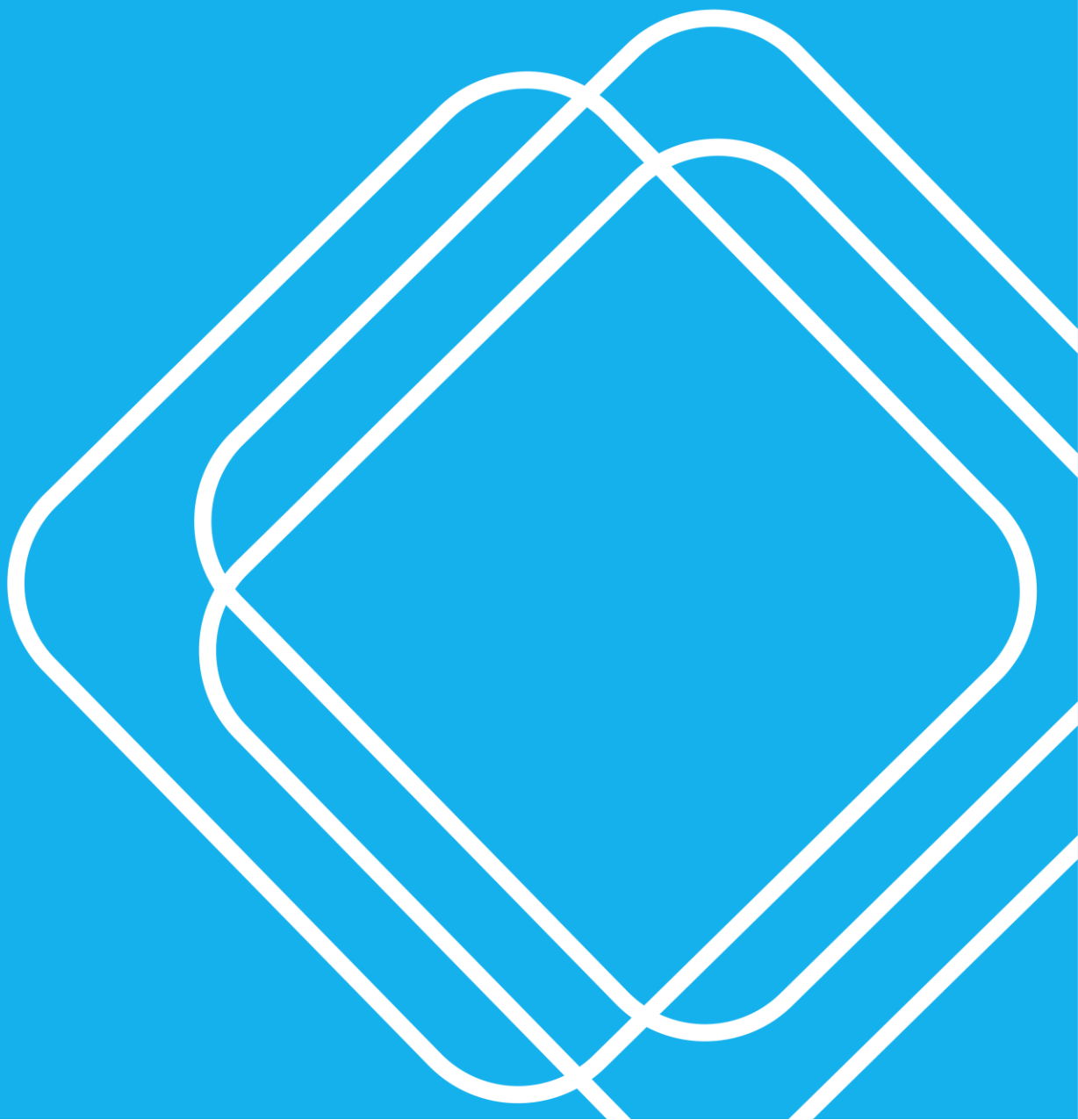
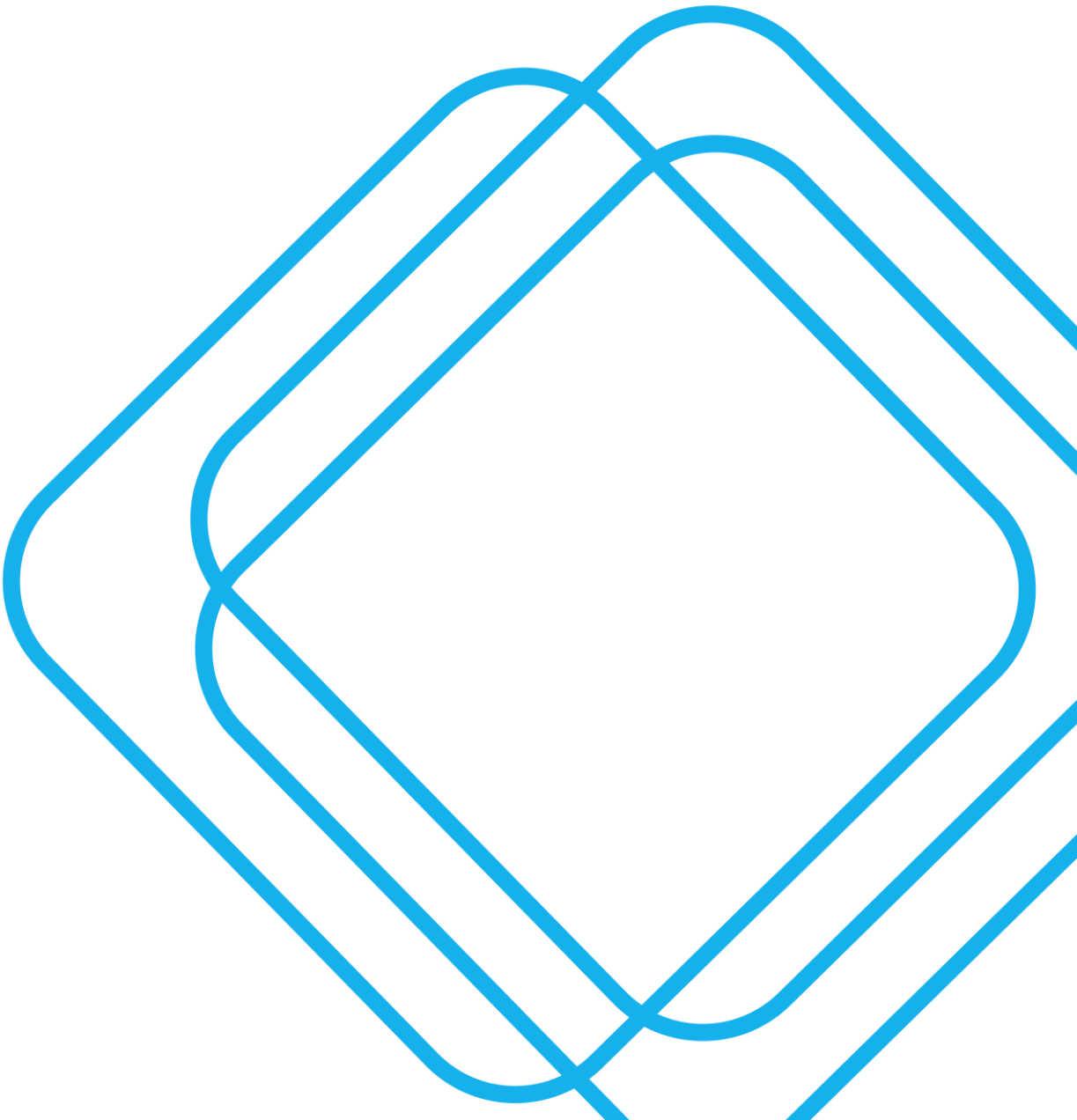
SCT Consulting

MACARTHUR GARDENS NORTH MASTERPLAN DA

Traffic and Transport Study

8 DECEMBER 2021





Quality Assurance

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1.0 Introduction

1.1 Background

Landcom is preparing a Masterplan for the Macarthur Gardens North (MGN), which is located just north of Macarthur Station in the Campbelltown City Local Government Area (LGA). The MGN is located on a greenfield site of approximately 18.52 hectares and is bounded by Goldsmith Avenue to the north, Gilchrist Drive to the east and the southern railway line (with Macarthur Station) to the south, as seen in **Figure 1–1**.

The MGN Masterplan proposes a mixed-use and medium to high-density residential precinct that includes a station arrival plaza and park, a regional east-west cycleway network and a significant amount of open space that retains the existing creek and biodiversity within the area. The MGN Masterplan has a proposed yield of:

– 1,250 apartments

– 1,960 m^2 of ground level retail activation along the arrival plaza and main street.

To support the development of the MGN Masterplan, Landcom will submit to Campbelltown City Council a Development Application (DA) for the entire Masterplan.

Figure 1–1 Location of Macarthur Gardens North Masterplan site

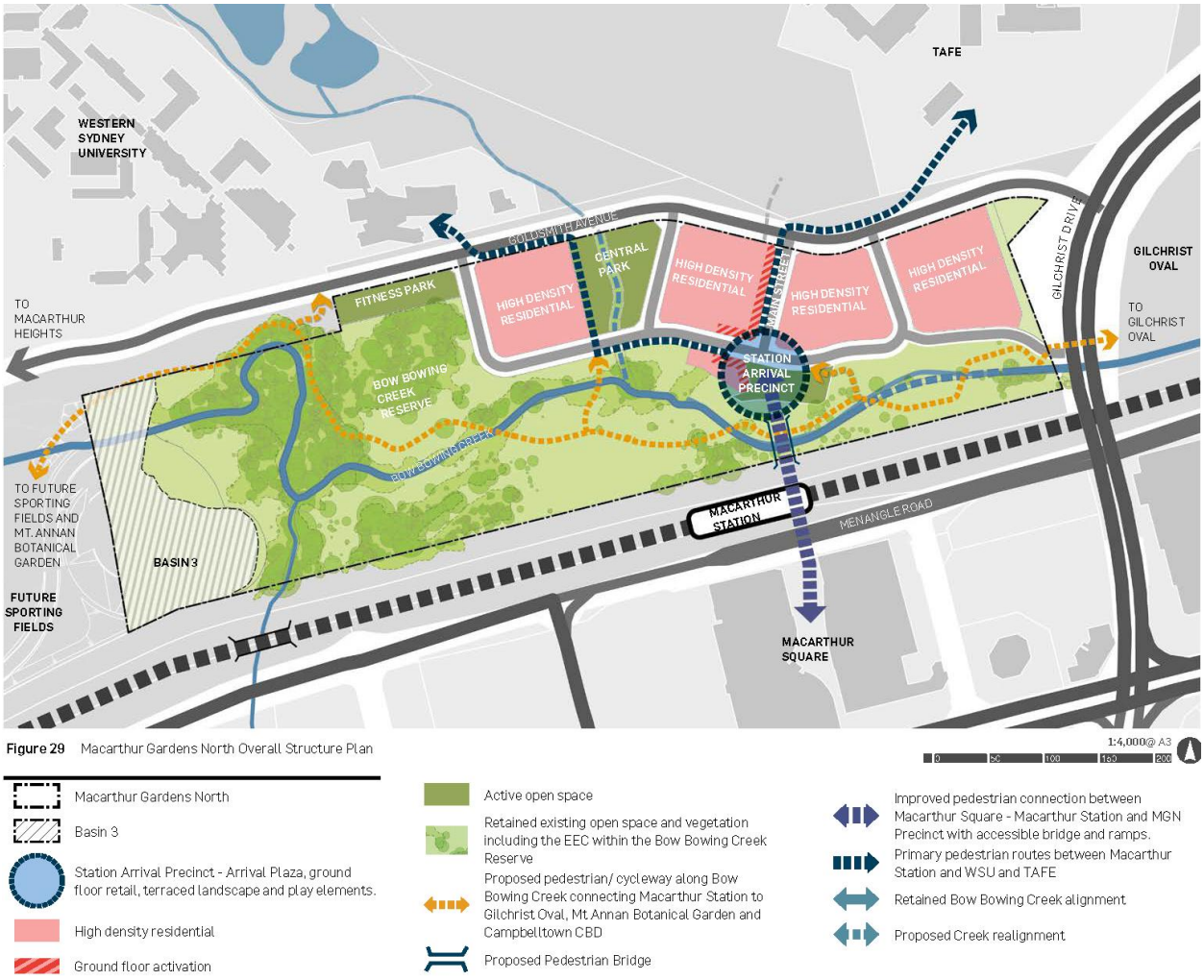


Figure 29 Macarthur Gardens North Overall Structure Plan

Source: Urbis, 2021

1.2 Purpose of report

The purpose of this Traffic and Transport Study is to support the Development Application for a proposed mixed-use Masterplan of the Macarthur Gardens North (MGN) site. This report will include and assess the impact of the development of 1,250 apartments and a small retail component, proposed as part of the Masterplan. It will also review the proposed connectivity and access to the surrounding road network, car parking requirements, public and active transport requirements and any mitigation measures required as a result of the MGN Masterplan.

In summary, the report has considered the following scope of works:

- Background research to inform the strategic context of the MGN Masterplan
- Review of existing traffic and transport context surrounding the MGN
- Assessment of proposed access arrangements for vehicles and pedestrians into and through the MGN
- Assessment of likely vehicle, active and public transport numbers generated by the MGN Masterplan as well as other surrounding developments
- Commentary on compliance with required relevant parking rates under the Campbelltown City DCP and other relevant guidelines
- Assessment of likely infrastructure upgrades required to cater for the MGN Masterplan
- Proposed public and active transport measures and sustainable travel initiatives for the development.

1.3 Report structure

This report has been structured into the following sections:

- **Section 2** provides an overview of the strategic context of the MGN Masterplan and a summary of the review of all relevant background documents.
- **Section 3** provides an overview of the existing conditions for all transport modes and a description of the existing transport demographics in the area.
- **Section 4** provides an overview of the proposed MGN Masterplan, and its associated parking and access arrangements.
- **Section 5** presents the increase in trip generation as a result of the MGN Masterplan, as well as the likely distribution of trips from the MGN in the future.
- **Section 6** describes the operational impacts of the MGN Masterplan on the surrounding transport network, for all modes of transport.
- **Section 7** summarises the study findings and presents the final conclusions of the assessment.

2.0 Strategic Context

Several relevant planning documents have been reviewed to provide background context for guiding the development of the MGN Masterplan and traffic and transport initiatives.

2.1 The NSW Government Future Transport 2056 Strategy

The Future Transport Strategy 2056 (The NSW Government, March 2018) is an update of NSW's Long-Term Transport Master Plan. It is a vision for how transport can support growth and the economy of New South Wales over the next 40 years. The Strategy is underpinned by the Regional Services and Infrastructure Plan and the Greater Sydney Services and Infrastructure Plan, as well as a number of supporting plans including Road Safety and Tourism.

The Future Transport Strategy 2056 sets the long-term vision for mobility and transport provision in NSW, explains how the customer experience of transport will change and what this means for NSW. The Future Transport Strategy 2056 identifies that Sydney will grow as a global metropolis with benefits distributed more evenly across the City. It sets out a vision of three cities to guide many of the planning, investment and customer outcomes including faster, convenient and reliable travel times to major centres, as shown in **Figure 2–1**.

Existing and potential transit connections, together with new technology and innovation, will make the network surrounding the Site more responsive to demand and better able to manage congestion in the future.

For the three cities identified, more specific outcomes listed as part of the Strategy which will benefit the Site's transport context, include:

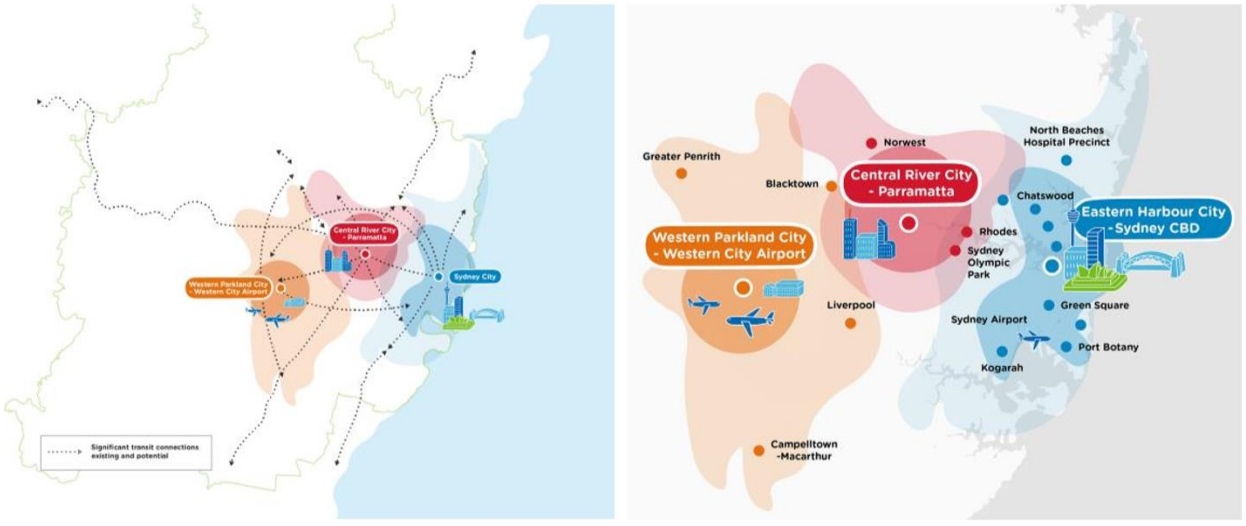
– A 30-minute access for customers to their nearest centre by public transport 7-days a week

– Fast and convenient interchanging with walking times no longer than five minutes between services

– Walking or cycling is the most convenient option for short trips around centres and local areas, supported by a safe road environment and attractive paths

– Fully accessible transport for all customers.

Figure 2–1 A future metropolis of three cities



Source: Future Transport 2056 Strategy

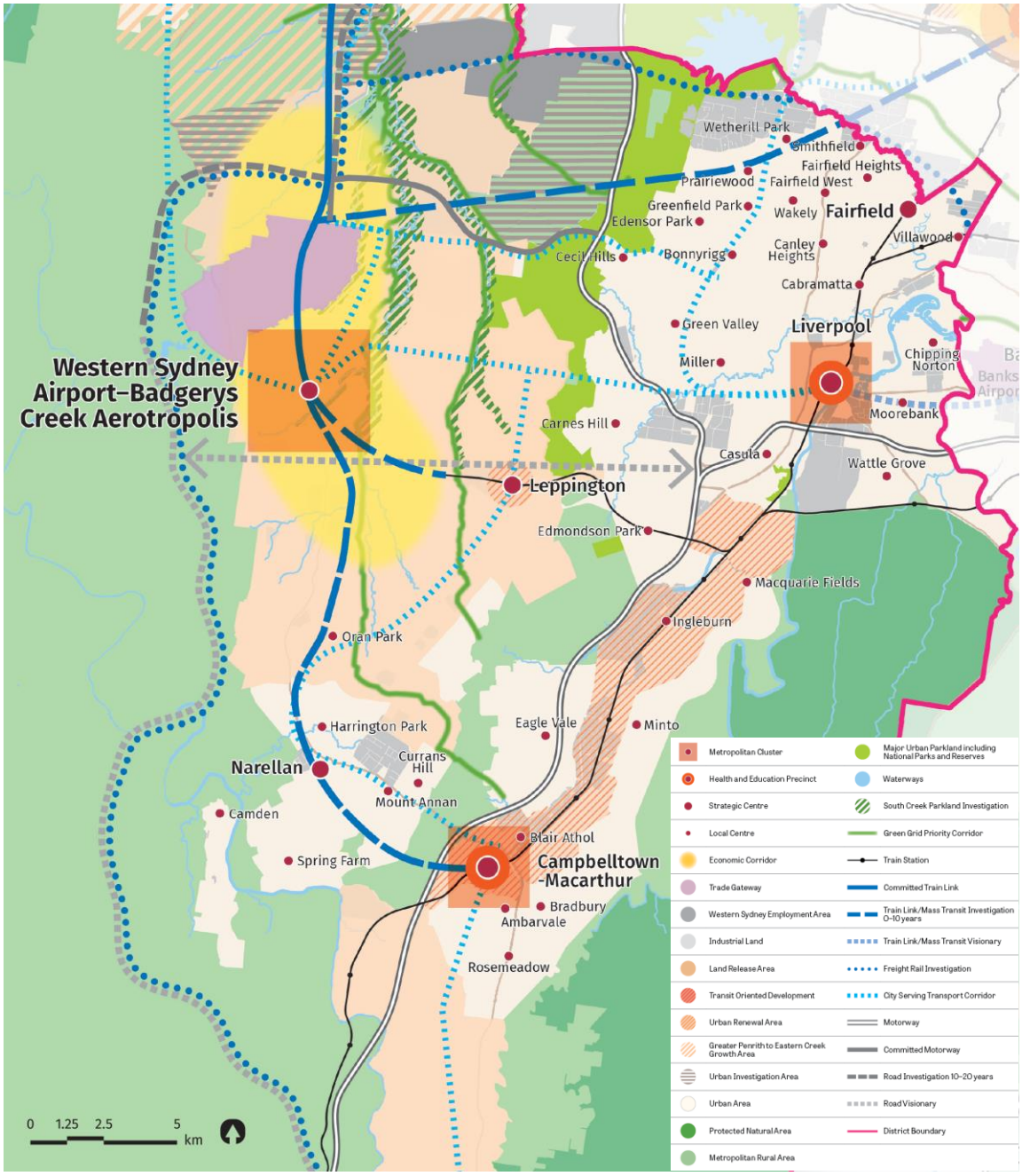
Implication for the MGN: The MGN is located within the Campbelltown-Macarthur Cluster of the Western Parkland City. This combined with the MGN's proximity to public transport facilities means the MGN is well positioned to access a strategic centre within 30 minutes. As specified in the Strategy, the MGN Masterplan also aims to make walking or cycling a convenient option for short trips around centres and local areas.

2.2 Western City District Plan

The Western City District (**Figure 2–2**) is Greater Sydney's parkland city, as it is surrounded by World Heritage listed landscapes, as well as towns and centres. The vision for Greater Sydney as a metropolis of three cities (the Western Parkland City, the Central River City and the Eastern Harbour City) means residents in the Western City District will have quicker and easier access to a wider range of jobs, housing types and activities. This vision will improve the District's lifestyle and environmental assets.

The vision for the Western City District Plan will in part be achieved by aligning growth with infrastructure, including transport, and delivering sustainable and adaptable solutions. The Western City District indicated that there will be a population growth of 464,000 people and demand for an additional 184,500 dwellings in the next 20 years. This will be provided in land release areas and urban renewal close to existing centres. The focus of growth will be on well-connected and walkable places that build on local strengths and deliver quality public places.

Figure 2–2 Strcuture Plan of Western City District



Source: Greater Sydney Commission, 2018

The District Plan informs local strategic planning statements and local environmental plans, the assessment of planning proposals as well as community strategic plans and policies. The District Plan also assists Councils to plan for and support growth and change and align their local planning strategies to place-based outcomes. It guides the decisions of State agencies and informs the private sector and the wider community of approaches to manage for growth and change. Community engagement on the District Plan has contributed to a plan for growth that reflects local values and aspirations, in a way that balances regional and local considerations.

Relevant to the Macarthur area, the Western Parkland City will capitalise on the established centres of Liverpool, Greater Penrith and Campbelltown-Macarthur, which together will form a metropolitan cluster in the future. The future linkage of walking and cycling paths, bushland and a green urban landscape framed by the Greater Blue Mountains World Heritage Area, the Scenic Hills and Western Sydney Parklands will also connect Macarthur better with the surrounding district, via sustainable transport.

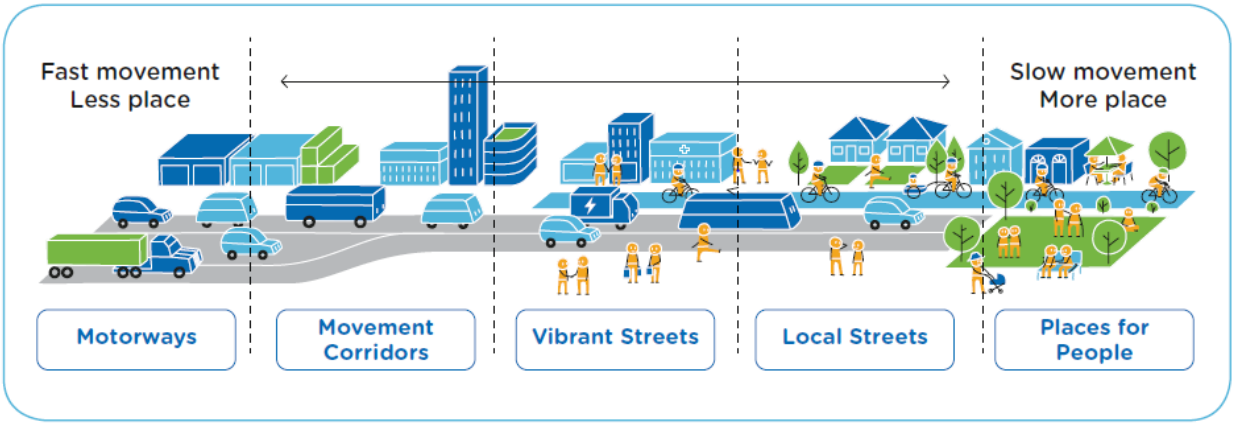
Implication for the MGN: The MGN is located within the Campbelltown-Macarthur Cluster of the Western Parkland City. This combined with the MGN's proximity to public transport facilities means the MGN is well positioned to access a strategic centre within 30 minutes. The Masterplan's residential development also aligns with the Plan's vision to provide future housing developments close to existing and well-connected centres.

2.3 Greater Sydney Services Infrastructure Plan

The Greater Sydney Services and Infrastructure Plan is a 40-year plan for transport in Sydney. It is designed to support the land use vision for Sydney. Building on the state-wide transport outcomes identified in the Future Transport Strategy 2056, the Plan establishes the specific outcomes transport customers in Greater Sydney can expect and identifies the policy, service and infrastructure initiatives to achieve these.

To support the liveability, productivity and sustainability of places for the transport network, a Movement and Place Framework was developed, as presented in **Figure 2–3**. The Framework acknowledges that transport networks have different functions and roles and serve as both a destination and as a means to move people and goods. The Movement and Place Framework will enable us to plan, design and operate the transport network to meet these different needs by providing greater transparency, supporting collaboration between those responsible for land use, transport and roads while also encouraging input from the community. Through the framework we will be able to design a future network that is better used and supports the safe, efficient and reliable movement of goods and the need for liveability of places along it.

Figure 2–3 Different movement environments under the Movement and Place Framework



Source: https://future.transport.nsw.gov.au/wp-content/uploads/2018/plans/Greater_Sydney_Services_Infrastructure_Plan.pdf, 2018

Implication for the MGN: The road network proposed as part of the MGN would be classified as local streets and will be part of a suburban neighbourhood where people live their lives, as well as facilitating local community access to the station. The Masterplan will also involve a station arrival precinct which is a place for people, and therefore entirely will have a Place function.

2.3.1 Future Transport Network

The future transport network visions, as presented in the Greater Sydney Services Infrastructure Plan (**Figure 2–3**), and the implications the implementation these visions would have for the MGN and surroundings are described in the following sections.

City-shaping network

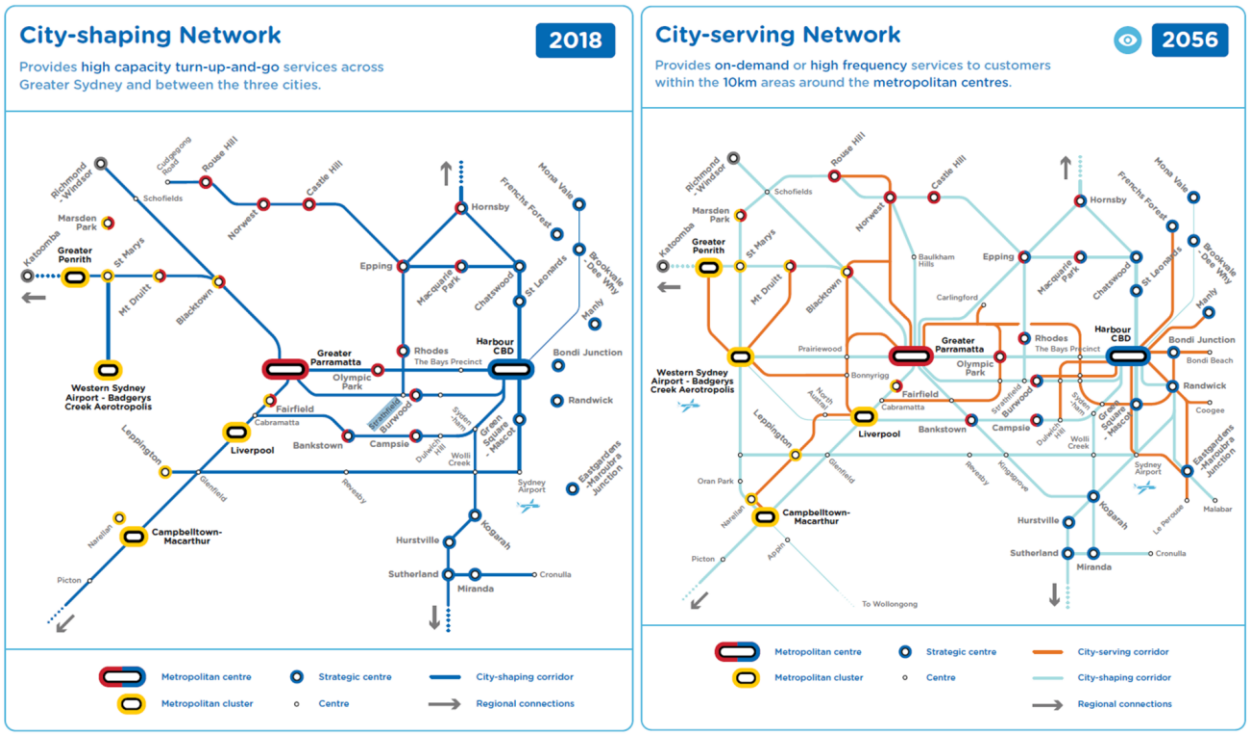
The city-shaping network (**Figure 2–4**) includes higher speed and volume linkages between future cities and centres. The function of this network is to enable people living in any of the three cities to access their nearest metropolitan centre within 30 minutes and to be able to travel efficiently between these metropolitan centres.

As Greater Sydney transitions to a metropolis of three cities, the city-shaping network will need to expand to provide improved access to and between each metropolitan city/centre, particularly Greater Parramatta and centres in the metropolitan cluster in the Western Parkland City.

City-serving network

The city-serving network (**Figure 2–4**) will provide high-frequency services within a ~10km radii of the three metropolitan cities/centres. This will support access within some of the densest land use in Greater Sydney where demand for travel is most concentrated. As these inner urban areas in each of the three cities develop and become denser, the government will investigate the prioritisation of on-street public transport services and invest in higher frequency services.

Figure 2–4 Greater Sydney and 2056 transport network vision



Source: https://future.transport.nsw.gov.au/wp-content/uploads/2018/plans/Greater_Sydney_Services_Infrastructure_Plan.pdf, 2018

Implication for the MGN: The MGN, located within the Campbelltown-Macarthur Cluster, is part of both city-shaping and city-serving networks that would bring the MGN into reach of Greater Sydney and all three cities by high frequency and high capacity public transport links.

Bicycle Network

Building on the existing network, the immediate focus with regards to future bicycle transport links, is to work with local Councils to deliver committed Priority Cycleway projects, to address key missing links around the Harbour CBD, Greater Parramatta, Greater Penrith, Blacktown and Liverpool (such as the Nepean River Green Bridge and Inner West Greenway). Council partnership programs are delivering local bicycle infrastructure, and bicycle parking is also being rolled out at interchanges.

By 2056:

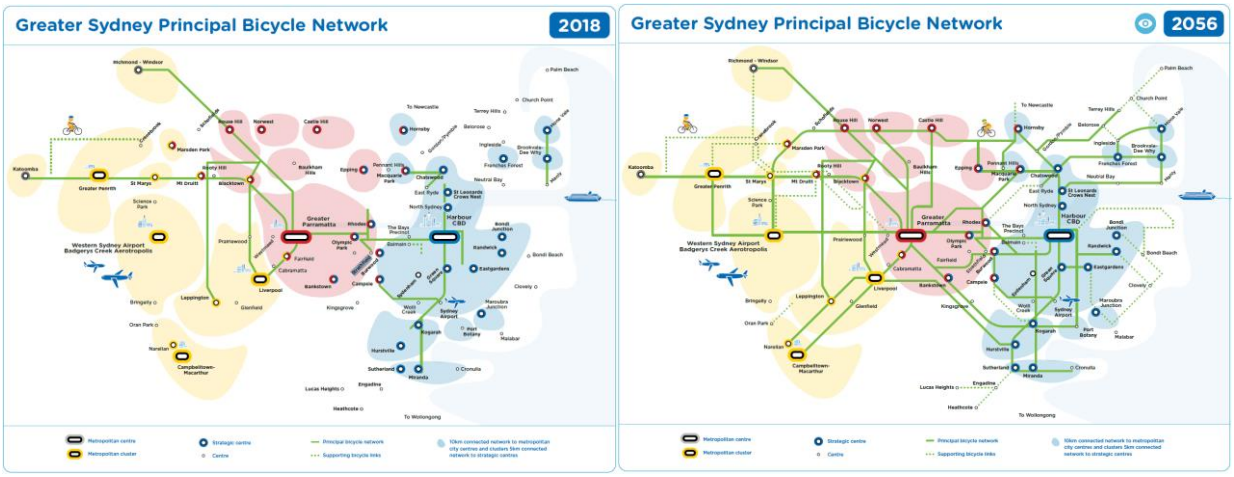
– Walking and cycling network coverage will be improved by using state held corridors for public transport, pipelines, waterways, crown land and service easements for bicycle network infrastructure

– All strategic centres will have connected walking and cycling networks, including strategic centres across the Western Parkland City

– Further investment in connections to strategic centres and in the Principal Bicycle Network will support walking or cycling being the most convenient option for short trips, improving health outcomes, safety and convenience for customers as well as boosting the productivity, liveability and sustainability of Greater Sydney.

Figure 2–5 shows the current / committed Greater Sydney Bicycle Network alongside the envisioned 2056 Bicycle Network.

Figure 2–5 Current / committed and 2056 Greater Sydney Principal Bicycle Network



Source: https://future.transport.nsw.gov.au/wp-content/uploads/2018/plans/Greater_Sydney_Services_Infrastructure_Plan.pdf, 2018

Implication for the MGN: Transport for NSW and Council will work together to investigate the delivery of Principle Bicycle Network that connects the MGN with surrounding centres including Liverpool and Greater Parramatta. The PBN with key centres and connections with the Western Sydney Parklands will help encouraging a mode shift towards more sustainable transport trips and reduce future residents' reliance on private vehicles for trips of all purposes.

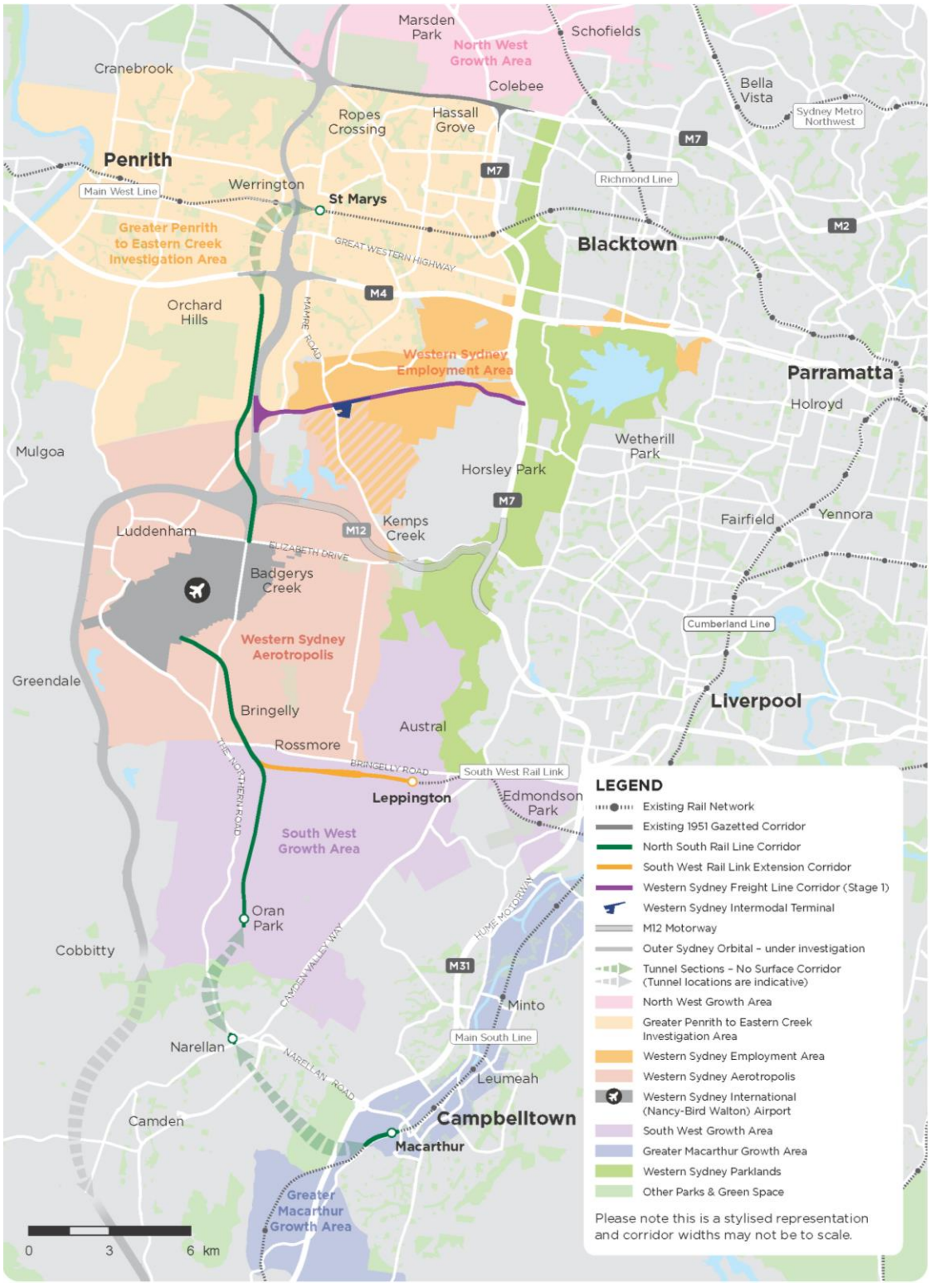
2.4 Future Transport Links Western Sydney

With the Western Sydney International (Nancy-Bird Walton) Airport and Aerotropolis at its centre, Western Sydney will have new economic and social opportunities, and be an exciting hub for new communities. In June 2020, the NSW Government has confirmed the final corridors which will support the delivery of the proposed Sydney Metro – Western Sydney Airport project, South West Rail Link Extension and Western Sydney Freight Line.

Preserving vital corridors for three new transport links will pave the way for a significant boost to connectivity in the region, helping bring growth and jobs to Western Sydney.

The North South Rail Line is a passenger rail line connecting St Marys with Macarthur (as shown in **Figure 2–6**). The line will run from the Main West Line (T1 Western Line) to the Main South Line (T8 Airport and South Line). This rail line will connect to the new Western Sydney Nancy Bird Walton Airport, Aerotropolis and surrounding business areas.

Figure 2–6 Future Transport Links Western Sydney



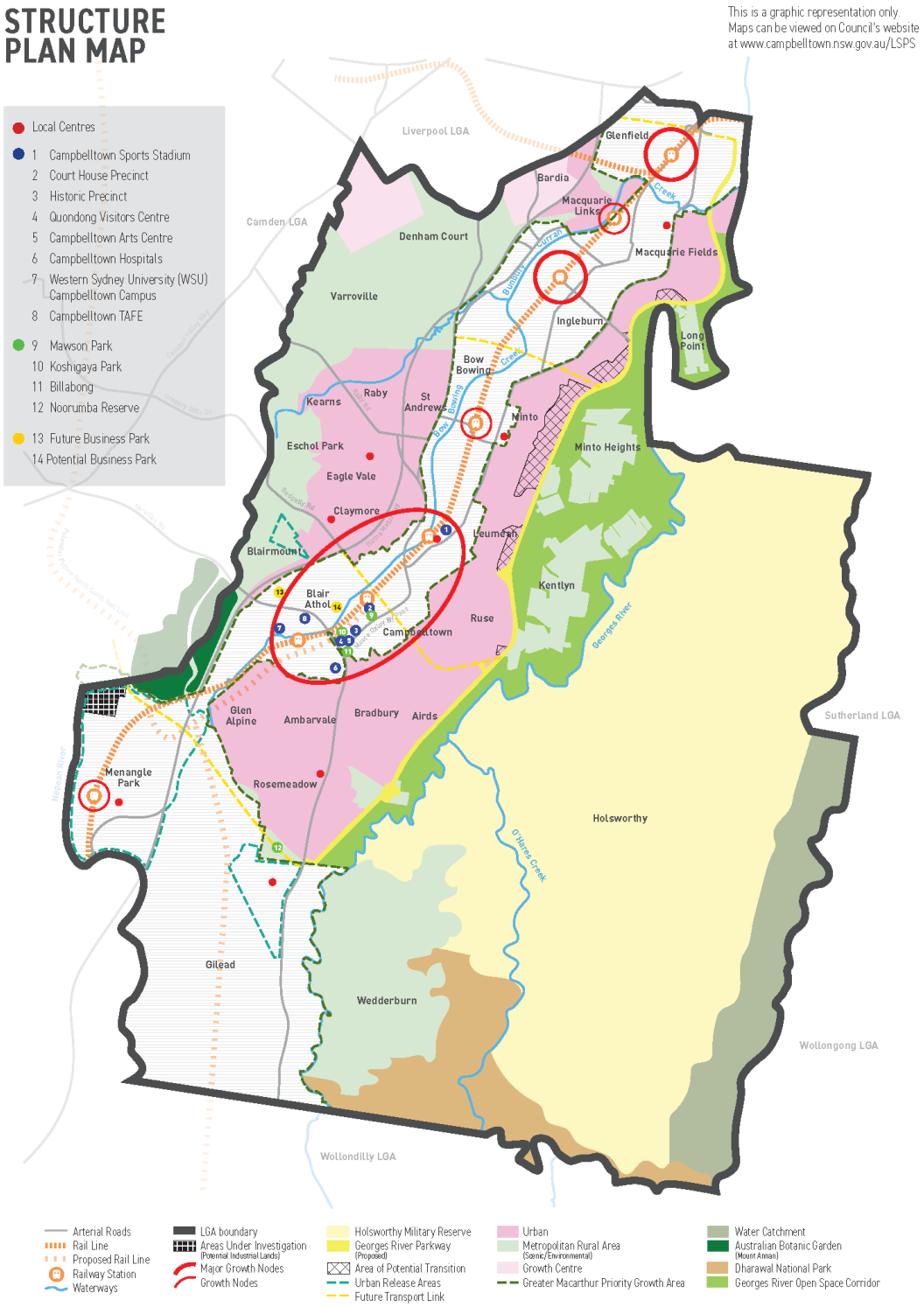
Source: Transport for NSW, 2020

Implication for the MGN: The future transport link between the North West, Western Sydney Airport, South West and Greater Macarthur Growth Areas will provide improve transport options and accessibility for future MGN residents to future employment areas along Sydney's expanded Metro network. This will also enable MGN to be designed as a transit-oriented development with 30-minute access to jobs and economic growth across Western Sydney and for the planned Western Sydney Airport.

2.5 The Campbelltown 2040 Local Strategic Planning Statement (LSPS) (Campbelltown City Council, 2020)

The Campbelltown City Council's Local Strategic Planning Statement (LSPS) is the plan for the LGA's community's social, environmental and economic land use needs over the next 20 years and provides context and direction for land use decision making within the Campbelltown LGA. The Campbelltown City Council's Structure Plan is shown in **Figure 2–7**, with Macarthur being located within the Glenfield-Macarthur Renewal Corridor.

Figure 2–7 The Campbelltown City Council Structure Plan



Source: Campbelltown City Council, 2020

The priorities and actions outlined in the LSPS aim to ensure that Council can plan for what is needed in the future, including a choice of well-designed housing, a diverse array of high quality jobs, and the required infrastructure, facilities and services needed to support a vibrant and thriving community.

In accordance with the LSPS, the NSW Department of Planning, Industry and Environment (DPIE) has prepared growth projections for the Campbelltown LGA, which indicate a longer-term demand for 26,700 dwellings being required by 2036, with a five-year target of 6,800 dwellings by 2021, under the District Plan. The Macarthur Precinct has been identified as having a future dwelling potential of 4,650 new homes in the future.

The LSPS sets out several actions under four main themes, to ensure that the Campbelltown LGA can respond to the future local challenges and opportunities, over the next 20 years. With regards to transport connectivity, the LSPS states that some future developments and redevelopments of existing areas may lend themselves to reduced private car ownership due to their proximity to public transport and provision ride share facilities. Opportunities for such a model will be considered when large scale developments are proposed in proximity to transport hubs.

The LSPS also states that reduced car dependency will only occur if public transport is easy to access, fast, safe, and provided ahead of development, and the aim needs to be to discourage the purchase of a second private vehicle.

Specific actions relevant to Macarthur include:

- Collaborate with Government with the aim of achieving the early provision of a **north-south transport corridor with public transport in Greater Macarthur**, that connects the growth area internally and to other strategic locations.
- Subject to the provision of appropriate and efficient public and alternative transport options for all users, develop a range of **maximum parking rates** suitable for different land use types and scenarios.
- Work with the NSW Government to explore the possibility of **providing electric train suburban services** to Menangle Park and areas to the south (as urban development takes place in these areas) to **relieve future pressure on Campbelltown and Macarthur stations**.
- Prepare **master plans** for the town centres identified within the **Glenfield to Macarthur Urban Renewal Corridor** that incorporate opportunities for in-centre living.
- Work with neighbouring councils to prepare a joint **Greater Macarthur Integrated Transport Strategy** to identify necessary future transport and infrastructure corridors.
- Support Government in the provision of **upgraded bus services to connect Campbelltown-Macarthur** and the Illawarra in collaboration with the relevant communities.
- **Improve pedestrian and cycle connections** between Leumeah, Campbelltown and Macarthur centres.

Implication for the MGN: The LSPS highlights the Macarthur Precinct's location in proximity of excellent public transport and good walking and cycling links. A number of actions relevant to the MGN focus on the improvement of public and active transport links, as well as other measures to reduce car dependence, such as constrained residential parking provision (maximum car parking rates) for developments in proximity of train stations.

2.6 The Glenfield to Macarthur Urban Renewal Corridor (GMURC) Strategy

The NSW Government has identified urban renewal opportunities along the Glenfield to Macarthur railway corridor to accommodate and support future population and economic growth, with a population growth of the corridor forecast to be 84,500 over 20 years. The corridor consists of seven precincts surrounding train stations, being Glenfield, Macquarie Fields, Ingleburn, Minto, Leumeah, Campbelltown and Macarthur.

The aim of the 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.

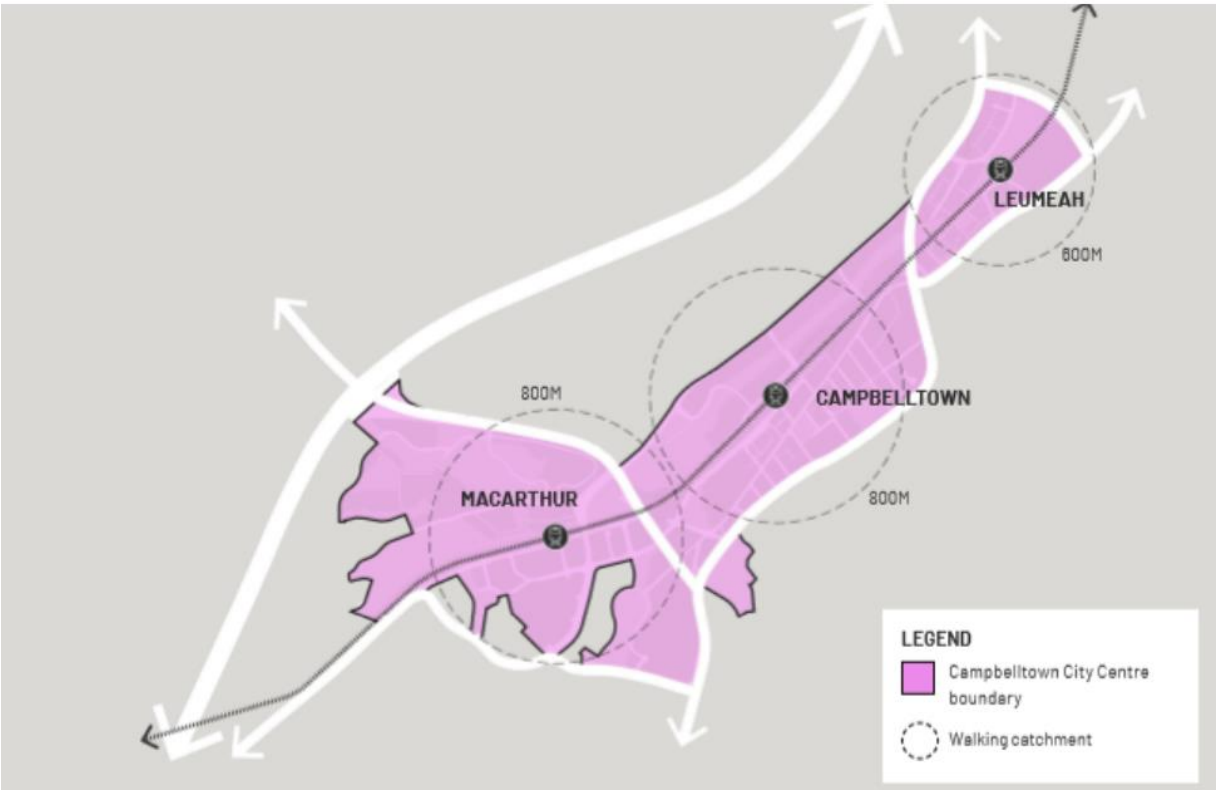
Council is currently undertaking detailed work to support the amendment of planning controls like zoning and maximum building height for the precincts along the GMURC. This involves changing Campbelltown Local Environmental Plan 2015 to permit development which is generally consistent with the released Precinct Plans. Additional work is also being undertaken to identify the infrastructure and open space requirements for each precinct and develop a funding strategy to provide them.

Implication for the MGN: The GMURC Strategy identifies that the role of the future Macarthur Precinct is to serve residents predominantly within a walking and cycling catchment of train stations and essential services. In line with the MGN Masterplan, it focuses on mixed-use urban activation and increased residential density around train stations.

2.7 Reimagining Campbelltown City Centre Masterplan

The 'Reimagining Campbelltown City Centre Master Plan' was prepared (by Council) in conjunction with the Campbelltown-Macarthur Place Strategy (**Section 2.8**) and supports a more liveable future for the Campbelltown City Centre.

Figure 2–8 The three centres of the Reimagining Campbelltown City Centre Masterplan (2020)



Source: Campbelltown City Council, 2020

In the Masterplan, the definition of a City Centre includes the proximity to major infrastructure (roads and rail) and being within an eight to ten-minute walkable catchment of each of the three train stations. One of the Masterplan's visions, relevant to transport for the area aims to deliver an integrated transport solution for Campbelltown's City Centre, to be a '30-minute city as both the heart of the Macarthur region and the southern gateway to Sydney'.

Key outcomes of the Reimagining Campbelltown City Centre Masterplan include:

- **Walking will be the attractive choice** for daily living. The centres will be connected via high-quality walkable local streets that connect key destinations, are easy to navigate, efficient to move through, and pleasant and interesting places for walking that are not conflicted by vehicles.
- **Key destinations within the centres are connected by sustainable transport options** to minimise dependency on private vehicles and parking demand throughout the city centre. Bus and rail interchanges located at every centre allow for seamless movement.
- **Parking provision** within the City Centre is effectively managed using a strategic city-wide approach to parking provision that **promotes sustainable travel choices**.
- **A non-car dependent transport network** will be implemented that is focused on people, has multiple options and is of high-quality and will allow residents to **access the City Centre within 30 minutes**. High-frequency transit services could connect 48% of the Macarthur Region with the City Centre in 30 minutes in the future.

– **Improved public transport connections** to major centres in Greater Sydney including more reliable rail services, ensuring capacity keeps pace with demand, improved service frequency and seamless interchanges.

– **The principal active transport network facilitates regional access to the City Centre by bicycle or on foot**, particularly for trips that are less than 10 kilometres. High-quality principal cycle routes could connect 61% of the Macarthur Region with the City Centre within 30 minutes by bicycle in the future.

Implication for the MGN: Based on the Reimagining Campbelltown City Masterplan, the character and role of the future city is to serve residents predominantly within a walking and cycling catchment of essential services and good public transport. This will be supported by introducing a non-car dependent high-quality sustainable transport network which focuses on people (and not cars), has multiple options, and allows residents to access the Campbelltown City Centre without a car within 30 minutes.

2.8 The Campbelltown-Macarthur Place Strategy for the Macarthur Precinct

The Campbelltown-Macarthur Place Strategy (NSW Government, November 2017), is the key output of the Campbelltown-Macarthur Collaboration Area, led by the Greater Sydney Commission. It was adopted in 2020 and identifies place-specific actions required to ensure that the future Campbelltown City Centre is sustainable and resilient and fulfills its metropolitan role. The precinct planning is part of the Reimagining Campbelltown CBD project (**Section 2.7**).

Figure 2–9 The Macarthur Precinct Plan

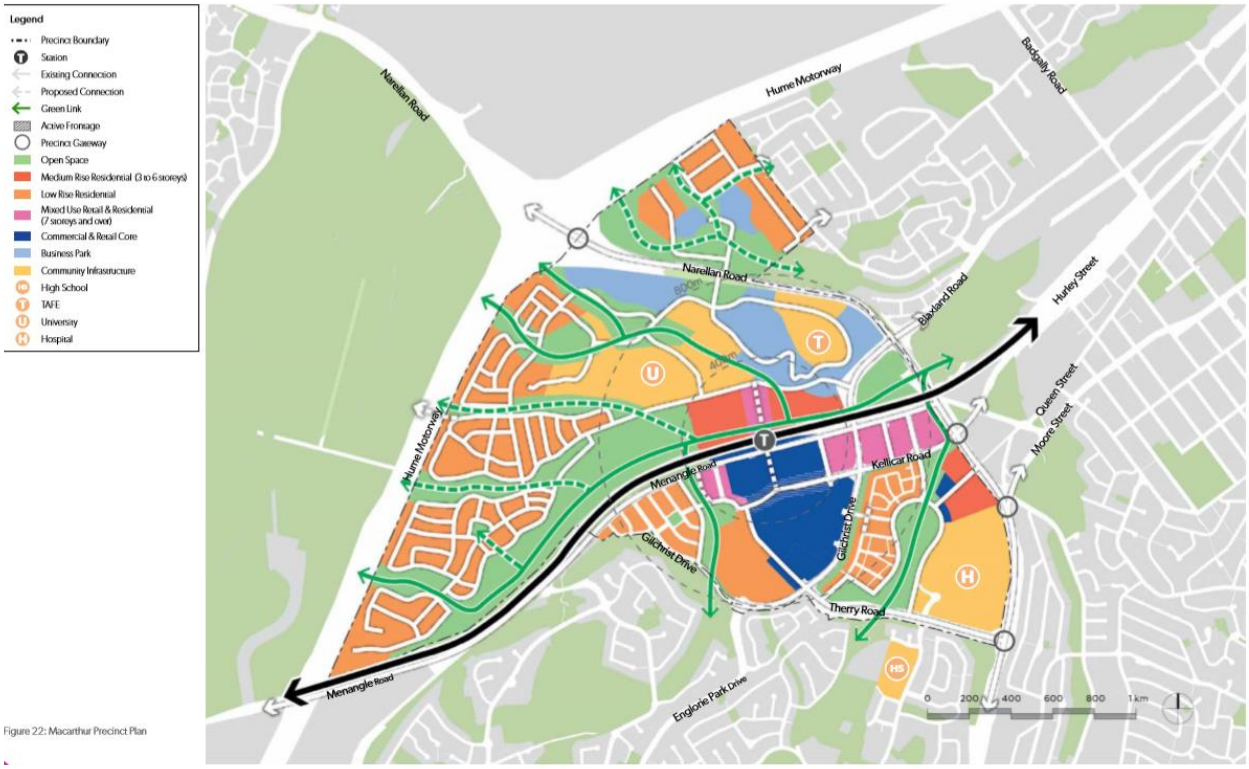


Figure 22: Macarthur Precinct Plan

Source: NSW Government, November 2017

The Macarthur Precinct is the southernmost precinct in the 'Glenfield to Macarthur Urban Renewal Corridor (GMURC)' and the major destination for retail, tertiary education and health services in the region. The GMURC Strategy identifies the Macarthur Precinct as complementing Campbelltown as a Regional City Centre in the future.

The character of the future Macarthur Precinct serves residents predominantly within a walking catchment and reduces the need for cars to get to work, do the shopping, visit a park, or go out for coffee or dinner. Future Precinct key vision statements that may encourage this, relevant to the MGN, include:

– **Enhancing the activity around Macarthur Station** with pedestrian friendly streets, outdoor dining, street tree planting, inviting public gathering spaces and attractive street furniture

– **Strengthening connections** between the Macarthur Station and the University and TAFE

- Providing a variety of **housing types within walking distance** of the Macarthur Station
- Enhancing the role as the **retail hub of south-west Sydney** through a revitalised town square and activated Kellicar Road, with **high levels of amenity and access to public transpor**t
- Introducing **new regional and local cycle routes and walking connections** to improve links with Macarthur Station and the surrounding area
- **Improving linkages to and through the City Centre** through a high-quality pedestrian plaza connecting Macarthur Station, Macarthur Square, Kellicar Road and Bolger Street.

Implication for the MGN: The Place Strategy identifies that the role of the future Macarthur Precinct is to serve residents predominantly within a walking and cycling catchment of essential services and good public transport. The Precinct is expected to provide a non-car dependent high-quality sustainable transport network which focuses on people (and not cars). Improved access to public and active transport links will help achieve this.

2.9 The Campbelltown City Council Development Control Plan 2015

The general Campbelltown City Development Control Plan 2015 (DCP) provides objectives, controls and design criteria to achieve desirable development outcomes in line with Council's vision for the LGA. Objectives related to car parking and access for all types of residential developments include:

- Provide adequate on-site car parking for residents and visitors that is convenient, secure and safe having regard to the traffic generated by the proposed development.
- Ensure efficient and safe vehicle and pedestrian movement within, into and out of the development.
- Ensure that the location and design of driveways, parking, service areas and access areas are practical, easily maintained, convenient, safe and suitably landscaped.
- Provide safe convenient access for vehicles, pedestrians and cyclists whilst minimising conflict between them.

The DCP 2015 specifies minimum car parking provisions across the LGA, as seen in **Table 2-1**. The MGN is zoned as 'Deferred Matter' and The Campbelltown (Sustainable City) DCP 2015 sets out development control for 'multi dwelling houses' such as townhouses within Deferred Areas under 'Part 2 - Residential and Ancillary Development on Urban Land'. However, this section of the DCP does not outline any specific parking rates for flat buildings, mixed-use or commercial developments, and so these rates have been derived from Part 5 (Residential Flat Buildings and Mixed-Use Development and Commercial Development) of the DCP.

Table 2-1 General required minimum car parking provisions in the Campbelltown City LGA

Land use class	Land use	Required minimum provision
Residential	Multi-dwelling houses	– 1 single garage per dwelling – 1 external additional visitor car parking space for every 2 units (or part thereof), unless all dwellings within the development have direct frontage to a public street
	High density (flat buildings – zone R4)	– 1 car parking space per dwelling – 1 additional car parking space for every 4 dwellings (or part thereof) – 1 additional visitor car parking space for every 10 dwellings (or part thereof) *Developments containing 3 or more storeys shall provide all required car parking at basement level*
	Bicycle parking	1 space per 5 dwellings
Retail	Shops (neighbourhood shops)	1 space per 25 m^2 GFA
	Restaurant or cafe	1.5 spaces per 10 m^2 GFA

Source: The Campbelltown City Council Development Control Plan 2015 Volume 1, Part 2 and 5

The above minimum parking rates apply generally across the Campbelltown City LGA, and do not take into account the excellent access to public transport provided by the Macarthur Station as well as nearby access to facilities including Macarthur Square, the Western Sydney University and TAFE NSW.

These general parking rates are therefore not considered fully appropriate for the high-residential component of the MGN Masterplan. To help determine more appropriate vehicle and bicycle parking provision rates, a benchmark review (**Section 4.4**) for high density residential developments in Sydney was undertaken, focusing on:

– Other centres and precincts located in Sydney with comparable access and proximity to public transport

– Other DCPs and site specific DCPs for the Campbelltown City Council

– RMS guidelines.

Implication for the MGN: The DCP parking rates for the medium-density residential component of the MGN are appropriate because they are single-dwelling house with separate off-street parking on each lot. They are not fully appropriate for the high-residential component of the MGN Masterplan due to the MGN's proximity to public transport. A benchmark review was therefore undertaken to determine more suitable (lower) parking rates, in order to reduce car dependence given the site's proximity to public transport services.

2.10 Apartment Design Guide

The Apartment Design Guide (Department of Planning, Industry and Environment) provides design criteria and general guidance about how development proposals can achieve the nine design quality principles identified in SEPP 65 (State Environmental Planning Policy No 65 - Design Quality of Residential Apartment Development). The SEPP 65 legislation states:

(1) If an application for the modification of a development consent or a development application for the carrying out of development to which this Policy applies satisfies the following design criteria, the consent authority must not refuse the application because of those matters:

(a) if the car parking for the building will be equal to, or greater than, the recommended minimum amount of car parking specified in Part 3J of the Apartment Design Guide

The specific term of the Apartment Design Guide that captures parking provision is repeated below:

Objective 3J-1

Car parking is provided based on proximity to public transport in metropolitan Sydney and centres in regional areas

Design criteria

1. For development in the following locations:
   - on sites that are within 800 metres of a railway station or light rail stop in the Sydney Metropolitan Area; or
   - on land zoned, and sites within 400 metres of land zoned, B3 Commercial Core, B4 Mixed Use or equivalent in a nominated regional centre

The minimum car parking requirement for residents and visitors is set out in the Guide to Traffic Generating Developments, or the car parking requirement prescribed by the relevant council, whichever is less.

The car parking needs for a development must be provided off-street.

Source: Department of Planning, Environment and Industry (2015)

The rates provided in the Guide to Traffic Generating Developments are shown in **Table 2-2**.

Table 2-2 Roads and Maritime Services Guide to Traffic Generating Developments (2002) parking rates

Dwelling type	Number of parking spaces required (minimum)	
	Metro Regional CBD Centres	Metro Sub-Regional CBD Centres
1 Bed	0.4 spaces	0.6 spaces
2 Bed	0.7 spaces	0.9 spaces
3 Bed	1.2 spaces	1.4 spaces
Visitor	0.14 spaces	0.2 spaces

Source: Roads and Maritime Service, 2002

Implication for the MGN: As per SEPP 65, the parking rates that comply with the above rates cannot be used as grounds to refuse consent of this SSDA. The Apartment Design Guide stipulates that the rates for Metro Regional CBD Centres should be applied to Macarthur Precinct as a Strategic Centre defined in A Plan for Growing Sydney.

2.11 Guide to Traffic Generating Developments

The RMS Guide to Traffic Generating Developments (RTA, 2002) sets out traffic generation rates based on survey data collected in New South Wales for a range of land uses. This guide is referred to in the Austroads Guide which is used by Roads and Maritime Services and is generally regarded as the standard for metropolitan development characteristics.

Over the past few years, several surveys have however been undertaken to update trip generation and parking information as part of the Guide. The Technical Direction: TDT 2013/04a provides a summary of the updated information. Typical vehicle trip generation rates for high density residential flat dwellings in Sydney are shown in **Table 2-3**, based on the TDT 2013/04a. The guidance provides advice on the traffic impacts of land use developments, based on traffic surveys in various locations in Sydney.

The TDT 2013/04a does not specify trip generation rates for medium-density developments, but in accordance with the Guide to Traffic Generating Developments (RTA, 2002), it is **0.50 - 0.65 trips per dwelling** for dwellings of 3 or more bedrooms.

Table 2-3 Typical vehicle trip generation rates for high density residential flat dwellings

Weekday rates	Sydney average	Sydney range
AM peak (1 hour) vehicle trips per unit	0.19	0.07-0.32
PM peak (1 hour) vehicle trips per unit	0.15	0.06-0.41
Daily vehicle trips per unit	1.52	0.77-3.14

Source: Roads and Maritime Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys

It should be noted however, that these vehicle trip generation rates are based on surveys in a range of different locations in Sydney. Many of these are much closer to Sydney CBD and have access to more frequent public transport services than the MGN study area.

A review was therefore undertaken of trip generation rates and mode share across several sites more similar to the MGN (**Section 5.1**).

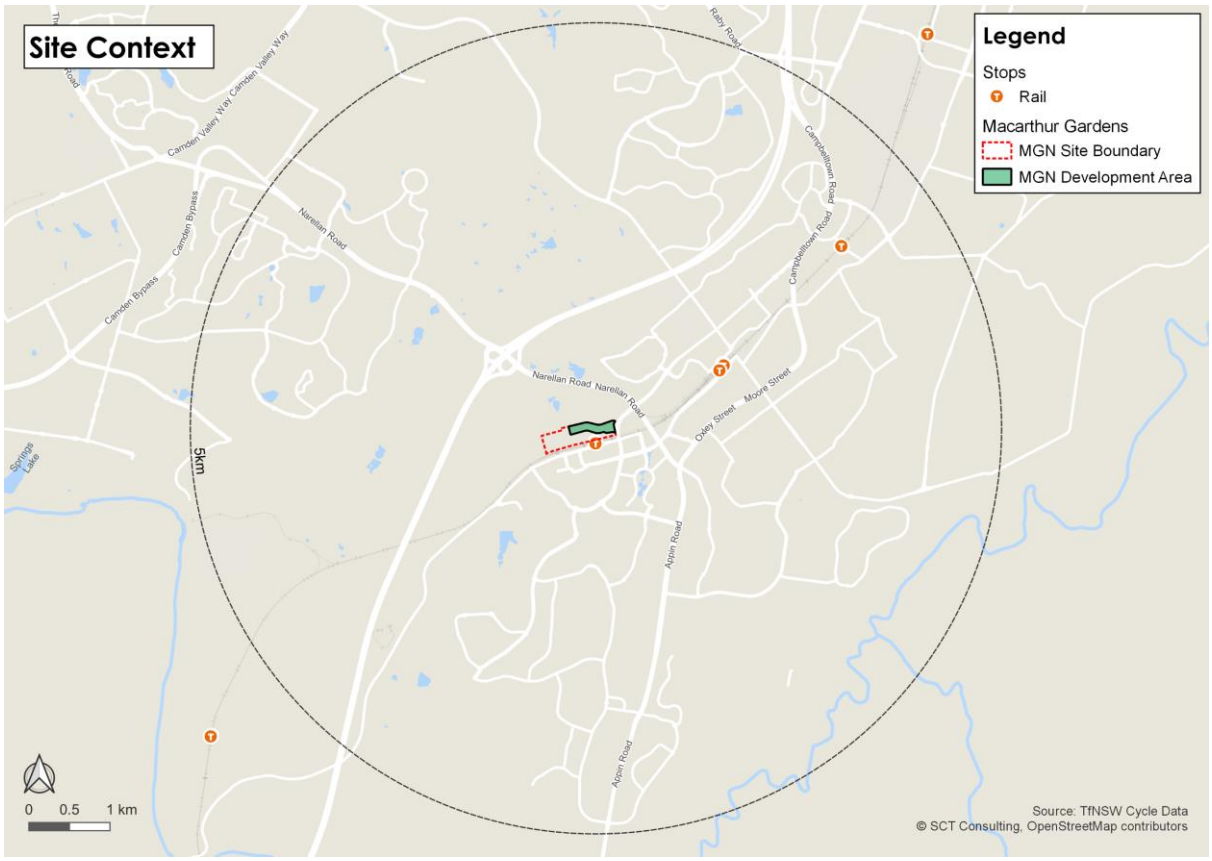
Implication for the MGN: The RMS Guide trip generation rates for the medium-density residential component of the MGN are appropriate. However, they are not fully appropriate for the high-residential component of the MGN Masterplan due to the MGN's proximity to public transport. A benchmark review was therefore undertaken to determine more suitable (lower) trip generation rates.

3.0 Existing Conditions

3.1 Site location

The Macarthur Gardens North (MGN) site is located in the Campbelltown City Local Government Area (~45km from the Sydney CBD), and is bounded by Goldsmith Avenue to the north, Gilchrist Drive to the east and the southern railway line (with Macarthur Station) to the south. The MGN site (the site) in relation to the surrounding area is shown in **Figure 3–1**.

Figure 3–1 The site in context of the surrounding area



Source: OpenStreetMap, SCT Consulting, HERE Technologies, TfNSW, 2020

3.2 The MGN masterplan site

The site is part of the broader Macarthur region, which is a rapidly expanding and developing area. It is located on a greenfield site of approximately 18.52 hectares, approximately 200m – 400m north of the Macarthur Station and south of the Western Sydney University and TAFE NSW – Campbelltown.

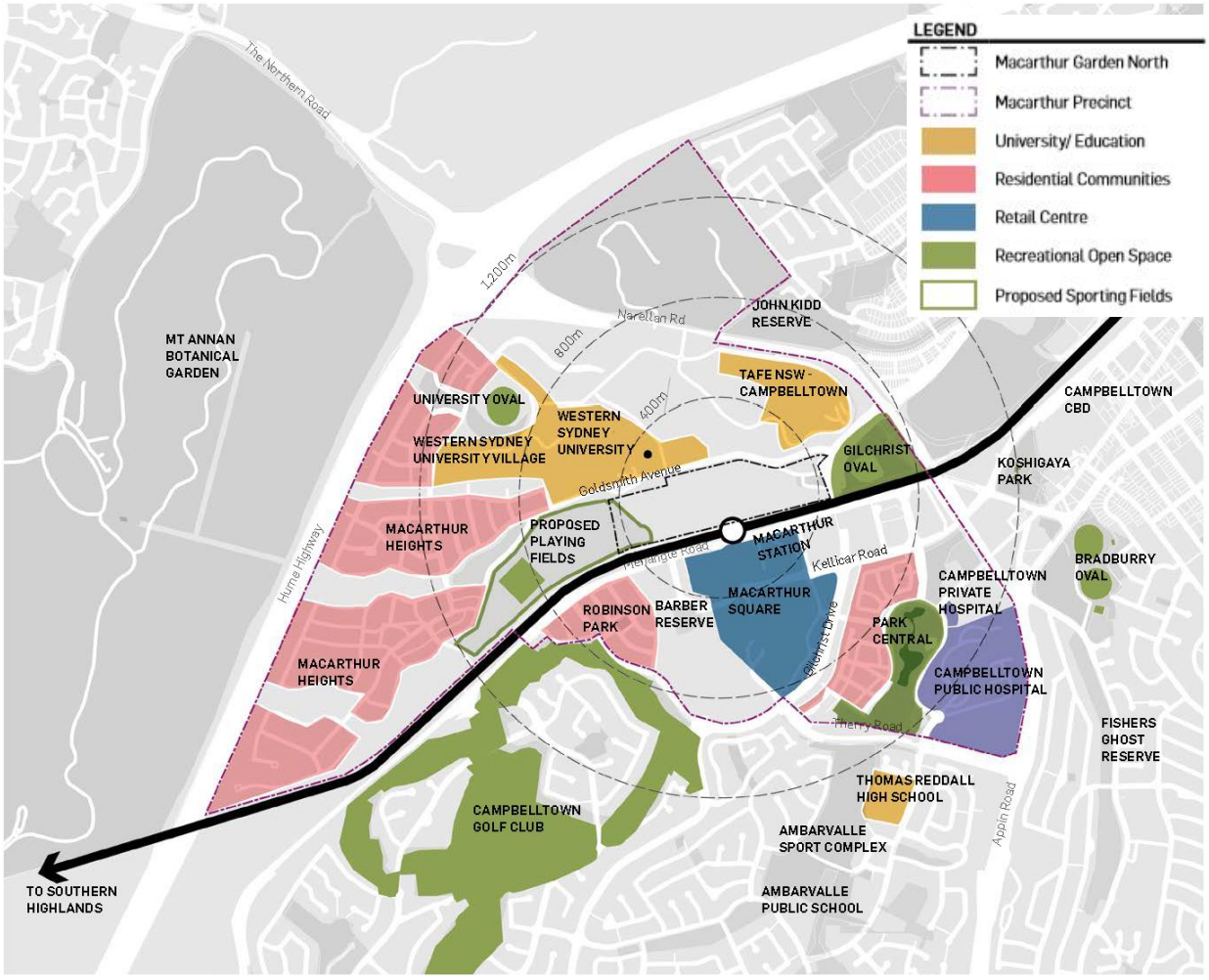
The site is also located near local services and amenities including the Macarthur Square Shopping Centre, Campbelltown Mall, Campbelltown Hospital, as well as open space and green infrastructure. The site in relation to other existing surrounding land uses is shown in **Figure 3–2**.

The railway corridor running east to west dissected the precinct and creating an infrastructure barrier between north and south of the railway.

Being at the heart of the precinct next to railway station, MGN provides an opportunity stitching these communities, significant centre and facilities into an integrated and well-connected precinct.

There is currently no development located on the existing site that would generate any traffic or transport movements.

Figure 3–2 The site in relation to existing surrounding land uses



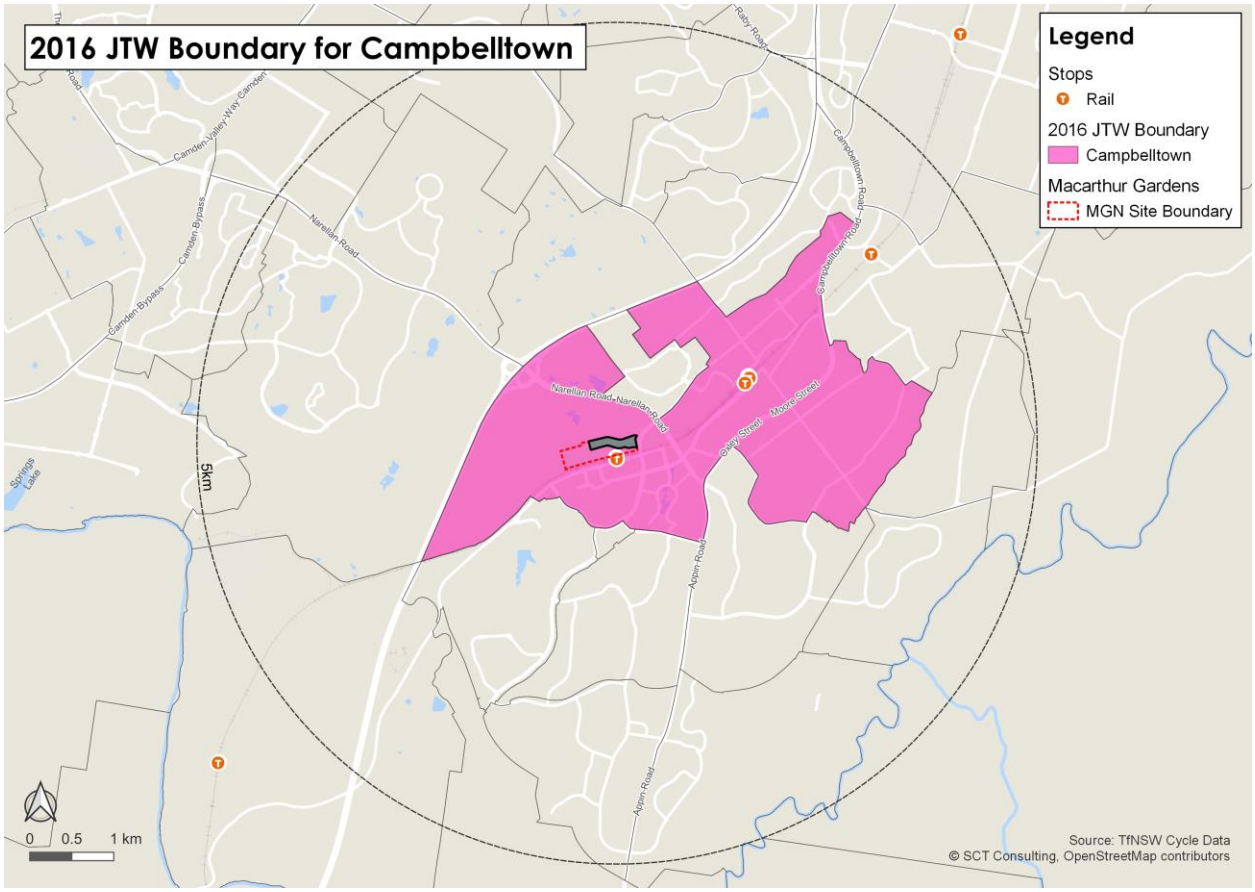
Source: Urbis, 2020

3.3 Travel behaviour

3.3.1 Method of travel to work data

2016 Method of travel to work data (journey to work data) from the relevant statistical area of 'Campbelltown' was analysed to determine travel behaviour of employees working in the vicinity of the site. The site area analysed for journey to work data is shown in **Figure 3–3**.

Figure 3–3 Study area for the travel behaviour reference for method of travel to work analysis



Source: SCT Consulting, 2020

At the time of the JTW data being collected in 2016, approximately 5,100 trip samples were included in the survey for the area. According to the Australian Bureau of Statistics, a person in employment are those of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit.

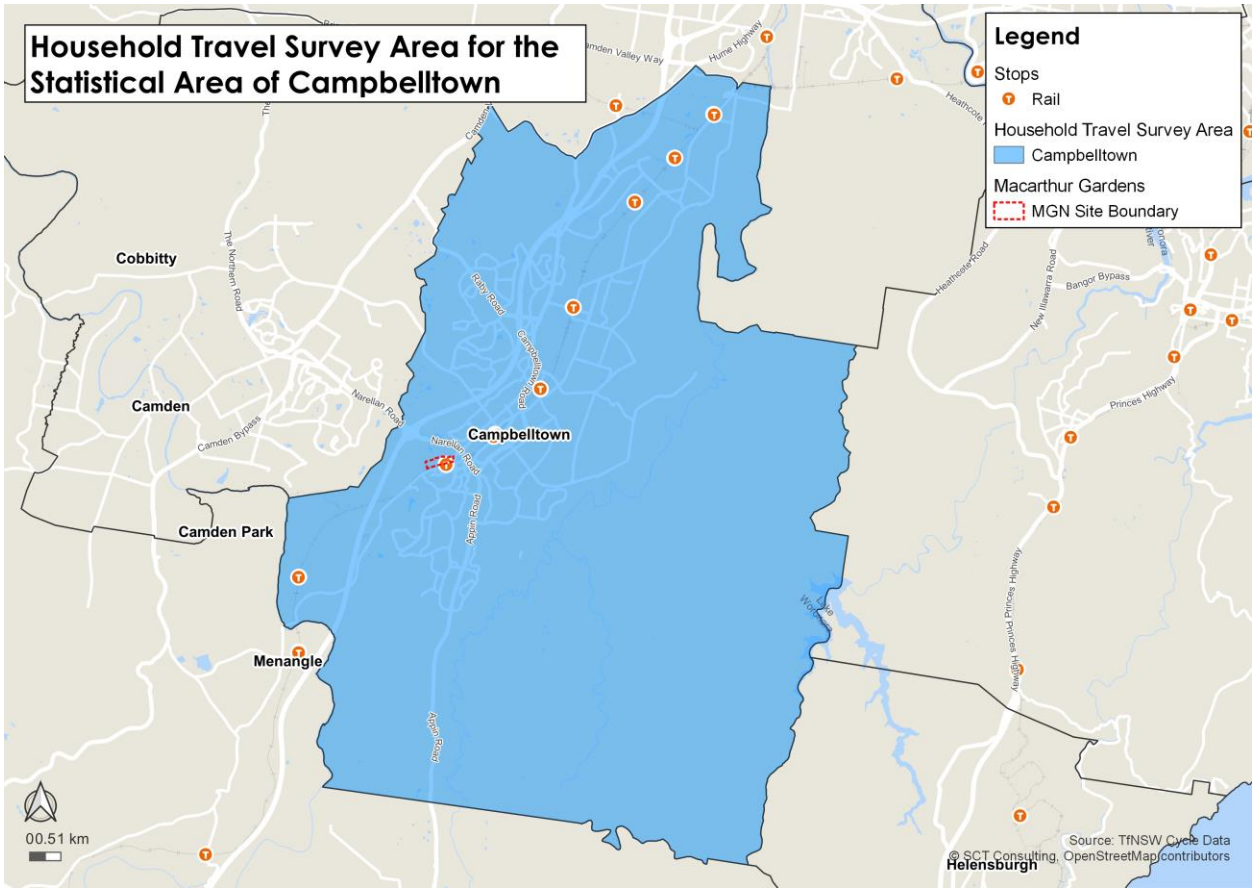
The study area showed higher proportion of drivers, 58 percent, in comparison to the 54 percent of Greater Sydney, showing a higher dependency of the private car use. Train and bus usage was stated as 18 and 1 percent respectively, which is slightly lower than Greater Sydney (with a total of 22 percent public transport usage). Active transport usage was three percent for walking and cycling combined. It should be noted that 10 percent of the people surveyed at the time were working at home or did not go to work.

Of the 42,489 people who work in Campbelltown City Council LGA, the majority of workers (62 percent) travel outside of the LGA to work. The main areas of employment for residents is Campbelltown City LGA (34 percent), followed by Sydney City LGA and Liverpool LGA (11 percent respectively), Camden LGA (six percent) and Canterbury-Bankstown LGA (six percent). Smaller origins include Parramatta and Fairfield LGAs (four and three percent), and other origins across the Greater Sydney region each generating three or less than three percent of work-related trips to the area.

3.3.2 Household Travel Survey

The site sits within the statistical area ‘Campbelltown’ as defined by the Australian Bureau of Statistics, 2018 / 2019 Household Travel Survey (HTS), as seen in **Figure 3–4**. Analysis of the 2018 / 2019 Household Travel Survey (HTS), which is reflective of travel characteristics of residents throughout an average weekday, indicates that vehicle driver and passenger as mode of transport account for 70 percent of all daily trips, while walk only / walk linked, bus and train account for a total of 19, three and seven percent respectively, as seen in **Table 3–1**.

Figure 3–4 Study area for the travel behaviour reference for household travel survey analysis



Source: SCT Consulting, 2020

Table 3–1 Household Travel Survey – residents within Campbelltown Statistical Area, mode choice

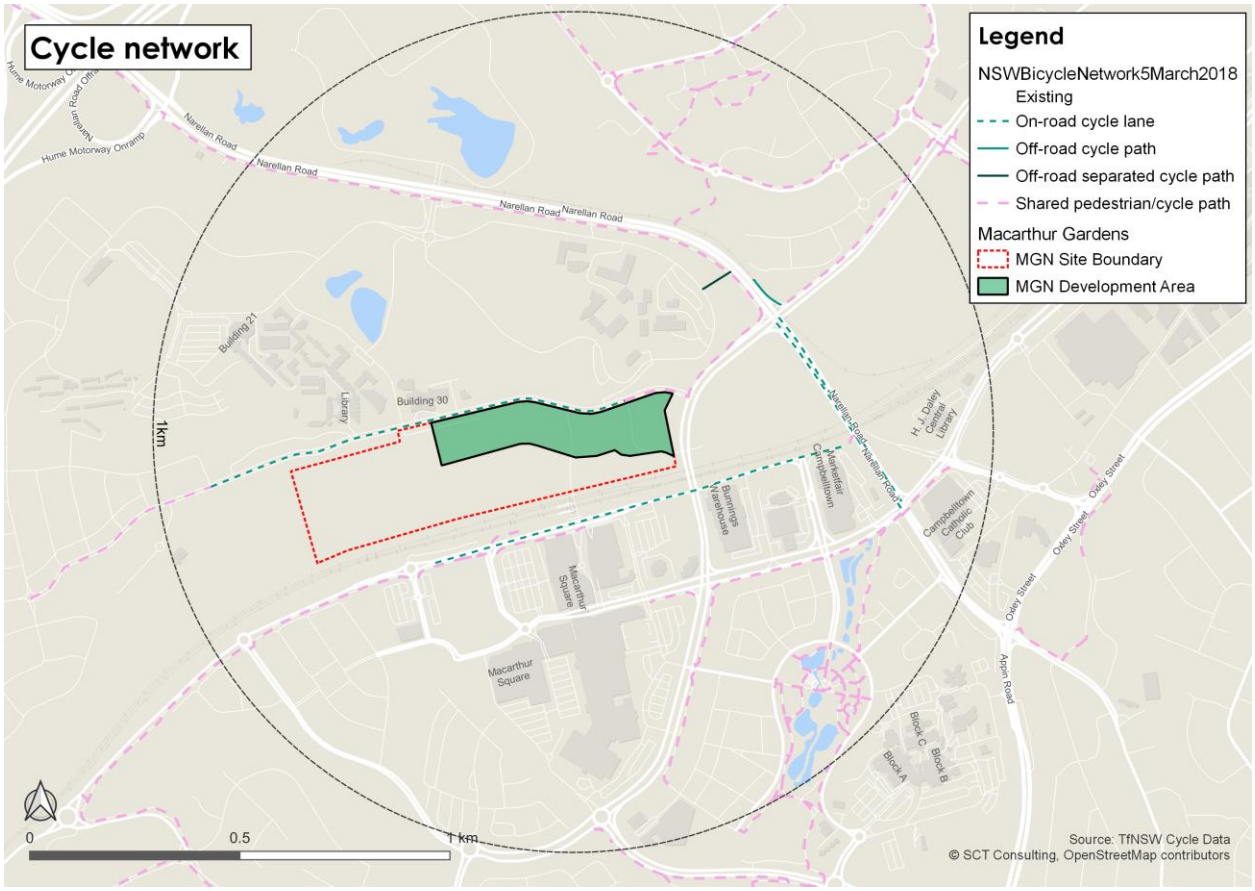
Mode	Percentage
Vehicle (Driver)	43.7%
Vehicle (Passenger)	26.3%
Train	7.4%
Bus	2.9%
Walk only	7.5%
Walk linked	11.5%
Other	0.7%

Source: https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts/household-travel-survey-hts

3.4 Walking and cycling

There are formal walking and cycling facilities provided in proximity of the site, although a number of physical barriers limit active transport access from the site to the regional network. These include the Hume Motorway west of the site, Narellan Road / Appin Road east of the site and the railway line south of the site, as seen in **Figure 3–5**.

Figure 3–5 Cycling routes surrounding the site



Source: OpenStreetMap, SCT Consulting, HERE Technologies, TfNSW, 2020

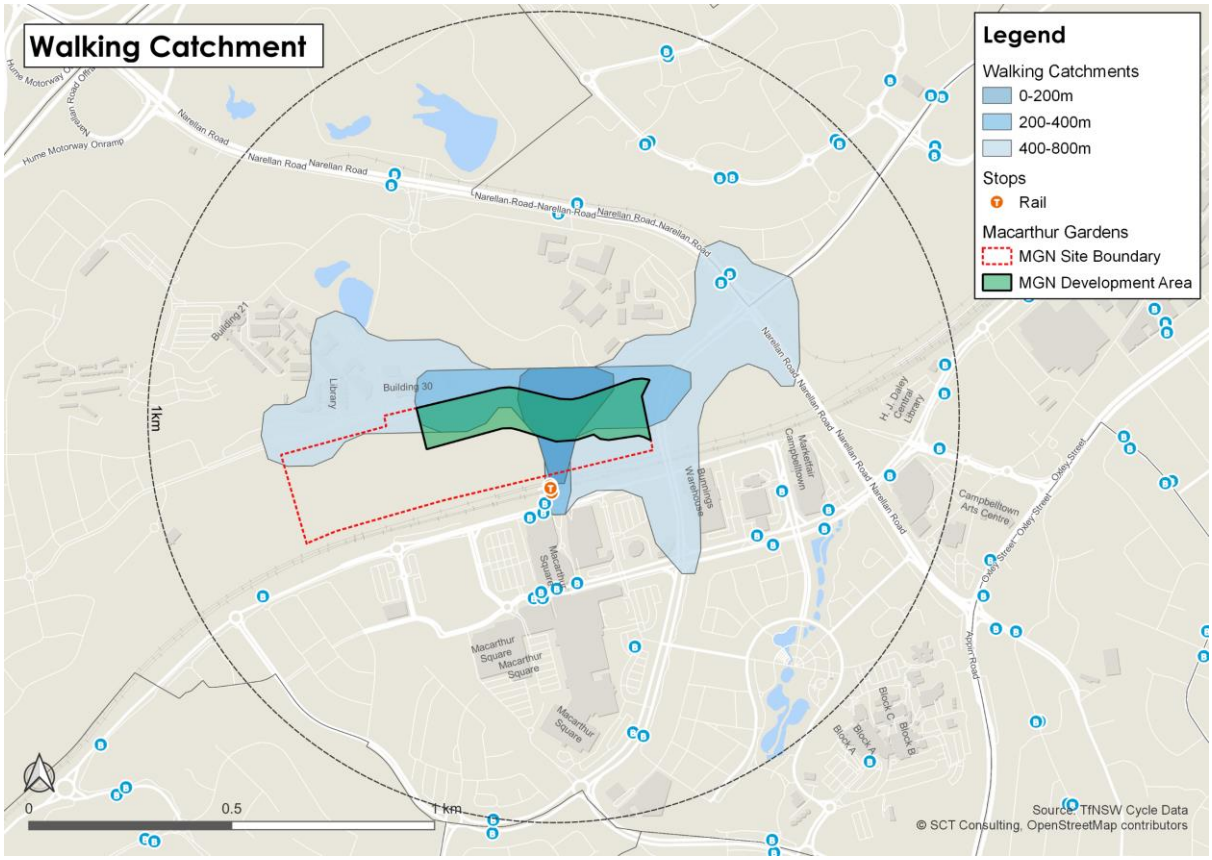
A dedicated on-road cycle lane is provided on Goldsmith Avenue, immediately north of the site. This leads to an off-road shared path on the western side of Gilchrist Drive and Blaxland Road as well as the southern side of Narellan Road. A cycle network is also provided along Menangle Road to the south of the railway line and Macarthur Station, providing an east-west cycle connection between Campbelltown and Menangle Park.

Footpaths are provided on both sides of Goldsmith Avenue immediate to the north of the site, between Gilchrist Drive and Milky Way (northern side) and between Gilchrist Drive and University Drive (southern side). The footpaths along Goldsmith Avenue are then connected to walking paths within Western Sydney University and TAFE NSW – Campbelltown to the north of the site as well as Macarthur Station to the south of the site. Two pedestrian zebra crossings are provided at Goldsmith Avenue, approximately 210m and 580m respectively west of the intersection with Narellan Road, to provide access to these facilities from the site. Pedestrian access is also provided to Gilchrist Oval located east of the site, through the site and under Gilchrist Drive.

A shared path is provided along the western side of Gilchrist Avenue, just to the north of Goldsmith Avenue. The shared path then extends to Narellan Road (on the southern side only). Once you cross the railway line via the station concourse, there are also footpaths along both sides of Menangle Road south of the site.

The walking catchment from the site is shown in **Figure 3–6**, which clearly shows that Macarthur Station, Western Sydney University and TAFE NSW – Campbelltown are all located within a walking distance of 200m to 400m of the site, or within a ten-minute walk to / from the site.

Figure 3–6 Walking catchment of site



Source: OpenStreetMap, SCT Consulting, HERE Technologies, 2020

3.5 Public transport

3.5.1 Train

The nearest train station to the site is the Macarthur Station, which is located within a 5 to 10-minute walk from the site via an existing access path provided between Goldsmith Avenue and the station. Macarthur Station is served by the T8 (Macarthur to City via Airport and / or Sydenham) and Southern Highlands train services. The Southern Highlands line services Macarthur Station with trains running from Campbelltown to Moss Vale or Goulburn and trains running from Town Hall to Macarthur.

The number of train services for the weekday peak hours (6am to 9am and 3pm to 7pm) and weekend throughout the day (6am to 9pm) is summarised in **Table 3-2**. As seen, the T8 line services the Macarthur Station frequently, with an average of approximately five services per weekday peak hour in each direction and four services per hour throughout the day during weekends.

A lesser number of train services are provided on the Southern Highlands line, with on average approximately one service per hour running between Campbelltown and Moss Vale and between Macarthur and Town Hall respectively in each direction, during both weekday peak hours and per hour throughout the day during weekends.

The proximity of the site to the Macarthur Station along with the frequent number of train services available to the City and Airport, suggests that future residents of the site will be well served by public transport to these key employment and local centres.

Table 3-2 Train service frequency for Macarthur Station

Train line	To	From	Number of services			
			Weekday		Weekend	
			AM (6-9am)	PM (3-7pm)	Sat (6am-9pm)	Sun (6am-9pm)
T8	Macarthur	City (via Airport or Sydenham)	14	17	60	60
	City	Macarthur (via Airport or Sydenham)	15	20	60	60
Southern Highlands	Campbelltown	Moss Vale	5	5	10	10
	Moss Vale	Campbelltown	4^	5	10^	10^
Southern Highlands	Town Hall	Macarthur	3	6	10	9
	Macarthur	Town Hall	4	5	9	9
Total			**41**	**58**	**149**	**148**

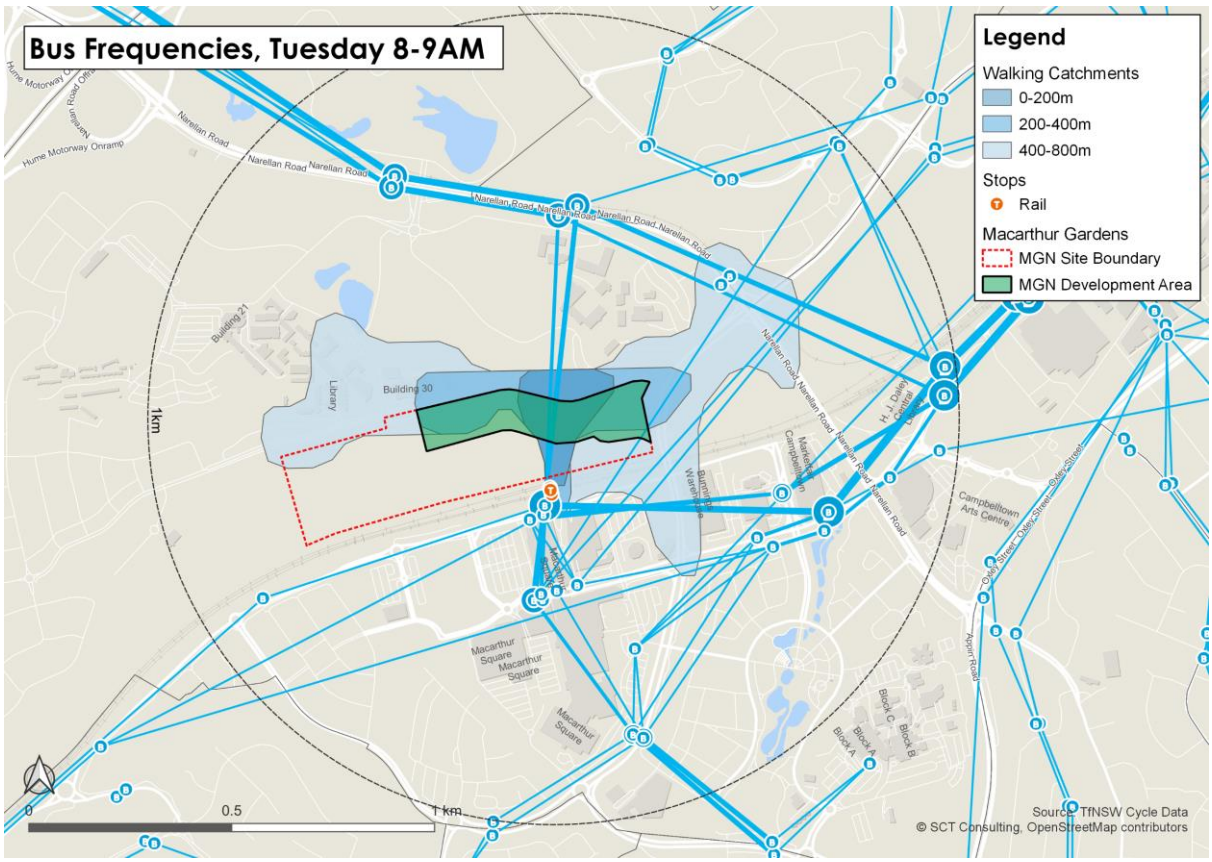
Source: https://transportnsw.info/routes/train, April 2020

^ *Two services in the AM peak hour and one service during the weekends travel from Goulburn, via Moss Vale to Campbelltown*

3.5.2 Bus

A bus interchange is located to the south of Macarthur Station and serves the local bus network to Campbelltown and Narellan primarily. The Macarthur Station interchange is served by the bus routes that run along Menangle Road, as seen in **Figure 3–7**.

Figure 3–7 Bus facilities and frequencies within walking distance from the site



Source: OpenStreetMap, SCT Consulting, HERE Technologies, TfNSW, 2020

The number of bus services for the weekday peak hours (6am to 9am and 3pm to 7pm) and weekend throughout the day (6am to 9pm) at the nearest bus stop located just south of the site (at the Macarthur Station interchange) are shown in **Table 3-3**. The bus data indicates that the combined frequency of bus services at the Macarthur Station interchange is approximately (in both directions), 47 and 44 services per AM and PM peak hour respectively during weekdays and 22 and 13 services per hour throughout the day, on Saturdays and Sundays respectively.

Table 3-3 Bus route frequency for the Macarthur Station Interchange

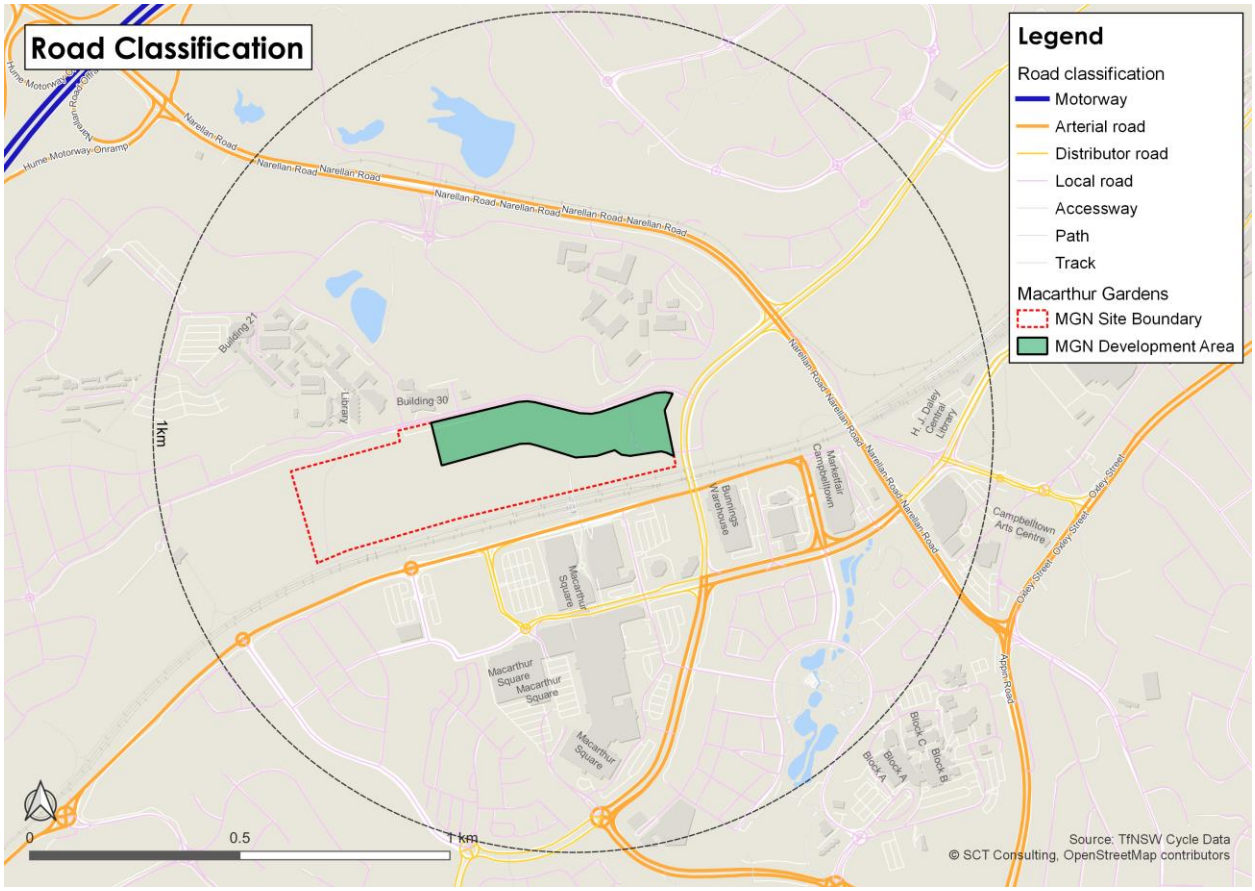
Route	To	From	Total number of services			
			Weekday		Weekend	
			AM (6-9am)	PM (3-7pm)	Sat (6am-9pm)	Sun (6am-9pm)
878	Campbelltown	Kearns via Eschol Park	-	-	-	-
	Kearns	Campbelltown via Eschol Park	-	1	13	-
879	Leumeah	Campbelltown via Blair Athol	6	9	14	12
	Campbelltown	Leumeah via Blair Athol	5	8	14	12
880	Minto	Campbelltown via Kearns and Eagle Vale	10	15	13	10
	Campbelltown	Minto via Kearns and Eagle Vale	12	11	12	12
886	Campbelltown to Glen Alpine (Loop Service)		7	10	15	13
887	Wollongong	Campbelltown	6	8	8	8
	Campbelltown	Wollongong	5	7	9	9
888	Campbelltown	St Helens Park	1	17	49	25
	St Helens Park	Campbelltown	16	-	-	-
889	Menangle	Campbelltown	2	3	2	-
	Campbelltown	Menangle	3	2	3	-
890	Campbelltown to Harrington Park via Narellan Vale and Narellan (Loop Service)		6	6	16	-
890C	Camden	Campbelltown via Narellan	2	1	10	-
	Campbelltown	Camden via Narellan	2	4	9	-
891	Mount Annan	Campbelltown via Currans Hill	7	10	26	14
	Campbelltown	Mount Annan via Currans Hill	7	8	25	15
892	Campbelltown to Mount Annan via Narellan Vale (Loop Service)		5	8	13	9
893	Narellan	Campbelltown via Elderslie / Spring Farm	7	9	22	11
	Campbelltown	Narellan via Elderslie / Spring Farm	7	9	23	11
895	Campbelltown to Camden South via Camden (Loop Service)		15	19	17	14
896	Campbelltown to Oran Park via Gregory Hills (Loop Service)		9	9	14	13
Total			**140**	**174**	**327**	**188**

Source: Opal data, 2020

3.6 Road network

The site is bounded by Goldsmith Avenue to the north, Gilchrist Drive to the east and the southern railway line to the south. It has direct access to Narellan Road / Appin Road via Goldsmith Avenue and Gilchrist Drive, that provides connection to Sydney CBD and the Southern Highlands (via the Hume Motorway). Other key roads in proximity of the site include Menangle Road and Oxley Street / Moore Street / Campbelltown Road, as seen in **Figure 3–8**.

Figure 3–8 Road classification around the site



Source: SCT Consulting, SIX Maps, OpenStreetMap, 2020

The characteristics of the key road network surrounding the site, as shown in **Figure 3–8** are:

– **Goldsmith Avenue** - a two-way, two-lane divided local road that runs in an east-west direction between Gilchrist Drive in the east and University Drive in the west, immediate to the north of the site. The local road currently provides access to the Macarthur Heights residential development, Western Sydney University as well as Gilchrist Oval. It will provide main access into the site and connects the site with the regional road network.

– **Gilchrist Drive** - a two-way, four-lane divided distributor road that runs just east of the site between Menangle Road and Narellan Road (where it becomes Blaxland Road). It acts as the main access route, together with Williams Downes Avenue, from the site to the external road network via Goldsmith Avenue and provides vehicular connection across the railway line to Macarthur Square.

– **William Downes Avenue** - a two-way, two to three-lane undivided local road that runs just north of the site and connects to Narellan Road via a roundabout with the Western Sydney University Access Road. It acts as the main access route, together with Gilchrist Avenue, from the site to the external road network via Goldsmith Avenue.

– **Menangle Road** - a two-way, two-lane undivided arterial distributor road that runs south of the site between Narellan Road (although the two roads do not intersect) and Picton Road south west of the site. Menangle Road can be accessed from the site via Kellicar Road and provides access to Macarthur Station as well as a north-south alternative to the Hume Motorway from the site to access Menangle and Picton.

– **Narellan Road** - a two-way, six-lane divided arterial road that runs north and east of the site between the Hume Motorway and Appin Road. It is part of an important north-south corridor (A9) that skirts around the Western Sydney connecting Windsor with Penrith, Narellan and Campbelltown. It further extends south towards Appin via Appin Road (B69). It connects to site to the Hume Motorway (which provides access to Sydney's Motorway network via the M7 and M5). Narellan Road is accessed from the site via Goldsmith Avenue and Gilchrist Drive, but it can also be accessed through the internal campus road network of Western Sydney University (David Pilgrim Avenue and William Downes Avenue), although this is a longer and slower route with Local Area Traffic Management measures.

– **Oxley Street / Moore Street / Campbelltown Road** - a two-way, four-lane divided arterial road that runs in a north-south direction between Camden Valley Way in the north and Narellan Road in the south. It also acts as an alternative to the Hume Motorway and provides access to a number of suburbs north of the site including Campbelltown and Minto.

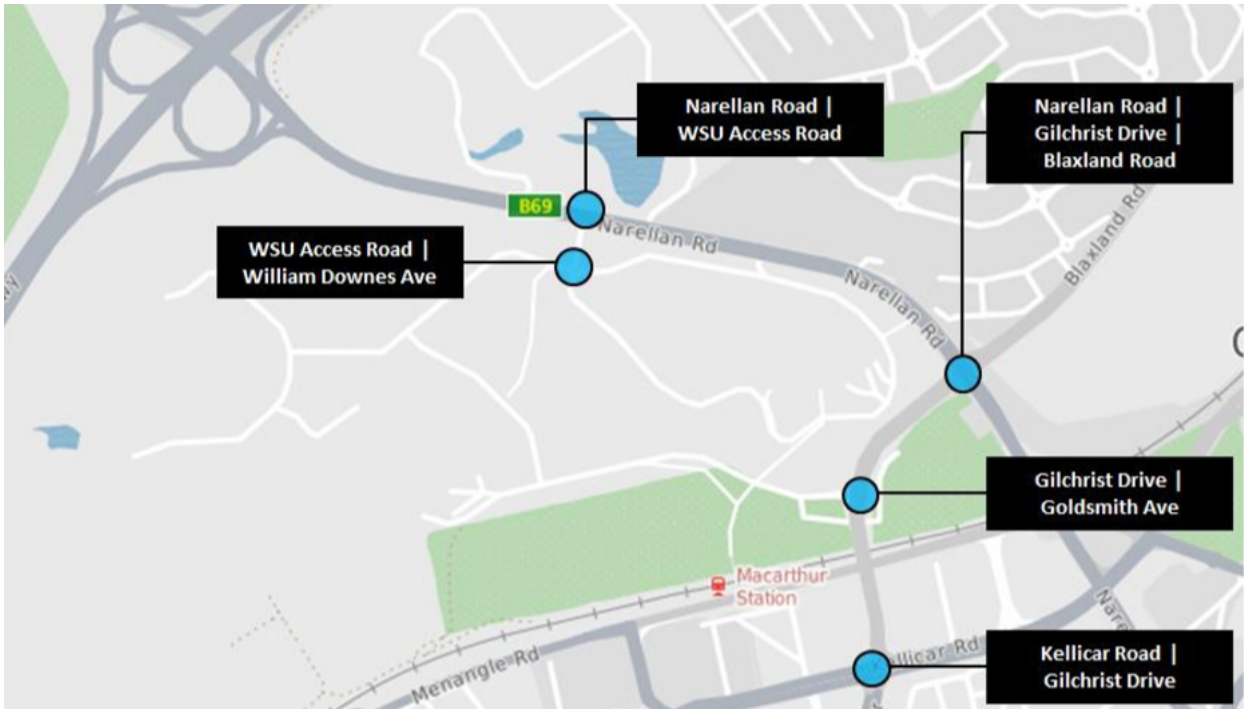
3.7 Existing traffic conditions

3.7.1 2019 Intersection volume surveys

In August 2019, SCT Consulting collected traffic volume surveys on the surrounding key intersections (**Figure 3–9**), to understand the traffic conditions surrounding the site. Based on these volumes, a SIDRA network model was prepared to determine the existing network performance of the surrounding intersections which include:

1. Western Sydney University Access Road / William Downes Avenue (roundabout)
2. Narellan Road / Western Sydney University Access Road (traffic signals)
3. Narellan Road / Gilchrist Drive / Blaxland Road (traffic signals)
4. Gilchrist Drive / Goldsmith Avenue (traffic signals)
5. Kellicar Road / Gilchrist Avenue (traffic signals).

Figure 3–9 Surveyed intersections surrounding the site



Source: SCT Consulting, 2019

3.7.2 SIDRA Input data

The traffic flows (classified into light and heavy vehicles) on the surrounding intersections were obtained from surveys undertaken by SCT Consulting on Thursday 1 August 2019, from 7am to 9am and from 4pm to 6pm. Intersection layouts were derived from a combination of site visits, Sixmaps imagery and traffic signal design drawings.

Traffic signal data was obtained from Transport for NSW for all of the signalised intersections for the surveyed dates. Data provided included 15-minute summary signal timing data and SCATS summary images.

3.7.3 Network performance

Operational performance is typically measured through an assessment of the throughput of vehicles across a traffic network, with average delay per vehicle used to assess the performance of an individual intersection. The average delay per vehicle measure is linked to a Level of Service (LoS) index which characterises the intersection's operational performance. **Table 3-4** provides a summary of the LoS performance bands.

Table 3-4 Level of Service (LoS) index

Level of Service (LoS)	Average Delay per Vehicles (sec/h)	Performance explanation
A	Less than 14.5	Good operation
B	14.5 to 28.4	Good with acceptable delays and spare capacity
C	28.5 to 42.4	Satisfactory
D	42.5 to 56.4	Operating near capacity
E	56.5 to 70.4	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control method.
F	70.5 or greater	At capacity, at signals incidents will cause excessive delays. Roundabouts require other control method.

Source: Guide to Traffic Generating Developments; RMS, 2002

In addition, intersection performance is measured using degree of saturation, which is a measure of the spare capacity of each intersection. These measures enable clearer target setting, with future performance of degree of saturation greater than one being unacceptable.

The 2019 AM and PM peak hour traffic volumes as well as the existing intersection performance based on the SIDRA analysis are presented in **Table 3-5**.

Table 3-5 Existing (2019) intersection volumes and performance surrounding the site

Intersection	Peak hour	Demand flow (veh/hr)	Level of Service (LoS)	Degree of Saturation (DoS)	95% back of queue (m)	Ave. Delay (sec)
Western Sydney University Access Road / William Downes Avenue	AM	917	A	0.255	8	6.3
	PM	534	A	0.083	3	5.1
Narellan Road / Western Sydney University Access Road	AM	5,899	B	0.793	322	27.4
	PM	5,638	B	0.810	344	20.1
Narellan Road / Blaxland Road / Gilchrist Drive	AM	5,885	D	0.958	223	54.7
	PM	7,557	E	0.985	295	57.2
Gilchrist Drive / Goldsmith Avenue	AM	3,023	B	0.522	146	17.6
	PM	3,552	B	0.587	231	16.8
Kellicar Road / Gilchrist Drive	AM	3,364	C	0.686	166	35.3
	PM	4,768	D	0.997	238	49.2

Source: SCT Consulting, 2019

As seen in **Table 3-5**, the intersections surrounding the site are currently operating with an acceptable Level of Service (LoS) in the AM peak hour, with the worst performing intersection being the Narellan Road / Blaxland Road / Gilchrist Drive intersection, which operates at a LoS D and is approaching a Degree of Saturation (DoS) of 1.0.

During the PM peak hour, this intersection is performing unsatisfactorily at LoS of E and with DoS 0.985. The intersections of Gilchrist Drive / Goldsmith Avenue and Kellicar Road / Gilchrist Drive are performing satisfactorily, except for a DoS approaching 1.0 for the Kellicar Road / Gilchrist Drive intersection in the PM peak hour.

The intersection performance analysis confirmed that there is significant capacity available at the intersection of Gilchrist Drive / Goldsmith Avenue and Narellan Road / Western Sydney University Access Road, which are the main access points of the future development trips of the site.

The traffic surveys undertaken were also used to analyse and understand the existing traffic distribution and trip generation rates for Macarthur Heights, as part of the analysis undertaken by SCT Consulting for Macarthur Gardens North. The result of this analysis is discussed further in **Section 5.2** and apply to development trips associated with the site.

4.0 The Proposal

4.1 The Macarthur Gardens North Masterplan

Landcom has prepared a Masterplan for the Macarthur Gardens North (the site), which is located on a greenfield site of approximately 18.52 hectares, just north of Macarthur Station in the Campbelltown City LGA. The site is bounded by Goldsmith Avenue to the north, Gilchrist Drive to the east and the southern railway line (with Macarthur Station) to the south.

Macarthur Gardens North presents the opportunity to create a new type of precinct which is sustainable, creative, connected and attractive. It will be a vibrant, youthful and engaging place to live, work and visit, drawing on and connected to the surrounding assets of the town centre, Macarthur Square, Western Sydney University (WSU), TAFE Campbelltown and natural ecosystems.

The vision and the design philosophy for Macarthur Gardens North is guided by the following principles:

– Celebrate natural assets - retain Bow Bowing Creek Riparian Corridor and ecological communities

– Seamless connections to key destinations - promote active transport network

– A new community wih access to jobs - mix of housing offer close to the train station

– Contextual built form response - logical building envelopes, orientation and articulation

– Activate places for people - new community park, arrival plaza and fitness park

Most of the residential component of the site will be high-density apartments. The land use of the site is shown in **Figure 4–1**, with a proposed yield of:

– 1,250 apartments

– 1,960 m^2 of ground level retail activation along the arrival plaza and main street.

Figure 4–1 MGN draft structure plan

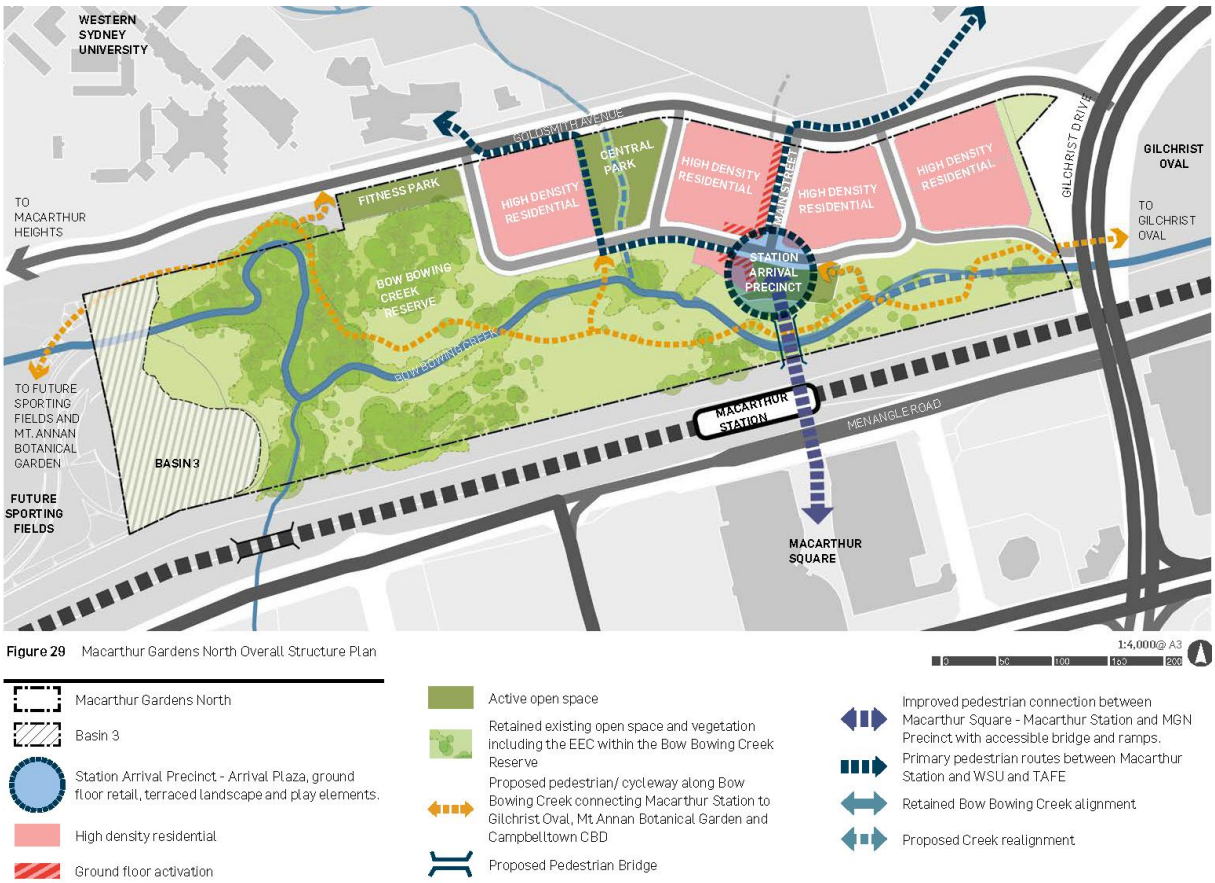


Figure 29 Macarthur Gardens North Overall Structure Plan

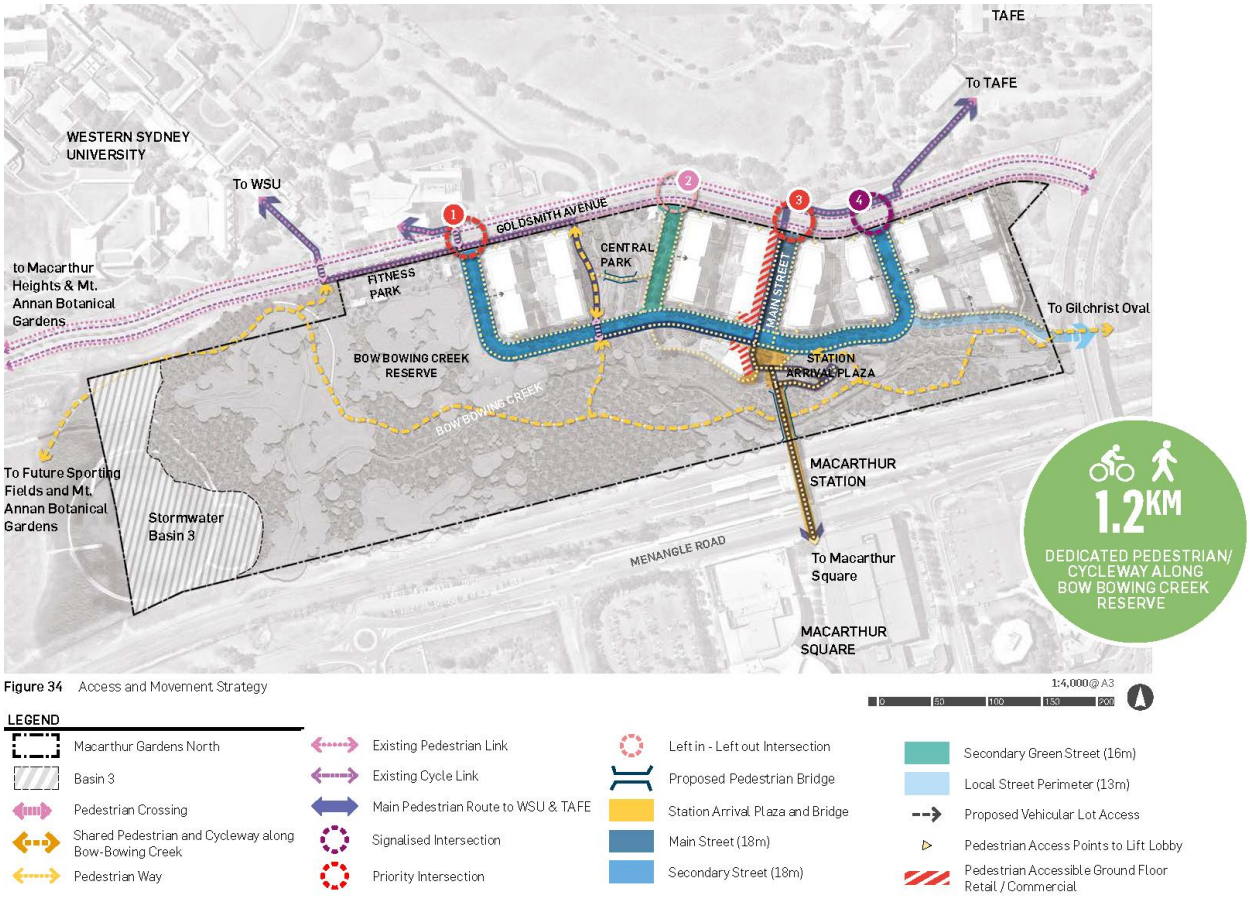
Source: Urbis, 2021

4.2 Proposed access arrangements

4.2.1 Vehicular access

Vehicles will access the site from the surrounding road network via the William Downes Avenue (through WSU) and Goldsmith Avenue. There are four access points proposed to access the site along Goldsmith Avenue, as shown in **Figure 4–2**. It is assumed that access intersections 1, 2 and 3 will be priority intersections and access intersection 4 will be traffic signals that facilitate safe pedestrian crossing to TAFE as well as a gateway treatment.

Figure 4–2 Proposed access and movement strategy around the site



Source: Urbis, 2021

Access 4 will be relocated 50m to the west of the existing access road to Gilchrist Oval, and continue to provide access to Gilchrist Oval. The existing pedestrian crossing near Access 1 will need to be relocated to the west, to align with the pedestrian desire lines and continue to facilitate safe crossing between the site and the WSU and the TAFE.

The proposed internal road network layout consists of four north-south local streets, which all run between Goldsmith Avenue and an east-west street along the southern boundary of the residential developments and extends to the existing underpass beneath Gilchrist Drive (via a local street).

4.2.2 Typical street cross-sections

The main secondary streets proposed that wrap around the precinct have a 18.0m road reserve. The secondary street is designed to provide safe pedestrian connection on both sides of the road reserve with verges and on-street parking as the buffer between the carriageway and the footpath.

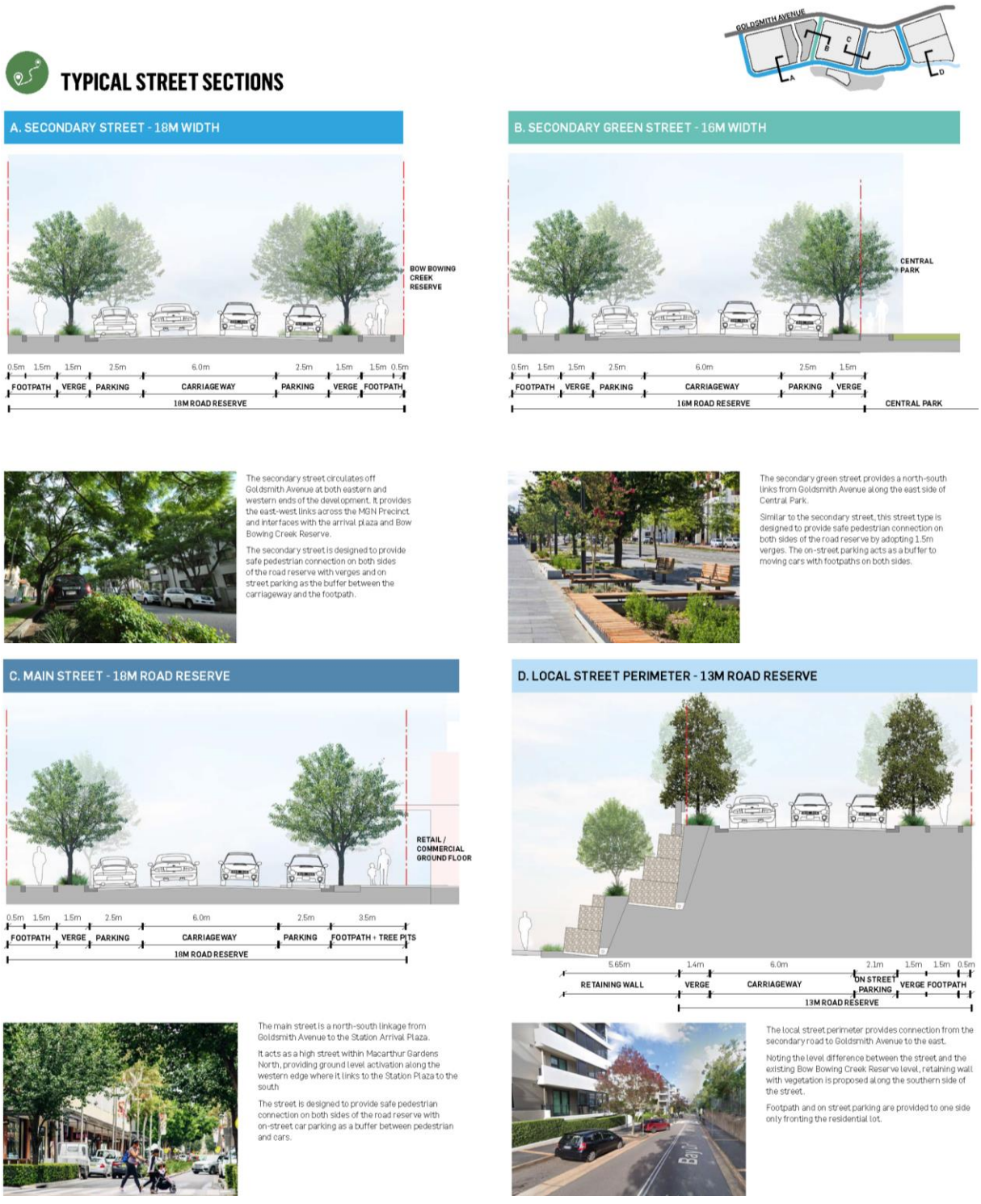
A secondary green street is also proposed (with 16.0m road reserve) that provides a north-south link from Goldsmith Avenue along the east side of Central Park. Similar to the secondary street, this street type is designed to provide safe pedestrian connection on both sides of the road reserve by adopting 1.5m verges. The on-street parking acts as a buffer to moving cars with footpaths on both sides.

A main street (with 18.0m road reserve) is also proposed as a north-south linkage from Goldsmith Avenue to the Station Arrival Plaza. It acts as a high street within Macarthur Gardens North, providing ground level activation along the western edge where it links to the Station Plaza to the south. The street is designed to provide safe pedestrian connection on both sides of the road reserve with on-street car parking as a buffer between pedestrian and cars.

Finally, a local street perimeter (with 13.0m road reserve) provides connection from the secondary road to Goldsmith Avenue to the east. Footpath and on-street parking are provided to one sideonly fronting the residential lot.

Typical street cross-section of internal streets within the precinct are shown in **Figure 4–3**.

Figure 4–3 Typical internal local street cross-sections



Source: Urbis, 2021

4.2.3 Pedestrian and cycling access

As shown in **Figure 4–2**, the Masterplan would facilitate improved pedestrian connections between Macarthur Square, Macarthur Station (south of the site) and the Western Sydney University and TAFE NSW – Campbelltown (north of the site).

A pedestrian network through the site will be provided via footpaths along the internal local streets, that connect with Goldsmith Avenue to the north, to Gilchrist Oval and to Macarthur Station (via an approximate 200-400m walk). Safe pedestrian access across Goldsmith Avenue is provided at the a new zebra crossing located near Access 1 and a new traffic signals with controlled crossings at Access 4.

Cycling access from the site will be connected to the surrounding road network via existing facilities along Goldsmith Avenue and the rest of the network. A new shared path is also proposed south of the site along Bow Bowing Creek, connecting the site (at the eastern end) to the greater Green Grid Network, as well as Gilchrist Oval in the east. Multiple connections are also proposed between the Bow Bowing Creek and Goldsmith Avenue through the permeable street network of the site.

4.2.4 Public transport access

The improvements to the pedestrian network as part of the Masterplan will provide convenient access to the Macarthur Station and bus interchange, via an approximate 200-400m walk from the site. As described in **Section 3.5**, the proximity of the site to the Macarthur Station along with the frequent number of train services available to the City and Airport, suggests that future residents of the site will be well served by public transport to these key destinations. In addition, the frequent number of bus services at the Macarthur Station Interchange will provide access to surrounding local and key employment centres in the Campbelltown and Macarthur Region.

A public transport corridor (as part of the Sydney Metro Greater West project) has been planned and reserved between the North West, Western Sydney Airport, South West and Greater Macarthur Growth Areas. The Future Transport Link through Western Sydney will provide improve transport options and accessibility for future MGN residents to future employment areas along Sydney's expanded Metro network. This will also enable MGN to be designed as a transit-oriented development with 30-minute access to jobs and economic growth across Western Sydney and for the planned Western Sydney Airport.

4.3 Travel Demand Management

Sustainable transport and Travel Demand Management (TDM) strategies involve the application of policies, objectives, measures and targets to influence travel behaviour, to encourage uptake of sustainable forms of transport, i.e. non-car modes, wherever possible. TDM measures have proven to reduce congestion created by growth within urban areas and unlock urban renewal opportunities. They result in travel behaviour that uses less road space than a single occupant vehicle commute and takes advantage of spare transport capacity outside the morning and afternoon peaks.

TDM strategies generally guide all relevant customers (residents, employees and visitors) in changing the travel behaviour in the following ways:

– Reduce travel

– Re-mode (consideration of travel via alternative modes)

– Re-time (consideration of travel at alternative times)

– Re-route.

Landcom sets up a framework for encouraging more sustainable travel, which has been used as a key principle of planning for the development. A Travel Plan should be developed by future developers and monitored by strata management for the MGN community to deliver best practice travel programs and initiatives to manage travel demand for a transit-oriented development. Key initiatives and measures of Travel Demand Management Strategies should be strongly suggested and further developed into a Travel Plan to:

– Reduce the need to travel

  - Planning of MGN as a mixed-use community to maximise trip containment within the wider Macarthur Precinct and encourage use of active transport (walking and cycling) for short trips.

– Re-think the mode of travel

- Walking and cycling:
    - A highly permeable and safe pedestrian network throughout the development and connections to surrounding regional facilities
    - Dedicated cycle routes that connect to the regional routes and major transport hubs
    - Key design principles to integrate walking and cycling network and facilities into the planning and delivery of the development
    - High quality, safe and accessible end-of-trip facilities (centralised cycle hubs that are integrated within development at convenient locations, on-street secure bicycle storage located conveniently at end of cycle destinations, parking hubs for shared bikes, lockers and showers)
    - Promotion of bicycle initiatives – such as NSW Bicycle Week, cycle to work day, free bike check-up events.
- Public transport:
    - Provision of access to frequent public transport services to establish a non-car travel behaviour
    - Good quality connections to public transport interchange / stops in the vicinity of the development
    - Tailored information with clear mapping and walking catchments at public transport stops
    - Provision of public transport information from home via television channel or community app.
- Parking measures to encourage alternative modes of travel:
    - Restrained parking rates with flexibility in parking arrangements such as shared parking between non-conflicting uses, shared vehicles parking and / or carpooling to accommodate parking needs of all employees
    - Parking spaces dedicated to electric vehicles, with charging stations; The design to consider the future ability of spaces to link to electrical systems / power supply within the structure
    - Parking spaces dedicated to car share scheme and community car-share vehicles, both on-street and incorporated in easily accessed public car parks.
- Development and use of carpooling app for the wider precinct and community.

– Re-time and Re-route journeys:

- Development of specific community app / community engagement program to enable changing travel behaviour which includes:
    - Active and public transport maps
    - Personalised journey planner
    - Notifications to latest travel information
    - Shared vehicles information
    - Car-pooling opportunities
    - Other precinct-related information.
- Real-time information embedded into development and public transport stops.
- Employers to promote and encourage flexible working hours and arrangements.

While it is important to develop a Travel Plan that is aimed at managing travel demand and reducing reliance on car travel, it is more important to monitor and evaluate the effectiveness of individual measures and the need to adjust the measures. The planning and implementation of a targeted Travel Plan with the above green travel initiatives / principles could support the delivery of a transit-oriented development at MGN that provides significant opportunities for alternative travel options and reduces the need for car travel.

At the masterplanning stage, there is no means to enforce the delivery of Green Travel Plan actions. It is recommended that subsequent development applications be given the requirement to develop green travel plans to realise the benefits of the site's excellent access to public and active transport network and regional services.

4.4 Parking requirements and provision

Transit-oriented developments aim to adopt car parking rates that provide a balance between meeting car parking demand whilst encouraging sustainable and active transport by residents. New developments are encouraged to reduce car parking provision and demonstrate the inclusion of transport alternatives or strategies to discourage and minimise private motor vehicle use.

The site is located with excellent access to active transport and public transport, provided by the Macarthur Station, as well as facilities including Macarthur Square, the Western Sydney University and TAFE NSW. This could warrant a reduction of Council's 'general' car parking rates as outlined in the Campbelltown City DCP 2015. The intent to provide restrained car parking for the site is aligned with the following strategic planning documents:

– The Campbelltown 2040 Local Strategic Planning Statement (LSPS) (Campbelltown City Council, 2020)

– The Campbelltown-Macarthur Place Strategy for the Macarthur Precinct (NSW Government, November 2017)

– The Reimagining Campbelltown City Centre Masterplan (Campbelltown City Council, 2020)

– The Campbelltown City Council Development Control Plan (DCP) 2015.

A common theme throughout the review is that the character and role of the future Macarthur Precinct is to serve residents predominantly within a walking and cycling catchment of essential services and good public transport. This will be supported by introducing a non-car dependent high-quality sustainable transport network which focuses on people (and not cars), has multiple options, and allows residents to access the Campbelltown City Centre without a car within 30 minutes.

The LSPS also outlines the development of **maximum** parking rates for land uses with good public transport accessibility as one of Council's future priority actions. As per SEPP 65, the Apartment Design Guide stipulates that the rates for Metro Regional CBD Centres should be applied to Macarthur Precinct as a Strategic Centre defined in A Plan for Growing Sydney.

4.4.1 The Campbelltown City Development Control Plan (DCP) 2015

The general Campbelltown City Council Development Control Plan (DCP) 2015 specifies minimum car parking provisions across the LGA. The minimum parking rates specified in the DCP, apply generally across the Campbelltown City LGA, and do not take into account the excellent access to public transport provided by the Macarthur Station as well as nearby access to facilities including Macarthur Square, the Western Sydney University and TAFE NSW. These general parking rates are therefore not considered fully appropriate for the high-density residential component of the MGN Masterplan.

4.4.2 Benchmark review of relevant parking rates in Sydney

To help determine more appropriate vehicle and bicycle parking provision rates for the site, a benchmark review of other relevant car and bicycle parking rates for high density residential developments in Sydney was undertaken, focusing on:

– Other centres and precincts with comparable access and proximity to public transport (metro and train)

– Other DCPs and site specific DCPs for the Campbelltown City Council

– RMS guidelines.

Residential car and bicycle parking rates

Table 4-1 shows a summary of relevant residential car parking rates within and outside the Campbelltown City LGA respectively. Although there is significant variation between these parking rates, a trend is clearly apparent with parking rates near railway and metro stations and the RMS guidelines in proximity of sub-regional and regional centres being lower than the Campbelltown City LGA general guidelines.

Table 4-1 Benchmark review of relevant residential parking rates (apartments)

Document / Area	Benchmark type	Benchmark status	Min. / Max.	1 Bed Flat rate (spaces / unit)	2 Bed Flat rate (spaces / unit)	3 Bed Flat rate (spaces / unit)	Visitor rate (spaces / unit)
Campbelltown City DCPs							
LGA wide	General DCP	Adopted	Min.	1.25	1.25	1.25	0.1
Campbelltown Link Site	Site-specific	Adopted	-	1.0	1.0	1.0	0.2
Glenfield Road Site	Site-specific	Adopted	-	0.75	1.0	1.5	0.2
Edmondson Park Site	Site-specific	Adopted	-	0.75	1.0	1.5	0.2
Other DCPs							
Camden Growth Centre Precincts	Centre-specific	Adopted	-	1.0	1.0	1.5	0.2
Liverpool City Centre	Centre-specific	Adopted	-	1.0	1.0	1.5	0.1
Hornsby (<800m of station)	Centre-specific	Adopted	Max.	0.4	0.7	1.2	0.14 (Min.)
Epping Town Centre	Centre-specific	Adopted	Max.	0.4	0.7	1.2	0.14 (Min.)
Metro Station Precincts							
Tallawong Station Precinct South	Sydney Metro	Adopted	Min.	0.6	0.9	1.4	0.1
Castle Hill North	Sydney Metro	Adopted	Max.	0.5	0.8	1.3	0.2
Kellyville / Bella Vista Station Precincts	Sydney Metro	Proposed	Min.	0.4	0.7	1.2	0.1
			Max.	0.6	0.9	1.4	0.1
RMS and other guidelines							
RMS Guidelines for Metro Sub-Regional CBD Centres	General guidelines	Adopted	Min.	0.6	0.9	1.4	0.2
RMS Guidelines for Metro Regional CBD Centres	General guidelines	Adopted	Min.	0.4	0.7	1.2	0.14
Apartment Design Guide*	General	Adopted	Min.	0.4	0.7	1.2	0.14

Source: SCT Consulting, September 2020

*The Apartment Design Guide does not itself specify parking rates; rather, it specifies that for developments near a station or a centre, the minimum car parking requirement is equal to RMS Guidelines for Regional Centre for Macarthur given its status as a Strategic Centre according to A Plan for Growing Sydney.

The benchmark examples for sites within the Campbelltown City Council most comparable to the site are the Campbelltown Link Site as well as those adopted for the Glenfield Road and Edmondson Park areas. However, accessibility and proximity to public transport is significantly better from the MGN site than these areas, as seen in **Table 4-2**. This suggests a similar or lower parking rate could be applied for the site.

It is noted that the number of peak hour services to the city is significantly higher from Glenfield Station than from Macarthur Station. However, the accessibility to more frequent train / metro services at Macarthur Station could increase significantly when Sydney Metro Greater West is connected to Macarthur.

Table 4-2 Proximity of the site to public transport compared to other DCP sites in the LGA

Site area	Nearest train station	Train lines serving the station	Approximate distance from site to train station	AM / PM Peak hour services to / from the city*
Macarthur	Macarthur Station	T8 (Macarthur to City via Airport or Sydenham) | Southern Highlands	200m – 800m	15 / 17
Campbelltown Link Site	Macarthur Station	T8 (Macarthur to City via Airport or Sydenham) | Southern Highlands	800m – 1,200m	15 / 17
Glenfield Road Site	Glenfield Station	T2 (Parramatta / Leppington to City) | T5 (Leppington to Richmond via Parramatta) | T8 (Macarthur to City via Airport or Sydenham)	1,500m – 2,000m	31 / 41
Edmondson Park Site	Edmondson Park Station	T2 (Parramatta / Leppington to City) | T5 (Leppington to Richmond via Parramatta)	800m – 2,000m	16 / 24

Source: SCT Consulting, September 2020

* Number of services (all lines serving the Station combined) between 6am and 9am from the Station to the City and between 3pm and 7pm from the City to the Station

Apart from the site-specific DCPs which prescribed more restrained parking requirements given their good accessibility and proximity to public transport, a number of other centre-specific or precinct DCPs across Sydney have also prescribed more restrained parking requirements for sites that are located close to public transport such as Epping, Hornsby, Castle Hill, Bella Vista and Kellyville.

Based on the above analysis, it is proposed that the site adopt 0.6, 0.9 and 1.4 parking spaces per 1, 2 and 3-bedroom flat respectively (plus 0.1 visitor spaces per flat) for the medium and high-density component. This is lower than the Campbelltown City Council site specific rates, but they are reflective of site's proximity and excellent access to Macarthur Station and regional services at Macarthur Square, Western Sydney University and TAFE NSW.

Bicycle parking provision requirements for residential developments was derived from several relevant documents as summarised in **Table 4-3**.

Table 4-3 Benchmark review of relevant residential bicycle parking rates

Precinct / Area	Benchmark type	Benchmark status	Bicycle parking rate
Campbelltown City DCPs			
LGA wide	General DCP	Adopted	One space per 5 dwellings
Glenfield Road Site	Site-specific	Adopted	One space per 5 dwellings (in developments with a total gross floor area exceeding 1,000m^2)
Edmondson Park Site	Site-specific	Adopted	One space per 5 dwellings (in developments with a total gross floor area exceeding 1,000m^2)
Other DCPs			
Camden LGA	General	Adopted	One space per 3 units for residents
Hornsby (<800m of station)	General	Adopted	One space per 5 units for residents and one visitor space per 10 units
Rouse Hill Regional Centre	Centre-specific	Adopted	One space per 5 dwellings
Blacktown Growth Centre Precincts	Centre-specific	Adopted	One space per 3 dwellings
Metro Station Precincts			
Tallawong Station Precinct South	Sydney Metro	Adopted	One space per apartment and one visitor space per 10 apartments
Hills Showground / Kellyville / Bella Vista Station Precincts	Sydney Metro	Proposed	One space per 3 apartments for residents and one visitor space per 12 apartments

Source: SCT Consulting, September 2020

Given the plans outlined in the reviewed background documentation, where there is a strong focus to introduce new regional and local cycle routes to improve links with Macarthur Station and surrounding areas, future residents of the site are likely to use bikes. This is also supported by the fact that the site will be located in proximity of the Western Sydney University and TAFE NSW, and so a portion of the residents may be students with less probability of owning a car.

It is therefore suggested that the higher bicycle parking rate of **one space per 3 apartments and one visitor space per 12 apartments** be applied to the residential (apartment) component of the site.

Retail car parking rates

The retail component of the site is expected to be minor and will most likely be used by residents and passing trade within the local walking catchment, accessing the premises by foot or cycle. Hence, it is expected that the car parking needs for customers of the retail component would be small and could most likely be provided by short-term on-street parking in proximity of the development.

If retail off-street parking was to be provided, a lower rate (such as one space per 60-130m^2) can be considered to cater for staff parking needs. The range proposed for retail parking rates could be refined as the Masterplan develop and the specific uses and scale of the retail areas are more defined.

4.4.3 Further opportunities to reduce car dependence and encourage sustainable travel behaviours

The car parking provision rates reviewed in the previous section all assume traditional models of car ownership. However, consumer preferences are changing, and this should be considered to ensure that the MGN Masterplan does not deliver an over-supply of parking for future residents.

Strategies to improve the efficiency of parking

The following opportunities could be considered to further reduce requirements or to support lower requirements of parking provision, presented in order of their level of ambition and level of impact[1]:

– **Unbundled parking:** Unbundled parking is parking that is separated from the cost of the flat, with residents having the choice to purchase or lease parking rather than it being bundled in the cost of housing. This strategy better matches supply with demand and gives residents the choice of more affordable homes.

– **Decoupled parking:** Decoupled parking is parking that is spatially separated from the building to which the parking services. It is also generally unbundled from the sale or rental of an apartment or building. In addition to the benefits of unbundled parking, it provides potential for parking to transition to other uses if car ownership decreases over time. However, it should be noted that such an approach would require a separate building for parking purposes as part of the development, which may pose challenges for the project.

– **Car sharing:** Car share allows residents or businesses to use a shared vehicle fleet. Car share relies on the restriction of parking in areas of high public transport access and mobility choice.

Car share parking: examples elsewhere in Sydney

Car sharing has become a major mainstream option for residents in Sydney. The choice not to buy a second car (or even not to own a car at all) but rent one on an hourly basis as required can deliver major savings to consumers, as well as making much more efficient use of scarce parking space. According to the City of Sydney, a single car share vehicle can replace up to 12 private vehicles that would otherwise compete for local parking[2].

At the Central Park development in Chippendale, about 700 residents, or one in 10, are car-share members using about 50 car sharing spaces at the One Central Park and Duo building[3]. The Chippendale development delivered 0.6 car spaces per apartment, having been constructed during 2012-2013. Since then, the number of car share members in the City of Sydney has more than doubled, suggesting an even lower rate could be achieved if a similar development was delivered now.

There are currently no specific requirements car share provision in the Campbelltown City Council DCP or in the LSPS. However, the LSPS states that some future developments may reduce private car ownership due to their

[1] Source: adapted from Kinesis (2019), Cherrybrook Precinct Parking Strategy, February 2019.
[2] Source: City of Sydney (2019), Car Sharing. Available from: https://www.cityofsydney.nsw.gov.au/live/residents/car-sharing
[3] Source: Financial Review (2019), How the rise of car sharing could slash property prices. Available from: https://www.afr.com/real-estate/residential/how-the-rise-of-car-sharing-could-slash-property-prices-20190524-p51qog

proximity to higher order public transport options and the mandated provision on-site of ride share facilities. Other DCPs from elsewhere in Greater Sydney provide an indication of car share rates:

– The City of Sydney DCP specifies a minimum rate of car share parking to be provided in residential developments, ranging from 1 per 50 car spaces provided to 1 per 90 car spaces provided, depending on the development's location. For office, business or retail premises, the minimum rate specified ranges from 1 per 30 car spaces to 1 per 50 car spaces, depending on the location.

– North Sydney Council does not provide a minimum rate of car share parking; however the DCP allows developers to substitute residential or commercial parking spaces with car share spaces at the rate of 3 or 4 to 1.

– The City of Parramatta Council DCP prescribes 1 car share parking space is to be provided for any business development with a floor space of 5,000 square metres or above and is within an 800m radial catchment of a railway station. 1 car share space can be provided in lieu of 3 car parking spaces.

Car share parking: potential application to the MGN site

For residential car share parking, a reasonable approach based on the above examples could be to provide car share parking spaces at a ratio of **1 per 150 car parking spaces provided**, in lieu of **3 car parking spaces per car share parking space**. This would capitalise on the precincts' excellent public transport access to the Macarthur Station, but also reflect the area's more suburban character compared to the City of Sydney, North Sydney and Parramatta.

With the introduction of car share parking policies for the site, a total of 18 normal car parking spaces could be replaced by 6 shared vehicles parking spaces for the proposed residential component of the Masterplan. These shared vehicles, to be located in the local street network would be available for residents of Macarthur Heights as well as students and staffs of WSU and TAFE. Given the site's proximity to Macarthur Station, the shared vehicles could also be used by visitors of surrounding suburbs that are not close to the station.

4.4.4 Parking requirement summary

In supporting all the relevant planning initiatives near the site, there is a major opportunity to deliver reduced parking provision and at the same time improve access to active transport facilities such as bicycle parking. This will not only reduce traffic on the road network, but also make the developments more affordable.

Based on a benchmark review of similar precincts and areas in Sydney and to deliver a less car-dependent development, the following **maximum** parking rates are recommended for the MGN Masterplan:

– **Residential:** 0.6 spaces per 1-bedroom flat, 0.9 spaces per 2-bedroom flat, 1.4 spaces per 3-bedroom flat, and 0.1 spaces for visitor parking for all apartments

– **Retail:** 1 space per 60-130 m^2 GFA

– **Bicycle parking:** One space per 3 apartments for residents and one visitor space per 12 apartments.

It is also recommended to further explore opportunities for unbundled, decoupled and car sharing arrangements. Using conservative assumptions, the provision of 6 shared vehicle parking spaces could replace a further 18 residential parking spaces for the site.

4.4.5 Proposed car parking provision

Applying the recommended maximum parking rates to the estimated residential yields for the MGN Masterplan would result in 1,166 parking spaces being provided for the site, as shown in **Table 4-4**. The number of bicycle parking spaces required for the apartments would be 520 spaces.

If retail off-street parking was to be provided, a lower rate (such as one space per 60-130m^2) can be considered to cater for staff parking needs. The range proposed for retail parking rates could be refined as the Masterplan develop and the specific uses and scale of the retail areas are more defined. Based on approximately 1,960 sqm GFA of retail and an average rate of one space per 95m^2, the retail component should provide 21 off-street parking spaces.

Table 4-4 MGN car and bicycle parking provision

Type of dwelling	Number of dwellings	Proposed car parking rates	Car parking spaces	Proposed bicycle parking rates	Bicycle parking spaces
Studio / 1-bedroom unit	604	0.6 space per unit	363	1 space per 3 unit	201
2-bedroom unit	496	0.9 space per unit	447		165
3-bedroom unit	150	1.4 space per unit	210		50
Visitor space	1,250	1 space per 10 unit	125	1 space per 12 unit	104
Sub-total for high-density apartments			***1,145***		***520***
Retail	~1,960 sqm of GFA	1 space per 95m2 of GFA	21		-

Source: SCT Consulting

5.0 Trip generation and distribution

5.1 Trip generation

The site is located with excellent access to active transport and public transport, provided by the Macarthur Station, as well as facilities including Macarthur Square, the Western Sydney University and TAFE NSW. The site's proximity to these facilities could warrant a reduced trip generation rate, compared to the typical RMS' Guide to Traffic Generating Developments' rates.

5.1.1 Typical vehicle trip generation rates

The *Guide to Traffic Generating Developments*[4] states the following trip generation rates for the following types of residential dwellings:

– High density residential (in Metropolitan Regional (CBD) Centres): 0.24 trips per unit

– High density residential (in Metropolitan Sub-Regional (CBD) Centres): 0.29 trips per unit.

More recent additional surveys were undertaken for high density residential flat dwellings in Sydney that are (i) close to public transport, (ii) greater than six storeys and (iii) almost exclusively residential in nature. The typical average trip generation rates for eight surveyed sites across Sydney as published in *Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys*[5]; are shown **Table 5-1**.

Table 5-1 Typical vehicle trip generation rates for high density residential flat dwellings

Weekday rates	Sydney average	Sydney range
AM peak (1 hour) vehicle trips per unit	0.19	0.07-0.32
PM peak (1 hour) vehicle trips per unit	0.15	0.06-0.41
Daily vehicle trips per unit	1.52	0.77-3.14

Source: Roads and Maritime Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys

It should be noted however, that these vehicle trip generation rates are based on surveys in a range of different locations in Sydney. As shown in **Table 5-2**, many of these are much closer to Sydney CBD and have access to more frequent public transport services and hence have different public transport mode share compared to the site.

Table 5-2 Vehicle trip generation rates and mode shares for surveyed high density residential flat dwellings

Surveyed location	Weekday vehicle trip generation (veh / unit)			% mode split		
	AM peak	PM peak	Daily	Car Driver	Car Passenger	Non-Car
Site 1: St Leonards	0.14	0.07	0.77	22%	5%	73%
Site 2: Chatswood	0.14	0.12	1.23	23%	12%	64%
Site 3: Cronulla	0.07	0.11	0.93	31%	1%	67%
Site 4: Rockdale	0.32	0.18	2.25	42%	15%	43%
Site 5: Parramatta	0.27	0.12	1.67	33%	9%	57%
Site 6: Liberty Grove	0.28	0.41	3.14	48%	20%	32%
Site 7: Strathfield	0.10	0.06	1.16	28%	3%	69%
Site 8: Pyrmont	0.18	0.10	1.03	34%	6%	60%

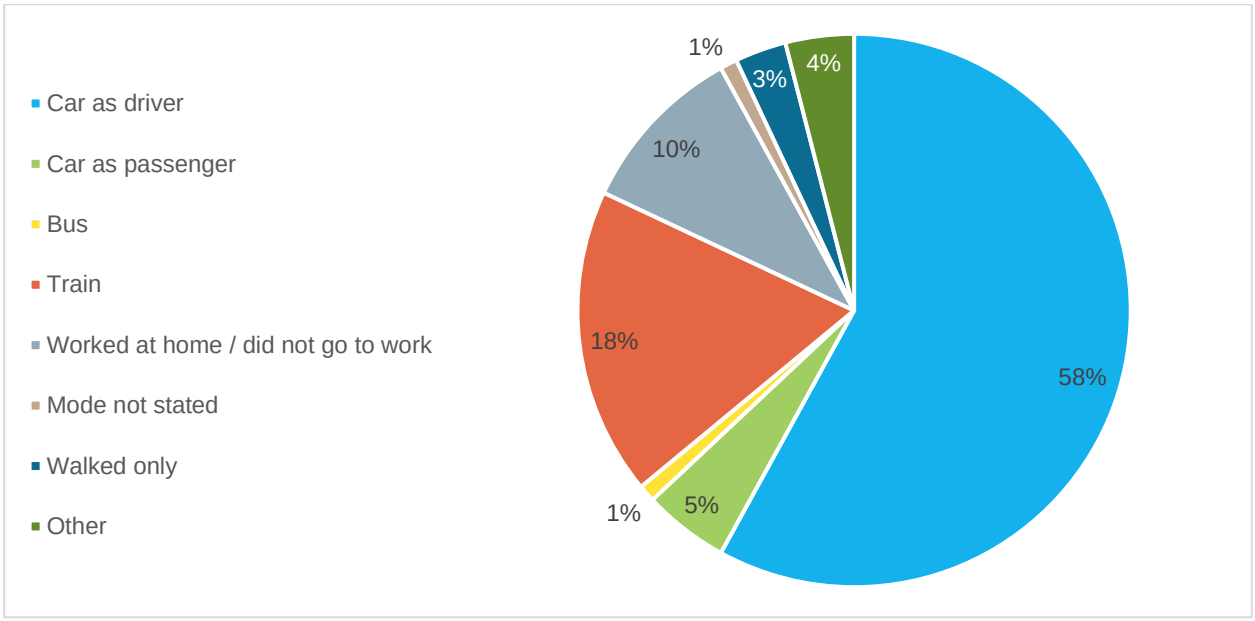
Source: Roads and Maritime Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys

[4] Roads & Traffic Authority (2002), Guide to Traffic Generating Developments, October 2002.
[5] Roads and Maritime Services (2013), Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys, August 2013.

5.1.2 Travel behaviour for the MGN site

Figure 5–1 shows mode shares for residents travelling to work in 2016 from the Campbelltown Statistical Area which include the Macarthur and Campbelltown Stations. As seen, although a large proportion of residents drive to work (63 percent driving or passenger), a significant number also use public or active transport to get to work, with 19 percent using train or bus.

Figure 5–1 2016 Travel to work mode shares for residents and around the site (Campbelltown SA)



Source: TfNSW 2016 Census Journey to Work data by Travel Zone

5.1.3 Recommended vehicle trip generation rates

The car driver and passenger mode share (combined) for the site and surrounding areas is 63 percent (**Figure 5–1**). This is clearly much higher than some of the surveyed locations (**Table 5-2**), such as St Leonards (27%), Chatswood (35%) and Cronulla (32%).

It is therefore proposed that the residential vehicle trip generation rates can be established by using the surveyed locations that resemble the site most closely. According to surveyed sites as shown in **Table 5-2**, these are Rockdale (Site 4, with a car driver and passenger mode share of 57%) and Liberty Grove (Site 6, with a car driver and passenger mode share of 68%). The average of these two surveyed locations is summarised in **Table 5-3**.

Table 5-3 Recommended weekday high density residential vehicle trip generation rates

Surveyed location	AM peak (veh / unit)	PM peak (veh / unit)	Daily (veh / unit)
Site 4: Rockdale	0.32	0.18	2.25
Site 6: Liberty Grove	0.28	0.41	3.14
Average (recommended)	**0.30**	**0.30**	**2.70**

Source: Roads and Maritime Technical Direction TDT 2013/04a: Guide to Traffic Generating Developments: Updated traffic surveys

The proposed peak hour trip generation rate of 0.30 trip per unit is similar to those prescribed for Metropolitan Sub-Regional (CBD) Centres. This is considered appropriate as the recommended car parking rates are also based on Metropolitan Sub-Regional (CBD) Centres.

5.1.4 Trip generation of MGN Masterplan

The MGN Masterplan proposes a development of **1,250 apartments**. Applying a trip generation rate of 0.30 trips per dwelling for high-density residential developments, the development is expected to generate a total of **375 trips** being generated in the AM and PM peak hour respectively.

It should be noted that the retail component of the MGN Masterplan is expected to be minor and will most likely be used by residents and passing trade within the local walking catchment, accessing the premises by foot or cycle. Hence the vehicular trip generation by the retail component to the external road network is expected to be negligible.

5.2 Trip distribution

Based on the traffic surveys undertaken by SCT Consulting in 2019, there is a 35:65 split in the AM peak hour and a 25:75 in the PM peak hour of traffic using William Downes Avenue versus Goldsmith Avenue while accessing the surrounding arterial road network from the site.

Of these, 63 percent of traffic leaves the site and 37 percent enters the site in the AM peak hour. During the PM peak hour, 45 percent of traffic leaves the site, while 55 percent enters it.

Approximately 70 percent will then travel north and 30 percent south in the AM peak hour, according to the traffic surveys undertaken by SCT Consulting in 2019. During the PM peak hour, 60 percent of traffic will travel south and 40 percent will travel north. **Table 5-4** summarises the additional number of trips on the five intersections surrounding the site, as a result of the proposed development.

Table 5-4 Additional number of trips on the surrounding intersection as a result of the proposed development

Intersection	Number of additional trips (veh/hr)	
	AM Peak Hour	PM Peak Hour
Western Sydney University Access Road / William Downes Avenue	130	90
Narellan Road / Western Sydney University Access Road	130	90
Narellan Road / Blaxland Road / Gilchrist Drive	150	105
Gilchrist Drive / Goldsmith Avenue	245	215
Kellicar Road / Gilchrist Drive	125	125

Source: SCT Consulting, May 2020

As seen in **Table 5-4**, the majority of trips generated by the MGN Masterplan will travel through the Gilchrist Drive / Goldsmith Avenue intersection, with 245 and 215 trips per hour in the AM and PM peak hour respectively. The Kellicar Road / Gilchrist Avenue intersection in the AM peak hour and the Western Sydney University Access Road / William Downes Avenue and Narellan Road / Western Sydney University Access Road intersections in the PM peak hour will be the least impacted by the MGN Masterplan, with 130 and 90 additional trips respectively generated by the site.

5.3 Public and active transport demand

The Journey to Work data (2016) data presented in **Section 3.3** indicates that public transport trips undertaken in the Campbelltown Statistical Area currently accounts for approximately 19 percent (18 percent train and one percent bus) of all trips undertaken.

However, a slightly higher usage towards public transport and active transport of future residents of the site can be expected compared to the wider Campbelltown area because of the proximity of the site to the Macarthur Station and bus interchange, and improvements to the cycle and walking networks as part of the proposed development.

A future mode shift of approximately 15 percent towards public transport (ten percent train and five percent bus trips) has therefore been assumed, resulting in a public transport mode split of 28 percent train trips and six percent bus trips. The assumption that all public transport trips would have a linked walking trip, would result in the same amount of walking trips for every public transport trip, plus the 'walk only' trips of three percent (as identified in the Journey to Work data).

Based on the above assumptions and the total number of vehicle trips generated being 375 trips during the AM and PM peak hours, the proposed development is likely to generate an additional 220 train trips, 50 bus trips and 290 walking (walk only and public transport trips) trips during each of the peak hours.

6.0 Traffic and transport impacts assessment

6.1 Public transport impacts

As described in **Section 5.3**, the MGN Masterplan is expected generate an additional 220 train trips and 50 bus trips during the AM and PM peak hours. As described in **Section 3.5**, the Macarthur Station is serviced with an average of approximately ten trains (in both directions) per weekday peak hour and eight services per hour throughout the day during weekends. The bus data indicates that the combined frequency of bus services at the Macarthur Station interchange is approximately (in both directions), 47 and 44 services per AM and PM peak hour respectively during weekdays.

It is expected that the additional public transport demand can be accommodated by the existing frequent train and bus services. Applying the additional 220 and 50 train and bus trips would equate to approximately 22 additional passengers per train and one additional passenger per bus being generated by the Masterplan during weekday peak hours.

In addition, the Sydney Metro Greater West corridor has been planned to connect Campbelltown to Northwest Metro line via Macarthur and future Western Sydney Airport, with frequent metro services providing excellent public transport access for residents to a large number of employment areas within 30 minutes of travel from the site.

6.2 Active transport impacts

As described in **Section 4.2.2**, improved cycling and walking access from the site to the surrounding road network will be provided as part of the proposed development, via new shared paths and footpaths. These include a shared path south of the site along Bow Bowing Creek connecting to greater Green Grid Network as well as Gilchrist Oval in the east. The proposed access to Goldsmith Avenue will provide good walking and cycling accessibility to Western Sydney University and TAFE NSW – Campbelltown, located north of the site, via two existing pedestrian crossings.

The proposed walking connection to the Macarthur Station will be further improved and hence further encourage access to public transport (both train and bus) for local residents.

Given the extent of the proposed improvements to the walking and cycling network as part of the proposed development, the surrounding active transport network is expected to be able to handle the additional 290 walking trips, as well as any additional cycling trips, as a result of the MGN Masterplan.

6.3 Parking impacts

The number of residential and visitor off-street car parking spaces provided as part of the high-density residential component of the Masterplan is complemented by the excellent level of access to frequent public transport (rail and buses), within short walking distance to the site and good access to active transport.

Ample on-street parking supply would be created on all local streets (except the laneways) to provide parking for visitors through the site. It is expected that these on-street parking spaces would be short-term time-restricted such that they are reserved for visitors and not to be used by commuters, given the site's proximity to the station. The reduced parking rates proposed for the MGN Masterplan, combined with the time-restricted on-street parking, will further encourage the uptake of public transport use and assist in reducing the traffic generating impacts of the site.

Given the plans to introduce new regional and local cycle routes to improve links with Macarthur Station and surrounding areas, future residents of the site are likely to use bikes. This is also supported by the fact that the site is located in proximity of the Western Sydney University and TAFE NSW, and so a portion of the residents may be students with less probability of owning a car. With the expectation of higher bicycle use by future residents, up to 394 bicycle parking spaces are proposed in the high-density residential component of the MGN Masterplan, to provide an alternative to driving for shorter distance trips and to encourage residents to adopt sustainable transport modes.

6.4 Road network impacts

As discussed in **Section 5.1**, the MGN Masterplan would generate 375 vehicular trips during the AM and PM peak hours respectively. The impact these additional trips will have on the five intersections analysed for the base case (2019) scenario (**Section 3.7**) in proximity of the site was determined using a SIDRA network model. As per the base case scenario, the following intersections were analysed:

1. Narellan Road / Western Sydney University Access Road (roundabout)
2. Western Sydney University Access Road / William Downes Avenue (traffic signals)
3. Narellan Road / Gilchrist Drive / Blaxland Road (traffic signals)
4. Gilchrist Drive / Goldsmith Avenue (traffic signals)
5. Kellicar Road / Gilchrist Avenue (traffic signals).

6.4.1 Background growth

The impact assessment on the surrounding road network is undertaken for a future year of 2029, 10 years after the 2019 base case traffic scenario presented in **Section 3.7**. To determine the 2029 traffic volumes on the five surrounding intersection analysed in the base case scenario, background traffic growth was established based on network background growth, as well as traffic growth as a result of surrounding developments, as summarised in **Table 6-1**. The sources of these background traffic growth elements are consistent with the Macarthur Heights TMAP (AECOM, 2012).

Table 6-1 Background traffic growth assumptions for future year (2029) traffic modelling scenario

Background growth elements	Source	Assumptions included in modelling
The 2019 Baseline Traffic Volumes	SCT Consulting Traffic Surveys, undertaken on 1 August, 2019	– Include a peak hour trip generation of 514 occupied dwellings in Macarthur Heights and existing trips generated by WSU and TAFE.
RMS Background Traffic Growth and WSU campus growth	Macarthur Heights TMAP Report (AECOM, 2012)	– Provided an absolute background traffic and campus student growth between 2016 to 2026. – Translates to traffic growth applied to 2019 baseline traffic flows, for a future year of 2029.
Macarthur Heights	SCT Consulting Traffic Surveys, undertaken on 1 August, 2019	– Includes the remaining 452 dwellings yet to be built at Macarthur Heights (up to the approved 966 dwellings), using a trip generation rate per dwelling of 0.78 in the AM peak hour and 0.71 in the PM peak hour. – Assumes 290 additional dwellings for Stage 6 of the development, with same trip generation rates as above.
Maryfields Estate	Maryfields Estate Concept Plane Revised Traffic and Transport Assessment (AECOM, 2015)	– Assumes additional traffic volumes as reported on Narellan Road and Gilchrist Drive.
Spring Farm Parkway	Macarthur Heights - Stage 5 DA Additional Modelling Memorandum (AECOM, 2017)	– Assumes a reduction in traffic volumes on Narellan Road and Gilchrist Drive, as agreed with Campbelltown City Council (as a result of Spring Farm Parkway).

Source: SCT Consulting, 2020

6.4.2 2029 intersection performance, with background traffic growth

The AM and PM peak hour traffic volumes as well as the intersection performance for 2029, with background traffic growth (as presented in **Section 6.4.1**), based on the SIDRA intersection performance analysis are presented in **Table 6-2**.

Table 6-2 Future (2029) intersection performance (with background traffic growth)

Intersection	Peak hour	Demand flow (veh/hr)	Level of Service (LoS)	Degree of Saturation (DoS)	95% back of queue (m)	Ave. Delay (sec)
Western Sydney University Access Road / William Downes Avenue	AM	1,053	A	0.230	7	5.9
	PM	740	A	0.118	4	5.3
Narellan Road / Western Sydney University Access Road	AM	6,822	F	1.120	1,243	123.5
	PM	5,771	D	0.938	427	46.1
Narellan Road / Blaxland Road / Gilchrist Drive	AM	7,897	F	1.165	473	114.2
	PM	7,648	F	1.058	511	81.8
Gilchrist Drive / Goldsmith Avenue	AM	3,691	C	0.789	283	37.2
	PM	3,585	C	0.689	264	31.8
Kellicar Road / Gilchrist Drive	AM	3,889	C	0.726	199	29.8
	PM	4,992	F	1.095	363	73.5

Source: SCT Consulting, 2020

As seen in **Table 6-2**, by 2029, the Narellan Road / Western Sydney University Access Road, Narellan Road / Blaxland Road / Gilchrist Drive and Kellicar Road / Gilchrist Drive intersections will operate with an unsatisfactory LoS and DoS of above 1.0, during at least one of the AM and PM peak hours based on the assumed background traffic growth. Infrastructure upgrades will be required for these three intersections to perform satisfactory in 2029 during the peak hours to alleviate the impacts as a result of the expected background traffic growth.

6.4.3 Infrastructure upgrades required to cater for background traffic growth

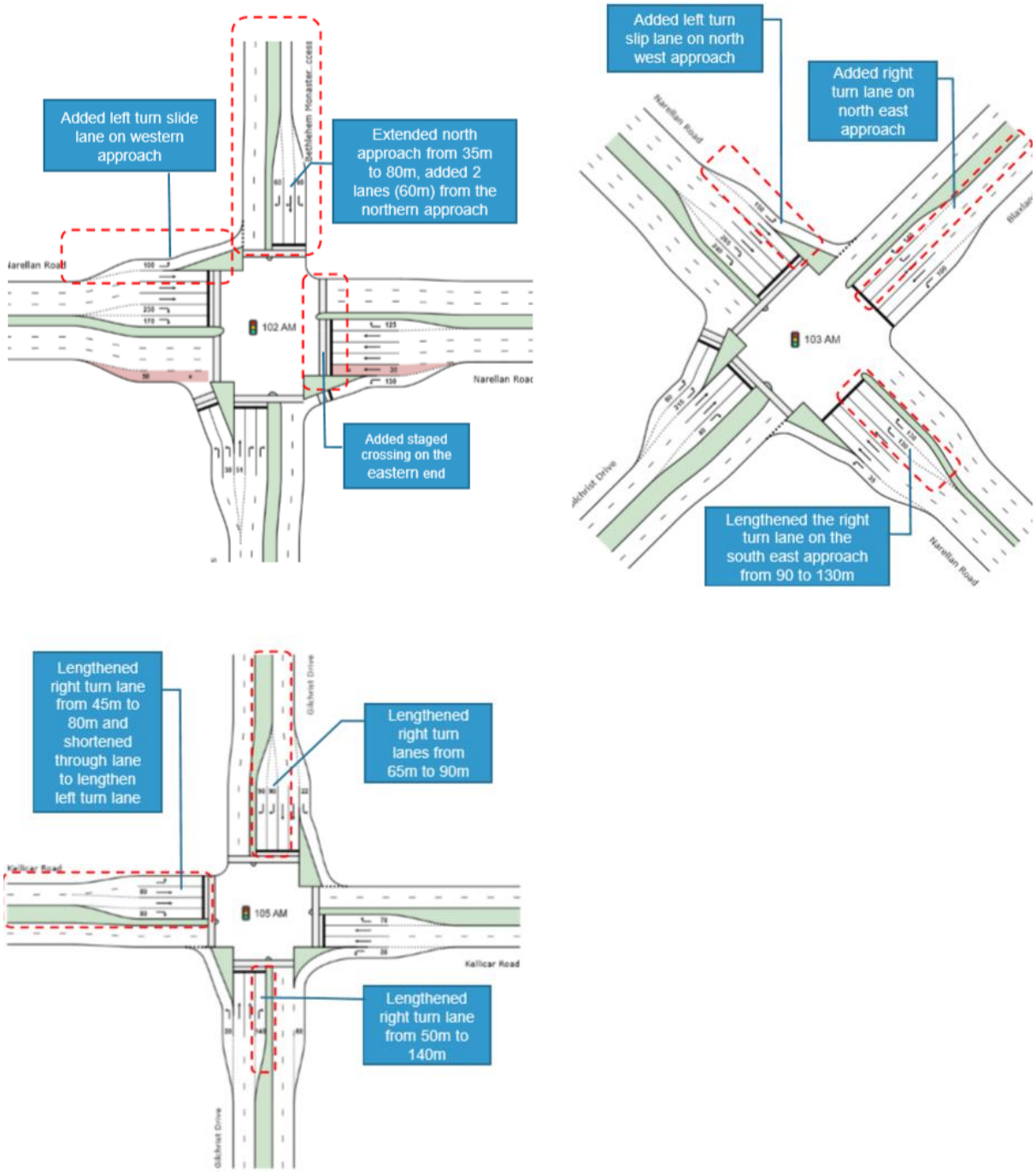
The future road network surrounding the site, requires infrastructure upgrades to cater for background traffic growth are shown in **Figure 6–1** and include:

– Narellan Road / Western Sydney University Access Road intersection:
  - Additional left turn slide lane on western approach;
  - Extending north approach from 35m to 80m, added 2 lanes (60m) from the northern approach; and
  - Additional staged crossing on the eastern end.
  - *It should be highlighted that all of these upgrade works at this intersection are committed as part of the delivery of the Maryfields Estate development.*

– Narellan Road / Blaxland Road / Gilchrist Drive intersection:
  - Additional left turn slip lane on north west approach;
  - Additional right turn lane on north east approach; and
  - Extending the right turn lane on the south east approach from 90 to 130m.
  - *It should be highlighted that all of these potential upgrade works at this intersection required to cater for background traffic growth are consistent with those suggested in previous traffic studies for Macarthur Heights in the 2012 AECOM TMAP.*

– Kellicar Road / Gilchrist Drive intersection:
  - Lengthened right turn lane from 45m to 80m and shortened through lane to lengthen left turn lane;
  - Lengthened right turn lanes from 65m to 90m; and
  - Lengthened right turn lane from 50m to 140m.
  - *It should be highlighted that all of these potential upgrade works at this intersection required to cater for background traffic growth are consistent with those suggested in previous traffic studies for Macarthur Heights in the 2012 AECOM TMAP.*

Figure 6–1 2029 Intersection infrastructure upgrades required with background traffic growth



Source: SCT Consulting, 2020

6.4.4 2029 intersection performance, with background traffic growth and infrastructure upgrades

The AM and PM peak hour traffic volumes as well as the intersection performance for 2029, with background traffic growth and proposed infrastructure upgrade (as shown in **Figure 6–1**), based on the SIDRA analysis are presented in **Table 6-3**.

Table 6-3 Future (2029) intersection performance (with background traffic growth and infrastructure upgrades)

Intersection	Peak hour	Demand flow (veh/hr)	Level of Service (LoS)	Degree of Saturation (DoS)	95% back of queue (m)	Ave. Delay (sec)
Western Sydney University Access Road / William Downes Avenue	AM	1,053	A	0.078	3	3.9
	PM	740	A	0.156	5	5.3
Narellan Road / Western Sydney University Access Road	AM	6,822	B	0.902	511	28.3
	PM	5,771	C	0.809	421	39.7
Narellan Road / Blaxland Road / Gilchrist Drive	AM	7,897	F	0.991	396	72.5
	PM	7,648	E	0.981	437	69.8
Gilchrist Drive / Goldsmith Avenue	AM	3,691	C	0.736	261	29.5
	PM	3,585	C	0.771	345	35.8
Kellicar Road / Gilchrist Drive	AM	3,889	B	0.806	168	27.6
	PM	4,992	E	0.979	466	62.3

Source: SCT Consulting, 2020

As seen in **Table 6-3**, the Narellan Road / Blaxland Road / Gilchrist Drive intersection is expected to operate just within capacity (DoS <1.0), during both the AM and PM peak hours, with the proposed infrastructure upgrades in place to cater for background traffic growth.

The performance of both the Narellan Road / Western Sydney University Access Road and Kellicar Road / Gilchrist Drive intersections will however improve, with the proposed infrastructure upgrades. During the PM peak hour however, the Kellicar Road / Gilchrist Drive will perform with a LoS E and a DoS that is approaching 1.0.

6.4.5 2029 intersection performance, with background traffic growth, infrastructure upgrades and MGN development trips

As described in **Section 5.1**, the proposed yield of 1,250 additional dwellings as outlined in the MGN Masterplan will generate a total of 375 additional trips during the AM and PM peak hour respectively. The AM and PM peak hour traffic volumes as well as the intersection performance for 2029, with background traffic growth and proposed infrastructure upgrade (as shown in **Figure 6–1**), as well as the inclusion of the 375 trips generated by the MGN Masterplan are presented in **Table 6-4**.

A comparison between the performance of the 2029 year (with background growth and proposed infrastructure upgrades) for the ‘without’ and ‘with’ MGN site development trips is shown in **Table 6-5**.

Table 6-4 Future (2029) intersection performance (with background traffic growth, infrastructure upgrades and MGN development trips)

Intersection	Peak hour	Demand flow (veh/hr)	Level of Service (LoS)	Degree of Saturation (DoS)	95% back of queue (m)	Ave. Delay (sec)
Western Sydney University Access Road / William Downes Avenue	AM	1,198	A	0.274	9	11.2
	PM	843	A	0.138	10	4.7
Narellan Road / Western Sydney University Access Road	AM	6,967	C	0.937	638	34.2
	PM	5,876	C	0.876	416	37.3
Narellan Road / Blaxland Road / Gilchrist Drive	AM	8,066	F	1.025	483	83.7
	PM	7,771	E	0.986	486	69.3
Gilchrist Drive / Goldsmith Avenue	AM	3,961	C	0.829	294	30.4
	PM	3,827	C	0.839	332	40.5
Kellicar Road / Gilchrist Drive	AM	4,032	C	0.851	185	29.6
	PM	5,134	E	0.970	424	61.2

Source: SCT Consulting, 2020

Table 6-5 Comparison of future (2029) intersection performance without and with the MGN development trips

Intersection	Peak hour	Without MGN development trips			With MGN development trips		
		Flow (veh/h)	LoS	DoS	Flow (veh/h)	LoS	DoS
Western Sydney University Access Road / William Downes Avenue	AM	1,053	A	0.078	1,198	A	0.274
	PM	740	A	0.156	843	A	0.138
Narellan Road / Western Sydney University Access Road	AM	6,822	B	0.902	6,967	C	0.937
	PM	5,771	C	0.809	5,876	C	0.876
Narellan Road / Blaxland Road / Gilchrist Drive	AM	7,897	F	0.991	8,066	F	1.025
	PM	7,648	E	0.981	7,771	E	0.986
Gilchrist Drive / Goldsmith Avenue	AM	3,691	C	0.736	3,961	C	0.829
	PM	3,585	C	0.771	3,827	C	0.839
Kellicar Road / Gilchrist Drive	AM	3,889	B	0.806	4,032	C	0.851
	PM	4,992	E	0.979	5,134	E	0.970

Source: SCT Consulting, 2020

As seen in **Table 6-4** and **Table 6-5**, the additional trips generated by the MGN site will have minor impacts on the performance of the surrounding intersections, compared to the 2029 scenario without the MGN site development trips. All assessed intersections are expected to perform at the same LoS with and without the MGN site, except for the intersections of Narellan Road / Western Sydney University Access Road and Kellicar Road / Gilchrist Drive where the LoS will change from B to C in the AM peak, but is still considered acceptable performance in an urban context.

The intersection upgrades required for three of the surrounding intersections to perform satisfactory in 2029 are required regardless of the inclusion of the additional trips generated by the MGN Masterplan.

6.5 Construction Activity and Potential Impacts

6.5.1 Construction activity and access routes

The construction of Stage 1 works currently proposed to involve the following activities:

– Early civil works, including lot grading and provision of stormwater network

– Construction of local road network

– Construction of parks and landscaping

There are no specific restrictions on truck weight on the surrounding road network, with both Gilchrist Drive and Narellan Road (in the vicinity of the site) being B-double classified roads. It is expected that construction vehicles would gain access to the site via Goldsmith Avenue.

There are currently no operational activities on site and the Stage 1 construction works would not impact any on site activities. However, it is expected that the road access to Gilchrist Oval as well as pedestrian access between Macarthur Station and Goldsmith Avenue will be maintained at all times. Otherwise, alternative accesses will be provided to ensure these connections are still provided at all times.

A construction compound will be set up within the site where contractor and trade vehicles would be parked in the secure compound.

6.5.2 Construction impacts

At this stage, the likely traffic generation as a result of Stage 1 construction activities is not known. However, the level of construction traffic is unlikely to exceed the amount of traffic increase as a result of the full occupation of the proposed development, around 300 trips during the peak hours. Typically, the traffic movements associated with construction activities would occur outside of typical commuter peak hours, where there will be spare capacity expected on the surrounding road network. Hence, the impacts of the likely Stage 1 construction activities should be accommodated within the existing network.

The details of the construction impacts would be further considered in the Construction Traffic Management Plan (CTMP).

6.5.3 Preparation of a Construction Management Plan

A detailed Construction Traffic Management Plan (CTMP), which will include a construction traffic control plan will be prepared, separate to this report at a later stage. This will be done prior to commencement of construction and in accordance with the *Traffic Control at Work Sites Technical Manual* (2010).

The CTMP will address the overall traffic management of the site during the construction phase, including provision for vehicular and pedestrian access, parking for construction vehicles and appropriate wayfinding. The vehicular movements and expected routes to and from the site will also be further quantified and defined.

7.0 Summary and conclusions

This report has been prepared by SCT Consulting, to assess the traffic and transport impacts for a proposed mixed-use Macarthur Gardens North Masterplan, which will consist of 1,250 apartments and a small retail component. The report is prepared to support a Development Application to be submitted by Landcom for the proposed Macarthur Gardens North Masterplan.

Vehicular access from the site to the external road network will be provided mainly via Goldsmith Avenue (via Gilchrist Drive) and William Downes Avenue (via Narellan Road). Access to the internal road network will be via four access points along Goldsmith Avenue. The proposed internal road network layout will run between Goldsmith Avenue and an east-west street along the southern boundary of the residential development and extend to the existing underpass beneath Gilchrist Drive (via a local street).

Additional walking and cycling facilities are proposed as part of the proposed development to improve access to the surrounding road network and key destinations such as the Western Sydney University, TAFE NSW-Campbelltown and the Macarthur Station. Frequent train and bus services are already provided from the Macarthur Station and bus interchange, that would connect the site with surrounding local and key employment centres.

In summary:

– Additional active transport facilities are proposed as part of the development, including improved linkages to the Macarthur Station, the Western Sydney University and TAFE NSW – Campbelltown. In addition, a shared path south of the site along Bow Bowing Creek connecting to greater Green Grid Network as well as Gilchrist Oval in the east will also be provided.

– The proposed development is likely to generate an additional 220 train trips, 50 bus trips and 290 walking (walk only and public transport trips) trips during the AM and PM peak hours. The public and active transport network surrounding the site is expected to be able to cope with this additional demand.

– Based on the intent to provide restrained car parking for the site given its proximity of good public transport, the total number of parking spaces for the site would be 1,164 car parking spaces. Ample on-street parking supply would be created on all local streets (except the laneways) to provide parking for visitors through the site. It is expected that these on-street parking spaces would be short-term time-restricted such that they are reserved for visitors and not to be used by commuters, given the site's proximity to the station.

– The future (2029) road network will require infrastructure upgrades as a result of background traffic growth, to the Narellan Road / Western Sydney University Access Road, Narellan Road / Blaxland Road / Gilchrist Drive and Kellicar Road / Gilchrist Drive intersections. These upgrades are required without the trips generated by the site.

– The proposed development is expected to generate a total of 375 vehicular trips per AM and PM peak hour respectively. These trips will access the surrounding road network via a 35:65 split in the AM peak hour and 25:75 in the PM peak hour via the William Downes Avenue and Goldsmith Avenue respectively.

– The additional 375 trips estimated to be generated by the site in the AM and PM peak hours, will not have a major impact on the performance of the surrounding intersections, compared to the 2029 scenario without the site's additional development trips.

– The surrounding road network is expected to be able to cope with the additional traffic, public transport and active transport trips generated by the MGN Masterplan. The intersection upgrades required for three of the surrounding intersections to perform satisfactory in 2029 are required regardless of the inclusion of the additional trips generated by the MGN Masterplan.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