 per cent. Approximately 24 per cent of workers travel by train and four per cent of workers travel by bus, a much lower mode share than outbound trips. This indicates the employment areas may not be directly accessible to the train stations and the frequent bus corridors or there is a good supply of off-street and on-street parking available to the employees within the Burwood Precinct.

Table 47 Burwood Precinct Employment Travel Origins
Source: BTS Journey to Work – Travel Zones

Employee origins		Train	Bus	Car	Walked only	Other	Total^*
1	**Strathfield-Burwood-Ashfield**	348	186	1,723	637	129	**3,023**
2	**Canada Bay**	87	101	1,040	89	75	**1,392**
3	**Canterbury**	78	94	629	6	12	**819**
4	**Bankstown**	91	15	528	3	27	**664**
5	**Auburn**	220	18	335	3	9	**585**
	Other	2,681	152	4,942	24	167	**7,966**
	Total	**3,505**	**566**	**9,197**	**762**	**419**	**14,449**
		24%	4%	64%	5%	3%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

The existing Journey To Work mode split for the Burwood Precinct compared to the wider Canada Bay LGA and Burwood LGA are summarised in **Table 48**. The suburb has developed from a largely low to medium density past to cater for increasing amounts of high density residential. The most popular choice of travel to work is vehicle travel (48%), followed by public transport (35%) and walk only trips (14%). It is evident that the public transport use mode share was higher and the private vehicle mode share was lower within the Burwood Precinct compared to both Canada Bay LGA and Burwood LGA. However, walk only trips are higher in both LGAs than in the Burwood Precinct. The low walking mode share may be attributed to the strong public transport provision in the Precinct, evidenced by the high bus mode share. It should be noted that the JTW data is based on the primary mode of travel used for each trip, indicating active transport mode shares may be underestimated due to people walking or cycling to their primary mode of rail travel.

Table 48 Burwood Precinct: Mode share for the Precinct compared to Canada Bay LGA and Burwood LGA (2011)
Source: BTS Journey to Work – Travel Zones

Mode	Existing Burwood Precinct mode share	Existing LGA mode shares	
		Canada Bay LGA	Burwood LGA
Vehicle driver	44%	62%	59%
Vehicle passenger	4%	4%	5%
Train	38%	14%	23%
Bus	5%	10%	4%
Ferry / Tram	<1%	2%	-
Walked only	<1%	3%	5%
Other mode	1%	2%	1%
Mode not stated	2%	1%	2%

5.3 FUTURE CHARACTER OF BURWOOD PRECINCT

The Burwood Town Centre and transport interchange is experiencing renewal and forms a hub to the south of the Precinct. The Burwood Precinct is well positioned, located approximately 11 kilometres west of the Sydney CBD and 11 kilometres east of the Parramatta CBD. The Precinct is characterised by the surrounding parklands, multicultural communities and a collection of heritage items, including houses, schools and corner stores. Future development and the proposed improvements will allow Burwood Precinct to achieve the vision.

The vision for the Burwood Precinct:

A commercial gateway to Burwood Town Centre based around an enlivened spine that builds upon existing amenity for new residents.

Future land use context

To achieve the vision for the Precinct, the following planning measures have been proposed as illustrated in **Figure 41**:

- Mixed use development south of Parramatta Road that supports the growth and prosperity of Burwood Town Centre, with an emphasis on Burwood Road.
- Residential focus surrounding the mixed use development south of Parramatta Road to the east and west of Burwood Road.
- An intensified residential community north of Parramatta Road close to open space and linked to Burwood town centre.

Collectively, the proposed measures may have the following potential transport implications:

- Improvement to pedestrian and cycle connectivity is required as a result of the proposed development, with the plan aiming to address the divide of Parramatta Road.
- Improvement to active transport and bus connections to existing rail stations and to the future rapid transit corridor along Burwood Road and Parramatta Road.
- Public transport service frequencies may need to be increased as the higher density land use zones are likely to increase public transport trips.
- Changes in existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

A review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and service improvements to be delivered, as discussed in the Transport Plan. These upgrades not only address existing deficiencies, but also cater for future growth of the Burwood Precinct. These proposed infrastructure upgrades are expected to reduce dependency on private vehicles and also provide alternative transport options for future residents and employees in the Burwood Precinct.

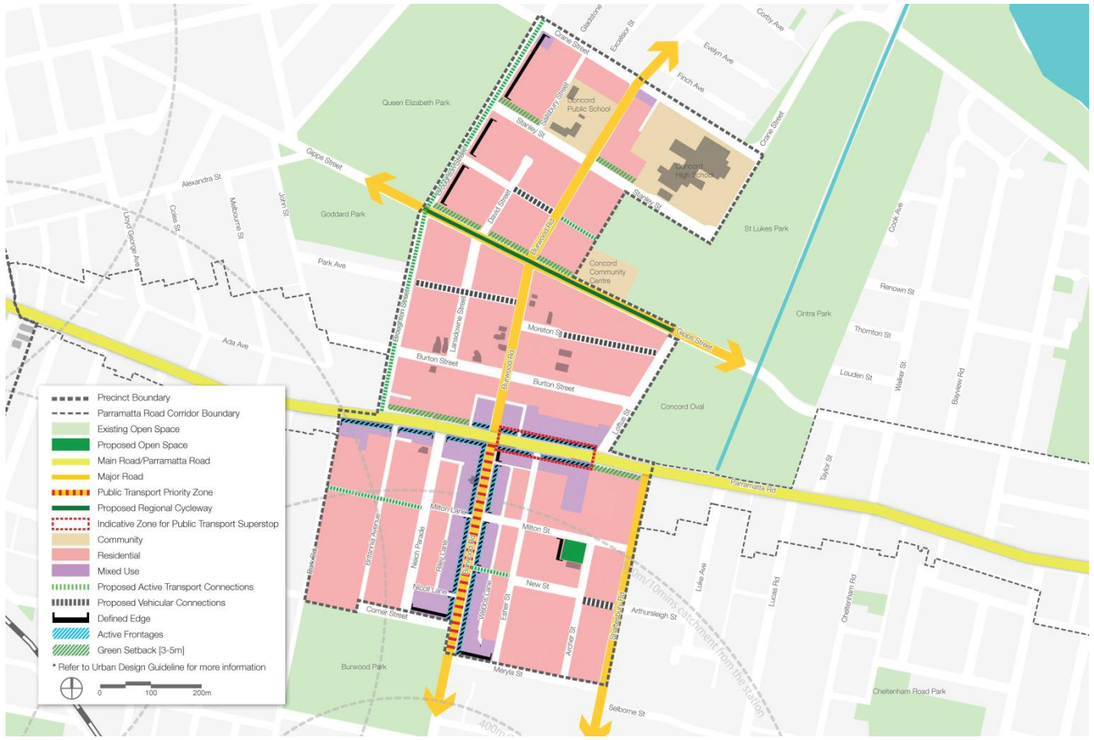

Figure 41 Burwood Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Burwood Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 43.** These identified opportunities and constraints serve as the basis for the strategic transport framework for Burwood Precinct.

In addition to the identified issues, the WestConnex project currently in progress is expected to impact on the existing traffic conditions. The *WestConnex M4 East EIS Traffic and Transport Assessment* outlined the anticipated impacts of the M4 East project on the road network in 2031 based on detailed traffic modelling. In Burwood, a reduction in volumes of traffic due to the extension of the M4 to the east is expected to improve level of service for the road network in the Precinct. Modelling suggests that midblock traffic conditions on Parramatta Road east of Concord will undergo substantial reductions in levels of delay, despite the reduction in through capacity due to bus lane provision. A large reduction in delay is anticipated at the Gipps Street intersection with Burwood Road although it is likely that it would remain congested. Key intersections on Parramatta Road, including Burwood Road, Broughton Street and Shaftesbury Street are expected to undergo significant improvements in levels of service as a result of the forecasted reduction in volumes due to the M4 East development in the long term. This reduction in traffic volumes provides a significant opportunity for the delivery of on-street Rapid Transit between Strathfield / Burwood along Parramatta Road.

5.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Burwood Precinct Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example of a location where urban renewal development has occurred and comparing it to the characteristics of the proposed Burwood Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Burwood Precinct.

This assessment enables the identification of infrastructure needs for the Burwood Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Burwood has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Burwood Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW, Burwood Council and City of Canada Bay for their feedback. This helped to inform the selection of the Sydney suburb of **Bondi Junction** as an ideal benchmark for what the future Burwood Precinct might look like.

Characteristics that Bondi Junction shares with the future Burwood Precinct include:

- Its functional nature and role within Sydney. Like Burwood, Bondi Junction is a strategic centre under *A Plan For Growing Sydney* and acts as a transport hub and focal point for a wider area.
- Bondi Junction includes an established mixed use, commercial and residential land uses, similar in extent to what might be expected from the future Burwood Precinct.
- It is relatively similar in size to the proposed scale of Burwood.
- Bondi Junction is the retail focal point for the wider area with a large Westfield shopping centre acting as the major trip generator. Burwood is also strongly influenced by a Westfield shopping centre.
- Bondi Junction is its own generator of traffic, similar to Burwood which is also a trip attractor.
- Bondi Road and Oxford Street are heavily trafficked during peak periods and have active street frontages in a similar fashion to Parramatta Road and Burwood Road.
- Bondi Junction has good public transport connections in all directions, including its location on the rail network as well as frequent bus services in all directions.
- Existing active transport infrastructure connects to adjacent suburbs through leisure routes and further opportunities exist to enhance these connections.

A review of Bondi Junction is described further in **Figure 43** that identifies the success and improvements identified (for Bondi Junction) that would be useful for establishing transport directions for the Burwood Precinct.

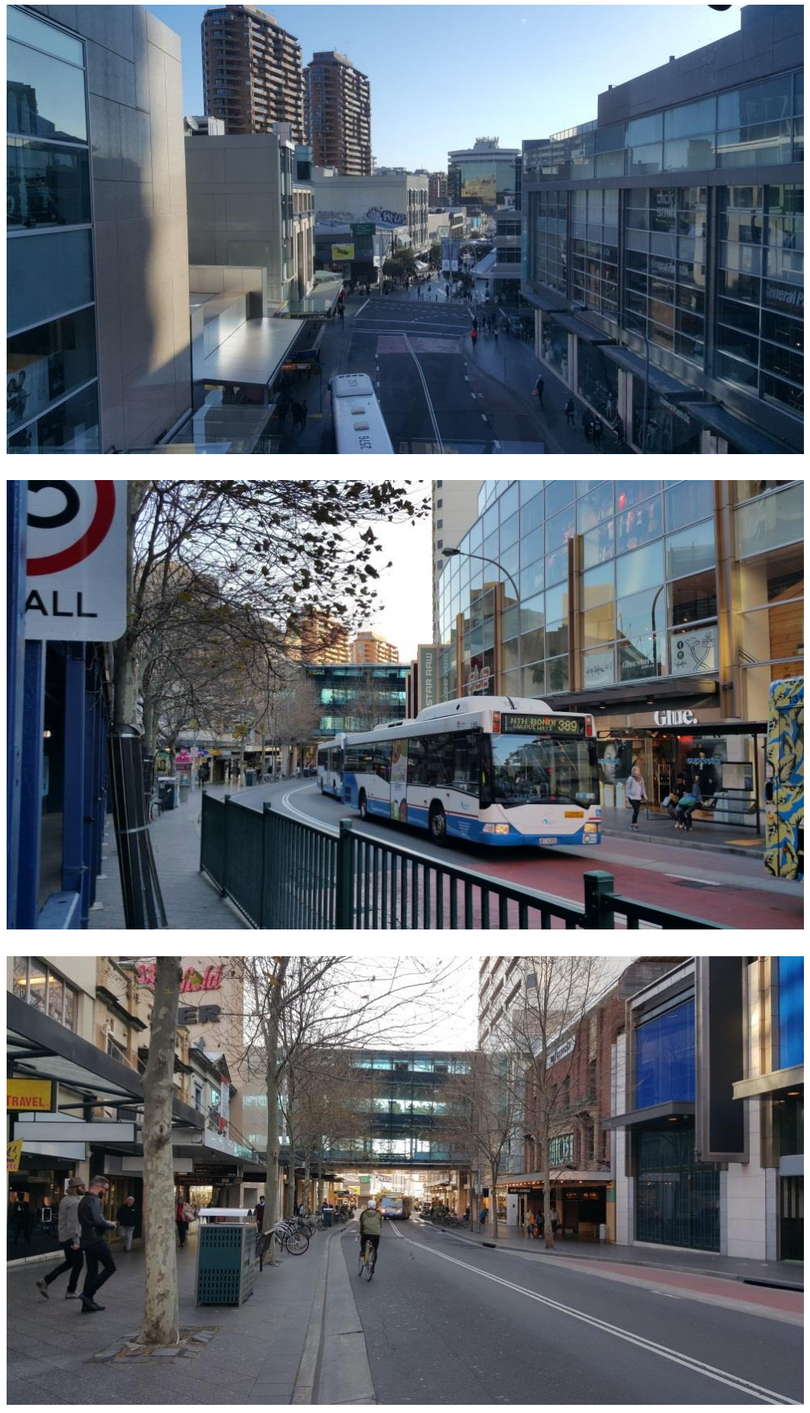

Figure 42 Bondi Junction Streetscapes (Source: AECOM, 2015)

a) Burwood Precinct Opportunities and Constraints

Significant Opportunities

O1 – Leverage potential traffic reductions along Parramatta Road (due to Westconnex) to enhance north south connectivity across Parramatta Road for all modes of transport

O2 – Increase the priority of Burwood Road (for all modes) at the intersection with Parramatta Road in order to ensure strong connectivity between the Burwood Precinct and the existing centre / Burwood rail station

O3 – Creating a series of new laneways and through links within the existing road network grid to increase the permeability of long blocks

O4 – Improving active transport connections to regional recreation and open space facilities, particularly via the Patterson / Gipps / Queens Road cycle route toward the leisure routes around Canada Bay

O5 – Reducing car dependency by lowering parking rates in areas with good access to public transport and capitalising on the rapid bus network along Parramatta Road

O6 – Potential to reduce traffic along Burwood Road by enhancing the route as a bus corridor and encouraging other vehicular traffic to utilise Shaftesbury Road

07 – Improve connectivity to the existing Burwood Town Centre for all modes of travel.

Primary Constraints

C1 – Overcoming the north-south barrier to permeability created by Parramatta Road

C2 – The distance between the Burwood rail station and the area to the north of Parramatta Road

C3 – Reliance on a small number of key roads for accommodating all modes of transport

C4 – Addressing deficiency and access to open space within and adjacent to the Precinct.

b) Case Study: Bondi Junction

Success of Bondi Junction

- Bondi Junction has a relatively high public transport mode share for residents as it acts as a hub for eastern suburbs buses connecting to the rail line
- It has strong connectivity to the key destinations of Bondi Beach and the Sydney CBD
- Having dense residential development around a strong public transport network has enabled Bondi Junction to support a culture of outdoor living, cafes and services and become Sydney's 5th largest commercial centre
- Proximity to the CBD and leisure areas has enabled Bondi Junction to support a demographic of young professionals who are able to commute easily and efficiently to their places of work, whilst also catering to and attracting recreational trips from around the region.
- Through well located parking buildings on the periphery of the precinct, the core of Bondi Junction is relatively traffic free, enabling bus, cycle and pedestrian infrastructure to be prioritised.

Potential Further Opportunities for Bondi Junction

- Enhancing cycle routes by creating dedicated cycleways, particularly in an east-west direction connecting to Oxford Street
- Improving the liveability and community feel of the precinct through enhanced public spaces via the Complete Streets Project.
- Consideration of light rail to Bondi Beach in order to reduce bus traffic in the precinct
- Improving pedestrian connectivity.

c) Strategic Transport Framework for the Burwood Precinct

	Opportunities and constraints addressed
D1 – Leverage and greater focus on existing public transport infrastructure, with improvements to bus facilities / services and stronger links to Burwood Station south of the Precinct	*O2, O5, 07*
D2 – Capitalise on the Precinct's proximity to Burwood Town Centre and existing community facilities by improving active transport links and infrastructure	*O2, O3, O4, C5, 07*
D3 – Capitalise on potential new rapid transit network along Burwood Road and Parramatta Road	*O5, O6, C2, 07*
D4 – Improve internal east-west connections to allow for greater permeability	*O1, O3*
D5 – Creating additional north-south walking and cycling connections, especially across Parramatta Road, linking the areas of the Precinct south of Parramatta Road to the parklands to the north	*O1, O5, C1, C3, C4*
D6 – Reduce the need for on-site parking for new developments near public transport nodes and locate parking away from active surface routes (preferably underground)	*O5, O6*
D7 – Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians.	*O3, O5*

d) Transport Infrastructure and Service Improvements

- Intersection upgrades or road capacity enhancements
- Street extensions and connections.
- Provision of active transport facilities and streetscape improvements
- Improve public transport services provision and bus priority measures
- New public transport infrastructure (e.g. Light Rail or Rapid Transit)
- Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 43 Burwood Precinct Transport Plan Framework (source, AECOM, 2015)

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services in order to reach the desired land use and transport planning outcomes.

5.5 FUTURE TRANSPORT PROVISION FOR BURWOOD PRECINCT

Precinct strategic transport framework

The strategic transport framework for the Burwood Precinct is presented in **Figure 23**. The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure upgrades

In the future Burwood Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government and Burwood Council and Canada Bay Council, during policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Burwood Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

The directions have been addressed with the following improvements, shown schematically in **Figure 44** and summarised in **Table 49**.

Table 49 Burwood Precinct: Transport Infrastructure and Service improvements

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Intersection upgrades or road capacity enhancements						
B1	✓			Extension of eastbound right turn bay from Parramatta Road to Wentworth Road (pinch point works)	S	D4, D5, D7
B2	✓			Construct additional eastbound right turn bay from Parramatta Road into Shaftesbury Road (pinch point works)	S	D4, D5, D7
B3	✓			Potential upgrade / signalisation of intersections along Shaftesbury Road to improve traffic efficiency and circulation	M	D4, D5, D7
B4	✓			Implementation of clearways on Parramatta Road.	S	D6, D7
Street extensions and connections						
B5	✓		✓	New east-west road and active transport connections through Burwood Road, north and south of Parramatta Road.	L	D4, D5, D7
Provision of active transport facilities and streetscape improvements						
B6*			✓	Burwood Road general public domain and streetscape improvements between Parramatta Road and Gipps Street	S	D2, D5, D7
B7			✓	Gipps Street and Stanley Street streetscape improvements including Gipps Street cycleway	S	D4, D5, D7
B8*			✓	New north-south active transport connection from Luke Avenue to and Parramatta Road intersection to Burwood Park.	M	D4, D5, D7
B9*			✓	Public domain improvements and streetscape upgrade to Parramatta Road from Shaftesbury Road to Broughton Street	S	D5, D8
Improve public transport service provision and bus priority measures						
B10		✓		Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD.	S	D1, D3, D7
B11		✓		Delivery of new Suburban bus route between Burwood – Chatswood via Drummoyne and Lane Cove.	S-M	D1, D7
B12		✓		Converting of existing route to Suburban bus routes between: - Bondi Junction – Burwood via Eastgardens - Bondi Junction – Burwood via Sydenham - Hurstville – Burwood via Roselands - Liverpool – Burwood via Bankstown	S-M	D1, D7
B13		✓		Converting of existing route to Suburban bus route between Parramatta and Burwood via Homebush.	S-M	D1, D7
New public transport infrastructure						
B14		✓		Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.	M-L	D3, D7
B15		✓		Delivery of Hurstville to Macquarie Park Rapid Transit via Burwood including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.	M-L	D3, D7

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Burwood | Transport Improvements

ID	Potential Improvements
B1	Extension of eastbound right turn bay from Parramatta Road to Wentworth Road (pinch point works)
B2	Construct additional eastbound right turn bay from Parramatta Road into Shaftesbury Road (pinch point works)
B3	Potential upgrade / signalisation of intersections along Shaftesbury Road to improve traffic efficiency and circulation
B4	Implementation of clearways on Parramatta Road.
B5	New east-west road and active transport connections through Burwood Road, north and south of Parramatta Road.
B6*	Burwood Road general public domain and streetscape improvements between Parramatta Road and Gipps Street
B7	Gipps Street and Stanley Street streetscape improvements including Gipps Street cycleway
B8*	New north-south active transport connection from Luke Avenue to and Parramatta Road intersection to Burwood Park.
B9*	Public domain improvements and streetscape upgrade to Parramatta Road from Shaftesbury Road to Broughton Street
B10	Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD.
B11^	Delivery of new Suburban bus route between Burwood – Chatswood via Drummoyne and Lane Cove.
B12^	Converting of existing route to Suburban bus routes between: · Bondi Junction – Burwood via Eastgardens · Bondi Junction – Burwood via Sydenham · Hurstville – Burwood via Roselands · Liverpool – Burwood via Bankstown
B13^	Converting of existing route to suburban bus route between Parramatta and Burwood via Homebush.
B14^	Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.
B15^	Delivery of Hurstville to Macquarie Park Rapid Transit via Burwood including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.

Legend			
	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Indicative Zone of Future Super Stop Envelope		

^ Routes shown are indicative & final alignments are subject to further investigation.

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

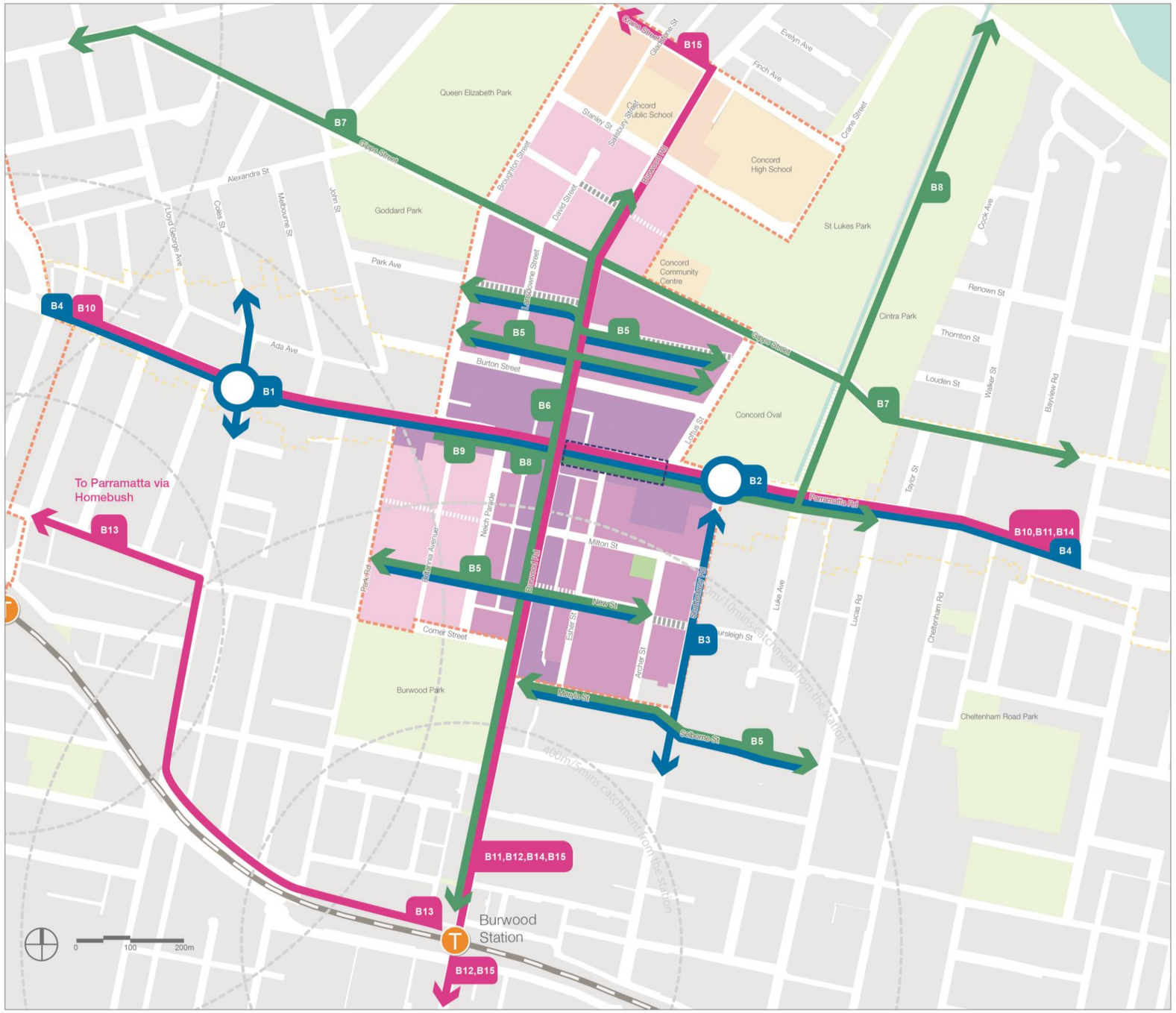

Figure 44 Burwood Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure whereby developments are permitted to provide a lower rate of on-site parking close to public transport, while developments further away would need to provide a higher rate of parking provision. Canada Bay and Burwood Councils provide parking rates that do not consider the distance from public transport nodes. However, it should be noted that Burwood provides relatively lower rates than Canada Bay as a method of reducing excessive off-street parking provision.

The proposed parking rates for the Burwood Precinct consider elements of the Canada Bay DCP and Burwood DCP, while also adopting the emerging best practice approach which considers the radial distance to rail stations or bus superstops. The proposed rates provided are maximum parking rates, as opposed to minimums. Due to their proximity to rail stations and the bus corridors, residents and workers within these zones are more likely to use public transport. Based on the accessibility to public transport, density and mix of land uses proposed for Burwood Precinct, it is considered appropriate that existing parking rates may be scaled down to encourage mode shifts to non-vehicular travel and reduce vehicular impacts on the surrounding road network.

The 400m and 800m walking catchments for Burwood Station as well as the potential bus superstop along Parramatta Road are shown in **Figure 45**. It is evident that a sizeable portion of the Precinct lies within 400 metres of Burwood Station and the bus corridors. The proposed parking rates for the Burwood Precinct are outlined in **Table 50** and **Table 51**. The refined parking rates attempt to address Precinct transport principle 'D6' outlined in **Figure 43**, by reducing parking availability and thereby reducing parking.

While the goal of the reformed parking rates is to reduce car dependency for short tips, with an existing vehicle ownership of 1.3 vehicles per household[6], the reduced off-street parking rates will have implications on the Precinct in the short term. To minimise these impacts, decoupled parking is proposed along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

[6] ABS Census, 2011

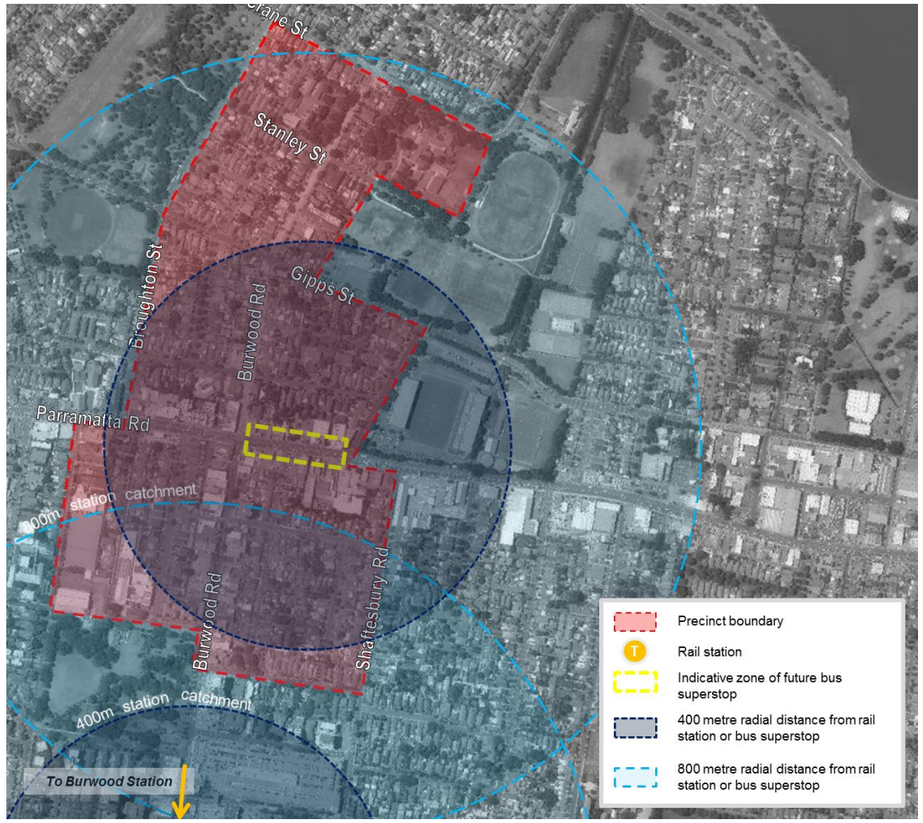

Figure 45 Burwood Precinct: Rail station and proposed bus superstop catchments
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Table 50 Proposed parking rates within 400m of a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom		
	3+ bedroom		
Business premises	1 space per 100sqm of GFA		
Retail	1 space per 100sqm of GFA		

Table 51 Proposed parking rates NOT within 400m of a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 space per dwelling;	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling;	
	3+ bedroom	1.2 spaces per dwelling;	
Business premises	1 space per 70sqm of GFA		
Retail	1 space per 60sqm of GFA		

6. Kings Bay

6.1 EXISTING LAND USE

The Kings Bay Precinct is located to the east of Burwood Precinct, bordered by Queens Road to the north and Dalmar Street to the south. The Kings Bay Precinct is located within three local government areas (LGAs): Canada Bay LGA, Burwood LGA and Ashfield LGA. A review of the Canada Bay Local Environmental Plan (LEP) 2013, Burwood LEP 2012, Ashfield LEP 2013 and aerial photography indicates that a majority of land uses in the Precinct are consistent with their specified zone.

Kings Bay is currently an industrial Precinct dominated by car showrooms, car servicing centres, panel beaters, small manufacturers and warehouses. Residential areas and large public recreation areas, including parks, golf courses and leisure centres are also present near the Precinct. The land adjacent to Parramatta Road is zoned as an Enterprise Corridor, characterised by retail outlets and other commercial land uses. The Precinct is bordered by large Public Recreation zones consisting of parklands and open spaces. The Kings Bay Precinct boundary and existing land use zones are shown in **Figure 46**.

Figure 46 Kings Bay Precinct Boundary
(Source: Canada Bay LEP 2013, Burwood LEP 2012 and Ashfield LEP 2013. Base map: NSW Land & Property Information – SixMaps, amended by AECOM, 2015)

6.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing Road Network

The existing road network in the Kings Bay Precinct is illustrated in **Figure 47**, highlighting the key roads connections including Parramatta Road. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of the current road function and operational roles.

Table 52 identifies some of the key roads within the Kings Bay Precinct along with their classification based on both the Austroads functional system and Roads and Maritime's administrative system. Parramatta Road and Queens Road serve as the primary east-west arterial corridors for the Precinct, with north-south connections to sub-arterial and collector roads. While three intersections of Parramatta Road within the Precinct boundary are signalised, right turn bans limit access to either side of Parramatta Road. As a result, Harris Road provides the only connection north for westbound vehicles on Parramatta Road. In addition, there are no right turns permitted for eastbound traffic on Parramatta Road within the Precinct, with Croydon Road providing the first opportunity east of the Precinct boundary.

Table 52 Key roads in the vicinity of the Kings Bay Precinct

Road	Functional Classification	RMS Classification
Acton Street	Local	Local
Cheltenham Road	Local	Local
Croydon Road	Collector	Local
Harris Road	Collector	Regional
Lucas Road	Local	Local
Parramatta Road	Arterial	State Road
Queens Road	Arterial	State Road
Regatta Road	Collector	Local
Walker Street	Collector	Local

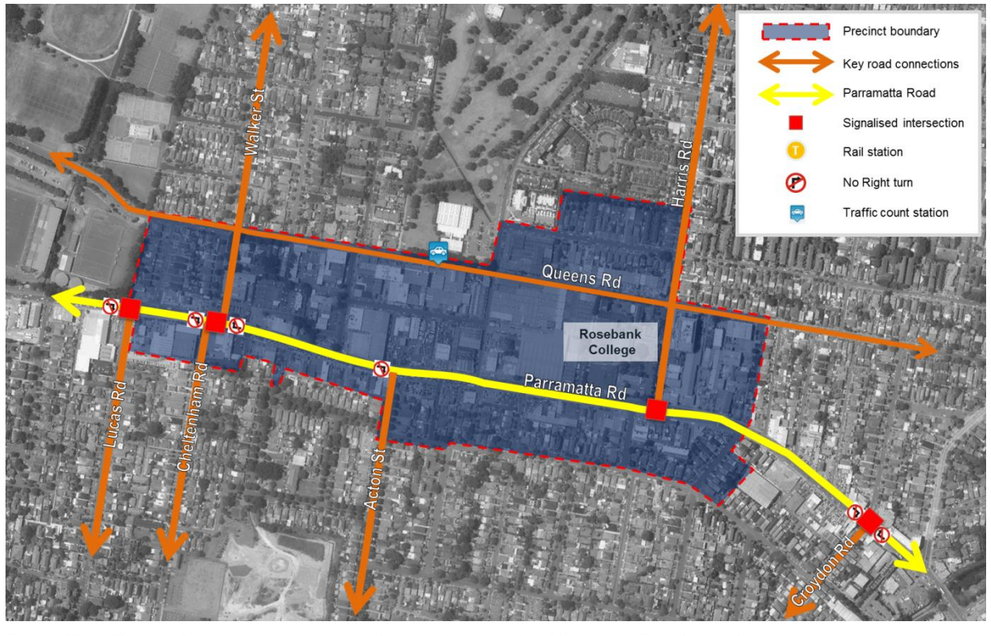

Figure 47 Road network and major connections in the vicinity of the Kings Bay Precinct
(Source: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

Traffic volumes

There are no permanent Roads and Maritime Services traffic count stations located within the Kings Bay Precinct, with the nearest counting station located approximately two kilometres east of the Precinct in Ashfield along Parramatta Road. However, the *WestConnex M4 East EIS Traffic and Transport Assessment* provided volumes for Queens Road at the centre of the Precinct, obtained from automatic traffic count surveys completed between 2012 and 2014. It is considered that the volumes from the two counters provide an indication of the scale of traffic passing through the Precinct.

Table 41 shows the volumes per weekday for Parramatta Road east of the Precinct and Queens Road in 2012. According to the Roads and Maritime Road Network Management Hierarchy, based on the given description of the road and speed limit, Parramatta Road would be classified as a Class 5 Urban road (5U). Characteristics of a Class 5U road involve moderately high traffic volumes, including freight, public transport and commercial vehicle travel (RMS Network and Corridor Planning, 2008). The lower volumes on Queens Road indicate that it would be classified as a lower level Class 4 Urban road (4U), typically considered as important State Roads with moderately high traffic volumes.

Table 53 Traffic counting stations near the Kings Bay Precinct (Source: RMS traffic counts)

Road Name	Station Description	Westbound*	Eastbound*	Total*
Parramatta Road~	Ashfield - East Of Dalhousie Street	27,800	29,400	57,200
Queens Road^	Between William Street and Coonardoo Close	13,600	13,700	27,300

*Weekday counts
~RMS traffic counts, 2012
^ WDA automatic traffic counts, 2012-14

Key Intersections

Key intersections on Parramatta Road in and around the Precinct include:

- Cheltenham Road, providing a North-South connection between Croydon Public School and Kings Bay.
- William Street, providing a link from Kings Bay Precinct to the Kings Bay, Canada Bay and Exile Bay.
- Harris Road providing access north to Five Dock (signalised, right turn bay provided).
- Croydon Road connects to Croydon Town Centre, Croydon Rail Station and Kings Bay.
- Great North Road providing access north to Five Dock, Wareemba and Abbotsford.

Constraints

The Precinct contains a number of land uses such as retail zones, community facilities and education facilities, which often generate private vehicle trips. In particular, the dense retail district between Regatta Road and Harris Road causes severe traffic congestion during morning peak hours (i.e. 6am to 9:30am) and school hours. This reflects the lack of permeability for customers and employees accessing the retail district of Kings Bay.

Constraints of the surrounding road network include:

- Harris Road and Regatta Road intersections at Parramatta Road and Queens Road.
- Vehicular and pedestrian movement conflicts at Regatta Road, William Street, Courland Street, Lavender Street and York Avenue due to the lack of pedestrian crossings.
- North-south vehicular connectivity across Parramatta Road.

Existing parking conditions

A majority of roads provide unrestricted on-street parking throughout Kings Bay Precinct, including William Street, Regatta Road and Bayview Road. Clearways are in operation along Parramatta Road between 6am – 7pm weekdays and 8am – 8pm weekends.

Approximately 110 public off-street parking spaces are provided by Canada Bay Council at the Five Dock Leisure Centre along the northern boundary of the Precinct. New developments are required to provide off-street parking to service the anticipated demands of the proposed land use. A summary of the current off-street parking rates in the Kings Bay Precinct based on the Development Control Plans for each LGA are presented in **Table 54** to **Table 56**.

Table 54 Off-street parking rate summary – Canada Bay LGA (Source: Canada Bay DCP 2013)

Land use	Parking rate (minimum)		
Residential	Detached	1 space per dwelling	
	1 bedroom unit	1 space per dwelling	Visitors: < 5 dwellings, 1 space per dwelling > 5 dwellings 0.5 spaces per dwelling
	2 bedroom unit	1.5 space per dwelling	
	3+ bedroom unit	2 spaces per dwelling	
Office/Business	1 space per 40sqm of GFA.		
Restaurants / cafes	The greater of: 1 space per 6sqm of serviced area or 1 space per 4 seats.		

Table 55 Off-street parking rate summary – Burwood LGA (Source: Burwood DCP 2013)

Land use	Parking rate (minimum)		
Residential	Studio	0.5 space per dwelling	Visitors: 0.2 spaces per dwelling.
	1 bedroom unit	0.5 space per dwelling	
	2 bedroom unit	1 space per dwelling	
	3+ bedroom unit	1.2 spaces per dwelling	
Business	1.5 spaces per 100 sqm of GFA		
Retail	1.5 spaces per 100 sqm of GFA		

Table 56 Off-street parking rate summary – Ashfield LGA (Source: Ashfield DCP 2013)

Land use	Parking rate (minimum)		
Residential	1 bedroom unit	1 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom unit	1 space per dwelling, plus 1 space for every five 2-bedroom units	
	3+ bedroom unit	1 spaces per dwelling, plus 1 space for every two 3-bedroom units	
Commercial premises including offices	2.5 spaces per 100 sqm of GFA		
Retail	2.5 spaces per 100 sqm of GFA		

Public Transport Provision

Public transport services in Kings Bay Precinct are based around bus services operating along Parramatta Road, Queens Road and Harris Road. It should be noted that there are no rail stations located within convenient walking distance (800 metres) of the Precinct boundary. However rail services at the nearest stations, Burwood Station and Croydon Station, have been taken into consideration below.

Rail services

Burwood Station is located approximately 1.1 kilometres south-west of the Precinct boundary and Croydon Station is located approximately 1.2 kilometres south of the Precinct boundary. Based on station barrier counts Burwood Station was ranked the 15th busiest station on the Sydney Trains network recording approximately 29,040 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). While both Burwood Station and Croydon Station are serviced by the T2 Inner West & South Line; Burwood Station also services the T1 North Shore, Northern & Western Line. These lines connect to several centres including the Sydney CBD, Parramatta and Liverpool, as shown in **Figure 48**.

Figure 48 Location of Croydon Station and Burwood Station on the Sydney Trains network (Source: Sydney Trains, 2015)

The number of rail services stopping at Burwood Station and Croydon Station during peak periods are shown in **Table 57** and **Table 58**.

Table 57 Rail service frequencies at Burwood Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T1 North Shore, Northern & Western Line		
Berowra to City via Gordon, Hornsby to City via Macquarie University	25	16
City to Berowra via Gordon, City to Hornsby via Macquarie University	16	19
Hornsby and Epping to City via Strathfield	8	8
City to Epping and Hornsby via Strathfield	8	8
Emu Plains to City, Richmond to City	8	11
City to Emu Plains, City to Richmond	17	8
T2 Inner West & South Line		
Campbelltown to City via Granville	8	9
City to Campbelltown via Granville	11	8

Table 58 Rail service frequencies at Croydon Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T2 Inner West & South Line		
Campbelltown to City via Granville	9	13
City to Campbelltown via Granville	8	8

Bus services

The Kings Bay Precinct is currently serviced by several bus routes connecting to major centres including Leichhardt, Strathfield, Sydney CBD, Burwood and Hurstville. Bus routes are accessible within the Precinct along Queens Street, Parramatta Road and Harris Road. The Precinct is currently served by the following bus routes:

- Route 439 (Mortlake to City via Leichhardt) passes along Bayview Road and around Canada Bay, providing bus services to the northern and Western districts of Kings Bay Precinct.
- Route 502 (Drummoyne to City) operates along Harris Street and Garfield Street and runs south of the Great North Road.
- Route 461 (Chiswick to Campsie via Strathfield and Burwood) operates along Garfield Street, Harris Street and Parramatta Road.
- Route 415 (City to Parramatta via Burwood) operates along Parramatta Road within the Precinct.
- Route 490 & 492 (from Drummoyne to Hurstville/Rockdale via Burwood and Kingsgrove) operates along the Great Northern Road and passes along Croydon Road and Church Street.

Figure 49 presents the bus routes in and around the Kings Bay Precinct.

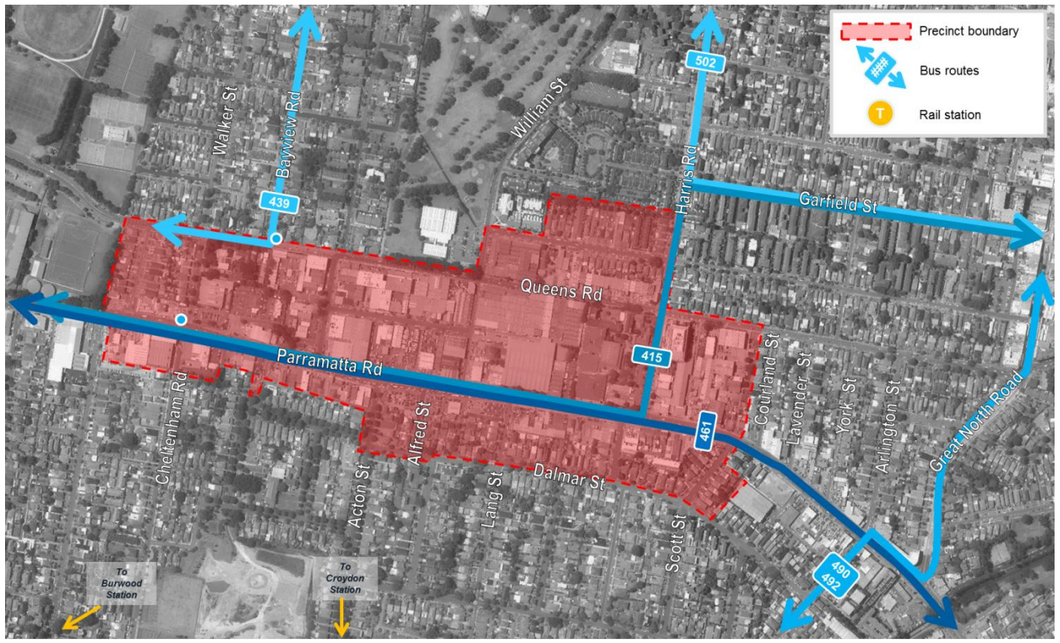

Figure 49 Bus services in the vicinity of the Kings Bay Precinct
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015).

Table 59 provides a summary of peak bus service frequencies for routes operating in and around the Kings Bay Precinct.

Table 59 Bus service frequencies for the Kings Bay Precinct (Source: Transdev and Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
439	Mortlake to City via Leichhardt	10 minutes	10 minutes
502	Drummoyne to City	10 minutes	<10 minutes
461	Chiswick to Campsie via Strathfield and Burwood	<15 minutes	15 minutes
415	City to Parramatta via Burwood	10 minutes	5 minutes
490 and 492	Drummoyne to Hurstville and Rockdale via Burwood and Kingsgrove	10 minutes	10 minutes

Active Transport Provisions

Active transport provisions in the study are been illustrated in **Figure 61**. While paved footpaths are provided on either side of a majority of roads, there are limited formal pedestrian crossings of Parramatta Road within the Precinct. The Precinct has well connected cycle facilities, with an on-road cycle route along Queens Road serving as the key east-west active transport link. An on-road cycle route to the east of the Precinct on Croydon Road provides residents with an active transport link to Croydon Station, south of the Precinct. Cycling facilities are present as on-road cycle routes only, with off-road routes present north of the Precinct.

Figure 50 Active transport facilities and desire lines in the vicinity of the Kings Bay Precinct
(Source: NSW Land & Property Information – SixMaps, 2015)

Travel Patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 revealed that more residents of Kings Bay Precinct are employed in Sydney Inner City (29 per cent) than any other destination, as shown in **Table 60**. Private vehicle travel is the dominant mode in all of the top five destinations, with a mode share of 69 per cent. This is likely to be a result of the lack of convenient rail connections available from the Precinct, with rail mode share of only 11 per cent.

Table 60 Kings Bay Precinct Workforce Travel Destinations
Source: BTS Journey to Work – Travel Zones

Workforce destinations		Train	Bus	Car	Walked only	Other	Total*^
1	Sydney Inner City	246	372	437	5	77	**1137**
2	Canada Bay	14	27	406	77	22	**546**
3	Strathfield-Burwood-Ashfield	17	24	323	43	24	**431**
4	Ryde - Hunters Hill	10	9	171	3	6	**199**
5	Leichhardt	0	13	178	0	7	**198**
Other		152	34	1232	3	54	**1475**
Total		**439**	**479**	**2747**	**131**	**190**	**3986**
		11%	12%	69%	3%	5%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

A majority of workers in the Kings Bay Precinct start their travel in the neighbouring areas of Canada Bay and Strathfield - Burwood – Ashfield as shown in **Table 61**. The top five places of residence for people working in Kings Bay also included Canterbury, Bankstown and Leichhardt. Similar to outbound trips, the majority of inbound trips to the Kings Bay Precinct are made by car with a dominant mode share of 80 per cent. Only seven per cent of workers travel by train and five per cent of workers travel by bus, a lower public transport mode share than outbound trips. This indicates that there may be issues with public transport accessibility to employment areas or there is a good supply of off-street and on-street parking available to the employees within the Kings Bay Precinct.

Table 61 Kings Bay Precinct Employment Travel Origins
Source: BTS Journey to Work – Travel Zones

Employee origins		Train	Bus	Car	Walked only	Other	Total*^
1	Canada Bay	10	41	600	112	38	**801**
2	Strathfield-Burwood-Ashfield	38	56	464	49	39	**646**
3	Canterbury	7	22	115	0	6	**150**
4	Bankstown	16	0	120	0	3	**139**
5	Leichhardt	0	6	96	0	6	**108**
	Other	143	38	1182	0	27	**1390**
	Total	**214**	**163**	**2577**	**161**	**119**	**3234**
		7%	5%	80%	5%	4%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

The existing mode split for the Kings Bay Precinct compared to the wider Burwood LGA , Canada Bay LGA and Ashfield LGA is summarised in **Table 62**. The most popular choice of travel to work is vehicle travel (69%), followed by public transport (24%) and walk only trips (3%). It is evident that while the public transport mode share is lower in the Precinct than all LGAs, the bus mode share is higher than all LGAs. This suggests that residents are using buses as it is the only available public transport, but are not provided with a heavy rail option. In addition, the private vehicle mode share was higher than all LGAs, further indicating a lack of public transport infrastructure located within convenient walking distance of Kings Bay Precinct. However, it should be noted that the JTW data is based on the primary mode of travel used for each trip, indicating active transport mode shares may be underestimated due to people walking or cycling to their primary mode of rail travel.

Table 62 Kings Bay Precinct: Mode share of Precinct compared to Burwood LGA, Canada Bay LGA and Ashfield LGA (2011)
Source: BTS Journey to Work – Travel Zones

Mode	Existing Kings Bay Precinct mode share	Existing LGA mode shares		
		Burwood LGA	Canada Bay LGA	Ashfield LGA
Vehicle driver	64%	47%	62%	46%
Vehicle passenger	5%	4%	4%	4%
Train	11%	36%	14%	36%
Bus / Ferry / Tram	13%	4%	12%	6%
Walked only	3%	5%	3%	4%
Other mode	2%	1%	2%	2%
Mode not stated	2%	2%	1%	2%

6.3 FUTURE CHARACTER OF KINGS BAY PRECINCT

The Kings Bay Precinct is well positioned, located approximately 10 kilometres west of the Sydney CBD and 12 kilometres east of the Parramatta CBD. The Precinct is an industrial Precinct dominated by car showrooms, car servicing centres, panel beaters, small manufacturers and warehousing. However the area is challenged by poor amenity on Parramatta Road and with surrounding development. Future development will enable Kings Bay Precinct to transform to a new residential village and achieve the Precinct vision.

The vision for the Kings Bay Precinct:

A new residential urban village with a Parramatta Road address, a fine-grained active street network and strong links to the open space network along Sydney Harbour.

Future land use context

To achieve the vision for the Precinct, the following planning measures have been proposed as illustrated in **Figure 51**:

- Spencer Street will form the 'main street' of a new compact local centre - an active east-west spine for local shops and services, and a new address for medium and high density residential development.
- Taller residential buildings will mark the centre of the Precinct at the corner of Parramatta Road, William Street and Spencer Street.
- Development of local services that support new residents and complement the Five Dock town centre.
- Some district services and employment uses to be retained, particularly on the southern side of Parramatta Road.

Collectively, the proposed measures could have the following potential transport implications:

- Improvement to pedestrian and cycle connectivity is expected as a result of the proposed development, with the plan aiming to address the divide of Parramatta Road.
- Improvements to active transport and bus connections to existing rail stations, such as Croydon Station as well as future rapid transit corridor on Parramatta Road
- Public transport service frequencies may need to be increased, as the higher density land use zones are likely to increase public transport trips.
- Changes in existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

Review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and service improvements to be delivered, as discussed in the Transport Plan. These upgrades not only address existing deficiencies but also cater for future growth of the Kings Bay Precinct. The proposed transport improvements are expected to reduce dependency on private vehicles and also provide alternative transport options for future residents and employees of Kings Bay Precinct.

Figure 51 Kings Bay Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Kings Bay Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 53**. These identified opportunities and constraints serve as the basis for the strategic transport framework for Kings Bay Precinct.

In addition to the identified issues, the WestConnex project currently in progress is expected to impact on the existing traffic conditions. The *WestConnex M4 East EIS Traffic and Transport Assessment* outlined the anticipated impacts of the M4 East project on the road network in 2031 based on detailed traffic modelling. In Kings Bay, a reduction in volumes of traffic due to the extension of the M4 to the east is expected to improve level of service for the road network in the Precinct. Modelling suggests that midblock traffic conditions on Parramatta Road west of Harris Road will undergo substantial reductions in volumes and levels of delay. Key intersections on Parramatta Road, including Harris Road, are expected to undergo significant improvements in levels of service as a result of the forecasted reduction in volumes due to the M4 East development in the long term.

6.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Kings Bay Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example of where urban renewal has occurred and comparing it to the characteristics of the proposed Kings Bay Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Kings Bay Precinct.

This assessment enables the identification of infrastructure needs for the Kings Bay Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Kings Bay has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Kings Bay Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW, Burwood Council, City of Canada Bay and the Ashfield Council for their feedback. This helped to inform the selection of the Sydney suburb of **Neutral Bay** as an ideal benchmark for what the future Kings Bay Precinct might look like.

Characteristics that Neutral Bay shares with the future Kings Bay Precinct include:

- Its location along a key transport corridor. Like Kings Bay with Parramatta Road, Neutral Bay is located along Military Road.
- Its functional nature and role within Sydney. Like Kings Bay, Neutral Bay is a relatively small in size and is located within inner Sydney.
- Neutral Bay caters more to through traffic rather than acting as a significant origin or destination. It is however an important location for the distribution of trips from the Warringah Freeway to lower north shore suburbs such as Cremorne and Mosman. As such it acts as a local hub, similar to how Kings Bay might be considered in relation to neighbouring suburbs Canada Bay and Five Dock.
- Neutral Bay has a similar volume of commercial and residential development to what might be expected from the future Kings Bay Precinct.
- Neutral Bay, like Kings Bay, is not located within walking distance of a train station and instead relies on the frequent bus services present along Military Road.
- Military Road is heavily trafficked, in a similar fashion to Parramatta Road.
- Existing active transport infrastructure includes a connection over the Warringah Freeway to the west. Like Kings Bay, Neutral Bay is a focal point for key cycle connections, with major cycle routes passing through or located nearby.

A review of Neutral Bay is described further in **Figure 53** that identifies the success and improvements identified (for Neutral Bay) that would be useful for establishing transport directions for the Kings Bay Precinct.

Figure 52 Neutral Bay Streetscapes (Source: AECOM, 2015)

a) Kings Bay Precinct Opportunities and Constraints

Significant Opportunities

O1 – Enhancing links to Croydon Station so that it is easier to access rail services with a focus on north south connectivity across Parramatta Road

O2 – Enhance access to open space areas to the north with improved active travel infrastructure between Parramatta Road and the foreshore

O3 – Introduce a series of new laneways and through links within the existing road network grid to encourage greater land use mix and create a distinct place for residents

O4 – Improving active transport connections to regional recreation and open space facilities, particularly via the Patterson / Gipps / Queens Road cycle route toward the leisure routes around Canada Bay

O5 – Reducing car dependency by lowering parking rates in areas with good access to public transport and capitalising on the rapid bus network along Parramatta Road.

Primary Constraints

C1 – High traffic volumes along Parramatta Road and surrounding streets

C2 – Overcoming the north-south barrier to permeability created by Parramatta Road

C3 – The distance between Croydon Station and the Precinct

C4 – Reliance on a small number of key roads for accommodating all modes of transport

C5 – Removal of on-street parking to facilitate the Gipps / Patterson / Queen Street separated cycleway.

b) Case Study: Neutral Bay

Success of Neutral Bay

- Neutral Bay has a relatively high public transport mode share for residents as it acts as a key stop for Northern Beaches buses en-route to North Sydney and the Sydney CBD
- It has a distinct character with a local feel, despite its central location along a major road (Military Road)
- On street parking is provided on the periphery of the commercial area enabling residents to park without needing to cross Military Road
- Neutral Bay has strong pedestrian permeability with laneways leading away from Military Road and to the rear of developments
- Having dense residential development around a small commercial area has enabled Neutral Bay to support a culture of active laneways and al-fresco dining, with public space being well utilised and patronised.

Potential Further Opportunities for Neutral Bay

- Enhancing cycle routes by creating dedicated cycleways, particularly in an east-west direction connecting to the crossing of the Warringah Freeway
- Better connectivity between major bus stop and Neutral bay commercial areas
- Improving interface with Military Road and identifying features to help distinguish Neutral Bay from other points along Military Road
- Improving pedestrian connectivity across Military Road, which includes fences forming a physical barrier to pedestrian movements.

c) Strategic Transport Framework for the Kings Bay Precinct

	Opportunities and constraints addressed
D1 – Improve public transport services and enhance priority for public transport with stronger links to major transport hubs and corridors	*O1, C3*
D2 – Capitalise on potential new rapid transit network along Parramatta Road	*O5, C1*
D3 – Capitalise on the Precinct's proximity to open space and leisure areas by improving active transport links and infrastructure, including connections to the new Gipps / Patterson Queen Street Cycleway.	*O2, O4, C2*
D4 – Introduce further laneways to allow for alternate circulation routes for local traffic without crossing Parramatta Road, particularly in an east-west direction to the north of Parramatta Road	*O3, C4*
D5 – Improve north-south links for all modes of transport, especially across Parramatta Road	*O1, O2, C2*
D6 – Reduce the need for on-site parking for new developments near public transport nodes and locate parking away from active surface routes (preferably underground)	*O5, C5*
D7 – Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians.	*O3, C1*
D8 – Enhance the streetscape throughout the Precinct, particularly along Parramatta Road	*O2, O3, C1*

d) Transport Infrastructure and Service Improvements

- Intersection upgrades or road capacity enhancements
- Street extensions and connections.
- Provision of active transport facilities and streetscape improvements
- Improve public transport services provision and bus priority measures
- New public transport infrastructure (e.g. Light Rail or Rapid Transit)
- Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 53 Kings Bay Precinct Transport Plan Framework (Source: AECOM, 2015)

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services in order to reach the desired land use and transport planning outcomes.

6.5 FUTURE TRANSPORT PROVISION FOR KINGS BAY PRECINCT

Precinct strategic transport framework directions

The strategic transport framework for the Kings Bay Precinct is presented in **Figure 54**. The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure and service improvements

In the future Kings Bay Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government, Canada Bay Council, Burwood Council and Ashfield Council, during a policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Kings Bay Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

The directions have been addressed with the following improvements, shown schematically in **Figure 53** and summarised in **Table 63**.

Table 63 Kings Bay Precinct: Transport Infrastructure and Service improvements

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Intersection upgrades or road capacity enhancements						
K1	✓			Investigate removal of the right turn ban and reconfiguration of lanes on northern and southern approaches of Queens Road / Regatta Road	S	D5, D7
K2	✓		✓	Investigate signalisation of Parramatta Road / Regatta Road intersection with right turn bans and implementation of pedestrian phasing.	S	D5, D7
K3	✓			Investigate widening and conversion of Lyons Road West / William Street roundabout into a signalised intersection.	M	D5, D7
K4	✓			Investigate provision of dedicated eastbound and westbound right turn bays on Queens Road at William Street.	S	D5, D7
K5	✓			Investigate potential upgrade of Harris Road / Queens Road intersection to provide additional capacity.	S	D5, D7
K6	✓			Investigate additional westbound right turn bay from Parramatta Road into Great North Road.	S	D5, D7
K7	✓			Investigate widening and addition of a lane for the northern approach of Queens Road / Great North Road intersection	S	D5, D7
K8	✓			Implementation of clearways on Parramatta Road during weekends, intra-peak (10am-3pm).	S	D6, D7
Street extensions and connections						
K9	✓			Investigate realignment Parramatta Road / Byron Road and Parramatta Road / Harris Road intersections to form one signalised intersection and provide a second right turn bay and convert kerb lane to dedicated left turn lane on the northern approach.	S-M	D5, D7
K10	✓		✓	Investigate new urban spaces and extension of Spencer Street.	M	D4, D5, D7, D8
Provision of active transport facilities and streetscape improvements						
K11			✓	Provision of a new cycleway along Gipps Street, Patterson Street and Queen Street.	S	D3, D7, D8
K12*			✓	Implementation of new signalised pedestrian crossings on Parramatta Road at William Street.	S	D5, D7, D8
K13			✓	Investigate new public domain open space connection along William Street between Parramatta Road and Queens Road.	S	D3, D5, D8
K14*			✓	Incorporation of Wangal Park into the Regional Cycle Network (Cheltenham Road Park)	L	D1, D3, D5, D8
K15*			✓	Public domain improvements and streetscape upgrade to Parramatta Road from Scott Street to Luke Avenue	S	D5, D8
Improve public transport service provision and bus priority measures						
K16		✓		Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD	S	D1, D2, D7
K17		✓		Commencement of new Suburban bus route between Burwood – Chatswood via Drummoyne and Lane Cove	S-M	D1, D7
New public transport infrastructure						
K18		✓		Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km	M-L	D1, D2, D7

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Kings Bay | Transport Improvements

ID	Potential Improvements
K1	Investigate removal of the right turn ban and reconfiguration of lanes on northern and southern approaches of Queens Road / Regatta Road
K2	Investigate signalisation of Parramatta Road / Regatta Road intersection with right turn bans and implementation of pedestrian phasing.
K3	Investigate widening and conversion of Lyons Road West / William Street roundabout into a signalised intersection.
K4	Investigate provision of dedicated eastbound and westbound right turn bays on Queens Road at William Street.
K5	Investigate potential upgrade of Harris Road / Queens Road intersection to provide additional capacity.
K6	Investigate additional westbound right turn bay from Parramatta Road into Great North Road.
K7	Investigate widening and addition of a lane for the northern approach of Queens Road/Great North Road.
K8	Implementation of clearways on Parramatta Road during weekends, intra peak (10am-3pm)
K9	Investigate realignment Parramatta Road / Byron Road and Parramatta Road / Harris Road intersections to form one signalised intersection and provide a second right turn bay and convert kerb lane to dedicated left turn lane on the northern approach.
K10	Investigate new urban spaces and extension of Spencer Street.
K11*	Provision of a new cycleway along Gipps Street, Patterson Street and Queen Street.
K12*	Implementation of new signalised pedestrian crossings on Parramatta Road at William Street.
K13	Investigate new public domain open space connection along William Street between Parramatta Road and Queens Road.
K14*	Incorporation of Wangal Park into the Regional Cycle Network (Cheltenham Road Park)
K15*	Public domain improvements and streetscape upgrade to Parramatta Road from Scott Street to Luke Avenue
K16	Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD
K17	Commencement of new Suburban bus route between Burwood – Chatswood via Drummoyne and Lane Cove
K18	Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1kmv

Legend

	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Indicative Zone of Future Super Stop Envelope		

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

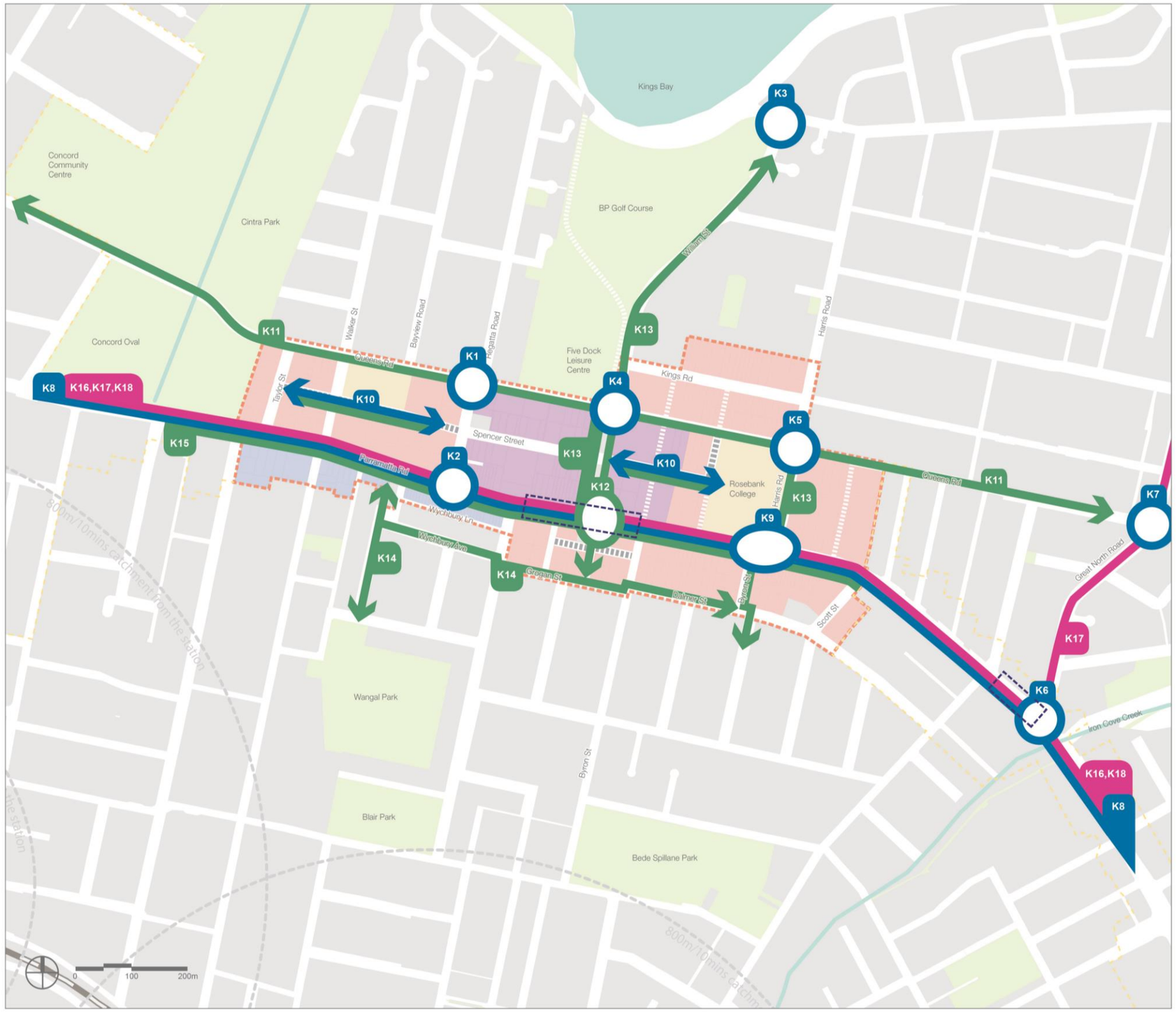

Figure 54 Kings Bay Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure whereby developments are permitted to provide a lower rate of on-site parking close to public transport, while developments further away would need to provide a higher rate of parking provision. Canada Bay, Burwood and Ashfield Councils provide parking rates that do not consider the distance from public transport nodes.

The proposed parking rates for the Kings Bay Precinct consider elements of each LGA's DCP, while also adopting the emerging best practice approach which considers the radial distance to rail stations or proposed bus superstops. Due to their proximity to public transport, residents and workers within these zones are more likely to use public transport. Based on the accessibility to public transport, density and mix of land uses proposed for the Kings Bay Precinct, the existing parking rates have been scaled down within the 400 metre range to encourage mode shifts to non-vehicular travel and reduce vehicular impacts on surrounding road network. However it is considered that scaled down parking rates will not be viable outside of the 400 metre range, unless there is significant intervention with the provision of additional transport infrastructure.

The 400m and 800m walking catchments for Burwood Station and Concord Station as well as the proposed future bus superstop along Parramatta Road are shown in **Figure 55**. The proposed parking rates for the Kings Bay Precinct are outlined in **Table 64** and **Table 65**. The refined parking rates attempt to address Precinct transport principle 'D6', by reducing parking availability and thereby reducing parking.

While the goal of the reformed parking rates is to reduce car dependency for short tips, with an existing vehicle ownership of 1.5 vehicles per household[7], the reduced off-street parking rates will have implications on the Precinct in the short term. To minimise these impacts, decoupled parking is proposed along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

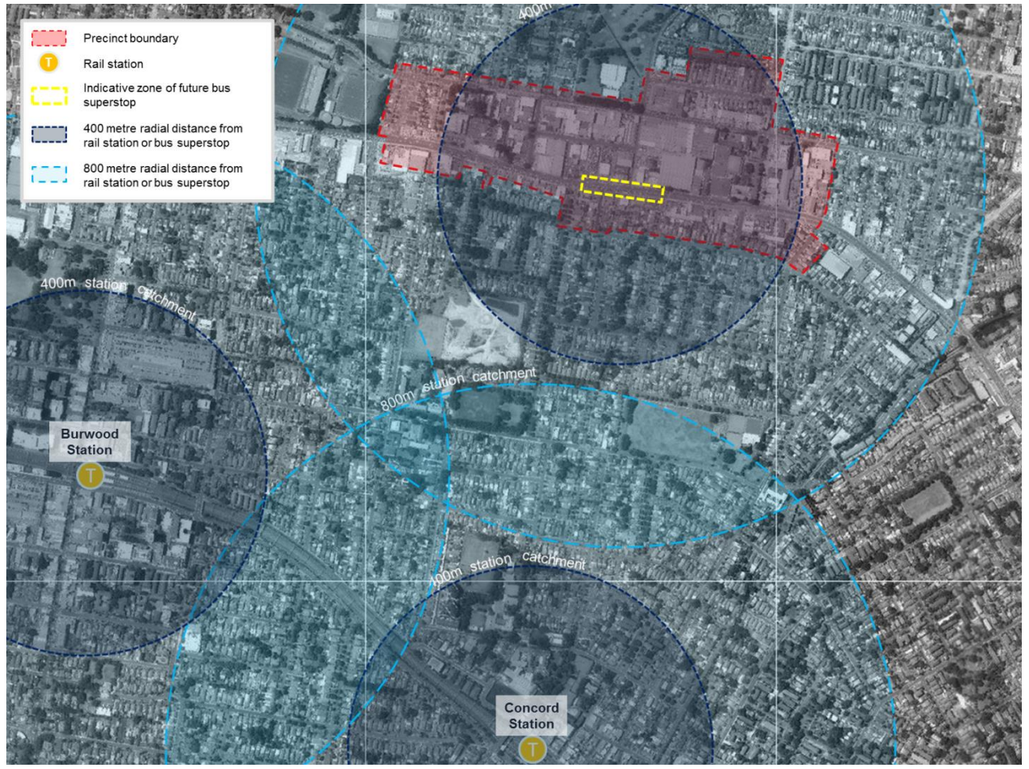

Figure 55 Kings Bay Precinct: Rail station or proposed bus superstop catchments
Source: NSW Land & Property Information – SixMaps, 2015 and NSW Transport Info 2015 (modified by AECOM)

Table 64 Proposed parking rates within 400m of a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1 space per dwelling	
Business premises	1 space per 70sqm of GFA		
Retail	1 space per 60sqm of GFA		

Table 65 Proposed parking rates NOT within 400m of a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	1 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1.2 spaces per dwelling;	
Business premises	1 space per 50sqm of GFA		
Retail	1 space per 50sqm of GFA		

[7] ABS Census, 2011

7. Taverners Hill

7.1 EXISTING LAND USE

The Taverners Hill Precinct is located within two LGAs: majority of the Precinct is located within Leichhardt Council (north of Parramatta Road) with the southern portion located within Marrickville Council. The Precinct is well connected to a number of transport modes with light rail stops located to the west, train stations located to the south and bus services traversing through the middle of the Precinct along Parramatta Road. A review of the Marrickville LEP 2011 and Leichhardt LEP 2013 and aerial photography indicates that a majority of land uses in the Precinct are consistent with their specified zone. Taverners Hill Precinct boundary and key land uses are outlined in **Figure 56**.

The Precinct contains general and low density residential land uses with some medium density uses within Leichhardt and some high density uses within Marrickville. The land adjacent to the Parramatta Road is zoned as an Enterprise Corridor or general industrial land uses, characterised by retail outlets and other light industrial uses. The Precinct is bordered by large parklands and open space areas to the north-west.

Figure 56 Taverners Hill Precinct Boundary
(Source: Marrickville LEP 2011 and Leichhardt LEP 2013. Base map: NSW Land & Property Information – SixMaps, amended by AECOM, 2015)

7.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing Road Network

The existing road network in the Taverners Hill Precinct is illustrated in **Figure 57**, highlighting the key roads connections including Parramatta Road, Old Canterbury Road and Tebbutt Street. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of current road function and operational roles.

Table 66 identifies some of the key roads within Taverners Hill Precinct along with their classification based on both the Austroads functional system and Roads and Maritime's administrative system. Parramatta Road serves as the primary east-west arterial corridor for the Precinct. Flood Street and West Street both serve as the key north-south connections (signalised at Parramatta Road) with West Street providing a link to Lewisham Station, Petersham Station and Petersham Park. Tebbutt Street is another north-south connector road north of Parramatta Road which links to Marion Street. Old Canterbury Road is a north-south connector south of Parramatta Road which is one way southbound between Cook Street and Barker Street.

Table 66 Key roads in the vicinity of the Taverners Hill Precinct (Source: AECOM, 2015)

Road	Functional Classification	RMS Classification
Brown Street / Barker Street / Cook Street / Hathern Street	Local	State Road
Flood Street	Local	Local Road
Old Canterbury Road	Collector	State Road
Parramatta Road	Arterial	State Road
Tebbutt Street	Collector	State Road
West Street	Local	Regional Road

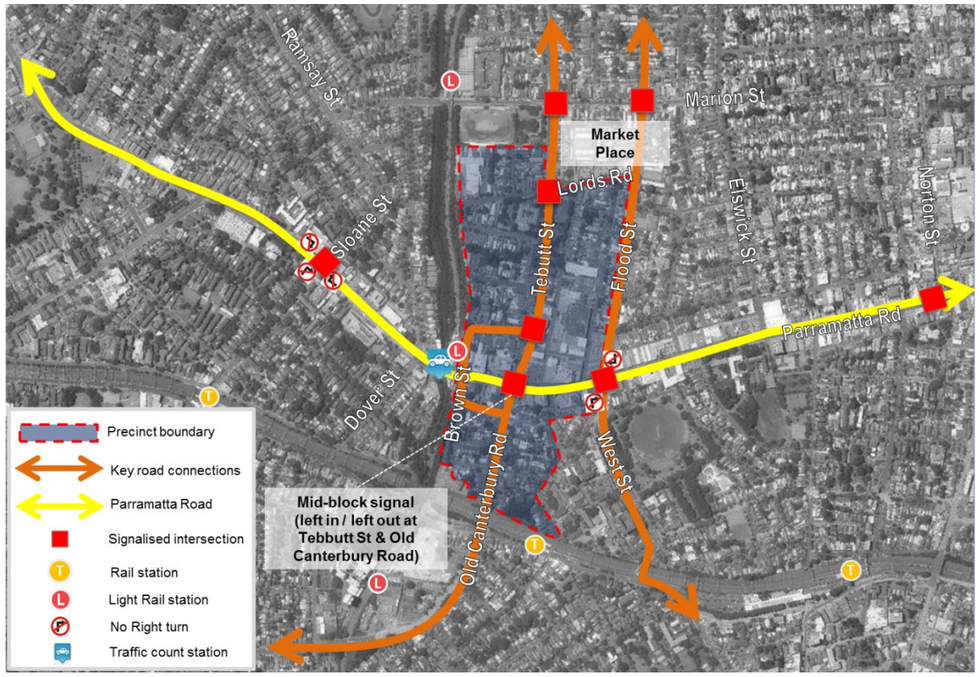

Figure 57 Road network and major connections in the vicinity of the Taverners Hill Precinct
(Source: NSW Land & Property Information – SixMaps, amended by AECOM, 2015)

Traffic volumes

There are no Roads and Maritime Services traffic count stations located within the Taverners Hill Precinct, however a counting station is present west of the Precinct along Parramatta Road at the Light Rail Line. It is considered that these volumes would provide an indication of the scale of traffic passing through the Precinct. **Table 67** highlights a single traffic count station west of the Taverners Hill Precinct, with volumes over 50,000 vehicles per day in 2012. According to the Roads and Maritime Road Network Management Hierarchy, based on the given description of the road and speed limit, the section of the Parramatta Road would be classified as a Class 5 Urban road (5U). Characteristics of a Class 5U road involve moderately high traffic volumes, including freight, public transport and commercial vehicle travel (RTA Network and Corridor Planning, 2008).

Table 67 Traffic counting stations near the Taverners Hill Precinct (Source: RMS traffic counts)

Road Name	Station Description	Westbound*	Eastbound*	Total*
Parramatta Road	Leichhardt – At Light Rail Line	31,700	33,000	64,700

*Weekday counts for 2012

Key Intersections

Key intersections that are in close proximity to the Taverners Hill Precinct are:

- Parramatta Road / Tebbutt Street / Old Canterbury Road providing a north-south connection across Parramatta Road via the Brown Street overpass.
- Parramatta Road / Flood Street / West Street providing a north-south connection to the eastern side of the Precinct.
- Tebbutt Street / Lords Road and Flood Street / Lords Road, providing access to the local Public School and the Leichhardt Market Place.
- Foster Street / Marion Street and Flood Street / Marion Street providing an east-west connection across the Inner West Light Rail and the Greenway.

Constraints

The key constraints of the road network within the Taverners Hill Precinct include:

- Tebutt Street, Old Canterbury Road, Flood Street and along Parramatta Road.
- Limited crossing opportunities of the T1 Western Line.
- Limited access to Lewisham Station via Thomas Street.
- Limited crossing of the light rail line at Marion Street.
- Lack of secondary east-west connections in the Precinct.

Existing parking conditions

Majority of roads provide unrestricted on-street parking throughout Taverners Hill Precinct, including Tebbutt Street and Flood Street. Clearways are in operation along Parramatta Road between 6am – 10am and 3pm – 7pm during weekdays.

Currently there are no off-street council or commuter car parks provided within a convenient distance of the Precinct. Private parking is provided at various activity centres throughout the Precinct such as Market Place Leichhardt. New developments are required to provide off-street parking to service the anticipated demands of the proposed land use. A summary of off-street parking rates in Leichhardt is provided in **Table 68**. The portion of the Precinct within Marrickville is under Parking Area 1 and Area 2, a summary of parking rates is provided in **Table 69**.

Table 68 Off-street parking rate summary – Leichhardt LGA (Source: Leichhardt DCP 2013)

Land use	Parking rate		
Residential	Studio	0 to 0.5 spaces per dwelling	Visitors: 0.09 to 0.125 spaces per dwelling.
	1 bedroom unit	0.333 to 0.5 spaces per dwelling	
	2 bedroom unit	0.5 to 1 space per dwelling	
	3+ bedroom unit	1 to 1.2 spaces per dwelling	
Office premises	Min: 1 space per 100 sqm of GFA; Max: 1 space per 80 sqm of GFA		
Business premises	Min: 1 space per 100 sqm of GFA; Max: 1 space per 60 sqm of GFA		
Bulky goods	Min: 1 space per 125 sqm of GFA; Max: 1 space per 100 sqm of GFA		
Restaurants or cafes	Min: 1 space per 80 sqm of GFA; Max: 1 space per 50 sqm of GFA		

Table 69 Off-street parking rate summary – Marrickville LGA (Source: Marrickville DCP 2011)

Land use	Parking rate		
Residential flats - 7 or more units (Area 1 and 2)	Studio	1 space per dwelling;	Visitors: 0.25 spaces per resident space.
	1 bedroom unit	1 space per dwelling;	
	2 bedroom unit	1 space per dwelling;	
	3+ bedroom unit	1 space per dwelling;	
Business, retail and shops (Area 1)	Up to 500sqm	1 per 100sqm GFA	
	500 - 750sqm	5 + 1 per 65sqm GFA over 500sqm GFA	
	750 – 1,000sqm	9 + 1 per 45sqm GFA over 750sqm GFA	
	Over 1,000sqm	15 + 1 per 35sqm GFA over 1,000sqm GFA	
Business, retail and shops (Area 2)	Up to 500sqm	1 per 80sqm GFA	
	500 - 750sqm	7 + 1 per 45sqm GFA over 500sqm GFA	
	750 – 1,000sqm	12 + 1 per 35sqm GFA over 750sqm GFA	
	Over 1,000sqm	20 + 1 per 30sqm GFA over 1,000sqm GFA	

Public Transport Provision

Public transport services are based around Lewisham Station, Taverners Hill Light Rail stop and Marion Light Rail stop, all of which are in close proximity to the Precinct. Bus services are also provided along Parramatta Road, Marion Street and the southern side of Lewisham Station. Bus services along Parramatta Road provide connections to major centres including Burwood / Strathfield to the west and the Sydney / CBD to the east. Bus services along Marion Street provide connections to other centres such as Five Dock and Mortlake.

Rail services

Lewisham Station lies on the southern boundary of the Precinct, accessible from Thomas Street. Based on station barrier counts Lewisham Station was ranked the 102nd busiest station on the Sydney Trains network recording approximately 4,780 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014).

Lewisham Station is serviced by the T2 Inner West & South Line. These lines connect the Taverners Hill Precinct to several major centres including the Sydney CBD, Parramatta and Liverpool.

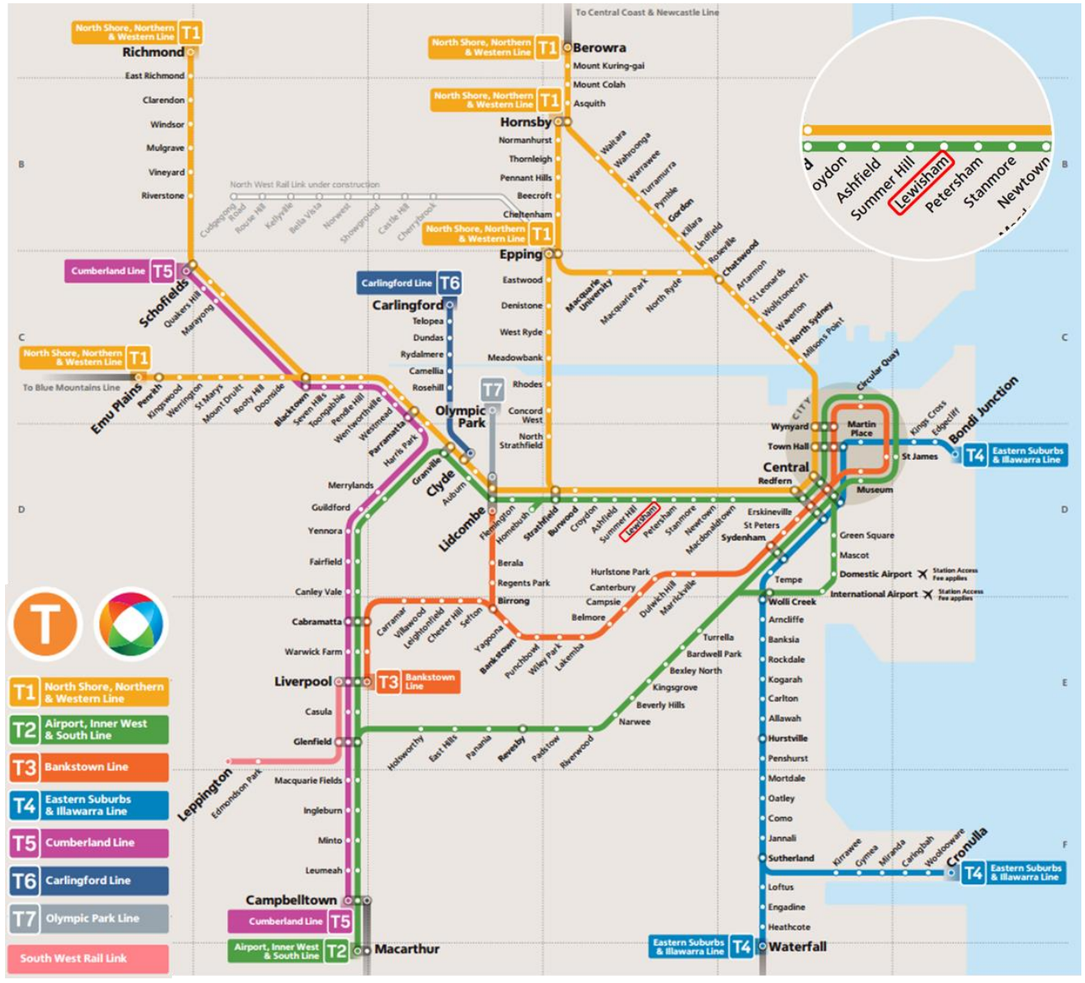

Figure 58 Location of Lewisham Station on the Sydney Trains network (Source: Sydney Trains, 2015.)

The number of rail services stopping at Lewisham Station during peak periods is shown in **Table 70**.

Table 70 Rail service frequencies at Lewisham Station (Source: Sydney Trains, 2015.)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T2 Inner West & South Line		
Campbelltown to City via Granville	8	8
City to Campbelltown via Granville	8	8

The Taverners Hill Light Rail stop is located on the western boundary of the Precinct, providing connections to light rail services between Central Station and Dulwich Hill. The Inner West Light Rail extension from Lilyfield to Dulwich Hill opened in March 2014.

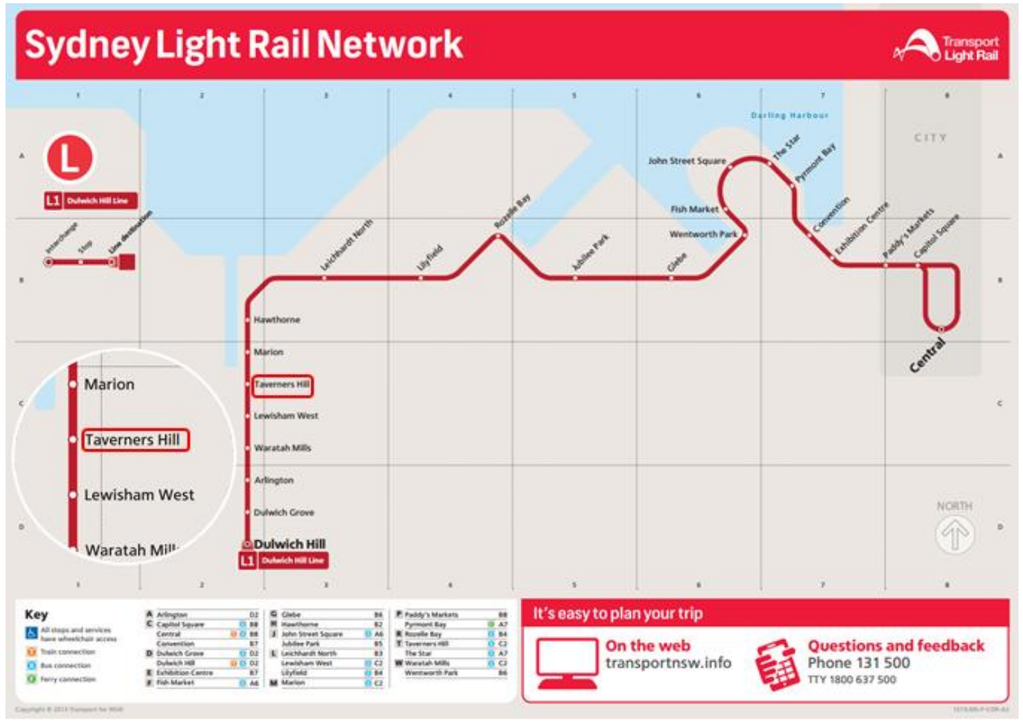

Figure 59 Location of Taverners Hill on Sydney's Light Rail Network (Source: Transdev, 2015)

The number of light rail services stopping at Taverners Hill Light Rail Station during the peak periods are shown in **Table 71.**

Table 71 Light Rail service frequencies at Taverners Hill Light Rail Station
Source: Transport NSW, 2015

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
Zone 2 Pyrmont Bay to Dulwich Hill		
Pyrmont Bay to Dulwich Hill	12	12
Dulwich Hill to Pyrmont Bay	12	12

Bus services

The Taverners Hill Precinct is currently serviced by several bus routes connecting to the major centres of: Burwood, Strathfield, Sydney CBD and Campsie. Bus routes are accessible along Parramatta Road, Marion Street and Railway Terrace with bus stops located just outside the Precinct, however one bus stop is located on Parramatta Road (near Carrington Street). The Precinct is currently served by the following bus routes:

- Route 370 (Leichhardt to Coogee via UNSW) operates along Marion Street starting and terminating at the Market Place.
- Route 413 (Campsie to City via Ashbury) travels along Railway Terrace and West Street south of the Precinct.
- Route 436 (Chiswick to City via Leichhardt), 438 (Abbotsford to City via Leichhardt) and 439 (Mortdale to City via Leichhardt) travels along Marion Street north of the Precinct.
- Route 461 (Burwood to City), 480 (Strathfield to City via Ashfield) and 483 (Strathfield to City via South Strathfield / Ashfield) passes through the Precinct along Parramatta Road.

Figure 60 presents the bus routes in and around the Taverners Hill Precinct.

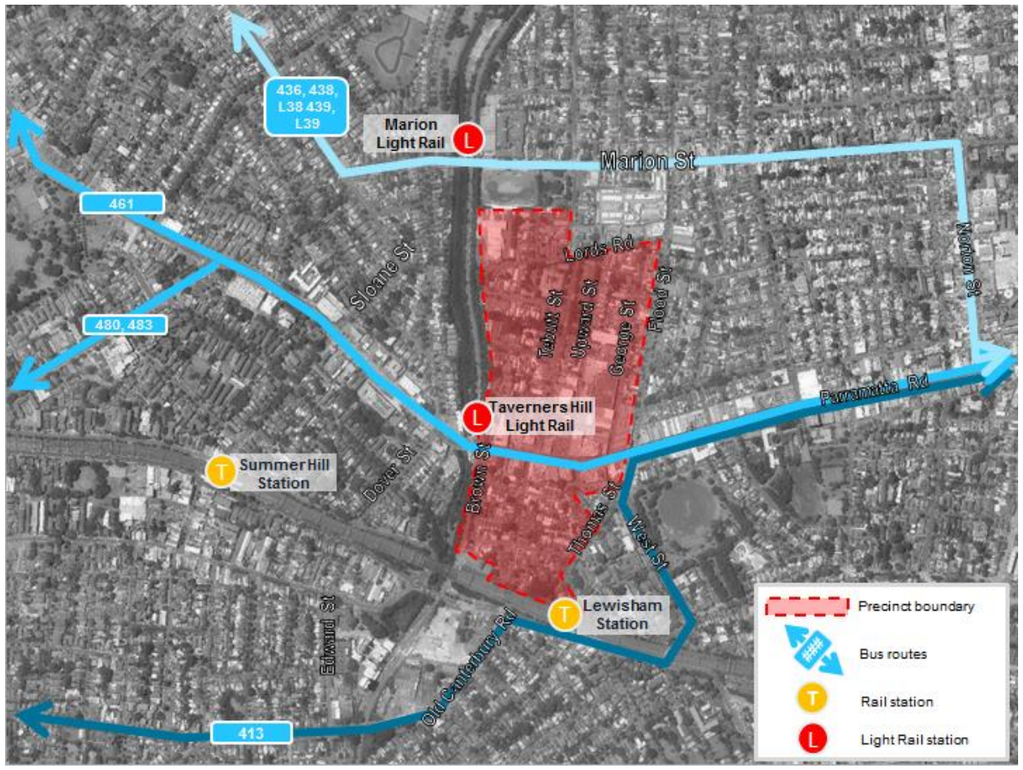

Figure 60 Bus services in the vicinity of the Taverners Hill Precinct
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Table 72 provides a summary of peak bus service frequencies for routes operating in and around the Taverners Hill Precinct.

Table 72 Bus service frequencies for the Taverners Hill Precinct (Source: Transdev and Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
370	Leichhardt to Coogee	10 – 30 minutes	10 – 15 minutes
413	Campsie to City via Ashbury	10 – 30 minutes	15 – 30 minutes
436, 438, L38, 439, L39	Five Dock to City via Leichhardt	10 – 15 minutes	10 – 30 minutes
461, 480, 483	Strathfield & Burwood to City via Domain	15 – 30 minutes	15 – 30 minutes

Active transport provisions

Active transport facilities in Taverners Hill Precinct are illustrated in **Figure 61**. Paved footpaths are provided on either side of a majority of roads and signalised pedestrian crossings are present at intersections along Parramatta Road. A mid-block signalised crossing is provided within the Precinct on Parramatta Road near Tebbutt Street and Old Canterbury Road. A pedestrian bridge is located approximately 400 metres east of the Precinct, integrated with the Taverners Hill Light Rail stop. Cycle facilities surrounding the Precinct are extensive providing links to a number of interchanges including Lewisham Station and Taverners Hill Light Rail stop and on the GreenWay / along the Hawthorne Canal. While cycling facilities within the Precinct are present as on-road cycle routes only, the GreenWay is an off-road shared path present just outside the western Precinct boundary.

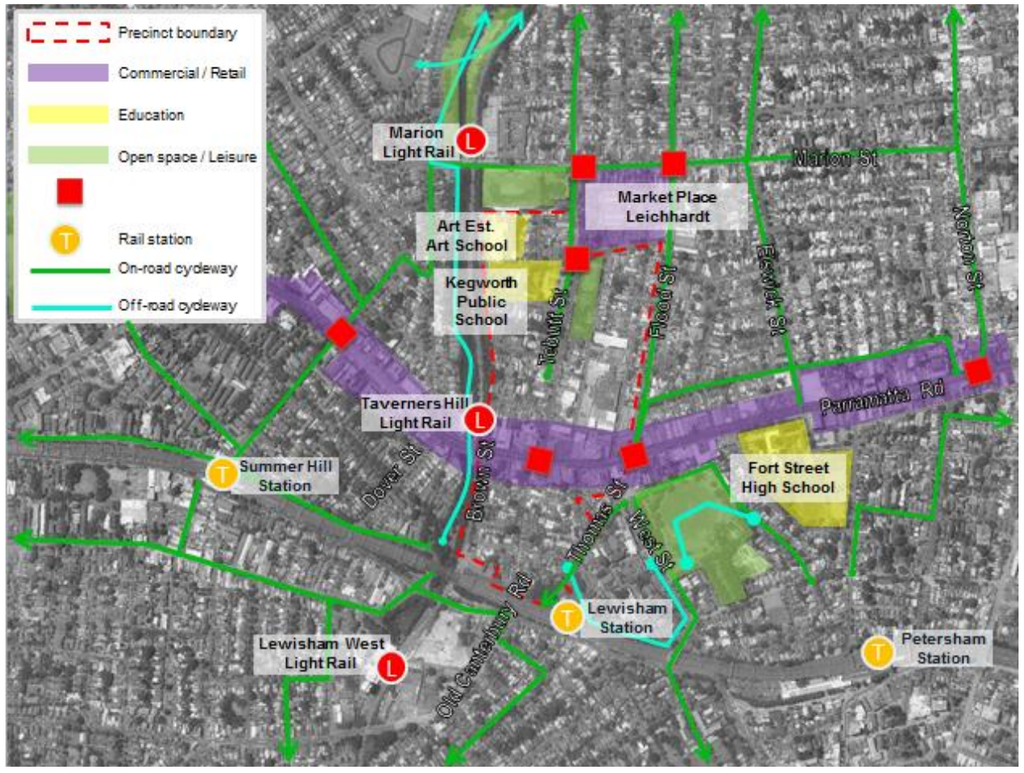

Figure 61 Active transport facilities and desire lines in the vicinity of the Taverners Hill Precinct
(Source: NSW Land & Property Information – SixMaps, 2015)

Travel Patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 revealed that more residents of the Taverners Hill Precinct are employed in the Sydney Inner City (46 per cent) than any other destination with approximately 59 per cent of residents travelling to Sydney Inner City by either train or bus. JTW data showed that cars had the highest overall mode share for residents within the Precinct accounting for 53 per cent of trips. The high level of car dependency within the Precinct may be attributed to a lack of direct public transport connections to other metropolitan locations from Taverners Hill.

Table 73 summarises the JTW workforce travel destination data for the Taverners Hill Precinct.

Table 73 Taverners Hill Precinct Workforce Travel Destinations
Source: BTS Journey to Work – Travel Zones (821, 939)

Workforce destinations		Train	Bus	Car	Walked only	Other	Total^*
1	Sydney Inner City	326	364	361	22	96	**1169**
2	Leichhardt	4	19	143	51	20	**237**
3	Strathfield – Burwood - Ashfield	29	0	93	16	12	**150**
4	North Sydney - Mosman	50	3	57	0	9	**119**
5	Ryde – Hunters Hill	13	3	79	0	6	**101**
	Other	96	22	616	24	17	**775**
	Total	**518**	**411**	**1349**	**102**	**171**	**2551**
		20%	16%	53%	4%	6%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

In terms of people employed, the area of Strathfield – Burwood – Ashfield accounted for the most workers within the Precinct than any other area recording approximately 15 per cent. As with outbound trips, the highest mode share for inbound trips were made by cars (75 per cent). Public transport accounted for 17 per cent of trips to the Precinct, which indicates the attractiveness of using public transport to access the Precinct.

Table 74 summarises the JTW employment travel origin data for the Taverners Hill Precinct.

Table 74 Taverners Hill Precinct Employment Travel Origins
Source: BTS Journey to Work – Travel Zones (821, 939)

Employee origins		Train	Bus	Car	Walked only	Other	Total^*
1	Strathfield - Burwood - Ashfield	27	32	295	31	22	**407**
2	Leichhardt	6	22	161	73	20	**282**
3	Canterbury	3	13	167	0	6	**189**
4	Canada Bay	9	14	153	3	6	**185**
5	Sydney Inner City	31	28	90	6	9	**164**
	Other	208	37	1115	25	37	**1422**
	Total	**284**	**146**	**1981**	**138**	**100**	**2649**
		11%	6%	75%	5%	4%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

Table 75 shows the existing mode share for the Taverners Hill Precinct compared to the wider Leichhardt LGA and Marrickville LGA. The data shows the Precinct has a similar mode split to Marrickville LGA. All three areas showed travelling by car as the most popular choice followed by public transport. It is evident that the chosen form of public transport to travel by was dependent on the service provided. The Leichhardt LGA is serviced by the Parramatta Road and Victoria Street bus corridors which showed a high proportion of bus trips, compared to Marrickville LGA which is served by two train lines which had a higher proportion of train trips.

Table 75 Taverners Hill Precinct: Mode share for the Precinct compared to Leichhardt LGA and Marrickville LGA (2011)
Source: BTS Journey to Work – Travel Zones

Mode	Existing Taverners Hill Precinct mode share	Existing LGA mode share	
		Leichhardt LGA	Marrickville LGA
Vehicle driver	49%	50%	43%
Vehicle passenger	4%	4%	4%
Train	20%	5%	30%
Bus / Ferry / Tram	16%	29%	11%
Walked only	4%	6%	6%
Other mode	6%	5%	5%
Mode not stated	1%	1%	1%

It should be noted that the extension of the Light Rail network to Dulwich Hill is not reflected in the 2011 JTW data, with the extension opening in 2014.

7.3 FUTURE CHARACTER OF TAVERNERS HILL PRECINCT

The Taverners Hill Precinct is a layering of intimate and fine grained neighbourhoods and places with a quirky and diverse range of building typologies ranging from low rise early period residential heritage dwellings to small-scale industrial buildings. Taverners Hill is a mixed use area with a varied built form and streetscape character. Old Canterbury Road and Tebbutt Street form a north-south spine linking Market Place at Marion Street in the north with Lewisham Station at Thomas Street in the south. The Precinct is also served by light rail with two stops along its western edge. Future development will build upon the existing character to achieve the vision set out for the Taverners Hill Precinct.

The vision for the Taverners Hill Precinct:

An urban village with strong green, water and active transport links via the adjoining GreenWay; a traffic calmed road network; a revitalised neighbourhood centre around a pedestrianised Parramatta Road intersection; and enhanced accessibility to nearby multiple public transport modes and high amenity neighbourhood parks, squares and leafy streets just off Parramatta Road.

Future land use context

To achieve the vision for the Precinct, the following planning measures have been proposed as illustrated in **Figure 62**:

- A public transport oriented residential community of medium density living centred around the identity and high amenity of its neighbourhood parks, squares and leafy streets off Parramatta Road.
- Taller built form to mark the Precinct along Parramatta Road, building on the good access to the bus, light rail and heavy rail networks. Built form will need to respond to sensitive edges, heritage elements and the larger footprints of commercial buildings
- Reinforcing Tebbutt Street as the 'main street' for the Precinct, with residential infill development around the area, providing defined street and open space edges.
- New residential zones will support the retail activities along Tebbutt Street and business enterprises along Parramatta Road to reinforce a true mixed use experience.

Collectively, the proposed measures could have the following potential transport implications:

- Improvements to the pedestrian environment and circulation are likely to encourage active transport mode share.
- Improvements to active transport and bus connections to existing rail stations, such as Lewisham Station as well as future rapid transit corridor on Parramatta Road.
- Public transport service frequencies may need to be increased, as the higher density land use zones are likely to increase public transport trips.
- Changes in the existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

Review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and service improvements to be delivered, as discussed in the Transport Plan. These upgrades not only address existing deficiencies but also cater for future growth of the Taverners Hill Precinct. The proposed transport improvements are expected to reduce dependency on private vehicles and also provide alternative transport options for current and future residents and employees of Taverners Hill Precinct.

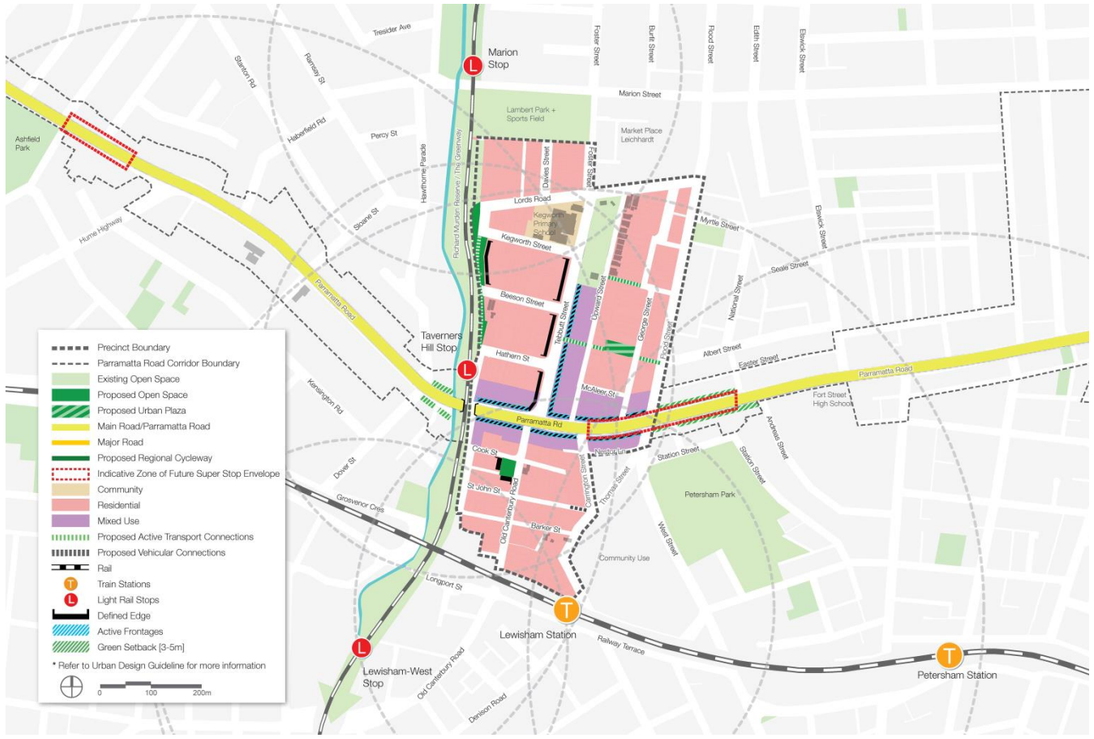

Figure 62 Taverners Hill Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Taverners Hill Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 64**. These identified opportunities and constraints serve as the basis for the strategic transport framework for Taverners Hill Precinct.

In addition to the identified issues, the WestConnex project currently in progress is expected to impact on the existing traffic conditions. The *WestConnex M4 East EIS Draft Traffic and Transport Assessment* outlined the anticipated impacts of the M4 East project on the road network in 2031 based on detailed traffic modelling. In Taverners Hill, a decrease in volumes of traffic due to the extension of the M4 Motorway to the east is expected to marginally improve midblock traffic conditions on Parramatta Road west of West Street in the long term. Key intersections on Parramatta Road, including Flood Street, are expected to undergo significant improvements in levels of service as a result of the forecasted reduction in volumes due to the M4 East development in the long term.

7.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Taverners Hill Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example of where urban renewal has occurred and comparing it to the characteristics of the proposed Taverners Hill Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Taverners Hill Precinct.

This assessment enables the identification of infrastructure needs for the Taverners Hill Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Taverners Hill has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Taverners Hill Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW, Marrickville Council and Leichhardt Council for their feedback. This helped to inform the selection of the Sydney suburb of **Wolli Creek** as an ideal benchmark for what the future Taverners Hill Precinct might look like.

Characteristics that Wolli Creek shares with the future Taverners Hill Precinct include:

- Its location along a key transport corridor. Like Taverners Hill with Parramatta Road, Wolli Creek is located along the Princes Highway.
- Its functional nature and role within Sydney. Like Taverners Hill, Wolli Creek is relatively small in size and is located a similar distance to Sydney CBD.
- Wolli Creek has good public transport accessibility via the rail network, whereby it is located adjacent to Wolli Creek Station. Taverners Hill shares this level of rail accessibility, providing access to both Taverners Hill light rail stop and Lewisham Station south of the Precinct.
- Wolli Creek has dense residential development, similar to what might be expected from the future Taverners Hill Precinct.
- Although rail is the primary focus of Wolli Creek, bus services are also available along the major road corridor and connecting to Wolli Creek Station.
- Princes Highway is heavily trafficked, in a similar fashion to Parramatta Road.
- Active transport infrastructure and connectivity is limited by the constraints of the rail lines and major road corridor.
- Wolli Creek is a dense, walkable area, with all residents living within walking distance to the rail station.

A review of Wolli Creek is described further in **Figure 64** that identifies the success and improvements identified (for Wolli Creek) that would be useful for establishing transport directions for the Taverners Hill Precinct.

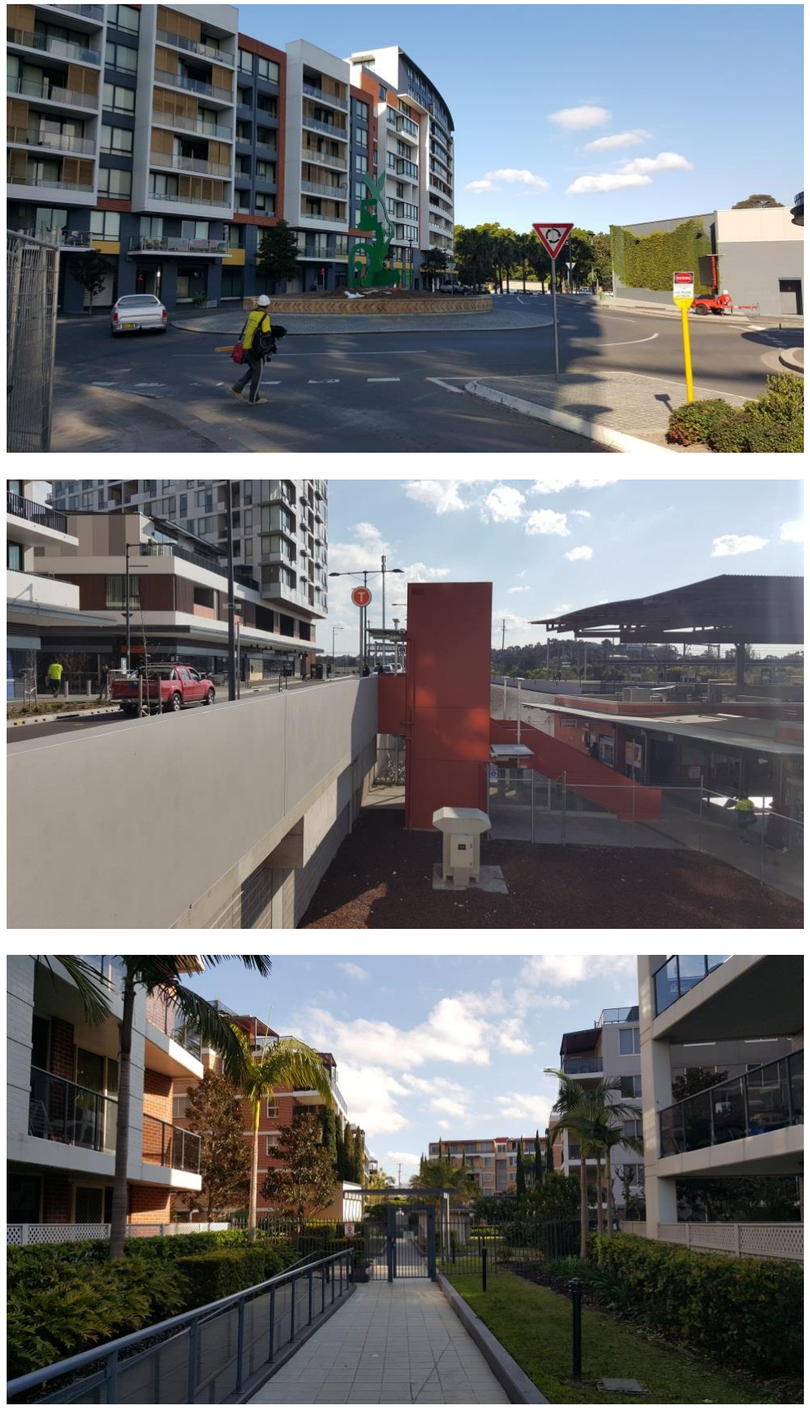

Figure 63 Wolli Creek Streetscapes (Source: AECOM, 2015)

a) Taverners Hill Precinct Opportunities and Constraints

Significant Opportunities

O1 – Enhancing links to both light and heavy rail stations with a focus on north south connectivity across Parramatta Road and a defined route for pedestrians to move between the two station locations and through rail underpasses

O2 – Enhance access to open space areas to the north with active travel infrastructure between the Taverners Hill Precinct and The Greenway as well as Leichhardt (Norton Street) in the east

O3 – Reduce the impact of the barriers provided by rail lines and Parramatta Road by enhancing connections across these constraints for all modes of transport

O4 – Introduce new north-south aligned laneways south of Parramatta Road and additional east-west aligned laneways to the north of Parramatta Road to enhance permeability for all modes of travel, provide activate streetscapes and link new developments to public transport infrastructure.

O5 – Focus on Taverners Hill as a transit oriented development with dense residential land use, active streetscapes and low parking rates across the Precinct in order to capitalise on the strong rail service provision and the rapid bus network along Parramatta Road.

Primary Constraints

C1 – High traffic volumes along Parramatta Road

C2 – Overcoming the barriers to permeability created by Parramatta Road and rail lines

C3 – The existing road network is constrained by the rail lines and underpasses, with few options for traffic distribution within the precinct and restricted access to access Parramatta Road

C4 – The high cost of reconfiguring the road network and existing impermeable street infrastructure

C5 – Low levels of connectivity and infrastructure connecting to adjacent neighbourhoods for non car modes of travel.

b) Case Study: Wolli Creek

Success of Wolli Creek

- Wolli Creek has a relatively high public transport mode share for residents as it provides rail connectivity in all four directions (north/south/east/west)
- It has a dense urban residential feel, with the most intensive land use immediately adjacent to the rail station – a prime example of transit oriented development within Sydney
- Parking requirements at Wolli Creek are minimised due to the high level of public transport accessibility
- The concentrated population of Wolli Creek also provides a market for ground floor retail and active streetscapes
- Wolli Creek has strong connectivity to the key destinations of Sydney Airport and the Sydney CBD
- The accessible location of Wolli Creek has enabled it to support a demographic of young professionals who are able to commute easily and efficiently to their places of work, particularly the Sydney CBD and Sydney Airport.

Potential Further Opportunities for Wolli Creek

- Enhancing active travel by creating dedicated cycleways to improve connectivity to existing cycle infrastructure adjacent to the Cooks River and other areas of open space
- Better pedestrian connectivity between adjacent neighbourhoods (which are divided by rail lines and the strategic road network) with the enhancement of crossing points and widening of underpasses
- Further increasing the level of active streetscapes
- Diversify the amenity for residents so that Wolli Creek is able to function more as a more self-contained community, building on the current commuter focus of the development.

c) Strategic Transport Framework for the Taverners Hill Precinct

	Opportunities and constraints addressed
D1 – Leverage and greater focus on existing public transport infrastructure, with improvements to bus facilities / services and stronger links to light and heavy rail stations	*O1, O4, O5, C5*
D2 – Capitalise on potential new rapid transit network along Parramatta Road	*O5, C1*
D3 – Capitalise on the Precinct's proximity to open space and leisure areas by improving active transport links and infrastructure to The Greenway and the north and Leichhardt in the east	*O2, C2*
D4 – Introduce further laneways to allow for alternate circulation routes for local traffic without crossing Parramatta Road, particularly in an east-west direction to the north of Parramatta Road and a north south direction to the south of Parramatta Road, enhancing connectivity to rail stations	*O4, O5, C3, C5*
D5 – Creating additional crossings of Parramatta Road and enhancing crossings of rail lines for all modes of transport	*O3, C2,*
D6 – Reduce the need for on-site parking for new developments across the precinct and locate parking away from active surface routes (preferably underground)	*O5*
D7 – Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians.	*O3, O4, C4*
D8 – Enhance the streetscape throughout the Precinct, particularly along new laneways	*O4, O5, C5*

d) Transport Infrastructure and Service Improvements

- Intersection upgrades or road capacity enhancements
- Street extensions and connections.
- Provision of active transport facilities and streetscape improvements
- Improve public transport services provision and bus priority measures
- New public transport infrastructure (e.g. Light Rail or Rapid Transit)
- Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 64 Taverners Hill Precinct Transport Plan Framework (Source: AECOM, 2015)

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services in order to reach the desired land use and transport planning outcomes.

7.5 FUTURE TRANSPORT PROVISION FOR TAVERNERS HILL PRECINCT

Precinct strategic transport framework

The strategic transport framework for the Taverners Hill Precinct is presented in **Figure 64**. The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure and service improvements

In the future Taverners Hill Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government, Leichhardt Council and Marrickville Council, during policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Taverners Hill Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

It may be possible to encourage individuals to modify their travel behaviour in ways that optimise the capacity of transport resources. For example, measures to reduce car dependency near Taverners Hill Light Rail stop have the potential to free up the capacity of road infrastructure systems.

The directions have been addressed with the following improvements, shown schematically in **Figure 65** and summarised in **Table 76**.

Table 76 Taverners Hill Precinct: Transport Infrastructure and Service improvements

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Provision of active transport facilities and streetscape improvements						
T1			✓	Upgrade streetscape along Parramatta Road.	S	D8
T2			✓	Potential GreenWay landscape enhancement with emphasis on the Parramatta Road gateway.	S	D3, D4, D8
T3			✓	Active streetscape upgrade to Tebbutt Street.	M	D3, D4, D8
T4*			✓	Connection under Longport Street to link existing GreenWay to the Lewisham West Light Rail stop	L	D1, D3, D7
T5*			✓	GreenWay connection under Parramatta Road	L	D1, D3, D5, D7
T6	✓		✓	Improve pedestrian and cycle crossing facilities at Flood Street intersection.	M	D4, D5, D7
Improve public transport service provision and bus priority measures						
T7		✓		Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD.	S	D1, D2, D7
New public transport infrastructure						
T8		✓		Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.	M-L	D1, D2, D7

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Taverners Hill | Transport Improvements

ID	Potential Improvements
T1	Upgrade streetscape along Parramatta Road.
T2	Potential GreenWay landscape enhancement with emphasis on the Parramatta Road gateway.
T3	Active streetscape upgrade to Tebbutt Street.
T4 *	Connection under Longport Street to link existing GreenWay to the Lewisham West Light Rail stop
T5 *	GreenWay connection under Parramatta Road
T6	Improve pedestrian and cycle crossing facilities at Flood Street intersection.
T7	Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD.
T8	Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.

Legend

	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Indicative Zone of Future Super Stop Envelope	L	Light Rail Stations

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

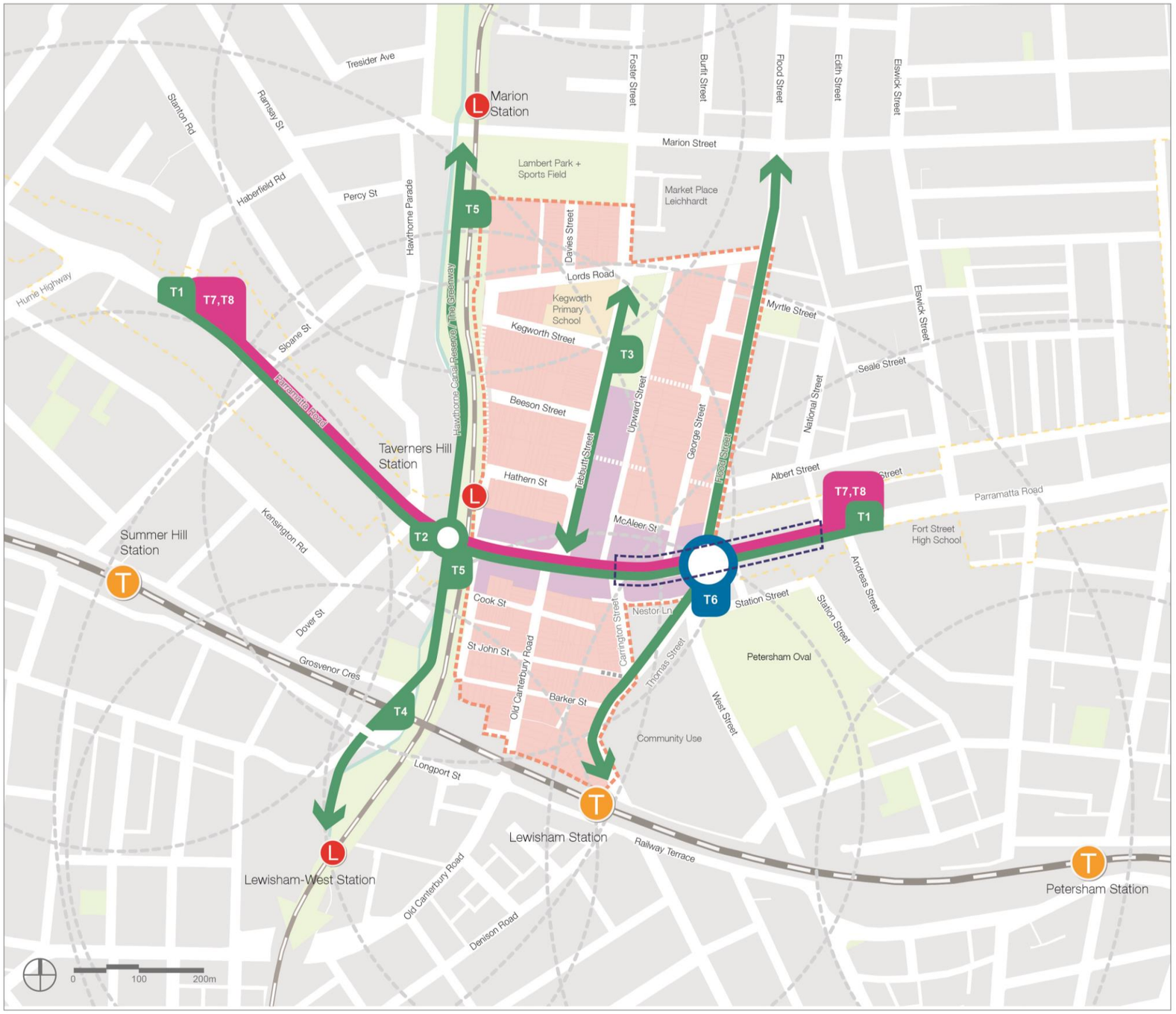

Figure 65 Taverners Hill Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure whereby developments are permitted to provide a lower rate of on-site parking close to public transport, while developments further away would need to provide a higher rate of parking provision. Leichhardt and Marrickville Councils provide parking rates that do not consider the distance from public transport nodes.

The proposed parking rates for the Taverners Hill Precinct consider elements of each LGAs DCP, while also adopting the emerging best practice approach which considers the radial distance to a rail station, light rail station or bus superstop. The proposed rates provided are maximum parking rates, as opposed to minimums. Due to the proximity of the Precinct to rail stations, residents and workers within these zones are more likely to use public transport. Based on the accessibility to public transport, density and mix of land uses proposed for Taverners Hill Precinct, it is considered appropriate that existing parking rates may be scaled down to encourage mode shifts to non-vehicular travel and reduce vehicular impacts on the surrounding road network.

The proposed 400m and 800m walking catchments for Summer Hill Station, Lewisham Station, Marion Light Rail Station and Taverners Hill Light Rail Station are illustrated in **Figure 66**. The entire Precinct lies within 800 metres of Taverners Hill Station, with a majority of the Precinct within 400 metres. This indicates strong connectivity to public transport facilities for the region. The proposed parking rates for the Taverners Hill Precinct are outlined in **Table 77** and **Table 78**. The refined parking rates attempt to address Precinct transport principle 'D6', by reducing parking availability and thereby reducing parking.

While the goal of the reformed parking rates is to reduce car dependency for short tips, with an existing vehicle ownership of 1.3 vehicles per household[8], the reduced off-street parking rates will have implications on the Precinct in the short term. To minimise these impacts, decoupled parking is proposed along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

[8] ABS Census, 2011

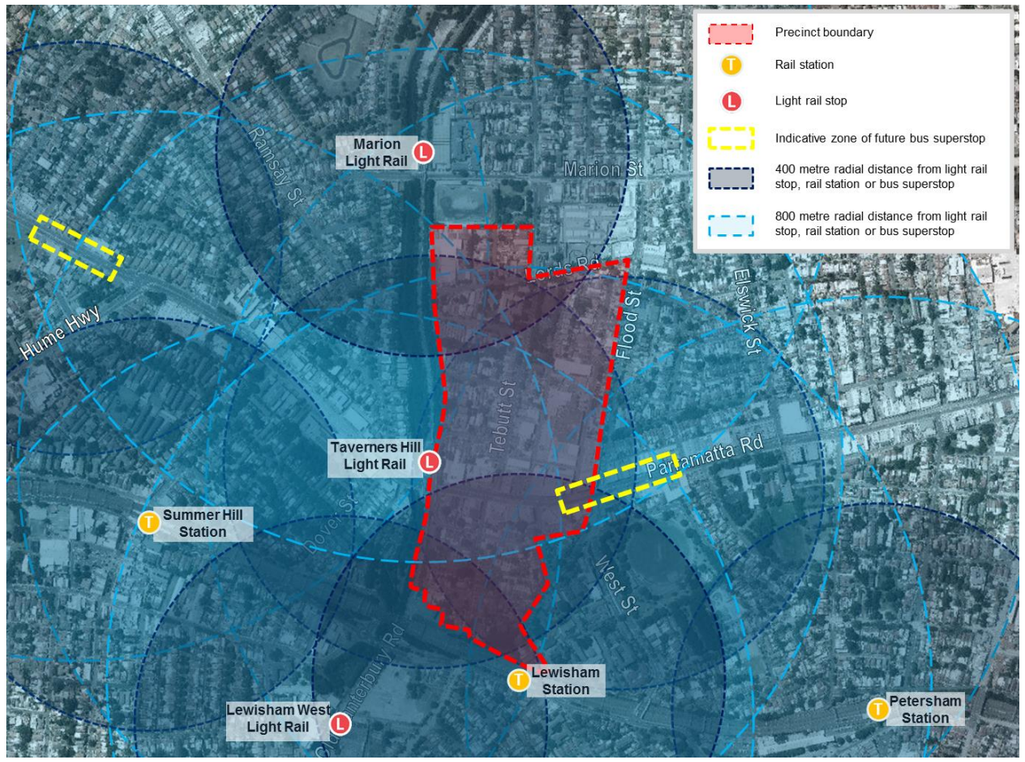

Figure 66 Taverners Hill Precinct: Rail station, light rail station and proposed bus superstop catchments (Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015)

Table 77 Proposed parking rates within 400m of a rail station, light rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom		
	3+ bedroom		
Business premises	1 space per 100sqm of GFA		
Retail	1 space per 100sqm of GFA		

Table 78 Proposed parking rates NOT within 400m from a rail station, light rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1.2 spaces per dwelling	
Business premises	1 space per 70sqm of GFA		
Retail	1 space per 60sqm of GFA		

8. Leichhardt

8.1 EXISTING LAND USE

The Leichhardt Precinct is an active Town Centre which is highly urbanised along Norton Street. The Precinct is bounded by Marion Street to the north, Renwick Street to the west, Balmain Road to the east and a number of local streets south of Parramatta Road to the south. The Precinct is well connected to bus services with a large number of frequent bus routes operating along Parramatta Road and Norton Street. The area is predominantly mixed use and retail with residential. The Leichhardt Precinct boundary is outlined in **Figure 67**.

Figure 67 Leichhardt Precinct Boundary
(Source: Marrickville LEP 2011 and Leichhardt LEP 2013. Base map: NSW Land & Property Information – SixMaps, amended by AECOM, 2015)

The Leichhardt Precinct is located within two LGAs: majority of the Precinct is located within Leichhardt Council (north of Parramatta Road) with the southern portion located with Marrickville Council. A review of the Marrickville LEP 2011 and Leichhardt LEP 2013 and aerial photography indicates that a majority of land uses in the Precinct are consistent with their specified zone.

The majority of the Precinct is mixed use and retail, particularly lots with frontages to Norton Street and Parramatta Road. Low density residential dwellings and educational land uses are also located within the Precinct.

8.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing Road Network

The existing road network in the Leichhardt Precinct is illustrated in **Figure 68**, highlighting the key road connections including Parramatta Road, Norton Street, Balmain Road and Crystal Street. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of current road function and operational roles.

Table 79 identifies some of the key roads within the Leichhardt Precinct along with their classification based on both the Austroads functional system and Roads and Maritime's administrative system. Parramatta Road serves as the primary east-west arterial corridor for the Precinct. Norton Street is the main north-south connector road between Parramatta Road and Marion Street, and Balmain Road is a one way northbound road.

Table 79 Key roads in the vicinity of the Leichhardt Precinct (Source: AECOM, 2015)

Road	Functional Classification	RMS Classification
Parramatta Road	Arterial	State Road
Norton Street	Collector	Regional Road
Balmain Road	Collector	Regional Road
Crystal Street	Collector	Regional Road
Marion Street	Collector	Regional Road

Figure 68 Road network and major connections in the vicinity of the Leichhardt Precinct
(Source: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

Traffic volumes

There are no Roads and Maritime Services traffic count stations located within the Leichhardt Precinct, however two relevant traffic count stations are located east and west of Leichhardt Precinct, along Parramatta Road. Their locations and volume of traffic are summarised in **Table 80.** Both of the stations recorded volumes over 50,000 vehicles per weekday in 2012. According to the Roads and Maritime Road Network Management Hierarchy, based on the given description of the road and speed limit, the section of the Parramatta Road would be classified as a Class 5 Urban road (5U). Characteristics of a Class 5U road involve moderately high traffic volumes, including freight, public transport and commercial vehicle travel (RMS Network and Corridor Planning, 2008).

Table 80 Traffic counting stations near the Leichhardt Precinct (Source: RMS traffic counts)

Road Name	Station Description	Westbound*	Eastbound*	Total*
Parramatta Road	Leichhardt – At Goods Railway Line	31,700	33,000	64,700
Parramatta Road	Camperdown – East of Cardigan Street	31,800	31,500	63,300

*Weekday counts for 2012

Key Intersections

Key intersections on Parramatta Road that are in close proximity to the Precinct are:

- Norton Street connects Parramatta Road to Lilyfield, the A4 City West Link and towards the Leichhardt North Light Rail Station. The street provides the primary access to Leichhardt town centre.
- Balmain Road, one way northbound between Parramatta Road and Marion Street provides links to the A4 City West Link and Lilyfield in the north.
- Crystal Street provides links to Petersham in the south.
- Catherine Street also connects Parramatta Road to Lilyfield and the A4, as well as the Lilyfield Light Rail Station.

Constraints

The Precinct is currently a local centre with mixed use and retail areas along Parramatta Road and Norton Street, with education facilities to the north which generates a number of private vehicles trips. The Norton Street, Balmain Road/ Crystal Street intersections with Parramatta Road in particular is an area of high vehicular and pedestrian activity. Crystal Street is also the nearest connection to the south of Parramatta Road providing links to Petersham and Stanmore Station.

Constraints of the surrounding road network include:

- Norton Street and Balmain Road / Crystal Street intersections at Parramatta Road.
- Limited vehicular crossings over the rail corridor to the south.
- Vehicular and pedestrian movement conflicts on Norton Street.

Existing parking conditions

Parking controls within the Leichhardt Precinct are varied with no un-timed parking offered. Bus lanes and clearways operate along Parramatta Road between 6am – 10am and 3pm – 7pm during weekdays with no parking permitted at all other times of the day. Time-restricted parking and parking permits apply within and surrounding the Precinct.

Time restrictions are in place for on-street parking within the Precinct, which includes:

- 2P and 4P parking restrictions on Norton Street and Marion Street
- 2P parking restrictions on Renwick Street
- 1/2P and 1P parking restrictions on Balmain Road
- 1P parking restrictions on Queen Street
- 2P parking restrictions on Elswick Street.

The Leichhardt Precinct provides parking permits for residents and local businesses for streets within the Leichhardt LGA These parking permits provide the necessary parking controls within the Precinct to manage the availability of on-street parking. Holders of the permits are able to park without restrictions in the appropriate parking facilities, which mostly encompass on-street parking.

Currently there are several council operated off-street car parks provided within a convenient distance of the Precinct, including:

- 10 spaces in the Council Carpark in Renwick Street (30 minutes).
- 87 spaces (and 4 disabled parking spaces) in the Council Carpark in Norton Street (30 minutes).
- 61 spaces (and 1 disabled parking space) in the Council Carpark in Hay St, Leichhardt (30 minutes).

New developments are required to provide off-street parking to service the anticipated demands of the proposed land use. A summary of off-street parking rates in Leichhardt is provided in **Table 81**. The portion of the Precinct within Marrickville is under Parking Area 2, a summary of parking rates is provided in **Table 82**.

Table 81 Off-street parking rate summary – Leichhardt LGA (Source: Leichhardt DCP 2013)

Land use	Parking rate		
Residential	Studio	0 to 0.5 spaces per dwelling	Visitors: 0.09 to 0.125 spaces per dwelling.
	1 bedroom unit	0.333 to 0.5 spaces per dwelling	
	2 bedroom unit	0.5 to 1 space per dwelling	
	3+ bedroom unit	1 to 1.2 spaces per dwelling	
Office premises	Min: 1 space per 100 sqm of GFA; Max: 1 space per 80 sqm of GFA		
Business premises	Min: 1 space per 100 sqm of GFA; Max: 1 space per 60 sqm of GFA		
Bulky goods	Min: 1 space per 125 sqm of GFA; Max: 1 space per 100 sqm of GFA		
Restaurants or cafes	Min: 1 space per 80 sqm of GFA; Max: 1 space per 50 sqm of GFA		

Table 82 Off-street parking rate summary – Marrickville LGA (Source: Marrickville DCP 2011)

Land use	Parking rate		
Residential flats - 7 or more units (Area 2)	Studio	1 space per dwelling	Visitors: 0.25 spaces per resident space.
	1 bedroom unit	1 space per dwelling	
	2 bedroom unit	1 space per dwelling	
	3+ bedroom unit	1 space per dwelling	
Business, retail and shops (Area 2)	Up to 500m^2	1 per 80sqm GFA	
	500 - 750m^2	7 + 1 per 45sqm GFA over 500sqm GFA	
	750 – 1,000m^2	12 + 1 per 35sqm GFA over 750sqm GFA	
	Over 1,000m^2	20 + 1 per 30sqm GFA over 1,000sqm GFA	

Public Transport Provision

Public transport services for the Precinct are based around bus services along Parramatta Road and Norton Street. Petersham Station and Stanmore Station are within 0.7 kilometres and 1 kilometre respectively of the southern Precinct boundary.

Rail services

Petersham Station is located approximately 0.7 kilometres south of the Precinct boundary and Stanmore Station is located approximately 1 kilometre south of the Precinct boundary. Based on station barrier counts Petersham Station and Stanmore Station were ranked the 67th busiest station on the Sydney Trains network, with both stations recording approximately 6,960 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). Petersham Station and Stanmore Station are serviced by the T2 Inner West & South Line.

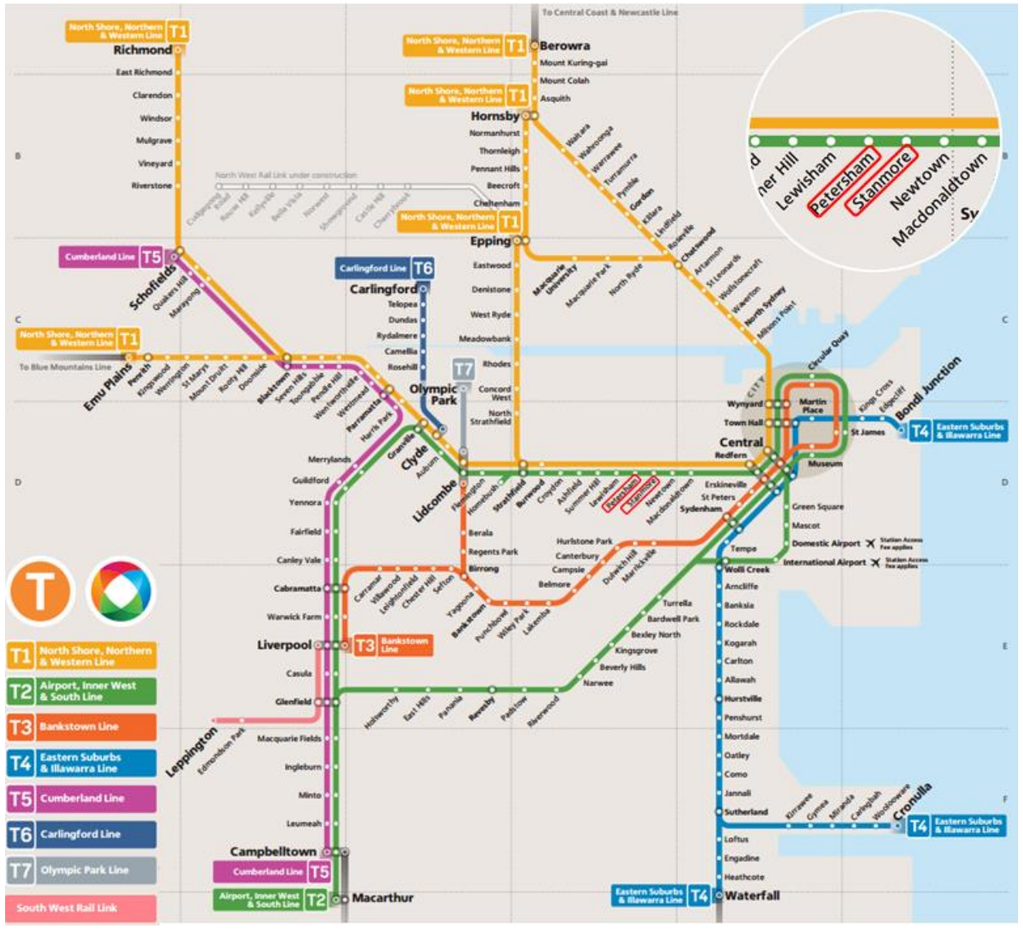

Figure 69 Location of Petersham and Stanmore Stations on the Sydney Trains network (Source: Sydney Trains, 2015)

The number of rail services stopping at Petersham Station and Stanmore Station during the AM and PM peak periods is shown in **Table 83**.

Table 83 Rail service frequencies at Petersham and Stanmore Stations (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T2 Inner West & South Line		
Campbelltown to City via Granville	8	8
City to Campbelltown via Granville	8-12*	8

*During the AM Weekday Peak Petersham receives four addition services compared to Lewisham

Bus services

The Leichhardt Precinct is primarily serviced by a number of bus routes connecting the Precinct to major centres including the Sydney CBD, Campsie, Rozelle, Five Dock, Burwood, Strathfield and Ashfield. Bus routes are accessible from Parramatta Road, Norton Street, Marion Street and Crystal Street as shown in **Figure 70**. The Precinct is currently served by the following bus routes:

- Route 370 (Leichhardt to Coogee) travels along Marion Street and Balmain Road.
- Route 413 (Campsie to City via Ashbury) passes through the Precinct travelling along Parramatta Road providing connections to Lewisham Station.
- Route 436, 438, 439 and 440 (Five Dock and Rozelle to City via Leichhardt) passes through the Precinct along Norton Street and Parramatta Road.
- Route 444 and 445 (Campsie to Balmain East) travels through the Precinct from Crystal Street to Norton Street providing connections to Petersham Station.
- Route 461, 480 and 483 (Strathfield and Burwood to City – Domain) passes through the Precinct along Parramatta Road.

Figure 70 Bus services in the Leichhardt Precinct
(Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015).

Table 84 provides a summary of peak bus service frequencies for routes operating in the vicinity of the Precinct.

Table 84 Bus service frequencies for the Leichhardt Precinct (Source: Transdev and Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
370	Leichhardt to Coogee	< 30 minutes	< 15 minutes
413	Campsie to City via Ashbury	< 30 minutes	< 30 minutes
436, 438, 439, 440, L38 and L39	Five Dock and Rozelle to City via Leichhardt	<10 minutes	< 10 minutes
444 and 445	Campsie to Balmain East	< 20 minutes	< 15 minutes
461, 480 and 483	Burwood Strathfield to the Domain	< 10 minutes	< 10 minutes

Active Transport Provisions

Active transport facilities within the Leichhardt Precinct are shown in **Figure 71**. Paved footpaths are provided on either side of the roads with pedestrian crossings at signalised intersections. However, due to the congested nature of Parramatta Road, the intersections with Norton Street and Crystal Street do not provide a pedestrian crossing on the eastern approach. A pedestrian bridge is provided near the Fort Street High School at Elswick Street, approximately 350 metres west of the Precinct to facilitate the safe crossing of Parramatta Road.

The cycle network surrounding the Precinct is shown in **Figure 71**. The Precinct is well connected to the existing cycle network with links along Norton Street, Balmain Road and Marion Street. The cycle network mainly comprises of on-road cycleways. There are limited opportunities for cyclists to safely cross Parramatta Road which presents a constraint to links to train stations to the south.

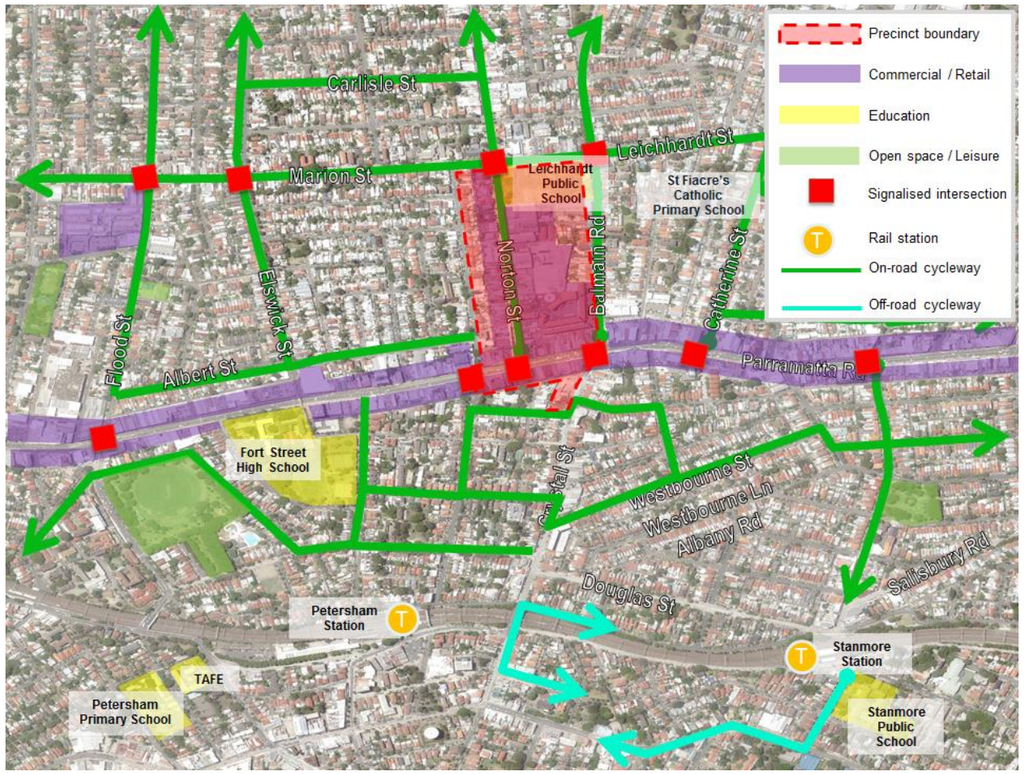

Figure 71 Active transport facilities and desire lines in the Leichhardt Precinct (Source: NSW Land & Property Information – SixMaps, 2015)

Travel Patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 revealed that more residents of the Leichhardt Precinct are employed in the Sydney Inner City (48 per cent) than any other area, with 61 per cent travelling by public transport, majority utilising buses. For residents within the Precinct the dominant mode of travel to work was by car accounting for 47 per cent of trips. 48 per cent of trips were undertaken by public transport with buses recording 30 per cent and train recording eight per cent.

Table 85 summarises the JTW workforce travel destination data for the Leichhardt Precinct. It should be noted that the southern section of the Precinct is within Travel Zone 317 and has not been included due to the small portion of the Precinct within the Travel zone.

Table 85 Leichhardt Precinct Workforce Travel Destinations
Source: BTS Journey to Work – Travel Zones (819)

Workforce destinations		Train	Bus	Car	Walked only	Other	Total
1	Sydney Inner City	34	350	167	21	53	625
2	Leichhardt	0	6	62	82	6	156
3	North Sydney - Mosman	22	6	34	0	3	65
4	Strathfield – Burwood - Ashfield	0	11	40	6	0	57
5	Ryde – Hunters Hill	4	6	41	0	3	54
	Other	45	18	276	7	12	358
	Total	105	397	620	116	77	1,315
		8%	30%	47%	9%	6%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

In terms of people employed within the area, the JTW data shows that employed people working in the area are dispersed throughout Sydney with no significant number of people originating from a certain area. The Strathfield – Burwood – Ashfield area recorded the highest number of employed people who work within the Precinct with 15 per cent.

Majority of trips is made by car recording 67 per cent of trips made to the Precinct. This reflects the fact the Precinct's central employment area is not easily accessible through public transport with buses and trains recording a total of 20 per cent of trips.

Table 86 summarises the JTW employment travel origin data for the Leichhardt Precinct. It should be noted that the southern section of the Precinct is within Travel Zone 317 and has not been included due to the small portion of the Precinct within the Travel zone.

Table 86 Leichhardt Precinct Employment Travel Origins
Source: BTS Journey to Work – Travel Zones (819)

Employee origins		Train	Bus	Car	Walked only	Other	Total
1	Strathfield – Burwood - Ashfield	10	50	168	8	12	248
2	Leichhardt	4	23	63	103	6	199
3	Canada Bay	3	16	117	0	6	142
4	Canterbury	3	15	90	0	3	111
5	Marrickville - Sydenham - Petersham	6	9	42	43	6	106
	Other	101	80	613	4	23	821
	Total	127	193	1093	158	56	1,627
		8%	12%	67%	10%	3%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

The existing mode split for the Leichhardt Precinct compared to the Leichhardt LGA is summarised in **Table 87**. The most popular choice of travel to work is vehicle travel (47%), followed by public transport (39%) and walk only trips (9%). It is evident that the mode split for the Precinct is similar to the Leichhardt LGA, with a slightly lower vehicular mode split. The data shows that buses are the main choice in terms of public transport given the significant number of bus routes serving the area. The data also shows a higher proportion of people travelling by train than Leichhardt LGA.

Table 87 Leichhardt Precinct: Mode share of the Precinct compared to Leichhardt LGA (2011)
Source: BTS Journey to Work – Travel Zones

Mode	Existing Leichhardt Precinct mode share	Existing LGA mode shares
		Leichhardt LGA
Vehicle driver	44%	50%
Vehicle passenger	3%	4%
Train	8%	5%
Bus / Ferry / Tram	31%	29%
Walked only	9%	6%
Other mode	4%	5%
Mode not stated	1%	1%

8.3 FUTURE CHARACTER OF LEICHHARDT PRECINCT

The Leichhardt Precinct is a centre steeped in local culture, and heritage values, which has experienced economic decline in recent years. The opportunity exists to reinvigorate Leichhardt by promoting new businesses and introducing appropriately scaled residential uses that will activate Norton Street and Parramatta Road. The Precinct is centred on the intersection of Norton Street and Parramatta Road, much of which is identified as a heritage conservation area. In addition, the existing food culture, and small shop frontages of the Precinct, will influence the types and scale of uses that should be encouraged. Future development will build upon the existing character to achieve the vision set out for the Leichhardt Precinct.

The vision for the Leichhardt Precinct:

A vibrant mixed-use entertainment precinct that is a destination for wider Sydney, with retail and residential opportunities creating a rejuvenated and active Norton Street and Parramatta Road.

Future land use context

To achieve the vision for the Precinct, the following planning measures have been proposed as illustrated in **Figure 72**:

- Continued evolution of Norton Street as a vibrant culinary, retail and entertainment destination for wider Sydney.
- Development along Parramatta Road to reflect the identity of a revitalised Norton Street, signalling the place as a destination.
- Improvements to streetscapes and new open space along Parramatta Road from Norton Street, to provide a marker to the entry of the Precinct.
- Infill residential development to increase the local population and support commercial activity.

Collectively, the proposed planning measures may have the following potential transport implications:

- Improvements to the pedestrian environment and circulation are likely to encourage active transport mode share.
- Improvements to active transport and bus connections to existing rail stations, such as Petersham Station as well as a future rapid transit corridor on Parramatta Road.
- Public transport service frequencies may need to be increased, as the higher density land use zones are likely to increase public transport trips.
- Changes in the existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

Review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and service improvements to be delivered, as discussed in the Transport Plan. These upgrades not only address existing deficiencies but also cater for future growth of the Leichhardt Precinct. The proposed transport improvements are expected to reduce dependency on private vehicles and also provide alternative transport options for future residents and employees of Leichhardt Precinct.

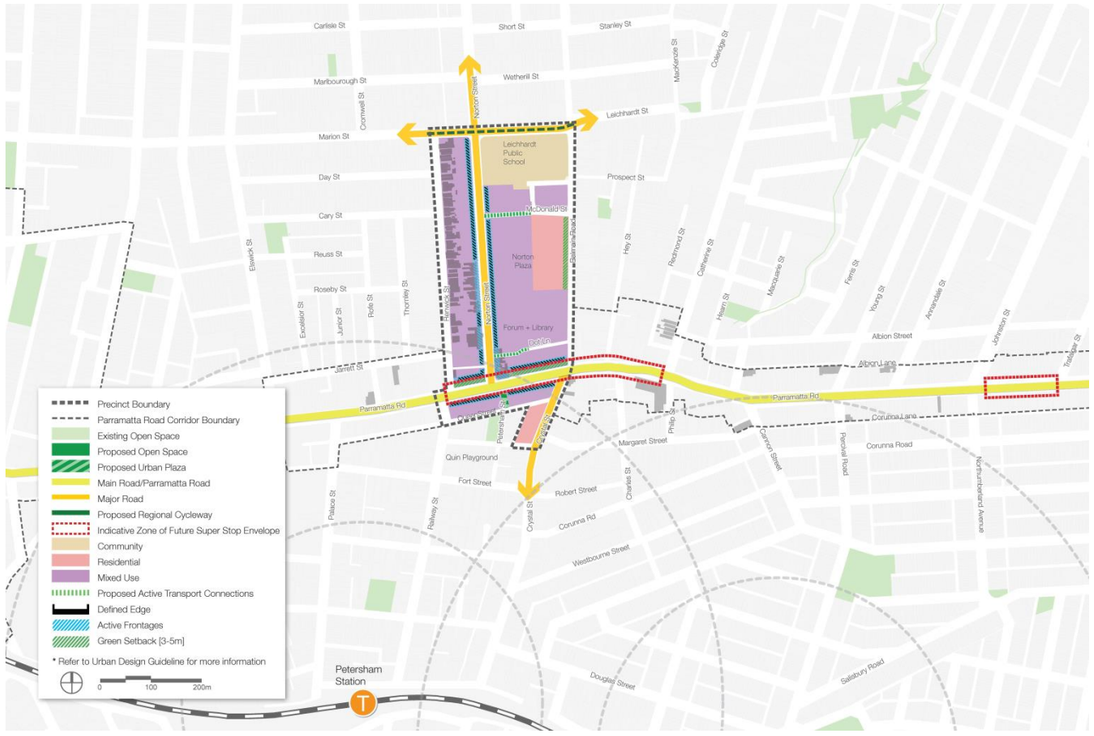

Figure 72 Leichhardt Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Leichhardt Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 74**. These identified opportunities and constraints serve as the basis for the strategic transport framework for Leichhardt Precinct.

In addition to the identified issues, the WestConnex project currently in progress is expected to impact on the existing traffic conditions. The *WestConnex M4 East EIS Draft Traffic and Transport Assessment* outlined the anticipated impacts of the M4 East project on the road network in 2031 based on detailed traffic modelling. In Leichhardt, a decrease in volumes of traffic due to the extension of the M4 Motorway to the east is expected to marginally improve midblock traffic conditions on Parramatta Road west of West Street in the long term. Key intersections on Parramatta Road, including Norton Street and Crystal Street, are expected to undergo significant improvements in levels of service as a result of the forecasted reduction in volumes due to the M4 East development in the long term.

8.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Leichhardt Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example of where urban renewal has occurred and comparing it to the characteristics of the proposed Leichhardt Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Leichhardt Precinct.

This assessment enables the identification of infrastructure needs for the Leichhardt Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Leichhardt has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Leichhardt Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW, Marrickville Council and Leichhardt Council for their feedback. This helped to inform the selection of the Sydney suburb of **Crows Nest** as an ideal benchmark for what the future Leichhardt Precinct might look like.

Characteristics that Crows Nest shares with the future Leichhardt Precinct include:

- Its location adjacent to a key transport corridor. Like Leichhardt with Parramatta Road, Crows Nest is located along the Pacific Highway.
- The major active retail street for Crows Nest is Willoughby Road, which is similar in function and character to Norton Street.
- Its functional nature and role within Sydney. Like Leichhardt, Crows Nest is located within inner Sydney, at a similar distance to Sydney CBD.
- Crows Nest has good public transport accessibility, particularly with bus routes providing access to a number of regional destinations, including the Northern Beaches, Sydney CBD and Neutral Bay. Leichhardt shares this high level of bus services, with Norton Street and Parramatta Road providing a high level of services.
- Crows Nest has established residential and commercial development away from the Pacific Highway, with newer high rise residential located along the Pacific Highway. This is similar to what might be expected from the future Leichhardt Precinct, with established development along Norton Street and new high rise residential located at or near to Parramatta Road.
- Rail services are located a short distance away at St Leonards, similar to the location of Leichhardt in relation to Petersham Station.
- The Pacific Highway is heavily trafficked, in a similar fashion to Parramatta Road.
- Active transport infrastructure and connectivity is limited due to the dominance of private vehicle infrastructure.
- The size of Crows Nest is similar to what is expected from the future Leichhardt Precinct.

A review of the Leichhardt Precinct is described further in **Figure 74** that identifies the success of Crows Nest and improvements identified (for Crows Nest) that would be useful for establishing transport directions for the Leichhardt Precinct.

Figure 73 Crows Nest Streetscapes (Source: AECOM, 2015)

a) Leichhardt Precinct Opportunities and Constraints

Significant Opportunities

O1 – Enhancing links to Petersham Station with a focus on north-south connectivity across Parramatta Road and along Railway Street

O2 –Provide new areas of public open space within the Precinct, building on that provided by the Italian Forum Cultural Centre

O3 – Improve connectivity to the existing active travel network with emphasis on a north-south connection between Petersham Station and Lilyfield to connect better to existing leisure routes and the rail station to the Leichhardt Precinct

O4 - Introduce new east-west aligned laneways to enhance permeability for all modes of travel, provide activate streetscapes and link new developments to public transport infrastructure.

O5 – Reduce parking rates across the Precinct to capitalise on the strong bus service provision on Norton Street and the rapid bus network along Parramatta Road.

Primary Constraints

C1 – High traffic volumes along Parramatta Road

C2 – Overcoming the barriers to permeability and space limitations created by Parramatta Road

C3 – A lack of public open space within the vicinity of the precinct

C4 – The distance between Petersham Station and residents located to the north of Parramatta Road

C5 – Low levels of connectivity and infrastructure connecting to adjacent neighbourhoods for non car modes of travel.

b) Case Study: Crows Nest

Success of Crows Nest

- Crows Nest has a relatively high public transport mode share for residents as it provides accessible rail and bus services
- It has a strong individual character, with high quality amenity and an active streetscape giving the area a local feel, despite its proximity to a major road corridor (Pacific Highway)
- Crows Nest has strong pedestrian permeability with laneways present throughout the mixed use area
- Crows Nest has strong connectivity to the key destinations of North Sydney and the Sydney CBD
- The accessible location of Crows Nest has enabled it to support a demographic of young professionals who are able to commute easily and efficiently to their places of work.

Potential Further Opportunities for Wolli Creek

- Establishment of dedicated cycleways to provide infrastructure for cyclists
- Improve connectivity to neighbouring locations and areas of green space
- Better pedestrian connectivity between adjacent neighbourhoods
- Further increasing the level of active streetscapes in addition to Willoughby Road (including on the Pacific Highway)
- Restrict parking to encourage travel by other modes of transport.

c) Strategic Transport Framework for the Leichhardt Precinct

	Opportunities and constraints addressed
D1 – Leverage and focus on existing public transport infrastructure, with improvements to bus facilities / services and stronger links to major transport hubs and corridors	*O1, O3, O5, C4*
D2 – Capitalise on potential new rapid transit network along Parramatta Road	*O5, C5*
D3 – Increase the availability of public open space within the Precinct and connect to leisure areas located to the north of the Precinct	*O2, C3*
D4 – Introduce further laneways to allow for alternate circulation routes for local traffic without crossing Parramatta Road, particularly in an east-west direction	*O4, C2, C3*
D5 – Enhancing pedestrian priority within the Precinct	*O3, O4, C3, C5*
D6 – Reduce the need for on-site parking for new developments across the precinct and locate parking away from active surface routes (preferably underground)	*O5, C1*
D7 – Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians.	*O4, C1*
D8 – Enhance the streetscape throughout the Precinct, particularly along new laneways	*O2, O4, C3*
D9 – Improve north-south connectivity for all modes of transport, including across Parramatta Road	*O1, O3, C2. C5*

d) Transport Infrastructure and Service Improvements

- Intersection upgrades or road capacity enhancements
- Street extensions and connections.
- Provision of active transport facilities and streetscape improvements
- Improve public transport services provision and bus priority measures
- New public transport infrastructure (e.g. Light Rail or Rapid Transit)
- Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 74 Leichhardt Transport Precinct Plan Framework (Source: AECOM, 2015)

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services in order to reach the desired land use and transport planning outcomes.

8.5 FUTURE TRANSPORT PROVISION OF LEICHHARDT PRECINCT

Precinct strategic transport framework

The strategic transport framework for the Leichhardt Precinct is presented in **Figure 74.** The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure and service improvements

In the future Leichhardt Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government, Leichhardt Council and Marrickville Council, during policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Leichhardt Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

The directions have been addressed with the following improvements, shown schematically in **Figure 75** and summarised in **Table 88**.

Table 88 Leichhardt Precinct: Transport infrastructure upgrades

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Intersection upgrades or road capacity enhancements						
L1	✓			Investigate upgrade to Parramatta Road / Norton Street intersection to improve access into the Precinct.	S-M	D4, D7
L2	✓			Investigate upgrade to Norton Street / Marion Street intersection to encourage east-west traffic movements along Marion Street.	S-M	D4, D7
L3	✓		✓	Upgrade Balmain Road / Parramatta Road intersection with improved pedestrian crossing opportunities.	S	D5, D7, D9
L4	✓			Upgrade Catherine Street / Phillip Street / Parramatta Road intersection to provide additional right turn opportunities into the Precinct.	S	D5, D7, D9
Street extensions and connections						
L5	✓		✓	Construction of new east-west road connections north of the Forum.	L	D3, D4, D7, D8
Provision of active transport facilities and streetscape improvements						
L6			✓	Investigate the use of Balmain Road as a two-way cycleway tying into Parramatta Road and Crystal Street and improving access to Petersham Station (Rail).	M	D1, D3, D5, D7, D8, D9
L7		✓	✓	Upgrade streetscapes along Railway Street to improve accessibility to Petersham Station.	M	D1, D8, D9
L8*			✓	Upgrade streetscape along Parramatta Road from Renwick Street to Balmain Road.	S	D1, D8, D9
Improve public transport service provision and bus priority measures						
L9		✓		Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD	S	D1, D2, D7
New public transport infrastructure						
L10		✓		Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.	M-L	D1, D2, D7

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Leichhardt | Transport Improvements

ID	Potential Improvements
L1	Investigate upgrade to Parramatta Road / Norton Street intersection to improve access into the Precinct.
L2	Investigate upgrade to Norton Street / Marion Street intersection to encourage east-west traffic movements along Marion Street.
L3	Upgrade Balmain Road / Parramatta Road intersection with improved pedestrian crossing opportunities.
L4	Upgrade Catherine Street / Phillip Street / Parramatta Road intersection to provide additional right turn opportunities into the Precinct.
L5	Construction of new east-west road connections north of the Forum.
L6	Investigate the use of Balmain Road as a two-way cycleway tying into Parramatta Road and Crystal Street and improving access to Petersham Station (Rail).
L7	Upgrade streetscapes along Railway Street to improve accessibility to Petersham Station.
L8 *	Upgrade streetscape along Parramatta Road from Renwick Street to Balmain Road.
L9	Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD
L10	Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.

Legend

	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Indicative Zone of Future Super Stop Envelope		

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

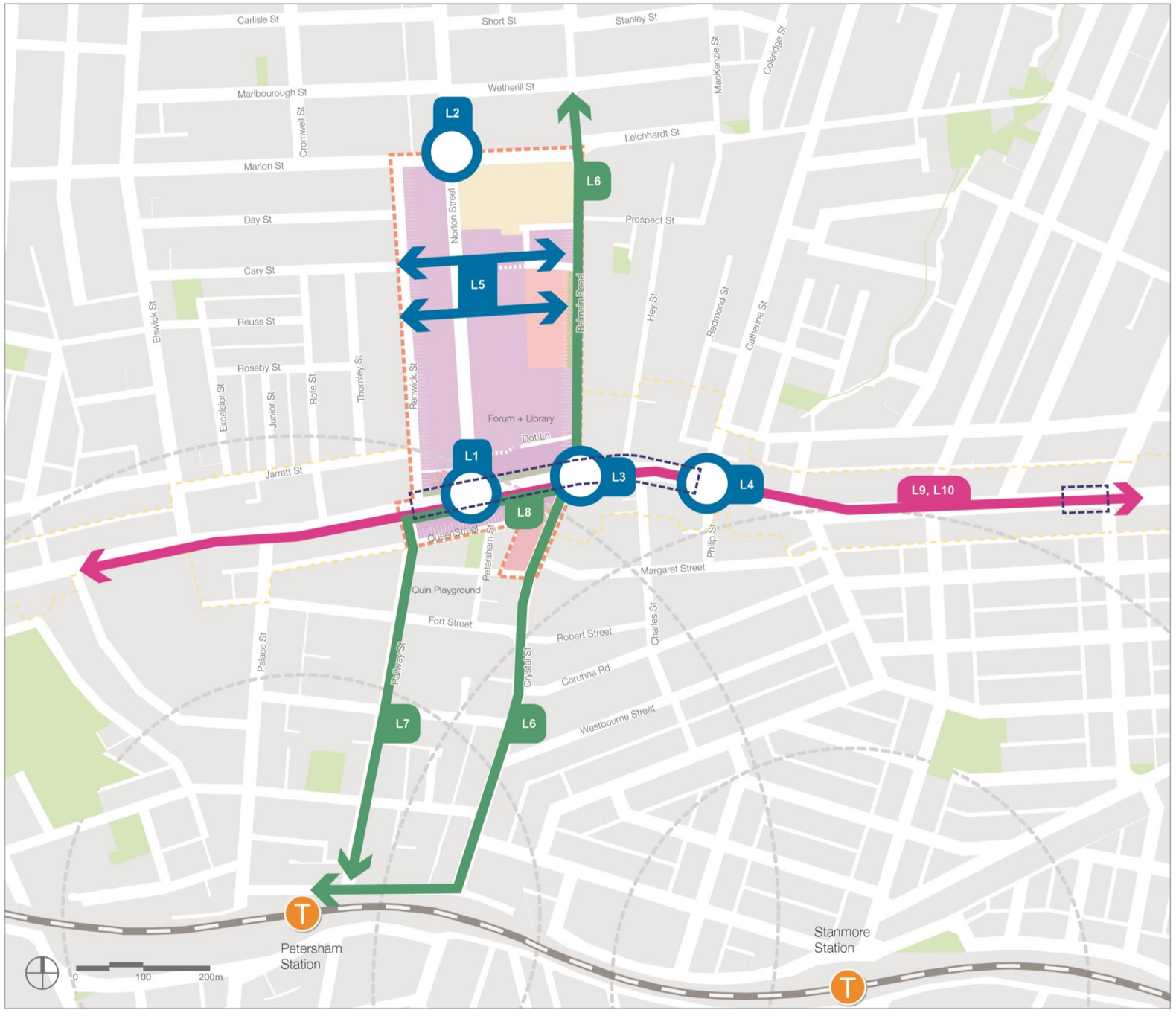

Figure 75 Leichhardt Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure whereby developments are permitted to provide a lower rate of on-site parking close public transport, while developments further away would need to provide a higher rate of parking provision. Leichhardt and Marrickville Councils provide parking rates without direct consideration of the distance from public transport nodes.

The proposed parking rates for the Leichhardt Precinct consider elements of each LGAs DCP, while also adopting the emerging best practice approach which considers the radial distance to rail stations or proposed bus superstops. Due to the proximity of the Precinct to bus corridors and rail stations, residents and workers within these zones are more likely to use public transport. Based on the accessibility to public transport, density and mix of land uses proposed for the Leichhardt Precinct, the existing parking rates have been scaled down within the 400 metre range to encourage mode shifts to non-vehicular travel and reduce vehicular impacts on surrounding road network. It is considered that scaled down parking rates will not be viable outside of the 800 metre range, unless there is significant intervention with the provision of additional transport infrastructure.

The 400m and 800m walking catchments for Petersham Station as well as the major bus corridors along Marion Street, Norton Street and Parramatta Road are illustrated in **Figure 76**. It is evident that a portion of the Precinct south of Parramatta Road lies within 800 metres of Petersham Station and Stanmore Station with the majority of the Precinct lies within the 400 metre catchment of the proposed bus superstop along Marion Street, Norton Street and Parramatta Road. The proposed parking rates for the Leichhardt Precinct are outlined in **Table** 89 and **Table 90**.

While the goal of the reformed parking rates is to reduce car dependency for short tips, with an existing vehicle ownership of 1.3 vehicles per household[9], the reduced off-street parking rates will have implications on the Precinct in the short term. To minimise these impacts, decoupled parking is proposed along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

The refined parking rates attempt to address Precinct transport principle ‘D6’, by reducing parking availability and thereby reducing parking.

[9] ABS Census, 2011

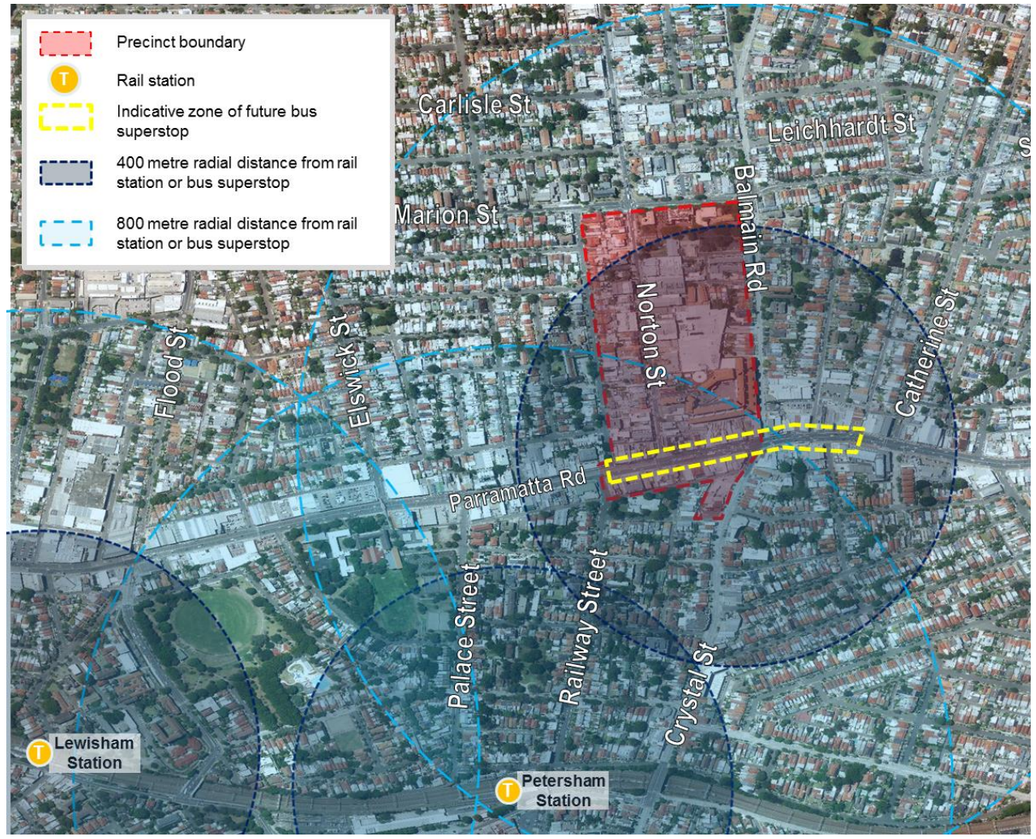

Figure 76 Leichhardt Precinct: Rail station or proposed bus superstop catchments
Source: NSW Land & Property Information – SixMaps, 2015 and NSW Transport Info 2015 (modified by AECOM)

Table 89 Proposed parking rates within 400m of a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1 space per dwelling	
Business premises	1 space per 100sqm of GFA		
Retail	1 space per 100sqm of GFA		

Table 90 Proposed parking rates NOT within 400m from a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	1 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1.2 spaces per dwelling;	
Business premises	1 space per 80sqm of GFA		
Retail	1 space per 60sqm of GFA		

9. Camperdown

9.1 EXISTING LAND USE

The Camperdown Precinct along Parramatta Road is characterised by medium to high residential, light industrial uses, homeware retail outlets, educational facilities and other commercial activity industrial area. The Precinct is divided by Parramatta Road, with the northern section bounded by Badu Park to the north-west and Booth Street to the east. The southern section is bounded by Cardigan Lane to the west, Australia Street to the east and Derby Street and O'Dea Reserve to the south. The Precinct is well connected to bus services with a number of bus routes operating along Parramatta Road. The Camperdown Precinct boundary is outlined in **Figure 77**.

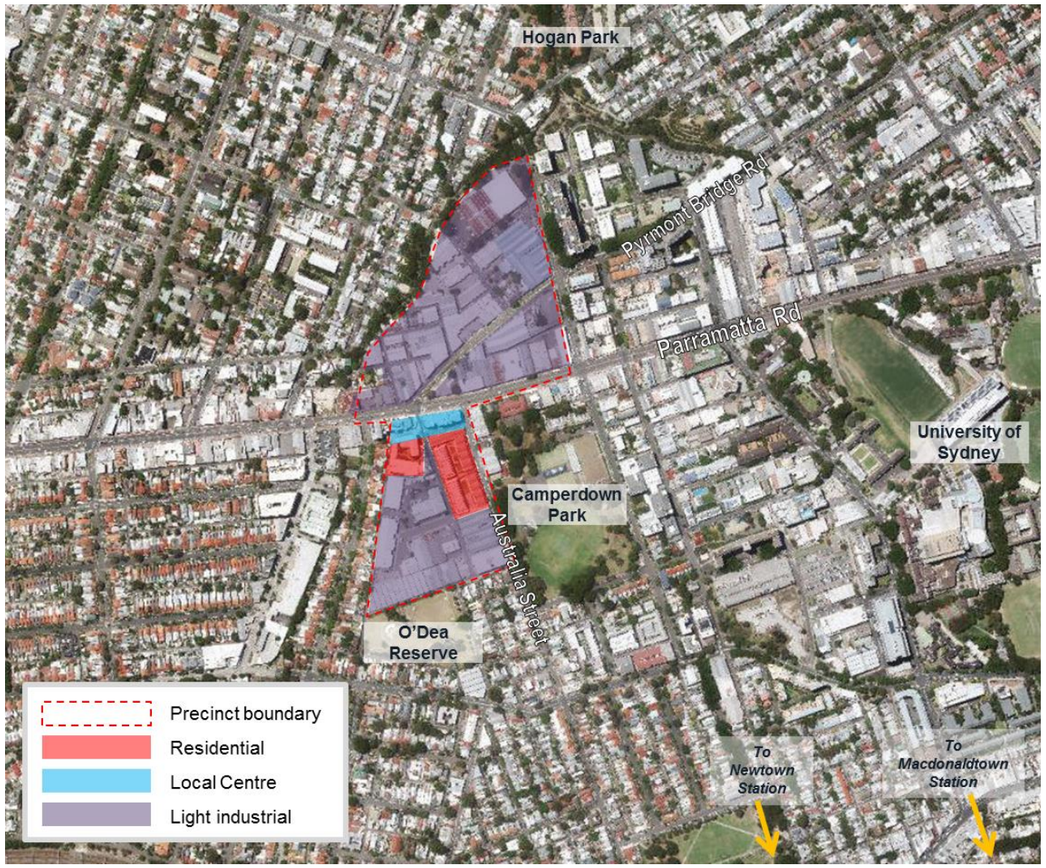

Figure 77 Camperdown Precinct Boundary
(Source: Marrickville LEP 2011 and Leichhardt LEP 2013. Base map: NSW Land & Property Information – SixMaps, amended by AECOM, 2015)

The Camperdown Precinct is located within two LGAs: majority of the Precinct is located within Leichhardt Council (north of Parramatta Road) with the southern portion located with Marrickville Council. A review of the Marrickville LEP 2011 and Leichhardt LEP 2013 and aerial photography indicates that a majority of land uses in the Precinct are consistent with their specified zone. Land use within the Precinct is currently residential, mixed use, retail and industrial.

9.2 EXISTING TRAFFIC AND TRANSPORT CONDITIONS

Existing Road Network

The existing road network in the Camperdown Precinct is illustrated in **Figure 78**, highlighting the key road connectors within the Precinct including Parramatta Road, Pyrmont Bridge Road and Booth Street. The Austroads Guide to Traffic Management (2009) provides a functional road classification system that categorises roads based on their role in the network. Roads and Maritime Services (Roads and Maritime) also use an administrative road classification system of State Roads, Regional Roads and Local Roads. These classification systems provide an indication of current road function and operational roles.

Table 91 identifies some of the key roads within the Camperdown Precinct along with their classification based on both the Austroads functional system and Roads and Maritime's administrative system. Parramatta Road serves as the primary east-west arterial corridor for the Precinct, with north-south connections to sub-arterial and collector roads. There are multiple right-turn restrictions on Parramatta Road in both eastbound and westbound directions.

Table 91 Key roads in the vicinity of the Camperdown Precinct (Source: AECOM, 2015)

Road	Functional Classification	RMS Classification
Australia Street	Local Street	Local Street
Booth Street / Mallett Street	Collector	Regional Road
Bridge Road	Collector	Regional Road
Parramatta Road	Arterial	State Road
Pyrmont Bridge Road	Sub-Arterial	State Road

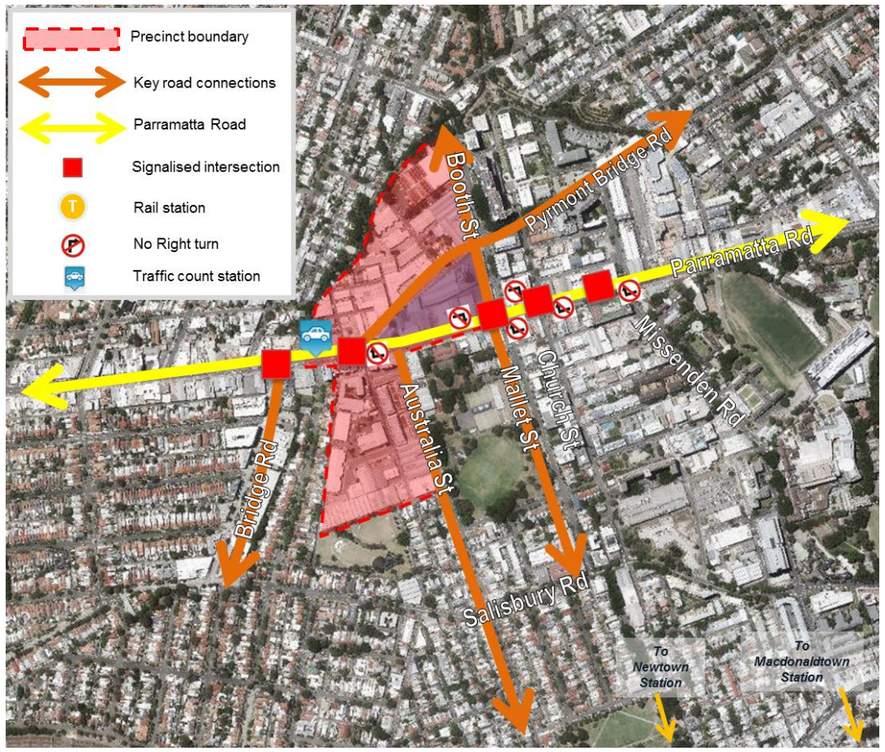

Figure 78 Road network and major connections in the Camperdown Precinct
(Source: NSW Land & Property Information – SixMaps amended by AECOM, 2015)

Traffic volumes

There is one Roads and Maritime Services traffic count station located within the Camperdown Precinct on Parramatta Road – east of Cardigan Street. **Table 92** highlights the traffic count station, with volumes over 50,000 vehicles per day in 2012. According to the Roads and Maritime Road Network Management Hierarchy, based on the given description of the road and speed limit, the section of the Parramatta Road would be classified as a Class 5 Urban road (5U). Characteristics of a Class 5U road involve moderately high traffic volumes, including freight, public transport and commercial vehicle travel (RMS Network and Corridor Planning, 2008).

Table 92 Traffic counting stations near Camperdown Precinct (Source: RMS traffic counts)

Road Name	Station Description	Westbound*	Eastbound*	Total*
Parramatta Road	Camperdown – East of Cardigan Street	31,800	31,500	63,300

*Weekday counts for 2012

Key Intersections

Key intersections on Parramatta Road that are in close proximity to the Precinct are:

- Parramatta Road / Pyrmont Bridge Road – Pyrmont Bridge Road is a major alternate connection which provides access to Glebe, the Sydney CBD and the Western Distributor.
- Parramatta Road / Mallet Street, connects Annandale to Newtown and provides access to Newtown Railway Station.
- Parramatta Road / Missenden Road / Lyons Road, connects Forest Lodge to King Street and provides access to Royal Prince Alfred Hospital and Sydney University.
- Parramatta Road / Ross Street and Parramatta Road / University Avenue provide access to St Johns Road and provide access from Sydney University to Glebe.

Constraints

Pinch-points of the surrounding road network include:

- Narrow roads and laneways with limited north-south movements between both sides of Parramatta Road.
- Limited capacity along Pyrmont Bridge Road to cater for increasing traffic demands.
- Limited right turn opportunities along Parramatta Road in both directions, due to right turn restrictions including:
    - Vehicles travelling eastbound banned from turning right (south) into Mallet Street, Camperdown Precinct
    - Vehicles travelling westbound banned from turning right (north) into Mallet Street, Camperdown Precinct
    - Vehicles travelling westbound banned from turning right (north) into Church Street, Camperdown Precinct.

Existing parking conditions

Parking controls implemented within the Camperdown Precinct are varied. Bus lanes operate along Parramatta Road between 6am – 10am and 3pm – 7pm during weekdays which otherwise is restricted to 1P parking between 10am – 3pm during weekdays and 8:30am – 12:30pm on Saturdays. Pyrmont Bridge Road has clearway restrictions between 6am – 10am and 3pm – 7pm during weekdays.

On-street parking within the Camperdown Precinct includes:

- Unrestricted parking along residential streets within the southern section of the Precinct.
- 2P restrictions along Mathieson Street, Cahill Street (west of Mathieson Street), Water Street
- Unrestricted parking along Chester Street, Guihen Street and Booth Street.

Currently there are no council or commuter off-street car parks provided within a convenient distance of the Precinct. New developments are required to provide off-street parking to service the anticipated demands of the proposed land use. A summary of off-street parking rates in Camperdown is provided in **Table 93.** The portion of the Precinct within Marrickville is under Parking Area 2, a summary of parking rates is provided in **Table 94**.

Table 93 Off-street parking rate summary – Camperdown LGA (Source: Camperdown DCP 2013)

Land use	Parking rate		
Residential	Studio	0 to 0.5 spaces per dwelling	Visitors: 0.09 to 0.125 spaces per dwelling.
	1 bedroom unit	0.333 to 0.5 spaces per dwelling	
	2 bedroom unit	0.5 to 1 space per dwelling	
	3+ bedroom unit	1 to 1.2 spaces per dwelling	
Office premises	Min: 1 space per 100 sqm of GFA; Max: 1 space per 80 sqm of GFA		
Business premises	Min: 1 space per 100 sqm of GFA; Max: 1 space per 60 sqm of GFA		
Bulky goods	Min: 1 space per 125 sqm of GFA; Max: 1 space per 100 sqm of GFA		
Restaurants or cafes	Min: 1 space per 80 sqm of GFA; Max: 1 space per 50 sqm of GFA		

Table 94 Off-street parking rate summary – Marrickville LGA (Source: Marrickville DCP 2011)

Land use	Parking rate		
Residential flats - 7 or more units (Area 2)	Studio	1 space per dwelling	Visitors: 0.25 spaces per resident space.
	1 bedroom unit	1 space per dwelling	
	2 bedroom unit	1 space per dwelling	
	3+ bedroom unit	1 space per dwelling	
Business, retail and shops (Area 2)	Up to 500m^2	1 per 80sqm GFA	
	500 - 750m^2	7 + 1 per 45sqm GFA over 500sqm GFA	
	750 – 1,000m^2	12 + 1 per 35sqm GFA over 750sqm GFA	
	Over 1,000m^2	20 + 1 per 30sqm GFA over 1,000sqm GFA	

Public Transport Provision

Public transport services for the Precinct are based around services along Parramatta Road and Booth Street. It should be noted that there are no rail stations located within convenient walking distance (800 metres) of the Precinct boundary. The nearest station is Newtown Station located approximately 1.3 kilometres south.

Rail services

Newtown Station is located approximately 1.3 kilometres south of the Precinct boundary. Based on station barrier counts Newtown Station was ranked the 37th busiest station on the Sydney Trains network recording approximately 13,660 entry and exit passenger movements during a typical weekday in 2013 (BTS Train Statistics 2014). Newtown Station is serviced by the T2 Inner West & South Line providing connectivity to the Sydney Trains network.

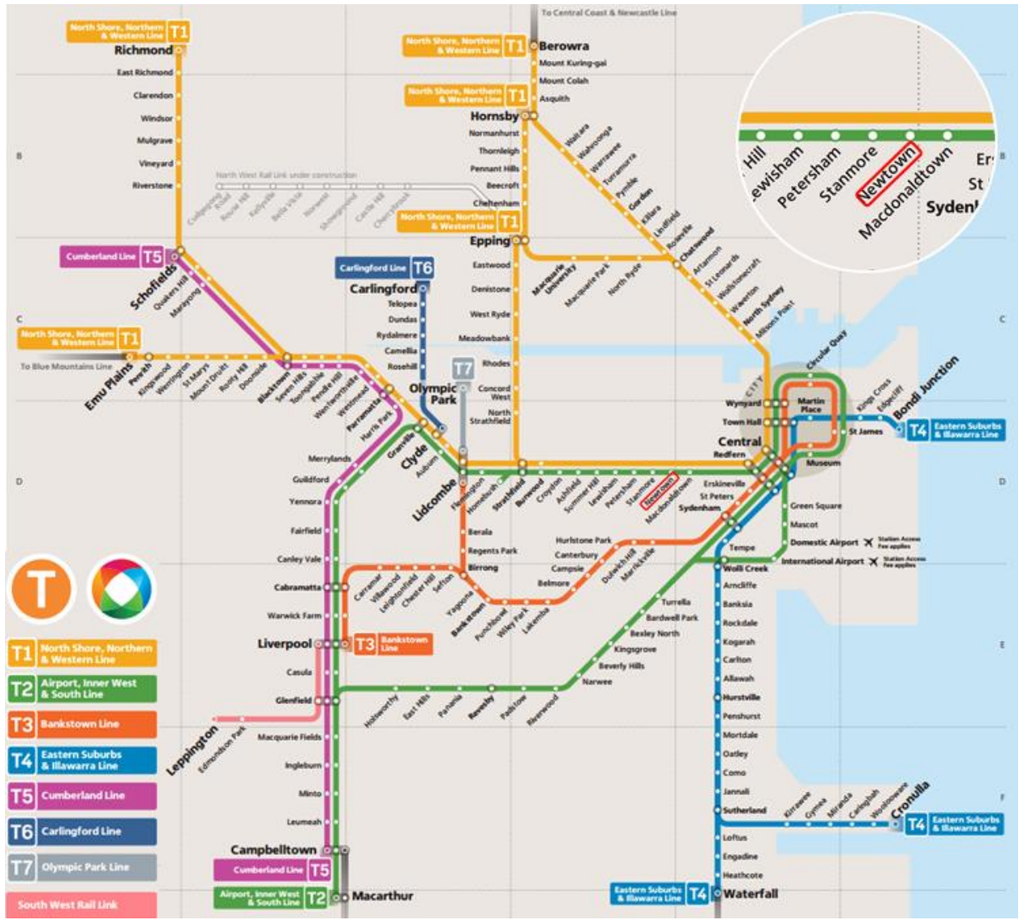

Figure 79 Location of Newtown Station on the Sydney Trains network (Source: Sydney Trains, 2015)

The number of rail services stopping at Newtown Station during the AM and PM peak periods is shown in **Table 95**.

Table 95 Rail service frequencies at Newtown Station (Source: Sydney Trains, 2015)

Key Destination	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
T2 Inner West & South Line		
Campbelltown to City via Granville	14	9
City to Campbelltown via Granville	14	11

Bus services

Camperdown Precinct is currently serviced by a number of bus routes connecting the Precinct to major centres including the Sydney CBD, Burwood and Strathfield. Bus routes are accessible from Parramatta Road and Booth Street as shown in **Figure 80**. The Precinct is currently served by the following bus routes (operated by Sydney Buses):

- Route 412 (Campsie to City) travels along Salisbury Road which is approximately 200 m south of the southern portion of the Precinct.
- Route 413 (Campsie to City via Ashbury) passes through the Precinct travelling along Parramatta Road.
- Route 436, 438, 439, 440 and respective limited stop services (Five Dock and Rozelle to City via Leichhardt) pass through the Precinct along Parramatta Road.
- Route 461, 480 and 483 (Strathfield and Burwood to City – Domain) pass through the Precinct along Parramatta Road.
- M10 (Maroubra to Leichhardt), a high frequency and high capacity bus, operates along Parramatta Road.

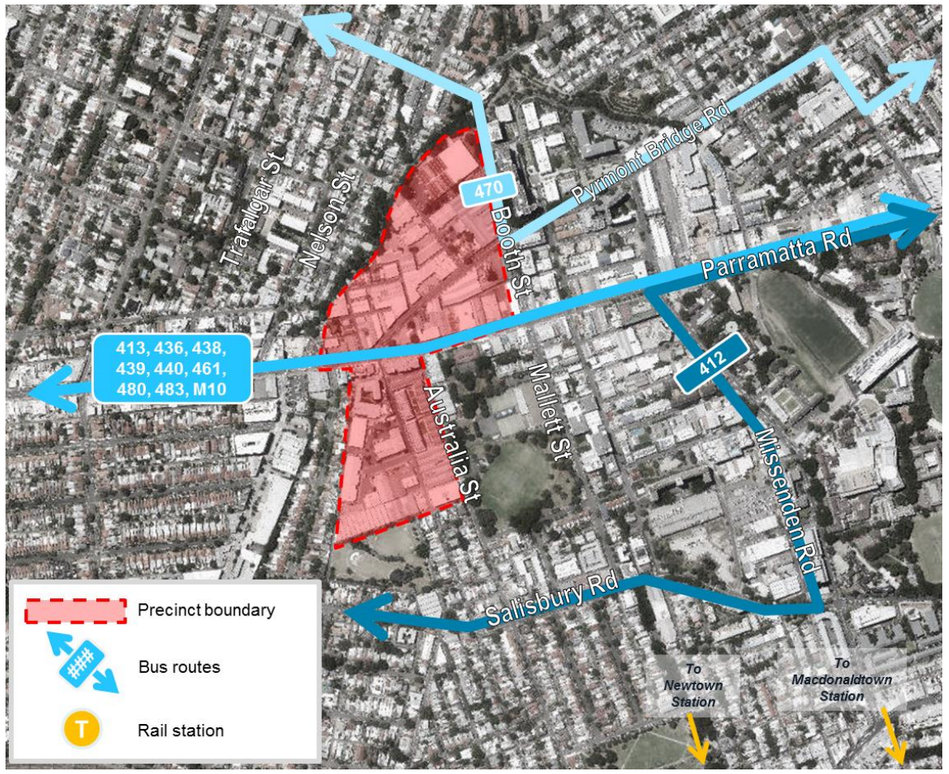

Figure 80 Bus services in the vicinity of the Camperdown Precinct (Source: NSW Land & Property Information – SixMaps and NSW Transport Info modified by AECOM, 2015).

Table 96 provides a summary of peak bus service frequencies for routes operating in the vicinity of the Precinct.

Table 96 Bus service frequencies for the Camperdown Precinct (Source: Transdev and Sydney Buses, 2015)

Route No.	Description	AM Weekday Peak (07:00-09:00)	PM Weekday Peak (16:00-18:00)
412	Campsie to City	Under 15 minutes between buses	Under 20 minutes between buses
413	Campsie to City via Ashbury	Under 15 minutes between buses	Under 25 minutes between buses
436, 438,439, 440, L38 and L39	Five Dock & Rozelle to City via Leichhardt	Under 10 minutes between buses	Under 10 minutes between buses
461,480 and 483	Strathfield & Burwood to City via the Domain	Under 10 minutes between buses	10 minutes between buses
470	Lilyfield to City	Under 5 minutes between buses	Under 10 minutes between buses

Active Transport Provisions

Active transport provisions within the Camperdown Precinct are shown in **Figure 81**. Paved footpaths are provided on either side of the roads with the exception of laneways. Pedestrian crossings are provided on most of the approaches at signalised intersections. No pedestrian crossing is provided on the eastern approach of the intersection of Parramatta Road / Mallet Street / Booth Street and on the western approach of Parramatta Road / Pyrmont Bridge Road.

The cycle network surrounding the Precinct is shown in **Figure 81**. Cycle routes within the Precinct are currently limited however the Precinct is surrounded by a number of cycle routes. The majority of the cycle routes are on-road cycleways providing links to number of key areas such as the University of Sydney.

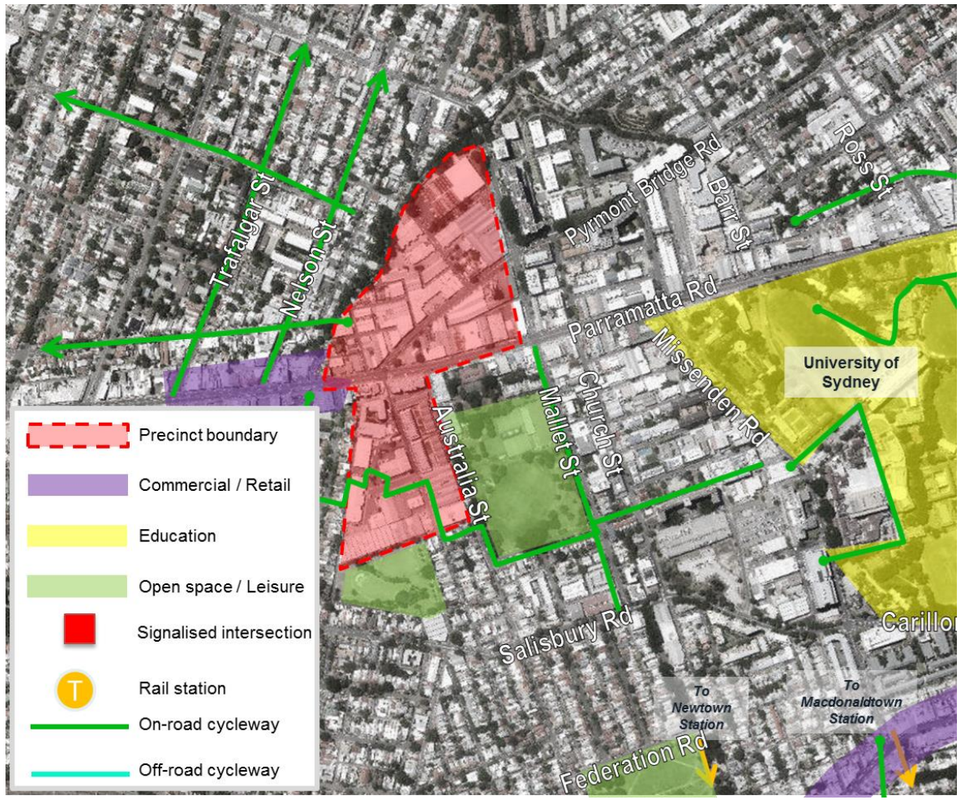

Figure 81 Active transport facilities and desire lines in the Camperdown Precinct (Source: NSW Land & Property Information – SixMaps, 2015)

Travel Patterns

A review of the Bureau of Transport Statistics (BTS) Journey to Work (JTW) data from 2011 revealed that more residents of Camperdown Precinct are employed in Sydney Inner City (53 per cent) than any other destination, as shown in **Table 97**. Private vehicle travel is the dominant mode to travel to work, with a mode share of 69 per cent. This is likely to be a result of the lack of convenient rail connections available from the Precinct, with rail mode share of only seven per cent. However, there is a relatively high bus mode share of 28 per cent given the Precinct's accessibility to frequent bus services along Parramatta Road.

Table 97 Camperdown Precinct Workforce Travel Destinations
Source: BTS Journey to Work – Travel Zones (237, 820)

Workforce destinations		Train	Bus	Car	Walked only	Other	Total*^
1	Sydney Inner City	52	518	318	147	121	**1156**
2	Leichhardt	0	25	102	49	13	**189**
3	North Sydney – Mosman	32	10	47	0	9	**98**
4	Chatswood – Lane Cove	16	3	64	0	3	**86**
5	Ryde – Hunters Hill	6	9	62	0	3	**80**
	Other	53	52	448	15	20	**588**
	Total	**159**	**617**	**1041**	**211**	**169**	**2197**
		7%	28%	47%	10%	8%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

The JTW data shows that employed people working in the area are dispersed throughout Sydney with no significant number of people originating from a certain area. Leichhardt was the top area employees in the Precinct originated from with 14 per cent of trips to the area. With 70 per cent of trips, the dominant mode was made by car to travel to the area. Only seven per cent of workers travel by bus and 11 per cent of workers travel by train. This indicates that there may be issues with public transport accessibility to the employment areas or an over-supply of off-street parking in these employment areas.

Table 98 summarises the JTW employment travel origin data for the Camperdown Precinct.

Table 98 Camperdown Precinct Employment Travel Origins
Source: BTS Journey to Work – Travel Zones (237, 820)

Employee origins		Train	Bus	Car	Walked only	Other	Total*^
1	Leichhardt	0	13	125	41	18	**197**
2	Sydney Inner City	6	20	84	50	18	**178**
3	Strathfield – Burwood – Ashfield	14	28	95	0	7	**144**
4	Marrickville – Sydenham – Petersham	8	3	38	23	7	**79**
5	Canada Bay	0	6	69	0	3	**78**
	Other	124	24	593	7	18	**766**
	Total	**152**	**94**	**1004**	**121**	**71**	**1442**
		11%	7%	70%	8%	5%	100%

^Excludes those who did not go to work or work from home
*Standard Area 3 selected were those that contained sections of the core study area

Existing mode splits

The existing mode split for the Camperdown Precinct compared to the Leichhardt LGA and Marrickville LGA is summarised in **Table 99**. The most popular choice of travel to work is vehicle travel (47 per cent), followed by public transport (36 per cent) and walk only trips (10 per cent). The data shows the Precinct and Leichhardt LGA have similar mode splits for bus and train where buses are the main choice in terms of public transport given the significant number of bus routes serving the Precinct and Leichhardt LGA. The data also shows a higher proportion of people walking to work compared to both LGAs.

Table 99 Camperdown Precinct: Mode share of the Precinct compared to Leichhardt LGA and Marrickville LGA (2011)
Source: BTS Journey to Work – Travel Zones

Mode	Existing Leichhardt Precinct mode share	Existing LGA mode shares	
		Leichhardt LGA	Marrickville LGA
Vehicle driver	43%	50%	43%
Vehicle passenger	4%	4%	4%
Train	7%	5%	30%
Bus / Ferry / Tram	29%	29%	11%
Walked only	10%	6%	6%
Other mode	6%	5%	5%
Mode not stated	1%	1%	1%

9.3 FUTURE CHARACTER OF CAMPERDOWN PRECINCT

The Camperdown Precinct is strategically located on the doorstep of University of Sydney and Royal Prince Alfred Hospital - major educational and health institutions that are recognised across Sydney, nationally and internationally. The area is characterised by narrow streets and parks, shaped by the subdivision of historical landholdings. The built form is strongly influenced by the institutional presence and industrial history, with rows of Victorian and Federation houses interspersed with larger-scale buildings of both institutional and industrial origin. In this context, the Camperdown Precinct will evolve into an attractive highly urbanised neighbourhood with high-quality amenity for housing and employment. The Precinct will take on a support role to the adjacent specialised activity institutions and their associated research centres by providing employment and ancillary uses. Future development will build upon the existing character to achieve the vision set out for the Camperdown Precinct.

The vision for the Camperdown Precinct:

An attractive highly urbanised precinct with high-quality amenity for housing and workplaces, well connected to the surrounding city and parklands, and focused on a busy and active local centre.

Future land use context

To achieve the vision for the Precinct, the following planning measures have been proposed as illustrated in **Figure 82**:

- An extension of the emerging higher density residential Precinct to the east of Mallet Street, developing as a local village which expands on existing areas of activity and makes use of the existing streets and lanes network.
- Taller built form to mark the Precinct, catering to both residential and business markets and offering potential for innovative and incubator business and research activities to find a home.
- New residential infill development will be located adjacent to this central core, designed to sensitively respond to both the industrial character of heritage structures and the nearby low scaled residential heritage area.
- Parramatta Road and Pyrmont Bridge Road to serve as active urban streets with retail and commercial activities drawing patrons from a wider catchment.

Collectively, the proposed planning measures may have the following potential transport implications:

- Improvements to the pedestrian environment and circulation are likely to encourage active transport mode share.
- Improvements to active transport and bus connections to existing rail stations, such as Newtown Station as well as a future rapid transit corridor on Parramatta Road.
- Public transport service frequencies may need to be increased, as the higher density land use zones are likely to increase public transport trips.
- Changes in the existing minimum parking controls to reduce additional private vehicle trips into and out of the Precinct.

Future regional transport context

Review of existing plans and policies has identified a number of committed regional transport infrastructure upgrades and improvements to be delivered, as discussed in the Transport Plan. These upgrades not only address existing deficiencies but also cater for future growth of the Camperdown Precinct. The proposed transport improvements are expected to reduce dependency on private vehicles and also provide alternative transport options for future residents and employees of Camperdown Precinct.

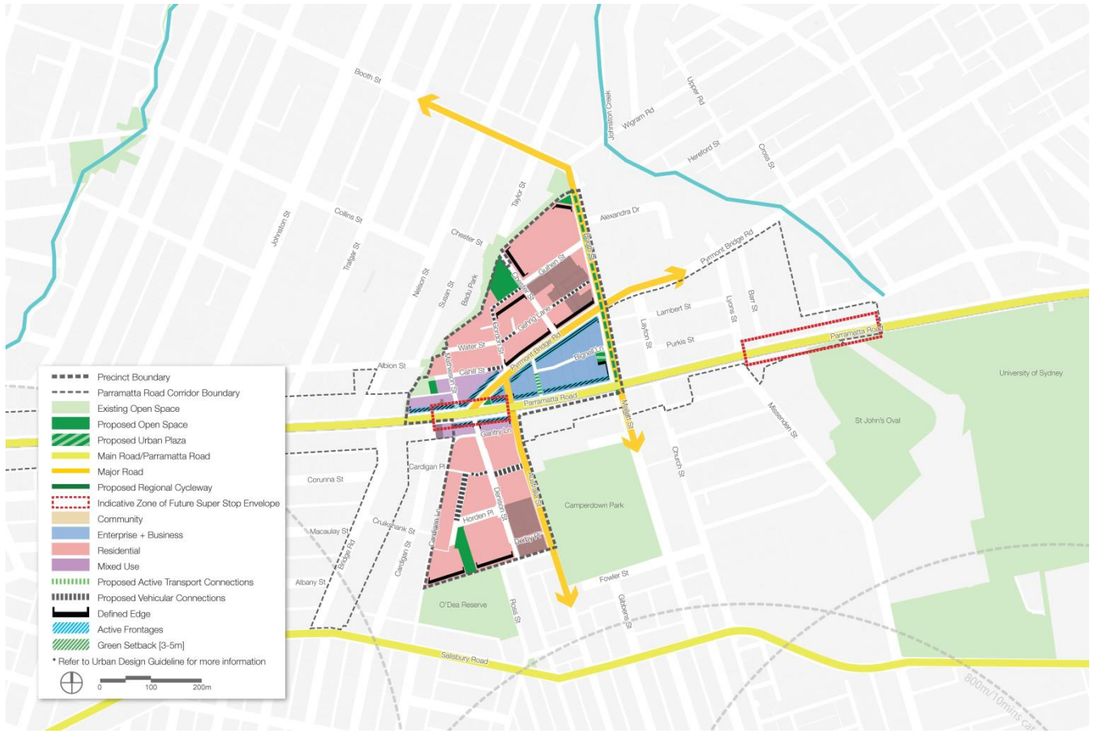

Figure 82 Camperdown Precinct Structure Plan (Source: Cox, Oculus, CM+, 2015)

Opportunities and constraints

Through the development of the Precinct Plans, a 'Strengths, Weaknesses, Opportunities and Threats' (SWOT) analysis has been undertaken to guide the scale and form of development. The key transport opportunities and constraints faced in achieving the proposed urban transformation of the Camperdown Precinct in terms of Place Making / Built Form, Linkages / Connections and Infrastructure have been identified in **Figure 84**. These identified opportunities and constraints serve as the basis for the strategic transport framework for Camperdown Precinct.

9.4 BENCHMARKING WITH COMPARABLE DEVELOPMENT

Rationale

The methodology used to inform the development of the Camperdown Transport Plan focuses on a benchmarking analysis. This involves selecting an existing example of where urban renewal has occurred and comparing it to the characteristics of the proposed Camperdown Precinct. This method has been used to benchmark the likely transport and parking requirements to be needed in order to support the proposed level of development at the Camperdown Precinct.

This assessment enables the identification of infrastructure needs for the Camperdown Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services to reach the desired transport and planning outcomes. At the conclusion of this review, the likely infrastructure and service requirements and behavioural targets can be identified for each mode of travel (and parking).

Preliminary Benchmarking Exercise and Site Selection

The likely nature and extent of the proposed development at Camperdown has been reviewed to develop a picture of what it could look like in the future. An initial review of case studies (similar precincts) was undertaken to identify potential matches / examples likely to be similar in nature to the future Camperdown Precinct. This exercise required the identification of locations within Sydney that represent more developed areas along key transport corridors.

Following the initial review of potential sites, possible case studies for use in the benchmarking assessment were identified and sent to UrbanGrowth NSW, Marrickville Council and Leichhardt Council for their feedback. This helped to inform the selection of the Sydney suburb of **Kingsford** as an ideal benchmark for what the future Camperdown Precinct might look like.

Characteristics that Kingsford shares with the future Camperdown Precinct include:

- Its location adjacent to a key transport corridor. Like Camperdown with Parramatta Road, Kingsford is located along ANZAC Parade.
- Both Kingsford and Camperdown are located a short distance from a major University and interact strongly with these education facilities.
- Kingsford is similar to what is expected from the future Camperdown Precinct.
- Like Camperdown, Kingsford is located within inner Sydney, at a similar distance to Sydney CBD.
- Kingsford has good public transport accessibility, particularly with bus routes providing access to a number of regional destinations, including the Sydney CBD. Camperdown shares this high level of bus services, with Parramatta Road providing a number of services.
- Kingsford has seen residential tower development in association with the University of NSW. This is similar to what might be expected from the future Camperdown Precinct, with new high rise residential located at or near to Parramatta Road likely to be attractive for University of Sydney students.
- ANZAC Parade is heavily trafficked, in a similar fashion to Parramatta Road.
- Active transport infrastructure and connectivity is available to key regional destinations.

A review of the Camperdown Precinct is described further in **Figure 84** that identifies the success of Kingsford and improvements identified (for Kingsford) that would be useful for establishing transport directions for the Camperdown Precinct.

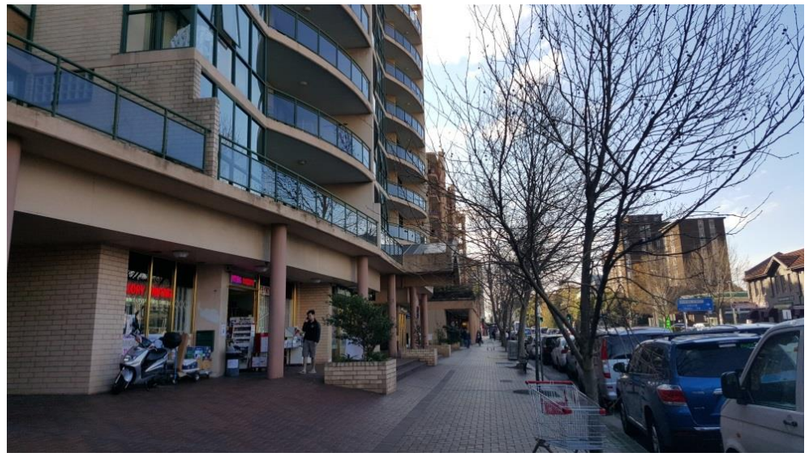

Figure 83 Kingsford Streetscapes (Source: AECOM, 2015)

a) Camperdown Precinct Opportunities and Constraints

Significant Opportunities

O1 – Enhancing links to University of Sydney, Royal Prince Alfred Hospital and Newtown

O2 – Enhance connectivity to areas of public open space with a focus on Camperdown Park, O'Dea Reserve

O3 – Enhance the existing cycle network with improvements to existing infrastructure including connectivity to Johnstones Creek

O4 – Reduce the impact of the barriers provided by Parramatta Road and Pyrmont Bridge Road by enhancing connections across these constraints for all modes of transport

O5 – Utilise and activate existing laneways to enhance permeability for all modes of travel, provide activate streetscapes (including an enhanced retail centre) and link new developments to public transport infrastructure.

O6 – Reduce parking rates across the Precinct to capitalise on the strong bus service provision on Norton Street and the rapid bus network along Parramatta Road.

Primary Constraints

C1 – High traffic volumes along Parramatta Road

C2 – Overcoming the barriers to permeability and space limitations created by Parramatta Road, including the lack of north-south connections across Parramatta Road

C3 – The amenity of the existing streetscape and commercial property frontages

C4 – The distance between the Precinct and Newtown Station

C5 – High demand for on-street parking.

b) Case Study: Kingsford

Success of Kingsford

- Kingsford has a relatively high public transport mode share for residents as it provides frequent bus services and is a walkable distance to the University of NSW and Prince of Wales Hospital
- It has a spacious, open feel with wide pedestrian footways
- Kingsford has an active and vibrant streetscape
- Kingsford has strong connectivity to the Sydney CBD and other major employment centres
- The accessible location of Kingsford has enabled it to support a demographic of young professionals and students who are able to commute easily and efficiently to their places of work or study.

Potential Further Opportunities for Kingsford

- The enhancement of east-west cycle routes
- Improve pedestrian connectivity to neighbouring locations and areas of green space
- Improve amenity and modernisation of streetscape in association with light rail development
- Further increasing the level of active streetscapes away from ANZAC Parade
- Restrict parking to encourage travel by other modes of transport.

c) Strategic Transport Framework for the Camperdown Precinct

	Opportunities and constraints addressed
D1 – Leverage and focus on existing public transport infrastructure, with improvements to bus facilities / services and stronger links to Newtown Station	*O5, O6, C1, C4*
D2 – Capitalise on potential new rapid transit network along Parramatta Road	*O6, C1*
D3 – Capitalise on the Precinct's proximity to open space and leisure areas by improving active transport links and infrastructure	*O2, O3, C2*
D4 – Enhance existing laneways to allow for alternate circulation routes for local traffic and to improve pedestrian permeability	*O5, C3*
D5 – Enhancing pedestrian priority within the Precinct, including crossings of Parramatta Road and Pyrmont Bridge Road	*O1, O4, C2*
D6 – Reduce the need for on-site parking for new developments across the precinct and locate parking away from active surface routes (preferably underground)	*D6, C5*
D7 – Ensure all key roads meet safety and performance standards for all vehicles, cyclists and pedestrians.	*O4, O5, C2*
D8 – Enhance the streetscape throughout the Precinct, particularly along new laneways and along existing commercial frontages	*O5, C3*
D9 – Improve north-south connectivity for all modes of transport, including across Parramatta Road	*O1, O4, C2*

d) Transport Infrastructure and Service Improvements

Intersection upgrades or road capacity enhancements

Street extensions and connections.

Provision of active transport facilities and streetscape improvements

Improve public transport services provision and bus priority measures

New public transport infrastructure (e.g. Light Rail or Rapid Transit)

Measures to reduce car dependency (e.g. car share schemes and reformed parking rates)

Figure 84 Camperdown Transport Precinct Plan Framework (Source: AECOM, 2015)

The Precinct Transport Plan Framework assists in the identification of infrastructure needs for the Precinct against capacity of existing infrastructure, informing the likely requirements for additional infrastructure and services in order to reach the desired land use and transport planning outcomes.

9.5 FUTURE TRANSPORT PROVISION OF CAMPERDOWN PRECINCT

Precinct strategic transport framework

The strategic transport framework for the Camperdown Precinct is presented in **Figure 84.** The specific infrastructure upgrades and service improvements that result from the framework are further detailed below.

Transport infrastructure and service improvements

In the future Camperdown Precinct, improvements in the transport and road network are required to cater for the increased development and the expected increases in travel demands. The improvements will also provide alternatives for future residents and employees to travel, without relying on private vehicles.

The proposed improvements are those that have already been identified by State Government, City of Sydney and Leichhardt Council, during policy and literature review undertaken as part of this study. The improvements have been adjusted and updated to better reflect the Camperdown Precinct Plan and specifically satisfy the following Guiding Principles of the Transport Plan:

- *Improve transport and land use integration*
- *Support multi-modal trips*
- *Take advantage of available capacity for the existing transport system*
- *Promote multi-purpose infrastructure*
- *Promote mixed-use development*
- *Manage travel demand*
- *Protect freight functions*
- *Coordinate travel distance and mode.*

In addition, future service upgrades and local development planning controls could be prepared to contribute towards the delivery of the remaining Guiding Principles:

- *Encourage behavioural solutions*
- *Provide transport options.*

The directions have been addressed with the following improvements, shown schematically in **Figure 85** and summarised in **Table 100**.

Table 100 Camperdown Precinct: Transport infrastructure upgrades and service improvements

ID	Mode			Potential improvements	Indicative timing (Short / Medium / Long)	Precinct directions addressed
	Road Network	Public Transport	Active Transport			
Street extensions and connections						
C1	✓		✓	Improve east-west connections by extending Cardigan Place and Hordern Place	M	D4, D7, D8
C2	✓		✓	Investigate formalising Bignell Lane as an east-west connection	M	D4, D7, D8
Provision of active transport facilities and streetscape improvements						
C3	✓		✓	Formalise Pyrmont Bridge Road, Mallett Street and Booth Street as local streets with one general traffic lane and one on-street parking lane on each side	S	D4, D5, D9
C4*			✓	Pyrmont Bridge Road public domain improvements between Parramatta Road and Mallett Street including new street tree planting, paving and bike parking	S	D3, D5, D7, D8
C5			✓	Australia Street improvements to pedestrian amenity to connect to Newtown Station	S	D1, D4, D5, D7, D9
C6			✓	Improve Chester Street and Taylor Street connections to Johnstons Creek	M	D3, D7, D8, D9
C7			✓	Improve north-south regional cycle connections across Parramatta Road	L	D3, D5, D7, D9
C8			✓	Pedestrian access improvements to Booth St between Wigram Road and Pyrmont Bridge Road.	S	D3, D5, D7
Improve public transport service provision and bus priority measures						
C9		✓		Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD	S	D1, D2, D7
New public transport infrastructure						
C10		✓		Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.	M-L	D1, D2, D7

*- Infrastructure upgrades suggested for Potential Urban Amenity Improvement Plan

Camperdown | Transport Improvements

ID	Potential Improvements
C1	Improve east-west connections by extending Cardigan Place and Hordern Place
C2	Investigate formalising Bignell Lane as an east-west connection
C3	Formalise Pyrmont Bridge Road, Mallett Street and Booth Street as local streets with one general traffic lane and one on-street parking lane on each side.
C4*	Pyrmont Bridge Road public domain improvements between Parramatta Road and Mallett Street including new street tree planting, paving and bike parking.
C5	Australia Street improvements to pedestrian amenity to connect to Newtown Station
C6	Improve Chester Street and Taylor Street connections to Johnstons Creek
C7	Improve north-south regional cycle connections across Parramatta Road
C8	Pedestrian access improvements to Booth Street between Wigram Road and Pyrmont Bridge Road.
C9	Provide bus priority measures where possible along Parramatta Road from Burwood to the Sydney CBD
C10	Delivery of Parramatta Road on-street Rapid Transit between Strathfield / Burwood and the Sydney CBD including more frequent services across the peak, weekdays and weekends, more reliable services with consolidated rapid transit stops every 800m to 1km.

Legend

	Potential Active Transport Improvement		Existing Open Space
	Potential Public Transport Improvement		Community
	Potential Road/Intersection Improvement		Employment
	Precinct Boundary		Commercial
	Parramatta Road Corridor Boundary		Residential
	M4 Motorway		Mixed Use
	Rail	T	Train Stations
	Indicative Zone of Future Super Stop Envelope		

* Infrastructure improvements suggested for Potential Urban Amenity Improvement Plan.

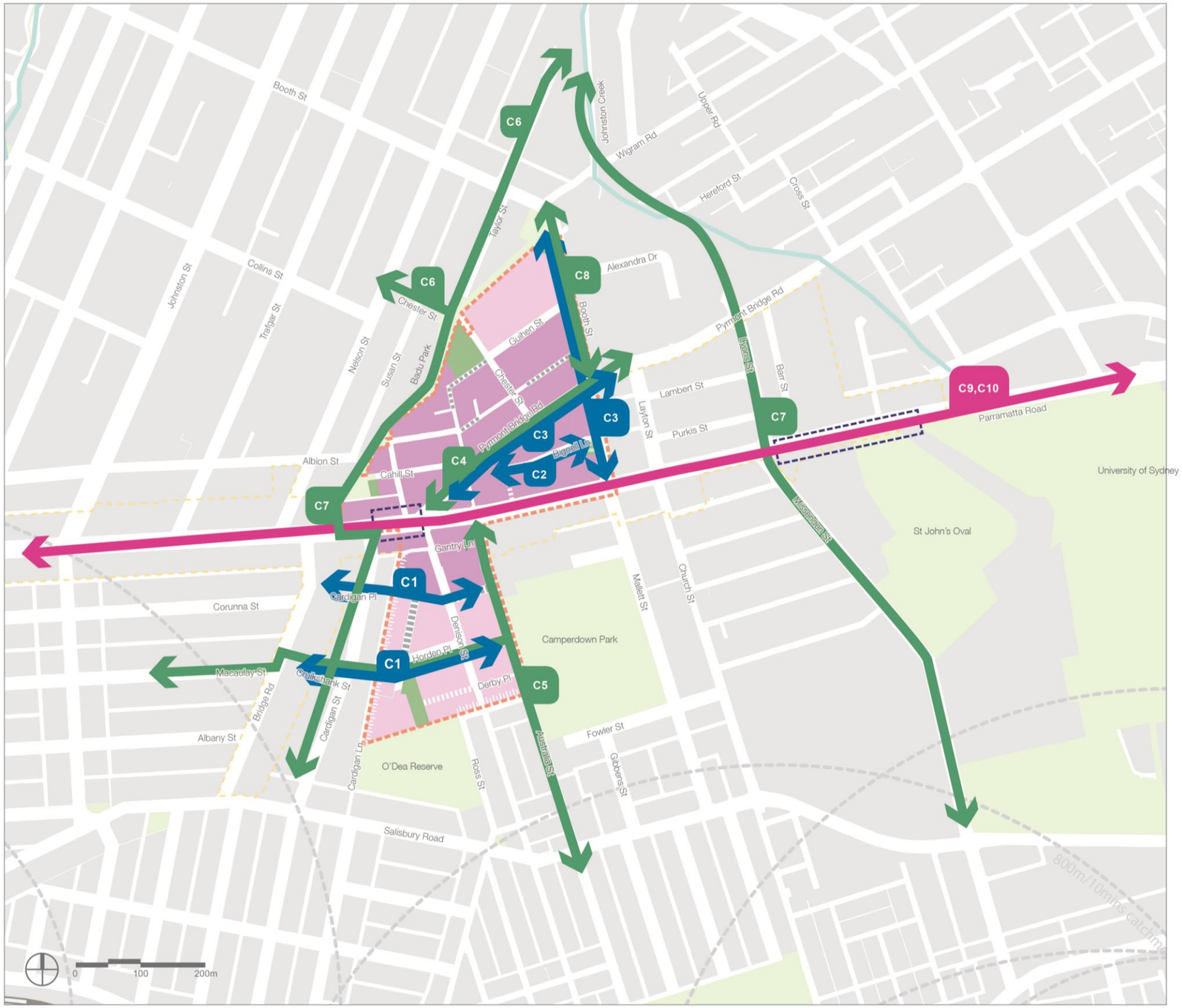

Figure 85 Camperdown Precinct transport improvements (Source: AECOM, 2015 and Basemap - Cox, Oculus, CM+, 2015)

Proposed parking controls

An emerging best practice model is to control parking based on proximity to public transport infrastructure whereby developments are permitted to provide a lower rate of on-site parking close to public transport, while developments further away would need to provide a higher rate of parking provision. Leichhardt and Marrickville Councils provide parking rates that do not consider the distance from public transport nodes.

The proposed parking rates for the Camperdown Precinct consider elements of each LGAs DCP, while also adopting the emerging best practice approach which considers the radial distance to rail stations or proposed bus superstops. Based on the accessibility to public transport, density and mix of land uses proposed for the Camperdown Precinct, the existing parking rates have been scaled down within the 400 metre range to encourage mode shifts to non-vehicular travel and reduce vehicular impacts on surrounding road network. However it is considered that scaled down parking rates will not be viable outside of the 800 metre range, unless there is significant intervention with the provision of additional transport infrastructure.

The 400m and 800m walking catchments for Newtown Station as well as the proposed bus superstop along Parramatta Road are illustrated in **Figure 86**. It is evident that the Camperdown Precinct lies within the 400m catchment of the bus corridor along Parramatta Road. The proposed parking rates for the Camperdown Precinct are outlined in **Table 101** and **Table 102**. The refined parking rates attempt to address Precinct transport principle 'D6', by reducing parking availability and thereby reducing parking.

While the goal of the reformed parking rates is to reduce car dependency for short tips, with an existing vehicle ownership of one vehicle per household[10], the reduced off-street parking rates will have implications on the Precinct in the short term. To minimise these impacts, decoupled parking is proposed along the border of the Precinct in order to encourage public and active transport at the centre of the Precinct. In addition, car sharing initiatives will incite a reduction in car ownership and dependency in the Precinct. These initiatives have the potential to lessen the demand for parking within the Precinct.

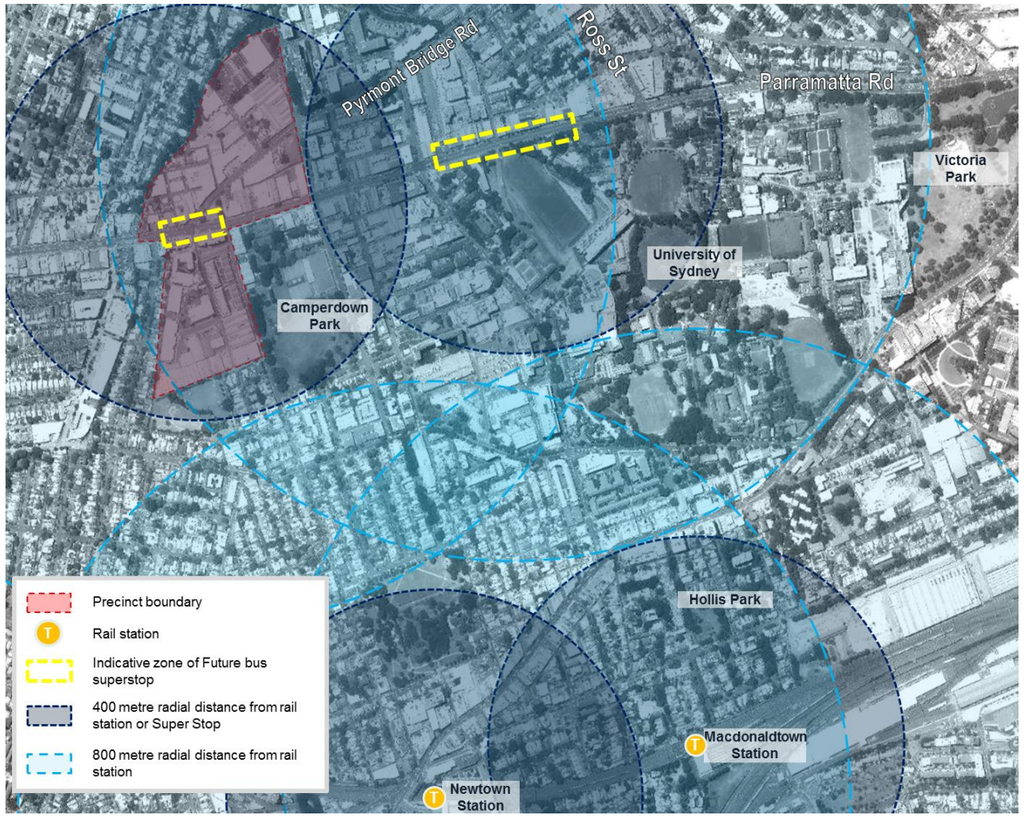

Figure 86 Camperdown Precinct: Rail station and proposed bus superstop catchments
Source: NSW Land & Property Information – SixMaps, 2015 and NSW Transport Info 2015 (modified by AECOM)

Table 101 Proposed parking rates within 400m of a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	0.5 spaces per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1 space per dwelling	
Business premises	1 space per 100sqm of GFA		
Retail	1 space per 100sqm of GFA		

Table 102 Proposed parking rates NOT within 400m of a rail station or proposed bus superstop (Source: AECOM, 2015)

Land use	Parking rate (maximum)		
Residential	1 bedroom	1 space per dwelling	Visitors: 0.2 spaces per dwelling.
	2 bedroom	1 space per dwelling	
	3+ bedroom	1.2 spaces per dwelling;	
Business premises	1 space per 80sqm of GFA		
Retail	1 space per 60sqm of GFA		

[10] ABS Census, 2011