



Glenfield to Macarthur

URBAN RENEWAL CORRIDOR STRATEGY

Integrated Transport Strategy



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Executive Summary

The NSW Government, through *A Plan for Growing Sydney*, has identified urban renewal opportunities along the Glenfield to Macarthur railway corridor to accommodate additional population and support economic growth. The aim of this proposed renewal is to take advantage of the existing and planned transport network, with a focus on mixed use urban activation and increased residential density around train stations. It is intended that this approach will support higher levels of self-containment within the corridor and reduce growth in private vehicle use in areas of relatively high access to transport, jobs and services.

The proposed growth in the Glenfield to Macarthur corridor is 84,500 over 20 years, approximately 13% or 9,000 residents above the previous forecast in the corridor. *A Plan for Growing Sydney* describes the need to accommodate 1.6 million more people by 2031, the corridor's growth over the same period would accommodate 5% of the 1.6 million.

This Integrated Transport Strategy supports the Glenfield to Macarthur Urban Renewal Corridor Strategy (URCS) by proposing development outcomes for transport and identifying opportunities and risks to the transport system by proposed future growth.

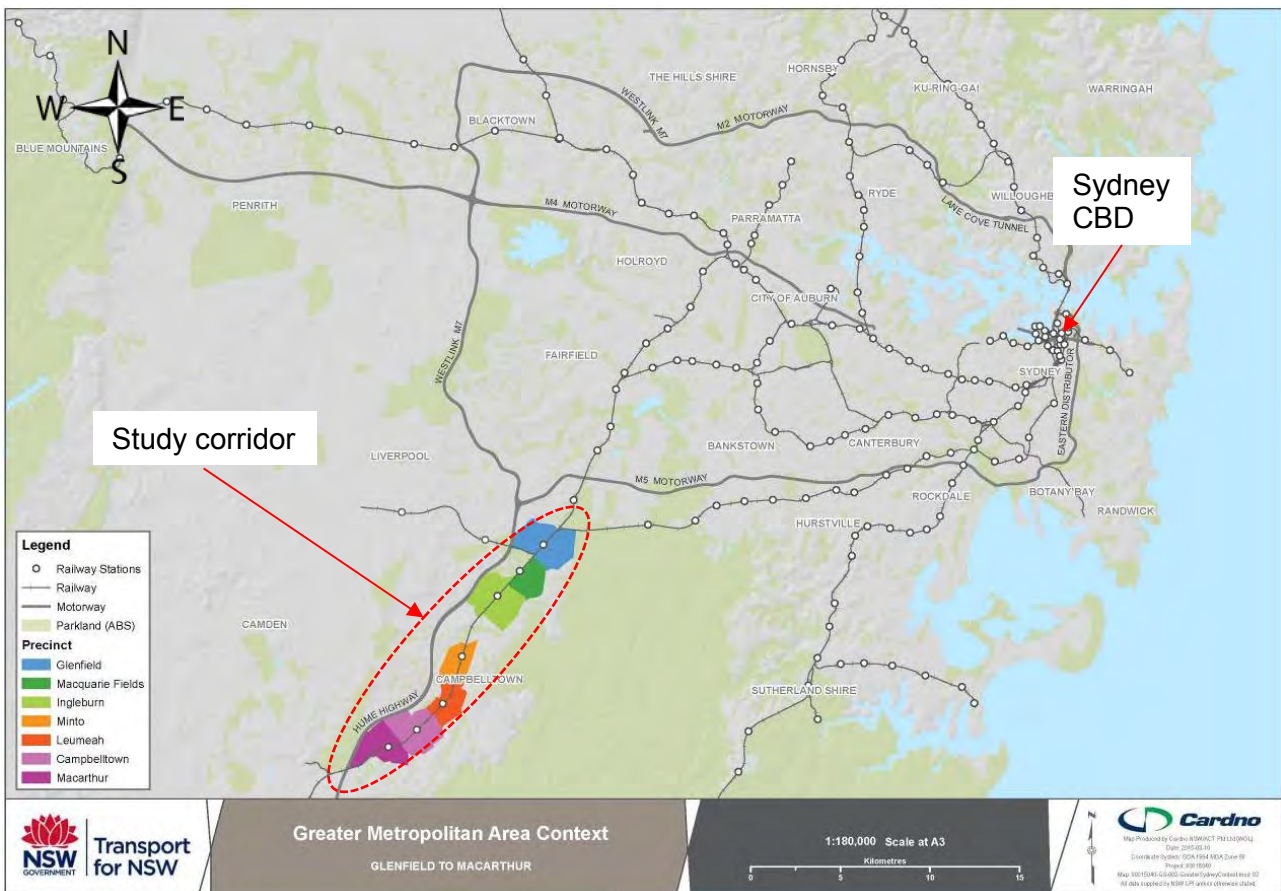
Following finalisation of the URCS, the Department of Planning and Environment and Campbelltown City Council will work together to identify opportunities for more detailed precinct planning along the corridor. This will involve more detailed transport assessment, including validation with detailed traffic modelling, and initiatives will be considered for new funding, reprioritisation within existing transport programs, and/or as part of regular network and other reviews.

A number of important transport challenges will need to be addressed, which are important to the success of the precincts and the ongoing functionality of the transport system, including:

- > Mitigation of the interface and conflict between the important freight tasks and adjacent land uses (particularly residential). In particular, noise impacts with the 24/7 operation of the nationally significant Southern Sydney Freight Line (SSFL) will need to be addressed with quarantining land uses to create a barrier, or by design and planning controls (e.g. double glazing of residential properties)
- > The Southern Sydney Freight Line carries a nationally significant freight task through the rail system on this corridor. Land uses adjacent to the rail corridor must not impede the option to duplicate the SSFL or augment the passenger rail task in the future.
- > The proposed increased retail and residential land uses should be located and designed so as not to jeopardise the long term viability of industrial areas in this corridor, which would create greater need for industrial uses and significant freight tasks in other, potentially less well-located locations.

Glenfield to Macarthur corridor

The Glenfield to Macarthur corridor, shown in **Figure 1**, is located in Sydney's south-west within the Campbelltown City Council local government area (LGA) between 30 and 45 kilometres from the Sydney CBD. The corridor consists of seven precincts surrounding train stations: Glenfield, Macquarie Fields, Ingleburn, Minto, Leumeah, Campbelltown and Macarthur.

Figure 1 Location of the Glenfield to Macarthur corridor


Background and population growth

There were 53,600 people living in the Glenfield to Macarthur corridor in 2011. The population is forecast to increase to approximately 75,100 by 2036 through natural/background (BTS) population growth, and to approximately 87,300 if the proposed urban activation and densification occurs. The jobs are proposed to increase from 40,000 in the 2011 estimate to 60,700 with the proposed structure plan. The proposed activation and intensification is intended to focus uplift around areas with the most potential and least constraints. The natural growth and structure plan growth forecast for each precinct is detailed in **Table 1-1**.

Table 1-1 2036 background and proposed population growth

Precinct	Background (BTS)	Proposed Structure Plan	Change	% change
Glenfield	14,100	14,900	800	6%
Macquarie Fields	7,900	7,900	0	1%
Ingleburn	16,600	17,900	1,300	8%
Minto	2,600	3,100	500	20%
Leumeah	9,300	10,000	700	8%
Campbelltown	13,700	18,300	4,600	33%
Macarthur	10,900	15,200	4,300	39%
Total	75,100	87,300	12,200	16%

There were approximately 40,000 jobs in the Glenfield to Macarthur corridor in 2011. This workforce is expected to increase by around 50% to 60,700 by 2036 under the proposed structure plans for the seven station precincts. The forecast employment for each precinct is detailed in **Table 1-2**. Jobs growth is expected to occur through the corridor over the 20 year period regardless of planned activation of the precincts. The structure plans propose an increase of 3% for employment across the corridor.

Table 1-2 2036 background and proposed employment growth

Precinct	Background (BTS)	Proposed Structure Plan	Change	% change
Glenfield	2,300	2,500	200	9%
Macquarie Fields	2,300	2,300	0	0%
Ingleburn	15,000	14,800	-200	-1%
Minto	5,300	5,400	100	2%
Leumeah	7,100	7,100	0	0%
Campbelltown	15,600	17,300	1,700	11%
Macarthur	11,100	11,300	200	2%
Study Area	58,700	60,700	2,000	3%

Existing travel behaviour

The existing travel behaviour within the study area provides an insight into how the study area functions and consequently transport considerations.

Journey to work data for people who live in the study area indicates a high proportion of vehicle driver and passenger, 65% and 6% respectively with a total of 71% of all trips by vehicle. This is a little lower than the mode share splits for Greater Sydney, with vehicle drivers and passengers at 68% and 6% respectively. The study area has a higher mode share of public transport usage at 26% when compared to the greater metropolitan area (GMA) at 20%. Active transport use within the corridor is half that of the GMA at 3% and 6% respectively. The full mode share for the corridor and GMA is outlined in **Table 1-4**.

Table 1-3 2011 journey to work mode share for people living in the corridor

Mode split	Train	Bus	Ferry/ Tram	Vehicle driver	Vehicle pass.	Bicycle	Walked only	Other mode	Total
Corridor	25%	1%	0%	65%	6%	0%	2%	1%	100%
Greater Metropolitan Area	14%	6%	0%	68%	6%	1%	4%	1%	100%

Source: BTS 2011 JTW tables 13 v1.3 & 14 v1.4 (for bicycles)

The journey to work mode shares for people working in the study area represent an even higher reliance on private motor vehicles with the proportion of vehicle drivers and passengers at 83% and 8% respectively, a total of 91% of all work trips to jobs located in the corridor. Public transport use in the corridor for employment is low at 6% when compared to the GMA at 20%. Active transport use within the corridor is half that of the GMA at 3% and 6% respectively. The full mode share for the corridor and greater metropolitan area is outlined in **Table 1-5**.

There is a significant difference between the trips to jobs located in the corridor and work trips in the GMA. This may indicate the study area's workers live in parts of Sydney that have limited public transport regional coverage and frequency and as a result public and active transport travel times are not competitive with private vehicle.

Table 1-4 2011 journey to work mode share for people working in the corridor

Mode split	Train	Bus	Ferry/ Tram	Vehicle driver	Vehicle pass.	Bicycle	Walked only	Other mode	Total
Corridor	4%	2%	0%	83%	8%	0%	2%	1%	100%
Greater Metropolitan Area	14%	6%	0%	68%	6%	1%	5%	1%	100%

Source: BTS 2011 JTW Table5v1.3

The proportion of people who live and work in the study area is 32% (the proportion of journey to work trips that are self-contained within the corridor).

The workplace location for residents who live in the Glenfield to Macarthur corridor demonstrates a relatively local economy; the five top employment destinations for residents are Campbelltown, Sydney Inner City,

Liverpool, Bankstown and Camden. The employment for residents is located locally (approximately 45 minute public transport trip).

Existing transport network

Walking

The walking network in the study area varies from precinct to precinct in quality, connectivity and safety. There are some significant barriers to access some stations, including:

- > Lack of footpaths in some locations;
- > Large land parcels with limited public access;
- > Natural features, such as creeks and waterways;
- > Main roads with high traffic volumes and limited safe crossing opportunities;
- > Sporting facilities; and
- > Shopping centres.

Overall the walking network is basic and requires a clear hierarchy for infrastructure provision and connectivity.

Cycling

The cycling network is highly fragmented and does not connect key destinations within each precinct or regionally. It is likely that the disconnected network in this corridor contributes to the low mode share of cycling. Fragmented facilities are a key cause of low cycling resulting from a concern of safety and lack of connectedness.

In most cases the station is within close proximity to the precinct's main activity area for goods and services, which presents an opportunity to provide cycling facilities that connect multiple key destinations.

The high amount of private vehicle use within the study area is likely to require facilities that are of a high safety standard to encourage more people to cycle.

Rail

The rail network within the study area serves freight and passengers. There are three lines that service the study area: T2 South Line, T5 Cumberland Line and the South West Rail Link. The study area facilitates a large amount of industrial uses and as a region it is the gateway to and from the Southern Highlands, South Western Sydney and Canberra. In this context rail provides a significant role in supporting the local economy and intermodal facilities. Future proofing for both freight and passengers is a key challenge for this rail corridor.

There are seven stations, each with specific challenges, which include:

- Access and walking: maximising walking catchments will increase the amount of people who have access between the station and their residence and employment. This will increase the likelihood of achieving mode shift to sustainable modes of transport;
- Integration with other modes: Ensuring integration with other modes of transport maximises the customer experience and increases the likelihood that people will walk, cycle and catch the bus to/from the rail station;
- Parking: balancing the supply and restrictions of parking to support the use of public transport while balancing local economic factors;
- Land use: providing a mix of land uses within close proximity of the station to encourage multi-purpose trips and maximise local access to local business; and
- With the exception of Macquarie Fields Station, all stations have step-free access provisions to all platforms.

Freight

The study area supports a large amount of industrial uses and as a result, freight within the study area and wider region is an important service that facilitates the movement of goods to and within the Sydney region. The corridor is part of a nationally significant freight rail corridor and adjacent to a nationally significant road corridor.

Access to the railway lines and motorways is a key driver for industrial uses and maintaining and improving these access points will continue to support this activity.

Bus

The study area includes a coverage based bus network, with route frequency varying depending on origin, destination and key destination in between. Routes connect to Wollongong and Warragamba and also connect to Appin and Oran Park. These services are considered infrequent with one service in the AM and PM peak period.

Local routes cover the study area well and generally are all day services, not just peak demand services. There is a steady frequency throughout the day to support all day use.

While coverage is considered to be good, directness is affected and as a result journey times can be lengthy. A balance of coverage and directness for the study area is a recommended consideration for future networks.

The residential land use density through the corridor is low and there are a large number of bus routes in the region. As such higher frequency services are challenging due to the limited base demand.

Road and parking

The road network provides good local access with a limited number of connections to the arterial road network, in particular the Hume Motorway.

There are limited opportunities to cross the railway line on the local road network, this is considered a barrier to all transport modes.

Parking throughout the study area is provided through a mix of on and off street parking. A combination of time-based restricted and unrestricted parking currently exists in most precincts.

Integrated transport strategy

The objectives provide a framework for achieving an efficient and supportive transport system for the residents, workers, students and visitors in the Glenfield to Macarthur Corridor.

This set of corridor objectives was developed in consultation with key stakeholders and were developed to be consistent with the *NSW Long Term Transport Master Plan* and *A Plan for Growing Sydney*. The objectives are:

1. Improve competitiveness and attractiveness of public transport
2. Improve reliability and reduce waiting times for public transport
3. Improve the customer experience for public transport journeys
4. Encourage people to walk and cycle more
5. Increase density in key transport locations
6. Improve street legibility for all modes of transport
7. Minimise through traffic in local areas
8. Maximise investment in station supporting facilities
9. Support and facilitate efficient movement of freight throughout the corridor
10. Improve connections to regionally significant areas
11. Improve road safety around key transport hubs

12. Improve personal security around key transport hubs
13. Maximise integration with land use and other transport modes
14. Support positive provision for accessibility and active transport
15. Reduce reliance on private motor vehicle
16. Support collaboration with the business community, Council and NSW Government to improve transport for all stakeholders
17. Develop controls that support walking, cycling and public transport

These objectives aim to maximise the use of existing infrastructure, increase walking, cycling and public transport use and support the diverse land uses within the study area.

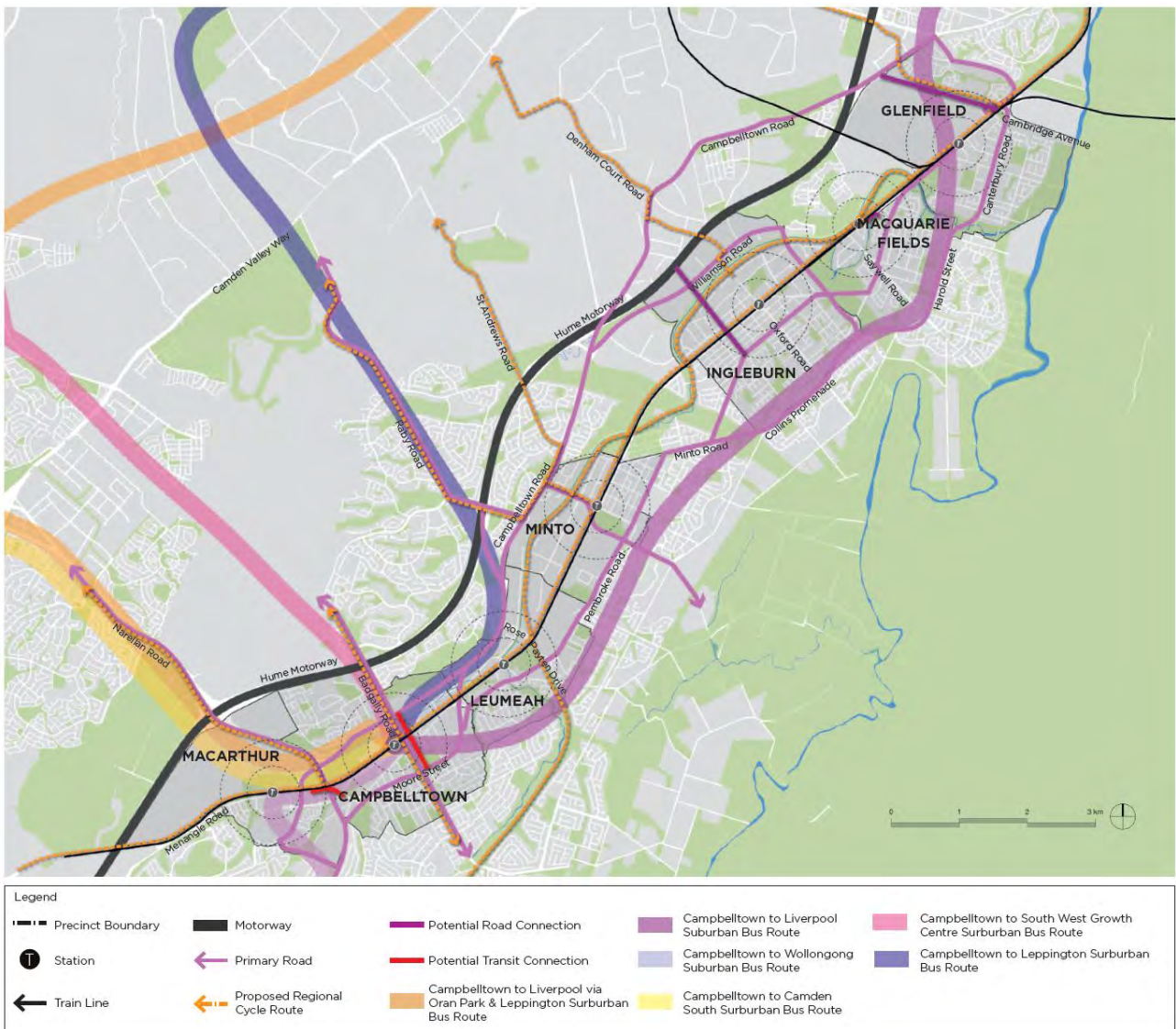
Improvement measures

The concept transport network is consistent with the objectives, and to complement the Glenfield to Macarthur Urban Renewal Corridor Strategy, a suite of transport initiatives are recommended for further assessment in detailed precinct planning, reprioritisation of existing NSW Transport programs, and/or implementation in council programs.

Other investigations

It is noted that a number of investigations and projects are currently underway: Greater Macarthur Land Release Investigation (south of the corridor), Outer Sydney Orbital Corridor Preservation Study, as well as the operation of the proposed Moorebank Intermodal Terminal. As more detailed precinct planning is undertaken, the relationship and impacts of potential projects to the corridor needs to be considered. In particular, if the Greater Macarthur Land Release area is to progress, the relationship between the transport needs and infrastructure for both precincts needs to be addressed.

Figure 2 Concept corridor transport network



Walking and cycling networks

The priority for walking and cycling in the study area is to establish a base network that is legible and connects to key destinations. The following is recommended:

- > Develop and implement a local and regional walking network and cycling network within the Local Government Area. In accordance with *Sydney’s Walking Future* and *Sydney’s Cycling Future*, future investment should aim to separate walking and cycling movements from each other as well as from vehicles, where practical and feasible.
- > Develop and implement green links to capitalise on open space, maximise personal security and increase the walking and cycling networks.

Rail Network

The priority for the rail corridor is to support both passenger and freight movement, which includes:

- > Protect integrity of passenger and freight rail and allow for growth. The Southern Sydney Freight Rail Line is a key link in the national freight network and, subject to Australian Rail Track Corporation planning and funding priorities, will require duplication in the longer term. In the medium term growth is likely to be accommodated through enhancements to the existing line including provision of freight passing loops.
- > Rail services in the corridor will increase to meet the growth needs of the broader region. The stopping patterns and level of service within the corridor will be matched to the role and function of each of the

precincts. Subject to future detailed planning and funding, infrastructure enhancements to provide additional capacity are likely to be required and would include infrastructure such as extra tracks, additional stabling capacity and upgrades to other rail related infrastructure.

- > Rail augmentation to support the continued growth of freight and passenger services within and through the corridor.

Road Network

The priority for the road network is to investigate potential new links and protect freight corridors. Some key considerations include:

- > A preliminary assessment of the road network indicates that the existing road network can adequately support the future network demands based on BTS base growth forecasts and the increased population growth outlined in the structure plans (the 2036 Project Scenario). Congestion would remain in existing locations, however road capacity upgrades such as the Narellan Road upgrade already underway will lessen the impact of growing demand. The following additional concept road links across the railway line are recommended for further investigation:
 - Glenfield: connection from Glenfield Road to Campbelltown Road;
 - Macquarie Fields: connection from Victoria Road to Railway Parade;
 - Ingleburn: Chester Road to Devon Road;
 - Campbelltown: transit and active transport connection from Broughton Street to Badgally Road; and
 - Macarthur: transit and active transport connection from Menangle Road to Camden Road under Narellan Road.
- > Any new regional road linkages across the railway line must take into consideration induced traffic demand, wider regional growth, the requirement for freight links to support development and the need for transit links.
- > Protect key freight routes into major employment areas and activity centres to facilitate efficient local and regional freight movements.
- > Further evaluation must be undertaken for regional road links, particularly for public transport and freight movements.

Bus Network

- > Increase bus service frequencies throughout the day and on weekends on key routes.
- > Establish direct bus routes in the corridor that are prioritised on the road network.
- > Identify key bus routes to review for service based networks. This concept is subject to feasibility assessments and further refinement to be completed by TfNSW.

Land use

- > Ensure that land use planning controls address the critical role and function of the rail corridor through the implementation of supportive design guidelines and building standards for development adjacent to major roads and rail corridors.
- > Support key employment land uses through planning and prioritising freight movement along major corridors.
- > Develop and adopt appropriate Travel Demand Measures for key land uses and centres including management of commuter car parking along the corridor to optimise utility of assets, improve urban amenity and accommodate the needs of commuters.

Summary

The proposed transport network responds to the existing environment future demand, and structure plan development. The walking and cycling networks have the potential to be implemented prior to the structure plan completion through NSW Government and Council programs. The proposed rail improvements are in

line with current planning for TfNSW's *Sydney's Rail Future* and therefore will be implemented as committed. The proposed bus routes in the region will be considered as part of upcoming regional bus network reviews. The potential road links identified require detailed modelling and multi-criteria analysis to ensure no adverse impacts arise as a result of new links, for example induced local demand and/or congestion.

This integrated transport strategy outlines a framework to support an increase in population and employment within the study area. However, further planning and analysis will be required in the following areas:

- > Strategic road network: Further consideration of key regional road links as part of broader planning processes such as the South West Growth Centre structure plan review, Western Sydney airport planning, and Greater Macarthur land release investigations.
- > Detailed local area road network analysis: to understand local road network performance.
- > Local area transport network: detailed planning and design of the street network to support a safe low-speed environment, including investigation of 40km/hr high pedestrian activity areas and local area traffic management facilities.
- > Consideration and analysis of the land use and freight conflicts including Southern Sydney Freight Line duplication, noise impacts, and future viability of industrial business with shifting land use profile.

In summary, the integrated transport strategy has identified a concept transport network with planning and policy considerations to support the projected increase in population and employment in the study area.

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Appendices

Appendix A Land zoning

Appendix B Traffic modelling report summary

Appendix C Multi-criteria assessment

1 Introduction

The Department of Planning and Environment (DP&E) together with TfNSW seek to identify urban activation and intensification opportunities along the Glenfield to Macarthur railway corridor to support target population and economic growth. An opportunity has been identified to further utilise the existing rail provision to provide land uses for an increasing population while reducing the required investment in new transport infrastructure and services.

Transport for NSW (TfNSW) commissioned Cardno to prepare an Integrated Transport Strategy in March 2015. Within the corridor there are seven passenger train stations and their surrounding precincts. Each train station and the surrounding 800m radius forms the principle focus of this study as outlined in **Section 2**. This Integrated Transport Strategy also considers how these precincts link to each other and the surrounding broader region.

This strategy helps to implement *A Plan for Growing Sydney* by shaping its implementation in a targeted area for growth, which is indicatively supported by council. It identifies opportunities and issues for subsequent detailed planning and implementation in NSW Government transport programs.

The key transport modes included in the strategy in order of priority are walking, cycling, public transport (mass modes), freight (all modes) and other road based modes.

These priorities have been set in accordance with the government's strategic objective for integrated land use and transport. This will improve sustainability and the environment and the physical health of residents and supporting local prosperity. This will also maximise the value of investment in transport infrastructure and services.

1.1 Study area

The Glenfield to Macarthur Corridor is located in the south-west of Sydney, approximately 35-40 kilometres (depending on location within the corridor) from Sydney CBD. The corridor is approximately 16 kilometres in length (north-south).

The corridor consists of the following seven precincts surrounding train stations:

- > Glenfield
- > Macquarie Fields
- > Ingleburn
- > Minto
- > Leumeah
- > Campbelltown
- > Macarthur

The corridor is shown in the context of Sydney's Greater Metropolitan Area and the suburban railway network in **Figure 1-1**. The corridor is also shown in more detail in **Figure 1-2**, including the 400 and 800 metre walking catchments to the stations in each precinct.

Figure 1-1 Glenfield to Macarthur Corridor - Greater Metropolitan Area Context

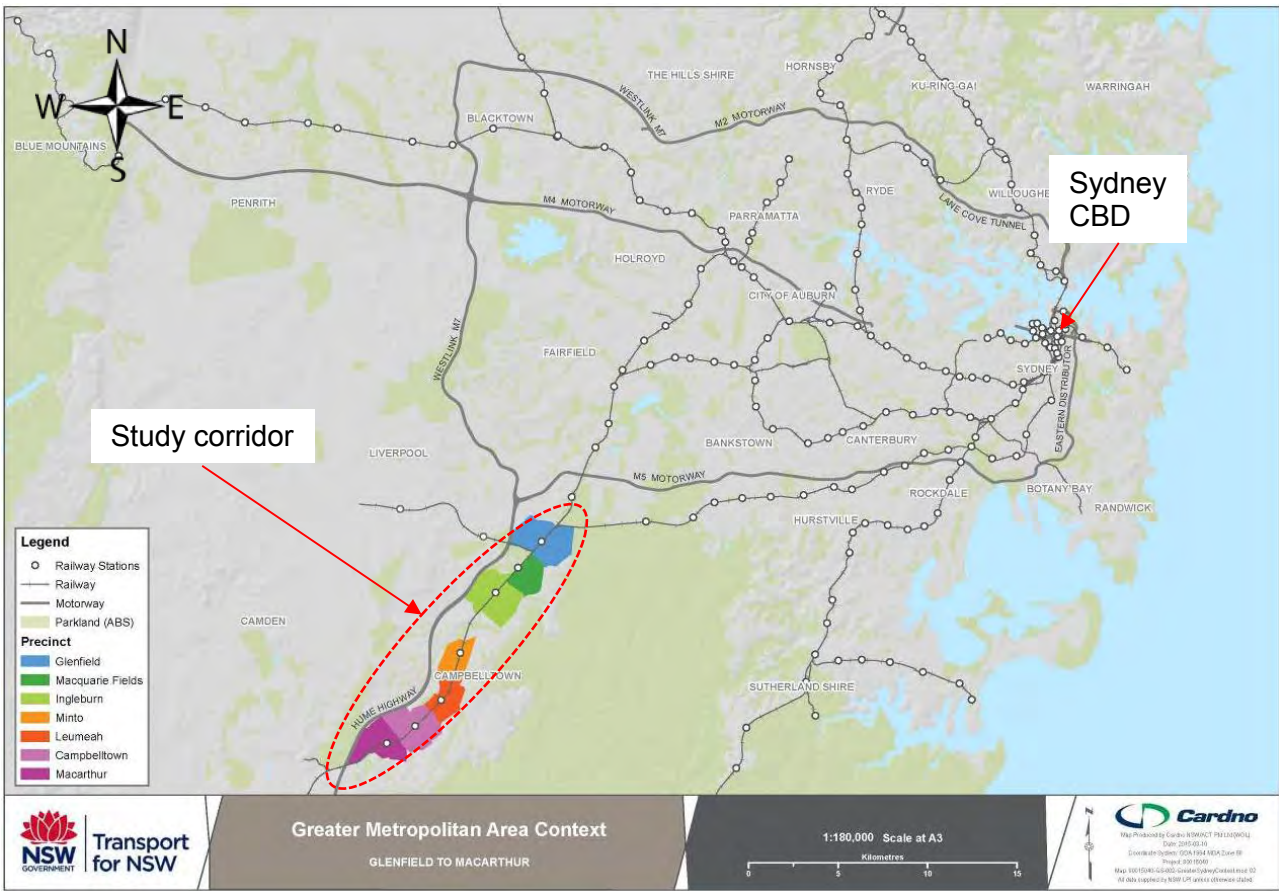
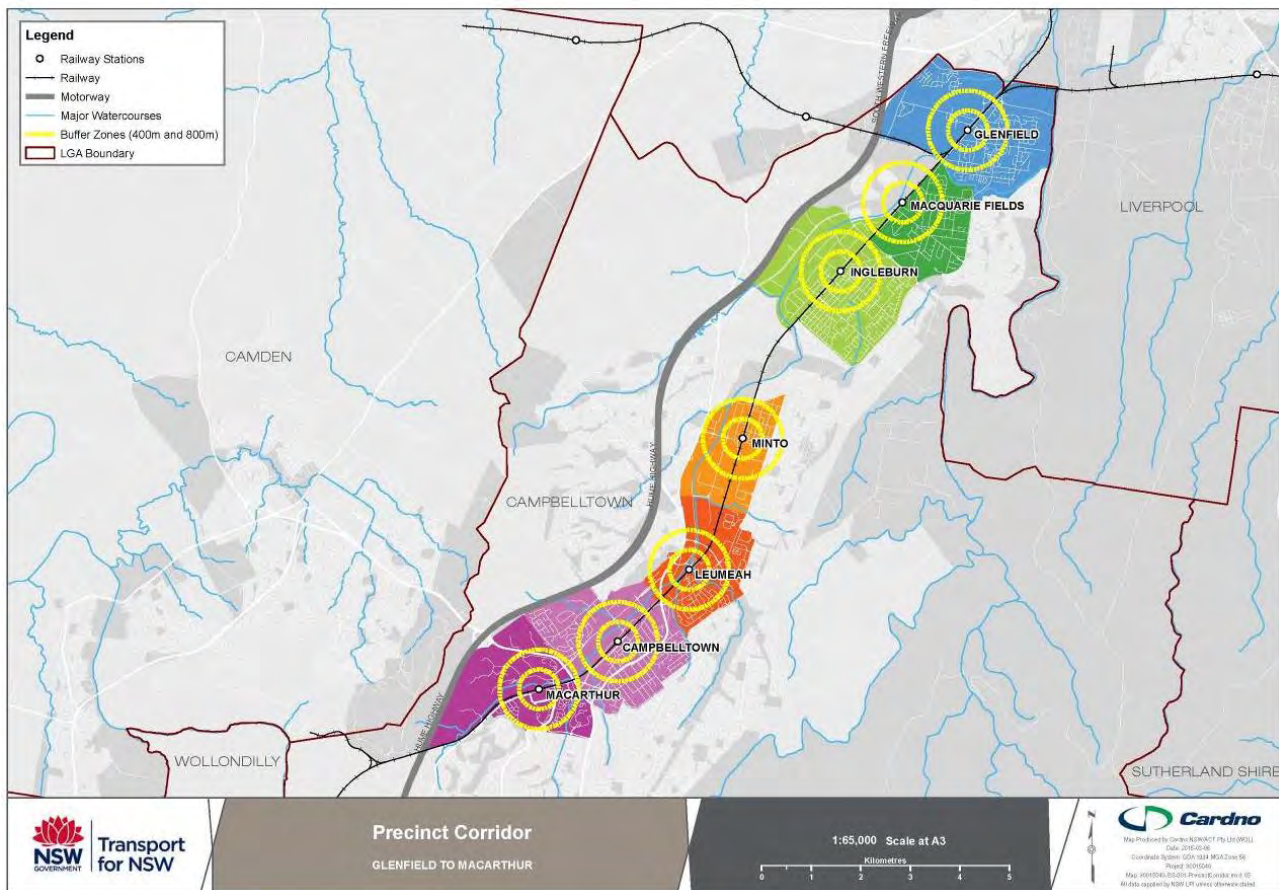


Figure 1-2 Glenfield to Macarthur precincts and station catchments



1.2 Report structure

Section 2 provides an overview and summary of existing development strategies and planning frameworks and current proposals. This includes those within the study corridor and for the surrounding region most notably the neighbouring proposed South West Growth Centre. These strategies include proposed land use development and transport initiatives and proposals.

Section 3 – Existing land uses: provides an overview of population, employment, dwellings, existing land uses of the study corridor and precincts.

Section 4 – Existing transport infrastructure: provides an overview of the existing physical transport infrastructure by transport mode including a general overview of its condition.

Section 5 examines transport network and infrastructure improvements that have been proposed before the commencement of this study.

Section 6 –Data review: provides a comprehensive review of demographics, employment and transport data. This section establishes the relationship between these factors.

Section 7 uses the relationship established in Section 6 to forecast the likely operation of the transport network into the future. This establishes the potential constraints of the existing network and is used to develop recommendations to maintain an effective transport network.

Section 8 summarises the constraints and opportunities of each transport mode in terms of condition and capacity discussed in Sections 4 - 7.

Section 9 ties the relevant objectives identified in the *NSW Long Term Transport Masterplan* and goals from *A Plan for Growing Sydney* and expands these into a series of corridor specific objectives to guide the development of this strategy. These objectives have been developed together with specific corridor measures and indicators relevant for transport in the study corridor and precincts.

Section 10 – Concept transport network: outlines recommendations to achieve the objectives from Section 9. This details how each objective relates to each relevant transport mode. These are considered on both a regional and precinct basis.

Proposed measures including infrastructure and service improvements developed as part of this study. All proposals are tested against the objectives which has formed the criteria for the multi criteria analysis.

This section focuses on improvements based on the potential of the existing transport network.

It also considers and ensures the concept transport network integrates with the proposed structure plans incorporating proposed changes and intensification and changing of land uses within each station precinct.

Section 11 provides guidelines and considerations to monitor the effectiveness of the strategy and ensuring the land use planning adopts strategy measures. This includes a summary of typical data collection methods and the purpose they serve.

Section 12 provides the summary of the key objectives, analysis and recommendations of this transport strategy.

2 The planning policy and project context

2.1 Strategic planning

A number of state and local planning policies are relevant to the development of the Glenfield to Macarthur Corridor Integrated Transport Strategy (GMCITS). These documents provide objectives and frameworks for development and transport within the regional and local area.

2.1.1 **NSW State Plan- NSW 2021 (2011, NSW Department of Premier and Cabinet)**

The NSW State Plan 2021 is the NSW Government's ten year plan to rebuild the economy, provide quality services, renovate infrastructure, restore accountability to government, and strengthen the local environment and communities in NSW. The plan sets priority goals for action and provides guidance for NSW Government resource allocation in alignment with the NSW Budget. There are five strategy areas outlined in NSW 2021, of them two are directly relevant to the GMCITS:

- > Return quality services: by providing the best transport, health, education, policing, justice and family services, with a focus on the customer.
- > Renovate infrastructure: by building the infrastructure that makes a difference to both our economy and people's lives.

Sitting underneath the five strategy areas of the NSW State Plan 2021 are 32 goals that explicitly state desired outcomes from each strategy. They include the following four 'return quality services' and two 'renovate infrastructure' goals that are relevant to the transport considerations of this study:

- > Goal 7 – Reduce travel times (Strategy area: Return quality services)

Relevance for the GMCITS: Aims to improve the efficiency of the road network and ease congestion through provision of real-time information, road infrastructure and incident management. This goal also aims to reduce the time people wait for public transport by increasing frequency, improving coordination between modes and providing accurate schedules.

- > Goal 8 – Grow public transport by making it a more attractive choice (Strategy area: Return quality services)

Relevance for the GMCITS: Aims to increase the attractiveness of public transport through on-time running across the public transport network. Provision of bus priority measures and accurate travel information will help to achieve this. Specific targets include an increased share of commuter trips by public transport to 28% by 2016, an increased share of all walking trips to 25%, and a doubling of cycling trips also by 2016. The mode share shifts will be driven by new services, expansion of light rail, strategic bus corridors, upgrade of supporting infrastructure, timetable changes, electronic ticketing and extension of walking and cycling routes.

- > Goal 9 – Improve customer experience with transport services (Strategy area: Return quality services)

Relevance for the GMCITS: Improved real-time information to customers.

- > Goal 19 – Invest in critical infrastructure (Strategy area: Renovate infrastructure)

Relevance for the GMCITS: Proposes to remove barriers to private sector partnerships and create an infrastructure project pipeline utilising best practice procurement and funding models while supporting councils to provide local infrastructure. This also targets to double the proportion of container freight movement by rail through NSW ports by 2020. Industrial land use intensity is anticipated to increase in the study corridor which would assist in doubling the proportion of freight rail movements.

- > Goal 20 – Build liveable centres (Strategy area: Renovate infrastructure)

Relevance for the GMCITS: Aims to deliver a metropolitan strategic planning framework to ensure customer needs inform the planning process, and transport infrastructure supports travel demands and accommodates land-use changes. This will result in increases to the percentage of the population living within a 30 minute public transport trip of a major centre in Sydney.

- > Goal 29 – Restore confidence and integrity in the planning system (Strategy area: Return quality services)

Relevance for the GMCITS: This goal aims for a clear and transparent planning system to provide better understanding of the planning processes for the community and stakeholders.

Implications for the Glenfield to Macarthur Corridor

- > The NSW State Plan 2021 supports the uptake of public and active transport. It has set solid goals for travel mode share that should be referenced when setting travel targets for the Glenfield to Macarthur Corridor.
- > A clear and transparent strategic planning framework and transparent planning system will support the development of the Glenfield to Macarthur Corridor and provide certainty for residents and developers as to the aims of the corridor's urban renewal.
- > Industrial land use intensity will increase in the Freight Activity Precinct creating increased volumes on the freight road and rail networks.

South Western Sydney – Regional Action Plan (2011, NSW Department of Premier and Cabinet)

The South Western Sydney Regional Action Plan is a regional sub-report of the NSW State Plan. It contains a two year action plan that sets out the initiatives and projects that will help achieve the 2021 goals in the south western areas of Sydney.

A key regional priority for the south western area is improvement of road and public transport connections to and from other regions of Sydney. The upgrade and construction of public transport links and infrastructure such as the South West Rail Link and Glenfield transport interchange upgrade are acknowledged as major projects that will support the area.

The Southern Sydney Freight Line (SSFL) is described in the Regional Action Plan as a dedicated freight line between Birrong and Macarthur stretching 36 kilometres between these stations. The project, completed in 2013, involved the construction of a third track within the rail corridor to separate the freight services from passenger rail.

As noted in the Regional Action Plan, the Campbelltown Hospital redevelopment will provide additional capacity to deliver paediatric outpatient, inpatient and ambulatory care. Construction has begun on this redevelopment which is due for completion in 2016. There will also be an increase in capacity for mental health patients. Due to the redevelopment of Campbelltown Hospital, and upgrades to other hospitals in the South Western Sydney Local Health District, 98 additional nurses were employed in the region in 2013.

Implications for the Glenfield to Macarthur Corridor

- > Upgrades to public transport infrastructure and services will reduce travel times and will enhance public transport in the study area.
- > Upgrades to the freight infrastructure will lead to an improvement in reliability for both passenger and freight services.
- > The redevelopment of Campbelltown Hospital will increase demand on the road and public transport network.

2.1.2 A Plan for Growing Sydney (2014, NSW Department of Planning and Environment)

A Plan for Growing Sydney, prepared by the NSW Department of Planning and Environment, presents the latest version of the NSW Government's vision for Greater Sydney in the year 2031. The Plan identifies the economic, lifestyle and cultural goals of Sydney and connects them to the interaction of "City Shapers", such as the Global Economic Corridor. To achieve this vision the goals include:

- > Goal 1: A competitive economy with world-class services and transport.
- > Goal 2: A city of housing choice, with homes that meet our needs and lifestyles.
- > Goal 3: A great place to live with communities that are strong, healthy and well connected.
- > Goal 4: A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources.

The Glenfield to Macarthur Corridor is located within the south western region of Sydney that is identified in the plan as the fastest growing subregion in Sydney. The plan refers to the Macarthur to Liverpool urban

corridor, an extension of the Glenfield to Macarthur corridor. The plan's south west subregion is shown on **Figure 2-1**.

Campbelltown and Macarthur are together nominated as one of Sydney's 28 strategic centres and a regional city centre. Strategic centres are Sydney's important business and employment hubs with a mix of intense economic and social activity built around transport networks. They have a range of major public infrastructure including hospitals and key education and sporting facilities. Campbelltown-Macarthur will also service the growing South West Growth Centre (SWGCG).

The plan recognises the challenges in this area, noting that the average vehicle kilometres travelled per person in Campbelltown is twice that of people who live in inner Sydney or the eastern suburbs. There are fewer jobs than workers in western Sydney and the region is lacking in knowledge-based jobs in particular.

Priorities for the south-west subregion:

- > Protect land to serve Sydney's future transport needs, including intermodal sites and associated corridors.
- > Investigate pinch-point connections between north-south and east-west road links.
- > Identify and protect strategically important industrial-zoned land

The plan identifies specific actions for the future development of the corridor including:

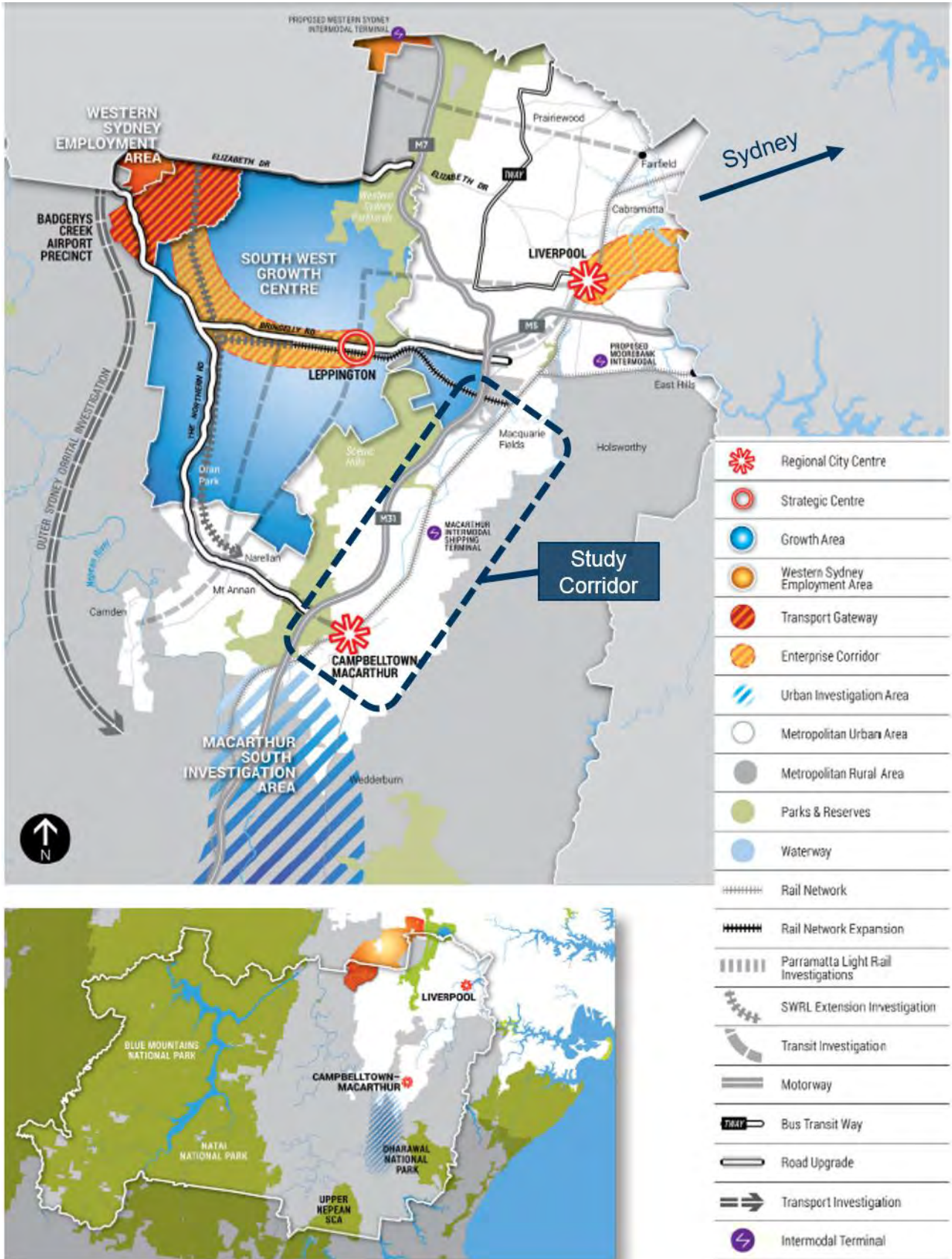
- > Continued growth of the Campbelltown – Macarthur region as a regional city centre to support the surrounding communities. Actions include additional housing, employment and services.
- > Work with Council to retain a commercial core in the Campbelltown – Macarthur region for long-term employment growth.
- > Work with Council to concentrate capacity for additional mixed-use development around train stations, including retail, services and housing.
- > Support the development of a major health and education precinct in Campbelltown-Macarthur, capitalising on Campbelltown Hospital and the University of Western Sydney.
- > Work with Council to investigate business park opportunities on the western side of the train line.
- > Work with Council to improve walking and cycling connections to train stations on the western side of the train line, and to Campbelltown Hospital and Queen Street.

In addition to the Glenfield to Macarthur Corridor, a new mixed use strategic centre is planned for Leppington. The Leppington Town Centre is a planned development focused around the new train station, which will include retail, employment and housing. Sydney's second airport at Badgerys Creek will be located 17 kilometres from the corridor to the west of the SWGC and will provide employment and economic opportunities.

Implications for the Glenfield to Macarthur Corridor

- > With fewer jobs than workers in western Sydney, many people living in the corridor are likely to have to travel outside the area to access employment.
- > As Campbelltown-Macarthur is the regional city centre and strategic centre set to service the SWGC, efficient transport connections between the areas located on the east and west sides of the Hume Motorway will be needed.
- > More jobs will be available in or close to the corridor through development of Leppington, Badgerys Creek airport and enhancement of Campbelltown-Macarthur as a regional city and strategic centre.
- > New public and active transport connections will be needed to support this growth in the currently underutilised and poorly connected areas and it is logical that transport links between Campbelltown and Leppington will require strengthening.
- > Investigations will be required to determine the optimal location for land use intensification and transport corridors in relation to each other.

Figure 2-1 A Plan to Grow Sydney – south-west subregion



Source: Extract from A Plan for Growing Sydney (pg12) NSW Department of Planning and Environment, 2014

2.1.3 NSW State Infrastructure Strategy (2014, Infrastructure NSW)

The *NSW State Infrastructure Strategy* (SIS), prepared by Infrastructure NSW presents a vision for NSW in 2031 and makes recommendations for infrastructure investment over the next 20 years, grouped by short, medium and long-term priorities. The 2014 update to the Strategy provides detail of the proposed funding strategy for infrastructure projects, Restart NSW Fund, and identifies additional priorities for transport infrastructure.

The Strategy indicates that south west Sydney's transport infrastructure deficiency in 2011 was road congestion that adds to freight costs and commute times. The strategy also identifies the need for a western Sydney Airport, discussed further in **Section 5.6.2**

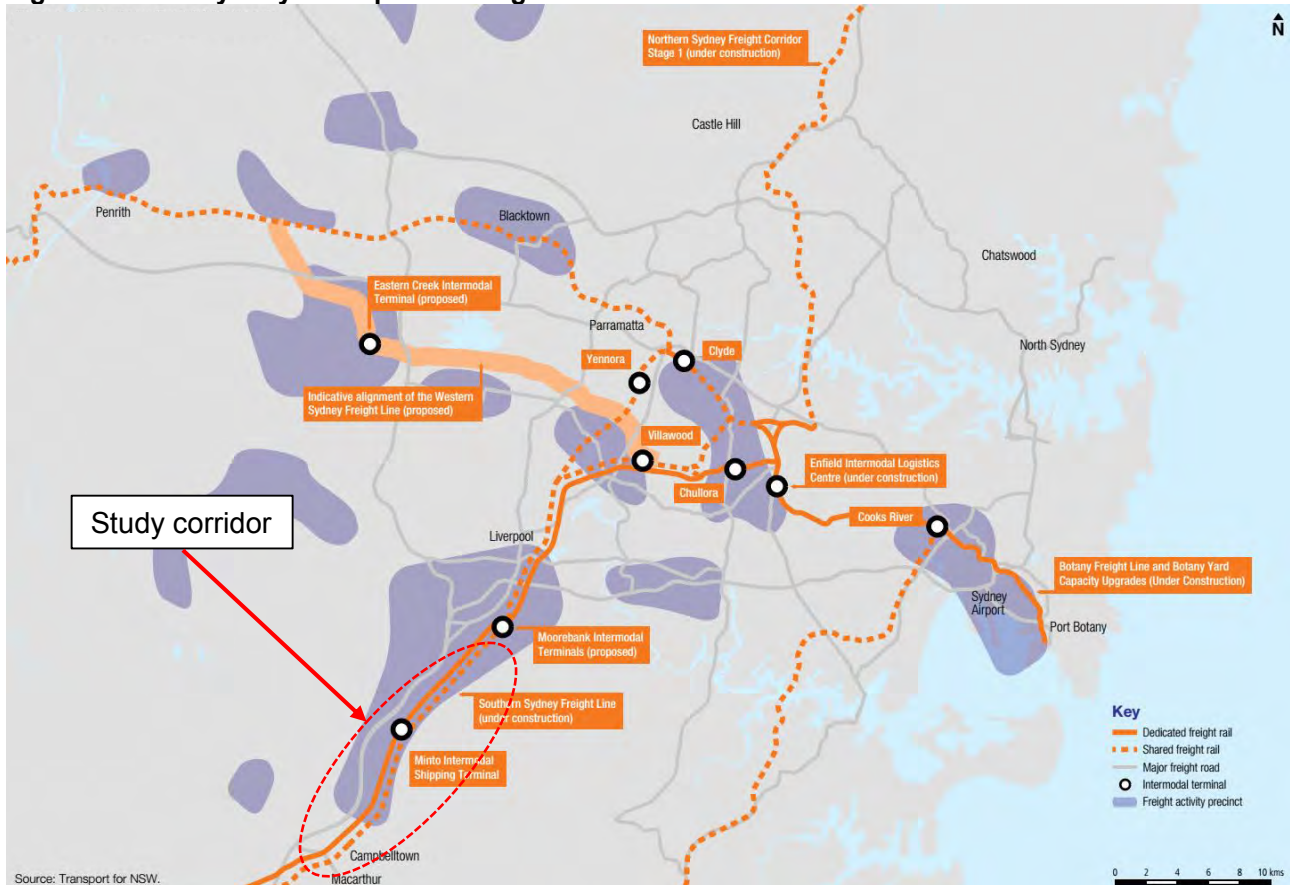
The SIS discusses the short to long term priorities of the South West Rail Link (SWRL) which opened in early 2015. Currently this train link is running as a shuttle service between Leppington Station and Liverpool Station. In the short term, the SWRL is to be integrated into the Sydney Trains network. The linking of Leppington to the rail network will provide a convenient method for workers to travel to new employment opportunities in this area, and residents of the SWGC to access the wider Sydney public transport network. In the long term, this line may be extended towards St Marys via the second Sydney Airport at Badgerys Creek.

The SIS also mentions "pinch points" in the road network that will be under greater pressure in the future. Infrastructure NSW has reserved \$300 million to relieve these traffic pinch points. Local to the corridor, Campbelltown Road, between Campbelltown and Cross Roads has been nominated for minor or major works by the RMS.

The strategy also discusses the proposal of an orbital transport corridor to connect the SWGC to the North West Growth Centre (NWGC). This proposal, not planned to be constructed within the next 20 years, will also link to the future second Sydney Airport and would provide a flood evacuation route for the Hawkesbury Region. The Sydney Outer Orbital Transport Corridor would increase capacity on Sydney's transport network, and the local road network within the Glenfield to Macarthur Corridor by directing through traffic onto the motorway.

The proposed Western Sydney Freight Line corridor and Eastern Creek Intermodal Terminal are identified, however these are uncommitted and the impact on the Glenfield to Macarthur corridor cannot be assessed at this time.

The Sydney metropolitan freight rail network, both existing and proposed features is reproduced in **Figure 2-2**. It identifies the study corridor as being partially within a significant freight activity precinct.

Figure 2-2 Sydney metropolitan freight rail network


Source: Transport for NSW. *The State Infrastructure Strategy 2012 – 2032, Infrastructure NSW, 2012*

Key freight transport nodes include:

- > The proposed Moorebank Intermodal Terminal
- > Macarthur Intermodal Shipping Terminal.
- > Minto and Ingleburn Vehicle Processing and Storage Facilities.

These facilities would support freight movement in NSW and have the potential to reduce freight traffic, particularly on inner Sydney roads.

Implications for the Glenfield to Macarthur Corridor

- > The pinch points program will deliver improved road capacity on the road network on Campbelltown Road between Campbelltown and Cross Roads through improvements in intersection design, lane approaches, and lane widening and bus priority treatments.
- > The integration of the SWRL will provide workers along the Glenfield to Macarthur Corridor with rail access to the new employment opportunities that will develop in the Leppington Town Centre and in the long term through the Badgerys Creek airport.
- > The long term proposal of the extension of the SWRL to St Marys, via the second Sydney Airport will encourage rail travel to the airport and St Marys region.
- > The Sydney Outer Orbital Transport Corridor will increase capacity along Sydney's transport network in the long term and reduce delays for vehicle drivers and freight.

2.1.4 Long Term Transport Master Plan (2012, Transport for NSW)

The *NSW Long Term Transport Master Plan (LTTMP)* identifies strategies and actions for integrated transport across the state over the next 20 years. It provides a framework to identify challenges and to prioritise actions to meet population demands on the transport system to 2031. The LTTMP sits beneath the *NSW State Plan 2021* and alongside *A Plan for Growing Sydney* and the *State Infrastructure Strategy*.

Integrating transport and land use planning is a strong theme throughout the LTTMP, acknowledging that developments generate travel demand and existing transport networks can be drivers for different types of developments. Convenient commutes improve quality of life and the local development pattern contributes to determining the attractiveness of walking and cycling for short trips.

The Plan sets out eight objectives for the NSW transport system that will guide the delivery of the LTTMP:

- > Improve quality of service.
- > Improve liveability.
- > Support economic growth and productivity.
- > Support regional development.
- > Improve safety and security.
- > Reduce social disadvantage.
- > Improve sustainability.
- > Strengthen the transport planning process.

The LTTMP's vision for Sydney over the next 20 years is to deliver a compact and connected city with several centres with a transport system that is quick and convenient with frequent services to other cities. Connecting urban centres is an important aspect within plan.

The LTTMP presents future active, public and private transport upgrades for the Glenfield to Macarthur Corridor which include:

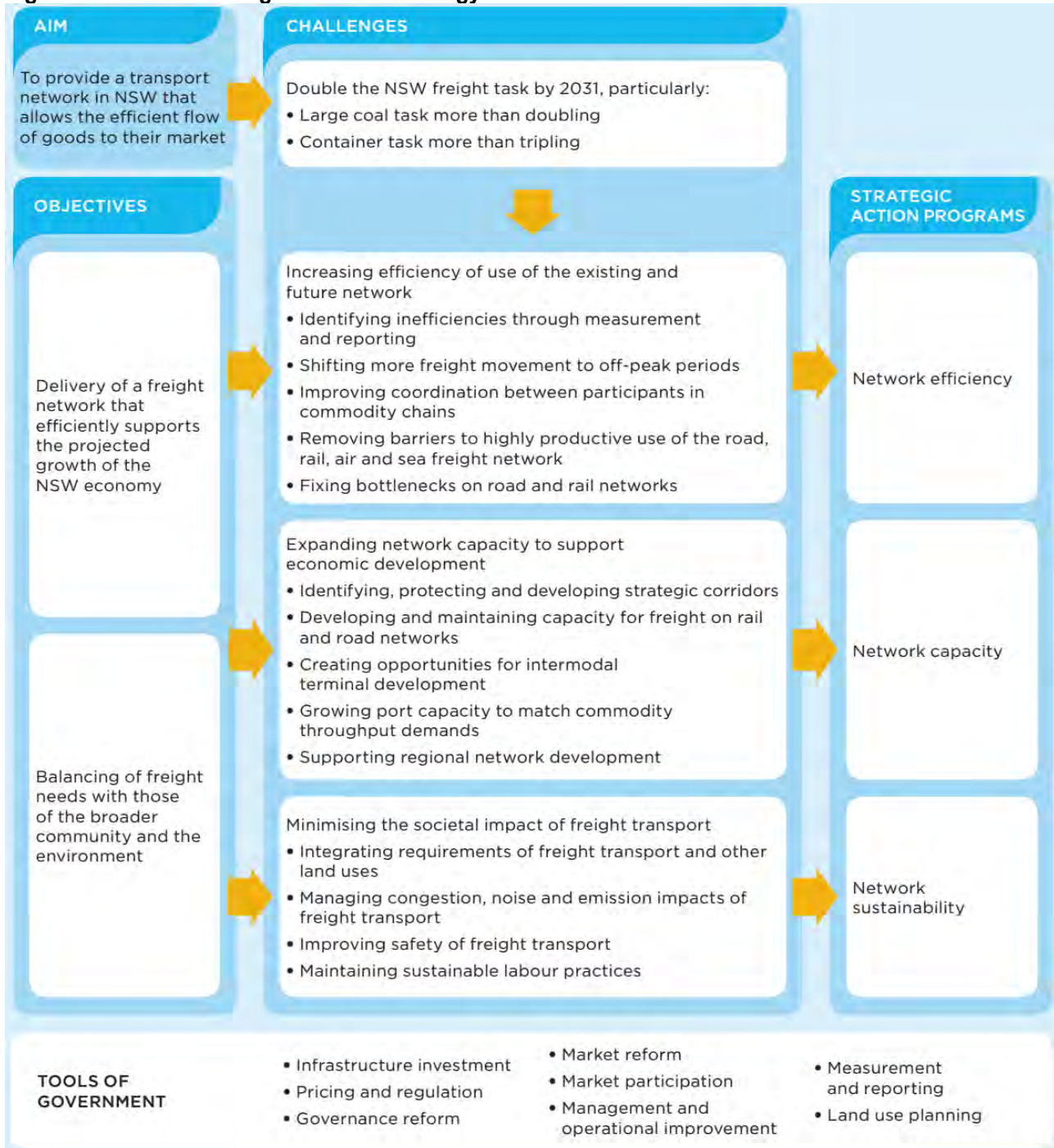
- > Redesign of bus networks to provide buses to the South West Growth Centre and Liverpool to Campbelltown via Leppington.
- > Encouraging high density development in suitable locations, particularly along major transport corridors such as the South West Rail Link.
- > Improve the public transport links between Liverpool and the Campbelltown and Macarthur regions. New road links and bus priority between Campbelltown and the South West Growth Centre.

Implications for the Glenfield to Macarthur Corridor

- > The LTTMP's objectives are relevant for the Glenfield to Macarthur Corridor and should guide the development of the strategic transport objectives.
- > The provision of additional transport links across the rail line to the South West Growth Centre and bus priority will increase public transport connectivity and improve travel times.

2.1.5 NSW Freight and Ports Strategy (2013, Transport for NSW)

The NSW Freight and Ports Strategy specifies the Actions required to address the forecast doubling of the NSW freight task by 2031. The Strategy's structured in three Strategic Action Programs: Network Efficiency, Network Capacity and Network Sustainability. The framework for the strategy is reproduced in **Figure 2-3**.

Figure 2-3 NSW Freight and Port Strategy Framework


In the context of the study area, most factors of the framework could have an impact on the transport network.

An efficient freight network is a key requirement for stimulating economic growth and activity. Currently, rail freight is considered 'unreliable' and 'expensive' due to infrastructure limitations. A program for strategic actions is proposed to occur over three stages; network efficiencies, network capacity and network sustainability. These stages will be completed by changes to scheduling, building of infrastructure and policy.

The Strategy identifies intermodal terminals and freight activity precincts throughout NSW. The precincts typically cluster around the intermodal terminals and also international gateways such as airports and ports. A freight activity precinct is identified in the Glenfield to Macarthur Corridor between Moorebank and Minto. The precinct connects to intermodal terminals at Minto and the proposed facility at Moorebank.

The Glenfield to Macarthur Corridor is a component of the busiest freight corridor in NSW's freight network. Both the railway line and Hume Motorway form part of greater regional and interstate networks.

Approximately 41 million tonnes of freight moved between NSW and Victoria in 2011, the majority passing through this corridor. 92% of the freight was moved by road and 8% by rail.

As part of Stage 1 Network Efficiencies, the South Sydney Freight Line (SSFL) was completed. This project increased the capacity of the line by separating the passenger services from freight services. Prior to this project, there was a freight curfew during peak hour commuter travel, and commuter trains always had priority. The SSFL was able to provide network efficiencies to increase capacity and frequency for freight movements.

Implications for the Glenfield to Macarthur Corridor

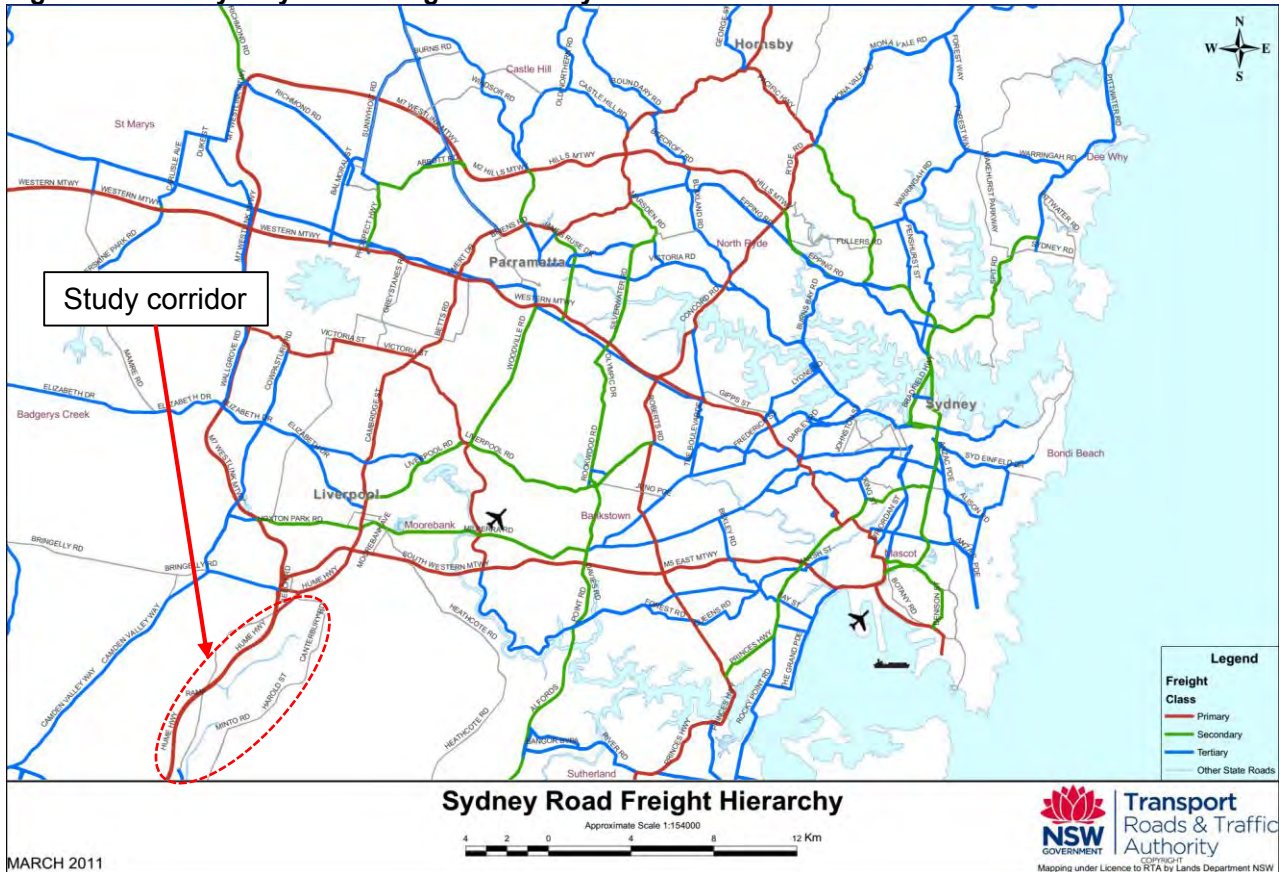
- > The freight corridor has national significance and the addition of freight generation within the corridor and nationally will have cumulative effects on the corridor.
- > Upgrades to the rail freight infrastructure in the corridor will lead to an improvement in reliability for both passenger and freight services.
- > Rail and road freight services growth will increase freight noise footprints in the Glenfield to Macarthur Corridor.
- > The Glenfield to Macarthur Corridor includes a freight activity precinct and two intermodal terminals.

2.1.6 **Metropolitan Road Freight Hierarchy**

The Metropolitan Road Freight Hierarchy identifies where the need for freight movement is greatest and assists in land use planning. The objectives of the metropolitan road freight hierarchy are:

- > To support the pattern of industrial lands and activities that lead to varying freight flows on the road network by providing suitable road infrastructure.
- > To provide for the specific needs of freight vehicles in operating the road network as a safe, sustainable and efficient road transport system for all road users
- > To supplement the administrative classification of roads by recognising the varying intensity of freight generating activities and heavy freight vehicle demand on roads within the State Road classification.

In the context of the study area, the Hume Motorway forms part of the primary road freight network. The Sydney metropolitan road freight network is reproduced in **Figure 2-4**.

Figure 2-4 Sydney Road Freight Hierarchy


Source: Metropolitan Road Freight Hierarchy on the State Road Network Practice Note, TfNSW, June 2011

2.1.7 Sydney's Rail, Bus, Walking, Cycling Futures

To support the LTTMP, a number of mode-specific strategies have been developed for the Sydney metropolitan area.

Sydney's Rail Future (2012, Transport for NSW)

Sydney's Rail Future, released in June 2012, is a strategic document that highlights the long term plan to increase the capacity of Sydney's rail network through the investment of new services and upgrades of existing infrastructure. The document outlines a number of areas of improvement, comparing Sydney's rail network to those of other major cities around the world; it identifies complex train timetables, crowded trains, crowded stations, narrow platforms and traditional signalling technology as potential future areas of development to ensure that Sydney's rail network can accommodate the growing population and trend towards public transport in Sydney.

The future of Sydney's rail network is set out in five stages which are operating efficiencies, network efficiencies, new rapid transit system, Second Harbour Crossing and southern sector conversion.

Most of the stages in this five stage program will affect the Glenfield to Macarthur Corridor, except for Stage 3, which relates mainly to the North West Rail Link.

To support the five stage program, the following key upgrades to the Sydney Trains network will specifically affect the Glenfield to Macarthur Corridor.

- > Upgrades to power supply and safety aspects of the Airport Line will allow services from Glenfield and the South West regions to be doubled to 16 trains per hour during peak times.
- > A second harbour crossing will enable more services to the south-west by unlocking the CBD bottleneck through the building of new train stations in the CBD. There will be an additional 60 train services per hour through the CBD during peak times across all lines.

The plan notes the 2013 timetable change which provided more regular services between Parramatta and Liverpool to south western Sydney via the Cumberland Line. Services will also be faster due to modern train fleets servicing this line.

Implications for Glenfield to Macarthur Corridor

- > Improvements to rail along the corridor are focused on increasing frequencies and alleviating the bottlenecks on the network that cause delays. The improved reliability of the train service will promote public transport use.
- > Increased number of services on the T2 Airport, Inner West and South Line will improve the attractiveness of public transport.

Sydney's Bus Future (2013, Transport for NSW)

Sydney's Bus Future, released in December 2013 is the strategic document that will shape Sydney's bus network in the long term. The document includes the NSW Government's step-by-step actions to deliver fast and reliable bus services for commuters within Sydney. The Plan aims to provide a simpler, faster and better bus network that will be reliable and well integrated into the public transport network.

The plan sets out a three-tiered network of rapid routes, suburban routes and local routes. The characteristics of each tier are presented in **Table 2-1**.

Table 2-1 Sydney's Bus Future - route tiers

Route	Rapid	Suburban	Local
Objective	Fast and reliable journeys, connect major centres, current or future high demand, existing priority infrastructure	Provide cross metropolitan routes	Complete the network and provide local shopping services, CBD shuttles and peak expresses
Infrastructure	Bus priority	Bus priority at key pinch points	Local streets and roads, bus priority for peak express connections
Frequency	Very frequent - 'turn up and go'	Mix of 'turn up and go' and timetabled services	Timetabled services
Number of routes	13	20 initially	
Stops	Every 800 metres to one kilometre	Every 400 metres	Every 400 metres

Specific changes to bus services through the Glenfield to Macarthur Corridor include:

- > Introductions of new suburban bus routes to support the SWRL.
- > Rapid bus routes will be developed for the SWGC. Propose over 150 new services, including more early morning, evening, night time and weekend services. In the long term this route may be converted to a Bus Rapid Transit.
- > A South West rapid route will be investigated between Liverpool and Campbelltown via Leppington.
- > Bus priority projects for the rapid routes between Liverpool and Campbelltown and suburban routes.
- > Upgrades to bus facilities at Glenfield transport interchange.

Implications for Glenfield to Macarthur Corridor

- > A simpler and more frequent bus service along the corridor will make bus travel more attractive.
- > Bus connections to the SWGC and the Leppington town centre from the corridor will need efficient east-west routes to support access to jobs and services. Upgraded facilities and infrastructure will reduce delays and will encourage bus use within the Glenfield to Macarthur Corridor.

Sydney's Cycling Future (2013, Transport for NSW)

Sydney's Cycling Future presents a city-wide approach to supporting cycling as a means of transport and making it safer and more accessible to people across Sydney. The plan commits to separated cycleways

wherever possible, cycle connections to major centres and transport interchanges, promotion of the network and engagement with cycle infrastructure providers and users.

Campbelltown-Macarthur is identified in the plan as a Major Centre which will have a bicycle network plan developed, in collaboration with the relevant councils, for a five kilometre catchment as part of the Connecting Centres Program. The program supports local councils to develop bicycle plans and fund infrastructure. The five kilometre catchment will be expanded to cycling links within a ten kilometre catchment in the long term.

Specific improvements for the Glenfield to Macarthur Corridor:

- > Priority cycleway routes proposed between Liverpool and Glenfield.
- > Installation of secure bicycle facilities at Campbelltown Station.
- > Bicycle Network Plans will be developed with councils within 5 kilometre catchments of various centres.

Implications for Glenfield to Macarthur Corridor

- > A Bicycle Network Plan will be developed for Campbelltown-Macarthur to plan and fund cycling infrastructure to encourage cycling as a mode of transport.
- > Cycling infrastructure at train stations in the Glenfield to Macarthur Corridor will encourage public transport customers to ride to the station.

Sydney's Walking Future (2013, Transport for NSW)

The NSW Government is focused on supporting customers to walk more often for short trips, understanding that increased walking activity will benefit the community's health and the environment and relieve pressure on local road networks. Sydney's Walking Future sets out a strategy and actions to make walking an attractive mode in Sydney's centres. The plan states that walking infrastructure will be prioritised in the development of new transport and urban development projects.

Campbelltown-Macarthur has been identified as a major activity centre as part of the Connecting Communities Program which aims to encourage people to walk at these centres. In addition to this, the program will prioritise the development of pedestrian infrastructure within a two kilometre catchment of major centres and interchanges.

There are currently no specific plans for major infrastructure in the Glenfield to Macarthur Corridor that are identified in this plan.

Implications for Glenfield to Macarthur Corridor

- > The attractiveness of walking in Campbelltown and Macarthur will increase as the Connecting Communities Program is implemented.
- > Improving pedestrian infrastructure within two kilometres of transport interchanges through the corridor will encourage public transport customers to walk to their closest station.

2.2 Regional strategic planning

2.2.1 Maldon – Dombarton Rail Link

The Maldon – Dombarton Rail Link has long been proposed to provide an alternative link between Western Sydney and Port Kembla. Preliminary construction work began in the 1980's before the project was indefinitely suspended. A feasibility study was released in 2011 generally supporting the proposal on the ground to provide an alternative link as other areas of the rail network are approaching capacity.

TfNSW is conducting a Registration of Interest process for the construction, operation and maintenance of the proposed Maldon-Dombarton Railway. The Registration of Interest closed on 10 April 2015.

TfNSW is currently reviewing submitted Registrations of Interest. The outcome of the review will inform the next steps TfNSW takes on the project.

Future construction of the Maldon-Dombarton Railway would provide relatively direct access to Port Kembla, creating additional freight rail traffic through the Corridor. Demand for rail-served industrial land is likely to strengthen as a result.

2.2.2 South West Growth Centre (SWGC)

The SWGC is 17,000 hectares of largely greenfield area proposed for new urban development to be included in the Sydney metropolitan region. It is anticipated the region will eventually contain 110,000 new dwellings and 300,000 residents. It is located adjacent to and the south of the Western Sydney Employment Area (WSEA). The precinct neighbours the Glenfield to Macarthur corridor to the north-west. The South West Rail Link spur from Glenfield provides the growth centres only current rail linkage.

TfNSW is investigating corridor protection for a South West Rail Link Extension. This could extend the rail catchment within the region and assist in reducing the reliance on private vehicles.

The South West Growth Centre is a long term proposal, however much of the master planning has been undertaken and this includes proposed transport networks that provide an opportunity to integrate with the Glenfield to Macarthur corridor. This includes a grid network of roads that are proposed to link with Campbelltown Road.

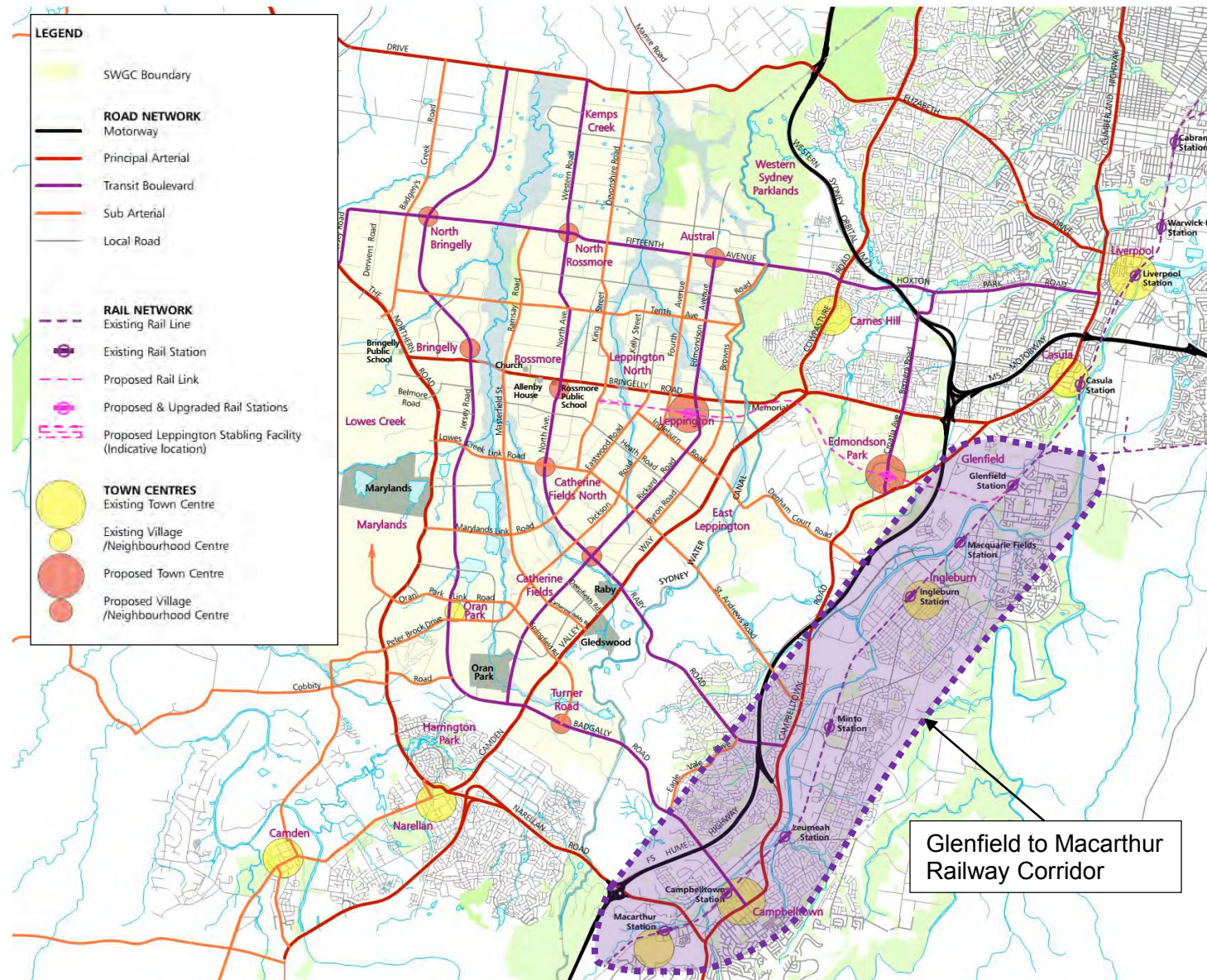
SWGC Road Network Strategy

Spakman Mossop Michaels completed the SWGC Road Network Strategy for the RMS (formerly RTA) in June 2011. The strategy is based on three major road categories developed by the RMS for growth centres which are principal arterials, transit boulevards, and sub-arterials.

The planning of the road network is intended to avoid future consequences of land use conflicts due to the change of the roads function and use. Bicycle and pedestrian network integration is to be provided for all road categories.

The proposed SWGC Road Network in context with the Glenfield to Macarthur rail corridor is shown in **Figure 2-5**.

Figure 2-5 South west growth centre proposed



Source: South West Growth Centre Road Network Strategy, Spacman Mossop Michaels, 2011

As shown in **Figure 2-5** a number of major roads, both existing and proposed would provide links towards the Glenfield to Macarthur rail corridor. These include:

- > Denham Court Road, a sub arterial to link with the Hume Motorway.
- > St Andrews Road a sub arterial linking to Campbelltown Road.
- > Raby Road, a Transit Boulevard linking to Campbelltown Road.
- > Badgally Road a Transit Boulevard linking to Campbelltown Road.
- > Narellan Road, a principle arterial linking to Campbelltown Road.

These are generally based on existing roads with proposed improvements and links. Most of these do not continue further east of Campbelltown Road or cross the railway corridor in the study area.

2.3 Glenfield to Macarthur Planning

The GMCITS is located in the Campbelltown Local Government Area (LGA). Strategic planning, local planning, land use, land zoning and development control are all governed by Campbelltown City Council.

Relevant planning documentation was reviewed to assess existing controls and policy in regards to transport provisions. This review included:

- > Campbelltown Local Environmental Plan 2002
- > Draft Campbelltown Local Environmental Plan 2014
- > Campbelltown (Sustainable City) Development Control Plan 2014
- > Glenfield Road Urban Release Area Development Control Plan 2002
- > The Link Site Development Control Plan 2002
- > University of Western Sydney Development Control Plan 2008
- > Campbelltown Regional Structure Plan
- > Campbelltown-Macarthur Structure Plan
- > Campbelltown-Macarthur Precincts Structure Plan
- > Campbelltown-Macarthur Access

Each of the transport plans' components generally align with the state, metropolitan and regional plans regarding integration of land use and transport, with objectives aligned with providing higher density developments close to existing public transport facilities and improving transport networks including pedestrian, cyclist and roads.

Specifically the aim of the Draft LEP 2014 plan are to:

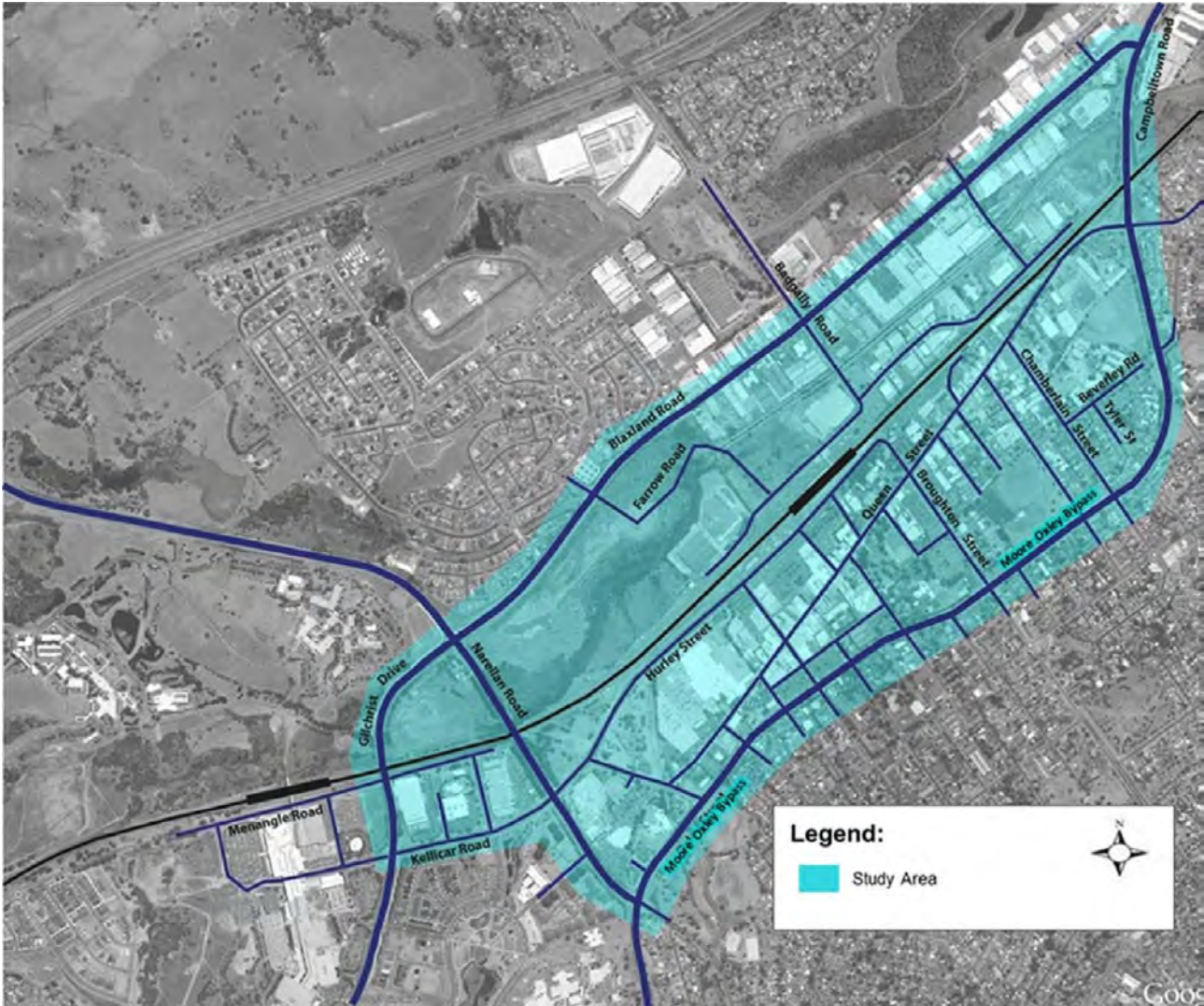
- > Provide a comprehensive planning framework for the sustainable development of land in Campbelltown LGA.
- > Facilitate Campbelltown LGA's development as the compact and vibrant primary business centre for the Macarthur Region, with distinct limits to urban growth and a clearly defined separation between urban and non-urban areas.
- > Reinforce a hierarchy of centres and strengthen the role of the Campbelltown – Macarthur Centre as the primary business centre for the Macarthur Region.
- > To optimise the integration of land use and transport and encourage safe, diverse and efficient means of transport throughout Campbelltown and to other places.
- > Medium and high density residential housing is to be placed in close proximity to commercial centres, transport hubs and routes.
- > Neighbourhood, local and community centres are planned to provide retail, business and community uses which will support public and active modes of transport.

> Building floor space ratio and heights are to reflect their proximity to public transport facilities.

2.3.1 Campbelltown CBD Traffic Study

Hyder Consulting completed the “Traffic Study for Campbelltown CBD” in December 2014. Campbelltown City Council commissioned the study to identify road network capacity constraints that would occur as a result of the then forecast land use intensity increase scenario in the Campbelltown CBD over the next 20+ years. The roads and area assessed in the study is shown in **Figure 2-6**.

Figure 2-6 Campbelltown CBD Traffic Study Area



Source: Traffic Study for Campbelltown CBD Volume 1, Hyder Consulting, 2014

The study considered only the road network and vehicular traffic. Growth scenarios were modelled on the assumptions in the Strategic Travel Model (STM) and the then proposed development density increase within the study area. Proposed road network improvements were based on accommodating the forecast demands and reducing congestion. Current thinking also considers managing demand and reducing our mode share.

Key intersections were modelled in the Campbelltown CBD with additional movements indicating 18 intersections would experience a poor level of service. Within the forecast future scenario the traffic study identifies 20 intersections that will require road improvements and specifies the approximate timeframe for improvement, either short, medium or long term.

Many of the concept improvements relate to the implementation of clearways and lane amplifications leading up to and at signalised intersections.

A major option identified is a rail bridge to link Badgally Road and Broughton Street. Hurley Street would then run under the proposed bridge and link to Queen Street via Langdon Avenue. Another concept is to extend Beverley Road to form a link between Broughton Street and Campbelltown Road. None of these concepts have been committed to.

Implications for Glenfield to Macarthur Corridor

- > The proposed road network changes should be considered in the development of the G2MITS.

2.4 Key considerations

The NSW Government and Campbelltown City Council have created a framework for the planning and delivery of transport infrastructure and services. Key considerations for the study area include:

Strategic

- > The NSW State Plan 2021 supports the uptake of walking, cycling and public transport. It has set goals for travel mode share that should be referenced when setting travel targets for the study area.
- > A clear and transparent strategic planning framework and planning system will support the development of the corridor and provide certainty for residents, businesses and developers.
- > Planning for additional employment within the corridor to provide opportunities work close to home will reduce the pressure on the wider transport network.
- > The development of Leppington, Western Sydney Employment lands, Badgerys Creek airport and enhancement of Campbelltown-Macarthur as a regional city and strategic centre is likely to provide additional employment opportunities within and close to the study area.

Planning and development

- > The Draft Campbelltown LEP supports the vision of planning medium and high density housing close to public transport and commercial centres. This will improve accessibility, shorter journeys and encourage use of public transport.
- > The encouragement of self-contained local centres that provide a mix of land uses will encourage more walking, cycling and public transport use for short trips to and within local centres.
- > Development in the study area should be located close to railway stations to encourage more walking, cycling and public transport use.
- > High density residential use should be supported by active street frontages and enhanced active transport networks surrounding railway stations.
- > The integrity of freight routes and the ability to increase capacity on both freight and passengers along the rail corridor must be maintained.

Transport

- > As Campbelltown-Macarthur is the regional city centre and strategic centre set to service the SWGC, efficient transport connections between the areas east and west of the Hume Motorway will be needed.
- > **Walking and cycling**
 - New and amended active transport connections will be required to improve accessibility and support growth in the study area.
 - Well-connected, direct and prioritised infrastructure for walking and cycling should be provided to promote active transport access to educational facilities, town centres, key destinations and public transport.
- > **Public transport**
 - New and amended public transport connections will be required to improve accessibility and support growth in the study area.

- Upgrades to public transport infrastructure and services should be provided to reduce travel times and enhance public transport attractiveness in the study area.
- The integration of the SWRL will provide workers along the Glenfield to Macarthur Corridor with rail access to the new employment opportunities that will develop in the Leppington Town Centre and through the proposed Badgerys Creek airport.
- The provision of additional public transport links across the rail line to the SWGC will increase public transport connectivity and improve travel times.
- Improvements to rail along the corridor are focused on increasing frequencies and alleviating the bottlenecks on the network that cause delays. The improved reliability will promote public transport use.
- A simpler and more frequent bus service along the corridor will make bus travel more attractive.
- Integration improvements between bus and rail will encourage more people to use public transport, including transferring from one mode to another.

> **Freight**

- Protect the integrity of the freight corridor to maintain and increase capacity for freight on rail and road networks.
- Upgrades to the rail freight infrastructure in the corridor will lead to an improvement in reliability for passenger and freight services.
- Increased rail freight services and reliability will provide an attractive alternative to road freight through south-western Sydney.
- Freight activity within the study area is high and includes two intermodal terminals that require good freight connections to arterial road and rail networks.

> **Roads**

- New and amended road connections will be required to improve local and regional accessibility and support growth in the study area. Road upgrades will improve connectivity and safety.
- The pinch points program will deliver improved road capacity on the road network on Campbelltown Road between Campbelltown and Camden Valley Way/ Hume Highway through improvements in intersection design, lane approaches, lane widening and bus priority treatments.
- The Sydney Outer Orbital Transport Corridor will increase capacity on Sydney's transport networks in the long term and reduce delays for vehicle drivers and freight.

These key considerations will be used to develop objectives and measures to encourage more walking, cycling and public transport use while seeking to support the corridor's key employment uses, freight activity and strategic role within Metropolitan Sydney.

3 Existing land uses

3.1 Land zoning

The current zoning for each station and surrounding lands under the Campbelltown Local Environmental Plan 2002 is shown in **Appendix A**. At the time of preparation of this report, Campbelltown Council was undertaking the implementation of a new Local Environmental Plan in response to a state-wide requirement to adopt new planning controls of the standard instrument.

3.2 Land uses

The land uses in terms of key trip generators within each precinct are discussed in the following sections. It is assumed that most people have a broad idea of the trip generation characteristics of common land uses.

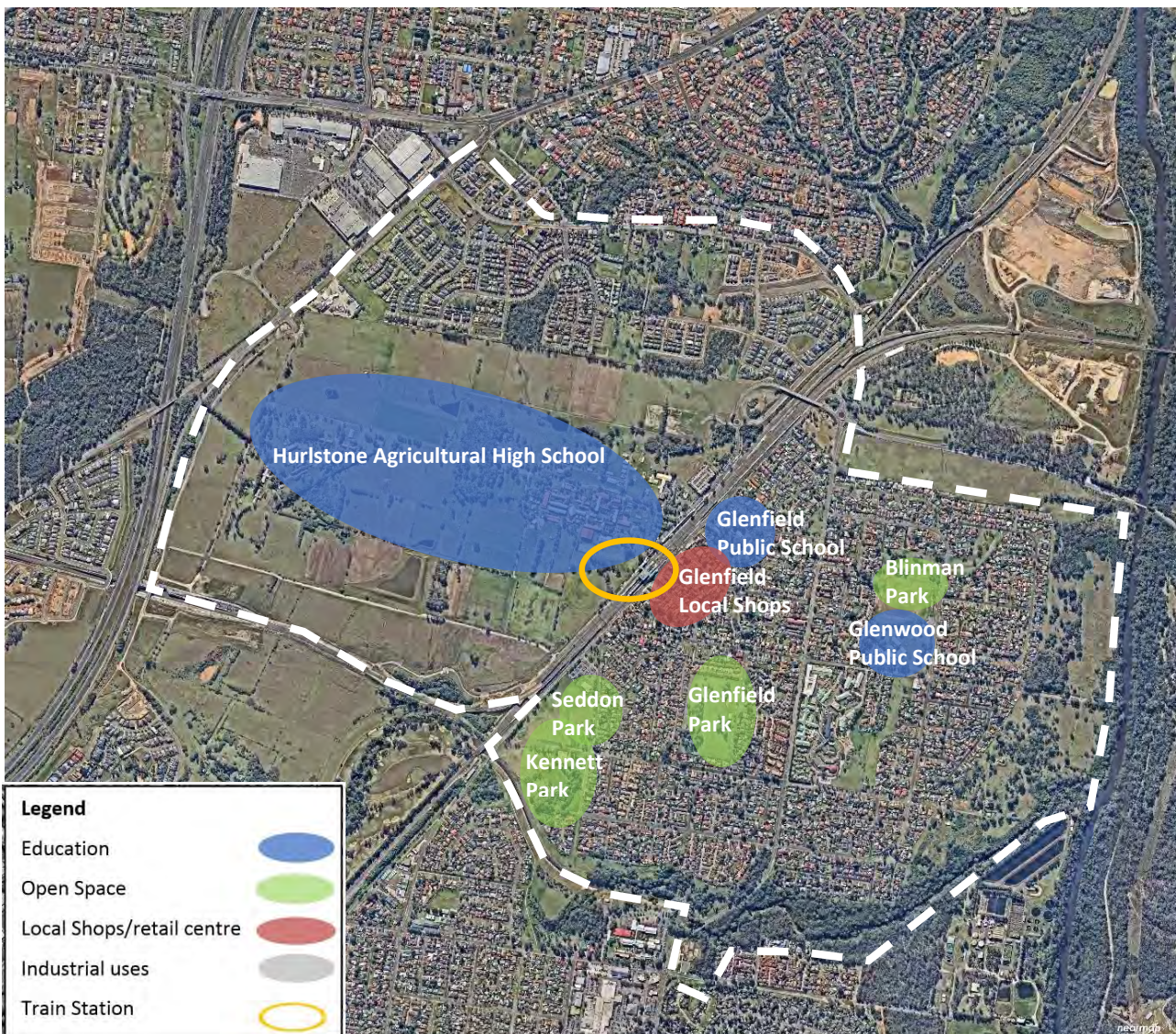
Glenfield precinct

The Glenfield precinct surrounds Glenfield Station on both sides of the railway line. The suburb's village centre, adjacent to the east of train station, provides local cafes, shops, newsagents and health services for the surrounding residential area. Low density residential housing and the Glenfield Public School are within the vicinity of the station to the east. By way of land use and density, the east side of the station is the higher trip generating area.

The western side of the station contains a commuter car park, Hurlstone Agricultural High School, and two schools for specific purposes; Ajuga School and Campbell House School for students with a disability or behavioural needs respectively. Hurlstone Agricultural High School is an item of heritage significance within 400 metres vicinity of the station. North of the education precinct is the Glenfield urban release area, which was released for low density housing in 2008.

The key land uses in the Glenfield precinct are shown on **Figure 3-1**.

Figure 3-1 Glenfield precinct land uses



Macquarie Fields

The Macquarie Fields precinct is located east of the railway line and all trips to the station currently access from the east side. Macquarie Fields Station, on the railway line, is within a low density and residential only area of the precinct. A commuter car park is provided to the south east of the station. There is no customer access to the west of the station due to the Bunbury Curan Creek easement and boundary of the Macquarie

Links International Golf Club. A pocket of the industrial land precinct of Ingleburn is located on the west side of the railway line to the south-west of the station. This area is not directly accessible from Macquarie Fields with road access provided to Henderson Road in Ingleburn.

The town centre is approximately one kilometre east of the station where a significant shopping centre is located. One kilometre south of the station is Macquarie Fields Public School and High School, adjacent to an indoor sports complex. One kilometre east of the train station is James Meehan High School and the Glenquarrie Shopping Centre and the TAFE. The key land uses in the Macquarie Fields precinct are shown on **Figure 3-2**.

Figure 3-2 Macquarie Fields precinct land uses



Ingleburn precinct

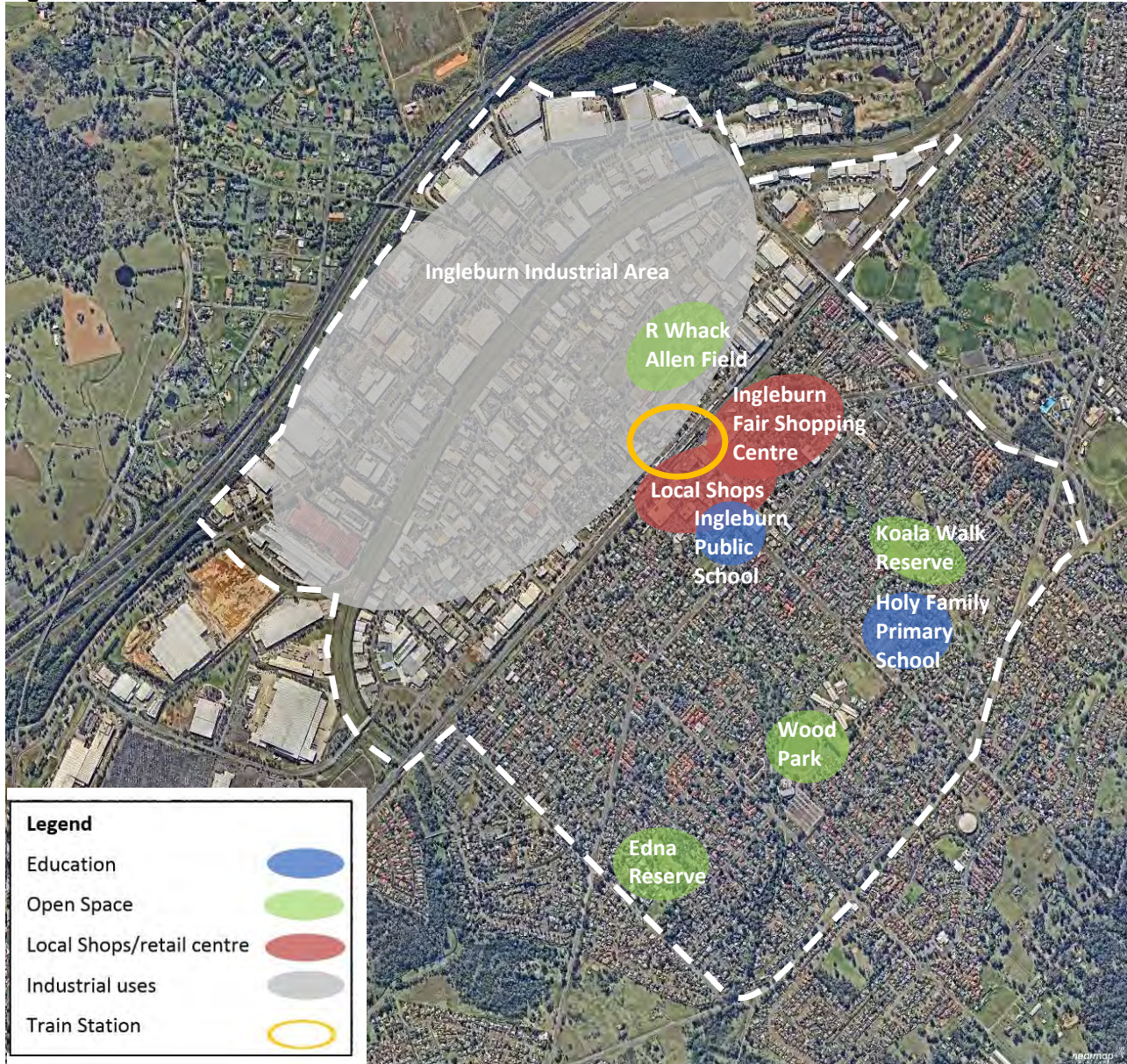
The Ingleburn precinct surrounds Ingleburn Station to the east and the west of the railway line. The area features local shops, restaurants, cafes, banking, supermarkets, and the Ingleburn Hotel. The area east of the town centre is largely low density residential with one and two storey dwellings.

To the west of the station is a commuter car park, with surrounding uses that include large showrooms and industrial uses.

Further west between the train station and the Hume Motorway is the Ingleburn industrial precinct with large warehousing, manufacturing and transport distribution facilities. The largest, by area land use is the Patrick Autocare vehicle storage area. The Ingleburn industrial precinct represents a significant employment precinct in the study corridor. As a result of the land uses, the precinct accommodates a higher proportion of freight vehicle movements in the region. Vehicular connections to the Hume Motorway to the north, to the south and from the north are relatively direct, however connections from the south to the precinct are circuitous under the existing road network configuration. While being located adjacent to the SSFL, there are no intermodal facilities that provide access between the freight rail line and industrial land uses.

Items of heritage significance within the 400 metre vicinity of the station include a sandstone water trough (Oxford Road, Ingleburn), and Ingleburn Community Hall (72 Oxford Road, Ingleburn).

The key land uses in the Ingleburn precinct are shown on **Figure 3-3**.

Figure 3-3 Ingleburn precinct land uses


Minto precinct

The Minto precinct surrounds Minto Station on both sides of the railway line. The station is adjacent to the Minto town centre with small local shops and businesses operating close to the station entrance. Minto Marketplace is approximately 500 metres east of the station. Large commuter car parks are located on both sides of the railway line. To the north-east, land is characterised by low density residential.

To the south and west of the station is the Minto industrial area providing warehousing, manufacturing and distribution facilities. The Macarthur International Shipping Terminal (MIST) is located to the south-east of the station and is a significant intermodal facility for the region. This is currently the only railway freight interchange facility within the study corridor. The MIST facility is located on the east side of the railway corridor, as such freight trains must use the passenger rail lines to access the facility. No access (track point crossovers) to the SSFL is available along the study corridor.

Access to and from the Hume Motorway is available to and from the north, however there are no nearby on and off ramps to the south.

The key land uses in the Minto precinct are shown on **Figure 3-4**.

Figure 3-4 Minto precinct land uses



Leumeah precinct

The Leumeah precinct surrounds Leumeah Station on both sides of the railway line. The station is surrounded by large car parks and local shops including supermarkets, liquor shop, a pharmacy, and post office. West Leagues Club, Campbelltown Sports Stadium and an apartment building are immediately north of the station. Nearby residential dwellings are typically medium density, two-storey buildings. West of the train station is predominantly commercial and light industrial uses with bulky goods and wholesale outlets amongst large warehousing facilities. The area also includes several fast food restaurants, homemaker retail facilities and two hotels.

North of the precinct, industrial land uses include a large car storage, processing facility (Prixcar Services) and the Keylink Industrial Centre.

The key land uses in the Leumeah precinct are shown on **Figure 3-5**.

Figure 3-5 Leumeah precinct land uses



Campbelltown precinct

Campbelltown Station is in the main activity centre of the Campbelltown precinct. It has the greatest range of land uses and is also a regional strategic transport hub. The precinct extends to the Hume Motorway in the west and to residential areas in the east. The train station is on the edge of the Campbelltown town centre, a

large commercial core in Sydney's south west. To the east of the station is Campbelltown Council Administration Centre, Campbelltown Court House and Police Station, various service stations, local cafes and small businesses servicing locals and visitors to the area. Campbelltown Mall, a large shopping centre is located to the south-east of the station. Large commuter car parks are located on Railway Street and Hurley Street on the eastern side and Farrow Road on the western side.

The western side of the station land uses mainly comprise of light industrial and large scale/ bulky retail land uses. Given the scale of the precinct, notable freight vehicle movements would be generated by the precinct. The closest access to the Hume Motorway is via Blaxland Road and Narellan Road to the south and Raby Road to the north in Minto. The industrial land precinct is bisected by Badgally Road which passes under the Hume Freeway, however no motorway access facilities are located at this location.

The key land uses in the Campbelltown precinct are shown on **Figure 3-6**.

Figure 3-6 Campbelltown precinct land uses



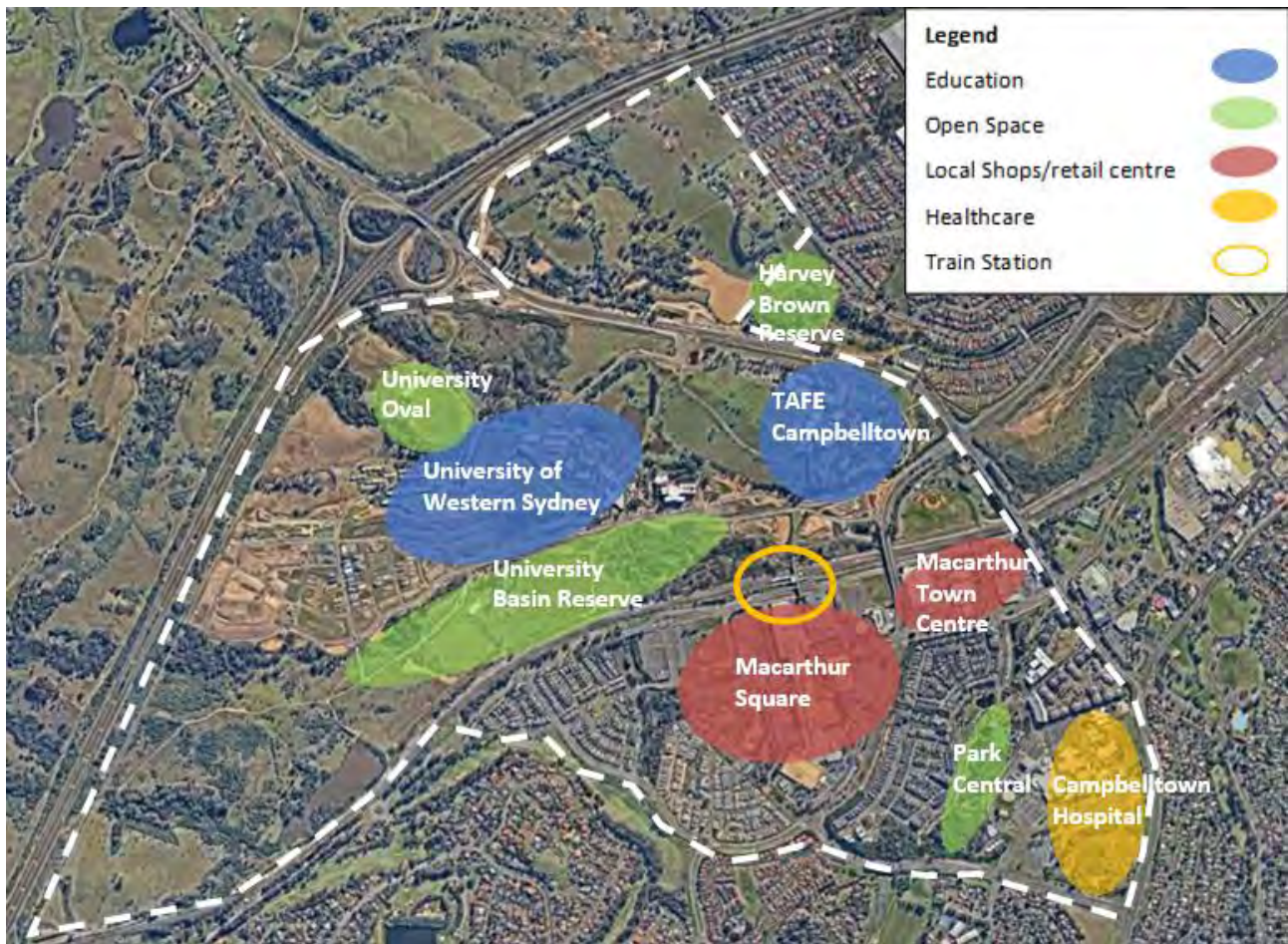
Macarthur precinct

The Macarthur precinct surrounds Macarthur Station on both sides of the railway line. The train station is adjacent to Macarthur Square, a regional shopping centre providing retail and leisure services and facilities. There is direct access to Macarthur Station from Macarthur Square via a pedestrian footbridge. There is a commuter car park to the north and south of the station, either side of Macarthur Square. Campbelltown hospital is located to the east of Macarthur Square and is separated by a park and residential precinct.

To the north and west of the station is the University of Western Sydney, and TAFE NSW Campbelltown Campuses. More recently low and medium density residential development has been zoned immediately south and west of the station. Pedestrian access to the station from the western side is through the University Basin Reserve.

The key land uses in the Macarthur precinct are shown on **Figure 3-7**.

Figure 3-7 Macarthur precinct land uses



3.3 Key considerations

The existing population, workforce and land uses provide an insight into how the study area functions and consequently transport considerations. Key considerations for the study area include:

- > Resident populations within the study area's precincts vary significantly, from approximately 2,100 in Minto to 14,500 in Ingleburn. While some precincts are large in area, the key driver of residential population size is land use.
 - Minto's low residential population is an indicator of the precinct's role within the corridor. Minto is dominated by industrial, retail and commercial land uses, leaving little land for residential uses within close proximity to key transport hubs. This provides good access to employment within the Minto area.
 - Ingleburn is a more balanced precinct, with industrial land uses adjacent to the Hume Motorway that provides good access to the arterial network and reduces through routing within retail and residential areas.
 - Campbelltown and Macarthur are each smaller than Ingleburn, yet combined these form the study areas largest centre for business, education, health, retail land uses and other major services.
 - Other precincts provide a mix between Minto and Ingleburn. This structure and residential density provide opportunities for uplift and additional land uses to support the local area. Improved transport accessibility within the precincts will enable changes in land use, density and structure.
- > Campbelltown Station is the regional transport hub with Glenfield also servicing as a lower order transport hub being located at a junction between two railway lines.
- > The resident workforce for the study area also varies significantly, from approximately 930 for Minto to 7,300 for Ingleburn. This indicates that Ingleburn may have the residential and employment demand to encourage more walking, cycling and public transport use through improved infrastructure and services. For Minto, opportunity may be limited as a result of low residential and employment demand, which results in a relatively unconstrained transport network, particularly road network. When this occurs achieving mode shift to more sustainable modes of transport becomes cumbersome and costly.
- > Other precincts provide a mix of employment within each area. It should be noted that the residential and employment proportions for each precinct are very similar, for example Ingleburn has 27% of the employment population and 27% of residential population for the study area. Although not everyone will live and work within the same precinct, this provides an opportunity for self-containment of trips and an increase in walking, cycling and public transport in the corridor.
- > Land use throughout the study area is mixed, with a variety of residential, commercial, retail and industrial. There is a distinct light to medium industrial use throughout most precincts. In particular for Ingleburn, Minto and Leumeah where the western side of the rail is majority industrial uses.
- > There are also significant accessibility barriers, particularly to the west as a result of large land parcels at Glenfield and Macquarie Fields surrounding the stations.
 - Glenfield has a large agricultural school that restricts permeability and activation on the western side of the railway line. This also limits the size of the residential population able to live in proximity to the station.
 - Macquarie Fields has a golf course to the west of the station that results in no access from this side. There is residential housing on the western side within 800m of the station, however access is restricted as a result of the golf course. This presents an opportunity to improve public transport accessibility.

These key considerations will be used to develop objectives and measures to encourage more walking, cycling and public transport use while seeking to support the corridor's key employment uses, freight activity and strategic role within Metropolitan Sydney.

4 Existing transport infrastructure

This section describes each precinct's transport networks by mode. This provides an initial indication of the strengths and opportunities for each mode.

4.1 Walking

Walking is typically a local transport mode that connects people to local goods and services, other modes of transport or facilitates multi-purpose trips. Walking is a viable option for distances under two kilometres (approximately 25 minutes) and is often quicker for short trips door to door. Walking is also the most space efficient mode of transport for short trips and presents the highest benefits. Co-benefits where walking replaces a motorised trip include improved health for the individual, reduced congestion on the road network and reduced noise and emission pollution.

Throughout the study corridor, the footpath network, where provided is generally constructed to minimum design standards of 1.2 metres wide. In many locations, footpaths are not provided, or are provided on one side of the street only. In retail and commercial precincts paths are generally quite generous, typically extending the full width between the road and property boundary.

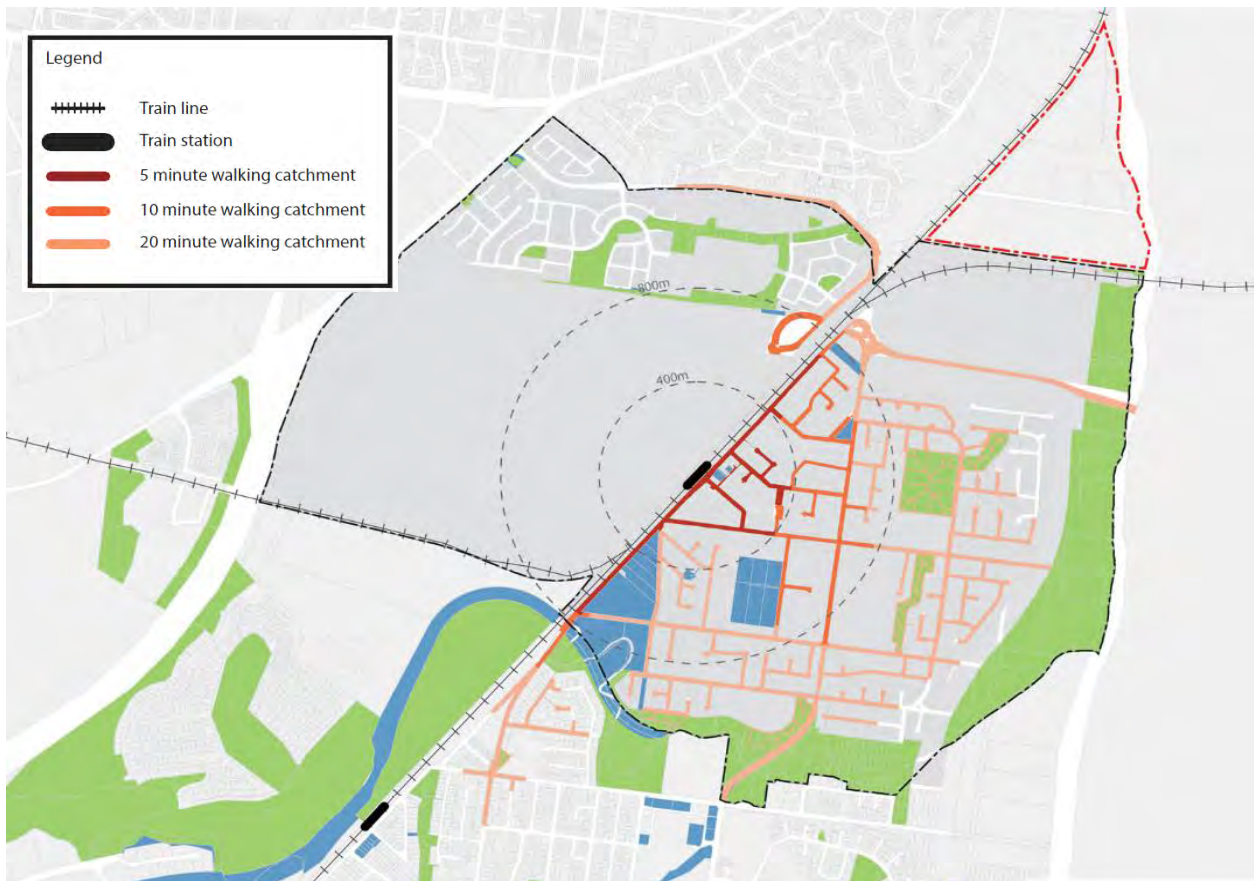
In many instances, the road network has been designed to prioritise vehicle movements, including many intersections with roundabouts. These often provide positive safety outcomes for vehicle movements however pedestrians have no priority and are at greater risk crossing when compared with other intersection layouts. Crossing at roundabout intersections also deviate from pedestrian desire lines.

Footpaths and crossing facilities are generally provided to higher standards near each station, with wider paths, zebra crossings or pedestrian refuges.

Each study area has a footpath network that differs depending on the precinct and the land use.

4.1.1 Glenfield

The five minute (400 metre) and ten minute (800 metre) walking catchments to Glenfield Station are shown on **Figure 4-1**. Customers arriving on foot will typically access the station from the eastern side where there is an established road and footpath network. Customers accessing the station from the western side will generally arrive via taxi, bike, or car via drop-off or commuter car park.

Figure 4-1 Glenfield Station walking catchments


Source: Cox Architects

Glenfield has a well-developed footpath network around the station. Footpaths in these areas are offset from the property boundary, this increases sight distance at driveways, providing a safety benefit compared to paths adjacent to property boundaries or fence lines.

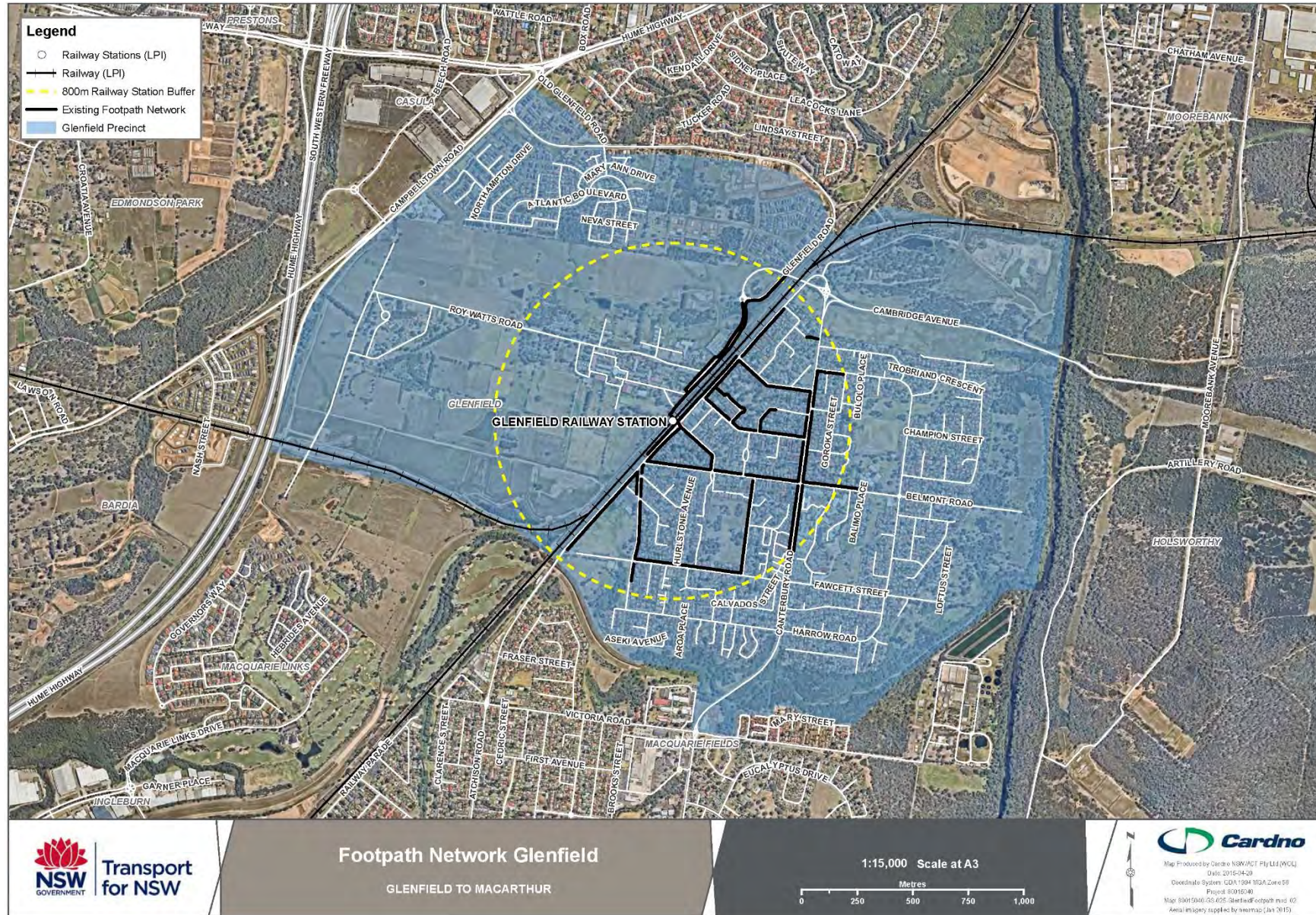
Signalised crossings are provided on all legs of the intersection of Railway Parade and Hosking Crescent. Railway Parade forms the main retail street of Glenfield and it runs parallel to the railway line on the south-east side. Adjacent to the interchange it has a posted 50 kilometre per hour speed limit.

Recent improvements include a new footpath adjacent to a bike path on the north-west side of the interchange. This provides a sheltered link between the interchange and the multi-level commuter car park. A raised zebra crossing is provided from the commuter car park across the private access road.

No footpaths are provided linking to the new residential development north of the interchange and footpaths are not provided in the lower order streets.

Overall the pedestrian network is considered safe with improvement potential by way of expanding the network to cover more area and complete missing links.

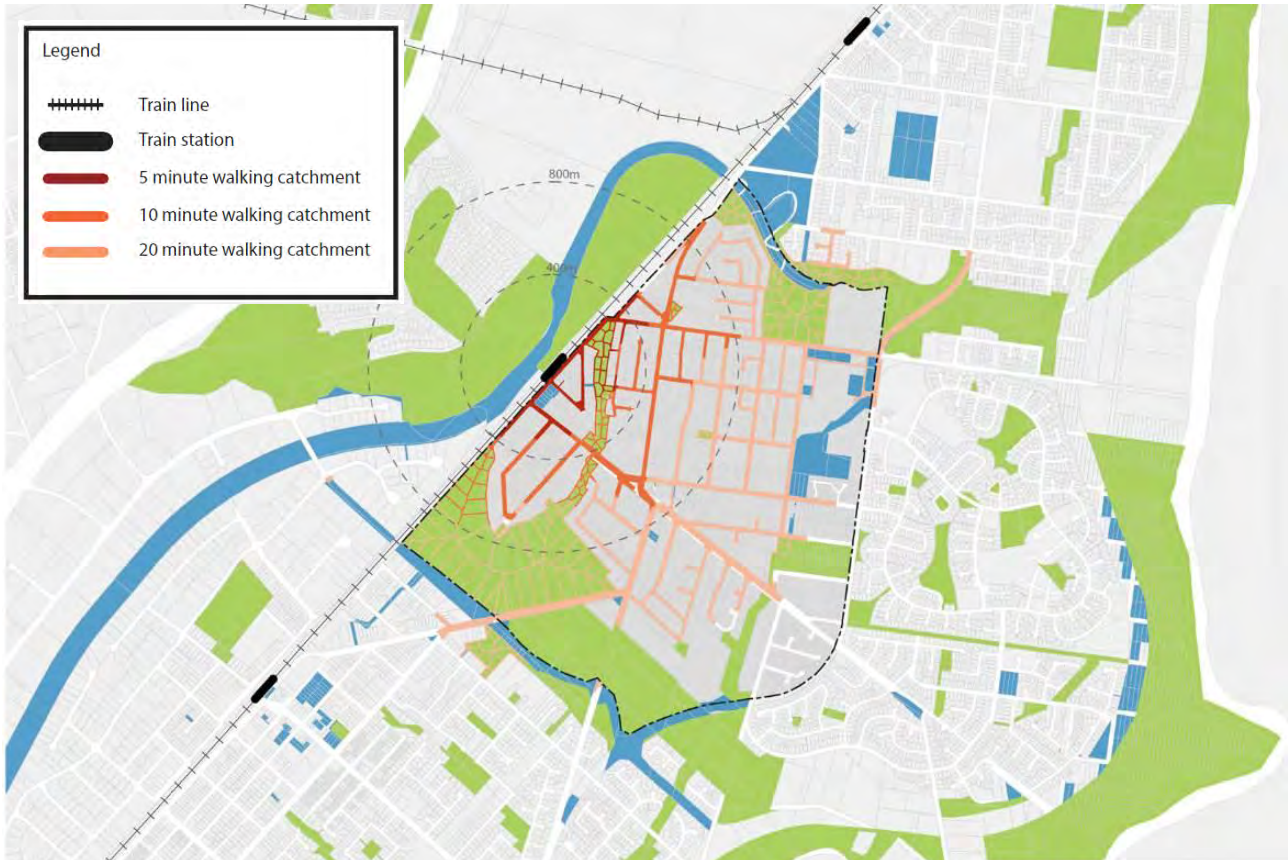
Figure 4-2 shows the current footpath network within the Glenfield precinct

Figure 4-2 Existing footpaths at Glenfield


4.1.2 Macquarie Fields

The five minute and ten minute walking catchments to Macquarie Fields Station are shown in **Figure 4-3**. Pedestrians accessing the interchange by foot can only access the station from the eastern side where there is an established road and footpath network. A golf course, the Bunbury Curan Creek and the Macquarie Links gated residential development restricts movements from the west.

Figure 4-3 Macquarie Fields Station walking catchments



Source: Cox Architects

Footpaths are generally provided on one side of the carriageway close to the station. The footpath catchment is limited by way of Redfern Creek with the nearest crossing of the creek provided from Alexander Crescent to Windsor Street.

Where footpaths are provided, kerb ramps are provided at intersections with priority controlled crossing points. There is no formal crossing of Railway Parade between the station and the main commuter car park.

Access to the west of the railway line is severed by the Bunbury Curan Creek and a golf course between the station and Macquarie Links Estate.

As no crossing of Redfern Creek is provided north of Railway Parade, the north-east walking catchment is effectively cut off from easy access to the station. The existing footpath facilities are provided in **Figure 4-4**.

4.1.3 Ingleburn

The Ingleburn precinct's footpath network along with the street network is developed in a grid configuration with relatively high levels of permeability with the exception of the railway line which reduces the permeability to the station, where it is the only crossing in the town centre.

Pedestrians accessing Ingleburn Station on foot can do so from both the eastern and western sides where there are established road and footpath networks. The station's pedestrian bridge provides a cross corridor connection between the retail activity centre on the east of the railway line and the industrial and employment lands to the west. This pedestrian connection is the only rail crossing within the Ingleburn town centre. In relation to the station, the nearest other rail crossings are an informal crossing under a railway bridge 1.4 kilometres to the south at Bow Bowing Creek and over the Henderson Road bridge 900 metres to the north.

The south-east side of the station contains the Ingleburn town centre. Pedestrian paths are generally the full width between the road and property boundary. Key roads within the town centre are designated as 10 kilometre per hour speed limited shared zones. The street environment is not in the form of a shared zone, however traffic management is configured to encourage low vehicle speeds and raised crossings are provided near intersections.

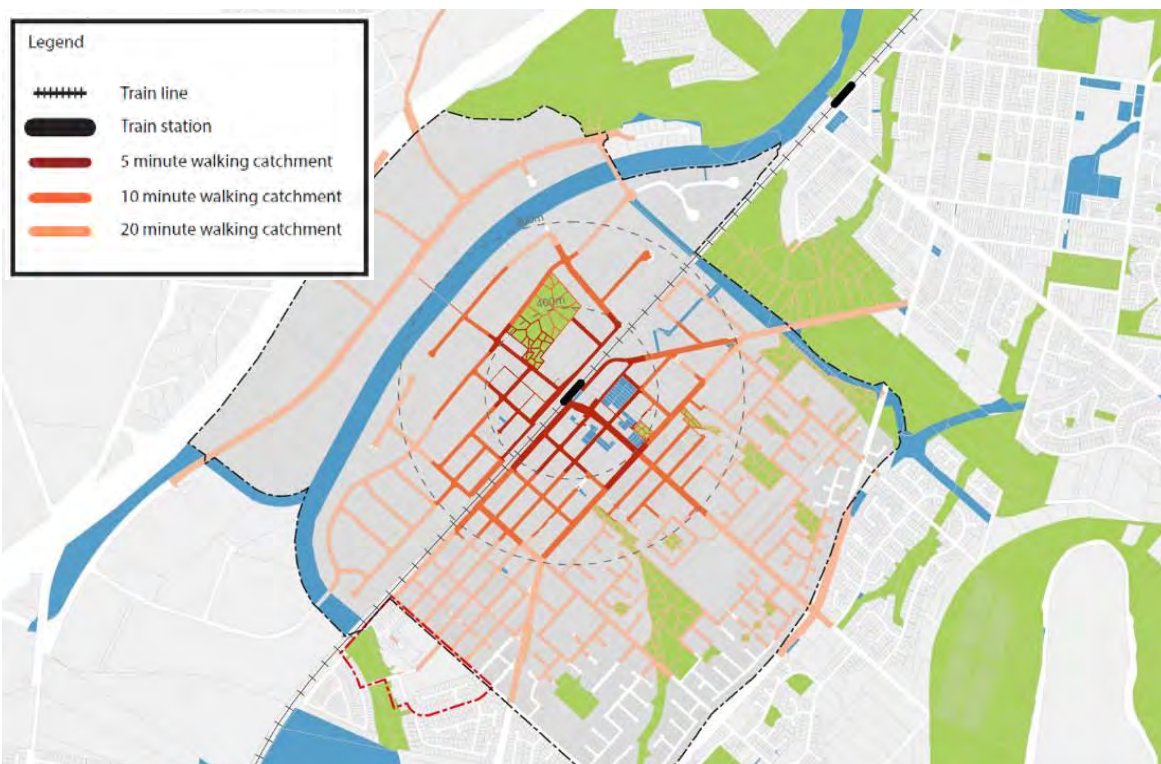
Away from the core precinct, in the residential and industrial areas, pedestrian paths, where provided are generally on one side of the carriageway only. The walking environment also has a large number of roundabouts and these typically provide pedestrian crossing facilities of reduced safety.

Notable pedestrian facilities include the Treelands Walk along Redfern Creek to the south of the interchange and Koala Walk to the east. These walks through park areas offer link benefits but generally have low passive surveillance.

The five minute and ten minute walking catchments to Ingleburn Station are shown in **Figure 4-5** and the footpath network is shown in **Figure 4-6**.

At the time of writing, Ingleburn Station was undergoing an upgrade under the Transport Access Program, as discussed in **Section 5.3.2**. This could reasonably be expected to provide pedestrian improvements in the interchange precinct at completion.

Figure 4-5 Ingleburn Station walking catchments



Source: Cox Architects

Figure 4-6 Existing footpaths at Ingleburn



4.1.4 Minto

Minto Station separates industrial land uses to the west and retail, recreational and residential uses to the east of the railway line. The small retail precinct to the east is provided with full road to property line width footpaths. On approach to Minto Station from the east crossing pedestrian crossing facilities are provided. On the western side a zebra crossing on Somerset Street connects the station entrance with the commuter car park. The footpath network connects to Minto Marketplace, the main retail precinct approximately 675 metres east of the interchange along Redfern Road. Shared paths are also provided through the Coronation Park recreational facility to the south-east of the interchange and these provide shorter links to residential land uses to the south-east of the station.

Residential streets within the 800 metre walking catchment generally only have a path on one side of the carriageway, some residential streets do not have any footpaths. There is also a lack of pedestrian paths to industrial land uses to the west of the station.

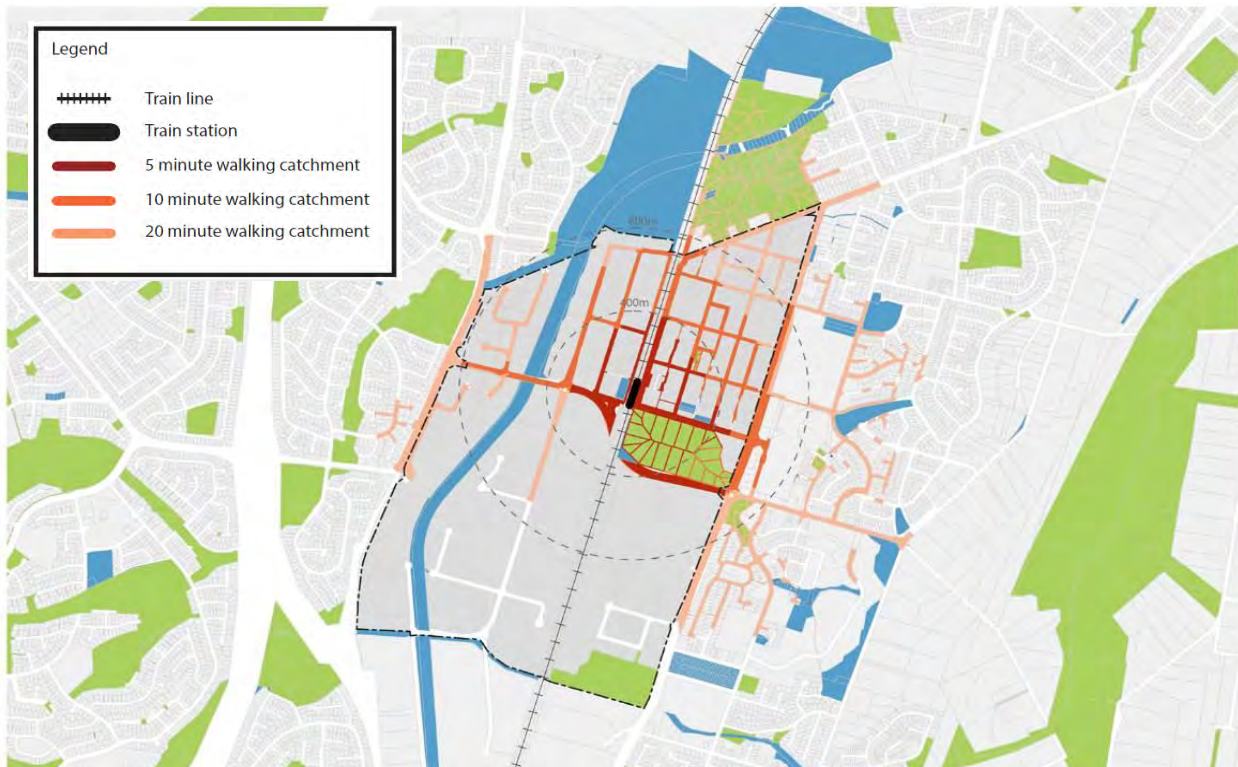
Connectivity to the station from the industrial lands to the south is limited, reduced by the lack of opportunities to cross Ben Lomond Road.

Residential land uses to the west are located beyond the 800 metre catchment of the station. There is evidence that the paths are regularly used by pedestrians however the access requires crossing Ben Lomond Road at roundabout intersections. There is a formalised crossing at the intersection of Ben Lomond Road and Campbelltown Road on the southern leg of the intersection.

The only railway crossings in Minto are provided at the station and one side of Ben Lomond Road.

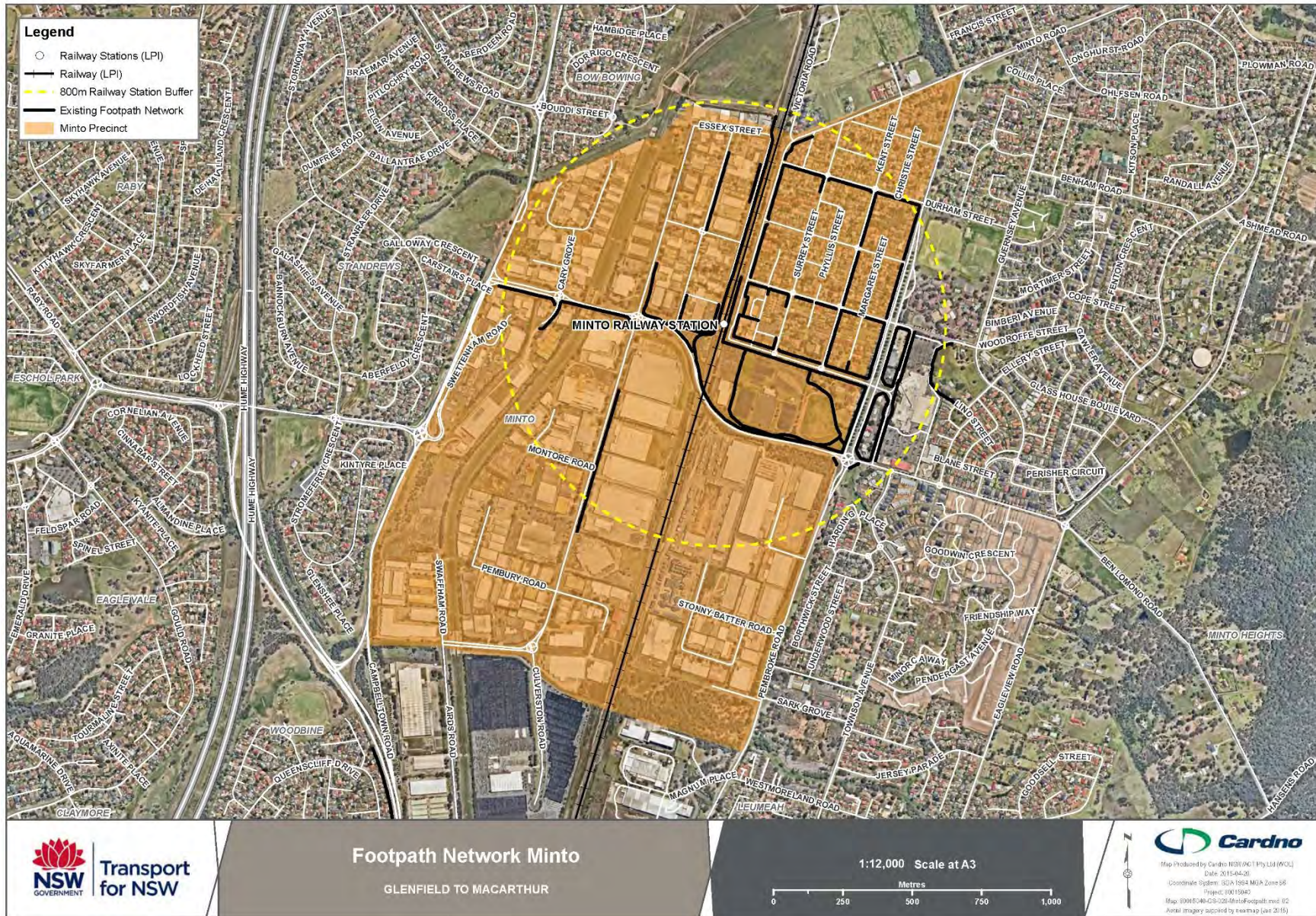
The five minute and ten minute walking catchments to Minto Station are shown on **Figure 4-7** and the existing footpaths are shown on **Figure 4-8**.

Figure 4-7 Minto Station walking catchments



Source: Cox Architects

Figure 4-8 Existing footpaths at Minto



4.1.5 Leumeah

Leumeah Station is located adjacent to a small retail precinct and the region's main sporting precinct. Two pedestrian railway crossings are provided in the station vicinity. These include at the station and to the north-east between the commuter and sports precinct car park. Further away there are two additional railway crossings, located at Campbelltown Road 840 metres to the south-west and Ross Payten Drive 520 metres to the north-east.

Pedestrian networks are provided on both the eastern and western sides of the station. There are large blocks of car parks around the station which provide additional permeability, however there is no advantage due to the vicinities road network block size.

On the western side the only pedestrian approach is via Plough Inn Road. This can be used to access residential areas in excess of 800 metres walking distance to the north-west. Pedestrian refuges are provided on the two roundabouts close to the station on Plough Inn Road.

On the eastern side pedestrians can access the station via O'Sullivan Road or Old Leumeah Road. On the eastern side, the roundabout intersection of O'Sullivan Road and Old Leumeah Road has a zebra crossing on the southern arm and a pedestrian refuge on the northern arm. Many residential land uses in the precinct are located on the opposite side of Pembroke Road. A roundabout intersection is located at O'Sullivan Road and there are refuges on all legs. A signalised intersection at Old Leumeah Road and signalised crossing points are located on the north-west and north-east legs.

A nature walk is provided along Smiths Creek Reserve to the south east and this increases the shorter distance walking catchment to some residential land uses to the east.

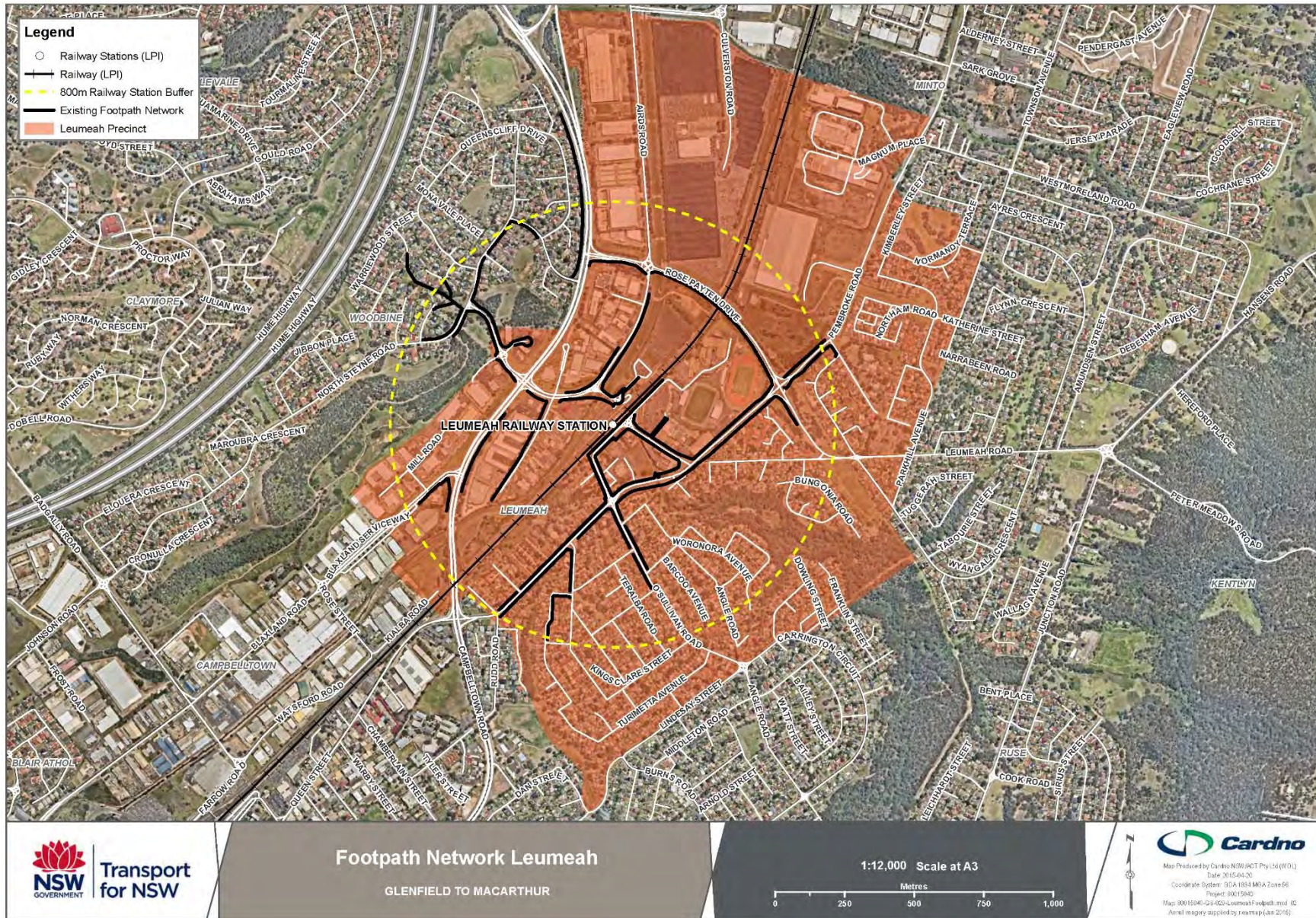
The five minute and ten minute walking catchments to Leumeah Station are shown on **Figure 4-9** and the existing footpath network is shown on **Figure 4-10**.

Figure 4-9 Leumeah Station walking catchments



Source: Cox Architects

Figure 4-10 Existing footpaths at Leumeah



4.1.6 Campbelltown

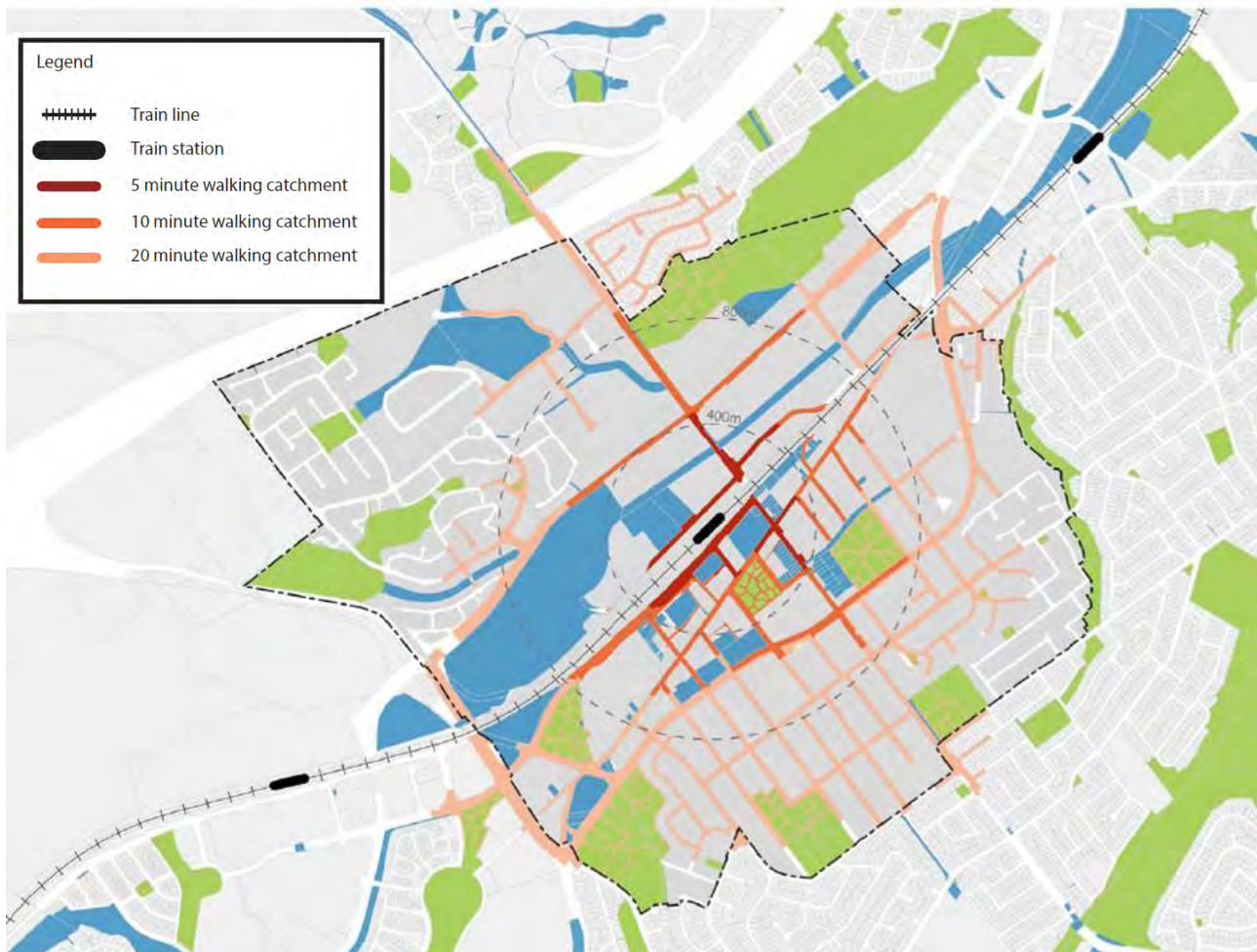
Pedestrians can access Campbelltown Interchange from both the eastern and western sides but there is limited permeability from the western side due to the undeveloped land, including Bow Bowing Creek and Fishers Ghost Creek reserve. A shared path is provided north of the interchange adjacent to Farrow Road linking to residential land uses approximately 750 metres from the interchange. There is a zebra crossing on Farrow Road adjacent to the interchange. This provides a formal crossing point access to the bus stop on the western side. It is not aligned with the pedestrian desire line between the interchange entrance and the large commuter car park.

Campbelltown has the largest business activity centre in the study corridor, located to the east of Campbelltown Interchange. As a result it has a well-developed pedestrian network to the south of the interchange which passes many activated frontages. Block sizes are larger surrounding the interchange due to large scale car parks, however footpaths are provided to guide pedestrians around these.

From the east the key desire line between the centre of the activity area and the Interchange is via Hurley Street and Patrick Street. There is a signalised midblock crossing on Hurley Street close to Patrick Street. Railway Street, parallel to Patrick Street is well aligned for access to the south of the interchange, however there are no at-grade pedestrian crossing facilities at the intersection of Railway Street and Hurley Street. An underpass beneath Hurley Street is located close to the intersection with Railway Parade but it presents some personal security perception issues.

The five minute and ten minute walking catchments to Campbelltown Interchange are shown in **Figure 4-11**, and the existing footpath network is shown on **Figure 4-12**.

Figure 4-11 Campbelltown Station walking catchments



Source: Cox Architects

Figure 4-12 Existing footpath at Campbelltown



4.1.7 Macarthur

Macarthur is the newest developing area in the study corridor. Due to the undeveloped nature of land use adjacent to the north of Macarthur Station, the footpath network is limited to a single path that provides access to the various educational land uses via the University Basin Reserve. The University Basin Reserve on the northern side only has one access point to the station.

The commuter car parks, shopping centre and retail blocks on the southern side reduce the path choice for pedestrian access to the station. Station access to the south is provided alongside Menangle Road and there is a pedestrian bridge that links directly to Macarthur Square shopping centre. Menangle Road has relatively wide pedestrian paths on both sides of the carriageway to the west, however crossing opportunities are limited and a central median has been installed to prevent errant crossings. The pedestrian footpath does not extend beyond the bus interchange on the north side of the carriageway to east.

Newly developed residential land uses close to the station generally do not have footpaths and convenient link opportunities appear to have been omitted.

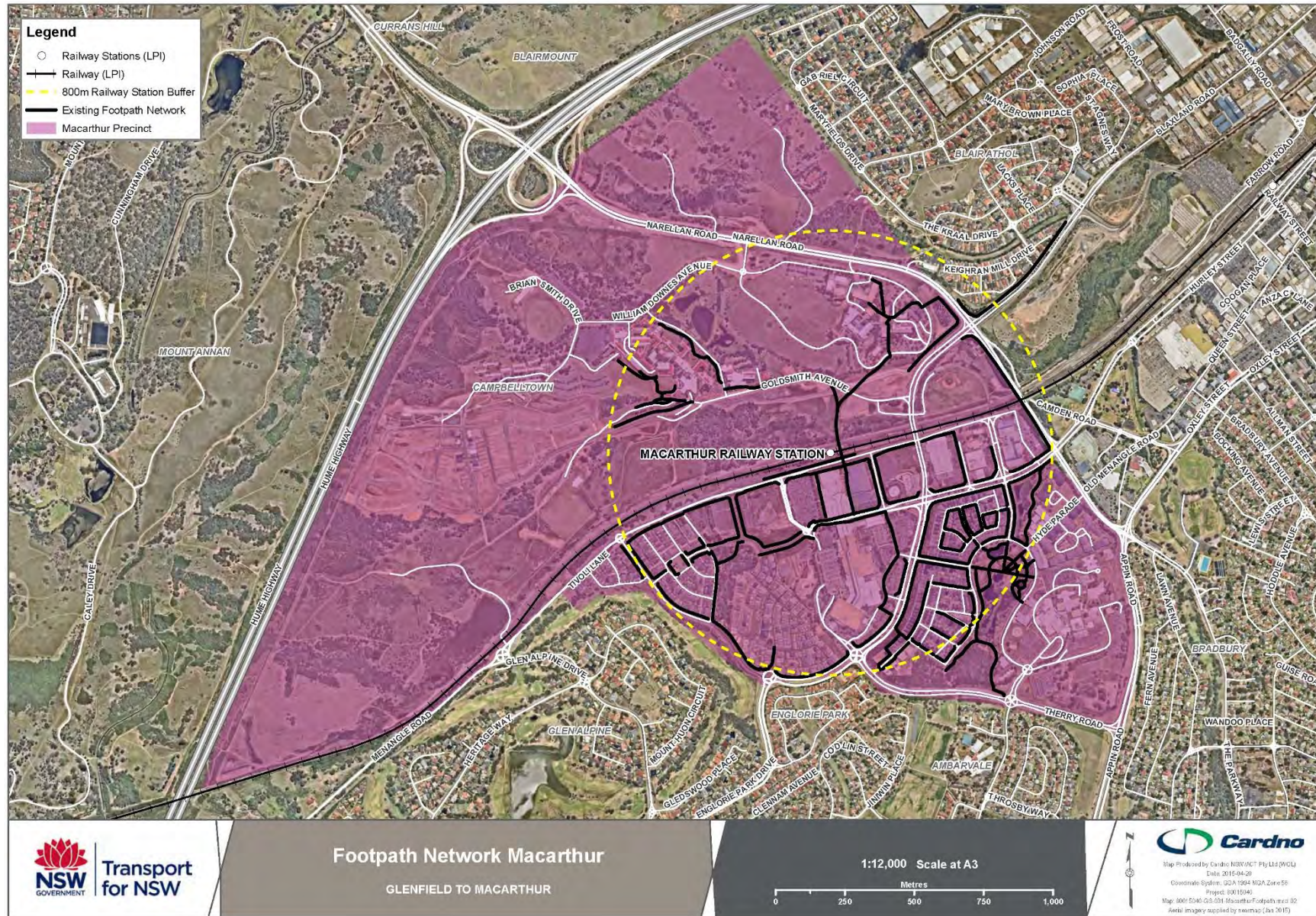
The five minute and ten minute walking catchments to Macarthur Station are shown in **Figure 4-13** and the existing footpath network is shown on **Figure 4-14**.

Figure 4-13 Macarthur precinct walking catchments



Source: Cox Architects

Figure 4-14 Existing footpaths in Macarthur



4.2 Cycling

The existing bicycle network in the study corridor is currently highly fragmented. All stations are surrounded by low density residential precincts with local access roads. With the prevailing low volume and speeds, these roads are generally suitable for mixed traffic facilities. For users willing to ride on the road, the facilities are direct and convenient, however less confident riders may not find the network conducive to encouraging regular riding.

Every station in the corridor provides some form of bicycle parking facility, in most cases both bicycle racks and lockers. The use of the bicycle lockers is unknown, however bicycle racks are generally used at all stations in addition to informal parking, usually with bicycle locks attached to fences.

4.2.1 Cycling routes

The Glenfield to Macarthur Corridor provides both regional cycling links and local cycling routes. These cycling facilities provide some level of support for cycling as a mode of transport, however the network is coarse and incomplete for cycling to be considered for many trips within the corridor. While it is difficult to establish the true network as mapping from different sources indicate different extents, reference in the following sections has been made to the online RMS Cycleway Finder which is continually updated.

Regional cycling routes

Regional cycling links are provided from the south to north via the Hume Motorway, which is classified as high difficulty, on a 2.5 metre shoulder lane. This facility is considered to have a low safety and amenity for people riding, the speed limit in the adjacent lane is 110 kilometres per hour.

The Eastern Road Corridor is comprised of a series of state roads that run along the eastern side of the Glenfield to Macarthur Corridor. These roads include Glenfield Road, Canterbury Road, Harold Street, Collins Promenade, Minto Road, Pembroke Road, Rudd Road and Queen Street. A regional cycleway travels along most of the length of this corridor and provides a more local connection north-south, compared to the Hume Motorway. However, this road is still considered to be moderately difficult by RMS.

The Parkway and Narellan Road provide an east-west regional cycleway connection.

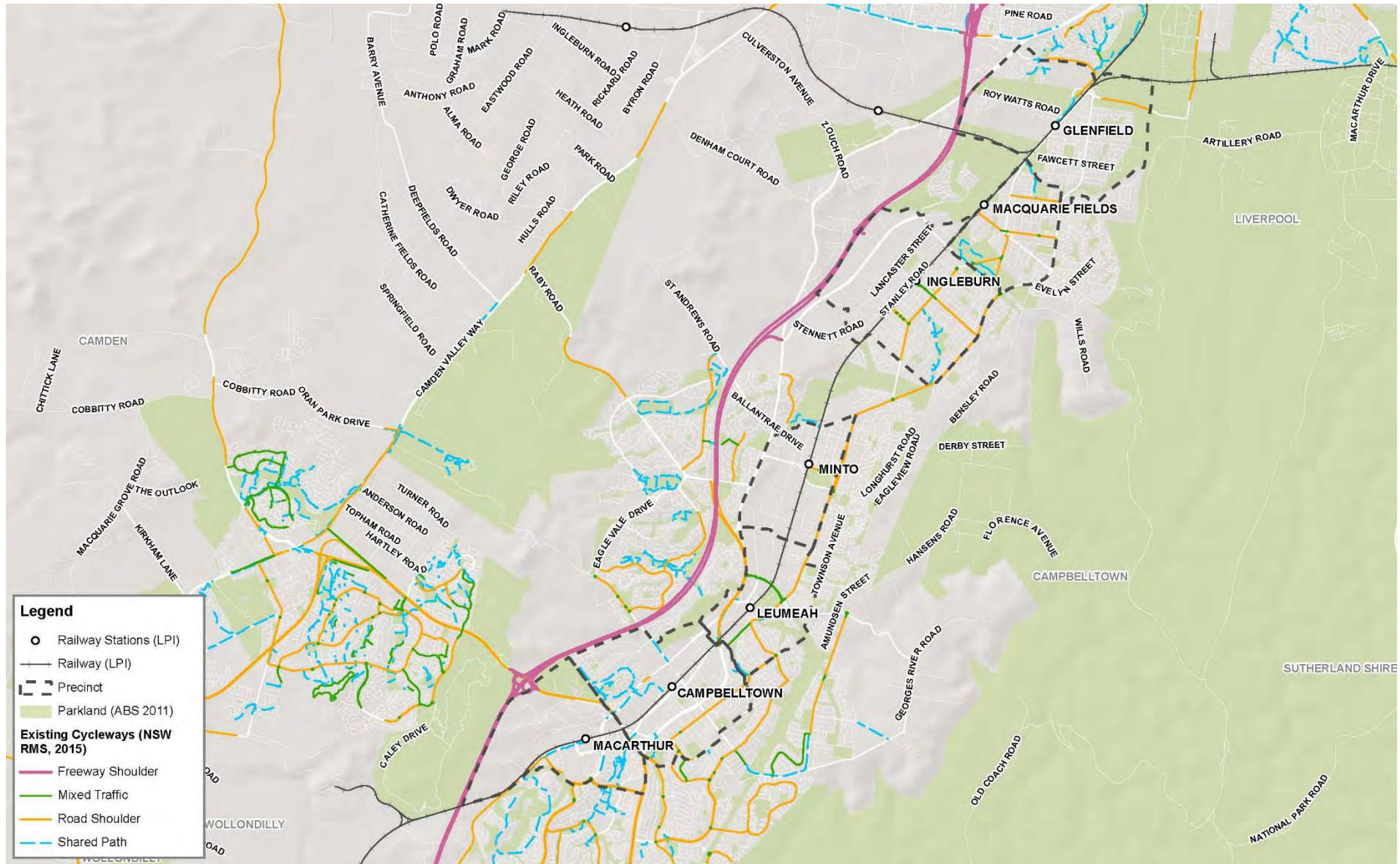
Local cycling routes

Local cycling routes provide an easy way to get to the local shops, school, public transport or main activity centre. They are generally not intended as regional connectors, although at times they do serve a dual purpose. Local designated routes are sparse throughout the Glenfield to Macarthur Corridor.

Campbelltown has the most extensive network of local connections; made up of local roads, shared paths and bicycle paths. On-street facilities generally consist of shoulder lanes, which provide minimal protection and comfort for people riding. Shoulder lanes place cyclists between moving traffic and the door opening zone of parked cars. This presents serious safety implications and these generally end just before intersections and can reappear on the opposite side.

Off-road facilities represent approximately 50% of the local network in Campbelltown, which provide an easy way to get around in comfort and safety for short trips. However, these facilities would not support medium or longer length cycling commutes for less confident cyclists due to the network fragmentation. The existing key regional cycling routes are shown in **Figure 4-15**, and characteristics of each precincts' cycle infrastructure in the following sections.

Figure 4-15 Existing cycling routes



Data source: RMS

4.2.2 Glenfield

Cycling in the Glenfield local area was observed to be low.

The cycle network is provided through a mix of facilities in the precinct. An off-road separated cycle path is provided on the north-west side of the station linking to the north. Adjacent to the south-east side of the station are on-road shoulder lanes for short lengths along Railway Parade. Many of the local streets provide an ideal mixed-traffic riding environment, however the core collector street network (Railway Parade, Belmont Road and Canterbury Road) would be uncomfortable for many cyclists to use due to prevailing traffic speeds, traffic volumes and the lack of any supporting infrastructure particularly at intersections.

Bicycle parking racks are provided on both sides of Glenfield Station and some usage was observed. Bicycle lockers are also provided on the north-west side of the station.

4.2.3 Macquarie Fields

Site observations indicated that minimal cycling was occurring and a few visible bicycles were parked within close proximity to the Macquarie Fields Station.

The cycle network is provided through a range of facilities in the precinct. Railway Parade, generally has a low volume of traffic as a result of not having through access to the north-east from the station and the low catchment of the road network. The parking lane on Saywell Road has bicycle stencils and a bicycle route sign observed to be indicating the direction towards Macquarie Fields shopping centre. Typically the parking lane was utilised by vehicles in the vicinity of the station.

Macquarie Fields has some bicycle parking racks and bicycle lockers for hire. A bike was observed to be chained to one rack and another bike was chained to a fence. The chains securing each bicycle appeared to be of greater strength than would normally be used, indicating a high concern of theft.

As per all modes, access is limited by the road network to the north-east of the station. The RMS Cycleway Finder identifies Saywell Road as a moderate difficulty on-road route.

4.2.4 Ingleburn

Ingleburn has a shorter spaced street network than other precincts in the study area. Specific cycling infrastructure was not observed, however there are wide roads near to the station which are relatively wide and could facilitate comfortable bicycle movements. Oxford Road in the activity centres has been designated as a 10 km/h shared zone which is suitable for mixed traffic cycling. Further south-east of the activity centre there are shoulder lanes between the parking and traffic lanes.

The street network is highly permeable on the south-east side of the station, however collector and arterial roads including Macquarie Street, Cumberland Road and Chester Road may not be comfortable for many cyclists due to traffic speeds, traffic volumes and lack of separation.

To the north-west of the station the land uses will generally result in a notable amount of larger vehicle movements. The road network layout results in a lower catchment of through movements providing more amenable mixed traffic conditions for cyclists. The exception to this is Lancaster Street which would have higher volumes.

Site observations indicated that minimal cycling was occurring, however several bicycles were parked within close proximity of the station and on temporary bicycle racks at the station. It should be noted that construction works were being undertaken during the site visit and as such bicycle parking demand may be higher outside of construction periods.

4.2.5 Minto

Site observations indicated that minimal cycling was occurring with one bicycle seen using the station facilities.

The street network is a mix of residential to the north-east and industrial for the remainder of the precinct. As a result street blocks are often large and a higher than average percentage of heavy vehicles are present. To the west is a drainage channel that limits access from the west to the precinct.

Shoulder lanes are provided on Redfern Road and shared paths are provided through Coronation Park. Local roads surrounding the station are generally suitable for mixed traffic given the width of carriageways and low vehicle volumes. Ben Lomond Road and Pembroke Road are unlikely to be favoured by cyclists due to these being road environments with higher speed and volume.

Bicycle parking facilities are provided, and were observed to be used at Minto Station.

4.2.6 Leumeah

Site observations indicated a low amount of cycling was occurring, with few bicycles parked within close proximity to the Leumeah Station.

No specific bicycle network infrastructure was identified in the immediate vicinity of the station. The street network within the immediate vicinity of Leumeah Station is surrounded by industrial and sports entertainment, which has large blocks and limits cycle permeability within the inner station precinct. Campbelltown Road is a significant arterial road and creates a barrier in some areas for access east-west.

The main arterial roads are separated from the station which creates streets that carry low volumes of traffic. Many cyclists would feel comfortable cycling in this type of environment. Arterial roads including Pembroke Road/ Rudd Road and Campbelltown Road are unlikely to be popular for cyclists to access the station. As such, bicycle network constraints are located away from the stations inner precinct.

Bicycle parking facilities are provided at Leumeah Station, pedestrian barrier fencing was a more convenient option for one bike rider on the day of inspection.

4.2.7 Campbelltown

Site observations indicated that a moderate amount cycling was occurring, with the highest demand for bicycle parking observed in the corridor within close proximity of Campbelltown Station.

The street network in Campbelltown is a mix of retail, commercial, industrial and residential. The layout varies from low speed environments within the town centre to wider streets in the industrial area. The street blocks within the town centre are considered medium to large, however there are opportunities to link through blocks connecting retail land uses. Hurley Street is a major road that runs parallel to the railway line on the southern side, this road carries large amounts of traffic and has limited crossing opportunities. As a result it presents a barrier to access to/from the station to the town centre.

No notable bicycle network infrastructure was observed on the south side of the station, as such the increased bicycle parking demand is likely to be proportional with the use of Campbelltown Station along the corridor. A wide shared path is provided adjacent to Farrow Road which provides a relatively high standard of facility on the north side of the station.

4.2.8 Macarthur

Site observations indicated that minimal cycling is occurring and no bicycles were seen parked within close proximity to the Macarthur Station.

With the relatively recent construction and upgrade of surrounding roads, cycling facilities are reasonably catered for on the adjacent road network. This includes on-road cycle lanes not adjacent to car parking provided on Menangle Road and shoulder lanes provided on Gilchrist Drive. While parking is generally permitted along Gilchrist Drive, its traffic utilisation is lower which provides a safer riding environment.

Given the significant educational land uses in the precinct there is significant potential for increased cycling and the University of Western Sydney Campbelltown Campus is currently undergoing major redevelopment.

Overall the location of the shopping centre with its car dominated access provisions means that the street network has been designed to accommodate relatively high volumes of vehicles, reducing the attractiveness of cycling.

The current realignment and construction of Goldsmith Avenue on the northern side of the station is expected to result in improved cycle network facilities.

4.3 Rail

4.3.1 Train lines and services

The Glenfield to Macarthur Corridor includes three lines on the Sydney Trains suburban network (the T2 South Line, the T5 Cumberland Line and the South West Rail Link) and one line on the intercity network (the Southern Highlands Line). It also facilitates regional and interstate rail services.

The SSFL is located adjacent to the Sydney Trains network. Freight train services operate on both the Sydney Trains network and ARTC's SSFL through the corridor. The SSFL is discussed in **Section 4.6.1**.

The corridor in relation to the wider Sydney Trains network is shown on **Figure 4-16**. A short description of each of the lines is presented including which of the Glenfield to Macarthur Corridor precincts are serviced by each line.

Figure 4-16 Glenfield to Macarthur Corridor in Sydney Trains suburban network context



Source: Sydney Trains

T2 Airport, Inner West and South Line

The T2 line runs services between the city and either Macarthur (via the Airport or Sydenham) or Campbelltown (via the Inner West and Granville). T2 trains via the Airport or Sydenham generally service all Glenfield to Macarthur Corridor stations but some Airport services skip Macquarie Fields and some services begin and terminate at Campbelltown instead of Macarthur.

Only specific peak period services operate via Sydenham to the CBD, with inbound services during the AM peak and outbound during the PM peak.

The T2 line via Granville starts and ends at Campbelltown except for three city-bound services and one outbound service per day which extends to Macarthur. These services stop at all other stations in the corridor.

T5 Cumberland Line

The T5 Cumberland Line provides a north-south train connection through Sydney's western regions, between Campbelltown and Schofields via Parramatta, Blacktown and Liverpool.

The Cumberland Line only runs on weekdays. If weekend track work affects the T1 Western and T2 South lines, the Cumberland Line may run on these occasions. The Cumberland Line significantly increased the number of services in October 2013, from five per weekday to 45 per weekday in both directions, running every 30 minutes.

South West Rail Link

The South West Rail Link (SWRL) is Sydney's newest train line which opened on 8 February 2015. The line provides a link service between new stations at Leppington and Edmondson Park in the South West Growth Centre (SWGK), and terminates at Liverpool. Passengers on the SWRL can interchange with T2 South Line and T5 Cumberland Line services at Glenfield or Liverpool and also the T3 Bankstown Line at Liverpool.

The SWRL runs two services per hour between 5:15am and 12:04am at Glenfield Station.

It is expected the SWRL will be better integrated into the future metropolitan rail network in the future with single services to Sydney CBD.

Southern Highlands Line and Main South Line

The Southern Highlands Line operates between Campbelltown and Goulburn. The majority of Southern Highlands Lines services commence/terminate at Moss Vale, only five services a day commence at Goulburn. Passengers can interchange at Campbelltown for services on the suburban network and connections to Sydney.

Regional and interstate services also operate on the main south line that commence at Sydney (Central Station) and service several locations including Canberra, Griffith and Melbourne. Along the study corridor, these services only stop at Campbelltown.

Summary of passenger rail services

A summary of train services along each line that service the Glenfield to Macarthur Corridor is provided in **Table 4-1**. The table provides the total number of daily services as well as services per hour during peak and off peak times.

Table 4-1 Glenfield to Macarthur Corridor train services per hour

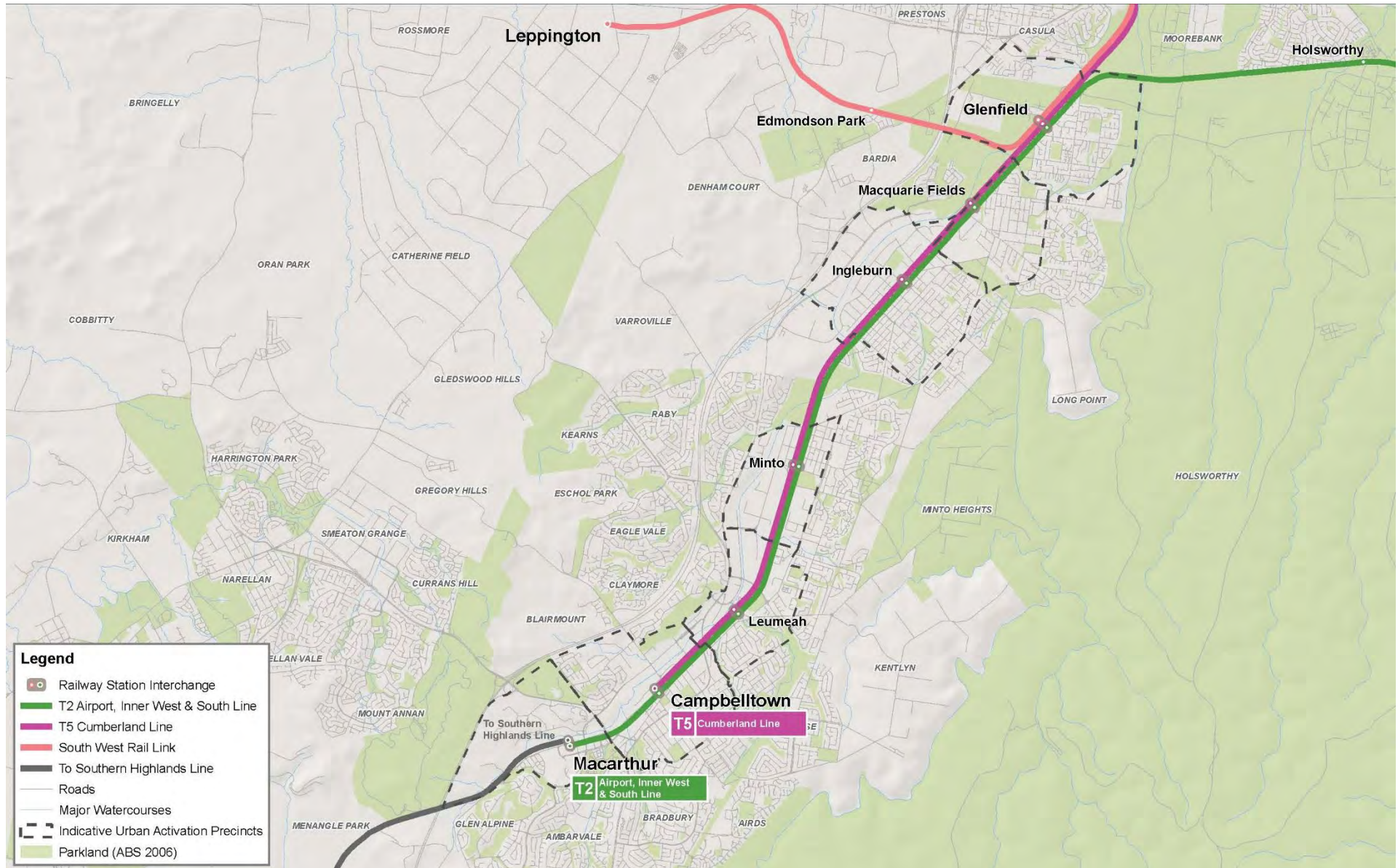
Line	Direction	Daily services	AM Peak (/hr) 06:00-09:30	Daytime (/hr) 09:30-16:00	PM Peak (/hr) 15:00-18:30
T2 via Airport Line	To city	66	4	2	4
	From city	66	4	3	4
T2 via Sydenham Line	To city	6	2	0	0
	From city	9	0	0	2
T2 via Granville	To city	71	5	3	4
	From city	70	4	3	4
T5 Cumberland Line	To Schofields	23	2	2	2
	From Schofields	22	2	2	2
South West Rail Link	To Liverpool	38	2	2	2
	From Liverpool	38	2	2	2
Southern Highlands	To city/Campbelltown	22	2	1	1
	From city/Campbelltown	27	2	1	2

Source: <http://www.nswtrainlink.info> viewed May 2015

4.4 Station interchanges

There are seven stations in the Glenfield to Macarthur corridor. These are shown in **Figure 4-17** and described in the following sections.

Figure 4-17 Glenfield to Macarthur corridor rail train lines



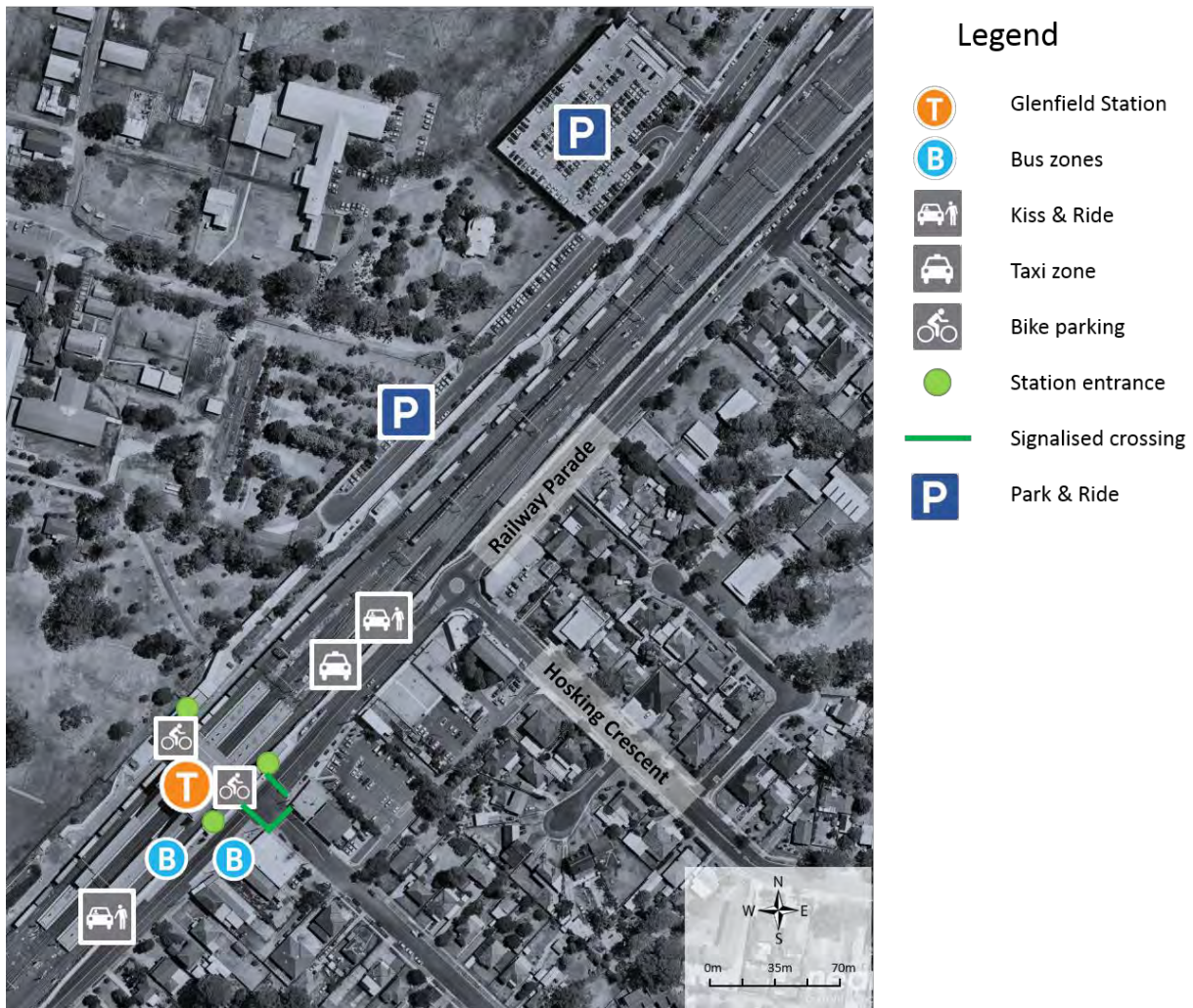
4.5 Station interchange precincts

The features of each train station in the Glenfield to Macarthur Corridor are described in the following sections and the interchange facilities are summarised in **Section 4.5.8**.

4.5.1 Glenfield station interchange precinct

Glenfield Station is situated on the western border of Glenfield's residential area. The station was upgraded as part of the SWRL project. The station has two entrances, one located on the eastern side of the railway line at the intersection of Railway Parade and Hosking Crescent and another located on the western side on Glenfield Road. The station has four platforms on two islands, accessed by stairs or lifts. The interchange facilities consist of bus zones, Kiss & Ride, Park & Ride, taxi zone, bike racks and lockers. These features are shown in **Figure 4-18**.

Figure 4-18 Glenfield Station interchange features



4.5.2 Macquarie Fields station interchange precinct

Macquarie Fields Station is situated on the far western border of the suburb’s core residential area. The only entrance to Macquarie Fields Station is on Railway Parade on the eastern side of the station, there is no access to the station from the west. To the west of the station is a golf course and the gated Macquarie Links residential community. The station has two side platforms, connected by a pedestrian bridge with the train line running between them. The station is not currently DDA compliant, with only the eastern platform providing ramp access. The interchange features of the station include bus stops, Kiss & Ride, cycle parking, and Park & Ride which are shown in **Figure 4-19**.

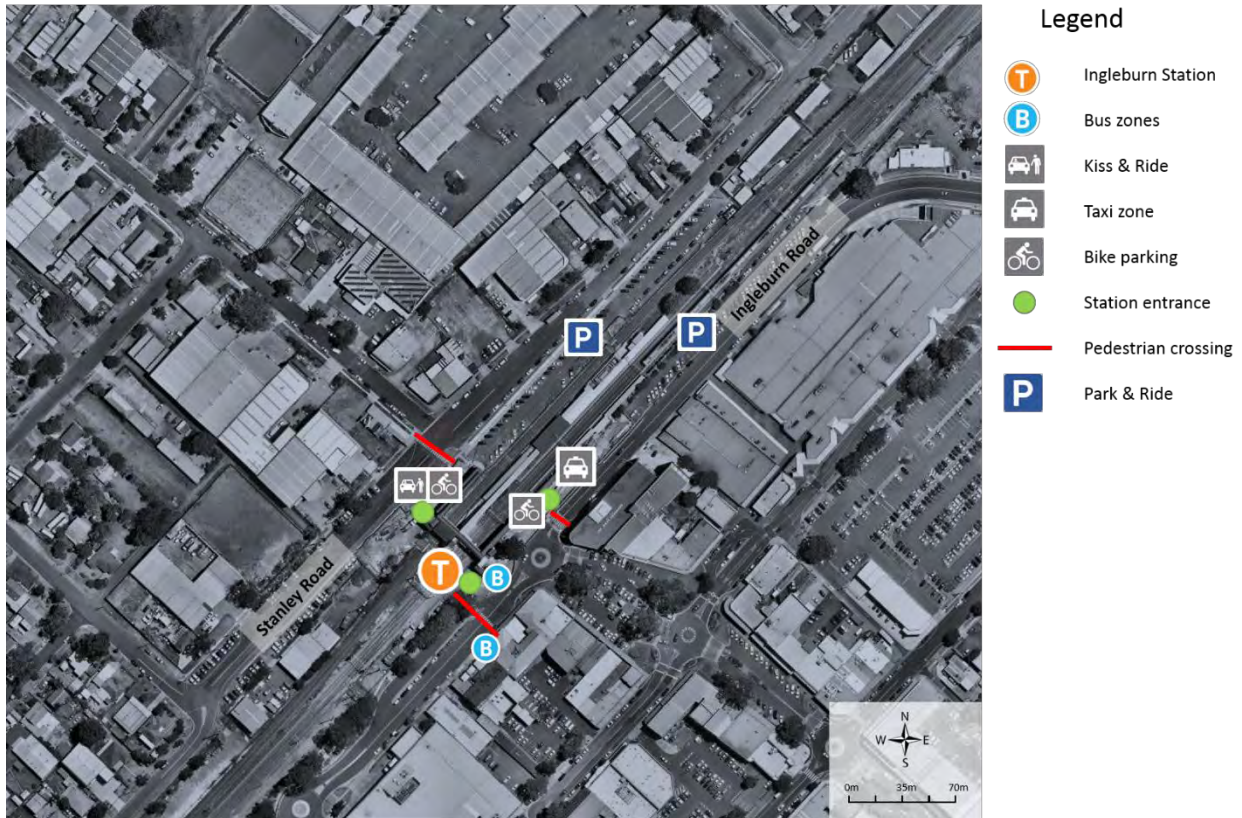
Figure 4-19 Macquarie Fields interchange features



4.5.3 Ingleburn station interchange precinct

Ingleburn Station is located adjacent to the Ingleburn town centre on the east of the station and industrial lands on the west. There are two entrances to Ingleburn Station, on the western side the entry is at the intersection on Memorial Avenue and Stanley Road and on the eastern side the entry is at the intersection of Oxford Road and Ingleburn Road. Ingleburn Station consists of an island with two platforms which can be accessed from a pedestrian bridge by stairs or a ramp (gradient 1:9). The interchange features consist of bus zones, Kiss & Ride, taxi zones, bike parking, and Park & Ride which are shown in **Figure 4-20**.

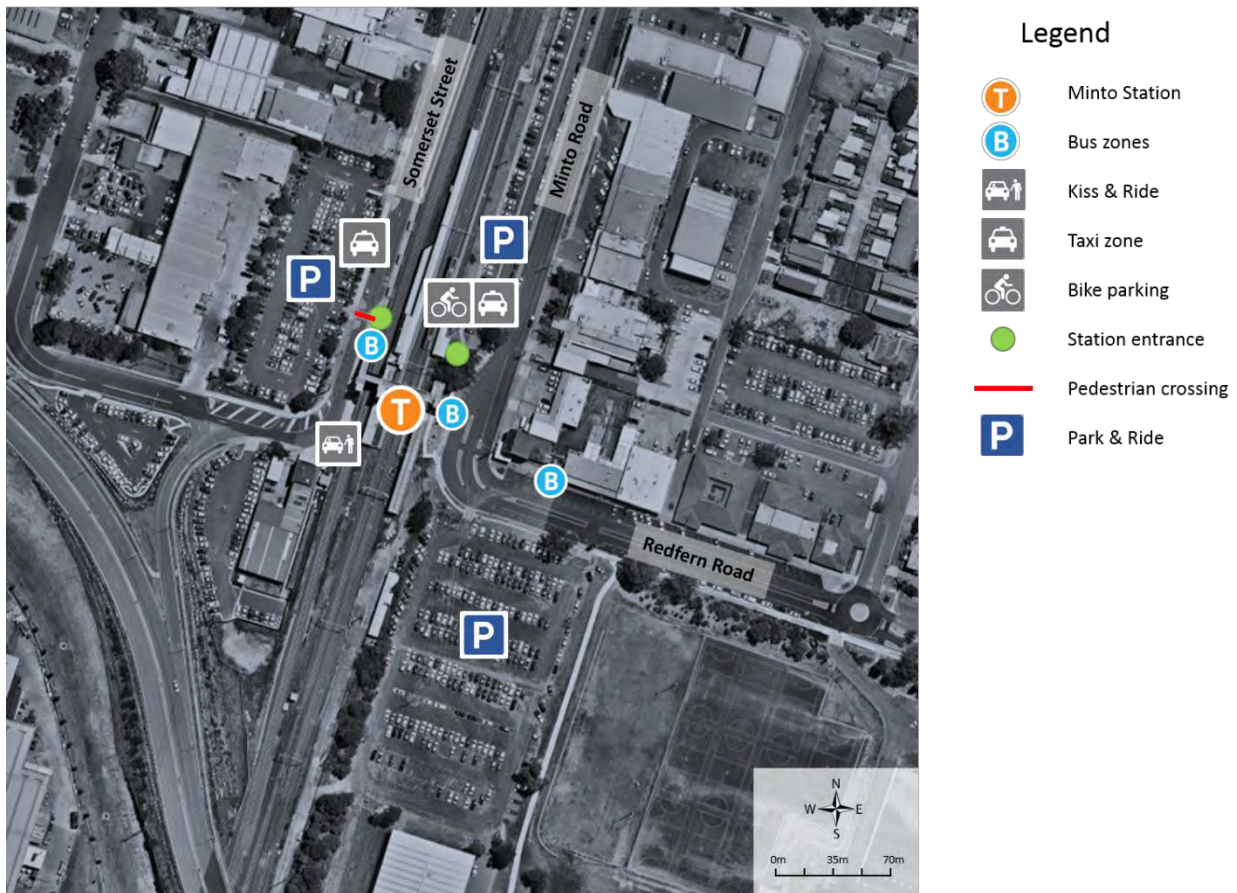
Figure 4-20 Ingleburn interchange features



4.5.4 Minto station interchange precinct

Minto Station sits adjacent to the Minto village centre which is located on the eastern side of the railway line. The station has two entrances, on the east off Minto Road and on the west off Somerset Road. There are two platforms at Minto, one a side platform on the eastern side of the railway line and the other on the eastern side of an island platform. Minto is accessible with lifts and ramps provided for the mobility impaired. The island platform is accessed via stairs or the lift from a pedestrian bridge while the side platform is accessed via a ramp. The interchange features of the station consist of Kiss & Ride, taxi zone, bike parking, and Park & Ride which are shown in **Figure 4-21**.

Figure 4-21 Minto interchange features



4.5.5 Leumeah station interchange precinct

Leumeah Station is located amidst a number of large blocks of commercial and retail land uses and commuter car parks. Accessed from both sides of the railway line, the station entrance on the eastern side is located on O'Sullivan Road and on the western side located off Plough Inn Road. The station has two platforms, a side platform off O'Sullivan Road on the eastern side and an island with a platform facing the east. The side platform is accessed via stairs and a ramp and the island is accessed via a pedestrian bridge, stairs and lift. The station provides cross corridor connections across the railway line for pedestrian movements. There is an additional pedestrian cross corridor connection 185 metres to the north, however to the south there are no other pedestrian cross corridor connections for 850 metres. Interchange features of Leumeah Station include bus zone, Kiss & Ride, taxi zone, bike parking and Park & Ride which are shown in Figure 4-22.

Figure 4-22 Leumeah interchange features



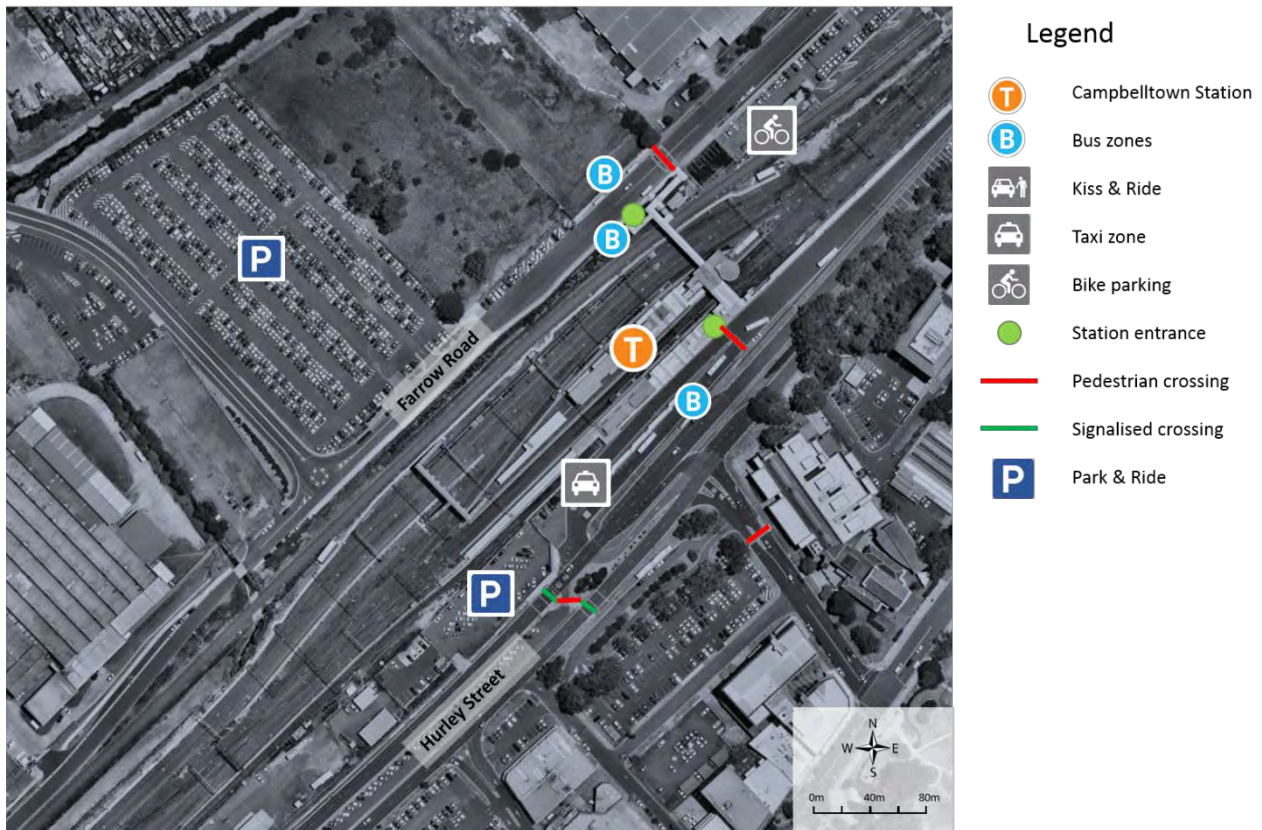
4.5.6 Campbelltown station interchange precinct

Campbelltown Station is located to the north-west of Campbelltown’s retail and commercial centre. On the eastern side of the railway line the station is adjacent to Campbelltown Council and Court House. On the western side the station is close to a large at-grade commuter car park and an auction centre. The station’s eastern entry is on Hurley Street and on the west on Farrow Road. The railway line between Campbelltown Road and Narellan Road has stabling facilities.

Interchange features of Campbelltown Station include bus zones, Kiss & Ride, taxi zones, bike parking and Park & Ride facilities which are shown in **Figure 4-23**.

Campbelltown Station has three platforms; one side platform on the eastern side and two platforms on an island, accessed by stairs and a lift from a pedestrian bridge.

Figure 4-23 Campbelltown interchange features



4.5.7 **Macarthur station interchange precinct**

Macarthur Station is located to the north of Macarthur’s retail hub and south of the University of Western Sydney and Campbelltown TAFE. The station has three entrances, two on the southern side and one to the north. The southern side entrances include one onto Menangle Road and the other is a pedestrian bridge link into the Macarthur Square shopping centre. The northern entrance is adjacent to the University Basin Reserve and a pedestrian path provides access from the station to the education institutions.

Macarthur Station has three platforms; a side platform on the southern side of the station and an island with two platforms. All platforms are accessed from both sides via a pedestrian bridge with lifts and stairs. Macarthur’s interchange facilities consist of bus zones, Kiss & Ride, taxi zones, bike parking and commuter parking to the west. The large shopping centre car park does not open until 10am which prevents it being used by commuters. The station and supporting facilities are shown in **Figure 4-24**.

Figure 4-24 Macarthur interchange features



4.5.8 Summary of station interchange facilities

Station precinct	Pedestrian access	Bicycle storage	No of bus routes	Kiss & Ride spaces	Taxi spaces	CCP spaces
Glenfield	Two access points. Northern access via footpaths. Southern access via signalised crossing.	20 bike racks 12 bike lockers	6 All bus stops are sheltered.	10 spaces Eastern side: Two Kiss & Ride spaces, 100m north and south of the station entry on Railway Parade. Western side: Eight spaces on Glenfield Road. All Kiss & Ride waiting areas are weather protected	2 spaces There are two allocated taxi zones, one located on Glenfield Road and the other on Railway Parade.	961
Macquarie Fields	Access only from eastern side via footpaths.	12 bike racks 6 bike lockers	4 All bus stops are sheltered.	4 spaces Eastern side: The bus waiting area is shared with a Kiss & Ride bay.	No spaces There is no taxi rank nearby.	159
Ingleburn	Two access points. Southern access via footpaths and pedestrian crossings and northern access via footpath and pedestrian crossing.	10 bike racks 4 bike lockers	5 All bus stops are sheltered.	5 spaces Kiss & Ride facilities are provided on both sides of the station.	12 spaces Eastern side: A taxi rank is provided on Ingleburn Road opposite the station entrance.	317
Minto	Two access points. Western access via footpaths or pedestrian crossing and eastern access via footpaths only.	5 bike racks 10 bike lockers	8 All bus stops are sheltered.	4 spaces Western side: A 'No Parking' section of Somerset Street allows Kiss & Ride to occur close to the station entrance.	9 spaces Eastern side: Minto Road has a taxi zone to the north of the station entrance.	636
Leumeah	Two access points. Northern access via footpaths and southern access via footpaths or pedestrian crossing.	5 bike racks 4 bike lockers	6 Bus stops on the east side are sheltered, the west side has no weather protection.	5 spaces Eastern side: A combined taxi and Kiss & Ride zone is provided on O'Sullivan Road adjacent to the station. There is no weather protection or seating provided here but the bus stop shelter is nearby.	5 spaces Eastern side: A combined taxi and Kiss & Ride zone is provided on O'Sullivan Road adjacent to the station. There is no weather protection or seating provided here but the bus stop shelter is nearby.	1404

Station precinct	Pedestrian access	Bicycle storage	No of bus routes	Kiss & Ride spaces	Taxi spaces	CCP spaces
Campbelltown	Two access points. Northern access via footpath or pedestrian crossing and southern access via footpath, pedestrian crossing or signalised crossing.	9 bike racks 12 bike lockers	22 All bus stops are sheltered.	13 spaces (approximately) Eastern side: An extensive Kiss & Ride zone is provided on Hurley Street to the east of the bus and taxi interchange. The Kiss & Ride zone includes some seating and weather protection.	11 spaces (approximately) Eastern side: A taxi zone is provided within the bus interchange. Western side: There is a taxi zone on Farrow Road adjacent to the station entrance, with space for one taxi	1144
Macarthur	Two access points. Northern access via footpath from education precinct and southern access via pedestrian overpass, through Macarthur Square Shopping Centre.	12 bike racks	17 All bus stops are sheltered.	11 spaces Southern side: Kiss & Ride is provided along the northern side of Menangle Road adjacent to the station, to the west of the bus interchange zone. Shelter and seating are provided.	5 spaces Southern side: Taxi zones are provided along the northern side of Menangle Road adjacent to the station, to the east of the station entrance. Shelter and seating are provided.	550

4.6 Freight

The Glenfield to Macarthur corridor forms part of the national freight network. It is a key corridor for freight movement between regional NSW, ACT, Victoria, South Australia and Western Australia. Freight rail movements between Victoria and Queensland are facilitated through the corridor. The rail corridor is a key link between Port Botany and south-west regional NSW.

The NSW Freight and Ports Strategy identifies a freight activity precinct through the Glenfield to Macarthur Corridor. Freight activity precincts are key nodes that are serviced by the freight network. They allow the co-location of supporting infrastructure to efficiently meet the needs of freight generators and operators. The freight precinct through the Glenfield to Macarthur Corridor commences south of Minto and extends through to Liverpool. It generally sits west of the railway line and extends west of the Hume Motorway.

4.6.1 Southern Sydney Freight Line

The Southern Sydney Freight Line (SSFL) is a 36 kilometre freight line connection between Sefton and Macarthur. The line consists of a third track through the rail corridor that is dedicated for freight services, allowing passenger services to operate separate to freight. The SSFL opened in early 2013.

There is no curfew on the freight line and services can operate 24 hours a day.

Future corridor widening may be required to increase capacity on this freight line through the addition of an extra freight track. This must be considered in future land use planning in terms of retaining an easement for expansion and the noise impacts of more regular freight train services.

4.6.2 Minto intermodal shipping terminal

Qube Logistics NSW currently operates the Macarthur Intermodal Shipping Terminal (MIST) in Minto. MIST is located south of Minto Station on the eastern side of the railway corridor. MIST is a key freight network node in metropolitan Sydney, operating a Port Botany shuttle for imports and export containers. It has two rail sidings, each about 580 metres long. Container repair, fumigation and locomotive repairs also occur at the site.

MIST also receives freight from regional NSW, for example to the neighbouring malting works. The industrial location is compatible with the 24/7 nature of rail operations.

4.6.3 Hume Motorway

The Hume Motorway forms part of the national road network is the primary road freight link between Sydney to Canberra, Melbourne, Adelaide and beyond. It also links to the M7 orbital motorway, providing a bypass route away from the Sydney CBD.

4.6.4 Local freight roads

The RMS have delegated Restricted Access Vehicle routes for B-double trucks and high vehicles. These routes support the industrial precincts in the corridor, most notably at Ingleburn and Minto. All routes link to the Hume Motorway

4.6.5 Other major freight generators

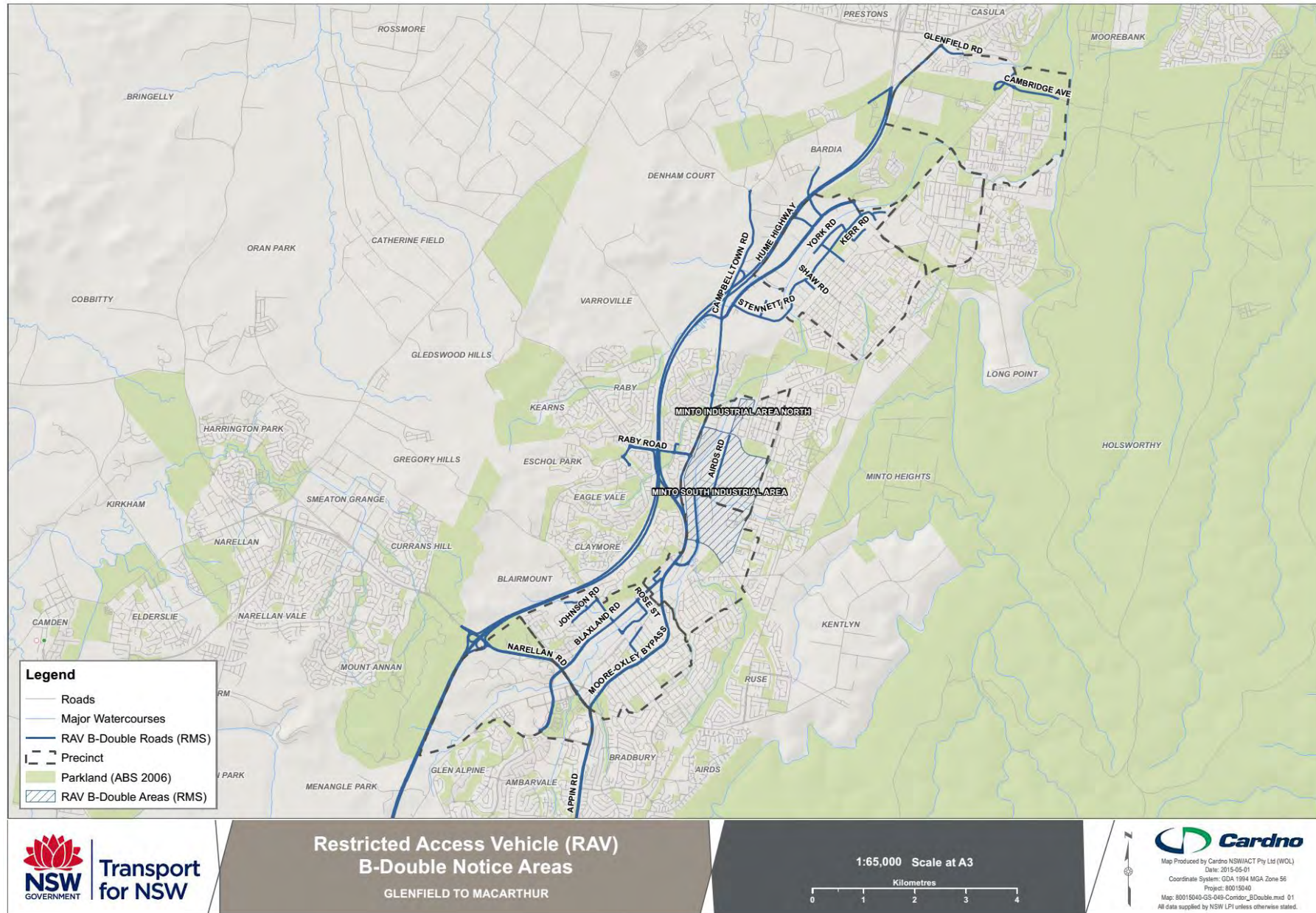
The major freight generators for the region include:

- > Patricks Autocare vehicle storage facility.
- > Barbeques Galore distribution centre.
- > Metro Ice Cream Distribution Pty Ltd.
- > Repco Ingleburn distribution centre.

The key freight generation areas of the study corridor are generally located to the west of the railway line in Ingleburn, Minto and Campbelltown.

Key freight roads throughout the study corridor are shown in **Figure 4-25**.

Figure 4-25 Restricted Access Vehicle Roads and Areas



4.7 Bus

The bus network servicing the Glenfield to Macarthur Corridor includes a number of different types of routes. These routes include local shopping and residential loops, routes that traverse the length of the corridor providing connectivity to sections east of the railway line and regional routes that provide connections to centres in other regions such as Camden, Wollongong and Liverpool.

4.7.1 Bus route hierarchy

The precincts have differing levels of bus coverage; the coverage ranges from Macquarie Fields local shopping routes to Campbelltown's large bus interchange. The bus routes in the corridor are shown in **Figure 4-26** and have been categorised as follows:

- > Regional routes – longer distance routes.
- > Eastern corridor routes – intercity buses between Campbelltown and Liverpool to the east of the rail corridor.
- > Local routes – routes connecting different precincts within and external to the corridor.
- > Precinct loop routes – local loop services connecting the stations to their precincts.

Due to the road network and land use development, many of the bus routes are indirect and circulate around curvilinear street networks in order to provide the largest possible catchment.

There are a large number of routes, many are derivatives of other routes, this reduces the legibility of the network and the frequencies along each route that could be reasonably provided with the existing resources. With all local routes mapped together, it is difficult to understand the network and its operation. It is apparent that the network has prioritised catchment coverage over route directness.

4.7.2 Interchanges and connection with rail services

All identified bus routes in the region have a stop at or near at least one station. Campbelltown is effectively the main regional centre in the precinct and transport hub. Many bus routes originate/ terminate at the station. Many CBD train services also originate and terminate at Campbelltown and the bus services provide connections to nearby regions outside of the railway catchment as well providing a transport network to support Campbelltown's own economy. Macarthur Station also supports a number of terminating bus services.

While the bus network supports the rail corridor, there is generally a high quantity of commuter car parking at each station which provides train users with a more convenient option than the bus. The level of service of some routes would not support commuters from the Sydney CBD to areas outside of the immediate walking catchment. Longer distance commuters are less likely to accept the delay from low frequency and indirect services within the study corridor.

It is anticipated that the bus network provides less use to station users in the catchment and more use for single public transport mode journeys along each respective bus route.

4.7.3 Bus services

There are 34 separate bus routes that operate approximately 1,344 services per weekday in the study corridor. These services are described in Table 4-2 and their existing operational details are outlined in

Table 4-3. Service spans are typically lower than the rail network.

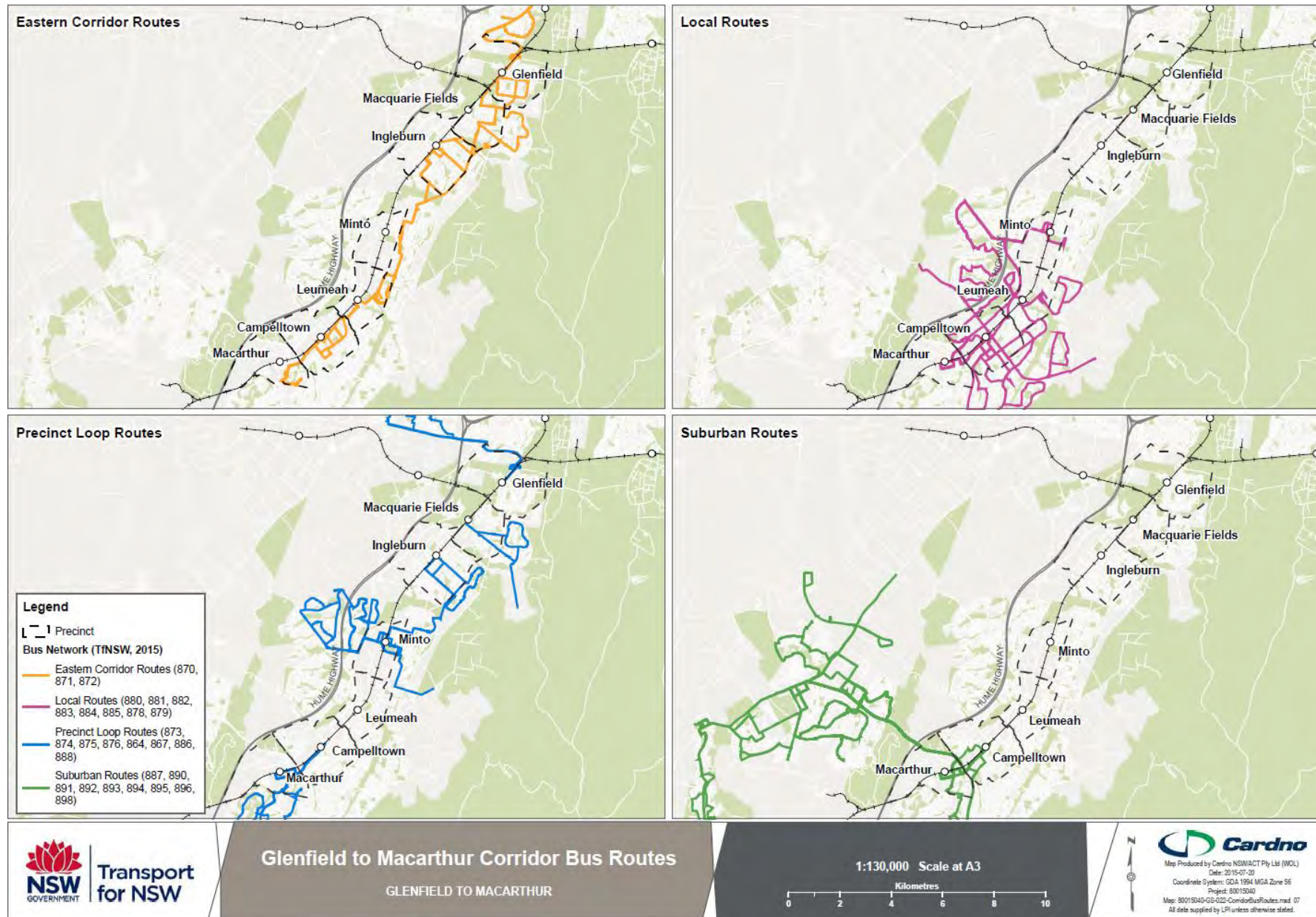
Figure 4-26 Existing bus routes in the study area


Table 4-2 Glenfield to Macarthur Corridor bus route description

Route No.	Route	Route Description	Significant connections not in close proximity to study corridor stations
850	Narellan to Minto	This route follows the spine of Camden Valley Way and Raby Road with branches to Oran Park and Gregory Hills and a loop of Catherine Field	
864	Carnes Hill to Glenfield (weekday only)	A relatively direct bus route providing a link from Glenfield Station to the north west of the study corridor. This route passes through the suburbs of West Hoxton, and along the border of Horningsea Park, Edmondson Park, Prestons and through the south-west corner of Casula. The route falls short of providing a connection to Carnes Hill Marketplace.	Crossroads Homemaker Centre
867	Prestons to Glenfield (weekday only)	A local service providing a link between the residential areas of Prestons, to the north west of the study corridor to Glenfield Interchange.	Prestons Shops
869	Ingleburn to Liverpool	This services a western catchment of the Hume and South Western Motorway.	
870	Campbelltown to Liverpool	A parallel route to the railway line between Campbelltown and Liverpool. It operates on the east side of the railway line between Campbelltown and Glenfield and the western side north of Glenfield to Liverpool. While similar to routes 871 and 872, this route services the eastern precincts of Glenfield.	Glenquarie Shopping Centre
871	Campbelltown to Liverpool	Similar to Route 870 and 872. This route has a deviation in Casula (outside of the study) corridor to service additional residential area.	Glenquarie Shopping Centre, Minto Marketplace, Campbelltown Hospital
872	Campbelltown to Liverpool	Common to Route 870 and 871, this route deviates at Leumeah, Ingleburn and Macquarie Fields to offer a different catchment. The Macquarie Fields diversion is extensive, servicing the outer eastern precincts of the suburb	Glenquarie Shopping Centre, Minto Marketplace, Campbelltown Hospital
873	Ingleburn to Minto	A local circuitous service on the south-east side of the railway line between these two neighbouring suburbs	Ingleburn RSL, Lagonda Drive Shops
874	Raby to Minto	A local loop service between Minto and residential precincts in the suburbs to the west of the Hume Motorway including Eagle Vale, Kearns, Raby, Varroville and St Andrews. Some services deviate to service the western employment district of Minto near the Railway Interchange.	Raby Shops, Minto Marketplace
875	St Andrews to Minto	A circuitous local route providing a link between Minto Railway Interchange and residential areas of St Andrews and Bow Bowing to the west of the Hume Motorway.	Minto Marketplace, St Andrews Shopping Centre

Route No.	Route	Route Description	Significant connections not in close proximity to study corridor stations
876	Macquarie Fields Loop (weekday only)	A local loop service capturing the south eastern residential area of Macquarie Fields. The service runs clockwise in the AM and anti-clockwise in the PM period.	Guise Public School
878	Campbelltown to Eschol Park	A Campbelltown feeder services including the suburbs of Kearns, Raby, St Andrews to the west of the study corridor and the employment areas to the west of the railway line in Campbelltown and Leumeah.	Raby Sports Complex
879	Campbelltown to Leumeah	A loop service servicing the suburbs of Macarthur, Blair Athol, Blairmount and Woodbine. The majority of this service operates between the railway and Hume Motorway corridor.	
880	Campbelltown to Minto	A larger loop servicing the western suburbs of the railway. Suburbs along the route include Macarthur, Blair Athol, Blairmount, Claymore, Eagle Vale, Eschol Park, Kearns, Raby and St Andrews. Some services extend to Minto Mall, however regular services commence/ terminate on the west side of Minto Railway Interchange	
881	Campbelltown to Leumeah North	A local route providing a feeder service to Campbelltown and Leumeah Railway Interchanges. The service loops around Leumeah North	
882	Campbelltown to Leumeah South	A Campbelltown feeder service that loops around Campbelltown and Leumeah South to the south-east of the railway corridor	
883	Campbelltown to Ruse	A Campbelltown feeder service that loops around Ruse to the east of Campbelltown. The 883K also services Kentlyn.	Ruse Village Shopping Centre
884	Campbelltown to Airds	A Campbelltown feeder service that loops around Airds south of Campbelltown. The 884W forms a spur that also services St Helens Park and Wedderburn further south.	
885	Campbelltown to, Bradbury	A Campbelltown feeder service that loops around Bradbury, south of Campbelltown	
886	Campbelltown to Ambarvale	A Campbelltown and Macarthur feeder service that loops around Glen Alpine, south of Macarthur. The route also has a stop in Rosemeadow.	
887	Campbelltown to Wollongong	A suburban service connecting the two localities. The service passes through the suburbs of Bradbury, Rosemeadow, Appin, and North Wollongong to the south of the study corridor.	University of Wollongong
888	Campbelltown to St Helens Park loop	A high frequency feeder service that loops around St Helens Park to the south of Campbelltown.	
889	Campbelltown to Menangle	Servicing towns south of Campbelltown along the railway line including Macarthur, Menangle Park. This is a very low frequency service.	

Route No.	Route	Route Description	Significant connections not in close proximity to study corridor stations
890	Harrington Park to Campbelltown	This links the study corridor to localities to the west of Campbelltown. It loops around Harrington Park. Suburbs along the route include Macarthur, Mount Annan, Narellan Vale and Narellan	
890C	Campbelltown to Camden	This route operates on Narellan Road and Camden Valley Way. It has a minor diversion to Macarthur and a major diversion through Narellan Vale significantly reducing the directness of the service.	
891	Mt Annan South to Campbelltown	Services to the west of Campbelltown with service to Mt Annan South and Currans Hill. Some services continue to Narellan.	Mt Annan Leisure Centre, Macarthur Square
892	Campbelltown Road to Mount Annan	A Campbelltown feeder service that loops around Mt Annan to the west.	Mt Annan Marketplace, Mt Annan Leisure Centre,
893	Campbelltown to Narellan	Service operates via Mt Annan, Narellan Vale, Elderslie to the west. This service loops around to provide greater coverage.	Mt Annan Marketplace, Mt Annan Leisure Centre, Narellan Town Centre
894	Campbelltown to Bridgewater Estate (Camden South)	A relatively direct bus route between each end. The route is configured as an arc to the south east of Campbelltown. It uses the key arterials of Narellan Road, Camden Valley Way and Old Hume Motorway. This service passes through Narellan and Camden town centre. It deviates of the principal arterial through Elderslie and Camden.	University of Western Sydney Macarthur, Mt Annan Marketplace, Narellan Town Centre
895	Campbelltown to Camden South	A circuitous version of the 894, this route services additional catchments in Macarthur, Smeaton Grange, Narellan, Elderslie, Camden and Camden South.	Mt Annan Marketplace, Narellan Town Centre
896	Campbelltown to Oran Park	Configured as a T at the Oran Park/ Gregory Hills end. The route separates at Narellan depending on the direction of travel. The route is quite direct until the end T-point at Camden Valley Way/ Gregory Hills Drive/ Oran Park Drive	Mt Annan Marketplace, Narellan Town Centre, Oran Park Town Centre
898	Campbelltown to Harrington Park	This service loops around Harrington Park with a termination, commencement spur at Gledswood Hills to the north west of Campbelltown.	Harrington Plaza
900	Campbelltown to Picton	A regional service that generally runs along regional arterial roads. It deviates to service the Narellan Town Centre and Camden Town Centre.	Narellan Town Centre, Camden CBD.
S9	Glenfield Loop	A local loop and Glenfield Interchange feeder service that also services Macquarie Fields to the south east of the railway line.	Glenquarie Shopping Centre

Table 4-3 Bus route operations

Route No.	Route	To	Service span	Bus frequency per hour			Number of Services			Precincts Served							
				AM Peak	PM Peak	Off-peak	Weekday	Saturday	Sunday	Glenfield	Macquarie Fields	Ingleburn	Minto	Leumeah	Campbelltown	Macarthur	
850	Narellan to Minto	Narellan	6:58am - 6:18pm	2	2	1	18	9	8					•			
		Minto	6:40am - 5:20pm	2	1	1	17	8	8					•			
864	Carnes Hill to Glenfield (weekday only)	Carnes Hill	4:10pm - 6:42pm	0	3	2	7	0	0	•							
		Glenfield	5:02am - 7:07am	2	0	2	6	0	0	•							
867	Prestons to Glenfield (weekday only)	Prestons	4:10pm - 6:42pm	0	3	2	7	0	0	•							
		Glenfield	5:06am - 7:01am	4	0	0	6	0	0	•							
869	Ingleburn to Liverpool	Ingleburn	6:52am - 8:39pm	2	2	2	27	13	13				•				
		Liverpool	5:47am - 7:32pm	2	2	2	27	15	13				•				
870	Campbelltown to Liverpool	Campbelltown	5:30am - 10:15pm	2	2	1	26	18	9	•	•	•	•	•	•	•	•
		Liverpool	6:03am - 10:50pm	2	2	1	26	18	9	•	•	•	•	•	•	•	•
871	Campbelltown to Liverpool	Campbelltown	8:45am - 7:35pm	<1	<1	1	8	11	6	•	•	•	•	•	•	•	•
		Liverpool	5:35am - 1:15pm	<1	0	1	6	11	6	•	•	•	•	•	•	•	•
872	Campbelltown to Liverpool	Campbelltown	5:16am - 10:00pm	2	2	2	32	32	19	•	•	•	•	•	•	•	•
		Liverpool	5:24am - 10:30pm	2	2	2	36	32	19	•	•	•	•	•	•	•	•
873	Ingleburn to Minto	Ingleburn	5:22am - 7:48pm	2	2	2	29	13	9			•	•				
		Minto	5:33am - 8:10pm	2	2	2	30	12	10			•	•				
874	Raby to Minto	Raby	5:32am - 8:30pm	2	2	2	31	13	12				•				
		Minto	5:14am - 8:39pm	2	2	2	31	13	12				•				
875	St Andrews to Minto	St Andrews	5:37am - 9:00pm	2	2	2	31	12	11				•				
		Minto	5:13am - 8:08pm	2	2	2	30	12	11				•				

Route No.	Route	To	Service span	Bus frequency per hour			Number of Services			Precincts Served							
				AM Peak	PM Peak	Off-peak	Weekday	Saturday	Sunday	Glenfield	Macquarie Fields	Ingleburn	Minto	Leumeah	Campbelltown	Macarthur	
876	Macquarie Fields Loop (weekday only)	via Parliament Rd	5:07am - 7:33am	3	0	0	7	0	0		•						
		via Saywell Rd	3:45pm - 6:20pm	0	2	2	7	0	0		•						
878	Campbelltown to Eschol Park & Kearns	Eschol Park & Kearns	9:45am - 2:36pm	0	0	1	6	15	0					•	•	•	
		Campbelltown	9:34am - 2:24pm	0	0	1	6	15	0					•	•	•	
879	Campbelltown to Leumeah	Leumeah	5:46am - 8:31pm	2	2	1	23	15	12					•	•	•	
		Campbelltown	6:12am - 8:57pm	2	2	1	24	15	12					•	•	•	
880	Campbelltown to Minto	Minto	4:44am - 10:53pm	3	4	2	44	31	15				•		•	•	
		Campbelltown	4:45am - 9:23pm	4	3	2	41	30	16				•		•	•	
881	Campbelltown to Leumeah Loop	Campbelltown via Macquarie St	5:12am - 6:07pm	1	2	1	14	3	0					•	•		
882	Campbelltown to Leumeah Loop	Campbelltown via Waminda Ave	5:39am - 11:32pm	2	2	2	35	27	15					•	•		
883	Campbelltown to Ruse Loop	Campbelltown via Waminda Ave	4:53am - 11:32pm	3	2	2	42	27	15						•		
884	Campbelltown to Airds Loop	Campbelltown via St Johns Rd	3:59am - 12:02am	4	3	2	46	29	11						•		
884W	Campbelltown to Wedderburn	Wedderburn	12:06pm - 5:40pm	0	<1	0.5	4	0	0						•		
		Campbelltown	7:01am - 4:48pm	1	0	0.5	5	0	0						•		
885	Campbelltown to Bradbury Loop	via Jacaranda Ave	4:34am - 12:02am	2	2	2	37	28	16						•		
886	Campbelltown to Ambarvale Loop	via Macarthur Square	4:27am - 10:01pm	2	2	1	30	15	13						•	•	
887		Wollongong	6:33am - 6:35pm	1	1	1	12	3	2						•	•	

Route No.	Route	To	Service span	Bus frequency per hour			Number of Services			Precincts Served							
				AM Peak	PM Peak	Off-peak	Weekday	Saturday	Sunday	Glenfield	Macquarie Fields	Ingleburn	Minto	Leumeah	Campbelltown	Macarthur	
	Campbelltown to Appin and Wollongong	Campbelltown	6:42am - 6:23pm	1	1	0.5	11	3	2							•	•
888	Campbelltown to St Helens Park loop	via Macarthur Square	3:57am - 11:32pm	4	4	2	69	52	27							•	•
889	Campbelltown to Menangle	Campbelltown	6:11am - 6:08pm	2	1	<1	7	0	0							•	
		Menangle		1	1	<1	6	0	0							•	
890	Harrington Park to Campbelltown	Harrington Park	5:46am - 11:02pm	1	1	2	31	23	17							•	•
		Campbelltown	5:13am - 9:38pm	3	3	1	32	23	16							•	•
890C	Campbelltown to Camden	Campbelltown	7:49am - 4:21pm	2	0	1	10	0	0							•	•
		Camden to Campbelltown	Camden	7:07am - 3:00pm	0	0	1	7	0	0						•	•
891	Harrington Park to Campbelltown	Harrington Park	5:02am - 10:32pm	2	2	2	33	30	26							•	•
		Campbelltown	5:21am - 9:38pm	1	2	2	31	29	27							•	•
892	Mount Annan to Campbelltown	Mount Annan	5:46am - 8:01pm	1	2	1	21	13	3							•	•
		Campbelltown	6:13am - 8:05pm	1	2	1	21	13	3							•	•
893	Narellan to Campbelltown	Narellan	6:14am - 8:31pm	2	2	2	29	9	12							•	•
		Campbelltown	5:33am - 7:05pm	2	2	2	29	9	12							•	•
894	Bridgewater Estate to Campbelltown	Bridgewater Estate	6:49am - 7:05pm	3	2	0	14	0	0							•	•
		Campbelltown	5:39am - 5:43pm	3	2	0	12	0	0							•	•
895	Camden South to Campbelltown	Camden South	5:21am - 11:39pm	4	4	2	46	18	16							•	•
		Campbelltown	4:28am - 11:08pm	4	4	2	53	19	15							•	•

Route No.	Route	To	Service span	Bus frequency per hour			Number of Services			Precincts Served							
				AM Peak	PM Peak	Off-peak	Weekday	Saturday	Sunday	Glenfield	Macquarie Fields	Ingleburn	Minto	Leumeah	Campbelltown	Macarthur	
896	Oran Park to Campbelltown	Oran Park	5:37am - 8:56pm	2	2	1	24	14	11							•	•
		Campbelltown	6:19am - 9:27pm	2	2	1	23	14	11							•	•
898	Harrington Park to Campbelltown	Harrington Park	5:08pm - 6:23pm	0	4	0	6	0	0							•	•
		Campbelltown	6:22am - 5:30pm	4	<1	0	7	0	0							•	•
900	Campbelltown to Picton	Campbelltown	7:25am - 4:05pm	1	1	0	2	0	0							•	
		Picton	8:25am - 5:25pm	1	1	0	2	0	0							•	
S9	Glenfield Loop	via Glenquarie Shops	9:10am - 2:08pm	0	0	0.5	4	0	0	•							

4.8 Road

The existing network is generally sufficient to accommodate existing demands, however during peak periods anecdotal evidence and site observations indicate there is significant congestion, particularly around Campbelltown and most notably on Narellan Road.

The key roads within the Glenfield to Macarthur corridor are presented on **Figure 4-27** and discussed in the following section, as either major north-south or east-west connections.

4.8.1 North-south connections

Hume Motorway

The Hume Motorway is a state road, also known as both the Hume Freeway and Hume Highway in various sections, and is one of Australia's major inter-city highways between Sydney and Melbourne. The Hume Motorway begins north of Glenfield, from where it is linked to the M5 and M7 motorways. The M5 and M7 motorways form part of Sydney's orbital motorway network. The Hume Motorway is the south western connection into Sydney's orbital motorway network. It provides access from the Southern Highlands, Goulburn and Canberra into Sydney.

The Motorway is located to the west of the Glenfield to Macarthur Corridor, forming the boundaries of the Macarthur, Campbelltown, Ingleburn and Glenfield areas. The Motorway runs parallel to the study area rail corridor.

The Hume Motorway is four lanes in each direction between Glenfield and Minto, changing to three lanes in each direction between Minto and Campbelltown and two lanes in each direction south of Campbelltown to Macarthur and beyond. The posted speed limits along this motorway are 100km/hr between the M5/M7 and Glenfield, and 110km/hr to the south of the Glenfield area.

The major exits that affect the local traffic network in the Glenfield to Macarthur Corridor are:

- > Brooks Road, Ingleburn: northbound entry only and southbound exit;
- > Campbelltown Road, Ingleburn: northbound exit and southbound entry only;
- > Campbelltown/Raby Road, Campbelltown: northbound entry only and southbound exit only; and
- > Narellan Road: All movements allowed.

These exit roads are all state funded regional roads.

Campbelltown Road

Campbelltown Road is a state road that links Campbelltown to Casula and provides regional north-south access to the Glenfield to Macarthur Corridor. This road is an alternate to the Hume Motorway.

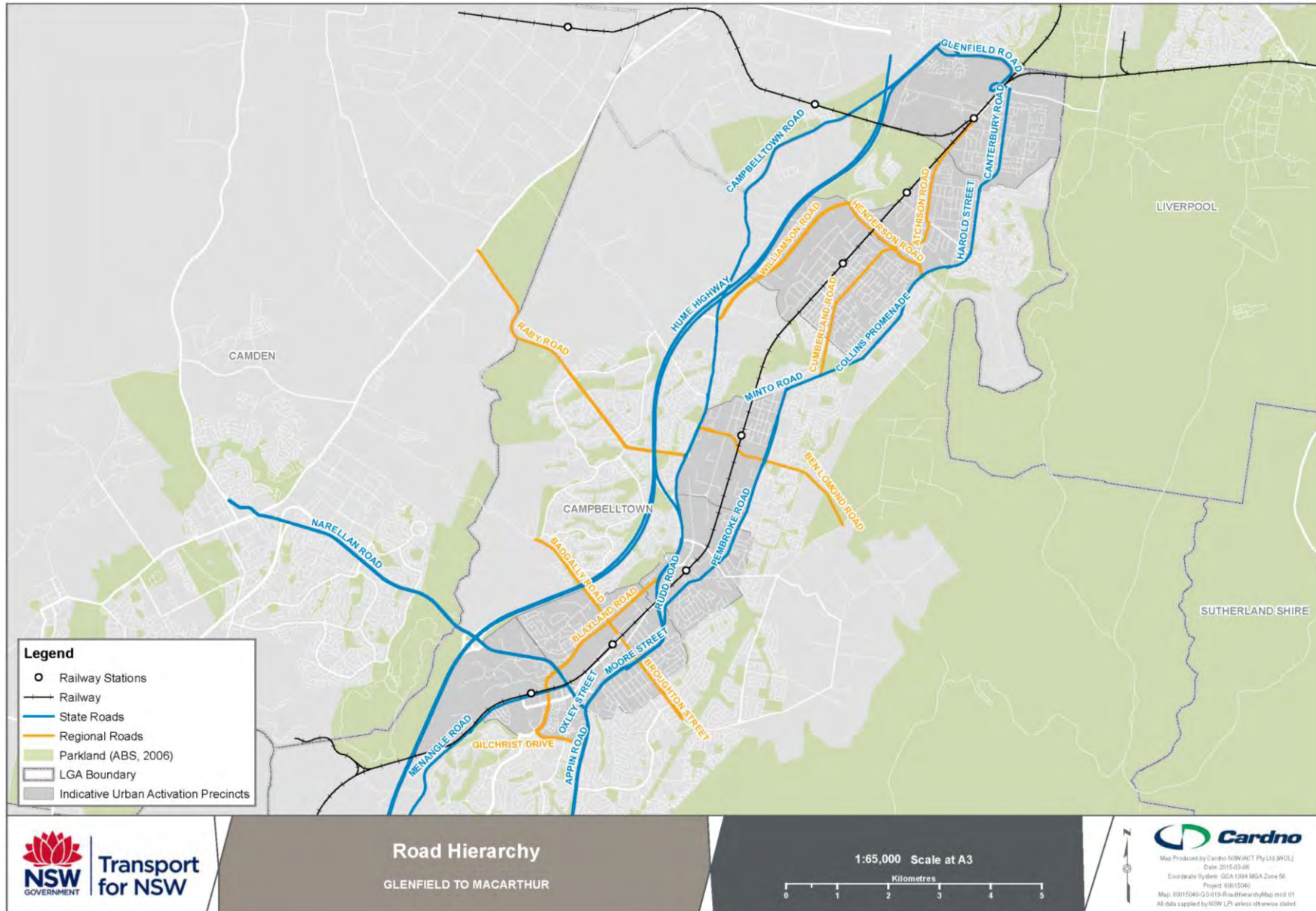
The road is predominantly one lane in each direction, except at larger intersections and a section between Camden Valley Way and Beech Road where the road varies between two and three lanes in each direction. Most of the intersections along this road are roundabouts with a few signalised intersections. The speed limit along this road varies from 70 to 80km/h. As discussed in the Hume Motorway section, there are two entry and exit points to the Hume Motorway from Campbelltown Road. On-street parking is generally not permitted.

In June 2014, the RMS announced plans for upgrade works of Campbelltown Road between Camden Valley Way and Brooks Road. The upgrade works are proposed to involve widening of the road from two lanes undivided in each direction to four lanes divided in each direction, new traffic signals and shared paths on the western side of Campbelltown Road. The objective of the proposed works is to provide a main road transport corridor to access the South West Growth Centre.

Moore Street/ Oxley Street

Moore and Oxley Streets are state roads that are a continuation of Campbelltown Road to the south. These streets are mainly three lanes southbound and two lanes northbound and have a speed limit of 60km/hr. No parking is allowed on either side of these roads.

Figure 4-27 Glenfield to Macarthur road hierarchy



Eastern Road Corridor

The Eastern Road Corridor is a series of state roads that run along the eastern side of the Glenfield to Macarthur Corridor. These roads include Glenfield Road, Canterbury Road, Harold Street, Collins Promenade, Minto Road, Pembroke Road, Rudd Road and Queen Street.

These roads run in a north-south direction from Campbelltown Road in the north to Campbelltown Road/Moore Street in the south between Leumeah Station and Campbelltown Station. These corridors vary between one and two lanes in each direction. The road is two lanes in each direction along Canterbury Road and Harold Street between Glenfield Road and Evelyn Street, with the exception of the section between Harrow Road and Victoria Road (Bunbury Curran Park) where there is one lane in each direction. The corridor is also two lanes in each direction along Pembroke Road between Durham Street and Ben Lomond Road, and outside Campbelltown Sports Stadium. The rest of this corridor is one lane in each direction.

The speed limit along the length of this corridor is 60km/hr. This corridor has limited on-street parking which predominantly occurs in the two lane sections of road.

Appin Road

Appin Road is a state road that connects Narellan Road in Macarthur to the Princes Highway in Bulli, in a generally north-south direction. It is a key road for freight and motorists travelling from south western Sydney to the South Coast. The road is mainly single lane in each direction, except for a section of road through Macarthur which is two lanes in each direction. The road varies between speed limits in this section of road from 60km/hr for a 300m northern section of Appin Road and is 80km/h thereafter.

On-street parking is generally not permitted along this road.

Menangle Road

Menangle Road is a state road which is predominantly one lane in each direction and connects Macarthur to Picton Road. The speed limit in the Macarthur section of Menangle Road is 60km/hr. Outside Macarthur Station, the road is expanded to two lanes in each direction. On-street parking is permitted north of the station on both sides of the road. In addition, there are some small sections outside Macarthur Station that allow vehicles to stop for Kiss & Ride.

Blaxland Road/ Gilchrist Drive

Blaxland Road is continued by Gilchrist Drive to the south. Blaxland Road and Gilchrist Drive are regional roads which are two lanes in each direction between Campbelltown Road and Narellan Road. The road consists of mainly signalised and roundabout intersections. No parking is allowed along this stretch of road. Speed limits along this road are 60km/hr in both directions.

Cumberland Road, Macquarie Road, Fields Road, Atchison Road and Railway Parade

Cumberland Road is a regional road that runs parallel to the Eastern Road Corridor between Minto Road and Henderson Road. The road is predominately one lane in each direction, with a median turning lane in the middle. Parking is permitted kerbside along the stretch of the road, and the speed limit is 60km/hr along the length. This road continues to the north with similar characteristics until it reaches Glenfield Station.

4.8.2 East west connections

Narellan Road

Narellan Road is a state road that travels in an east-west direction and provides a link to the Northern Road at Camden Valley Way and to Appin Road at Oxley Street. This road has two lanes in each direction between Appin Road and the Hume Motorway intersection with a posted speed limit of 80km/h to the west and 60km/hr to the east of the intersection with Blaxland Road. On-street parking is generally not permitted along this road.

This road currently reaches capacity during peak periods and upgrades are proposed which are discussed in **Section 5.6.1**.

Glenfield Road

Glenfield Road is a state road that provides an east-west connection between Campbelltown Road and the railway line. The road generally has a single lane in each direction, with a posted speed limit of 60km/hr. This road is the main bus corridor for services arriving at or departing from Glenfield Station. On-street parking is permitted kerbside.

Raby Road

Raby Road is a regional road that provides an east-west link between Campbelltown Road and Camden Valley Way. This 6 kilometre stretch of road has a speed limit of 60km/hr between Campbelltown Road and Thunderbolt Drive, and is mainly two lanes in each direction. Further to the west, the speed limit increases to 80 kilometres per hour and only has one lane in each direction. This intersects with Campbelltown Road at a two lane roundabout intersection. A northbound on-ramp and off-ramp is also provided for the Hume Motorway from Raby Road.

Badgally Road

Badgally Road is a regional road that connects Campbelltown Station to Eagle Vale Drive. This road is predominantly one lane in each direction, except for the section between Blaxland Road and Johnson Road which is two lanes in each direction. The speed limit along this road is 60km/hr, with a time restricted school zone limit also in place.

Ben Lomond Road

Ben Lomond Road is a regional road that that connects Campbelltown Road to Pembroke Road. This route is two lanes in each direction and has a speed limit of 60km/hr. Intersections are predominantly controlled by roundabouts. No on-street parking is permitted along this road.

Broughton Street

Broughton Street is a regional road that provides a connection from the Campbelltown Station to Junction Road. Within the study area, the road is two lanes in each direction, with a speed limit of 60km/hr. Intersections are usually controlled by traffic signals along this road. Timed parking is permitted along this road.

Williamson Road/ Henderson Road

Williamson Road and Henderson Road are regional roads, which travel north east, and provide a connection from Campbelltown Road to Harold Street. Henderson and Williamson Roads are two lanes in each direction with a speed limit of 70km/hr. These roads do not permit any on-street parking. The intersections are controlled predominately by roundabouts.

4.9 Parking

Parking is a key transport facility that can support access to the public transport network in key strategic locations. Conversely, an excessive supply of parking is not economically efficient, can impact the viability of public transport, contributes to congestion and improves the attractiveness of driving. Large parking areas occupy land that could be better utilised for other purposes.

This section details the existing on and off street parking for each precinct's train station and the controls that affect parking supply for new developments.

4.9.1 On-street and Park & Ride facilities

The study area has a mix of on and off street parking to support public transport and local business. **Table 4-4** indicates the facilities at each interchange for parking, this includes dedicated off-street facilities. On-street spaces for commuters were assumed to be spaces adjacent to the railway corridor. Given the time of demand for these spaces and their convenience, it is reasonable to assume that almost all of these spaces are used by commuters. Leumeah has the highest number of commuter car parking spaces available. The station's co-location with the sports stadium allow commuters complementary use of large car parking areas for commuters and stadium visitors. Campbelltown, Macarthur and Glenfield also have large commuter carpark facilities.

Table 4-4 Parking facilities at interchanges

Station	On-street	Off-street	Park & Ride (on and off street spaces)
Glenfield	28	933	961
Macquarie Fields	44	115	159
Ingleburn	161	156	317
Minto	0	636	636
Leumeah	28	1,376	1404
Campbelltown	17	1,127	1144
Macarthur	0	550	550
Total	278	4893	5,171

Overall, all commuter parking facilities were observed to be highly utilised, indicating a high reliance on private vehicles access to stations.

4.9.2 Campbelltown Development Control Plan (CDCP) parking controls

Off-street parking in the study area is generally controlled by CDCP, the objective of the CDCP for parking and access is to:

'Provide adequate on-site car parking for residents and visitors that is convenient, secure and safe having regard to the traffic generated by the development.'

CDCP outlines parking requirements based on the type of land use (e.g. retail) and the density of the land use. The combination of these two attributes results in the determination of the minimum amount of parking to be provided on-site by a development. The CDCP uses minimum parking controls, which result in a development requiring a set amount of parking spaces as a minimum. In areas of higher density in Sydney, parking rates are often set as maximums to reduce trips by private vehicles and to encourage more people to walk, cycle and catch public transport. This occurs in Parramatta and for comparative purposes, key land uses for Parramatta City Council parking rates (for the wider local government area) are shown alongside the CDCP rates in **Table 4-5** where applicable.

It should be noted that Parramatta City Council also have city centre and main town centres parking rates that are more restrictive than the rates provided below.

Table 4-5 Campbelltown and Parramatta City Council parking control comparison

Development Type	Campbelltown Council rates	Parramatta City Council rates
Residential		
Dwelling houses, domestic outbuildings, swimming pools/ spas and secondary dwellings	A dwelling house shall be provided with a minimum of one undercover car parking space	Outside city centre 1 space for dwellings less than or equal to 125 m ² 2 spaces for dwellings equal to or greater than or 125 m ²
Secondary dwellings	-	Outside city centre No additional parking is required for a secondary dwelling
Narrow lot dwellings	A narrow lot dwelling shall be provided with one covered car parking space.	-
Multi dwellings	One (1) external additional visitor car parking space shall be provided for every two (2) units (or part thereof), unless all dwellings within the development have direct frontage to a public street.	Outside city centre 0.6 spaces per studio apartment 1 space per 1 bedroom unit 1.25 spaces per 2 bedroom unit 1.5 spaces per 3 bedroom unit 2 spaces per 4 bedroom unit

Development Type	Campbelltown Council rates	Parramatta City Council rates
		Plus 0.25 space per dwelling for visitor parking A car wash bay which may also be a visitor space
Multi-dwelling close to public transport The public transport connections must be within 400 metres walking distance of a transit way bus stop with a service frequency of an average of 10 minutes or less during the morning peak hour (7am-9am) in either direction, or of a railway station).	-	Outside city centre 1 space per 1 or 2 bedroom unit 1.2 spaces per 3 bedroom unit 2 spaces per 4 bedroom unit Plus 0.25 space per dwelling for visitor parking A car wash bay which may also be a visitor space
Residential subdivision	All required visitors car parking spaces within a Strata Title subdivision shall be within common property.	-
Resident apartments	Each dwelling shall be provided with a minimum of one car parking space, and: an additional car parking space for every 4 dwellings (or part thereof); and an additional visitor car parking space for every 10 dwellings (or part thereof). Each development shall make provision for bicycle storage at a rate of 1 space per 5 dwellings within common property.	Outside city centre 0.6 spaces per studio apartment 1 space per 1 bedroom unit 1.25 spaces per 2 bedroom unit 1.5 spaces per 3 bedroom unit 2 spaces per 4 bedroom unit Plus 0.25 space per dwelling for visitor parking A car wash bay which may also be a visitor space
Resident apartments close to public transport The public transport connections must be within 400 metres walking distance of a transit way bus stop with a service frequency of an average of 10 minutes or less during the morning peak hour (7am-9am) in either direction, or of a railway station).	-	Outside city centre Same as multi-dwelling close to public transport In Parramatta City Centre: Studio: 0.5 spaces 1 bedroom: 0.75 spaces 2 bedroom: 1 spaces 3 or more bedroom: 1.5 spaces
Mixed use development	In addition to residential car parking rates the development shall provide one (1) car parking space per 25sqm of leasable floor space at ground level and one (1) car parking space per 35sqm of floor space at upper levels for all commercial/retail parts of the building. The development shall provide adequate space for the on-site parking, loading and unloading of all delivery/service vehicles as detailed in Part 6.4.2 of this Plan.	Outside city centre The residential component of mixed use development 0.6 spaces per studio apartment 1 space per 1 bedroom unit 1.25 spaces per 2 bedroom unit 1.5 spaces per 3 bedroom unit 2 spaces per 4 bedroom unit Plus 0.25 space per dwelling for visitor parking A car wash bay which may also be a visitor space
Commercial		
Retail Premises	Ground level - 1 space per 25m ² GFA Upper level(s)- 1 space per 35m ² GFA	Outside city centre 1 space per 30 m ² of gross floor area 1 loading bay per 400 m ² of gross floor area In Parramatta City Centre:

Development Type	Campbelltown Council rates	Parramatta City Council rates
		Minimum of 1 space per 60m ² of gross floor area, maximum of 1 space per 30m ² of gross floor area
Commercial Premises	Ground level - 1 space per 25m ² GFA Upper level(s)- 1 space per 35m ² GFA	Outside city centre 1 space per 50 m ² of gross floor area plus 1 loading bay per 400 m ² of gross floor area In Parramatta City Centre Minimum of 1 space per 70m ² of gross floor area, maximum of 1 space per 50m ² of gross floor area
Medical Facilities	> Ground level - 1 space per 25m ² GFA > Upper level(s)- 1 space per 35m ² GFA	> In Parramatta City Centre - Minimum of 1 space per 70m ² of gross floor area, maximum of 1 space per 50m ² of gross floor area
Shopping Centres	> Ground level - 1 space per 25m ² GFA > Upper level(s)- 1 space per 35m ² GFA	-
Restaurants	> 1.5 spaces per 10m ² GFA	> Outside city centre - First 100m ² > 1 space per 30 m ² of gross floor area Available on-street parking cannot be included in the calculation (Section 3.6.2 C.30 'Business and Retail Premises' does not apply to the first 100 m ² of floor space) - Additional floor space over the first 100 m ² > Whichever is greater - 15 spaces per 100 m ² or 1 space per 3 seats
Cafes	> 1.5 spaces per 10m ² GFA	> In Parramatta City Centre: - Minimum of 1 space per 60m ² of gross floor area, maximum of 1 space per 30m ² of gross floor area
Clubs	> 1.5 spaces per 10m ² GFA	-
Function Centres	> 1.5 spaces per 10m ² GFA	-
Hotels	> 1.5 spaces per 10m ² GFA	-
Convenience stores	> 1 space per 25m ² GFA Plus 5 spaces per work bay (for vehicle servicing facilities)	-
Service Stations	> 1 space per 25m ² GFA Plus 5 spaces per work bay (for vehicle servicing facilities)	-

Development Type	Campbelltown Council rates	Parramatta City Council rates
Bulky Goods/ Industrial	> 1 space per 60m ² GFA	> Outside city centre - 1 space per 70 m ² of gross floor area plus 1 loading bay per 800 m ² of gross floor area
Car Sales	> 1 space per 100m ² site area plus 5 spaces per work bay (for vehicle servicing facilities)	-
Motor Showrooms	> 1 space per 100m ² site area plus 5 spaces per work bay (for vehicle servicing facilities)	-
Squash Courts	> 3 spaces per court	-
Tennis Courts	> 3 spaces per court	-
Bowling Alley	> 3 spaces per alley	-
Gymnasiums	> for indoor facilities: - 1 space per 25m ² GFA > for outdoor facilities: - 1 space per 50m ² of site area	-
Recreational Facilities	> As per gymnasium rates	-
Sport Facilities	> As per gymnasium rates	-
Cinemas	> As per gymnasium rates	-
Motels	> 1 space for each unit Plus 1 space per 2 employees	-
Plant Nurseries	> 15 spaces; Plus 0.5 spaces per 100 m ² of site area.	-
Childcare Centre		
Childcare Centre	> A minimum of one (1) on site car parking space shall be provided for every four (4) children approved to attend the child care centre.	> Outside city centre - 1 space for every 4 children in attendances
Religious Establishments		
Religious Establishments	> A minimum of one (1) car parking space shall be provided for every 3.5 site users.	-
Separate Development DCP		
One Minto DCP	> A separate off-street car parking space shall be provided for the occupants of the studio apartment in addition to the car parking requirements for the main dwelling.	-

Development Type	Campbelltown Council rates	Parramatta City Council rates
Glenfield Urban Release Area	<ul style="list-style-type: none"> > Accommodation on-site for 2 cars provided for single detached dwelling-houses. > Number of bedrooms/ dwelling and rate: <ul style="list-style-type: none"> - Bedsitter of 1 bedroom – car parking spaces/ dwelling = 0.75 - 2 bedroom – car parking spaces/ dwelling = 1 - 3 or more bedroom – car parking spaces/ dwelling = 1.5 - Visitor spaces – car parking spaces/ dwelling = 0.2 	-
UWS DCP 2008	<ul style="list-style-type: none"> > Minimum 1 space per dwelling plus: <ul style="list-style-type: none"> - an additional space for every 4 dwellings (or part thereof) - an additional visitor space for every 10 dwellings (or part thereof) > Where development greater than 3 storeys all car parking is to be at basement level Parking at ground level shall be screened from view. > All residential apartment buildings to provide bicycle storage at a rate of 1 space per 5 dwellings within common property. 	-

Overall, the Campbelltown car parking rates are either slightly higher than Parramatta City Council rates or consistent. This is also reflective of the evolution of each region with regards to the amount of development and area density.

4.9.3 Precincts

Parking conditions for each precinct is discussed further in the following sections.

Glenfield

The Glenfield precinct has three primary demands for parking; these are residential, educational and commuter. These demands are currently catered for through on-street and off-street facilities.

Residential demands are accommodated on each respective property. Residential visitor demand is generally accommodated for on-street through a mix of unrestricted and restricted parking controls to manage a variety of demands simultaneously. The majority of on-street parking is restricted within 400 metres of the Glenfield Station. In the outer area controls are generally 3P and longer, closer to the Station controls are generally 2P or less to cater for the main street demand. The on-street parking controls have inconsistent times of operation in the precinct.

The off-street parking supply is provided via commuter, retail and sporting ground car parking. The largest facility is the commuter car park with approximately 750 spaces, which is located to the north of the station. The sporting ground provides 180 spaces and is located to the south of the station. The retail parking is a local facility that provides additional parking for people visiting the main street. Overall it is considered that Glenfield provides off-street parking for a much larger catchment area. This indicates that Glenfield provides Park & Ride facilities for people living outside the precinct.

There is existing Kiss & Ride facility located on the north-west side of the station. The provision of one Kiss & Ride facility is considered to be inadequate for the scale of the station and demand.

The on-street and off-street parking needs for the local area appeared suitably catered for within this precinct.

Macquarie Fields

The Macquarie Fields precinct has two primary demands for parking; residential and commuter. These demands are currently catered for through on-street and off-street facilities.

The residential demand is currently catered for on-street through a mix of unrestricted and restricted parking controls to manage a variety of demands simultaneously. The majority of on-street parking is unrestricted, with No Parking restrictions closer to the station to discourage commuter parking on-street. The use of No Parking as a restriction to manage commuter parking on-street has the potential to also impact on residential demand. For example, residents may have a visitor during these times or park their vehicle on-street. While an effective tool to manage commuter parking, consideration should be given to implementing timed parking restrictions to provide some flexibility for residents.

The off-street parking supply is provided via a commuter car park. The facility provides approximately 115 spaces, which is located to the south of the station. The parking was observed to be well utilised, with some vehicles parked informally on the grassed area adjacent to the formal commuter car park. The demand in this area is primarily from commuters, as there are no other significant demands within the area. Consideration should be given the formalising and integrating the adjacent grassed area with the existing commuter car park.

The current Kiss & Ride facility is located on the south-east side of the station. The provision of one Kiss & Ride facility is considered to be adequate for the scale of the station, and its demand and available access points.

The on-street and off-street parking needs for the local area appeared to be sufficient to cater for demand in the precinct.

Ingleburn

The Ingleburn precinct has three primary demands for parking; residential, retail/commercial and commuter. These demands are currently catered for through on-street and off-street facilities.

The residential demand is currently catered for on-street through a mix of unrestricted and restricted parking controls to manage a variety of demands simultaneously. The majority of on-street parking is unrestricted on the north-west side of the station and restricted on the south-east side of the station. This reflects the differing land uses of industrial, retail and commercial respectively. The north-west side of the station is largely unrestricted and provides overflow parking for employees of the industrial land uses in this area. The south-east side of the station has a higher demand for vehicle access and as a result parking. The retail and commercial nature of this area results in moderate-significant demand for parking, which has resulted in parking controls of 2P or less for the majority of the day Monday-Saturday.

The off-street parking supply is provided via a commuter and town centre car park. The largest facility is the town centre car park that collectively provides approximately 600 spaces. These spaces are located in two locations; north and south of the town centre. The commuter car park provides approximately 200 spaces, which are located within close walking distance of the station.

There is currently no Kiss & Ride facility located at the station. The provision of a Kiss & Ride facility on each side of the station is recommended to improve safety for these movements.

Minto

The Minto precinct has three primary demands for parking; industrial, residential, commuter and retail. These demands are currently catered for through on-street and off-street facilities.

The industrial land use is located on the north-west and south of the station, which occupies approximately three quarters of the area surrounding the station. The low density nature of the industrial land use does not generate significant on-street demand for parking, most parking is provided on-site. Parking in the industrial areas is unrestricted. The residential area also generates low demand for parking and has unrestricted on-street parking. The station is the largest generator of parking demand within the Minto precinct. This has resulted in a combination of parking restrictions along the main street, ranging from 15min to 2P operating during general business hours and on Saturday morning.

The off-street parking supply is provided via a commuter and town centre car park. The largest facility is the commuter car park that collectively provides approximately 600 spaces. These spaces are located in two locations; south and west of the town centre. The commuter car park is comprised of a combination of off-street and on-street parking, with 80 spaces on-street and 520 off-street.

There is currently no Kiss & Ride facility located at the station. The provision of a Kiss & Ride facility on the eastern side of the station is recommended to provide a formal location and prevent vehicle conflicts.

Leumeah

The Leumeah precinct has four primary demands for parking; these are commuter, entertainment, large scale retail/industrial and residential. These demands are currently catered for through on-street and off-street facilities.

The commuter demand is currently not catered for on-street, although some unrestricted parking is provided within walking distance of the station. There are some 2P parking restrictions on the south side of the station, adjacent to retail uses. The majority of parking for the precinct is provided via off-street facilities.

The off-street parking supply is provided via a commuter and town centre car park. The largest facility is the commuter car park that collectively provides approximately 1,300 spaces. These spaces are located in three locations; south-west, east and north-east of the station. The remaining parking that is located off-street is on private property, which amounts to approximately 1,400 spaces.

There are currently two Kiss & Ride facilities located on the north and south side of the station. The Kiss & Ride on the south side is timed between 9:00pm – 6:00am to cater for evening and late night demand.

The on-street and off-street parking needs for the local area are currently considered adequate for this precinct.

Campbelltown

The Campbelltown precinct has three primary demands for parking; these are retail, commercial, commuter and industrial. These demands are currently catered for through on-street and off-street facilities.

The parking demand is currently catered for on-street through a mix of unrestricted and restricted parking controls to manage a variety of demands simultaneously. The majority of on-street parking is restricted on the south-east side of the station and unrestricted on the north-west side of the station. This reflects the differing land uses of retail/commercial and industrial respectively. The south-east side of the station has a higher demand for access and as a result on-street parking. The retail and commercial nature of this area results in moderate-significant demand for parking, which has resulted in parking controls of 2P or less, with the majority being 1P during business hours Monday-Saturday.

The off-street parking supply is provided via a commuter and town centre car parking. The commuter car parking collectively provides approximately 1,050 spaces. These spaces are located in three locations all north-west of the station. The town centre car parking provides approximately 1,800 spaces, which are located on the south side of the station and distributed throughout the town centre.

There is currently one Kiss & Ride facility located on the north side of the station. The provision of a Kiss & Ride facility on the southern side of the station is not required as there is a 15min parking zone to cater for Kiss & Ride.

The on-street and off-street parking needs for the local area are currently considered adequate for this precinct.

Macarthur

The Macarthur precinct has three primary demands for parking; these are retail, educational and commuter. These demands are currently catered for through on-street and off-street facilities.

The parking demand is currently catered for on-street through a mix of unrestricted and restricted parking controls to manage a variety of demands simultaneously. The majority of on-street parking is unrestricted on the south side of the station with no current on-street parking on the north side of the station. This reflects the differing land uses of retail and educational respectively.

The off-street parking supply is provided via a commuter, town centre and educational car parking. The largest facility is the town centre car parking that collectively provides approximately 2,900 spaces. These spaces are located in a number of locations around the town centre. The commuter car park provides approximately 500 spaces, which are located within close walking distance to the station.

There is currently one Kiss & Ride facility located on the south side of the station. The provision of a Kiss & Ride facility on the north side of the Station should be investigated as part of the university and TAFE development. At present, there is no need for a Kiss & Ride at this location.

The on-street and off-street parking needs for the local area are currently considered adequate for this precinct.

4.9.4 Precinct parking considerations

Parking management strategies should be investigated to develop clear and consistent parking restrictions for on-street facilities and Opal card technology used to maximise the use of off-street commuter facilities for public transport customers.

Each precinct would benefit from an area wide parking study to determine complementary uses that could utilise parking at different times of the day. In addition travel demand management strategies, such as carpooling and public transport fare inclusion in ticket prices, should be investigated to develop an integrated parking management framework for the precinct.

4.10 Key considerations

The existing transport network in the Glenfield to Macarthur Corridor provides an insight into how the corridor functions and raises a number of transport considerations for the development of the precinct structure plans. Key considerations for the study area include:

Walking

- > The walking network in the study area varies from precinct to precinct in quality, connectivity and safety. Where provided, these are generally to minimum standards away from key activity precincts.

There are some significant barriers to access some stations, including:

- Large land parcels with limited public access;
 - Natural features, such as creeks and waterways;
 - Main roads with high traffic volumes and limited safe crossing opportunities;
 - Sporting facilities; and
 - Shopping centres.
- > The highest priority is establishing a clear and legible walking network around each station to provide basic access. Improved connectivity and maximising the walking catchment is also a high priority to increase the potential customer base.

Cycling

- > The cycling network is incomplete and does not connect key destinations within each precinct or regionally. In most cases the station is within close proximity to the precinct's main area for goods and services, which is an opportunity to provide cycling facilities that connect multiple key destinations. The high amount of private vehicle use within the study area is likely to require facilities that are of a high safety standard to encourage more people to cycle.
- > The result is that the cycling facilities and network is underutilised and cycling mode split is under represented.

Rail (Passenger)

- > The rail network within the study area serves freight and passengers. There are three train lines that service the study area, T2 South Line, T5 Cumberland Line and the South West Rail Link. The study area facilitates a large amount of industrial uses and as a region it is the gateway to and from the Southern Highlands, South Western Sydney and Canberra. In this context, rail provides a significant role in supporting the local economy and intermodal facilities. Future proofing for both freight and passengers is a key challenge for this rail corridor.
- > Within the study area there are seven rail stations, each with specific challenges, which include:
 - Access and walking: maximising walking catchments will increase the amount of people who have access between the station and their residence and employment. This will increase the likelihood of achieving mode shift to sustainable modes of transport;
 - Integration with other modes: Ensuring integration with other modes of transport maximises the customer experience and increases the likelihood that people will walk, cycle and catch the bus to/from the rail station;
 - Parking: balancing the supply and restrictions of parking to support the use of public transport however not encourage private vehicle use for all trips; and
 - Land use: providing a mix of land uses within close proximity of the station to encourage multi-purpose trips and maximise local access to local business.

Freight (Rail and Road)

- > The key rail and road freight networks have national significance and as a result the corridor has optimal access to the national and international freight network.
- > Consideration is required to reserve space to increase freight network capacity in the future.
- > The study area supports a large amount of industrial uses and as a result, freight within the study area and wider region is significant. Access to the railway lines and motorways is a key driver for industrial uses and maintaining and improving these access points will continue to support the local and regional industrial uses.

Bus

- > The study area has good coverage for bus routes, however service levels have a high variance of frequency depending on origin, destination and route in between.
- > There are routes that connect to Wollongong and Warragamba, which also connect to Appin and Oran Park. These services are infrequent with one service each in the AM and PM peak period.
- > Local routes cover the study area well and generally are all day services, not peak demand services. This means that there is a steady frequency throughout the day to support all day use.
- > While coverage is considered to be good, directness is affected and as a result journey times can be lengthy. A balance of coverage and directness with the services for the study area is a consideration for future networks.
- > The prevailing residential land use density through the corridor is low and there are a large number of bus routes in the region. As such it is difficult to justify higher frequency services.

Road and parking

- > The road network is largely local with some significant regional and cross corridor connections.
- > The road network provides good local connections and a limited number of connections to the arterial road network, in particular the Hume Motorway. The limited connections to the Motorway is considered to be typical for this type of infrastructure.
- > There are limited opportunities to cross the railway line for the local network, this is considered a barrier to all transport modes and consideration for increasing the amount of crossing opportunities should be investigated further.
- > Parking throughout the study area is provided through a mix of on and off-street parking. Parking policy and restrictions require careful consideration to balance the competing needs of local residents, commuters, businesses and visitors. A combination of time-based restricted and unrestricted parking currently exists in most precincts aiming to achieve this balance. Strategies developed to aid in the management of parking should consider these needs and seek to support a higher sustainable mode share for the future.

Summary

The assessment of the existing transport network has been undertaken to identify improvements and opportunities. These key considerations will be used to develop objectives and measures to encourage more walking, cycling and public transport use while seeking to support the corridor's key employment uses, freight activity and strategic role within Metropolitan Sydney.

5 Planned transport network improvements

This section provides a review of the known proposed transport network improvements in the region prior to the development of this strategy. These have been identified through background research and consultation with TfNSW.

5.1 Walking

5.1.1 Green Grid

The Green Grid is a NSW government initiative to ensure that Sydney continues to be one of the most distinctive and liveable cities in the world. The Sydney Green Grid project is outlined as Action 3.2.1 of A Plan for Growing Sydney, 2014. Initially, a pilot program will be undertaken in Parramatta City Council LGA. If this is successful, it is expected to be rolled out across metropolitan Sydney.

The initiative aims to provide and promote a network of green spaces such as national parks, wetlands and rivers that are connected via high quality walking and cycling connections which is called the Green Grid. The Green Grid will improve urban landscapes while ensuring that sustainable infrastructure is part of developments in Sydney's future.

The Glenfield to Macarthur Corridor is in close proximity to some major water bodies and national parks, such as the Nepean and Georges Rivers, Warragamba Dam, Western Sydney Parklands and Mount Annan Botanic Gardens.

The 'Green Grid' for Glenfield to Macarthur area seeks to maximise the use of open and green space for recreational and active uses. This initiative has the potential to activate spaces that feel unsafe and also reduce maintenance costs associated with open space.

It should be noted that the Green Grid may provide some key transport links, however the primary purpose of the network is to maximise the connection between green spaces.

5.2 Cycling

Campbelltown-Macarthur is identified in the plan as a Major Centre which will have a bicycle network plan developed, in collaboration with the relevant councils, for a five kilometre catchment as part of the Connecting Centres Program outlined in Sydney's Cycling Future. The initiative supports local councils to develop bicycle plans and fund infrastructure. The five kilometre catchment will be expanded to cycling links within a ten kilometre catchment in the long term.

Specific improvements for the Glenfield to Macarthur Corridor:

- > Priority cycleway routes proposed for between Liverpool and Glenfield.
- > Installation of secure bicycle facilities at Campbelltown Station.

In relation to these programs, no timeframes are specified and these will require collaboration with state and local governments.

5.3 Rail

5.3.1 Railway corridor

The railway line will remain a key transport corridor in the region and as part of the national network. As the needs of the both the freight and passenger network increase, so too will the need to provide additional capacity on the corridor. Major expansions can be expected in the longer term, however medium term improvements would likely include additional passing loops on the freight line and a review of passenger services and operations to utilise existing spare capacity on the network.

Long term expansion requirements are likely to include additional tracks, stabling and other supporting facilities along the corridor, however the extent of these facilities are not know at this stage and this has not been committed to.

5.3.2 Ingleburn station precinct accessibility upgrade

Ingleburn Station has been included as part of the Transport Access Program (TAP) and at the time of writing was being upgraded. The TAP is an initiative by Transport for New South Wales (TfNSW) to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most. The aim of the program is to provide:

- > Interchange precincts that are accessible to people with a mobility impairments, the elderly and people with prams, that is step free access;
- > Inclusive buildings and facilities for all modes that meet the needs of a growing population;
- > Modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers;
- > Safety improvements including extra lighting, help points, fences and security measures for car parks and interchanges, including bus stops and wharves;
- > Signage improvements so customers can more easily use public transport and transfer between modes at interchanges; and
- > Other improvements and maintenance such as painting, new fencing and roof replacements.

The proposed improvements for Ingleburn include:

- > Three new lifts;
- > Covered walkways from the lifts to the platforms;
- > Reconfiguration of the existing commuter parking to provide four accessible parking spaces;
- > The installation of new bicycle racks;
- > Reconfigured station entries;
- > New customer amenities;
- > Improvements to the bus stop and canopy, taxi zone, bicycle storage and accessible parking; and
- > Formalised kiss and ride facilities.

It is expected the improvements will support the use of public transport in the corridor and beyond.

5.3.3 Campbelltown station commuter car park expansion

The Minister for Transport announced an additional 450 commuter car parking spaces for Campbelltown Station, as an election commitment on 20 March 2015. TfNSW will work with Campbelltown Council to deliver the additional spaces near the Campbelltown Station Interchange precinct.

5.4 Freight

5.4.1 Road

The RMS is responsible for key road freight routes and they will monitor the road network and identify the needs so as to efficiently accommodate future demands.

5.4.2 Moorebank Intermodal Terminal

The proposed Moorebank Intermodal (freight) Terminal proposes to create a strategically located terminal to improve freight interchange for the south west Sydney region. It is to be located approximately 2.3 kilometres north-east of Glenfield Station adjacent to the national freight rail connection, specifically the Southern Sydney Freight Line and Hume Motorway. This includes a rail connection to Port Botany, where shipping containers will be transferred from ship to rail. This will allow the movement of freight to the western suburbs from the Port of Botany off the road network.

It will comprise of a freight rail yard, trucking terminal and warehousing. There will be two distinct components of the facility, these being:

- > An import-export terminal to manage up to 1.2 million shipping containers per annum; and

- > An interstate terminal linked to the national freight network with a proposed capacity of 500,000 shipping containers per annum.

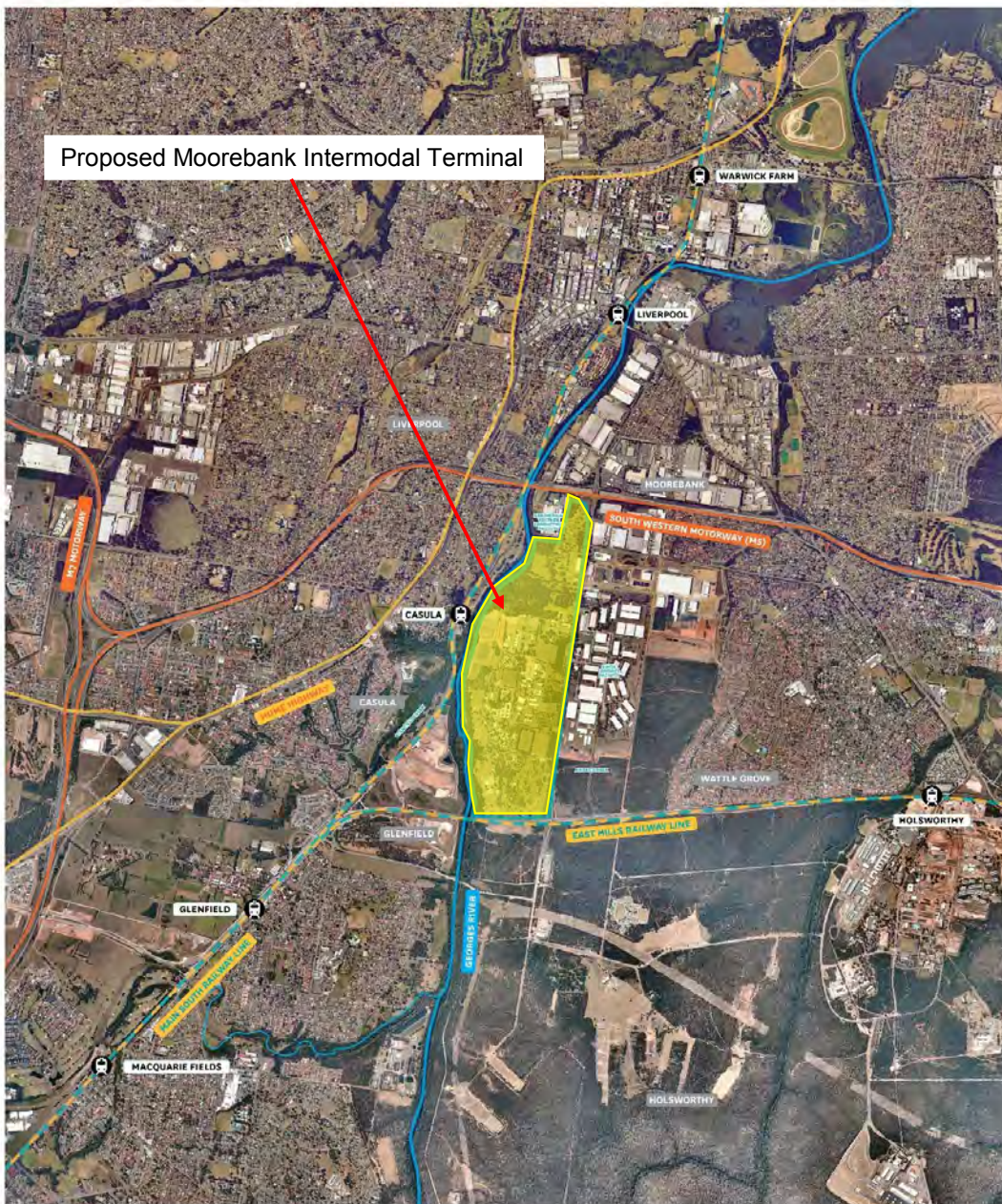
The key advantage of the terminal will be to take freight traffic from inner Sydney roads and transfer movements to rail, thus releasing road capacity, increasing reliability and efficiency.

The proposal was in Step 6 of an 8 step planning process at the time of writing. Additional up to date information is available at <http://simta.com.au/> and <http://www.miicl.com.au/>.

The road and rail network implications from the freight growth stimulated by the Moorebank Intermodal Precinct are being investigated.

The proposed location of the facility is shown in **Figure 5-1**

Figure 5-1 Proposed Moorebank intermodal terminal location



Source: <http://www.miicl.com.au/the-terminal/terminal-location-map.aspx>, viewed 06/03/2015

5.5 Bus

Transport for NSW undertakes continual reviews of bus services and strategic planning to determine requirements to accommodate future needs. The following considerations and concepts were inferred from consultation and are indicative of TfNSW's developing bus strategy for the region. These are in addition to the strategies and proposals set out in Sydney's Bus Future.

It must be noted that a wider network review is required before any significant changes are made to any services.

Existing constraints:

- > Cross regional links to the east are restricted by the Georges River and the Holsworthy Military Reserve.
- > Narellan Road experiences significant traffic congestion and increasing numbers of buses are also using the road to access Campbelltown.
- > Road congestion through Campbelltown reduces service reliability, particularly Narellan Road.
- > Macquarie Fields Railway Station has limited road access.

Considerations for the future bus network include:

- > Streamlining Campbelltown to Liverpool services, these longer distance routes are patronised greater than local routes.
- > The road and bus network should be integrated in the planning phase to ensure the requirements of the bus network are taken into account when changes are made to the road network.
- > Frequency increases are required to support the use of rail.
- > Bus services will need to integrate with the SWGC bus strategy.
- > Bus services between Wollongong and Campbelltown could be improved.
- > Providing more services along Narellan Road and Badgally Road.

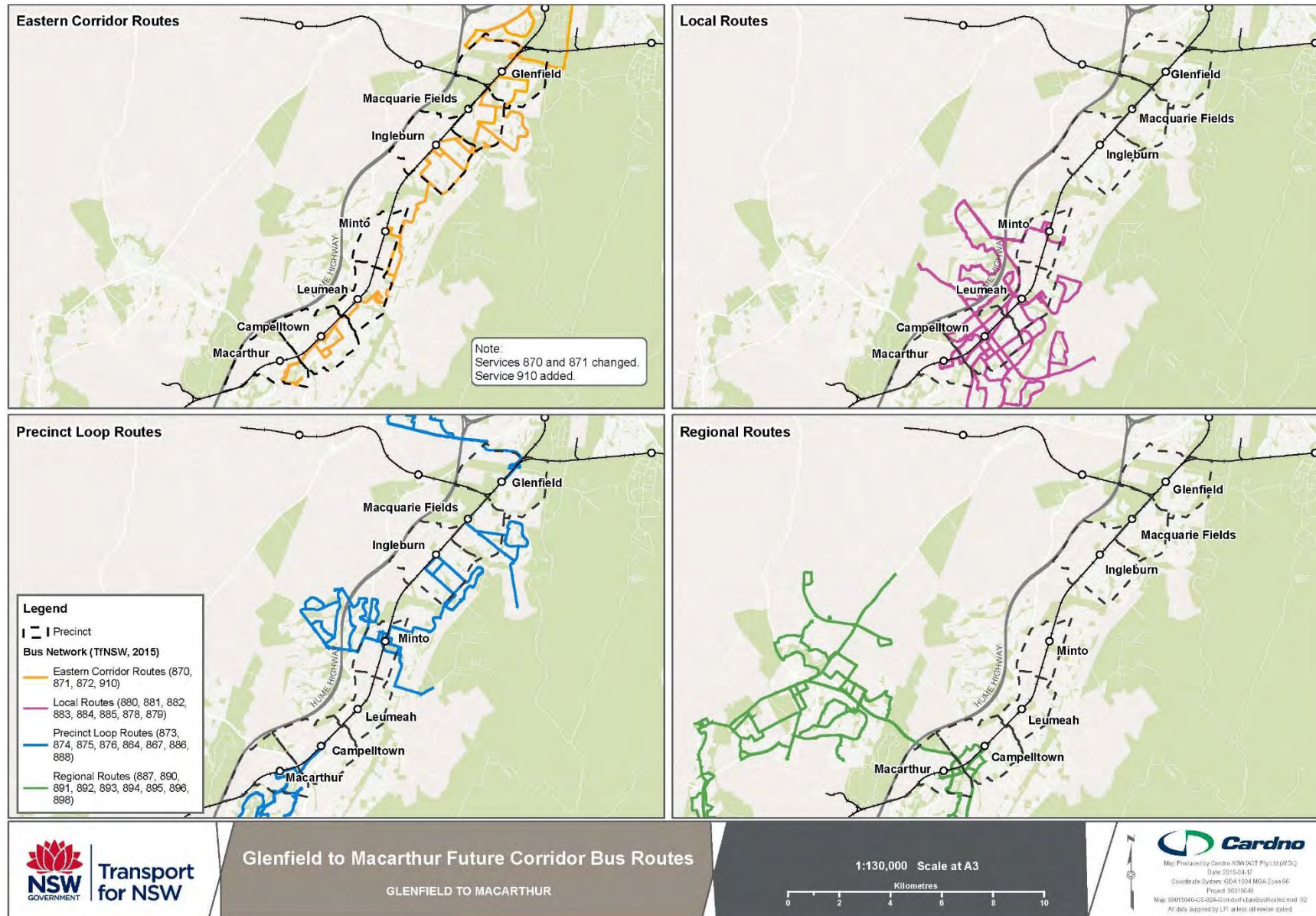
Concept routes and infrastructure improvements

The following pre-feasibility study concepts are potential solutions to accommodate the needs of an increasing population:

- > Proposed development in Macarthur South could impact bus routes, new routes or alterations to existing routes could be considered as part of a wider network review to service the area.
- > New transit roads could be provided for bus services only to bypass constrained roads around Campbelltown and Macarthur. These include:
 - Menangle Road to Camden Road link under Narellan Road.
 - Badgally Road and Broughton Street link/ railway crossing.
- > A potential new route between Ingleburn and Edmondson Park.
- > A new route between Catherine Fields and Minto is also being considered.

The concept future bus network routes are outlined in **Figure 5-2** as follows:

Figure 5-2 Planned future bus routes



5.6 Road

Regional road improvements will be largely driven by the development of the South West Growth Centre, Western Sydney Airport and the Western Sydney Employment lands. Increases to the number of railway crossing points would be driven by interconnectivity requires brought about by these neighbouring regional developments. Structure plans of the South West Growth Centre indicate key road corridors and their links with existing roads in the study corridor.

Key freight and transit corridors, including potential railway crossing points will need to be protected for future expansion of the road network.

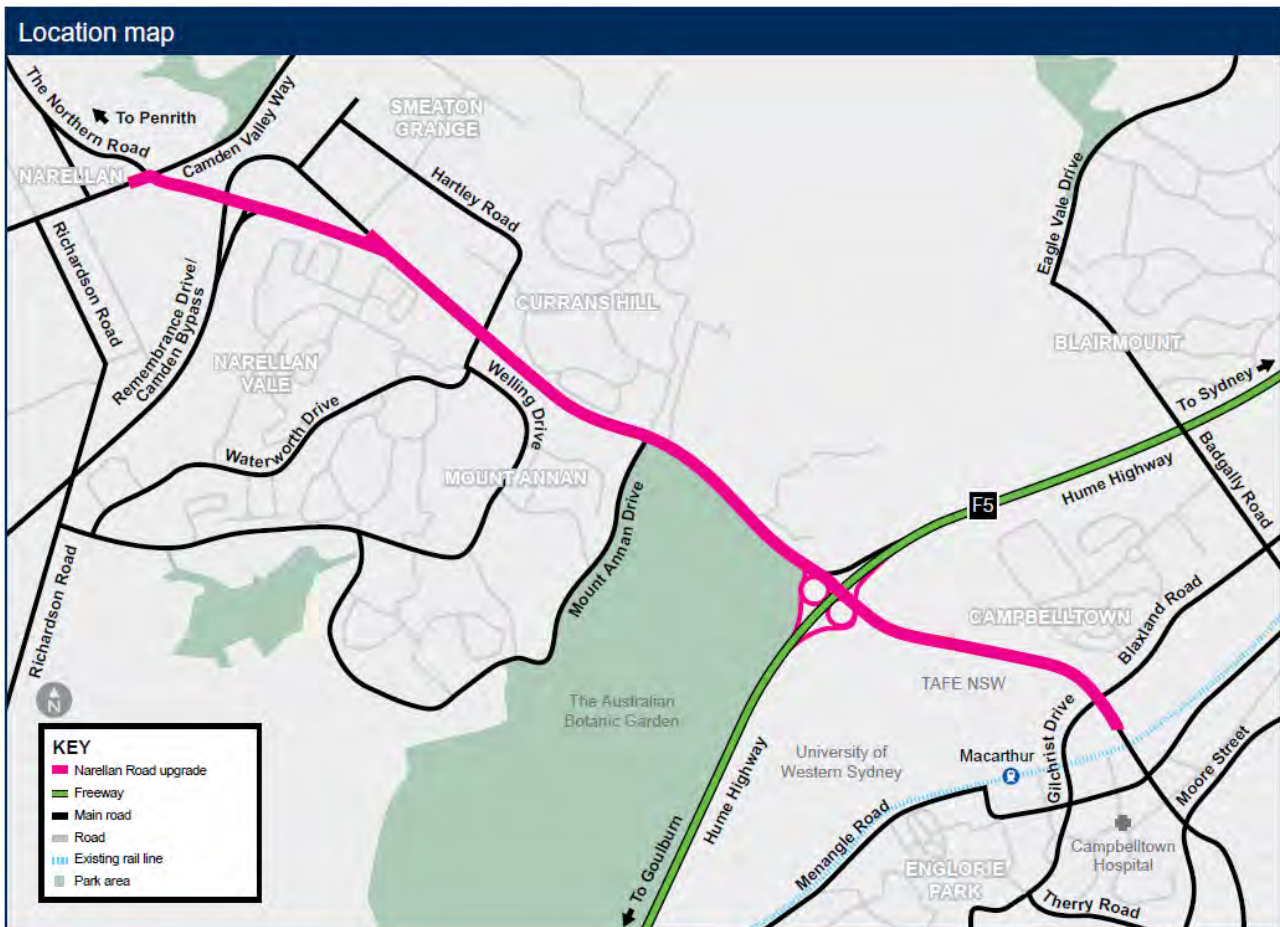
5.6.1 Narellan Road Upgrade

In June 2014, the RMS published plans to increase the capacity of Narellan Road, between Camden Valley Way and Blaxland Road. The Narellan Road Upgrade plans to provide road capacity for the growing population of South West Sydney. The 7.7 kilometre road upgrade is a key road in connecting the Hume Highway to regional centres of Camden and Campbelltown for motorists, commuters, cyclists and freight.

Stages of the upgrade include:

- > Stage 1: Three lanes for both directions on Narellan Road between Mount Annan Drive and Hume Highway interchange;
- > Stage 2: Three lanes eastbound between the Hume Highway and Blaxland Road and three westbound lanes between the UWS/TAFE access road and the Hume Highway interchange;
- > Stage 3: Increase to two right turn lanes on Narellan Road at the Blaxland Road/ Gilchrist Drive intersection;
- > Stage 4: Three lanes in both directions between Waterworth Drive and Mount Annan Drive; and
- > Stage 5: Bridge widening at the Hume Highway.

The upgrade also proposes to build a shared path running parallel to the road along the southern side. Stage 1 is currently under construction and expected to be complete by mid-2016 and Stage 2 to be complete by 2018, with subsequent stages yet to be finalised for completion. A map of the proposed upgrade is provided in **Figure 5-3**.

Figure 5-3 Narellan road upgrade


Source: <http://www.rms.nsw.gov.au/documents/projects/sydney-west/campbelltown-narellan-road/narellan-road-community-update-nov-12.pdf>

5.6.2 Glenfield Road

The RMS propose to widen Glenfield Road between Campbelltown Road and Brampton Avenue as part of the Pinch Point Program. The work will seek to improve traffic flow and pedestrian facilities. Construction on this project is expected to begin in 2015.

5.6.3 Cambridge Avenue

Investigations would be undertaken as part of the proposed Moorebank Intermodal Terminal to determine any requirements to upgrade Cambridge Avenue. This would be part of the Higher Productivity Vehicle route from the Moorebank Intermodal Terminal Precinct to the Hume Motorway, and to the M7.

5.6.4 Western Sydney Airport

A new airport is proposed at Badgerys Creek in Western Sydney. The new airport would be a major driver of growth in south west Sydney and is expected to be operational in the mid 2020's. It would provide links between the region and the rest of Australia and international locations. Infrastructure planning is underway to provide the necessary facilities to support the function and access to the airport.

Plans for these upgrades include:

- > The upgrade of Bringelly Road to a minimum of four lanes from Camden Valley Way to The Northern Road;
- > Werrington Arterial Stage 1 - upgrade of Gibbs Street to a four lane dual carriageway linking the Great Western Highway and M4 with east facing ramps on the M4 motorway;
- > The upgrade of The Northern Road to a minimum of four lanes from Narellan to the M4 Motorway;

- > Construction of a new four lane motorway between the M7 Motorway and The Northern Road; and
- > A \$200 million package for local roads upgrades.

The NSW and Australian Governments will also reserve a rail corridor that would link between the new South West Rail Link and St Mary's via the new airport.