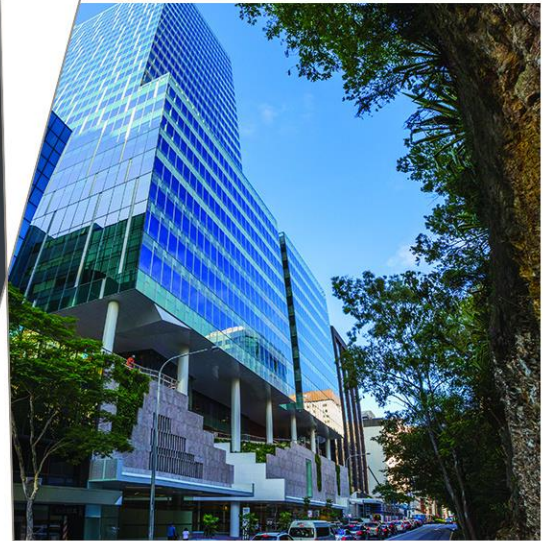


Review of Parking Rates

Part C.4 of Willoughby DCP

80021024



Prepared for
Willoughby City Council

9 February 2021

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1 Introduction

1.1 Background

The expansion of the Willoughby local government area (LGA) with respect to residential density and commercial, retail and other land uses has resulted in a growing need to respond to parking issues (both within the strategic and local centres and suburban areas) in a more sophisticated way.

Parking policy requirements influence the economic sustainability of potential projects, meaning that the costs associated with parking and end-of-trip facilities need to be clear. Changes to parking policies will help determine the appropriate scale and type of development that can be reasonably built within a given area.

Changing the structure of parking requirements can influence development by signalling Council's priorities in relation to parking supply and its strategic position on transport.

It is therefore imperative that parking policies reflect the true need for parking across all of the different types and uses and recognise that an oversupply of parking is just as undesirable as an undersupply.

The application of effective and transparent parking standards is important for all levels of development and approval. Commercial viability of development can be highly dependent on the requirements for car parking and associated space, particularly within a constrained town centre environment, due to the high cost of land and construction.

Car parking reduction factors, shared / reciprocal parking and cash-in-lieu policies all assist in creating a more efficient use for parking, ultimately for the benefit of residents, businesses and visitors through increased development and activity potential.

1.2 Study purpose

Willoughby City Council (Council) seeks modifications to the Willoughby Development Control Plan (DCP) parking provisions to adopt revised controls.

Council requires a review of its current parking requirements as defined in Part C.4 of the Willoughby DCP, adopted in 2006 and most recently amended in 2014. The principles illustrated in the DCP include requirements for car parking, scooter/ motorcycle parking and bicycle parking, as well as reduced rates that may be applied in Railway Precincts and Major Public Transport Corridors (MPTCs), reflecting the characteristics of the type of use and location.

1.3 Parking objectives and guiding principles

The key objectives and guiding principles of this study are to develop a revised set of parking rates for the Willoughby DCP that:

- > Manage demand for car use by employing the principles of travel demand management (TDM);
- > Align with the strategic directions of Willoughby Integrated Transport Strategy (ITS) 2036, including efficiently managing congestion and parking demand;
- > Accommodate future demand for parking;
- > Reduce private vehicle travel demand, particularly in the Chatswood CBD and local centres, and encourage mode shift to sustainable transport modes;
- > Reflect best practice research and parking rates in comparable areas;
- > Provide a framework for Development Applications (DAs) that is easy to apply and assess;
- > Provide flexibility for DAs with specific sites and needs; and
- > Reflect the nature and public transport accessibility of different land use precincts throughout Willoughby.

1.4 Council consultation

Council was consulted throughout the study to understand the context, strategic directions and important factors relevant to the development of new DCP parking rates. The following outline key directives for this study and parking planning as part of transport planning:

Land use planning

- > The new rates should be simple and easy to apply;
- > The DA process is key. The DCP should be clear on standard and consistent parking rates for key land uses and make it easy to assess DAs;
- > Parking is a tool that can be used to achieve desirable planning outcomes, but at the same time, it must be recognised that most people still believe it is necessary to own a car. Therefore, there is a need to recognise this fact and accommodate the demand for parking, but also to restrict parking supply in already constrained environments (such as the Chatswood CBD) to minimise further growth in traffic and encourage mode shift to sustainable transport options.

Parking controls and rates

- > There is a need for contemporary parking rates to manage growth and potential impacts on traffic congestion and parking;
- > Revised parking rates should reflect best practice in Sydney, Australia and globally;
- > Maximum rates should be considered for the centres of Chatswood, St Leonards and Artarmon;
- > The rates should reflect a 2036 planning horizon;
- > Reduced parking rates for Railway Precincts and Major Public Transport Corridors (MPTCs) is supported and should be carried over to the new DCP rates, although these areas may need to be refined;
- > There are already traffic and parking issues in Chatswood CBD in particular. This area should adopt similar principles to the City of Sydney by restricting the parking supply to encourage active and public transport; and
- > Consideration should be given to the needs and demands of employee parking versus customers / visitor parking at retail and commercial land uses.

Active transport

- > There is a strong desire for a higher cycling mode share, especially for trips up to 3 kilometres. Council is looking to provide more facilities to make cycling more attractive;
- > The study needs to provide details on requirements for end-of-trip facilities and the number of bicycle parking spaces. This needs to consider the needs of workers, residents and visitors.

1.5 Scope of work

The scope of work associated with this study involves:

- > A review of car parking supply requirements, including:
 - A background review of Council policy and strategic directions;
 - A review of best practice and a comparison of car parking rates;
 - Development of car parking provision reduction factors; and
 - Consideration of mixed use development and shared parking supply.
- > Development of parking rates for other transport modes (motorbike, scooter and bicycle parking).

The study is intended to focus on the requirements for provision of parking across different land uses and for different types of parking. This includes:

- > Residential and residential visitors;
- > Staff / tenants and commercial visitors;
- > Service / delivery;
- > Motorcycle / scooter;
- > Bicycle parking; and
- > End-of-trip facilities.

1.6 Study approach

Several different parking options are investigated, including:

- > **Status Quo** – retention of existing parking policy methods including current parking ratios (as neither a minimum nor a maximum) and reduction factors based on the location;
- > **Modification of Existing Policy** – maintenance of existing parking policy methodology, with changes to ratios and reduction factors in accordance with the outcomes of best-practice review; and
- > **Maximum Parking Standards** – establishment of redefined maximum parking ratios, along with abolishment of reduction factors in their current form.

Additional policy recommendations are discussed further, with respect to their impact and implication, based on the chosen policy option.

The effect of shared and reciprocal parking arrangements (and the prerequisites under which these arrangements may reduce on-site supply), as well as the role of on-street parking and other public parking, has been included in the discussion of each option.

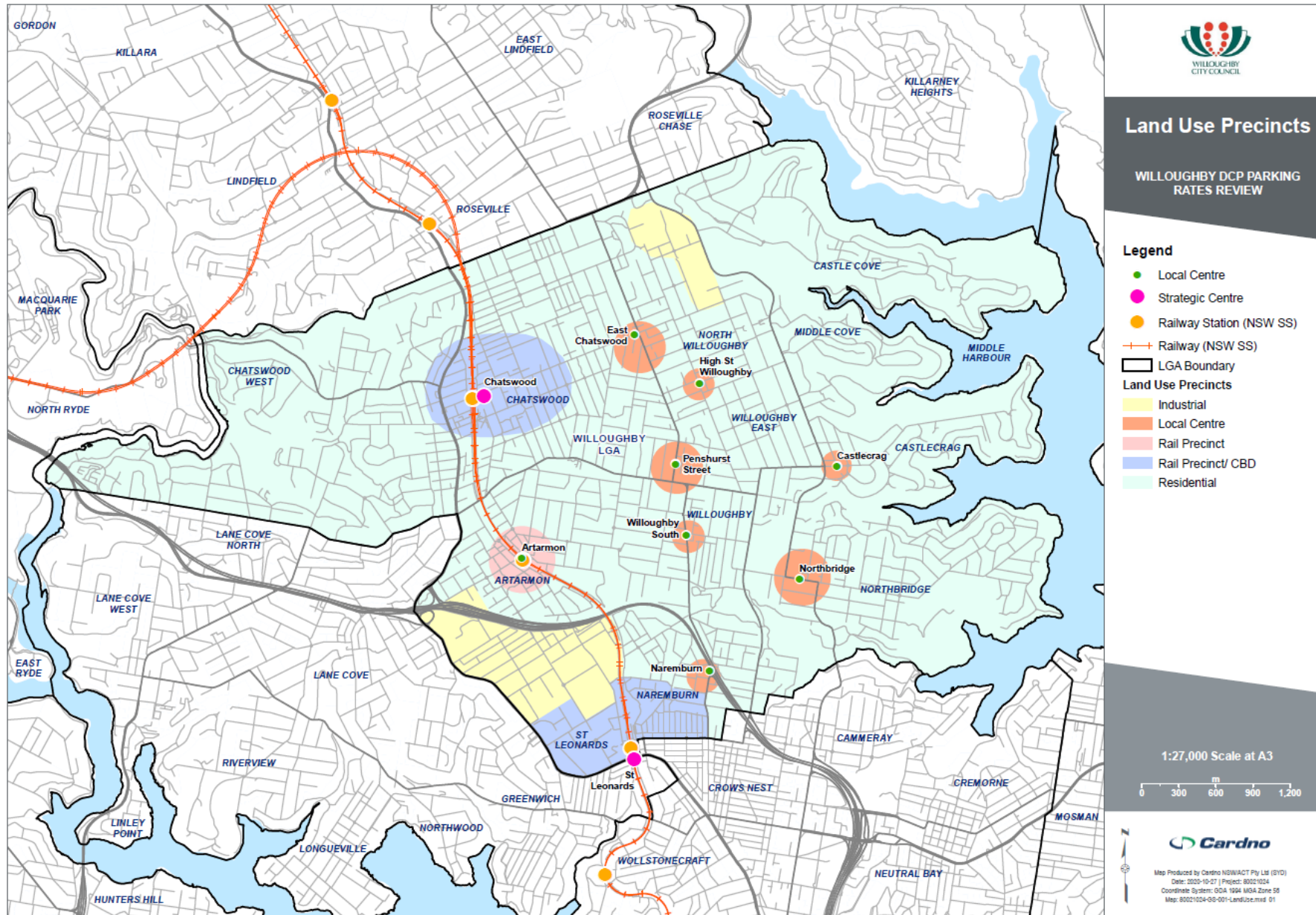
1.7 Study area

The study area is the Willoughby LGA, located in the north of Sydney adjacent to the Ku-ring-gai, Ryde, Lane Cove and North Sydney LGAs. The study area contains the strategic centre of Chatswood, the northern fringe of the St Leonards strategic centre, and eight local centres as well as various suburban areas.

The study area is well located for public transport, with access to the T1 North Shore and Western railway line, and a range of bus routes providing access across the LGA as well as to other major centres including North Sydney and the Sydney CBD.

The Willoughby LGA is shown in **Figure 1-1**.

Figure 1-1 Study area

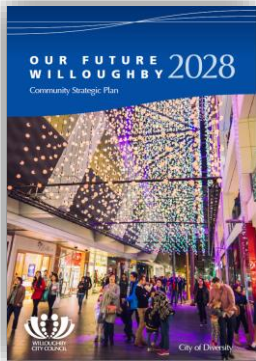


2 Strategic context

This section summarises Council's strategies, plans and policies in relation to parking for the Willoughby LGA.

2.1 Background review

2.1.1 Our Future Willoughby 2028 Community Strategic Plan (CSP)



Council's *Community Strategic Plan* (CSP) identifies the community's aspirations and priorities for the future, and presents a series of outcomes to achieve the overall community vision for Willoughby as a diverse, liveable and prosperous city. The outcomes are aligned with State Government goals presented by Transport for NSW and the Greater Sydney Commission.

Five outcomes are presented and include a city that is green, connected and inclusive, liveable, prosperous and vibrant, and effective and accountable. The outcome of a connected and inclusive city is most relevant for this study and includes Community Priority 2.4: Reduce parking and traffic congestion.

A key measure of the connected and inclusive outcome is an increase in the number of journeys to work that do not use a motor vehicle, which aligns with the objectives of the planning framework and Local Strategic Planning Statement.

2.1.2 Local Strategic Planning Statement (LSPS)

The *Willoughby Local Strategic Planning Statement* (LSPS) sets a 20-year vision for land use planning in the Willoughby LGA, including a range of directions, priorities and actions aligning with the Greater Sydney Commission's *Greater Sydney Region Plan* and *North District Plan*. The key themes include a liveable city, productive city, sustainable city and a city that aligns infrastructure with growth.

The LSPS identifies that increased use of walking, cycling and public transport will reduce congestion and parking problems for users of Willoughby's roads, and that restricting the provision of car parking could be a method of encouraging sustainable travel. Developing an improved interchange function in Chatswood could also help to manage congestion and parking, which is currently constrained.

Action 15.4 of the LSPS aims to improve the efficiency of the built environment by managing off-street and on-street car parking to encourage use of public transport and car sharing and limit growth in travel by private vehicles.



2.1.3 Willoughby Local Environmental Plan (LEP) 2012



The Willoughby LEP provides the statutory planning framework for all planning, development and building within the LGA. The LEP consists of written legislation and maps designating land for specific purposes through zoning and development controls.

The plan aims to enable sustainable, socially equitable and economically viable development to manage impacts and risks to the environment. In relation to parking matters, the LEP aims to:

- > Provide appropriate levels of car parking in connection with the location of development and managing the demand for ancillary car parking where there is good access to public transport nodes and services; and
- > Provide integrated development design of pedestrian and vehicular access, parking, loading and delivery facilities.

2.1.4 Willoughby Development Control Plan (DCP)



Willoughby DCP provides detailed guidelines and development controls for new development within the LGA to support the objectives and planning provisions contained within the LEP. The DCP must be considered by proponents preparing Development Applications. The DCP aims to encourage the use of active and public transport, as well as providing safe, convenient and efficient movement and accommodation of vehicles.

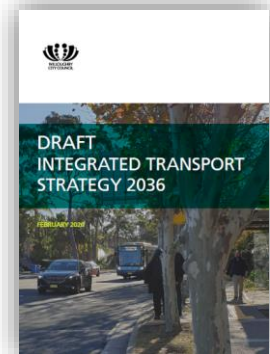
Part C.4 of the DCP provides transport requirements for development, which includes objectives of the requirements, car parking rates, consideration of Railway Precincts and MPTCs, and various other transport requirements for new development. Car parking rates are provided based on the land use and specify requirements for normal parking, visitor parking, motorcycle parking and bicycle parking. Design guidelines for parking are also provided. Lower rates are generally applicable for development within Railway Precinct and MPTCs, reflecting the nature and public transport connectivity of these areas.

The DCP indicates specific parking rates that are neither minimums or maximums. Proponents also have the ability to depart from the nominated parking rates if justified through a Traffic Study, evaluated by a merit-based assessment based on the site attributes, surrounding character and adjacent land uses.

2.1.5 Willoughby Integrated Transport Strategy (ITS) 2036

The ITS provides the overarching framework for transport planning and initiatives across the Willoughby LGA to 2036. Its five strategic directions are as follows:

1. Our transport system will be sustainable and promote greater levels of walking and cycling;
2. Our transport system will provide excellent local and regional connectivity and be accessible to all;
3. Our transport system will contribute to the development of vibrant, liveable and safe places;
4. Our transport system will support our local economy by efficiently managing congestion and parking demand; and
5. Our transport system will embrace smart technology and respond to community needs.



Strategic direction 4 specifically articulates the need to more efficiently manage congestion and parking demand. The ITS identifies a need for greater variety and ease of parking options as well as decreased traffic congestion. It reports on community research which indicates that parking has a poor perception of service and parking issues are important to address. It notes that parking congestion is an issue for the community, particularly around Chatswood, St Leonards and local centres. Key concerns are an insufficient number of parking spaces, the cost of parking and the difficulty in finding a parking space.

The ITS indicates that providing more car park infrastructure is not a feasible option for many reasons including cost and environmental impact, and alternative tools listed include: limiting parking and road space allocation, road user priority, and utilising smart technology, pricing and improved communication, including with real-time data.

Specific actions are presented in the ITS in relation to parking and include the following recommendations for revisions to the DCP:

- > Reduce provision of car parking;
- > Increase provision of car share spaces;
- > Increase bicycle and end-of-trip facilities;
- > Provide infrastructure for electric vehicles (EVs); and
- > Provide autonomous vehicle drop-off / pick-up points.

A variety of other actions / initiatives are also presented which may influence the demand for parking. Some of the more significant actions include:

- > Development of Movement and Place Local Area Plans for CBDs and Local Centres, and Vibrant Street Corridor Plans for key roads;

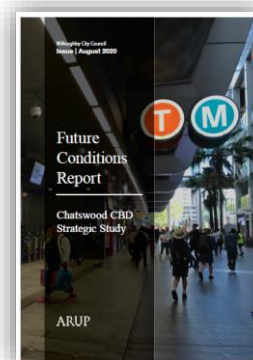
- > Development of multi-modal transport plans for recreational venues;
- > Enhanced walking and cycling infrastructure to encourage active transport, including paths, bicycle parking and end-of-trip-facilities;
- > Working with TfNSW for the trialling of electric autonomous buses to / from the Chatswood CBD;
- > Working with TfNSW for various bus improvements, including a rapid bus link from Chatswood to Dee Why;
- > A Mobility as a Service (MaaS) trial within the Chatswood CBD;
- > Investigation of provision of car sharing spaces and taxi / car share spaces in the CBD and local centres;
- > Development of Parking Management Plans for the Chatswood and St Leonards strategic centres;
- > Implementation of a parking guidance system comprised of variable message boards across the Chatswood CBD; and
- > A review of on-street parking fees within the Chatswood CBD.

2.1.6 Chatswood CBD Strategic Study – Future Conditions Report

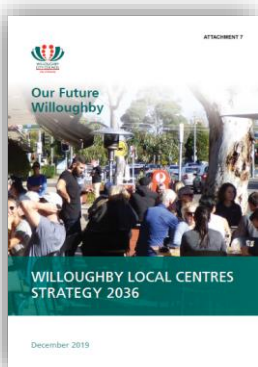
The Chatswood CBD Strategic Study outlines a 20-year vision for the precinct, comparing future population and employment growth scenarios involving strategic transport modelling and assessing potential impacts on the transport network. The study found a significant uplift in future trips is expected, including private vehicles, despite an overall mode shift to public transport.

Recommendations were made in relation to parking including:

- > Implementing innovative parking measures to address issues, encouraging the use of off-street parking;
- > Reviewing parking charges;
- > Expanding car share schemes and parking guidance systems; and
- > Undertaking a review of parking rates that apply to developments to support Travel Demand Management and encourage a shift to sustainable transport modes.



2.1.7 Willoughby Local Centres Strategy



The Local Centres Strategy provides the framework for future planning controls, public domain and transport improvements for eight local centres within Willoughby to guide their future development over the next 20 years. The strategy provides an overview of each local centre, including the existing conditions, planning controls, strengths and directions, and outlines an indicative master plan and recommendations for future development.

A Traffic and Transport Plan was developed to support the strategy which includes a review of the parking policy contained in the Willoughby DCP, guiding principles on parking management and a review of the existing and future parking demand and supply for each local centre.

The plan provides general recommendations regarding wayfinding and signage to parking facilities, the price of parking, parking management and enforcement and specific recommendations for each local centre such as time restrictions.

2.1.8 Street Parking Strategy

Council's *Street Parking Strategy* provides a framework for efficient and equitable use of street parking in the Willoughby LGA. It uses an evidence-based approach to guide decisions about where and when pricing and time restrictions need to be introduced or adjusted based on surrounding land uses.

The strategy notes that on-street parking is important for economic and social wellbeing, but acknowledges that the trend for rising parking demand cannot be sustained and that provision of additional parking will induce traffic into already congested roads. It aims to achieve a balance between supply and demand and encourage mode shift to active and public transport.

The strategy includes extensive analysis of parking within Willoughby and presents a range of potential solutions to the issues identified. Six strategic directions were proposed to address the issues:

1. Adopt a framework of time and pricing restrictions;
2. Apply parking controls that support the land use context;
3. Develop an integrated transport strategy;
4. Promote car share;
5. Maximise available street and road space for parked cars; and
6. Promote alternative transport choice for non-essential car journeys.



3 Land use context

3.1 Land use context

Current land uses and precinct types were used to differentiate land use precincts within the Willoughby LGA. The different precincts are identified and described in the following sections in order of precedence (i.e. developments in overlapping precincts would be considered as part of the first precinct described).

3.1.1 CBD (St Leonards and Chatswood)

The CBDs in Willoughby are St Leonards and Chatswood, both considered strategic centres according to the *Greater Sydney Region Plan* (Greater Sydney Commission, 2018). These areas are key centres containing employment, commercial and retail hubs within the LGA and have higher density than other areas. They are centred on train stations with multiple bus connections, promoting public transport to and from a range of other areas. Chatswood interchange is one of the busiest multi-modal hubs in Sydney, providing a range of connections across the LGA and further afield.

The high-quality active and public transport connectivity of these CBDs is conducive to adopting lower parking rates to minimise further traffic congestion and encourage the use of sustainable transport modes. This is particularly desirable given existing community perceptions of traffic and parking congestion issues in these areas.

The CBD areas overlap with the Railway Precincts below, but are considered to take precedence in terms of parking requirements due to the higher-order nature of these areas.

3.1.2 Railway Precincts

Railway Precincts within Willoughby LGA are areas focused around a train station, enabling convenient and efficient access by public transport. These precincts are currently defined in the Willoughby DCP as a 500 metre radius around St Leonards, Chatswood and Artarmon stations. For the proposed parking rates as part of this study, the Railway Precincts are defined as a 500 metre radius around Artarmon station only, since the precincts around St Leonards and Chatswood are treated as CBD environments as per the above section.

The existing Railway Precincts contain a mixed use or commercial core and higher density residential areas in the immediate surrounds of the station, transitioning to lower density residential areas on the peripheries. The land use configuration and frequent rail services facilitate a relatively high mode share for public transport, allowing car parking rates to be reduced in these areas.

3.1.3 Local centres

The local centres of Willoughby are introduced in **Section 3.2**, and generally provide smaller hubs of commercial, retail and residential areas situated on MPTCs. These centres facilitate transport by public and active transport, though to a lesser extent than the higher-order centres. Parking requirements will reflect the nature of these centres with moderate public transport connectivity and the need to limit traffic congestion.

3.1.4 Industrial/ business zone

The industrial/ business zone in Willoughby is the Artarmon precinct between the M2 Motorway, Pacific Highway and railway line. Industrial development within this precinct tends to provide on-site parking for staff and visitors. Industrial precincts can be difficult to service through public transport and be relatively inflexible with respect to mode shift, however the Artarmon industrial precinct is served by multiple bus routes along the Pacific Highway. As such, there may be minor benefit to constraining parking through policy within this precinct, although this will be less susceptible to mode shift than the centres above.

3.1.5 Residential areas

Other areas of Willoughby not contained in the above precincts are residential areas. These areas are largely comprised of low to medium density housing not situated close to public transport hubs or corridors. The parking rates for these areas will be the highest, reflecting their distance from employment and service centres, the need for private cars to access other destinations and the relative lack of public and active transport connections.

3.1.6 Overview of land use precincts in Willoughby

Land use precincts within Willoughby are shown in **Figure 1-1**.

3.2 Planned land use

Planned land use changes are generally focused around the CBDs and local centres as the most suitable areas to accommodate growth. The key future land use changes and characteristics of these areas are described in the following sections.

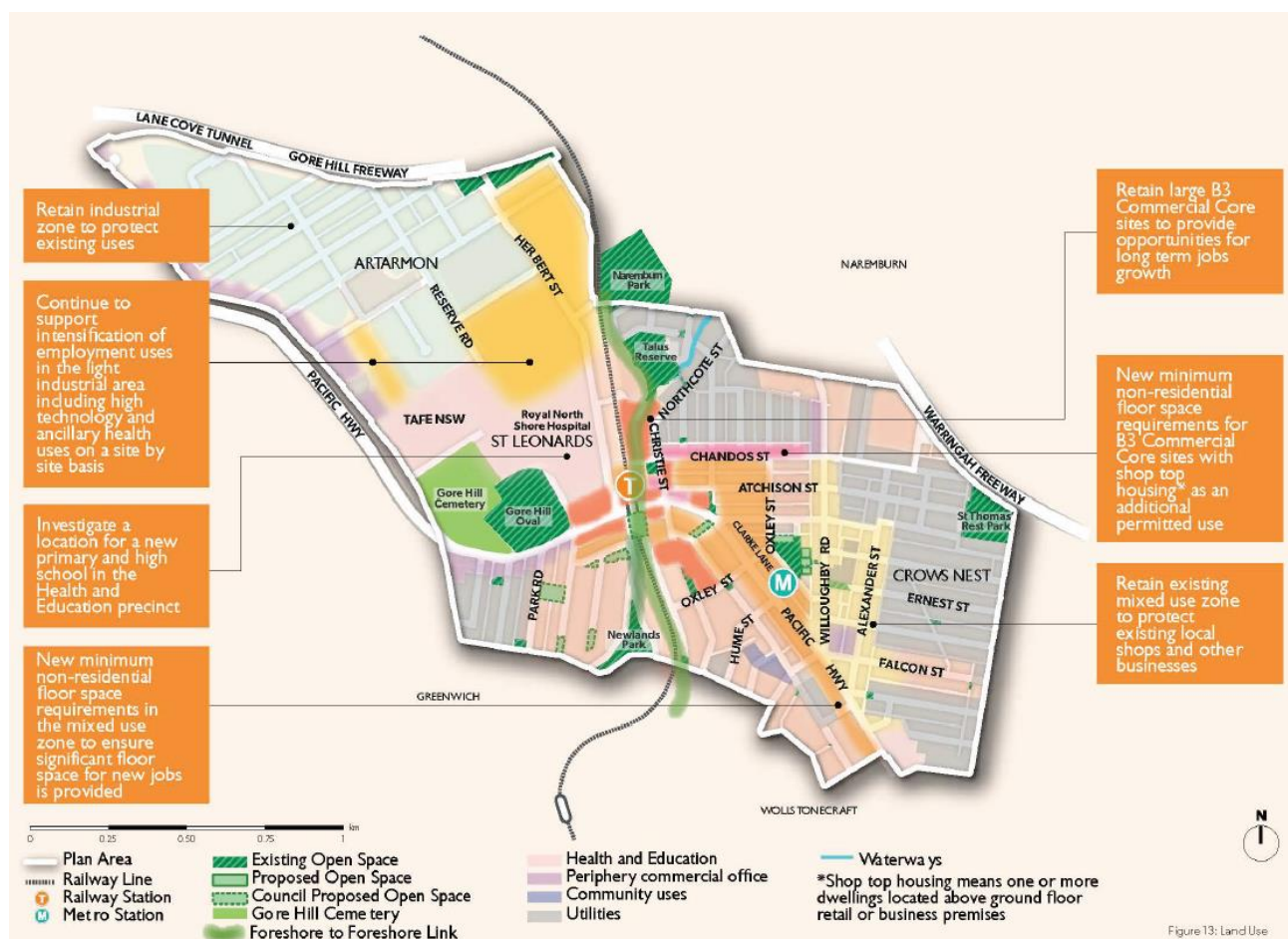
3.2.1 St Leonards

St Leonards is identified in the *Greater Sydney Region Plan* (Greater Sydney Commission, 2018) as a strategic centre and important health, education and commercial office precinct. The centre is forecast for a baseline target of 54,000 jobs in 2036, up from 47,100 in 2016. There is potential to leverage existing health facilities as part of the Royal North Shore Hospital and Mater Hospital to accommodate growth in health and education jobs. The new Crows Nest metro station (expected to be completed in 2024) will facilitate the increase in employment opportunities and residential capacity, which will encourage growth within the precinct.

St Leonards-Crows Nest is also a Planned Precinct, with the Department of Planning, Industry and Environment leading planning in collaboration with State and Local Government.

The *St Leonards and Crows Nest 2036 Plan* (Department of Planning and Environment, 2018) presents a structure plan for the proposed future land use as shown in **Figure 3-1**. The plan shows general retention of existing zoning, proposed intensification of employment within the industrial area and station surrounds, investigation of provision of a new primary school and high school and changes to various controls to support future residential and employment growth.

Figure 3-1 St Leonards 2036 Draft Plan for land use



Source: *St Leonards and Crows Nest 2036 Draft Plan*, Department of Planning and Environment, 2018

3.2.2 Chatswood

The Chatswood CBD is Willoughby's main commercial and retail centre, containing a diverse range of land uses in the surrounds of Chatswood train station and bus interchange. The *Chatswood CBD Planning and Urban Design Strategy* (Willoughby City Council, 2018) outlines a 20-year vision for the precinct, including

aspirations for population and employment growth. The CBD is forecast to grow by 6,300 – 8,300 jobs (to a total of 31,000 – 33,000 jobs) and up to 1,250 dwellings (to a total of up to 5,740 dwellings) to 2036. The strategy includes the following key planning principles:

- > Promoting office growth in the core;
- > Residential growth in the periphery;
- > Diverse mix of uses;
- > Greater (improved) public spaces;
- > Sustainable and active transport;
- > Urban design quality; and
- > Greening the centre.

The proposed future land uses within the Chatswood CBD are shown in **Figure 3-2**.

Figure 3-2 Proposed land use within the Chatswood CBD



Source: Local Strategic Planning Statement, Willoughby City Council, 2020

Overall the commercial core is planned to be expanded and mixed uses within the CBD intensified to accommodate future growth in population and employment.

3.2.3 Local centres

There are eight local centres within Willoughby LGA, providing employment, services, residential and other land uses on a more localised scale than the major centres of St Leonards and Chatswood. The local centres are planned to accommodate future residential and employment growth alongside the major centres, and are generally adjacent to MPTCs to facilitate sustainable travel.

The *Willoughby Local Centres Strategy 2036* (Willoughby City Council, 2020) aims to promote thriving, attractive and distinctive local centres throughout Willoughby and provides a framework of future planning controls and public domain improvements over the next 20 years.

A range of land use changes are proposed within the local centres including intensification of existing land uses and addition of new land uses, largely composed of shop-top housing as well as various improvements to the public domain. Key land use and planning changes include:

- > Rezoning, increased Floor Space Ratios (FSRs) and increased height limits to allow higher density land uses;
- > An additional 147,089m² GFA of residential land use across all local centres (an uplift of 238 per cent);
- > An additional 28,068m² GFA of non-residential land use across all local centre (an uplift of 26 per cent), mostly composed of retail and business use;
- > Provision of new public plazas and green space;
- > Additional through-site links; and
- > Various improvements to the public domain and pedestrian amenity.

Further details of residential and non-residential uplift and key land use changes for each local centre are provided in **Table 3-1**.

Table 3-1 Future land use within Willoughby's local centres

Local centre	Residential uplift to 2036	Non-residential uplift to 2036	Key future land use changes
Artarmon	15,549m ² (738%)	5,723m ² (40%)	<ul style="list-style-type: none"> ▪ New amenities, retail and cycle storage adjacent to the station; ▪ Various improvements to the public domain and road network to increase pedestrian priority and safety; and ▪ Additional at-grade car parking and access to basement parking from Hampden Lane.
Castlecrag	6,654m ² (185%)	1,527m ² (32%)	<ul style="list-style-type: none"> ▪ A new plaza and additional pedestrian links within and to the Quadrangle Shopping Village; ▪ A new park/ green space at the corner of Edinburgh Road/ The Postern; and ▪ Improvements to pedestrian crossings and footpaths to increase amenity and safety.
North Willoughby	28,570m ² (182%)	5,585m ² (25%)	<ul style="list-style-type: none"> ▪ New public spaces and through-site links including a pedestrianised or traffic-calmed plaza at the corner of Sydney Street/ Penshurst Street; and ▪ Improved pedestrian crossings, footpath treatments and amenity.
High Street	1,862 (all uplift)	1,354m ² (34%)	<ul style="list-style-type: none"> ▪ Threshold treatments at intersections for increased pedestrian amenity and safety; and ▪ Possible relocation of pedestrian crossings and additional crossings.
Naremburn	4,951m ² (424%)	1,734m ² (80%)	<ul style="list-style-type: none"> ▪ A new public plaza and through-site link; and ▪ Relocation of some parking to a rear laneway to improve public space fronting Willoughby Road.
Northbridge	42,028m ² (197%)	8,209m ² (25%)	<ul style="list-style-type: none"> ▪ New public space with basement car parking below and increased parking capacity; ▪ Various public domain and streetscape improvements; and ▪ Potential additional pedestrian crossings at existing intersections and other pedestrian crossing improvements.
Penshurst Street	21,467m ² (168%)	2,208m ² (17%)	<ul style="list-style-type: none"> ▪ Encouragement of shared access points to reduce the number of driveways on Penshurst Street; and ▪ Extension of Mowbray Lane to Penshurst Street.
Willoughby South	21,287m ² (428%)	1,219m ² (8%)	<ul style="list-style-type: none"> ▪ New laneways from Julian Street to Penkivil Street and Borlaise Street; ▪ A new street plaza on Julian Street by closing Julian Street at Willoughby Road or providing a shared left-out only lane; and ▪ Various landscaping and pedestrian access improvements around Sanders Park.

4 Travel behaviour

4.1 General LGA travel behaviour

Existing data sources were used to analyse current travel patterns within the Willoughby (LGA), including the Household Travel Survey (HTS) and Australian Bureau of Statistics (ABS) Census 2016 data.

The HTS is collected by Transport Performance and Analytics (TPA) as part of Transport for NSW (TfNSW) and gathers simple information of key travel statistics over a typical weekday for a sample of respondents, which is extrapolated to estimate travel behaviour for localities in the Greater Sydney region.

The ABS Census data is gathered using an enumerative method for all people in Australia on census night, and provides detailed travel information for a much larger sample than the HTS.

Both datasets were analysed to extract key information and travel statistics.

4.1.1 Demographics and vehicle ownership

Key demographic data and statistics for the Willoughby LGA are presented in **Table 4-1** and compared to the Sydney Greater Metropolitan Area statistics.

Table 4-1 Key demographics

Statistic	Willoughby LGA	Sydney GMA
Residential population	74,300 ¹	4,824,000
Households	28,480	1,759,923
Average people per household	2.6	2.7
Area (km ²)	22.4	12,370.0
Population density (people per km ²)	3,317	390
Average vehicles per household	1.4	1.6
Average vehicles per person	0.5	0.5

Data source: ABS 2016 Census

¹The Estimated Resident Population was approximately 77,900 for 2016, and was estimated to be approximately 80,300 in 2018 (according to .id). The census data shown in the table underestimates the population due to the less than 100% response rate (among other factors), but was used to obtain accurate ratios when combined with vehicle ownership.

The population density of Willoughby is also much greater than the Sydney average (almost 10 times higher). The average household in Willoughby owns 1.4 private vehicles, slightly less than the Greater Sydney average, which reflects the increased density and allows a reduced dependence on cars.

It is worth noting that 13.9% of households in WCC own no motor vehicles. This is 30% higher than the Greater Sydney average of 10.7%. These statistics demonstrate that car ownership in the railway suburbs in Willoughby is lower than the average, which supports a proposal to reduce car parking requirements in these areas.

This data by suburb or area is detailed in **Table 4-2**.

Table 4-2 Percentage of households with no motor vehicles in Willoughby City Council

Suburb or area of suburb	Percentage
St Leonards (part of suburb in WCC)	38.8
Chatswood CBD	32.3
Chatswood (suburb)	21.8
Artarmon	14.8
Naremburn	8.9
Willoughby	8
North Willoughby - Willoughby East	7.4
Roseville (part of suburb in WCC)	6.2

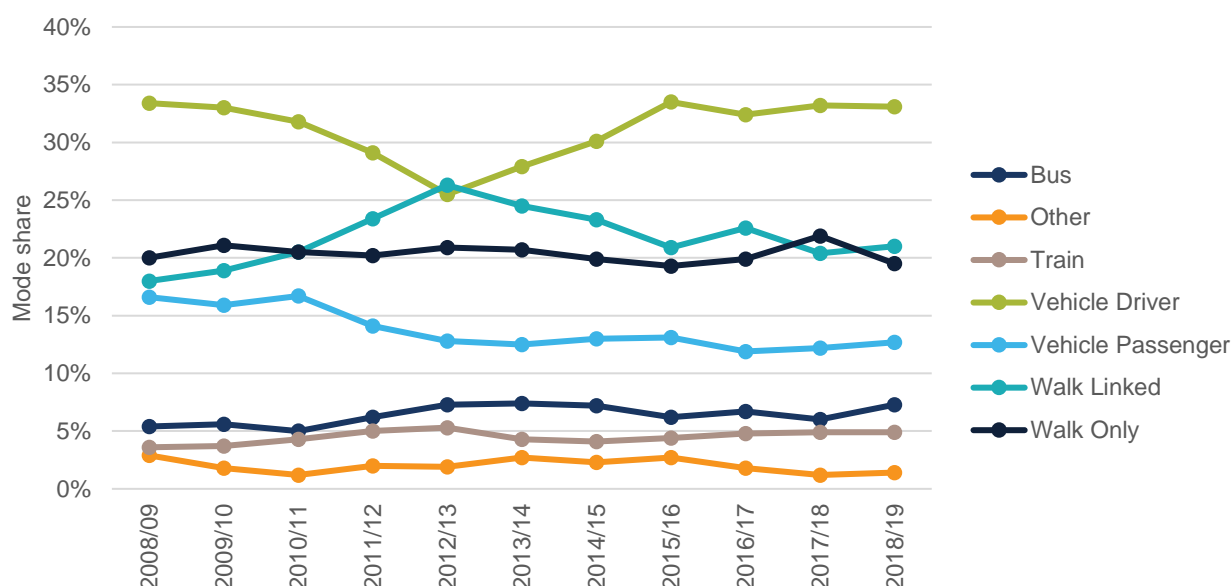
Suburb or area of suburb	Percentage
Chatswood W – Lane Cove North	5.9
Northbridge	3.8
Castle Cove - Middle Cove	3.5
Castlecrag	1.1
WCC average	13.9
Greater Sydney average	10.7

Source: <https://profile.id.com.au/willoughby/car-ownership>

4.1.2 Mode share

Mode share data was analysed using HTS data to determine the trends in all-day mode shares for all trip purposes over time, and the results are presented in **Figure 4-1**.

Figure 4-1 All-day, all-purpose mode share for workers in Willoughby



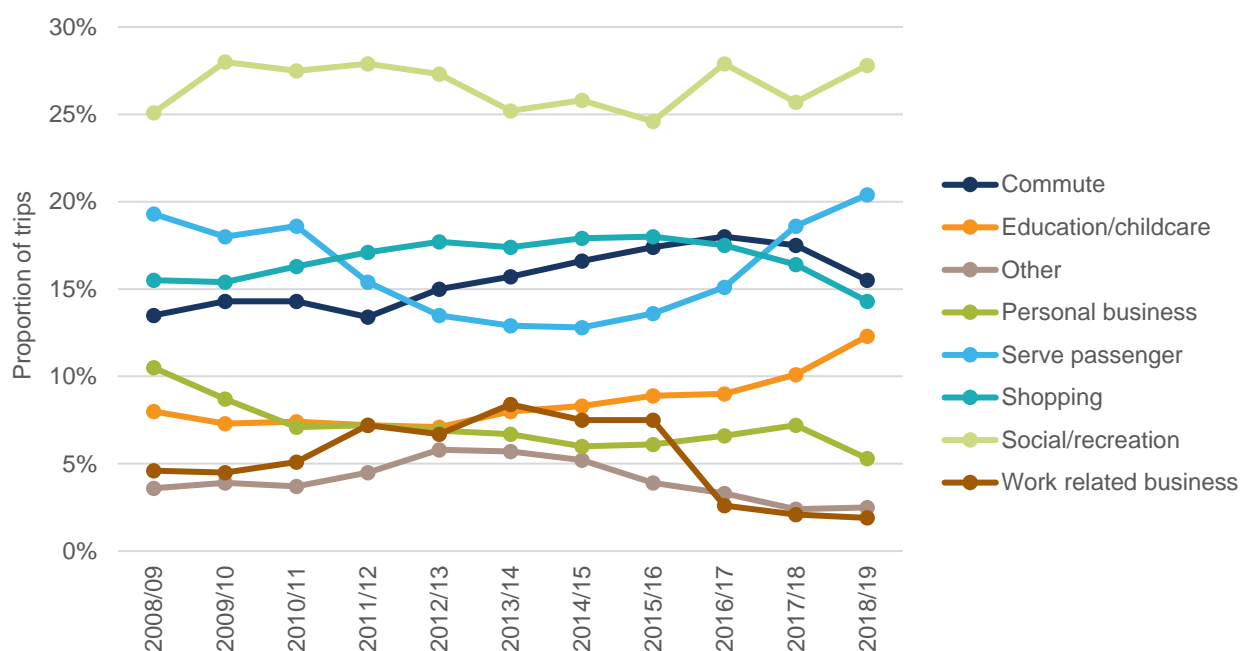
Data source: Household Travel Survey 2008-2019, TPA

The data indicates that the area is moderately reliant on private vehicles for workers, with approximately 25 – 35 per cent of all trips utilising private cars as drivers. Approximately 25 per cent of trips are taken using public transport, reflecting the connectivity of bus and train routes from centres such as Chatswood and St Leonards to other centres such as North Sydney and the CBD. Walking trips represent less than 10 per cent of all trips and may be a result of the limited walking catchments as well as constraints of the active transport networks. Cycling trips are not included as part of HTS data, but are typically minimal and comprised less than 1 per cent of Journey to Work trips from a review of ABS census data.

4.1.3 Trip purpose and travel distance

Household Travel Survey (HTS) data was analysed to determine the purpose of trips made over time, and the results are presented in **Figure 4-2**. Note these are purposes for trips throughout the entire day, and the peak hours are likely to reflect a different mix of trips.

Figure 4-2 Trip purpose trends in Willoughby LGA

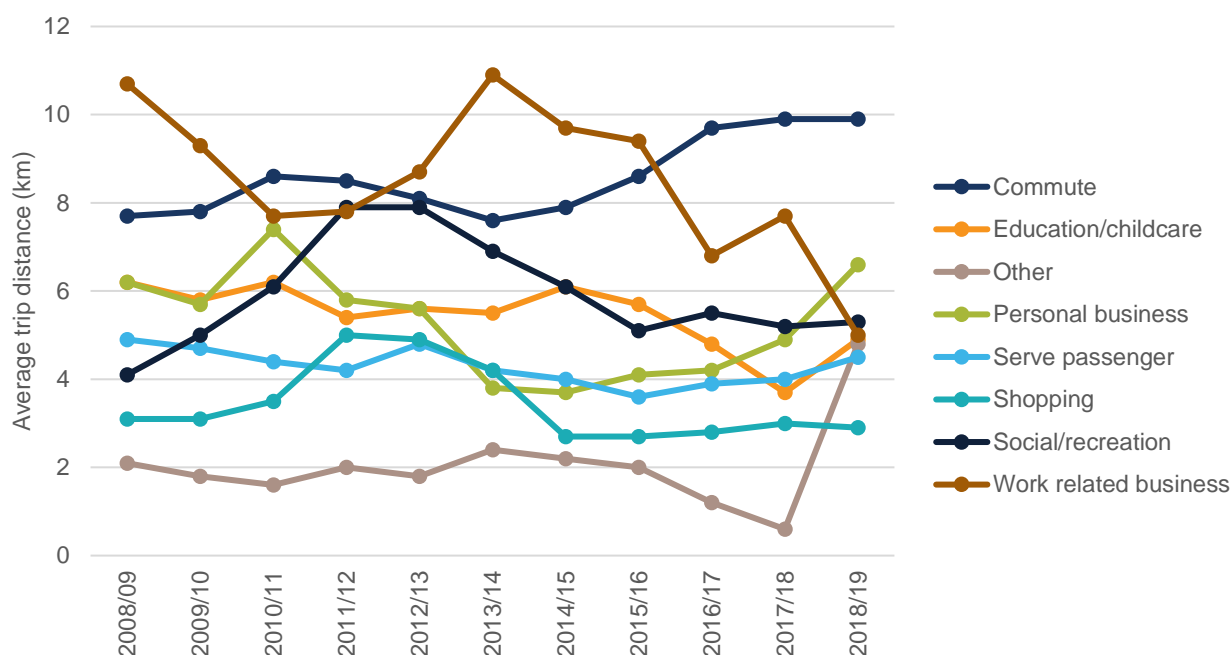


Data source: Household Travel Survey 2008-2019, TPA

The data shows that trips are undertaken for a wide range of purposes, the top five in 2018/19 being social / recreation (28 per cent), serving passengers (20 per cent), commuting (16 per cent), shopping (14 per cent) and education / childcare (12 per cent). The proportion of education / childcare and shopping trips taken shows an increase in recent years, balanced by a decline in the proportion of commuting, shopping and personal business trips. Other trip purposes have varied over time but remained roughly stable.

Trends for trip distance are shown in **Figure 4-3**.

Figure 4-3 Trip distance trends in Willoughby LGA



Data source: Household Travel Survey 2008-2019, TPA

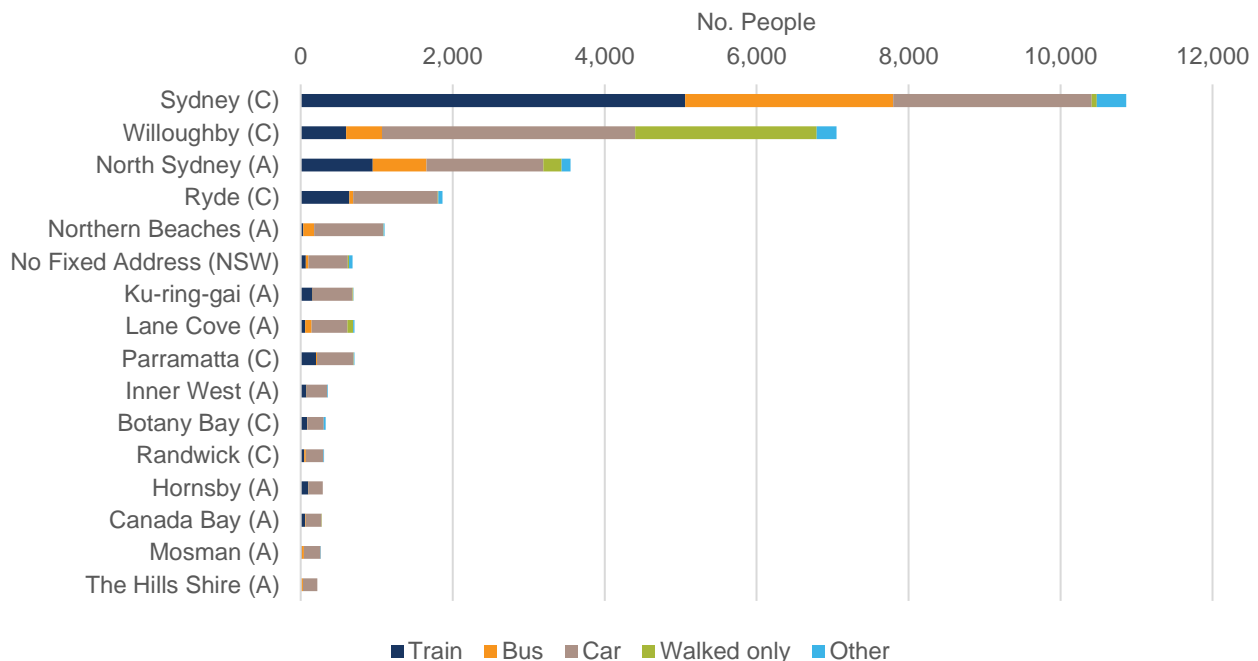
Trip distances were highest for commuters in 2018/19 (approx. 10 kilometres). The distance for other trip purposes varied between 3 - 7 kilometres. The proportion of work related business trips shows an average

decline over the period since 2008, which may reflect a gradual decrease in the need to travel for work purposes. The data indicates that the catchments of the centres within Willoughby are likely to attract a variety of trips from residents, while trips for work purposes will typically need to travel outside the LGA. Visiting retail and various ancillary land uses (e.g. post offices), which aligns with the community feedback received and the planned direction for the local centres.

4.1.4 Origins and destinations

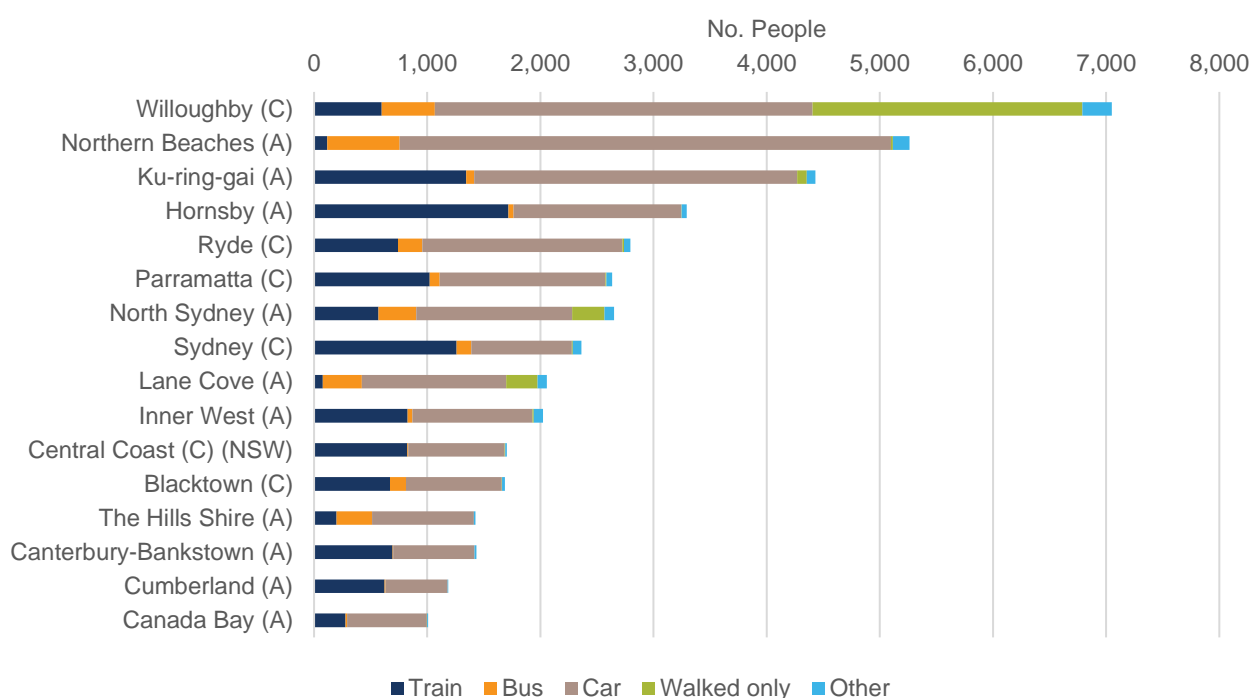
The top origins and destinations for workers (split by residents in Willoughby and people travelling to Willoughby to work) are presented in **Figure 4-4** and **Figure 4-5**. The results also include mode share to understand the connectivity of travel modes and relationship to origin-destination pairs.

Figure 4-4 Destination of residents in Willoughby*



Data source: ABS 2016 Census. *Data exclude the non-relevant modes: Worked at home, Did not go to work, mode not stated, Not applicable

Figure 4-5 Origin of workers in Willoughby*



Data source: ABS 2016 Census. *Data exclude the non-relevant modes: Worked at home, Did not go to work, mode not stated, Not applicable

The results show that the top destinations of workplaces for residents of Willoughby are Sydney (inner city), internal trips within Willoughby, and North Sydney. The remaining trips have destinations in surrounding suburbs. The top origins for people who travel to Willoughby to work are much more diverse and include internal trips within Willoughby, the northern beaches, Ku-ring-gai, Hornsby, Ryde and other suburbs in Sydney's North Shore and Inner West.

The results also indicate that Willoughby is reasonably well connected to the Sydney CBD and North Sydney by public transport, with the majority of trips taken by train and bus. A large portion of internal trips within Willoughby are also taken by walking only. Most other destinations are reliant on private vehicles, particularly for outbound trips. Although some key origins/ destinations include public transport connections such as railway stations (e.g. Hornsby, Parramatta), many trips are still taken by car, which may reflect the limited ability to interchange and could present an opportunity/ need to improve bus-rail connectivity.

4.2 Parking behaviour

A review of parking behaviour within Willoughby was undertaken through the *Street Parking Strategy* (Willoughby City Council, 2017). The study revealed that on-street parking in Willoughby is in high demand from various user groups. The demand greatly exceeds the supply in the Chatswood centre, and the study stated that searching for parking can comprise around 30 per cent of traffic congestion.

Other key findings from the Street Parking Strategy indicate that:

- > Demand for parking generally exceeds capacity within the centres of Artarmon, Chatswood and St Leonards. There is spare capacity in the streets at an approximate 10 minute walk from these centres;
- > Time restricted parking in Chatswood results in long term parking in surrounding residential streets;
- > The majority of parking demand in residential streets is caused by commuters, primarily from the Willoughby LGA or neighbouring suburbs. This is particularly true near key land uses such as the commercial centres, train stations, major bus routes, and medical and educational institutions;
- > Some areas of unrestricted street parking are operating at or above capacity (indicating illegal parking). This demand is largely generated by the Chatswood CBD and impacts resident parking;
- > Streets near some schools during drop off/ pick up times are parked out, with illegal parking occurring;
- > Parking near sports grounds and religious centres are regularly parked beyond capacity;

-
- > Short-stay parking generally operates near capacity;
 - > Half day ticketed parking (4P) spills into unrestricted residential streets at peak times; and
 - > Approximately 50 per cent of parking spaces within permit parking areas are occupied by permit holders.

The findings show that demand for parking generally exceeds supply, and is largely driven by commuter parking in the surrounds of key centres and land uses.

Council currently manages the demand for parking through various mechanisms including:

- > Parking and stopping restrictions;
- > Time restrictions;
- > Enforcement measures;
- > Parking permits; and
- > Pricing.

The introduction of time restrictions and pricing, as well as allocating permits for certain users, has been reported as successful in assisting to manage demand for parking. Continuing and refining these measures in conjunction with revised parking rates could help to address parking issues into the future, particularly in and near the major centres.

4.3 Residential vehicle ownership and parking demand

The majority of Willoughby residents have access to a private vehicle, through household vehicle ownership varies substantially. Data from ABS Census 2016 has been used to show the relationship between dwelling size and vehicle ownership, with a comparison against the WDCP requirements for car parking based on the dwelling type. The data has been split by precinct to review the differences between areas such as Railway Precincts and suburban residential areas. Statistical Area Level 1s (SA1s) are small geographical areas typically used for data analysis and were used to analyse the ABS data. The classifications of each SA1 by precinct type are shown in **Figure 4-6**.

Analysis of travel behaviour for workers in Willoughby (discussed in **Section 4.4**) was based on Destination Zones (DZNs) as SA1s were not available for analysis for workers. The classification of DZNs is shown in **Figure 4-7**. The DZNs for local centres were aggregated into MPTCs since the DZNs are larger areas and cover blocks not effectively classified as a local centre but still somewhat representative of an MPTC.

Figure 4-6 Classification of SA1s by precinct type

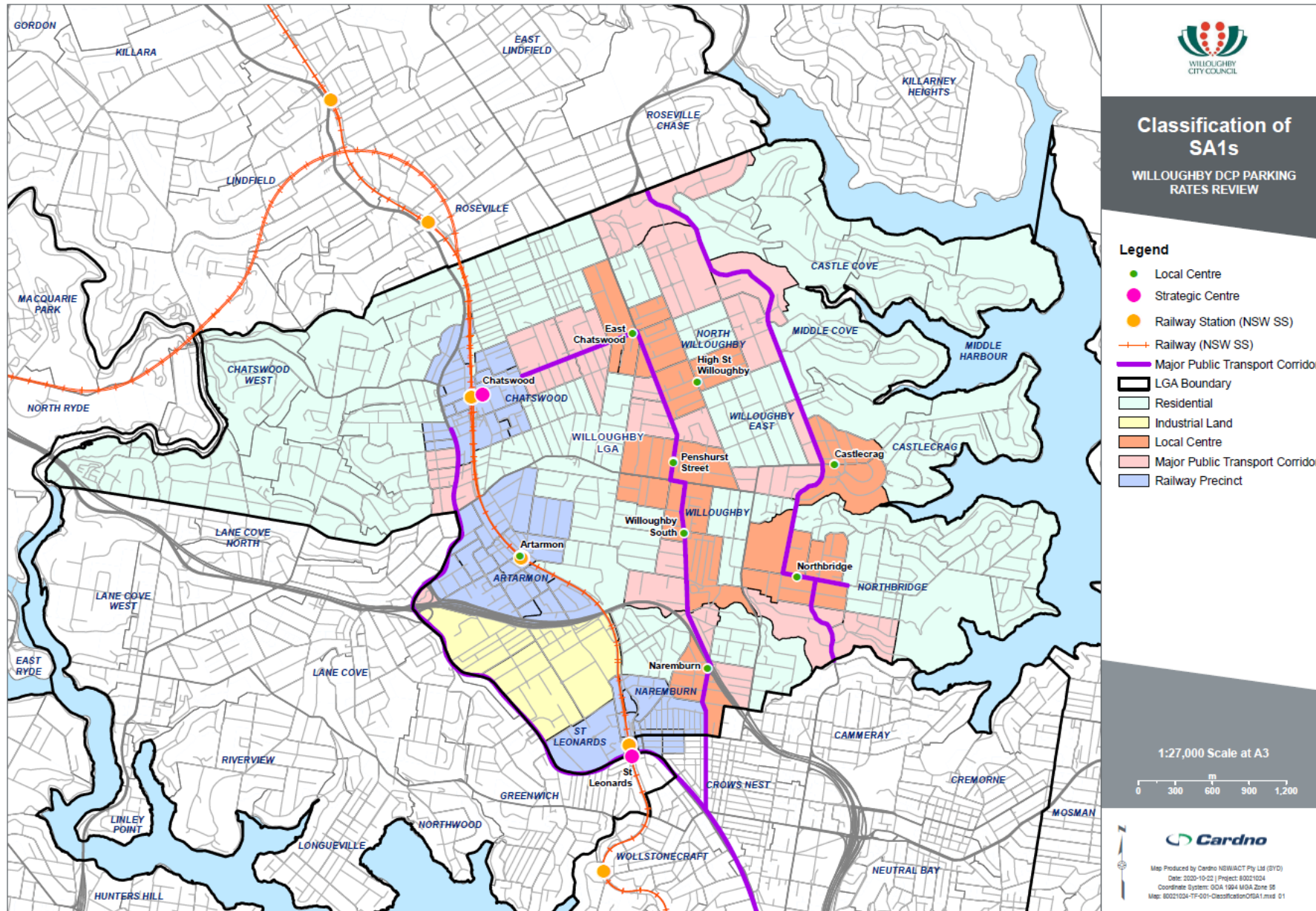
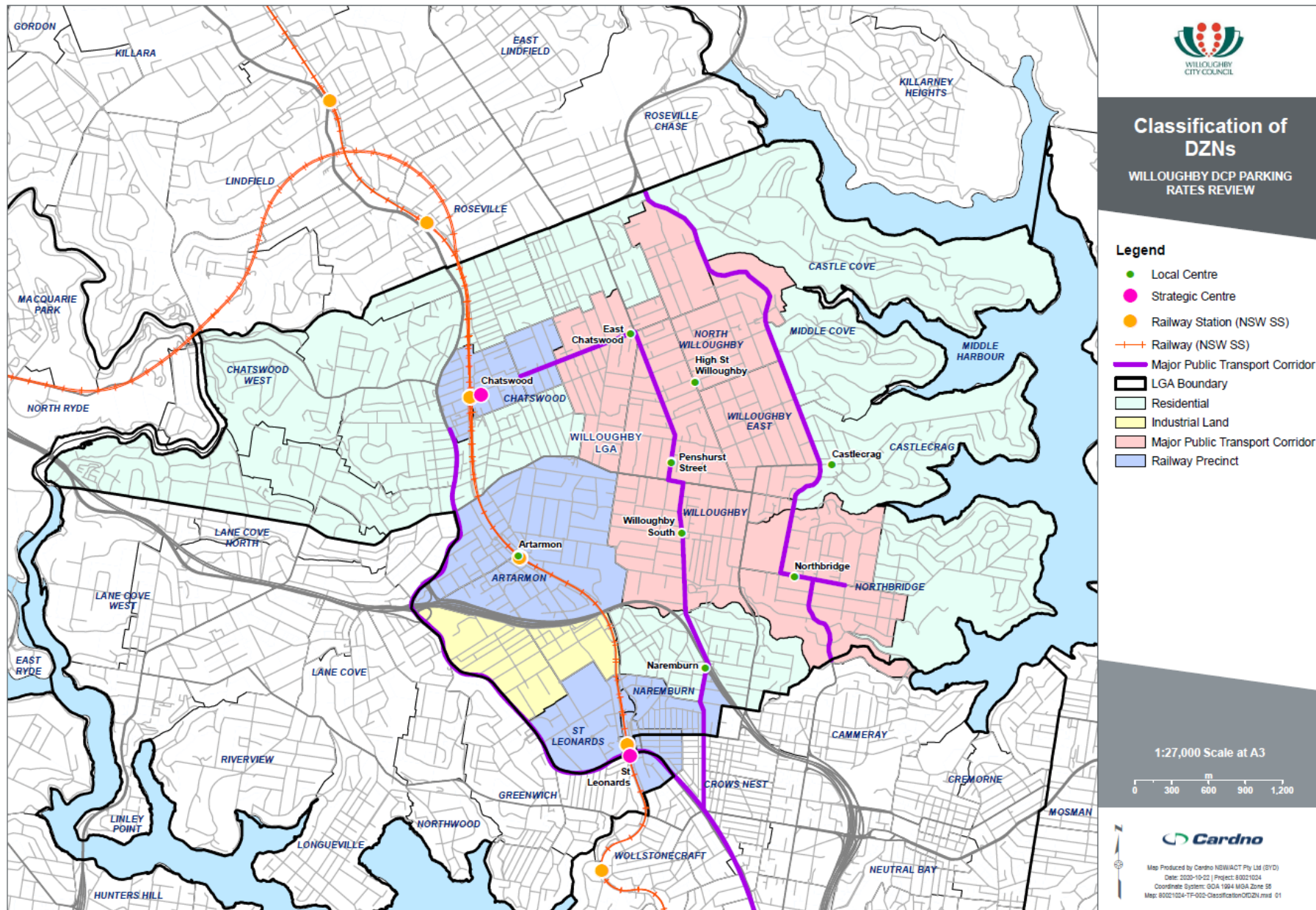


Figure 4-7 Classification of DZNs by precinct type

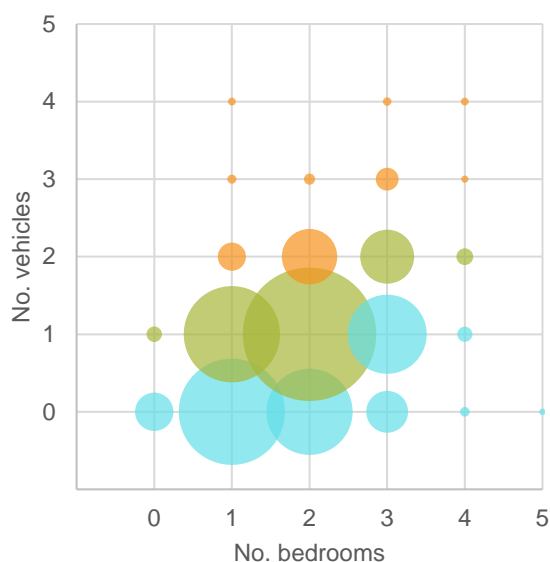


4.3.2 CBD environments (Chatswood / St Leonards)

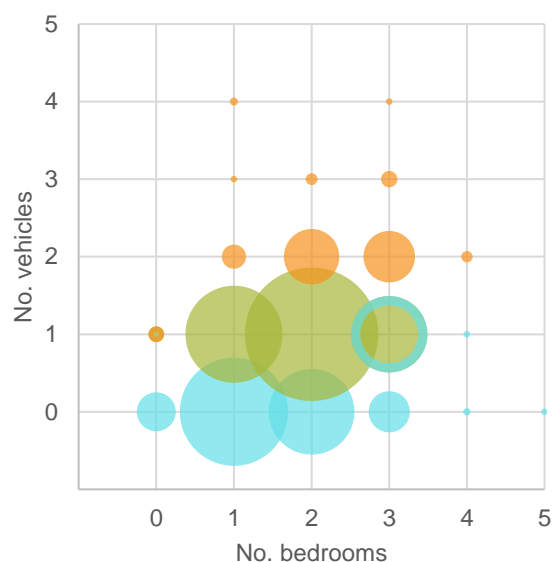
The number of bedrooms versus the number of vehicles owned, and the surplus / deficit of car parking, within the CBD environments (i.e. Chatswood and St Leonards) is shown in **Figure 4-8**.

Figure 4-8 Household characteristics – bedrooms vs vehicle ownership within CBD environments

Detached dwellings



Attached dwellings



● Parking > Cars ● Parking = Cars ● Parking < Cars

Data source: ABS Census 2016

The data shows that for detached dwellings:

- > 45 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 48 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 8 per cent of dwellings own more vehicles than they can accommodate within the property.

The data shows that for attached dwellings:

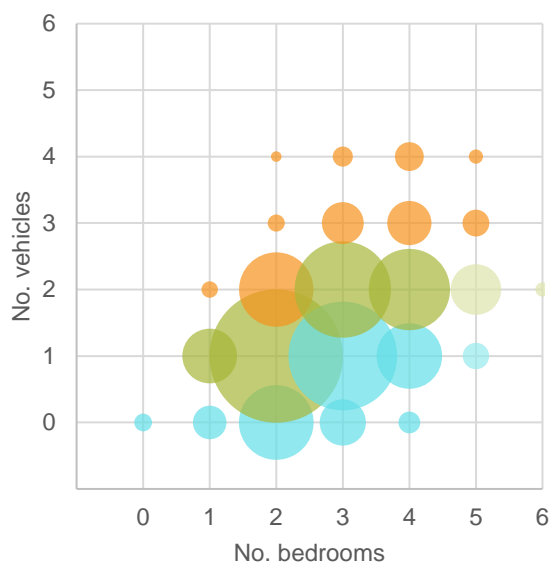
- > 38 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 52 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 10 per cent of dwellings own more vehicles than they can accommodate within the property.

4.3.3 Major Public Transport Corridors (MPTCs)

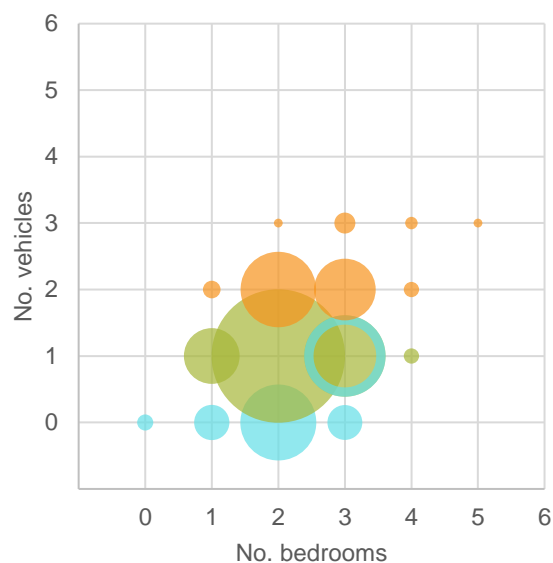
The number of bedrooms versus the number of vehicles owned, and the surplus/ deficit of car parking, within the MPTCs is shown in **Figure 4-9**.

Figure 4-9 Household characteristics – bedrooms vs vehicle ownership within Major Public Transport Corridors

Detached dwellings



Attached dwellings



● Parking > Cars ● Parking = Cars ● Parking < Cars

Data source: ABS Census 2016

The data shows that for detached dwellings:

- > 34 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 51 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 15 per cent of dwellings own more vehicles than they can accommodate within the property.;

The data shows that for attached dwellings:

- > 22 per cent of dwellings own fewer vehicles than spaces for car storage; and
- > 58 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking.
- > 20 per cent of dwellings own more vehicles than they can accommodate within the property;

4.3.4 Industrial/ business zones

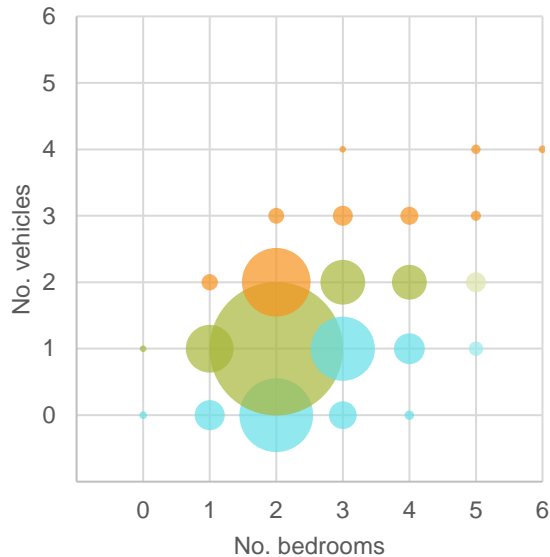
These zones contain a negligible number of dwellings and were not analysed.

4.3.5 Railway Precincts (non-CBD environment – Artarmon)

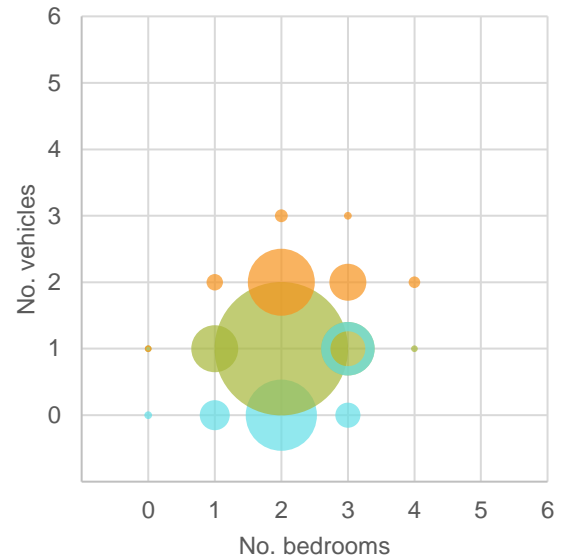
The number of bedrooms versus the number of vehicles owned, and the surplus / deficit of car parking, within the non-CBD Railway Precincts (i.e. Artarmon) is shown in **Figure 4-10**.

Figure 4-10 Household characteristics – bedrooms vs vehicle ownership within non-CBD railway precincts

Detached dwellings



Attached dwellings



● Parking > Cars ● Parking = Cars ● Parking < Cars

Data source: ABS Census 2016

The data shows that for detached dwellings:

- > 29 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 56 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 15 per cent of dwellings own more vehicles than they can accommodate within the property.

The data shows that for attached dwellings:

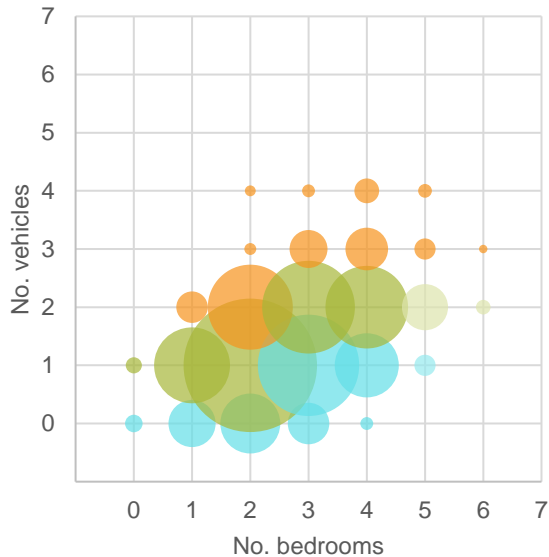
- > 20 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 63 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 17 per cent of dwellings own more vehicles than they can accommodate within the property.

4.3.6 Local Centres

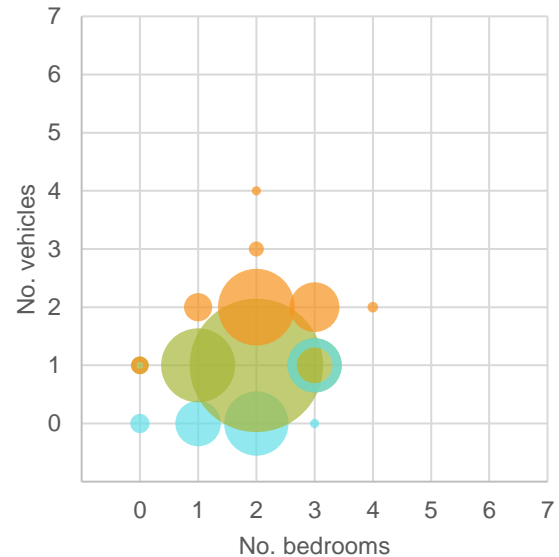
The number of bedrooms versus the number of vehicles owned, and the surplus / deficit of car parking, within the Local Centres is shown in **Figure 4-11**.

Figure 4-11 Household characteristics – bedrooms vs vehicle ownership within Local Centres

Detached dwellings



Attached dwellings



● Parking > Cars ● Parking = Cars ● Parking < Cars

Data source: ABS Census 2016

The data shows that for detached dwellings:

- > 29 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 54 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 17 per cent of dwellings own more vehicles than they can accommodate within the property.

The data shows that for attached dwellings:

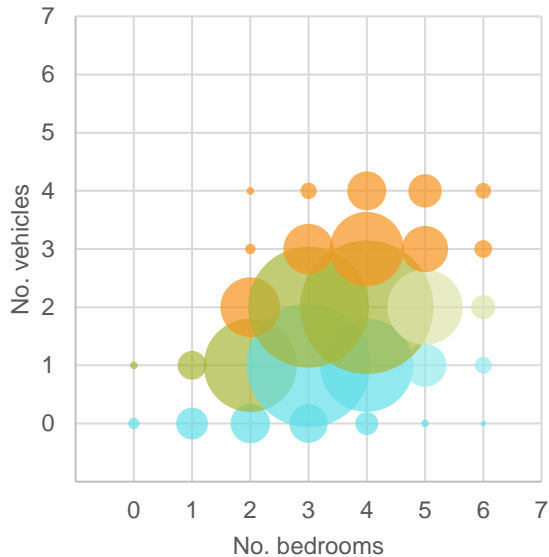
- > 17 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 61 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 21 per cent of dwellings own more vehicles than they can accommodate within the property.

4.3.7 Suburban residential areas

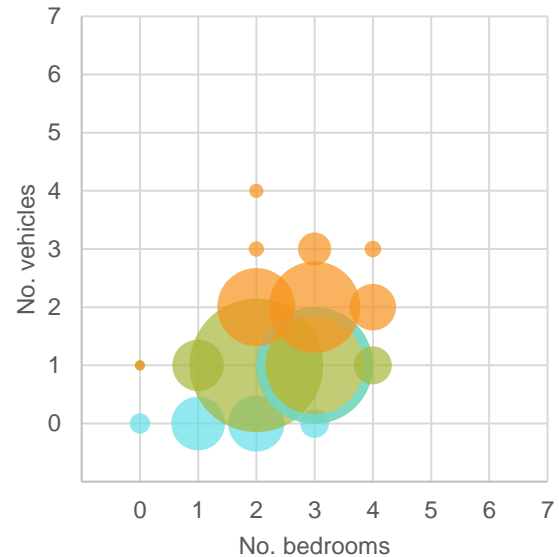
The number of bedrooms versus the number of vehicles owned, and the surplus / deficit of car parking, within the suburban residential areas is shown in **Figure 4-12**.

Figure 4-12 Household characteristics – bedrooms vs vehicle ownership within suburban residential areas

Detached dwellings



Attached dwellings



● Parking > Cars ● Parking = Cars ● Parking < Cars

Data source: ABS Census 2016

The data shows that for detached dwellings:

- > 32 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 50 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 18 per cent of dwellings own more vehicles than they can accommodate within the property.

The data shows that for attached dwellings:

- > 30 per cent of dwellings own fewer vehicles than spaces for car storage;
- > 52 per cent of dwellings own a number of vehicles consistent with the DCP requirement for parking; and
- > 18 per cent of dwellings own more vehicles than they can accommodate within the property.

4.3.8 Summary of findings

This analysis shows that around 50 per cent of dwellings have the same number of vehicles and parking spaces, 10 - 20 per cent own more vehicles than spaces, and 20 - 40 per cent have more spaces than vehicles. As such, there is the potential to better balance the parking provision in some areas to achieve a higher proportion of dwellings with equal vehicles and parking spaces. Residential parking rates could be reduced to avoid the over-provision of parking spaces, particularly in CBD environments, Railway Precincts and MPTCs. Increasing the price of on-street parking could also provide a signal to reduce vehicle ownership of households beyond what can be accommodated on-site.

4.4 Method of travel to work by precinct

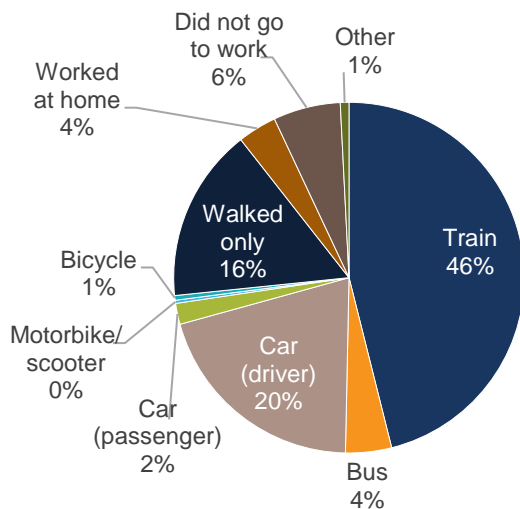
The method of travel to work (mode share) for journeys to work was analysed for each precinct type based on ABS Census 2016 Journey to Work (JTW) data. The results are shown in the following sections and provide an understanding of the travel behaviour of residents and workers in the Willoughby LGA.

4.4.1 CBD environments (Chatswood / St Leonards)

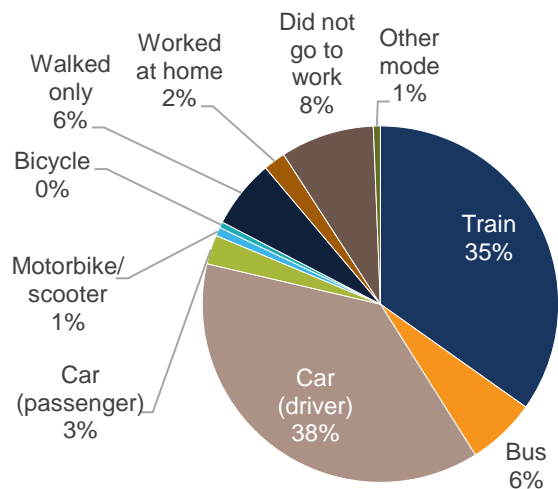
The mode share for residents and workers within the CBD environments (i.e. Chatswood and St Leonards) is shown in **Figure 4-13**.

Figure 4-13 JTW mode share – residents and workers within CBD environments

Residents



Workers



Data source: ABS Census 2016

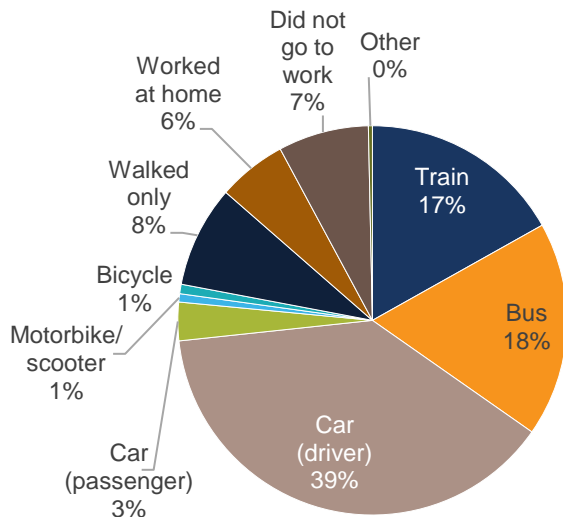
The data shows that train comprises a large mode share within the CBD environments, particularly for residents. Cars are also highly utilised and are the dominant travel mode for workers. Walking trips are significant for residents but very small for workers, reflecting the fact that many residents also work locally, however workers come from a broader range of origins.

4.4.2 Major Public Transport Corridors

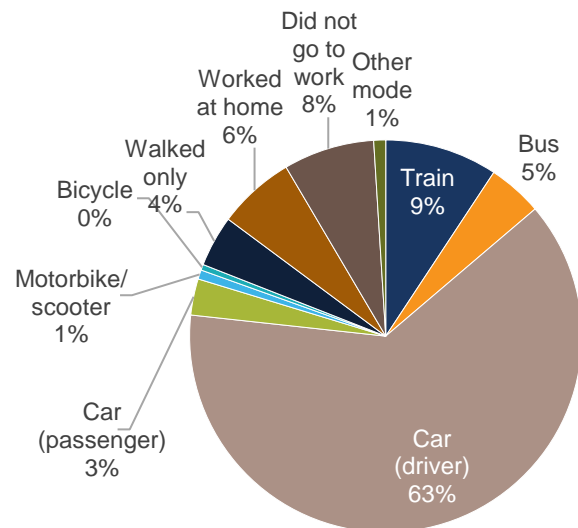
The mode share for residents and workers within the MPTCs is shown in **Figure 4-14**.

Figure 4-14 JTW mode share – residents and workers within MPTCs

Residents



Workers



Data source: ABS Census 2016

The data shows that cars are the dominant travel mode within MPTCs, particularly for workers. Public transport makes a combined 35 per cent of JTW trips for residents and 14 per cent for workers, reflecting the high level of connectivity in these areas by rail and bus, although workers still heavily rely on private vehicles for access from various origins.

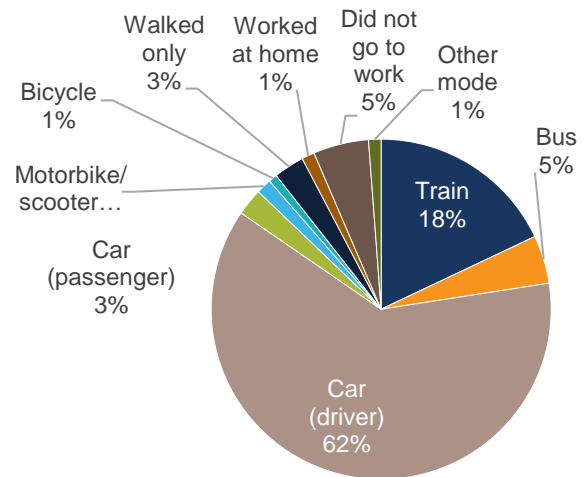
4.4.3 Industrial/ business zones

The mode share for residents and workers within the industrial / business zones is shown in **Figure 4-15**.

Figure 4-15 JTW mode share – residents and workers within industrial / business zones

Residents (N/A – negligible)

Workers



Data source: ABS Census 2016

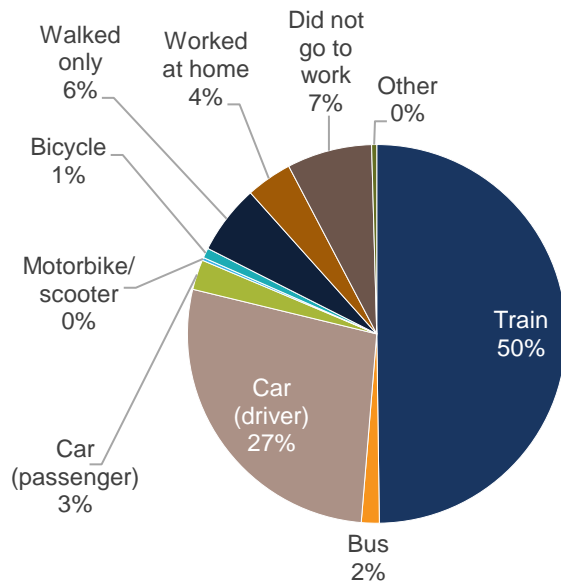
The data shows that industrial / business zones are heavily reliant on private vehicles for access by workers. This is consistent with the previous findings. The train as a travel mode (18 per cent of trips) reflects the proximity of the industrial zone to Artarmon station, accommodating public transport access. Other travel modes are small, since accessibility by foot, cycling and bus networks are limited between this area and residential areas.

4.4.4 Railway Precincts (non-CBD environment – Artarmon)

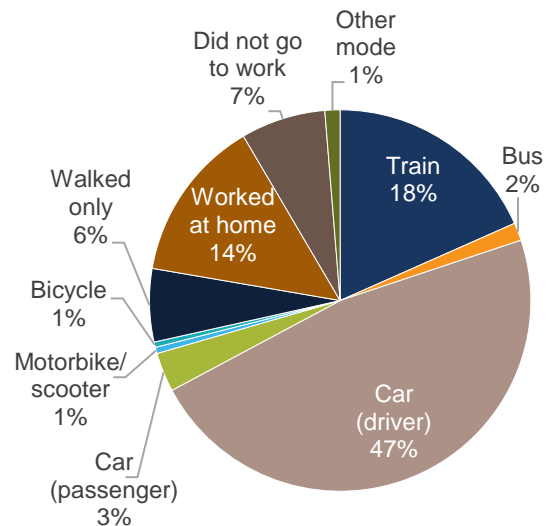
The mode share for residents and workers within the non-CBD Railway Precincts (i.e. Artarmon) is shown in **Figure 4-16**.

Figure 4-16 JTW mode share – residents and workers within non-CBD Railway Precincts

Residents



Workers



Data source: ABS Census 2016

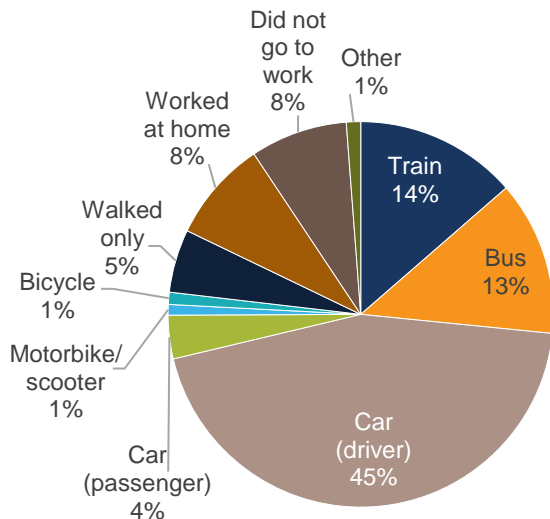
The data shows that for Artarmon, the train is the dominant travel mode for residents, reflecting the easy access from surrounding residential areas and the prime location of Artarmon in relation to rail-based centres such as North Sydney, Chatswood and the Sydney CBD. The train is less dominant for workers, who rely more heavily on cars, similar to the other precinct types. The bus mode share for both residents and workers is low, reflecting the limited bus services available in Artarmon, both in connectivity and frequency.

4.4.5 Suburban residential areas

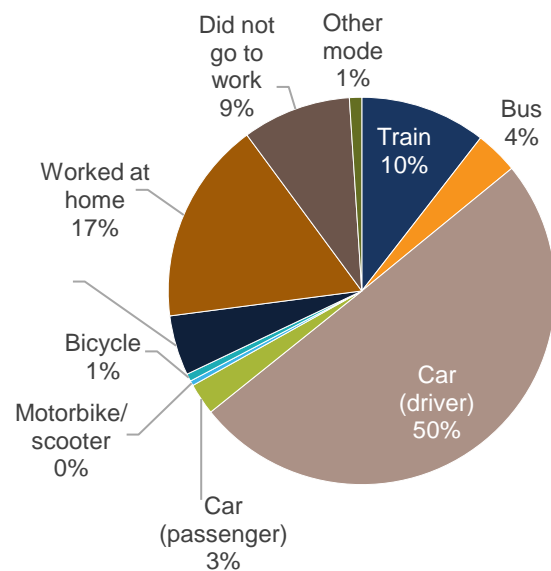
The mode share for residents and workers within the suburban residential areas is shown in **Figure 4-17**.

Figure 4-17 JTW mode share – residents and workers within suburban residential areas

Residents



Workers



Data source: ABS Census 2016

The data shows that cars are the dominant travel mode for both residents and workers in suburban residential areas, reflecting the fewer public transport connections and additional distance of these areas from employment compared to the other precinct types. Public transport still comprises a combined total of 27 per cent of trips for residents and 14 per cent of trips for workers. 'Worked at home' makes a significant proportion of workers in these areas, reflecting the residential nature with few local employment opportunities.

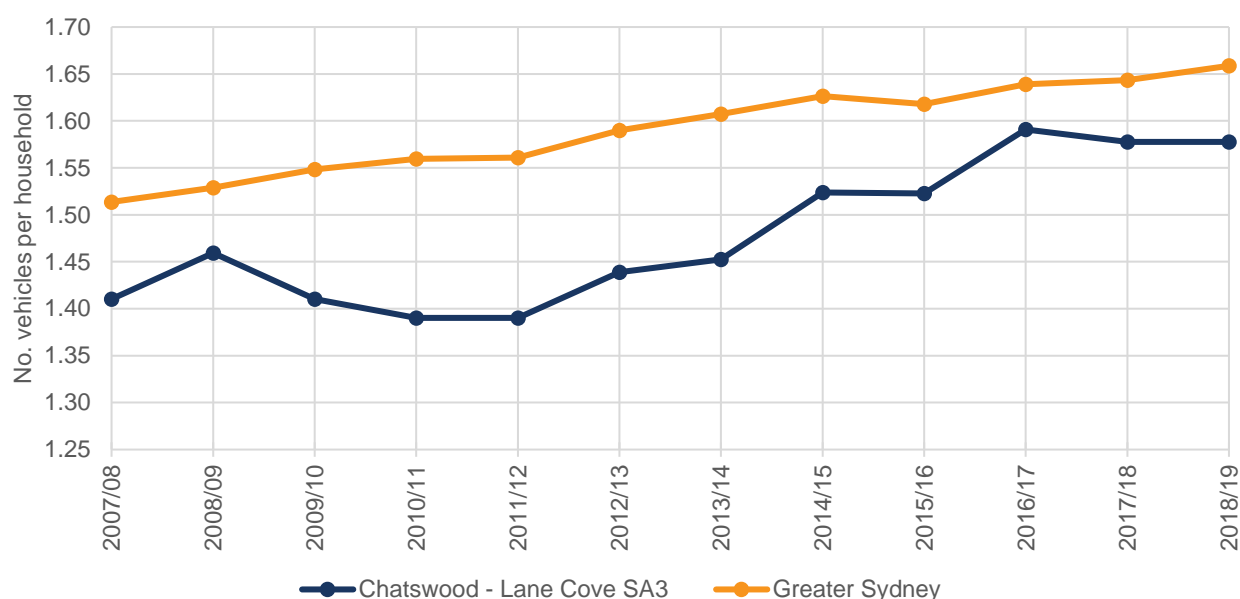
4.5 Potential future trends

This section provides an outline of potential future trends and their possible impacts on the parking system which may influence requirements and demand for parking.

4.5.1 Vehicle ownership

Trends in vehicle ownership are based on historical Household Travel Survey (HTS) data for the Chatswood – Lane Cove Statistical Area Level 3 are shown in **Figure 4-18**. This data is gathered on a yearly basis and provides an insight into travel behaviour over time.

Figure 4-18 Trends in vehicle ownership



Data source: ABS Census 2016

The data shows an increasing trend in vehicle ownership within the Chatswood – Lane Cove region over the period from 2007/08 to 2018/19, reflecting a similar trend throughout Greater Sydney. This trend may continue, although there will be competing and uncertain factors influencing this in the future, including:

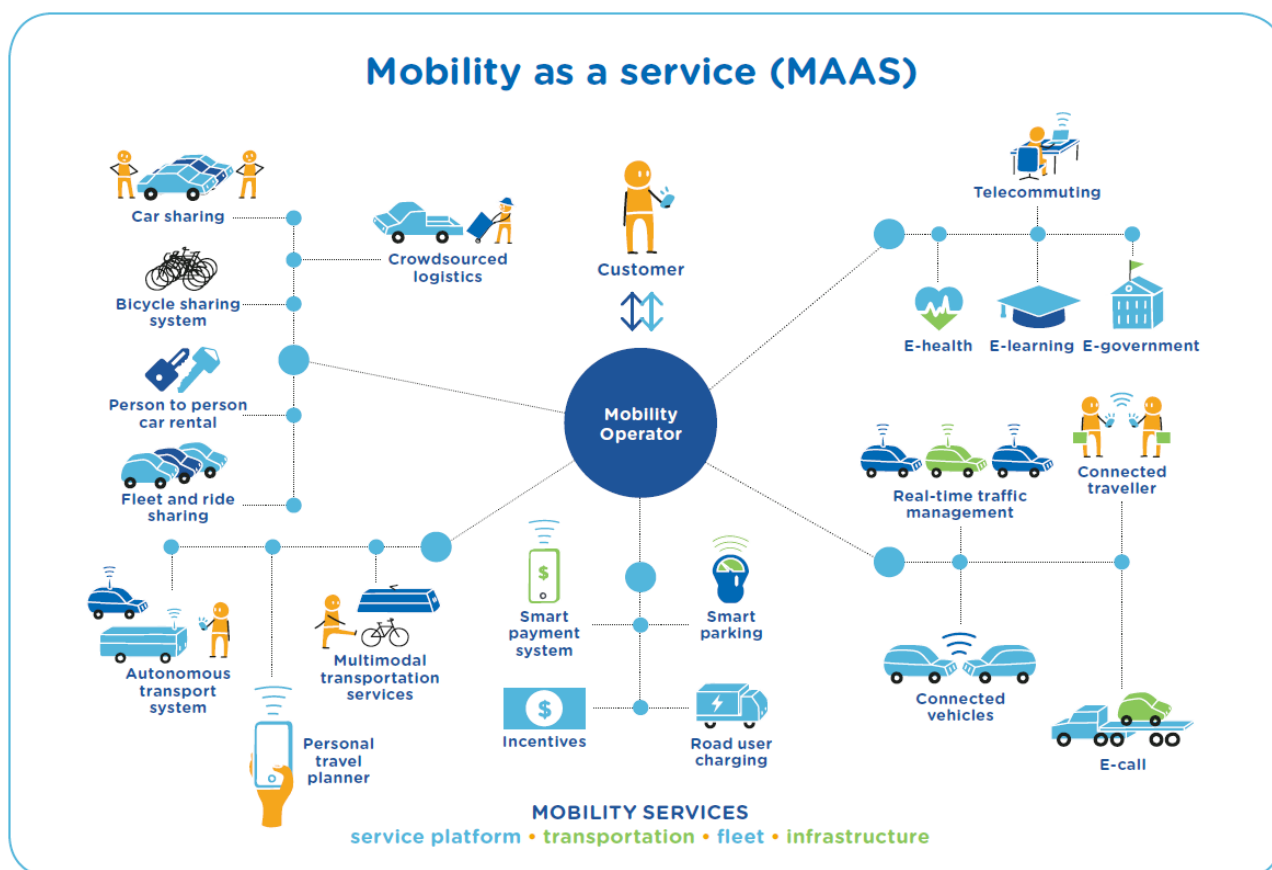
- > Increasing trends in working from home, reducing the need for people to own a car to travel to work;
- > Increasing options provided for mobility through Mobility as a Service, ride sharing and autonomous vehicles (AVs) (discussed in the following section); and
- > Potential for preferences to shift towards private vehicle travel as opposed to public transport due to concerns regarding COVID-19, or to more broadly change their home / working location or habits.

It is difficult to estimate what may happen in the future – the trend in historical data indicate that vehicle ownership may increase, however a range of factors may impact this as further discussed in the following section.

4.5.2 Mobility as a Service (MaaS), ride sharing and Autonomous Vehicles (AVs)

MaaS refers to a service model that bundles travel modes with technology platforms to enable convenient, customer-focused service offerings. This includes services such as car sharing and on-demand transport, and relies on data and communications networks to operate effectively. MaaS enables an integrated service offering that aims to provide a seamless experience where the customer can plan and pay for journeys ahead of time. An overview of MaaS is shown in **Figure 4-19**.

Figure 4-19 Overview of Mobility as a Service



Source: Future Transport Strategy 2056, Transport for NSW, 2018

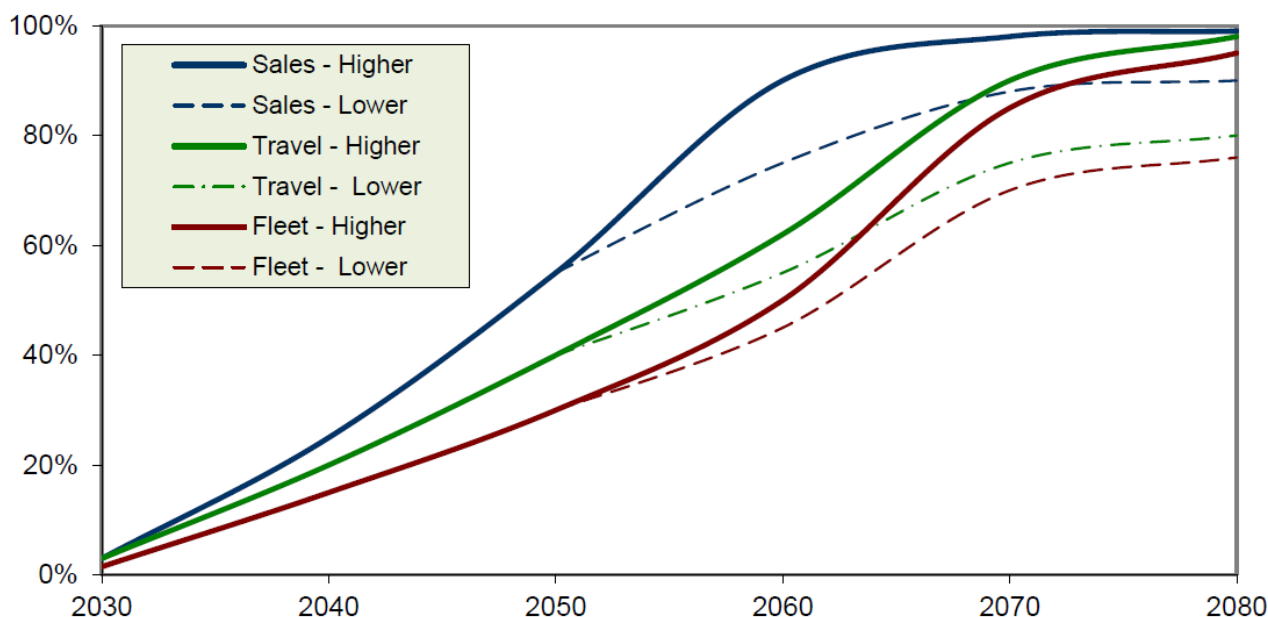
While not necessary components of MaaS, its uptake is expected to be linked to ride sharing and AVs, which enable additional transport options and emerging service offerings. Ride sharing allows multiple users to ride together, reducing the spatial needs for road space and increasing mobility on demand. The ride sharing industry has grown by approximately 41 per cent between 2015-2020¹, although this industry is expected to shrink this year due to COVID-19. Future increases in ride sharing could reduce demand for parking as well as congestion caused by vehicles searching for parking spaces.

AVs may enable various changes influencing the demand for parking, such as access to destinations without the need to park (since the vehicle is able to continue to drive after dropping off passengers), reduced vehicle ownership, reduced parking congestion, more efficient road use, enhanced mobility and reduced running costs. The use of AVs may shift demand for parking to different locations, since people may want their vehicle to park in available areas further away to avoid parking costs. This could allow more off-site parking and shared parking, reducing parking demand in urban areas.

The 2019 *Autonomous Vehicles Readiness Index* (KPMG 2019) reports that Australia has regulations supportive of the use of AVs and is in the process of reforming current driving laws to enable use of full AVs from 2020. A recent report from the *Victoria Transport Policy Institute* discusses the potential future uptake of AVs and the implications for transport planning. Forecast uptake scenarios over time for sales, travel and the proportion of AVs in the vehicle fleet is shown in **Figure 4-20**.

¹ IBISWorld 2020, <https://www.ibisworld.com/au/industry/ridesharing-services/5540/>, viewed 22/10/2020

Figure 4-20 Potential uptake of AVs



Source: *Autonomous Vehicle Implementation Predictions – Implications for Transport Planning*, Victoria Transport Policy Institute, 2020)

The data shows that between 2050-2060, approximately half of the vehicle fleet is expected to be autonomous. This reflects a long-term transition to AVs, it also indicates that AVs will comprise a significant proportion of the market by 2036 (around 10 per cent).

Overall, future trends and changes in technology are expected to improve the efficiency of the parking system and reduce the demand for parking (at least in areas of peak parking demand), but may also impact travel patterns in unexpected ways, increase the number of vehicles on the road or increase congestion due to empty running.

4.6 Summary of travel behaviour

A summary of the key findings from the analysis of travel behaviour is provided as follows:

- > Private vehicles comprise a significant mode share. Parking rates could be used to decrease the reliance on private vehicles and leverage sustainable transport modes, particularly in the CBDs, Railway Precincts and MPTCs;
- > Public transport is relatively well utilised in the CBDs and Railway Precincts, slightly less so in MPTCs and relatively little in residential areas. This provides an opportunity to use parking rates as a tool to restrict parking supply in the centres and limit traffic generation / congestion, but limits the effective use of this tool in residential areas throughout Willoughby due to the lack of alternative transport options available;
- > For journeys to work, most residents travel to the Sydney CBD, within Willoughby itself, or to North Sydney. These locations are highly accessible by rail from Willoughby, although access varies by the specific origin within Willoughby and residents may still require a car to access these locations or public transport interchanges;
- > For journeys to work, most workers within Willoughby also live within Willoughby or travel from areas throughout the North Shore and Northern Beaches. These locations are more dependent on cars for access, which is reflected in the mode share. Demand for car parking by employees is therefore expected to be more inelastic than demand for parking by residents;
- > Around half of residents have sufficient parking to accommodate their vehicles owned, and it is estimated there are more residents who have spare parking spaces than residents who have too few spaces. Overall there is opportunity to reduce residential parking rates to better provide parking to match vehicle ownership; and
- > Significant mode share differences are seen between the precinct types within Willoughby – CBDs and Railway Precincts have relatively high utilisation of public transport, MPTCs moderately so and residential areas less so. This means that differentiation of parking rates between these areas will be important to

match the nature of each area and account for variances in travel choices and availability of alternative transport modes.

5 Current WDCP Off-street parking rates

5.1 Parking rate options

The WDCP provides developers a target for the number of parking bays that needs to be included in all types of development in the LGA. Variation from these targets requires justification through a traffic study for which Council decides as part of a development application (DA). The DCP provides guidance on how variations can be accepted. The use of target rates, rather than minimum or maximum rates, establishes a 'deemed to comply' value for development. For this type of rate, strategic intent of the target is usually explained in the accompanying aims within the DCP.

Council's updated DCP parking rates should be designed so that all types of development meet strategic planning objectives e.g. through Willoughby ITS 2036. It is challenging to determine rates that will suit all land uses and changing needs, and other forms of parking requirements may be better suited to support Council's strategic planning needs. These forms are discussed in **Table 5-1**.

Table 5-1 Off-street parking requirement types

Parking requirement type	Detail
Minimum parking rates	<p>Minimum rates are used to ensure that developments provide more than zero parking spaces. The lack of an upper limit ensures that developers may increase supply but cannot reduce without a concession from Council.</p> <p>Minimum rates can be used to prevent overspill of parking into on-street spaces, and tend to be used in suburban areas where public parking is limited.</p> <p>Reduced minimums accept that a given overspill will be accommodated in public parking. This creates opportunities for improved efficiency and management control (pricing and duration restrictions), as well as reducing the economic burden on development, all of which can be beneficial to the local community.</p> <p>Historically, most minimum parking rates are set above the natural demand – i.e. Council requires more parking bays than developers want to build.</p>
Maximum parking rates	<p>Maximum rates are used to ensure that parking is not oversupplied, and are usually enforced in centres where traffic congestion is an issue and alternative public and active transport modes are highly accessible.</p> <p>This form of rates control leaves the decisions regarding on-site supply to developers and businesses. It acknowledges that developers may provide zero parking spaces on-site, and so is usually accompanied by a fixed contributions scheme related to intensity of development.</p> <p>Most maximum parking rates are set below the natural demand – i.e. Council requires that fewer bays be constructed than developers want on-site.</p>
Banded parking rates	<p>Banded parking rates provide developers with a range of acceptable parking ratios. They are generally used when developers are encouraged to make their own decisions on parking supply, avoiding the supply of zero spaces. This type of rate is generally used when there is a lack of sufficient on-street public parking controls.</p> <p>By setting both maximum and minimum rates, banded rates allow developers an opportunity to interrogate their needs and select the parking supply that suits market demands.</p>
Target parking rates	<p>The current DCP utilises target parking rates, which provide no explicit flexibility to developers in determining parking supply. However, the application of discretionary policies effectively enables modifications to these rates based on a number of factors.</p> <p>In application, target parking rates function like banded rates, but with an opaque range for appropriate supply. This reduces certainty for developers and represents a potential barrier to sustainable development.</p>
Parking caps	<p>Parking caps are used when traffic congestion or other constraints in CBD areas require restrictions on a local area basis. This form of parking restriction is usually applied to a dense city centre precinct, and applied as an area rate (i.e. parking spaces per hectare).</p>
Hybrid caps	<p>Hybrid caps are used when a combination of these restrictions are necessary to support Council's strategic objectives.</p> <p><i>For example: The City of Stirling in Western Australia requires commercial parking (independent of category) within the Mirrabooka City precinct to between 2 and 4 spaces per 100m², up to plot ratio 1.0. Beyond this density, parking is limited to 200-400 spaces per hectare.</i></p>

Parking requirement type	Detail
	<i>This gives developers the ability to choose a rate that suits their business, but maintains a long-term cap on parking supply (and trip generation) through to the development horizon.</i>

5.2 Current Willoughby DCP car parking rates

The current DCP parking rates are generally the same for the whole of the municipal area, with some specific reductions for Railway Precincts and certain development types in the Chatswood CBD.

A comparison of these rates against unconstrained demand (using best-practice guidelines) is used below to assess the potential over/undersupply of compliant parking. The *Willoughby Contributions Plan 2019* identifies occupancy rates for development, and has also been used for benchmarking purposes.

5.2.1 Residential parking

Residential parking rates for multi-dwelling housing are shown in **Table 5-2**.

Table 5-2 Willoughby DCP residential parking rates

Multi-dwelling housing	Parking rate		
	Outside of Railway Precinct or major public transport corridor	Within Railway Precinct or major public transport corridor	Difference between Railway Precinct or major public transport corridor and other areas
Studio	1 / dwelling	0.5 / dwelling	0.5 / dwelling
1 bedroom	1 / dwelling	1 / dwelling	0
2 bedroom	1.2 / dwelling	1 / dwelling	0.2 / dwelling
3+ bedroom	1.5 / dwelling	1.25 / dwelling	0.25 / dwelling
Visitor spaces	1 per 4 dwellings	1 per 4 dwellings	0

Residential parking standards have been compared with ABS Census vehicle ownership rates to determine the sufficiency of parking, shown in **Table 5-3**. The data shows that for the WDCP rates, approximately 50 per cent of Willoughby residents would have the same number of parking spaces as vehicles.

Table 5-3 Ratio of residential vehicle ownership to parking spaces

Residential Parking Sufficiency	Detached Dwellings		Semi-Detached and Attached Dwellings	
	Number	%	Number	%
Too Many Cars	2,129	18.5%	1,959	14.4%
Too Many Spaces	3,831	33.3%	4,980	36.5%
Equal cars and spaces	5,558	48.3%	6,696	49.1%

Source: ABS, 2016

Where there are 'Too Many Cars' this means that there is likely to be an overflow of demand onto residential streets. In this case, the obligation and cost burden of residential car storage is passed from developers to Council. It should be noted that this analysis does not account for residents who use their on-site parking spaces for vehicle storage which would indicate that the total number of vehicles parked on-street is likely to be higher.

Conversely, there are nearly 9,000 primarily zero-car households that have 'Too Many Spaces' and are paying for parking through rental or mortgage rates and receiving no direct benefit. This represents an inequity between demand and supply in Willoughby.

5.2.2 Office / business

Parking rates for office development is differentiated by location, with areas closer to public transport required to provide less parking. The Willoughby Contributions Plan 2019 is based on a development occupancy rate of 1 worker / 25sq.m GFA. Unconstrained office demand is generally considered to be approximately 1 space / 40sq.m GFA (*ITE Parking Generation 4th Edition*).

Based on the average attendance within an office development, this supply is usually sufficient to allow a car-as-driver mode share of approximately 75-80%. A similar assumption is used to establish the indicative supported mode shares below.

The WDCP rates reflect a supply of on-site parking for office / business land use as described in **Table 5-4**.

Table 5-4 Willoughby DCP office / business land use parking rates

Office / Business Land Uses	Parking rate (m ² GFA per space)	Parking rate (spaces per 100 m ² GFA)	Worker occupancy rate (worker per 100m ²)	Average office attendance	Parking spaces per employee	Supported driver mode share %	Current driver mode share %*
Chatswood (specific locations)	200	0.5	4	0.8	0.13	16%	42%
Railway Precincts (other)	110	0.91	4	0.8	0.23	29%	61%
Major Public Transport Corridor / Local Centre	60	1.67	4	0.8	0.42	53%	74%
Elsewhere	60	1.67	4	0.8	0.42	53%	68%

This analysis indicates that current parking provision may be considerably lower than current demand, and that between 30 and 60 per cent of drivers likely rely on publicly accessible all-day parking (on-street and off-street). This may not be an issue if a suitable amount of public parking is available.

This type of parking provision gives Council additional control over parking management, pricing and location of all-day supply. However, the scale of this responsibility implies that effective management of public parking is of paramount importance, if the economic and environmental goals of the WDCP are to be achieved.

5.2.3 Shop / supermarket

The parking demand associated with retail development is highly variable, and related not only to the type and scale of the retail offering, but also the density of residential / business surrounding it.

In the absence of this information, *ITE's Parking Generation* guide projects parking demand for large-scale retail centres at approximately 4 spaces / 100m², of which approximately 15 - 20% is used by employees. In contrast, *RTA Guidelines for Traffic Generating Development* recommends 5.5 to 8 spaces / 100m²

The WDCP provides the rate for 'Shop' at 4 spaces / 100m² GFA, and for 'Supermarket' at 6 spaces / 100m² GFA, suggesting that retail demand is likely to be generally satisfied by the supply of on-site parking.

5.2.4 Restaurant

The parking rate for restaurants as defined in the WDCP varies between 1 per 75m² GFA and 1 per 25m² GFA, depending upon location. This is likely to be significantly less than the unconstrained demand for parking. Restaurant peak parking demand is generally outside of business hours (evenings and weekends). Customers can therefore utilise on-street and off-street public parking that would otherwise be used by employees.

In locations where dense restaurant / entertainment and residential development are in close proximity, conflicts may occur where residents rely on on-street parking for private vehicle storage.

5.2.5 Medical

The WDCP sets parking requirements for medical uses primarily based on employees (medical practitioners and other staff). This is a better representation of the generation of parking demand, but is difficult to manage as assessment is based on operations rather than development factors.

The parking requirement for medical facilities is also highly dependent on the nature of the service provided:

- > Medical Clinics generate a greater number of patients and require a higher parking rate;
- > Specialist Centres have a greater proportion of non-practitioner staff, but fewer patients; and

- > Hospitals with overnight stay generate additional demand by visitors.

These services may be provided in stand-alone facilities or combined on a single site. As such, the parking needs of a medical land use do not easily fit within a simple rate calculation, and should be supported in every instance with a site-specific parking demand and supply management assessment.

5.2.6 Other land uses

Developing a standard parking rate for a wide range of land uses is difficult to determine through an evidence base. Standard parking requirements are usually been informed by multiple sources, including:

- > Parking surveys completed in the USA and Sydney dated from the 1970s;
- > Results of an investigation for a single development application that then become the standard for all subsequent developments;
- > Requirements applied by a neighbouring council which may be perceived to be attractive to users and as such, are adopted more broadly without proper analysis; and
- > An evolution from previous requirements, adjusted incrementally to reflect changing attitudes to the local parking supply.

It is therefore recommended that a simplified parking table be considered for use in local centres, which includes only key land uses that form a high proportion of all land use, and strengthens the requirement for site-specific parking studies as part of a Transport Impact Assessment (TIA) in support of development application.

5.3 Bicycle parking rates

Generally, bicycle parking requirements are expected to exceed the baseline demand for the majority of uses, but guarantees and minimum provision to support cycling mode share.

Current WDCP bicycle parking guidelines are shown in **Table 5-5**.

Table 5-5 WDCP bicycle parking requirements

Land use type	Bicycle lockers	Bicycle rail / racks
Residential	1 per 10 units	PLUS 1 per 12 units
Office / business	1 per 600m ²	PLUS 1 per 2,500m ²
Retail / restaurant	1 per 450m ²	PLUS 1 per 150m ²
Industrial	1 per 1,500m ² of site area	PLUS 1 per 2,500m ²

5.4 Motorbike parking rates

The WDCP states that motorbike parking must be provided at a rate of 1 motorcycle space per 25 car spaces. This is generally expected to accommodate demand in most areas, although may be slightly deficient in CBD areas where there is higher demand for motorbike parking and an increased reliance on this mode due to limited car parking supply.

6 Car parking provision reduction factors and discussion

Certain factors related to land use compatibility and density, public transport accessibility and availability of public car parking and others influence off-street parking needs.

The current DCP embeds some of these factors into different rates within the various precincts, i.e. reduced parking requirements in Railway Precincts and MPTC's. The format of these policies should be designed to be simple to calculate and to provide surety for developers.

6.1.1 WDCP parking reduction factors

The current WDCP allows for Council to vary the requirements for parking to a significant degree, based on a range of site location and development-specific factors, including the following:

1. The size and nature of the development, amount of additional floor area relative to the existing floor area and the parking demand generated;
2. Whether a Green Travel Plan (GTP) has been provided;
3. Encouraging less use of motor vehicles, especially those developments close to railway stations and major public transport routes;
4. Availability and accessibility of other public parking;
5. Accessibility of public transport and the probable transport mode of users;
6. Proximity to bicycle routes;
7. Existing and likely future traffic volumes on the surrounding road network and the nature of this network;
8. The environmental implications of providing parking with particular regard to vegetation and landscape impacts;
9. Results of a parking survey submitted to Council to justify demand for the proposed use; and
10. The impact of not providing the parking.

This list includes two types of concessions, which reasonably should be dealt with in two different ways:

- > **Demand reduction factors** (e.g. GTP, proximity to public and active transport networks). These factors reduce the need for parking, developers can provide less parking on-site without shifting the burden of parking supply onto Council. This type of variation should not attract additional contributions.
- > **Supply restraint factors** (e.g. heritage, traffic volumes, landscaping, and availability of public parking). These factors acknowledge that demand will be higher than the parking provided. This type of variation shifts the cost burden of supply onto the Council, and should attract an additional contribution. It should be noted that some supply restraint factors are not directly related to parking such as landscaping and heritage requirements from Council.

6.1.2 Reduction factors

Further discussion on the WDCP reduction factors are provided in the following sections.

Size and nature of the development, amount of additional floor area relative to the existing floor area and the parking demand generated

Cash-in-lieu of parking Cash-in-lieu of parking is a policy mechanism by which developers can formally cede responsibility for a portion of their parking demand to Council. This is accompanied by a fee sufficient to offset the impact of this parking, either through the provision of public car parking, or improvements to alternative transport.

Cash-in-lieu payments can be an attractive alternative for developers when constructing parking on-site is geometrically or financially infeasible. It can also benefit the wider community through the supply of publicly and equitably managed parking for the use of high-value or highest-need parkers.

The Willoughby Developer Contributions Plan 2019 does not have any capacity to allow developers to voluntarily increase their contribution to offset higher impacts. The current provisions allow Council to either require a given private parking supply, or to waive that requirement.

This can create transparency and equity issues. The success of cash-in-lieu parking arrangements can be substantially compromised if Council approves parking concessions in order to relieve developers from any obligation to provide car parking. Concessions should only be approved where the applicant can clearly demonstrate that the parking requirement is excessive.

If Council approves a concession because it is technically justifiable, the applicant should still have the ability to use the cash-in-lieu program to further reduce the amount of parking required on-site.

The cash-in-lieu amount should be set at a discount to the actual cost of providing the parking to:

- > Provide a financial incentive for developers to contribute to the creation of strategically located public parking facilities;
- > Recognise that Council will be able to recover some of the costs through user fees;
- > Recognise that parking spaces are not allocated to specific users on a reserved basis, although the general supply will be available to meet demand;
- > Recognise that the contributor will not have an ownership interest in the public parking facilities;
- > Recognise that the parking may not be as conveniently located to a specific development compared to on site or other nearby parking facilities;
- > Recognise that all or a portion of the parking may not be constructed at the same time as the development, and
- > Recognise that the developer / owner will not have any control over parking fees and use regulations.

The decision to accept cash-in-lieu should remain at the discretion of Council and not become an automatic right. This will allow Council to ensure that if it accepts cash-in-lieu payments, there is a reasonable expectation that; municipal parking is already available to serve the development; Council will be able to provide a supply increase in the short term; or that alternative transport options can be used instead.

It is also necessary to ensure that planning for the provision of future parking structures is transparent and that contributors to the cash-in-lieu fund are given clear indication as to what their payments are funding. This will ensure that developers continue to see benefits in contributing towards public parking, over the intrinsic advantages visible on-site. This usually involves the establishment of a site-specific car parking infrastructure fund, into which cash-in-lieu payments are directed, and out of which the planning, upgrading and management of car parking facilities is funded.

This is a typical way local governments administer cash-in-lieu, but it can be overly restrictive. A broader delivery model allows cash-in-lieu funds to be used to support sustainable public infrastructure, including upgrades to pedestrian, cycling and public transport facilities, can support a more flexible use of cash-in-lieu across Willoughby.

Regardless of the mechanism for funding - either through developer contributions, parking fees and fines or other public monies - it is important that the revenues and costs from parking-related activities be accounted for under one umbrella. This allows for reasonable modifications to the management structure, pricing regimes, infrastructure and maintenance, enforcement and compliance activities to be resolved in a transparent system with full accounting of the costs and benefits provided. This will then form the foundation for assessment of the requirements for cash-in-lieu payments by developers as well as determining and varying parking restrictions and pricing schemes based upon location, time of day and seasonal factors. Accounting for all financial aspects of parking will enable a much greater appreciation for the real costs of providing this service to the community.

Industrial land uses

Industrial development within the Artarmon and Smith Street sub-precincts tends to provide on-site parking for staff and visitors. Industrial precincts are often difficult to service through public transport, and relatively inflexible with respect to mode shift. As such, there is no significant benefit to constraining parking through policy within these sub-precincts.

Application of the standard DCP *Schedule of Car Parking Requirements* for proposed Industrial and Office components is considered to be sufficient to accommodate the majority of parking on-site in these areas for new developments. However, ongoing intensification of these commercial zones may result in additional pressure on street parking as additional office employment is added to traditional manufacturing workplaces. It is common that these changes result in a significant increase in parking demand, on a site that is unable to support supply.

When larger numbers of employee vehicles are accessing the site and requiring parking for the whole day this can result in:

- > Storage of large items in parking bays, displacing cars to the street;
- > Obstruction of heavy vehicles accessing buildings by vehicles parking on-street and verges, as well as throughout the site; and
- > Issues transporting large or heavy vehicles on the street (due to a lack of loading bays or problems negotiating other vehicles on the site).

To address this issue, Council can use contribution provisions to construct on-street public parking. Best practice embeds this funding mechanism within the DCP, and includes a clear set of criteria for the construction of on-street parking spaces, as well as a requirement for change of use applications to identify any extent of parking demand and overspill.

This is not intended to discourage change of use. However, the intensity of demand can be detrimental to the function and safety of the local network as the Precinct transitions to higher-value, and more employee-dense forms of development.

Whether a Green Travel Plan (GTP) has been provided, and the impact of not providing the parking

The impacts of undersupplying parking must be justified to Council prior to development approval. It is important that parking provided in developments is well managed and that priority is given to people who need it most, such as the elderly and people with disability. The following is recommended for justification for not providing off-street parking:

- > A Parking Management Plan aims to manage the **supply** of parking and the associated policy and management strategies to mitigate impacts of parking on the road network.
- > A GTP is necessary to provide an evidence base to Council that the **demand** for parking is managed and that transport infrastructure is in place to support the changing needs of employees / visitors to the development. The purpose of a GTP is to encourage employees within an organisation to make greater use of public and active transport and car share for accessing the workplace.

As a case example, the Western Australia Department of Transport *Parking Guidelines for Large Shopping Centres* provides guidelines around reduction of parking spaces for this specific land use. The benefits of management of parking supply and demand include:

- > Lower parking provision costs through more efficient use of parking bays;
- > Reputation gains for greater accessibility and lower congestion in the surrounding road network;
- > Better relationship with surrounding residents and businesses; and
- > Better public transport services resulting from increased patronage and reduced on road congestion.

Encouraging less use of motor vehicles, especially those developments close to railway stations and major public transport routes

The quality and frequency of public transport varies within the Willoughby LGA and its usage varies between user groups. Public transport provision has a large impact on employees and residents, as these groups are familiar with available services and benefit most from reductions in cost and delay. Conversely, entertainment, retail and service customers are much more likely to retain private vehicle modes even when there is a high-quality alternative.

Access for pedestrians, cyclists, public transport users and people with disabilities should be prioritised, and balanced with the needs of the road network, in order to create sustainable transport and economic outcomes. The support of these modes will help reduce the demand for parking in desirable and well-connected locations.

Work trip mode share

A summary of the mode share results from **Section 4.4** by precinct type for residents and workers is shown in **Table 6-1** and **Table 6-2** respectively.

Table 6-1 Summary of JTW mode share – residents

Precinct type	Train	Bus	Car (driver)	Car (passenger)	Motorbike/scooter	Bicycle	Walked only
Railway Precinct (CBD)	52%	5%	23%	2%	0%	0%	18%
Railway Precinct (other)	56%	2%	30%	3%	0%	1%	7%
Major Public Transport Corridor	20%	21%	45%	3%	1%	1%	9%
Local Centre	9%	29%	48%	4%	1%	1%	7%
Residential area	17%	16%	54%	5%	1%	1%	6%

Data source: ABS Census 2016

Table 6-2 Summary of JTW mode share – workers

Precinct type	Train	Bus	Car (driver)	Car (passenger)	Motorbike/scooter	Bicycle	Walked only
Railway Precinct (CBD)	39%	7%	42%	3%	1%	1%	7%
Railway Precinct (other)	23%	3%	61%	4%	1%	0%	8%
Major Public Transport Corridor	11%	5%	75%	4%	1%	0%	5%
Industrial / business zone	19%	5%	67%	3%	1%	1%	3%
Residential area	15%	5%	68%	4%	0%	1%	7%

Data source: ABS Census 2016

Results show that residents living within Railway Precincts have a higher tendency to travel by rail, comprising around 50% of all trips. All precincts rely somewhat on private cars for travel, particularly within the Local Centres and residential areas. Both rail and bus trips are significant within the MPTCs, reflecting their location of key bus routes but their moderate distance to the train stations. Walking trips comprise a low mode share for most precincts but are significant within the CBD environments. Bicycle mode proportion is small for all precincts.

For workers' travel, the results show that workers are much more reliant on private cars for travel. Cars are the dominant travel mode for all precinct types, although Railway Precincts contain significant mode shares for rail (particularly within the CBD environments), as well as the industrial / business zone to a lesser extent. The proportion of bus and active transport trips is low for all areas.

Given the high quality public transport coverage for Railway Precincts (CBD and other) in Willoughby, significant parking reductions are recommended for these areas. The recommended reduction factors should be proportional to the difference in mode share for vehicle drivers for other areas in the LGA.

Vehicle ownership

Vehicle ownership data analysis from **Section 4.3** shows that many residents either own more vehicles than they can store, or own less vehicles than they have parking spaces to accommodate. This implies that there is a level of inequity across the ownership spectrum. Some residents are paying for parking infrastructure they don't use, while other residents (who store their surplus vehicles on-street) are receiving benefits they don't pay for.

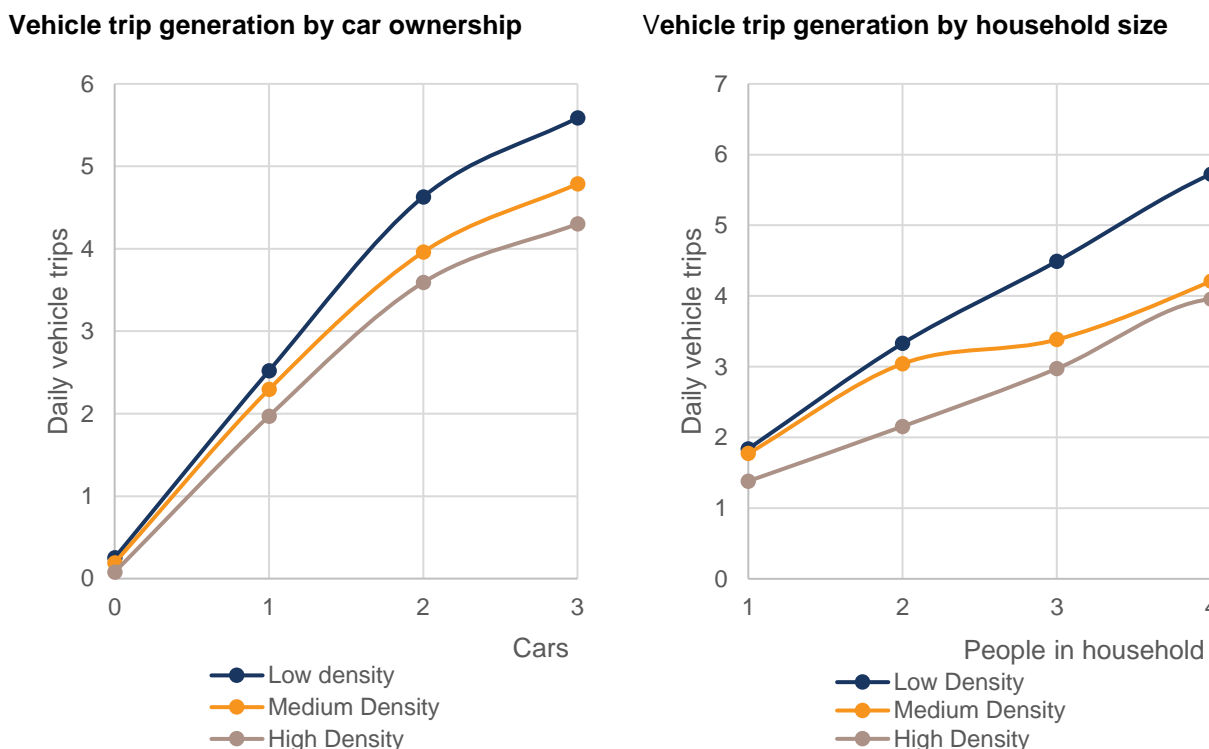
Recent investigations into the cost of on-site parking provide some indication of the scale of this benefit to city residents, which is in the order of \$2,000 per annum. This figure is remarkably consistent across the areas where studies have been completed, which includes cities across the Netherlands, San Francisco in California, and Darebin in Victoria. It is estimated that around 5,000 residential vehicles are parked on-street within the Willoughby LGA, which implies that Council is currently providing a de-facto subsidy to car owners equivalent to approximately \$10m per annum.

In the context of Willoughby's CBDs, Railway Precincts and Local Centres, residential on-street parking consumes space that would otherwise be available for more productive uses (such as employee and visitor parking), placing additional pressure on these areas and impacting their economic and environmental viability.

There is a strong relationship between residential density, car parking and trip generation, which largely determines the potential traffic impacts of development.

The dense dataset provided by the *Victorian Integrated Survey of Travel and Activity (VISTA)* shows that low density residential development and high private vehicle ownership create an environment with significantly greater household vehicle trip generation. This data is shown in **Figure 6-1**.

Figure 6-1 Average Household Vehicle Trip Generation Rates (VISTA)



As density intensifies, and particularly when residential vehicle ownership declines, vehicle trip generation drops. This occurs due to a number of reasons including smaller household sizes, greater accessibility to alternative transport and proximal activity and a reduced reliance on private motor vehicles.

The scale of impact from residential areas is significant, but difficult to manage. Large suburban dwellings often have ample space to support parked cars, in addition to abundant parking along the street-front.

As development intensifies, private vehicle ownership and vehicle trip generation tends to decline, and alternative transport mode shares increase. While multiple-unit apartment and townhouse development is expected to primarily occur along corridors and within centres, the same effects in residential areas promote sustainable transport outcomes.

Availability and accessibility of other public parking

The provision of free parking is the responsibility of Council, including associated construction, maintenance and operations costs for the benefit of the community. The provision of this free parking means that the cost burden of parking supply is felt by residents and their visitors, rather than the generators of this parking. This demand is likely to increase should Council experience any significant growth in employment or retail, as high levels of demand generated cannot be contained within the existing parking supply requirements.

The Willoughby Developer Contributions Plan does not provide developers with the opportunity to voluntarily increase their contribution to offset parking impacts through a cash in-lieu of parking scheme. The current provisions allow Council to either require a given private parking supply, or to waive that requirement.

The decision to accept cash-in-lieu should remain at the discretion of Council and not become an automatic right. This will allow Council to ensure that if it accepts cash-in-lieu payments, there is a reasonable expectation that municipal parking is already available to serve the development or that Council will be able to provide a supply increase in the short term.

The use of demand-responsive pricing in local centres and CBD areas is recommended, to ensure that public parking is at a level where occupancy is maintained at approximately 85-90%.

Accessibility of public transport and the probable transport mode of users

The probable transport mode of users can be defined by either employee driven or visitor driven land uses as follows:

- > Parking demand at **Employee-driven** land uses is influenced by proximity to public transport and provision of quality end-of-trip facilities,
- > Parking demand at **Visitor-driven** land uses is influenced by location within a dense urban community and opportunities for on-site mixed-use synergy.

It is recommended that parking requirements are differentiated for employee and visitor demands. Potential adjustments for the probable transport mode of users are shown in **Table 6-3**.

Table 6-3 Adjustment factors for probable transport mode of users

Category	Criteria for reduction factors	
	Employee-generated parking demand	Visitor-generated parking demand
Public Transport	The development is located within 800 metres of rail station	No reduction for this component of land use
	The development is located within 400 metres of a high-frequency bus route (i.e. average headway less than 15 minutes)	No reduction for this component of land use
	The development is located within 400 metres of a collector bus route (i.e. any bus route regardless of frequency)	No reduction for this component of land use
Bicycle Parking	Bicycle parking provided in excess of 2x statutory requirements AND high-quality end-of-trip infrastructure provided including showers, lockers and secure parking.	No reduction for this component of land use
Location	No reduction for this component of land use	The development is located within a local centre
Composition	The development proposes a mix of residential and commercial uses, provided at least 50% of the total plot ratio is residential.	
	The development proposes a mix of land uses which would be able to share on-site parking. The extent of parking reduction to be determined through a Parking Demand Assessment and in agreement with Council.	

Examples of employee-generated car parking land uses are offices and hospitals, and visitor-generated car parking are medical centres, restaurants, shops and places of assembly.

Proximity to bicycle routes

The presence of cycling routes alone is not enough to secure modal shift from private vehicles. In order for cycling to be a viable mode of transport to an increased number of people, routes must be safe, separated from vehicles and pedestrians and accessible. High quality end-of-trip facilities and wayfinding must also be provided.

End-of-trip facilities should be provided at a minimum level sufficient to support this mode. Best practice bicycle parking supplies enough spaces to cater for the target cycling mode share across all development sites.

Given the current journey-to-work cycling mode share of less than 1%, and with the assumption that bicycle use is consistent with Council objectives, a minimum bicycle parking rate is recommended consistent with a

2.5% employee mode share, plus additional spaces for visitors / customers. This creates an abundance of bicycle parking (compared to existing demand) that can support ongoing and future shifts towards more sustainable mode share targets.

Existing and likely future traffic volumes on the surrounding road network and the nature of this network

A perceived lack of parking availability can change the travel behaviour of vehicle drivers. Parking supply management therefore relies upon effective alternatives to driving, through high-quality active and public transport, such that the limitations on parking supply do not reduce the economic viability of the area, or create adverse impacts in the surrounding environment. Provision of wayfinding information can also help raise awareness of little-used parking areas a little further from desirable locations which could be used if people are willing to walk.

It is recommended that within Willoughby's CBD and railway precinct environments, maximum parking requirements or area caps are introduced. This would provide a Council with a greater control on the impacts of development on the road network reflected in CBD areas.

The environmental implications of providing parking with particular regard to vegetation and landscape impacts

Council and the community values its streetscapes, heritage buildings and natural environment. Under Willoughby's current parking requirements, developers are able to receive a concession for parking if it impacts upon heritage buildings, or results in an undesirable landscape or removal of trees.

It is recommended that this mechanism be retained, with a minor modification to its application: by giving Council the ability to waive *cash in lieu of parking* as appropriate to preserve aspects of the community and landscape that they value.

This change recognises the financial value of the Council concession, and makes that explicit in development negotiations with respect to impact and cost.

Results of a parking survey submitted to Council to justify demand for the proposed use

The WDCP parking requirements provide a set benchmark where developers choose not to provide their own evidence base. However, the individual characteristics of a given development may result in a reduced parking impact.

It is appropriate that evidence provided via a parking survey of a similar site be considered in evaluating the sufficiency of the proposed parking supply.

6.1.3 Consideration of mixed use development and shared parking supply

Shared parking is parking that is used by two or more uses instead of restricting parking to the exclusive use of each land use. If a development consists of multiple land uses where peak demands occur at different times of day, it is reasonable to assume that on-site parking can be shared between land uses. This type of parking arrangement is appropriate only for situations where peak demand differs between the constituent land uses. Representative land pairs which can leverage this effect include:

- > Residential Visitor Parking and Commercial / Office; and
- > Office/ Entertainment or Office / Restaurant.

The extent to which parking can be shared is related directly to the types of land uses proposed and the extent to which their peak hours of operation differ.

The more exclusive the parking is the less effective it becomes for the system as a whole. Shared parking takes advantage of the fact that most parking bays are only used part-time by a particular group, and many parking facilities have a significant proportion of unused bays, with utilisation patterns that follow predictable daily, weekly and annual cycles.

Efficient sharing of bays can allow parking requirements to be reduced significantly. Partial sharing occurs when arrangements are made by one facility to use another's parking facilities at certain times. For example, an office block would use parking spaces by day while restaurant users, or residents in the same building, are more likely to require bays in the evening.

A general benchmark for reduction is difficult to identify at a strategic level. It is recommended that all applications for parking reductions based on internal shared parking be justified through a parking assessment. One exception is with respect to residential / commercial development, in which it is considered reasonable that the requirement for residential visitor parking be waived, so long as there is sufficient on-site, shared commercial parking to satisfy the visitor parking requirement.

One simple metric for evaluating the opportunity for shared parking uses a Peak Parking Demand table submitted by the Applicant, as part of a Parking Management Plan (exemplified shown in **Table 6-4**), which provides enough evidence to Council to show that demand will not unreasonably coincide.

Table 6-4 Example shared parking demand table

Development type	Development users	Shared parking demand assessment				Unshared assessment (peak demand per land use)
		Morning	Midday	Afternoon	Evening	
E.g Office/Restaurant In Town centre	Office Staff	150	150	150	0	160
	Office Visitors	10	10	10	0	
	Restaurant Staff	5	10	10	20	120
	Restaurant Customers	25	50	20	100	
	Total	190	220	190	120	280

Note: This assessment supports a peak parking demand of 220 spaces, instead of the 280 spaces that would be required if evaluated separately

7 Parking rates comparison

Local governments set parking rates appropriate to the function of their primary activity centres, the mix of land uses and alternative transport provision, and the quantity of public parking. As such, direct comparison to other local council policies was undertaken with caution, as the parking rates themselves only describe a small component of the overall land-use and transport situation. The following sections provide an analysis of the comparison of Willoughby's off-street parking rates for similar land uses.

7.1 Car parking rates

7.1.1 Residential areas

The residential parking rates for Willoughby are compared to other similar LGAs in NSW and other states in **Figure 7-1** and **Figure 7-2**.

Figure 7-1 Residential areas – multi-dwelling off-street parking rates comparison (spaces per dwelling) (NSW LGAs)

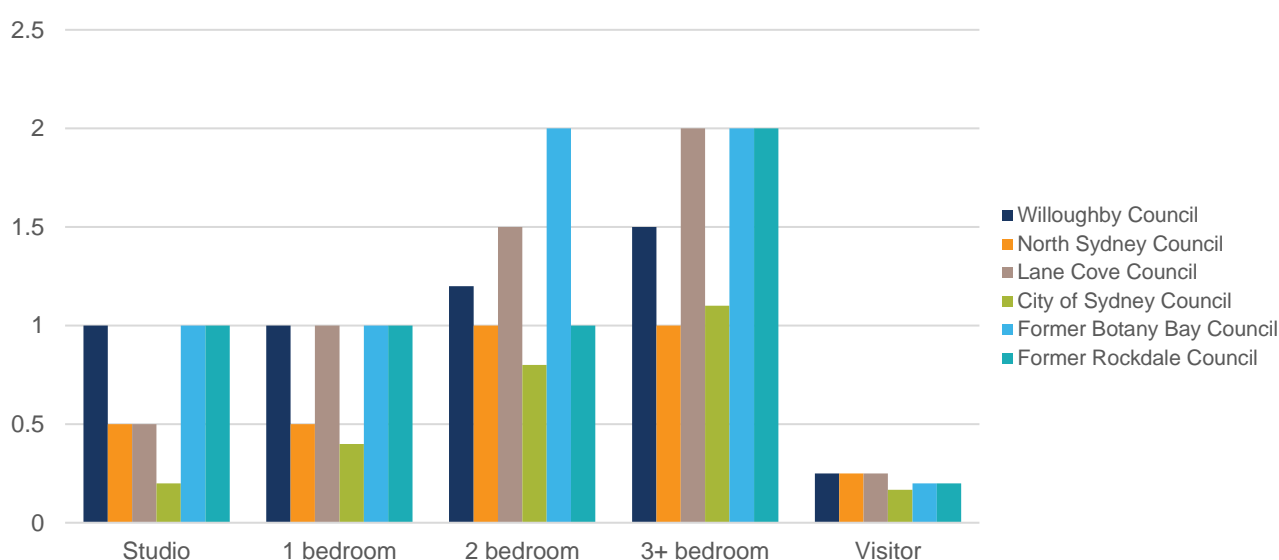
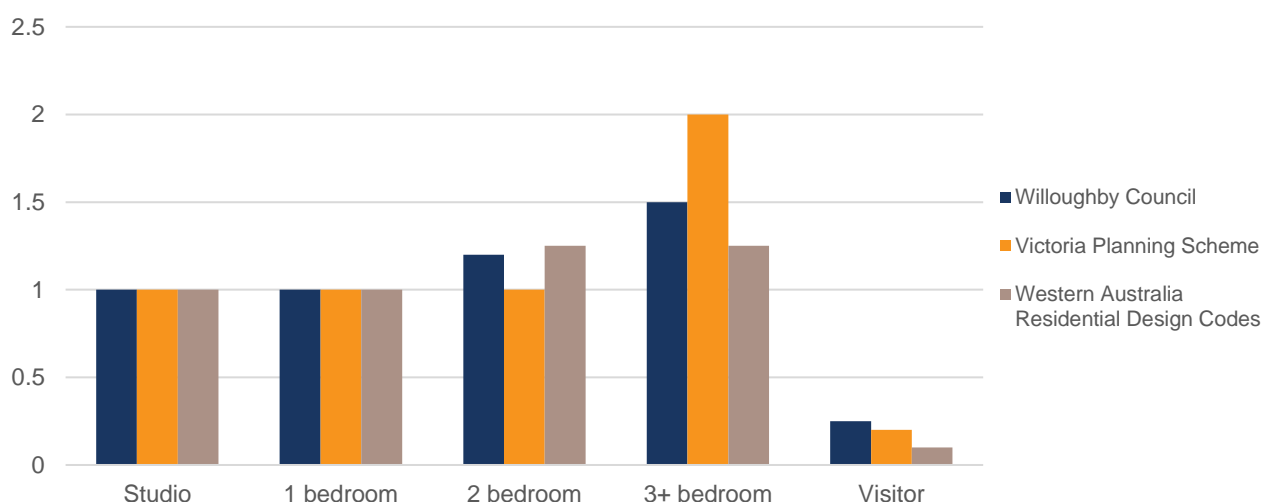


Figure 7-2 Residential areas – multi-dwelling residential off-street parking rates comparison (spaces per dwelling) (other states)



For multi-dwelling residential areas, Willoughby provides relatively high parking rates to other NSW LGAs, particularly for studio and one bedroom apartments. For larger dwelling sizes and visitors, Willoughby's rates are comparable to the other LGAs reviewed. Comparing to the Victoria Planning Scheme and WA Residential Design Codes, Willoughby provides comparable parking rates for all dwelling sizes, although provides the highest rate for visitors.

The requirements for on-site visitor parking are likely to over-represent the total demand, while imposing a considerable cost on housing purchase and rental prices.

7.1.2 Local centres

Willoughby's parking rates for core land use types located in local centres are shown in **Figure 7-3** to **Figure 7-5**.

Figure 7-3 Local centres – commercial (office) (spaces per 100m²)

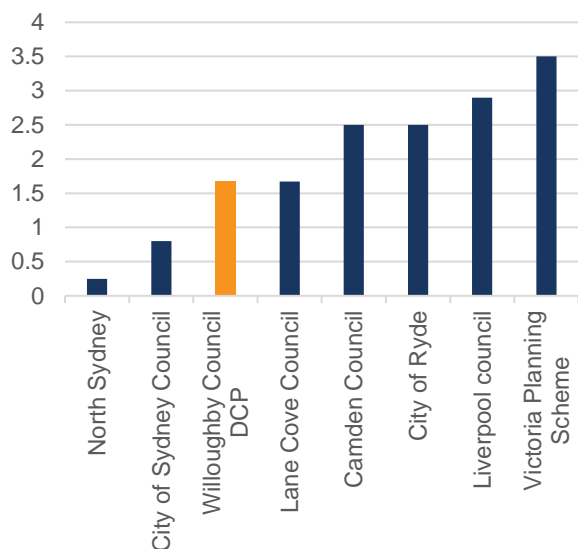


Figure 7-4 Local centres – retail/ shop (spaces per 100m²)

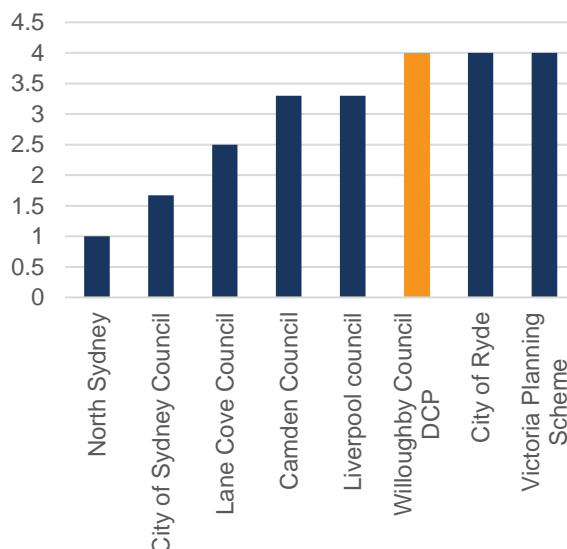
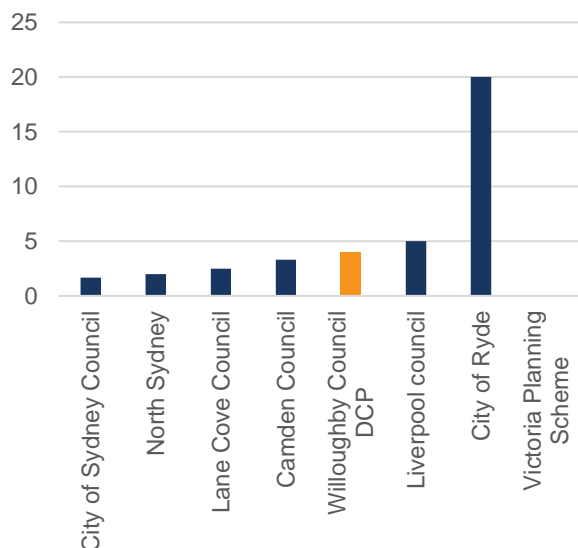


Figure 7-5 Local centres – restaurant (spaces per 100m²)



The results show that Willoughby's rates for commercial land uses are higher in comparison to the inner-city areas of Sydney such as City of Sydney and North Sydney Council areas, and lower compared to other jurisdictions.

For retail / shop land uses Willoughby's rates are on the higher end, equivalent to Campbelltown Council, the City of Ryde and the Victoria Planning Provisions. These rates are relatively consistent between councils, although North Sydney Council and the City of Sydney provide significantly lower rates than the other LGAs.

For restaurant land uses, Willoughby's rates lay at the lower end, with rates comparable to Camden Council and Liverpool Council. Restaurant parking rates vary widely, with councils like the City of Ryde and Campbelltown providing much higher rates than other LGAs.

Off-street parking rates for medical land uses vary by units of measure for each LGA, shown in **Table 7-1**.

Table 7-1 Local centre – medical land use off-street parking rates comparison

LGA	Medical land use off street parking rate	LGA	Medical land use off street parking rate
Willoughby Council	1 space per health care professional	Camden Council	0.5 spaces per health care professional
City of Sydney Council	0.8 space per 100m ² gross floor area	Liverpool Council	4 spaces per 100m ² gross floor area
North Sydney Council	0.25 spaces per 100m ² gross floor area	City of Ryde	1 space per health care professional
Blacktown Council	1 space per health care professional	Lane Cove Council	1 space per health care professional
Campbelltown Council	2.9 spaces per 100m ² gross floor area	Victoria Planning Provisions	5 spaces for the first professional plus 3 each for the remaining

The different units of measure make it difficult to compare between LGAs, but the data shows that Willoughby provides comparable rates to LGAs that use the same measure (spaces per health care professional).

7.1.3 Railway Precinct

Willoughby's parking rates for core land use types located in Railway Precincts are shown in **Figure 7-6** to **Figure 7-8**.

Figure 7-6 Railway Precinct – multi-dwelling off-street parking rates comparison

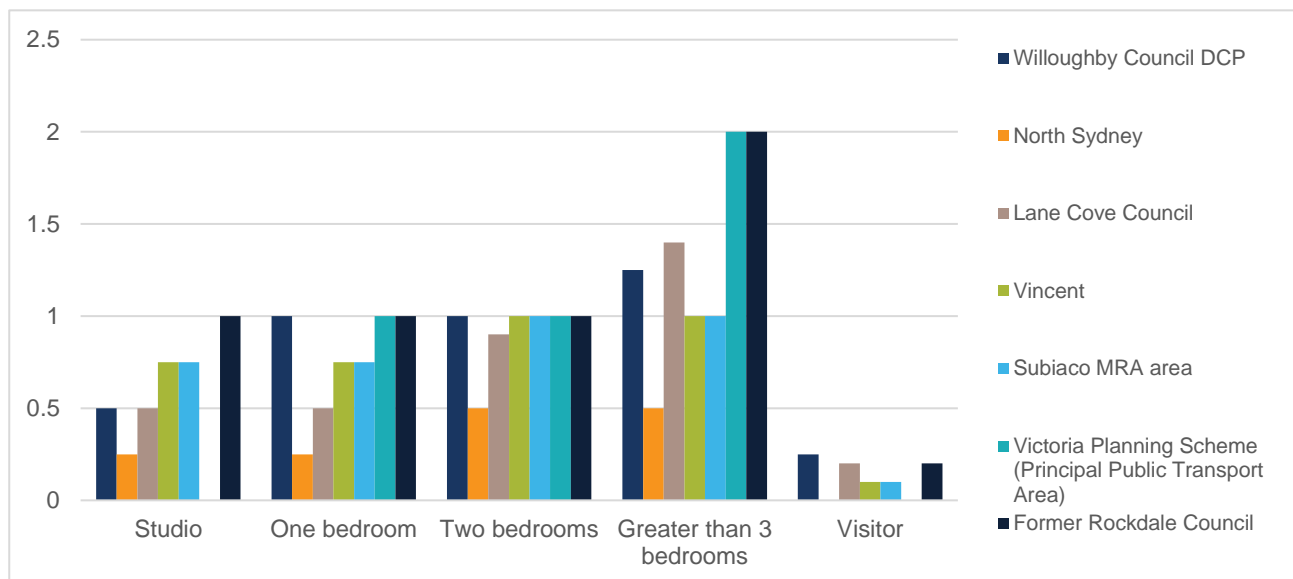


Figure 7-7 Railway Precinct – commercial (office) (spaces per 100m²)

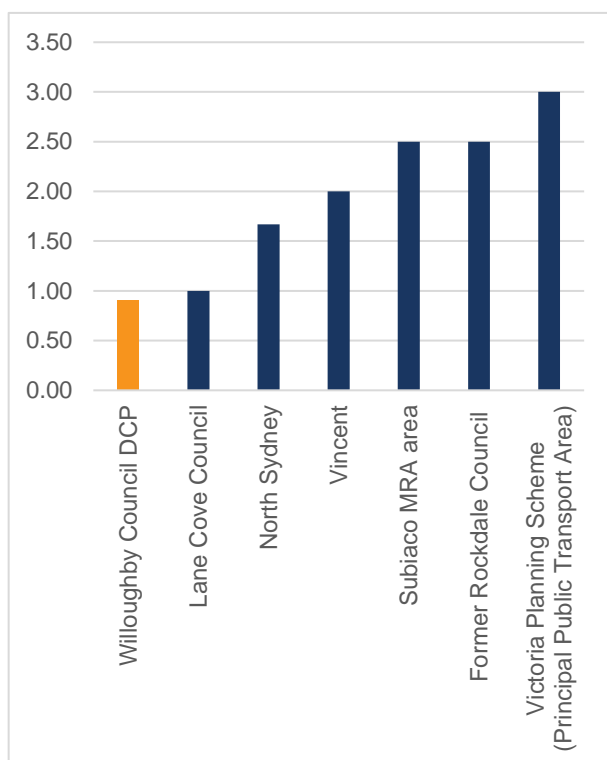
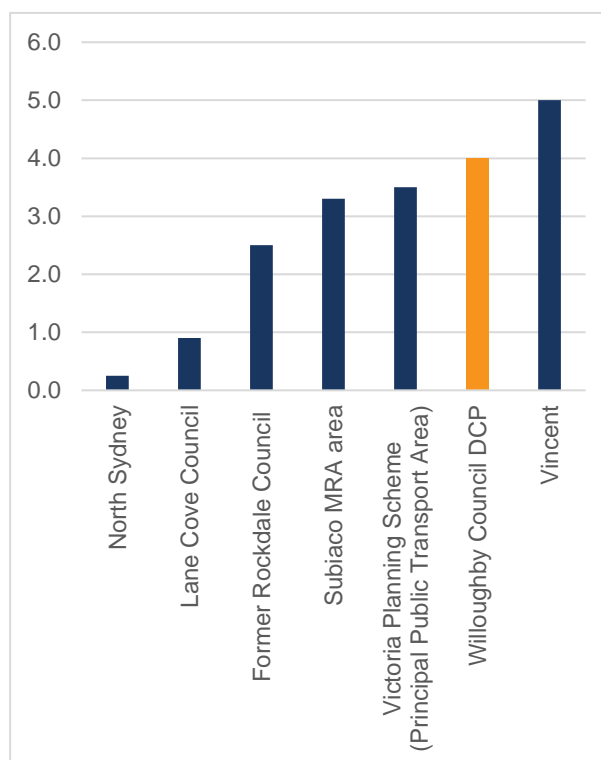


Figure 7-8 Railway Precinct – retail (spaces per 100m²)



The results show that Willoughby provides the lowest rates for commercial land use from all councils analysed, while providing the second highest rates for retail land use (behind the City of Vincent). Rates for both land uses vary significantly between the LGAs. For multi-dwelling residential areas within Railway Precincts, Willoughby provides rates on the higher end for most dwelling sizes, including the equal highest rates for one and two bedroom dwellings.

Off-street parking rates for medical land uses vary by units of measure for each LGA, shown in **Table 7-2**.

Table 7-2 Railway Precinct – medical land use parking rates

Local government area	Parking rate	Local government area	Parking rate
Willoughby Council DCP	1 space per healthcare professional	Vincent	3 spaces per consulting room or consultant, whichever is lesser
North Sydney	0.25 spaces per 100m ² gross floor area	Victoria Planning Provisions (Principal Public Transport Area)	3.5 spaces per 100m ² gross floor area
Lane Cove Council	1 space per 1.5 healthcare professional	Former Rockdale Council	2.5 spaces per 100m ² gross floor area

The results show that Willoughby requires a higher rate than Lane Cove Council, which uses the same measure (spaces per health care professional). This would result in the provision of 50% more spaces in Willoughby than Lane Cove.

7.1.4 Industrial / business zone

Willoughby's parking rates for core land use types located in industrial / business zones are shown in **Table 7-3**.

Table 7-3 Industrial/ business zone – off street parking rates

LGA	Industrial	Showroom
Willoughby Council DCP	1 space per 100m ² gross floor area	1 space per 60m ² gross floor area
Lane Cove DCP	+1 space per 77m ² GFA	+ 1 space per 300m ² GFA
Ryde DCP 2014	1.3 - 1.5 spaces per 100m ²	0.75 spaces per 100m ² GFA for vehicles sales premises
North Sydney DCP	1 space per 100m ² GFA	1 space per 100m ² GFA for vehicle sales premises
Campbelltown Council	1 space per 100m ² gross floor area	-
Fairfield Council	1 space per 70m ² gross floor area	1 space per 50m ² gross floor area
Liverpool Council	1 space per 75m ² factory or warehouse lettable floor area, or 1 space per 2 employees, whichever is the greater	Vehicle showroom - 1 space per 130m ² gross floor area
Blacktown Council	1 space per 75m ² plus 1 space per 40m ² for office component	1.5 spaces per 200m ² gross floor area (vehicle sales or hire premises)

The results show that Willoughby provides rates on the low end for industrial land use and towards the middle for showrooms. The rates provided are also simpler and easier to apply than the other LGAs, which include calculations based on floor area, employees and/ or office components.

7.1.5 CBD (St Leonards and Chatswood)

Willoughby's parking rates for core land use types located in CBD environments (i.e. St Leonards and Chatswood) are shown in **Figure 7-9** to **Figure 7-11**. A comparison of the RTA Guide to Traffic Development is also provided.

Figure 7-9 CBD – multi-dwelling off-street parking rates comparison

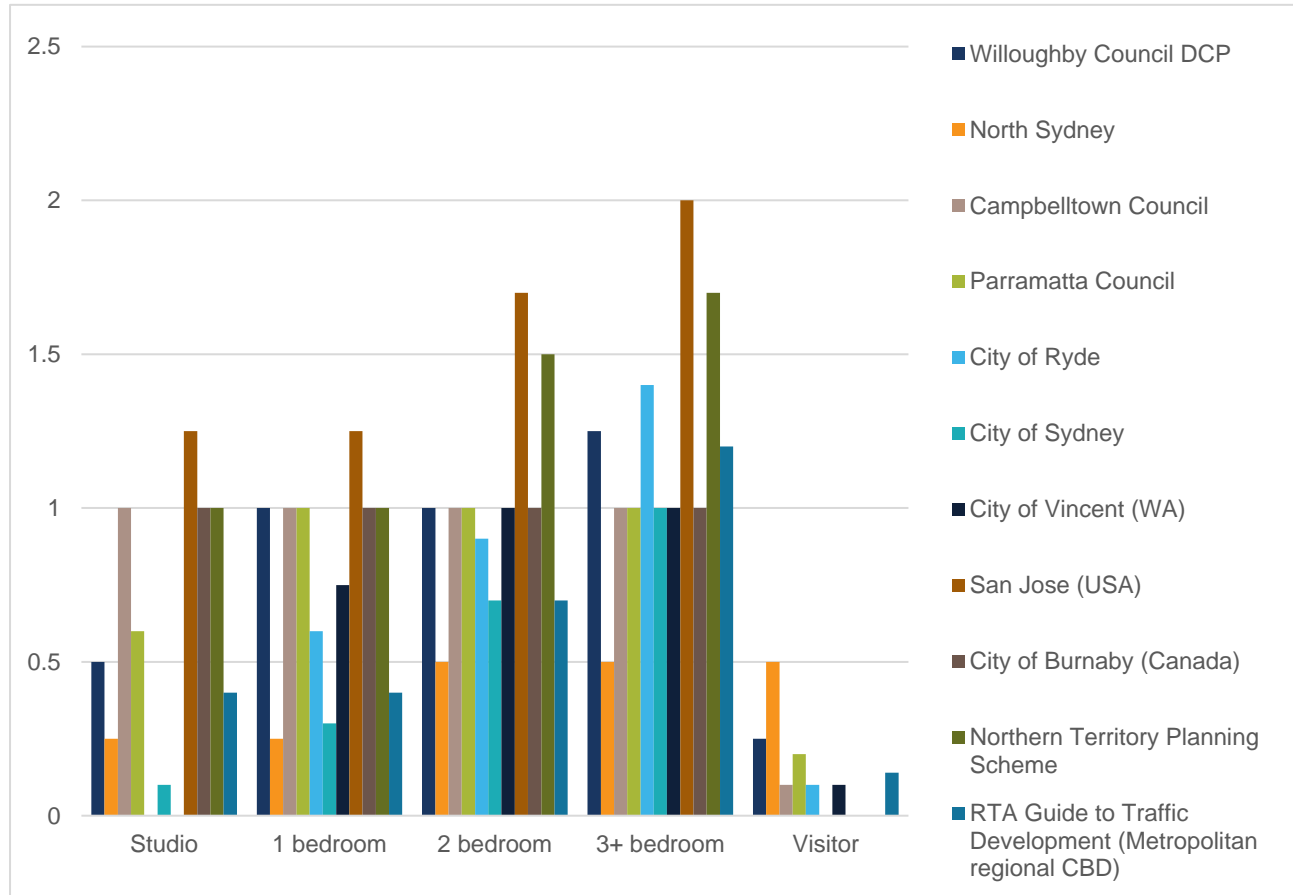
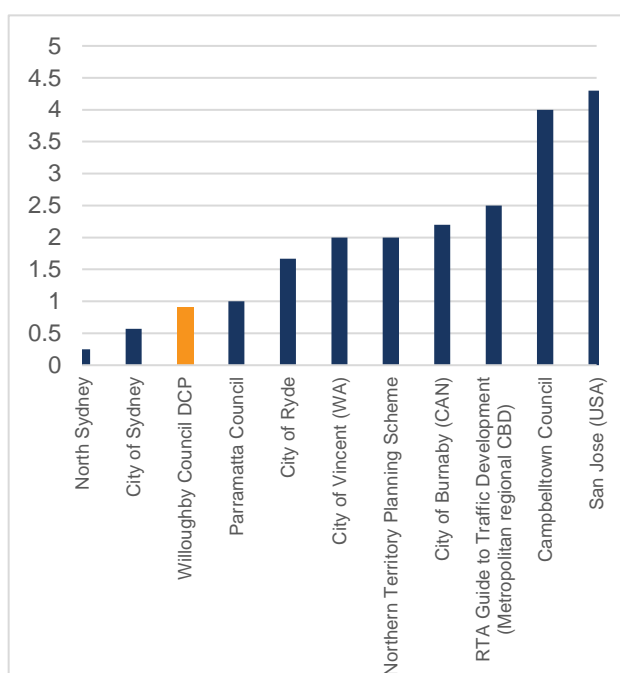
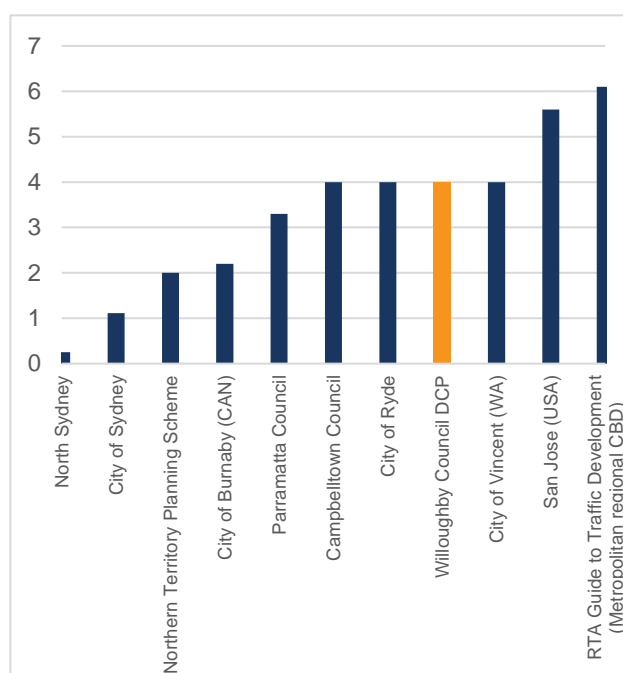


Figure 7-10 CBD – commercial (office) (spaces per 100m²)Figure 7-11 CBD – retail (spaces per 100m²)

The results show that Willoughby provides the second lowest rates for commercial land use within CBD environments (behind North Sydney), and significantly lower than most other LGAs. Willoughby provides relatively high rates for retail land use within CBD environments, equally the highest of the LGAs reviewed in Australia, and only lower than San Jose (USA). For residential dwellings in CBD environments, Willoughby provides rates on the higher end for one and two bedroom apartments, and comparable rates for other dwelling sizes.

7.2 Bicycle parking rates

A comparison of Willoughby's residential bicycle parking rates to similar jurisdictions is shown in **Table 7-4**. Willoughby's rates are the lowest in comparison to each assessed LGA, including other inner-Sydney areas.

Table 7-4 Comparison of residential bicycle parking rates

LGA	Residential flat building (resident)	Units	Residential flat building (visitor)	Units
Willoughby Council	0.1	Spaces per 100m ²	0.08	Spaces per 100m ²
Lane Cove Council	0.25	Spaces per 100m ²	0.1	Spaces per 100m ²
Western Australia Residential Design Codes	0.5	Spaces per 100m ²	0.1	Spaces per 100m ²
North Sydney Council	1	Spaces per 100m ²	0.1	Spaces per 100m ²
City of Sydney Council (all areas)	1	Spaces per 100m ²	0.1	Spaces per 100m ²
Former Botany Bay Council	Provide where floor space exceeds 600m ²		-	
Former Rockdale Council	1	Per 10 dwellings	-	
Victoria Planning Provisions	2	Per 10 dwellings	1	Per 10 dwellings

Non-residential bicycle parking rates for Willoughby are compared to similar jurisdictions in **Table 7-5**. Willoughby's rates are lower than the other assessed inner Sydney LGA's of Lane Cove Council, North Sydney Council and City of Sydney.

Table 7-5 Comparison of non-residential parking rates

	Commercial/ office (employee)	Commercial/ office (visitor)	Shop (employee)	Shop (customer)	Restaurant (employees)	Restaurant (visitors)
(spaces per 100m ² unless stated otherwise)						
Willoughby City Council	0.17	0.04	0.22	0.67	1 bicycle locker per 450m ²	1 Bike rack per 150m ²
Lane Cove Council	0.33	(1+) 0.125	2	2 for the first 200m ² and 0.5 for each additional 200m ²	2	1 rack per 200m ² over 200m ² GFA
North Sydney (maximum)	0.67	0.25	4	2 for the first 100m ² and 1 for each additional 100m ²	0.4	2 spaces plus one spaces per 100m ² over 100m ² GFA
City of Sydney (all areas) (maximum)	0.67	0.25	4	2 for the first 100m ² and 1 for each additional 100m ²	N/A	N/A
Victoria Planning Provisions	1 to each 300m ² of net floor area if the net floor area exceeds 1,000m ²		1 to each 600 m ² of leasable floor area if the leasable floor area exceeds 1,000 m ²		1 to each 100m ² of floor area available to the public	
City of Ryde	In every new building, where the floor space exceeds 600m ² GFA (except for dwelling houses and multi-unit housing) provide bicycle parking equivalent to 10% of the required car spaces or part thereof.					
Blacktown Council	Applicants are encouraged to incorporate, in the design of their buildings, safe storage/ parking areas for bicycles, with adequate shower and change facilities provided for staff (where appropriate).					
Former Rockdale Council	0.5 spaces per 100m ² GFA, with 15% to be accessible by visitors					
Former Botany Bay Council	In every new building, where the floor space exceeds 600m ² GFA (except for houses and multi-unit housing) bicycle parking equivalent to 10% of the required car spaces					

The bicycle parking rates for Willoughby are low for each land use in comparison to all other assessed jurisdictions. This is not conducive to promoting mode shift from private vehicles or aligning with Council's strategic direction. A higher rate of bicycle parking is needed to align with examples of best practice in other areas of NSW and Australia.

7.3 Motorcycle parking rates

Similarly to cycling parking rates, the ratio of Willoughby's motorcycling spaces compared to number of car parking spaces is the lowest of the assessed LGAs, shown in **Figure 7-6**.

Table 7-6 Motorcycle parking rates

	Willoughby City Council	Lane Cove Council	North Sydney Council (maximum)	City of Sydney Council (maximum)	Former Rockdale Council
Motorcycle/ Scooter	1 per 25 spaces (0.04)	1 per 15 spaces (0.06)	1 per 10 spaces (0.1)	1 per 12 spaces (0.08)	Retail and commercial land uses - 1 space per 20 spaces (0.05)

The current rate for the supply of motorcycle parking is considered adequate for the Willoughby LGA, though a higher rate for CBD and Railway Precinct locations would more suitable to accommodate increased mode share in these areas.

8 Parking rates for other transport modes

This section discusses and provides the rationale for the determination of parking rates for non-car transport modes, including bicycles, motorbikes and scooters.

8.1 Bicycle parking

8.1.1 Strategic goals for sustainable transport

As outlined in **Section 2.1**, Willoughby Council aims to promote travel by sustainable transport. The LSPS presents an aim for increased use of walking and cycling to reduce congestion and parking problems for users of Willoughby's roads. The ITS provides a strategic direction that "Our transport system will be sustainable and promote greater levels of walking and cycling", as well as an action to increase bicycle facilities and end-of-trip facilities.

The provision of bicycle parking and end-of-trip facilities will encourage and facilitate sustainable transport, and therefore the proposed requirements reflect ambitious goals for cycling to ensure that future demand can be accommodated in alignment with Council's strategic directions.

8.1.2 Bicycle parking rates

The provision of bicycle parking rates was determined using the target cycling mode share in comparison to the car mode share and parking rates. The target cycling mode share was based on ambitious targets to ensure potential future mode shift is accommodated / encouraged and align with the strategic goals for sustainable transport outlined above. The ratio of bicycle mode share to the car mode share was used to determine an appropriate provision of bicycle parking to accommodate demand. The required rate was rounded to enable easy application of the parking rates.

The analysis was based on workers in Willoughby, since this represents the demand at the land use where the bicycle parking requirements will apply.

The results of the analysis by precinct type are shown in **Table 8-1**.

Table 8-1 Bicycle and car mode shares for workers in Willoughby

Area type	Target bicycle mode share	Car (driver) mode share	Bicycle to car mode share ratio	Implied bicycle parking rate
Railway Precinct (CBD)	5.0%	42%	11.9%	1 bicycle space per 10 car parking spaces
Railway Precinct (other)	5.0%	60%	8.3%	1 bicycle space per 10 car parking spaces
Major Public Transport Corridor	4.0%	73%	5.5%	1 bicycle space per 20 car parking spaces
Industrial / business zone	3.0%	66%	4.5%	1 bicycle space per 20 car parking spaces
Residential area	3.0%	68%	4.4%	1 bicycle space per 25 car parking spaces

For simplicity, visitor parking for bicycles should be provided based on the same rates shown above – that is, the rate above is applicable both in relation to the number of car parking spaces provided for employees and for visitors.

Furthermore, developments should provide a minimum of 2 bicycle parking spaces (i.e. a single bike rack) as a minimum to ensure at least a small amount of parking is provided at all destinations.

8.1.3 End-of-trip Facilities (EOTF)

EOTF at destinations support bicycle trips by providing facilities for people to effectively end their trip by showering, changing and storing personal belongings. Although bicycle parking itself may be sufficient in many cases for short-stay trips, EOTF will typically be required to accommodate long-stay trips for land uses such as offices. EOTF should include change rooms, showers and lockers to store clothing and towels.

The proposed rates for EOTF applicable to long-term non-residential land uses are outlined in **Table 8-2**.

Table 8-2 Requirements for provision of EOTF

No. showers	No. change rooms	No. lockers
One shower per 5 employee bicycle parking spaces	One change room per shower	Two lockers per employee bicycle parking space

Note: where more than one shower or change room is required, separate male and female facilities must be provided

The provision of two lockers per bicycle parking space.

No evidence provided in published research found that an oversupply of bicycle parking alone (independent of cycling infrastructure) leads to induced bicycle use. However, an increase in the quality of facilities is correlated with increased bicycle use. Research undertaken on behalf of the WA Department of Transport for the Perth CBD showed that those buildings that provided the highest quality showers, lockers and other ancillary end-of-trip facilities had them oversubscribed by users². In a policy context, this suggests that provision of high-quality end-of-trip facilities, alongside additional bicycle parking, can result in a decrease in private vehicle modes. To best influence travel behaviour, EOTF should include clean, safe and comfortable showers, lockers and change rooms. These facilities will not be exclusive to cyclists but will also accommodate other people who walk or exercise regularly.

The effect of bicycle end-of-trip facilities is supported primarily for frequent activities such as employee commuting. Impacts of improved or increased bicycle end-of-trip facilities are much less significant for non-employee trips, at least at the relatively modest levels of usage observed in the City of Vincent.

8.2 Motorbike and scooter parking

Review of ABS Census (2016) data shows that motorbikes and scooters are used at slightly higher rates than bicycles for journey-to-work (approximately 0.5 per cent - 1.5 per cent of all trips). However, the size of the motorcycle fleet is approximately 5 per cent of all vehicles across Australia.

This suggests that there may be a differential between commuter use of motorbikes and recreational / utility use. With respect to parking supply, this implies that motorbike / scooter parking needs may be different for land uses which are heavily dominated by employees (e.g. office) or visitors (e.g. retail). There is some opportunity therefore, to prescribe different statutory rates for these two categories of use.

The provision of motorbike / scooter parking primarily benefits business, not necessarily vehicle owners. Motorbikes and scooters may park in standard bays, but this tends to be a poor use of space. Provision of motorbike / scooter parking in excess of the statutory requirements is unlikely to reduce car parking demand at a strategic level. This suggests that a provision for motorbike / scooter parking between two per cent and five per cent of total supply should be sufficient to accommodate demand.

The proposed parking rates for motorbike and scooter parking for office use and retail use are shown in **Table 8-3** and **Table 8-4** respectively.

Table 8-3 Parking rates for motorbikes and scooters (offices)

Area type	Target motorbike/ scooter mode share	Car (driver) mode share	Motorbike/ scooter : car mode share ratio	Implied motorbike/ scooter parking rate
Railway Precinct (CBD)	2.0%	38%	5.3%	1 motorbike/ scooter space per 20 car parking spaces
Railway Precinct (other)	2.0%	47%	4.2%	1 motorbike/ scooter space per 25 car parking spaces
Major Public Transport Corridor	2.0%	63%	3.2%	1 motorbike/ scooter space per 30 car parking spaces
Industrial / business zone	2.0%	62%	3.2%	1 motorbike/ scooter space per 30 car parking spaces
Residential area	2.0%	50%	4.0%	1 motorbike/ scooter space per 25 car parking spaces

² Western Australia Department of Transport, Perth End-of-trip Facilities, 2013

Table 8-4 Parking rates for motorbikes and scooters (retail)

Area type	Target motorbike/ scooter mode share	Car (driver) mode share	Motorbike/ scooter : car mode share ratio	Implied motorbike/ scooter parking rate
Railway Precinct (CBD)	4.0%	42%	10%	1 motorbike/ scooter space per 10 car parking spaces
Railway Precinct (other)	4.0%	60%	7%	1 motorbike/ scooter space per 15 car parking spaces
Major Public Transport Corridor	4.0%	73%	5%	1 motorbike/ scooter space per 20 car parking spaces
Industrial / business zone	4.0%	66%	6%	1 motorbike/ scooter space per 15 car parking spaces
Residential area	4.0%	68%	6%	1 motorbike/ scooter space per 15 car parking spaces

8.3 Service / delivery and loading

The provision of on-site service / delivery and loading is generally related to the scale of development, the intensity of use and the availability of public on-street facilities. The likely requirement for deliveries in new commercial developments should be considered and enabled where appropriate through an increase in on-street **loading zone** areas, particularly in 'main street' precincts where demand for parking is high, and where smaller office / retail development is located. **Loading bays / zones** should be flexible / shared where possible between businesses, and have timed restrictions (usually 15 minutes), and designed to accommodate larger and heavier vehicles as appropriate.

However, larger office / commercial buildings should be serviced via on-site docks connected to basement or under-croft parking structures. Access to dock areas should be designed to minimise the impact of service / delivery vehicles on pedestrian, cycling and bus modes.

9 Council inputs into recommendations

Further consultation was undertaken with Council to review draft parking rate recommendations. Council provided the following inputs:

Commercial land use rates

- > The initial suggested parking rate for commercial land use within the CBD areas of Chatswood and St Leonards was for 1 space per 100m². Council's preference is 1 space per 400m². Cardno supports this reduction in parking supply rate. The implications of this are that the lower supply of off-street parking means that the burden of parking is transferred from the development to Council via on-street parking. The rate for Artarmon is recommended to remain because Artarmon does not have the same level of supply that St Leonards or Chatswood CBD has.

Retail land use rates

- > The initial suggested parking rate for retail rates within the CBD areas of Chatswood and St Leonards was for 1 space per 70m². Council's preference is 1 space per 300m². Cardno supports this reduction in parking supply rate. A key consideration for this change is that the reduction in parking provision has a greater impact on retail than on office spaces, since office employees have more capacity to switch modes, and retail floor space experiences a higher density of workers/ customers.

10 Recommendations

The recommendations have been based on consultation with Council, alignment with strategic planning, consideration of the land use and transport networks, other jurisdictions and formulated to achieve the parking objectives and principles set out in this study are summarised in **Table 10-1**.

Table 10-1 Parking objectives and principles and formulated response

Objective or principle	Study response
Manage demand for car use by employing the principles of travel demand management (TDM);	TDM contains a comprehensive range of options and measures to reduce or spread travel demand. Parking controls and limiting the provision of parking at appropriate rates is one measure of TDM this study responds to.
Align with the strategic directions of Willoughby Integrated Transport Strategy (ITS) 2036, including efficiently managing congestion and parking demand;	Reducing parking rates at a rate that other transport modes could realistically accommodate increased demand.
Accommodate future demand for parking;	Identifying appropriate parking rates, acknowledging demand will increase, however this is expected to be at a lower rate with consideration of increase traffic congestion reducing the attractiveness and convenience of driving.
Reduce private vehicle travel demand, particularly in the Chatswood CBD and local centres, and encourage mode shift to sustainable transport modes;	Using limited parking rates as part of a range of measures to apply a traffic reducing measure.
Reflect best practice research and parking rates in comparable areas;	Benchmarking of other Australian and International jurisdictions.
Provide a framework for Development Applications (DAs) that is easy to apply and assess;	Formulate a rationalised parking rate table which shows the most commonly used and general land uses. This provides the flexibility to consider less common land uses on a case by case basis.
Provide flexibility for DAs with specific sites and needs; and	Recommending maximum rates for Chatswood, St Leonards and Artarmon and target rates for other locations with a cash-in-lieu scheme that allows developers to provide parking at different rates to the table and compensating Council appropriately.
Reflect the nature and public transport accessibility of different land use precincts throughout Willoughby.	Apply different controls to different parts of the LGA based on the locality to high quality public transport services.

10.2 Key rationale

The recommended rates outlined in **10.4** were developed under the following process:

- > Key land uses were identified by consolidating/ rationalising the land use categories from the existing WDCP. This allows the proposed rates to be simple and easy to understand.
- > Peak parking demand was calculated based on the *ITE Parking Generation Guide 4th Edition*. The Institute of Transportation Engineers (ITE) is an international association that specialises in developing best practice parking generation rates through parking supply and occupancy surveys.
- > The peak parking demand was scaled by the existing and target mode share for each precinct based on ABS Census 2016 data.
- > Rates from other similar jurisdictions / control plans were assessed and considered in the context of Willoughby LGA.
- > Recommendations were made and parking rates were proposed based on the research, analysis and results as well as from consultation with Council and applying their understanding of conditions.

This method allows a rigorous basis for parking provision based on satisfying parking demand while using parking supply as a tool within TDM to restrict traffic generation and congestion. The following was also considered in the recommendations and rates:

- > Residents living within Railway Precincts have a higher tendency to travel by rail, and therefore require less parking. All precincts rely somewhat on private cars for travel, particularly within the local centres and residential areas.
- > For workers' travel, the results show that workers are much more reliant on private cars for travel. Cars are the dominant travel mode for all precinct types, although Railway Precincts contain significant mode shares for rail (particularly within the CBD environments), as well as the industrial / business zone to a lesser extent.
- > The proportion of bus and active transport trips is low for all areas.
- > Given the high quality public transport coverage for Railway Precincts (CBD and other) in Willoughby LGA, significant parking reductions are recommended for these areas. Recommended reduction factors are specified in **Section 10.6**.
- > There is a strong relationship between residential density, car parking and trip generation, which largely determines the potential traffic impacts of development. Low density residential development and high private vehicle ownership create an environment with significantly greater household vehicle trip generation. As density intensifies, and particularly when residential vehicle ownership declines, vehicle trip generation drops. This occurs due to a number of reasons including smaller household sizes, greater accessibility to alternative transport and proximal activity and a reduced reliance on private motor vehicles.
- > As development intensifies, private vehicle ownership and vehicle trip generation tends to decline, and alternative transport mode shares increase. While multiple-unit apartment and townhouse development is expected to primarily occur along corridors and within centres, the same effects in residential areas promote sustainable transport outcomes.

10.3 Summary

The following is a summary of the recommended updates to parking requirements within the WDCP:

1. Maximum parking rates should be adopted in the CBD environments of St Leonards and Chatswood and the Artarmon Railway Precinct to restrict the parking supply and minimise further traffic congestion.
2. Parking rates are consolidated to the following land use zones:
 - CBD (St Leonards and Chatswood);
 - Artarmon Railway Precinct; and
 - Elsewhere in the LGA.
3. Council should accept cash-in-lieu payments for the provision of parking outside of Chatswood, St Leonards and Artarmon below the requirements contained in the WDCP. This should consider the availability and accessibility of existing or future public parking, and alternative transport opportunities. These payments should be used to provide alternative parking provision or as part of improved sustainable transport infrastructure measures that reduce the demand for parking. It is recommended that the value of the cash-in-lieu be less than the equivalent cost of land plus construction value, since the value to the developer is less, and Council may spend the fee on a provision other than parking. Therefore, it is recommended that the fee be equal to 75% of the capital cost and include either land or construction cost, but not both.
4. Reductions to car parking requirements are justified for local centres, in Railway Precincts and along MPTCs, as described in **Section 10.6**, and based on the following characteristics:
 - a. Proximity to public transport; and
 - b. Location (within a local centre or MPTC).
5. Further reductions in the requirements for car parking should be permitted (without application of cash-in-lieu) if developments achieve satisfactory outcomes in the following categories:
 - a. Composition (facilitating shared parking between different land uses);
 - b. Provision of a Parking Management Plan or Green Travel Plan (GTP); and
 - c. Provision of a parking survey to justify the demand for the proposed use.

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6. Council should retain the right to waive the requirement for cash-in-lieu of parking (where otherwise justified), in order to preserve aspects of the community and landscape that they value. These may be aspects such as streetscapes, heritage buildings and natural environment.
 7. Bicycle parking and end-of-trip facilities in excess of existing mode share should generally be provided to support mode shift to sustainable transport.
 8. Motorbike / scooter parking should generally be provided to promote more efficient forms of private vehicle transport.
 9. Loading and servicing requirements vary widely according to the nature of the individual development and tenancy. However, in line with the objectives and principles outlined previously, loading and servicing associated with moderate commercial developments should generally be accommodated on-street, where such facilities can be shared. For larger office / commercial sites, loading zones should be located on-site to provide a dedicated facility and to minimise the impact on street parking. Flexibility in the development application process could facilitate the provision of appropriate loading and servicing bays at a precinct level.

The recommended car parking rates by land use and precinct type are shown in **10.4**. Some existing land use categories have been removed or combined into the categories shown in the 'Proposed land use category' column. New parking rates are shown based on these proposed categories.

10.4 Recommended parking rates

Table 10-2 Recommended car parking rates

Existing land use category	Existing parking rate	Proposed land use category	CBD (St Leonards & Chatswood) Maximum rate	Proposed parking rate		Study finding/ commentary rationale	
				Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate		
Residential							
Dwelling houses	1 space / dwelling with 2 bedrooms or less	Dwelling houses	1 space / dwelling	1 space / dwelling	1 space / dwelling with 2 bedrooms or less	Reduced rates in CBD areas due to public transport provision and rationalisation of rates elsewhere.	
	2 spaces / dwelling with 3 bedrooms or more				2 spaces / dwelling with 3 bedrooms or more		
Dual Occupancy / semi detached	1 space / dwelling < 125 m² GFA						2 spaces / dwelling > 125 m² GFA
	2 spaces / dwelling > 125 m² GFA						
Attached dwellings, multi dwelling housing and residential flat buildings (outside railway precincts and MPTCs)	Studio / 1 bedroom - 1 space	Attached dwellings (dual and multi-dwelling housing)*	0.5 spaces per studio / 1 bedroom flat	0.5 spaces per studio / 1 bedroom flat	0.5 spaces per studio / 1 bedroom flat	Based on ABS data indicating number of people per bedroom (Section 4.3) and rounded to whole or half numbers	
	2 bedroom - 1.2 spaces		0.5 spaces per 2 bedroom flat	0.5 spaces per 2 bedroom flat	1 space per 2 bedroom flat		
	3+ bedroom - 1.5 spaces		0.5 spaces per 3+ bedroom flat	1 space per 3+ bedroom flat	1 space per 3+ bedroom flat		
	Visitor spaces - 1 per 4 dwellings		1 visitor space per 7 dwellings	1 visitor space per 7 dwellings	1 visitor space per 7 dwellings	1 visitor space per 7 dwellings	Consistent visitor parking rates applied, based on RTA Guide to Traffic Generating Developments
Attached dwellings, multi dwelling housing and residential flat buildings (within railway precincts or MPTCs)	Studio - 0.5 space						
	1 bedroom - 1 space						
	2 bedroom - 1 space						
	3+ bedroom - 1.25 spaces						
Visitor spaces - 1 per 4 dwellings							
Shop Top Housing	Studio - 0.5 space						

Existing land use category	Existing parking rate	Proposed land use category	Proposed parking rate			Study finding/ commentary rationale	
			CBD (St Leonards & Chatswood)	Railway precinct (Artarmon)	All other areas in the LGA		
			Maximum rate	Maximum rate	Target rate		
	1 space / dwelling (other than studios)						
	Visitor spaces - 1 per 4 dwellings						
* It is noted that the proposed rates for attached dwellings are low in comparison to the rates for high density residential dwellings outlined in the RTA Guide to Traffic Generating Developments (2002). The lower rates are however aligned with Council's strategic intentions and the traffic demand management approach to reducing additional traffic generation in the constrained Chatswood and St Leonards areas.							
Secondary Dwelling	Nil	[Remove category]	N/A			Removed to rationalise	
Housing for Seniors or People with a Disability	The relevant provisions of State Environmental Planning Policy (Seniors Living) 2004 (which are current at the time of application) apply for all development of housing for seniors or people with a disability in the City of Willoughby.	[Remove category]	N/A				
Casual residential							
Hotel and Motel Accommodation	1 space / unit	Hotels, motels and serviced apartments	0.25 space / room	0.75 space / room	0.75 space / room	Parking rate to suit needs of other land use	
	If restaurant or function room is included, parking rates for that use is to be in accordance with the relevant restaurant parking rate		If restaurant or function room is included, parking rates for that use is to be in accordance with the relevant restaurant parking rate				
Serviced Apartments	1 space / 4 units						
	+ 1 space / 2 employees						
Boarding houses	The relevant provisions of State Environmental Planning Policy (Affordable	Boarding houses	The relevant provisions of State Environmental Planning Policy (Affordable Rental Housing) 2009 apply.			As per NSW Government legislation	

Existing land use category	Existing parking rate	Proposed land use category	CBD (St Leonards & Chatswood) Maximum rate	Proposed parking rate		Study finding/ commentary rationale
				Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate	
	Rental Housing) 2009 apply.					
Bed and Breakfasts	The relevant provisions of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 apply. Alternatively, if subject to Development Application, 1 space / 5 beds and 1 space / resident owner or manager.	Bed and breakfast accommodation	The relevant provisions of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 apply.			As per NSW Government legislation
Group home	2 spaces minimum (each application to be determined on its merits)	[Remove category]	N/A			Removed for simplicity
Office / Business						
Office / Business premises within Railway Precincts and MPTCs	1 / 110 m²	Office and business premises	1 space / 400 m²	1 space / 75 m²	1 space / 60 m2	As per Council sustainability ambition, comment outlined in Section 9
Office/Business premises in Chatswood (Zone B3 under WLEP 2012) where access is only available from Pacific Highway, Albert Avenue, Victoria Avenue, Help or Railway Streets	1 / 200 m²					

Existing land use category	Existing parking rate	Proposed land use category	Proposed parking rate			Study finding/ commentary rationale
			CBD (St Leonards & Chatswood) Maximum rate	Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate	
Banks and financial institutions	Office component in accordance with the office rates above					
	Public areas - 1 space / 25m ²					
Sex services premises	1 space / 2 employees	Sex services premises	2 spaces per room	2 spaces per room	2 spaces per room	Based on assumption of 1 worker per 1 room
Retail						
Shop	1 space / 25 m ²	Retail premises	1 space per 70 m ²	1 space per 50 m ²	1 space per 33 m ²	As per Council comment outlined in Section 9
Bulky Goods	1 space / 77 m ² factory space	Bulky goods premises	1 space per 150 m ²	1 space per 125 m ²	1 space per 100 m ²	Rates based on peak parking demand and mode share
	Ancillary office space - in accordance with office / commercial rates above					
	1 space / 300 m ² warehouse space (i.e. space not accessible to the public)					
	6 spaces / 100 m ² showroom space (i.e. space available to the public)					
Video / DVD stores and supermarkets	6 spaces / 100 m ²	Retail premises (supermarkets)	1 space per 70 m ²	1 space per 50 m ²	1 space per 33 m ²	Video and DVD shops are no longer relevant land uses
Drive-in liquor stores	In accordance with RTA Guidelines for Traffic Generating Development	[Remove category]	N/A			Removed for simplicity

Existing land use category	Existing parking rate	Proposed land use category	Proposed parking rate			Study finding/ commentary rationale
			CBD (St Leonards & Chatswood) Maximum rate	Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate	
Motor vehicle services						
Vehicle repair station	4 holding bays / workshop bay	Service stations, vehicle repair stations and vehicle sales or hire premises.	5 holding bays per service / workshop bay	5 holding bays per service / workshop bay	5 holding bays per service / workshop bay	Existing rates retained
Service Stations	4 holding bays / workshop bay		Office & retail space - in accordance with office & retail rates.			To suit needs of other uses
	+ 1 car parking space / 25 m² retail space					
+ 1 space / 2 employees						
Vehicle sales or hire premises	Office space - in accordance with office / commercial rates above					
	+ 1 space / 200 m² of display area for customer parking (minimum of 2 spaces must be provided)					
Child care centres and education						
Long day care centres	1 space / 2 employees	Child care centres,	1 space per 20m²	1 space per 20m²	1 space per 20m²	Rates based on peak parking demand and mode share
Work based child care centres	Minimum 2 staff spaces		1 space per 20m²	1 space per 20m²	1 space per 20m²	
Preschool, Occasional Care Centres or Out of School Hours Care	1 space/ 8 children		1 space per 66m²	1 space per 66m²	1 space per 32.5m²	
	1 space/ full time staff member		1 space per 26m²	1 space per 26m²	1 space per 20m²	
	1 space/ 2 part-time staff					
	(May be reduced to require 1 space/ 2 employees if within 500m of a railway station)					
	1 space / 2 staff					

Existing land use category	Existing parking rate	Proposed land use category	Proposed parking rate			Study finding/ commentary rationale
			CBD (St Leonards & Chatswood) Maximum rate	Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate	
Educational Establishments	+ 1 space / 10 tertiary students	Educational Establishments	A site-specific parking study (School Travel Plan) must be developed to support development applications for educational establishments, which should consider the level of education (primary, secondary or tertiary), the number of employees and students, and provisions for drop off & pick up.			Based on fact that a new school/ development is uncommon and has unique needs
	+ 1 space / 10 seats in assembly hall (may be inclusive of all other requirements).					
	Spaces for sports fields or educational establishments in residential zones will be determined by Council in each case.					
Food & Beverage						
Pubs, Wine Bars, and Registered Clubs	1 space / 20 m ² of bar, lounge, dining room, function room, auditoria, garden lounge area	Restaurants or cafes, food and drink premises, pubs	1 space / 50 m ²	1 space / 50 m ²	1 space / 33 m ²	Rates based on peak parking demand and mode share
	+ 1 space / accommodation unit					
	+ 1 space / 2 employees					
Restaurants (outside railway precincts and MPTCs)	1 space / 25 m ²					
Restaurants (within railway precincts and MPTCs)	1 space / 75 m ²					
Drive in take away food and drink premises	1.5 spaces per 100m ² of site area, plus					
	2 spaces per 5 seats, plus					
	1 space per 3 employees					
Footway seating	Note: Additional parking spaces are not required for footway seating provided in					

Existing land use category	Existing parking rate	Proposed land use category	Proposed parking rate			Study finding/ commentary rationale
			CBD (St Leonards & Chatswood) Maximum rate	Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate	
	conjunction with an existing restaurant.					
Health and community services						
Hospitals	1 space / registered medical practitioner or dentist	Hospitals	3 spaces per bed	3 spaces per bed	3 spaces per bed	Rate considers professional, other staff and visitor
	+ 1 space / 2 other employees					
	+ 1 space / 3 beds for visitors					
Health Consulting rooms	1 space/ additional health care professional	All medical centres (including consulting rooms, medical centres and veterinary hospitals / clinics)	2 spaces per consulting room	2 spaces per consulting room	2 spaces per consulting room	Rate considers professional and patient
	+ 1 space/ 2 other employees					
	+ 1 space/ health care professional for patients, with a minimum of one disabled visitor parking space					
Medical Centres	1 space/ health care professional					
	+ 1 space/ 2 other employees					
	+ 1 space/ health care professional for patients, with a minimum of 2 disabled visitor parking spaces					
Veterinary hospitals	1 space/ veterinarian					

Existing land use category	Existing parking rate	Proposed land use category	Proposed parking rate			Study finding/ commentary rationale
			CBD (St Leonards & Chatswood) Maximum rate	Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate	
	+ 1 space/ 2 other employees					
	+ 1 space/ veterinarian for clients, with a minimum of 2 visitor spaces					
Leisure / recreation						
Squash	3 spaces / court	Recreational area, recreational facilities (indoor), recreational facilities (major), recreational facilities (outdoor), public places of worship	A site-specific parking study must be developed to support development applications for these land uses.			Consolidated requirement for simplicity, and based on unique nature of developments of this kind
Tennis	3 spaces / court					
Bowling greens	30 spaces for first green					
Bowling alleys	3 spaces / alley					
Gymnasiums	3 spaces / 85 m² GFA					
Public hall / place of assembly / place of public worship	1 space / 10 seats or					
	1 space / 10 m² of area where no permanent seating is provided					
	+ 1 space / 2 employees					
Industrial						
Industrial development (including warehouses)	Office and showroom area- in accordance with office/business rates above	Industrial retail outlets, industrial training facilities, and industries	N/A	N/A	Office and showroom area - in accordance with office / business rates above	Existing rate retained
	+ 1 space / 77 m² of factory use area		N/A	N/A	+ 1 space / 100 m² of factory use area	Existing rate rounded for simplicity
	+ 1 space / 300 m² of storage area		N/A	N/A	+ 1 space / 300 m²of storage area	Existing rate retained
High tech industrial	1 space/ 100 m²GFA	High technology industries	N/A	N/A	1 space / 100 m² GFA	

Existing land use category	Existing parking rate	Proposed land use category	Proposed parking rate			Study finding/ commentary rationale
			CBD (St Leonards & Chatswood) Maximum rate	Railway precinct (Artarmon) Maximum rate	All other areas in the LGA Target rate	
Self-storage facilities	Calculated as per industrial storage areas, unless traffic study is submitted which justifies an alternate rate. A minimum of two visitor parking spaces are to be provided at the front of the premises in a publicly accessible area for customers.	Self-storage units	N/A	N/A	Calculated as per industrial storage areas, unless traffic study is submitted which justifies an alternate rate. A minimum of two visitor parking spaces are to be provided at the front of the premises in a publicly accessible area for customers.	
Designated development	To be justified by a traffic and parking study.	Designated development	N/A	N/A	To be justified by a traffic and parking study.	
Other						
Funeral Home or Funeral chapel	1 space/ 10 seats	Other	Site-specific parking study required to support development applications for other land uses.			Uncommon and unique nature of development operation.

10.4.2 Accessible parking requirements

Accessible parking spaces should be required in accordance with the Building Code of Australia (BCA), which specifies requirements based on the building classification and type of development. Developments complying with the BCA will achieve the statutory requirements for accessible parking and will generally satisfy the demand for accessible parking.

10.5 Bicycle and motorcycle parking requirements

The recommended parking rates for bicycles and motorbikes / scooters are shown in **Table 10-3**, with further discussion provided in **Section 8**. These rates are recommended as minimum rates to ensure that sufficient bicycle parking is provided to accommodate and encourage sustainable transport modes.

Table 10-3 Recommended parking rates for bicycles and motorbikes / scooters

Precinct type	Bicycle parking rate	Motorbike / scooter parking rate
CBD Railway Precinct (St Leonards and Chatswood)	1 bicycle space per 10 car parking spaces	1 motorbike/ scooter space per 20 car parking spaces
Railway Precinct (Artarmon)	1 bicycle space per 10 car parking spaces	1 motorbike/ scooter space per 25 car parking spaces
Other areas	1 bicycle space per 20 car parking spaces	1 motorbike/ scooter space per 30 car parking spaces

The provision of bicycle and motorbike / scooter parking should be linked to the DCP requirement for the number of car parking spaces rather than the actual provision of car parking spaces on site. This will ensure that any reduction in the number of car parking spaces provided (e.g. due to a cash-in-lieu contribution) does not affect the provision of parking for sustainable transport modes, and that provision of car parking spaces below a maximum requirement does not reduce the provision of bicycle, motorbike or scooter parking.

The recommended requirements for end-of-trip facilities for all precinct types is shown in **Table 10-4**.

Table 10-4 Recommended requirements for end-of-trip facilities

No. showers	No. change rooms	No. lockers
One shower per 5 employee bicycle parking spaces	One change room per shower	Two lockers per employee bicycle parking space

10.6 Recommended reduction factors

Recommended reduction factors by precinct type for key influences on parking demand are shown in **Table 10-5**. Provision of parking below these reductions could be approved by Council at its discretion, potentially with cash-in-lieu payments.

Table 10-5 Recommended reduction factors

Adjustment type	Requirement for qualification	CBD (St Leonards & Chatswood) and Railway Precinct (Artarmon)	Other areas
Provision of bicycle parking and end-of-trip facilities (employee-driven parking only)	Bicycle parking is provided in excess of 2x the requirements and high quality end-of-trip facilities are provided, including showers, lockers and secure parking	Maximum parking rates apply, reduction not applicable	10%
Composition (shared parking)	The development proposes a mix of residential and commercial uses, provided at least 50% of the total plot ratio is residential.		10%
Green Travel Plan (employee-driven parking only)	The development proposes a mix of land uses which would be able to share on-site parking.		Extent of the parking reduction to be determined through a Parking Demand Assessment and agreed with Council.
Parking survey	Results of a parking survey submitted to Council to justify demand for the proposed use.		Extent of the parking reduction to be specified by the parking study and agreed with Council.