Parking

Willoughby Local Centres Strategy

80020036

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Contact Information

Cardno (WA) Pty Ltd
ABN 77 009 119 000

11 Harvest Terrace
West Perth WA 6005
Australia

www.cardno.com
Phone +61 8 9273 3888
Fax +61 8 9486 8664

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Author(s):

Jacob Martin
Team Leader – Transport Planning (Perth)

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1 Introduction

Parking is an essential and inherent component of both the transport and land use system, and is unique in that behaviour can be influenced directly at the planning and policy stage rather than solely through infrastructure provision.

Willoughby's Local Centres differ greatly with respect to their density, range of land uses, proximity to alternative transport options and location within the broader land use fabric.

- Land use defines the requirement for car parking quantum and location: short stay and on-street parking close to retail precincts, long-stay commuter parking on the periphery of the centres near to employment centres and along regional access routes.
- Development density and land use mix determines the viability of internal trips, which are much more likely to occur by active modes – generating activity without the need for parking infrastructure.
- Accessible, high-frequency public transport presents an alternative to residents living further afield. Providing viable opportunities to forgo driving to work results in a lower vehicle ownership, which translates into an overall change in travel behaviour.

This Section outlines a range of critical components of the parking system, in the context of the Willoughby Local Centres Strategy, including:

- Parking policy: Council policy can be used to both enable and restrict particular forms of parking.
- Parking supply: private requirements and public facilities, both on-street and off-street.
- Parking management: restrictions by time and duration, and how these can be used to influence behaviour and opportunities.

2 Parking Policy Review

2.1 Willoughby DCP

The **Willoughby Development Control Plan (WDCP) Section C.4** defines standards and guidelines intended to "manage the existing and future on and off road car parking in a manner that sustains and enhances the economic and environmental qualities of Willoughby".

It specifically recognises that "increasing the supply of parking can induce a greater number of vehicular trips which increases congestion, impacting negatively on the city environment."

These objectives acknowledge that constraining parking through planning policy can be an effective method to reduce private vehicle trip generation and to create a more sustainable land-use and transport environment.

2.1.1 Review of Parking Rates

The WDCP prescribes a target number of parking bays to be provided by a development. Any departure from this target requires justification through a Traffic Study, with a range of broad principles giving guidance for Council's approval of variation.

These principles are generally progressive and in-keeping with best-practice. However, there are no benchmarks given that would indicate the likely effect of each factor or whether any given proposal is reasonable.

In addition, the parking rates provided are the same for the whole of the municipal area. This suggests that application of these rates is likely to result in over-supply in dense Activity Centres, and under-provide in residential areas.

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.

Residential Parking:

Residential parking standards have been compared with ABS Census vehicle ownership rates to determine the sufficiency of parking.

This analysis suggests that using the DCP rates, only 50% of residents would have the same number of parking spaces as vehicles. The following provides a rough summary of the results:

Residential Parking Sufficiency	Detached Dwellings		Semi-Detached and Attached Dwellings	
	Number	%	Number	%
Too Many Cars	2129	18.5%	1959	14.4%
Too Many Spaces	3831	33.3%	4980	36.5%
Just Right	5558	48.3%	6696	49.1%

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 private owners to Council. Note that this doesn't account for residents who use their on-site parking spaces for other purposes (home gym, storage etc.).

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 a fundamental inequity which belies the objectives of the WDCP.

A more detailed discussion of Residential Parking Permits is included in **Section 4.2.2.**

Non-Residential Parking: Office / Business

Office development is differentiated by location, with areas closer to public transport required to provide less parking. The Willoughby Contributions Plan is predicated 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 mode shares below.

The WDCP rates reflect a supply of on-site parking as follows:

Office/Business Land Uses	Parking Rate	Parking Spaces per Employee	Supported Mode Share %	Current Mode Share %
Chatswood (specific locations)	1/200sq.m GFA	0.13	16%	42%
Railway Precincts and Major PT Corridors	1/110sq.m GFA	0.23	29%	75%
Elsewhere	1/60sq.m GFA	0.42	53%	75%

This analysis indicates that the statutory parking provision is considerably lower than current demand, and that between 30% and 60% of drivers likely rely on publicly accessible all-day parking (on-street and off-street) in these Local Centres. This is not necessarily an issue, so long as a suitable quantum 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.

Non-Residential Parking: 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 demand for large-scale retail centres is approximately 4 spaces/100sq.m, of which approximately 15-20% is used by employees. In contrast, RTA *Guidelines for Traffic Generating Development* recommends 5.5 - 8 spaces / 100sq.m.

The WDCP provides two rates: for 'Shop' at 4 spaces / 100sq.m GFA, and 'Supermarket' at 6 spaces / 100sq.m GFA, suggesting that retail demand is generally satisfied by on-site parking.

For the purpose of establishing an appropriate supply rate, it is recommended that the total retail space within a Local Centre be considered and applied equally across the Centre. This is based on the assumption that efficient publicly accessible parking is used as a common resource by all visitors to the Centre, rather than being allocated to an individual business. Given this, it is reasonable that a single parking rate be applied across all retail development.

Non-Residential Parking: Restaurant

The parking rate for restaurants as defined in the WDCP is likely to be significantly *less* than the unconstrained demand for parking. However, this 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 consumed by employees.

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

In general, the provision rates identified in the WDCP appear sufficient in this context.

Non-Residential Parking: Medical

The parking requirement for medical facilities is 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.
- 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 does not easily fit within a simple rate calculation, and should be supported in every instance with a site-specific Parking Study.

Non-Residential Parking: Other Land Uses

While it is tempting for Council to determine parking requirements for the widest range of land uses, the reality is that the associated rates are rarely evidence-based. Instead, parking requirements have usually been informed by a patchwork of sources, including:

- Parking surveys completed in the USA and Sydney, some as long ago as the 1970's.
- 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.
- 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 a few land uses, and strengthens the requirement for site-specific Parking Studies in support of development application.

2.1.2 Variations to Parking Supply

The WDCP allows for significant latitude by Council in varying the requirements for parking, based on a range of site location and development-specific factors. However, this appears to allow Council only to waive the parking requirement; there is no cash-in-lieu or developer contributions provision which would support formal transfer of parking supply obligation from the developer to the Council.

This may be a consequence of the progression of the Developer Contributions Plan to a percentage-based model, but it reduces the ability for Council and developers to negotiate a mutually beneficial outcome in instances where it is economically or physically infeasible to construct parking on-site.

Further discussion of a potential cash-in-lieu policy mechanism is provided in **Section 3.3**.

2.2 Willoughby Street Parking Strategy

The *Willoughby Street Parking Strategy* is a comprehensive review of street parking policies, using Chatswood as a specific case study to determine common issues and present specific recommendations. While this study focused primarily on the Chatswood area, many of the outcomes are applicable within other Local Centres.

This Strategy is an essential first-step in improving and standardising parking implementation across the Council area. The findings from this Strategy have been extended for the Willoughby Local Centres Strategy (WLCS), including a number of long-term recommendations which would be applicable beyond the horizon of the *Street Parking Strategy.*

In particular, this Strategy established a number of Strategic Directions, as described below:

1. **Adopt a framework of time and pricing restrictions**

   Using parking occupancy inputs is a fundamental premise of best-practice 'demand responsive' management practices.

2. **Apply parking controls that support the land use context**

   The *Street Parking Strategy* recommends broad duration restrictions to assist in managing on-street supplies. These have been given more definition in **Section 4.2.2** of this report.

3. **Develop an integrated transport strategy**

4. **Promote car share**

   A series of recommendations in support of car share are proposed. These are directly applicable to future sustainable development within Local Centres.

5. **Maximise available street and road space for parked cars**

   This recommendation recognises the importance of parking in supporting accessibility, and the value of constraining road capacity to limit traffic generation. However, the use of street space for on-street parking should also be compared against other options that benefit other modes and purposes. Protected bike lanes, bus priority, pedestrian facilities, al fresco dining and street trees may all be more valuable than parking, depending on the location.

   A holistic understanding of streetscape function should be part of corridor review across the network, and particularly in Local Centres.

6. **Promote alternative transport choice for non-essential car journeys**

   Parking supply constraints, pricing and lane allocation can all assist in making alternative transport modes more attractive for visitors, employees and residents.

3 Principles of Parking Management

The following describes a series of key principles for parking management in Local Centres, designed to create an effective, equitable transport system that supports adjacent land use.

3.1 General Principles

3.1.1 "Free" parking

Free parking that is available for all has generally been perceived as an ideal objective for both policy and decision makers, with any proposed measures which have sought to constrain demand or determine priority for access bitterly resisted, often in an emotional and irrational way.

This level of emotional response is related to the availability of parking and its significant role and impact on the ability of private individuals to access employment and the range of services and facilities that the community offers. The attitude of many people has, in the past, been that if parking is not readily available and accessible to services and amenities, they would often make the choice to shop or go elsewhere.

However, all parking has a cost: in space, opportunity, construction, maintenance, and enforcement. Where parking is provided free of charge to users, the direct financial costs are borne by the City and passed on to residents via increased rates, or by businesses and passed onto retailers and consumers through higher rents and prices. The opportunity costs are realised through reduced connectivity (land uses are further apart), decreased local amenity (pedestrian paths, trees), and a higher economic burden for development (the cost of parking infrastructure results in decreased investment in the area).

3.1.2 Supporting alternative transport

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. Parking itself is only one part of the Local Centres Strategy, and exists as an enabling force to support the land use planning and transport objectives of the City.

3.1.3 Parking management to affect traffic generation

A perceived lack of parking availability can create an emotional response in car drivers, particularly when there is no viable alternative to driving. Parking supply management therefore relies upon effective alternatives to driving, through high-quality path infrastructure 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.

3.1.4 Hypothecation of parking revenue

Paid parking fees are an effective measure for managing parking by increasing the efficient use of a shared resource. The revenue obtained from this form of parking management is, by definition, used to offset the cost of enforcement and installation. Beyond this maintenance cost, paid parking revenues may be 'hypothecated' to improvements in transport and local streetscapes.

This provides direct benefit to the community and additional value over and above the impacts of managed parking alone. International examples show that where revenue is hypothecated to local improvements, patronage of these businesses and land values increase markedly.

Recommendation:

Establish a parking fund to collect parking fees and infringement revenues.

3.2 Management Principles

3.2.1 Increases to parking supply

Construction of additional parking spaces can be considered where it facilitates desired activity, and where the associated trips are unlikely to be undertaken by alternative transport modes. Any increases in public parking supply should be considered in the context of all existing parking supplies, potential impact on congested roads, and in accordance with best-practice design principles.

3.2.2 Interactions with private parking

Parking should be considered as an ecosystem consisting of public and private, on-street and off-street, and considering all of the many needs of the people who use those bays. The optimal parking system would be one where all parking is used efficiently, with the minimum amount of space devoted to parking activities. After all, parking itself only facilitates activity; it does not create any of its own.

3.2.3 Wayfinding and signage

The effectiveness of parking is greatly improved through supplying better information to users. This information is typically provided in a range of media, including maps, mobile applications, static and dynamic signage and prominent parking information.

A coherent signage strategy is recommended in all Centres, identifying off-street car parking supplies and significant on-street parking. This may be implemented through static wayfinding signage displaying route/location and supply numbers, using a design of signage consistent for on-street and off-street.

Recommendation:

Review existing parking wayfinding and signage facilities.

Implement a consistent parking wayfinding and signage strategy within each Centre.

3.2.4 Shared Parking

Shared parking is parking that is used by 2 or more uses instead of restricting parking to the exclusive use of a single land use.

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.

3.2.5 Unbundled Parking

The cost of parking for residential and commercial units is usually passed on to the occupants indirectly through the rent or purchase price (bundled) rather than through a separate transaction. This means that tenants or owners are not able to purchase additional parking if required or given the opportunity to save money by reducing their parking demand.

The unbundling of parking can be introduced in several different ways:

- Facility managers can unbundle parking when renting building space;
- Developers can make some or all parking optional when selling buildings;
- Renters can be offered a discount on their rent for not using some or all of their allocated parking spaces; and
- Parking costs can be listed as a separate line item in the lease agreement to show tenants the cost and enable them to negotiate reductions.

3.2.6 Rationalisation of Parking

As discussed previously, road space is extremely valuable for a wide range of purposes. This creates an inherent conflict when it comes to allocating this space among the various users and functions.

One metric that can inform the value of kerbside space for parking purposes is occupancy. As identified in the *Willoughby Street Parking Strategy*, parking that operates at 85% is considered to be functioning 'optimally'. Parking that is operating at 50% or less, however, represents space that is not being optimally utilised. In this case, rationalisation of parking may allow for road space to be repurposed for more productive uses.

Reducing the parking supply in these poorly utilised areas, could allow for the construction of attractive protected bike lanes, canopy trees, activated entertainment spaces, improved pedestrian facilities and more.

Even in areas where demand for parking is relatively high, these uses may be more beneficial for the Centre than the parking – which may be relocated or consolidated as required to retain the necessary supply.

3.2.7 Pricing parking

Parking prices can be a very effective tool for traffic demand management, with the parking fee structure set to preferentially benefit certain target groups, based on the ideal function for a particular car parking location.

Parking pricing levels should ideally be set such that demand peaks at approximately 85-90% occupancy. Best-practice implementation involves 'demand-responsive' pricing, which increases or reduces fees based on occupancy. This can involve different fees at different times of day, or different days of the week, and include a mechanism to modify prices on a periodical basis to maximise the utility of the parking.

Based on this methodology, it is understood that the 'correct' price for parking in a location may be zero, if supply exceeds peak-period demand.

Demand responsive pricing relies on a high degree of good quality occupancy and duration of stay data.

Recommendation:

Prepare precinct-specific parking management plans. Expand paid parking using the 'demand responsive pricing' methodology.

3.2.8 Parking management and enforcement

Parking management and enforcement decisions are ideally made by a single internal business unit, where the costs of parking infrastructure, maintenance and enforcement are borne by the same entity that plans and implements parking resources, pricing and management decisions.

Recommendation:

Establish an internal business unit to oversee all aspects of parking management, infrastructure and enforcement.

3.3 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; and 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 appear to 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. However, this can create transparency and equity issues. The success of cash-in-lieu parking arrangements can be substantially compromised if the City approves parking concessions in order to relieve owners from any obligation to provide car parking. Concessions should only be approved where the applicant can clearly demonstrate that the parking requirement is excessive and not simply as a mechanism to allow applicants to proceed because they are unable to provide what is deemed to be an appropriate amount of parking.

Should the City approve 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 the City 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 the City and not become an automatic right. This will allow the City 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 the City will be able to provide a supply increase in the short term.

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 typical of the way Local Governments administer cash-in-lieu, but it can be overly restrictive. A broader delivery model, which 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 the City.

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.

4 Parking Review

4.1 Parking Function

As a matter of policy, it is appropriate that vehicle ownership is consistent with residents' capacity for on-site storage. Parking within residential areas is primarily provided on-site, however in many locations, on-street parking is used to supplement or replace car parking on-site.

This has repercussions on the availability of parking for residential visitors, service/delivery and other needs, and prevents repurposing of on-street parking for other mobility or amenity uses.

4.2 Parking Needs and Impacts

4.2.1 Resident Parking

While the majority of Willoughby residents have access to a private vehicle, 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.

Figure 4-1 Willoughby LGA Household Characteristics – Bedrooms vs Vehicle Ownership

The results indicate that while the majority of single unit dwelling residents have 1 or 2 cars, a substantial number (19%) own more cars than the WDCP requirements for parking. In addition, 33% of these residents have more parking spaces than they need for car storage.

A similar analysis of townhouse/terrace and apartment residents tells a similar story, with 14% of residents owning more cars than spaces and 36% owning more spaces than cars (note that the WDCP requirement is 1.2-1.5 spaces for 2- and 3-bedroom units).

This indicates 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 provides some indication of the scale of this benefit to City residents, which is in the order of $2,000 p.a. 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. Given that the above estimates 5,000 residential vehicles parked on-street, this implies that the Council is currently providing a de-facto subsidy to car owners equivalent to approximately $10M per annum.

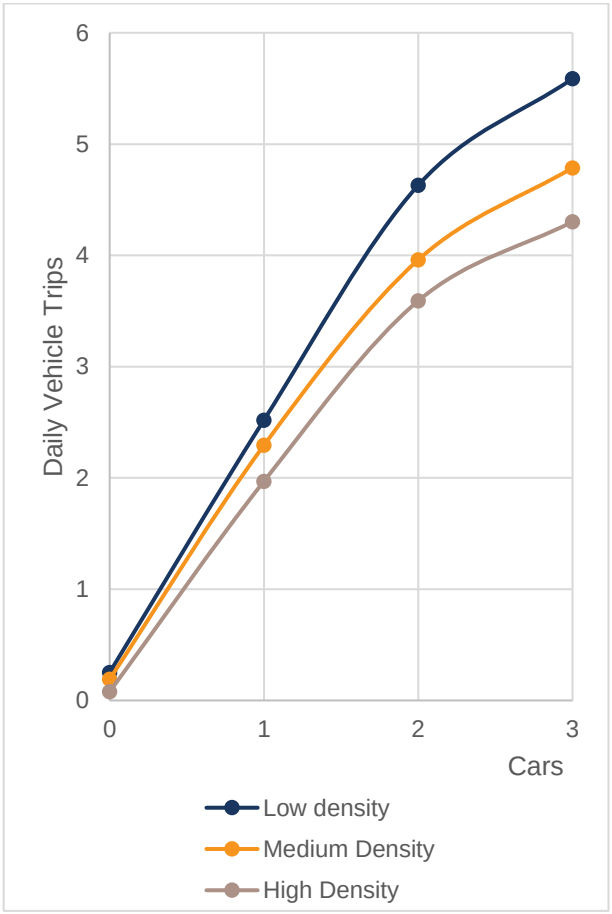
In the context of Willoughby's Local Centres, residential on-street parking consumes space that would otherwise be available for more productive uses (employee and visitor parking), placing additional pressure on those Centres and impacting their economic and environmental viability.

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

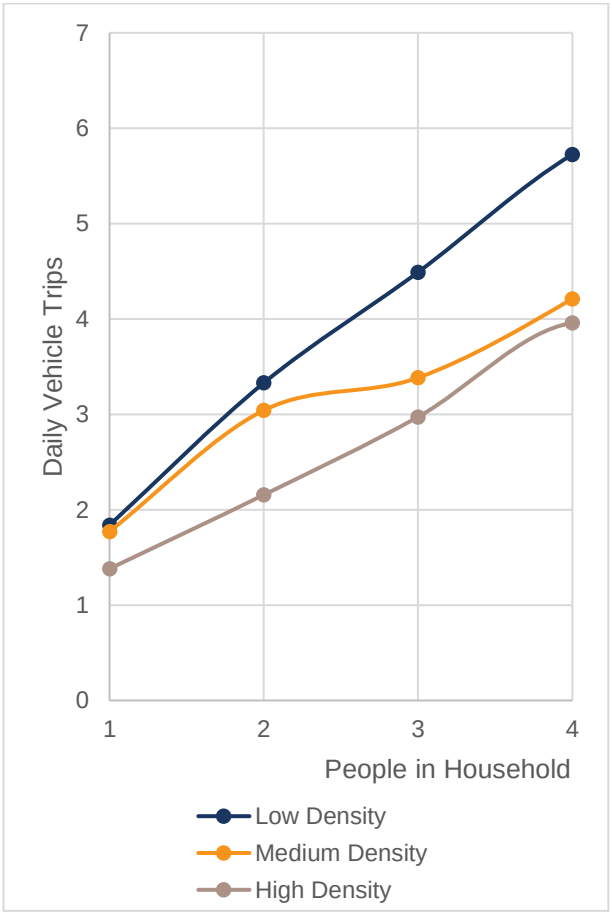
The dense dataset provided by the *Victorian Integrated Survey of Travel and Activity (VISTA)* indicates that low density residential development and high private vehicle ownership create an environment with significantly greater household vehicle trip generation.

Figure 4-2 Average Household Vehicle Trip Generation Rates (VISTA)

Vehicle Trip Generation by Car Ownership



Vehicle Trip Generation by Household Size



As density intensifies, and particularly when residential vehicle ownership declines, vehicle trip generation drops. This occurs due to a number of reasons: 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.

4.2.2 Resident Parking Permits

The Willoughby Council operates a number of residential parking permit schemes to allow limited on-street vehicle storage by residents. The cost of these permits is set at a rate sufficient only to recoup the cost of administration, with a small factor applied where multiple permits are sought. However, this cost is nominal ($40 and $80 for the first and second permit, respectively) and significantly less than the value of those spaces.

Eligibility is limited to older developments (pre-1999) and is related to the number of spaces on-site and the number of vehicles owned.

The uptake of such a system is primarily dependent on the fee charged. To this end, the following is considered:

- Residents parking their vehicles on-street do so either because the number of vehicles owned is greater than on-site car parking, or that parking has been appropriated for other uses (a home gym, extra bedroom/workroom, additional storage etc.).
- If so used, that resident receives a financial benefit proportional to the value of the land or construction cost of the parking space (a secure garage may cost $30-40,000 to construct, and provides an equivalent value). As such, an on-street parking bay represents a benefit to the vehicle owner of approx. $1,500-2,000 p.a.

An annual parking permit fee functions as a price signal to residents. It allows vehicle owners to adequately account for the cost of parking infrastructure and consider storage as part of the real cost of ownership. Where residents have insufficient parking, this permit scheme provides an opportunity to shift the burden of storage onto Council, but provides funds for the maintenance of that infrastructure at an equivalent market rate.

Alternatively, residents may choose to retain their vehicles wholly on-site, or divest surplus vehicles.

This form of management has some intrinsic advantages:

- It allows the underlying parking restrictions to support the desirable use of on-street parking;
- The pricing regime can be introduced progressively over time; and
- It retains equity for all residents, existing and future.

It is expected that any form of on-street parking permit model would involve a relatively low introductory price, with gradual increases over time to manage uptake and on-street usage.

Recommendation (Policy)

Expand the residential permit scheme and price permits at a rate consistent with the opportunity cost of parking infrastructure, with a transition period to support behaviour change by residents.

4.3 Non-Residential Parking Management

Local Centres are designed to be economically sustainable environments for residents, employees and visitors surrounded by lower-density residential zones. These Activity Centres are complex systems defined by their land uses and mobility needs, which must be satisfied by a combination of on-road and segregated transport modes.

The viability of Willoughby's Local Centres is inextricably linked to the provision of a variety of transport modes. Given the highly car-dependent nature of Australian cities, and the current deficiencies in alternative transport networks, car parking is a primary factor in determining economic viability. However, parking infrastructure has an enormous cost; not just the direct expenditure on construction and maintenance, but also the opportunity costs in land, streetscape amenity, development density and proximity.

The following describes a general methodology that can be used to determine parking restrictions within each Local Centre, as an extension to the recommendations in the *Willoughby Street Parking Strategy.*

4.3.1 On-Street Parking Management (Free)

- **Time Restrictions:** It is recommended that managed parking be restricted to a single period across each Centre (e.g. 8am-5:30pm Weekdays, 8am-12noon Saturday). This greatly improves both compliance and enforcement by standardising expectations. In locations where after-hours or weekend activity is high, these land uses would govern the timeframe for parking restrictions.

  Limiting paid parking (and duration restrictions) to daylight hours limits the potential impact on residents and visitors. This is particularly important in areas with a high residential density.

- **2P Free Parking:** This form of free parking is not recommended where parking areas are located close to businesses. The incentive for employees and other long-stay users to park in these zones illegitimately (reparking their vehicle every 2 hours), is strong. Therefore, time restricted 2-hour parking is appropriate generally only in adjacent residential areas, to support visitation throughout the day, and only where peak demand remains below 85% of supply.

- **1P Free Parking:** This form of free parking restricts use to only very short-stay uses. It can be used to reinforce quick turnover, but is often insufficient to adequately manage supply in high-demand areas due to the high overheads for enforcement.
- **Residential Parking Permits:** Residential parking permits are considered to be appropriate where on-site parking supply is low as a result of heritage building construction, and where adjacent land uses are likely to consume the bays required for these residents.

  They have some inherent advantages, by creating a two-tier system; giving exemptions to residents so that they can avoid the impacts of duration restrictions or parking fees.

  Residential parking permit schemes are expensive to maintain, and are generally not priced at a level commensurate with their value. It is therefore recommended that expansions to the residential permit schemes in their current form should be avoided.

4.3.2 On-Street Parking Management (Paid)

Paid parking is recommended to be introduced in accordance with a 'demand responsive pricing' methodology, as described in the *Willoughby Street Parking Strategy* i.e. wherever peak parking occupancy regularly exceeds 85% of supply. This is method is largely reactive, but allows for a consistent application of paid parking across the City's Centres irrespective of location.

The 'free' parking described above is effectively just paid parking with a price of $0/hr.

- **1P Paid Parking:** To be used in retail areas to support high turnover business visitors, and to redistribute longer-stay activities to adjacent off-street public and private car parks
- **2P Paid Parking:** To be used in areas adjacent to retail to support business and medical visitors; specifically excludes use by employees.
- **4P Paid Parking:** To be used to support longer-stay uses including restaurants and recreation, as well as a mixture of short-stay uses; specifically excludes use for commuter parking and has minimal value for employees unless all-day parking is very scarce.
- **Capped Fee Parking:** Allows for hourly paid parking up to a set duration cap (e.g. 4 hours), with no additional cost beyond this duration. This is intended to create spaces for employees to park in the public realm, while still retaining viability for short-stay visitors.
- **First-Hour Free Parking:** Can be used to promote very short stay uses and encourage rapid turnover of parking in off-street parking situations. First-hour free parking is not considered to provide the same level of advantage in on-street environments, particularly where demand is already high.

4.3.3 Off-Street Parking Management

- **2P Paid Parking:** Parking in high-turnover areas to support recreation or retail/restaurant uses; specifically excludes use by employees.
- **4P Paid Parking:** To support use in entertainment precincts as well as a mixture of short-stay uses; specifically excludes use for park 'n' ride, with minimal value for employees unless all-day parking is very scarce.
- **Unrestricted Paid Parking:** Allows use for all purposes.
- **Capped Fee Parking:** Allows for hourly paid parking up to a set duration cap (e.g. 4 hours), with no additional cost beyond this duration. This is intended to create spaces for employees to park in the public realm, while still retaining viability for short-stay visitors.
- **Private/Tenant Parking:** This parking is privately owned and outside of the control of the City. However, it is beneficial for the function of the parking system that all bays are efficiently used. Relocation of employees to private tenant bays frees up public spaces for visitors, and privately-owned public parking represents a valuable supply located close to attractive destinations.

  It is expected that as Local Centres transition to a paid parking focus and demand for parking on the whole increases, there will be increased pressure on private parking. This may result in a change in management of these private bays, including implementation of private paid parking.

4.4 Application to Centres

The demand for parking is intimately related to the type, location, and density of development, as follows:

- **Employee parking**: demand is related to the provision of alternative transport modes.

  Employee behaviour is often very elastic: constraining parking can have a big impact on private vehicle mode shares.

- **Residential parking:** demand is equivalent to vehicle ownership and related to the provision of alternative transport modes, and to the density and quality of retail, employment, and entertainment destinations within walking distance.

  Due to self-selection, reducing on-site parking rates has a direct impact on residential vehicle ownership and private vehicle trip generation.

- **Restaurant/Entertainment Visitor parking:** demand is related to the density and mix of development, and particularly the proximity of residents and employment, not so much on transport provision.

  Parking pricing can impact the location and distribution of demand, but mode shift due to parking constraint is likely to be modest.

The City's control over the supply of parking (through statutory policy and public parking) can be used to constrain certain types of parking to influence travel behaviour.

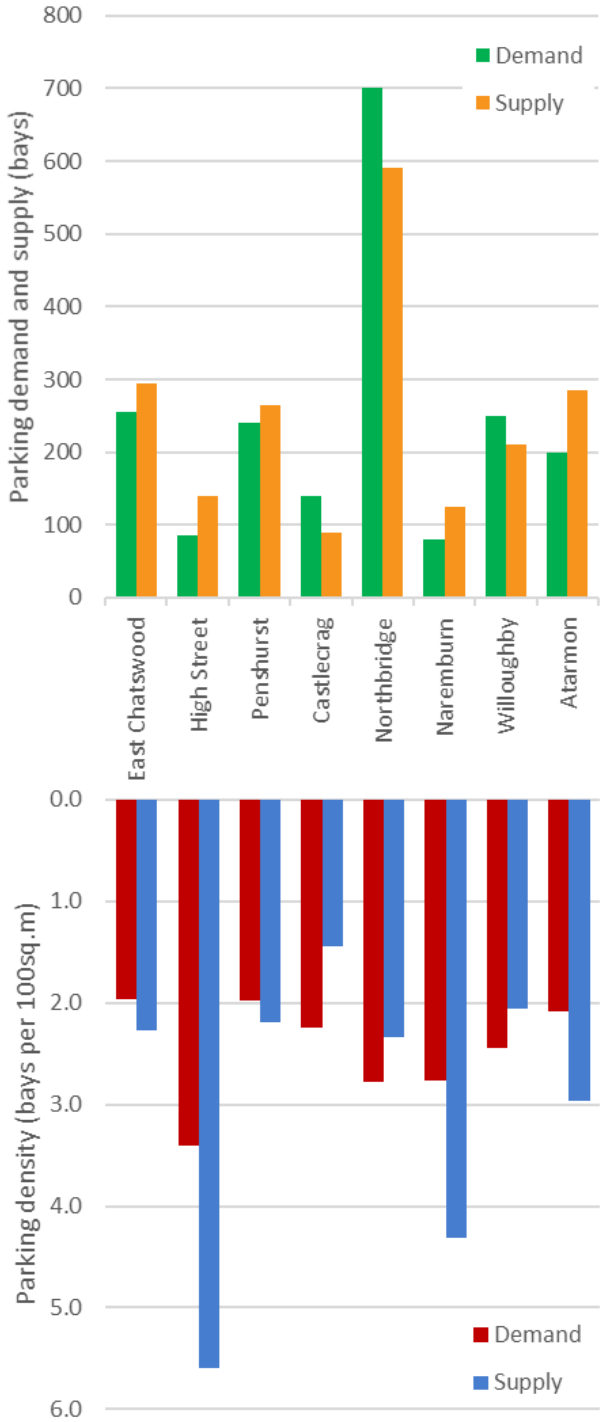
The existing supply of parking and land use profile for each Local Centre has been characterised using a data collection based on aerial imagery and street-level interrogation.

Cardno's Parking Demand Model has been applied to these precincts to calculate the theoretical parking demand. This calculation considers includes both the Centre itself and the surrounding land uses within a reasonable walking catchment (nominally 400m from the centroid of the area).

Figure 4-3 provides an overview of the parking demand and supply rates for each Centre. This describes the absolute quantum of parking bays within the Local Centre boundary (including on-street and off-street supply), as well as the parking supply ratio (bays per 100sq.m gross floor area).

The absolute magnitude of demand varies considerably between Centres, with Northbridge (dominated by the Northbridge Plaza and adjacent retail land uses) generating a significantly higher demand than other Centres. However, when demand is considered in the context of development area, the variation is reduced, and Northbridge is shown to generate parking demand at the same rate as other Local Centres.

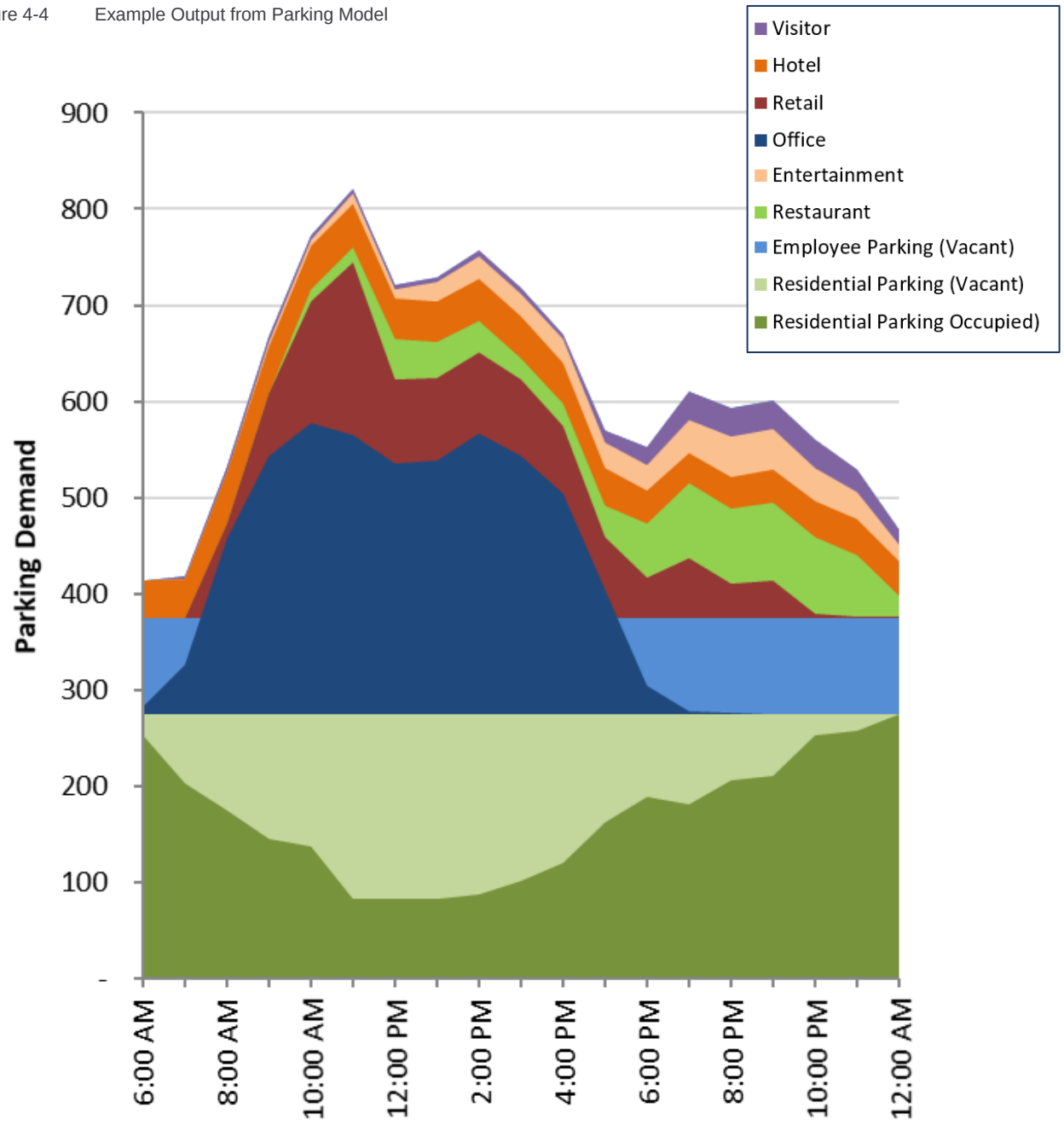
Figure 4-3 Parking demand



The Parking Demand Model gives a theoretical assessment of parking demand for each Centre based on the land uses with its boundary, the density of residential development within a reasonable walking catchment (approximately 400m), and certain characteristics of the internal parking supply.

The results are shown as a parking demand profile across the day – the number of bays occupied between 6am and midnight. Some features of these graphs are described below.

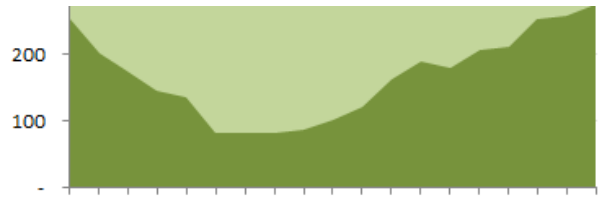
Figure 4-4 Example Output from Parking Model



For the purpose of this assessment, all residents are assumed to park on their property. For this reason, residential parking is split into two: Occupied bays and Vacant bays. In this example, there are 275 residential parking spaces in the Centre, 85 of which are still occupied at noon.

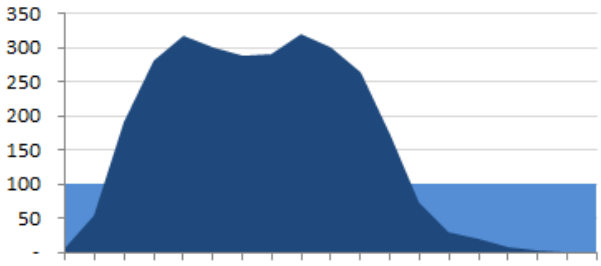
This simplifies the calculations, but tends to under-estimate the requirement for on-street parking. This should be considered when comparing the supply of public parking to the calculated demand in **Section 5**.

Figure 4-5 Residential parking (vacant and occupied)



The model also allows for the fact that some parking isn't available to all users. In particular, employees usually have access to off-street parking that is exclusively for their use.

Figure 4-6 Employee parking (vacant and occupied)



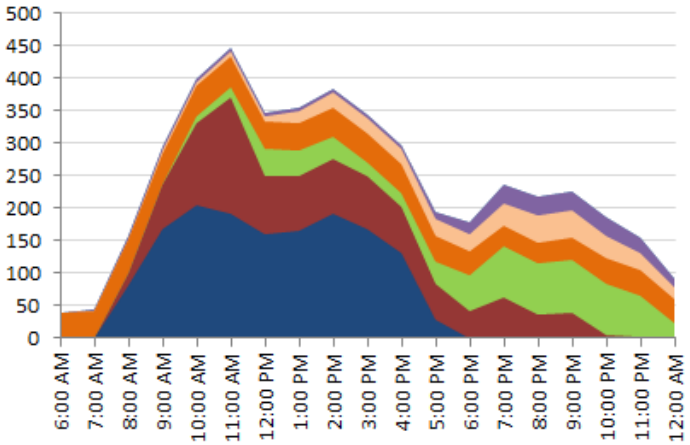
This is modelled as a given supply that fills in the daytime (to accommodate office employees), but is vacant in the evening. Parking demand that can't be satisfied within the exclusive supply overspills into public parking. The extent of dedicated employee parking has been determined through the desktop survey.

In this example, there are 100 spaces that are dedicated for employees, but demand is much higher. This means that during the peak, 220 public spaces are consumed by employees. Various management practices can improve the efficiency of this supply, by permitting parking by other groups.

Parking for all remaining land uses are assumed to be accommodated in a shared public supply (publicly available private parking as well as public on-street and off-street car parks). All of this demand is collapsed into several categories: Visitor, Hotel, Retail, Entertainment and Office.

For this example Centre, the parking demand for public spaces peaks at around 11am, and is primarily from office-type uses and retail. This Centre demonstrates a peak demand of approximately 450 public parking spaces.

Figure 4-7 Parking demand by land use



In reality, parking cannot operate at 100% efficiency. Using the industry-standard optimal rates of 85-90%, this Centre requires parking in the order of 500-530 publicly available spaces.

A similar exercise performed for the weekend may show a very different profile for parking demand, based on the different land uses within the Centre. In fact, once dedicated employee parking is taken into account, the public supply requirement may be larger on the weekend than during the weekday.

5 Local Centres Summary

The following is a characterisation of each Local Centre, identifying current land uses and the results of parking demand investigation.

5.1 Artarmon Local Centre

Figure 5-1 Artarmon Activity Centre

Table 5-1 Artarmon Land Use Mix

Town Centre	
Office/Commercial	3,300 m^2
Medical	1,150 m^2
Shopping/Retail	2,900 m^2
Restaurant	375 seats
Health/Fitness	200 m^2
Attached Housing	9 dwellings
Parking	
Off-Street Supply	200 spaces
On-Street Supply	85 spaces
Peak Non-Residential Parking Demand	200 spaces
Surrounds (400m)	
Aged Care	120 beds
Retirement	40 dwellings
Attached Housing	3,000 dwellings
Detached Housing	300 dwellings

Figure 5-2 Artarmon Parking Profiles

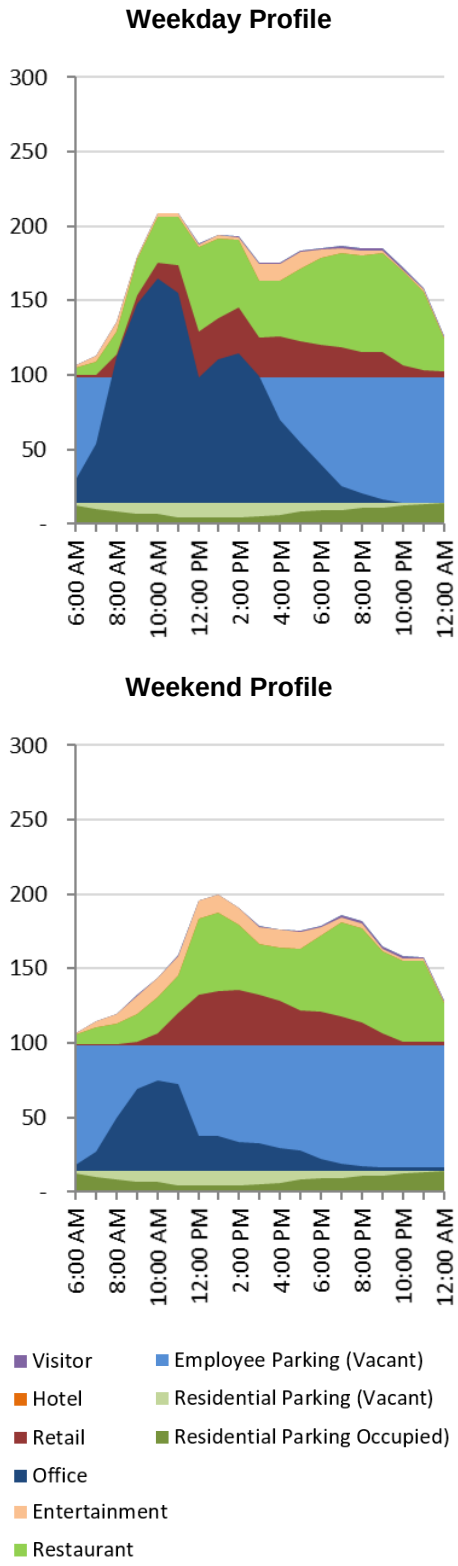
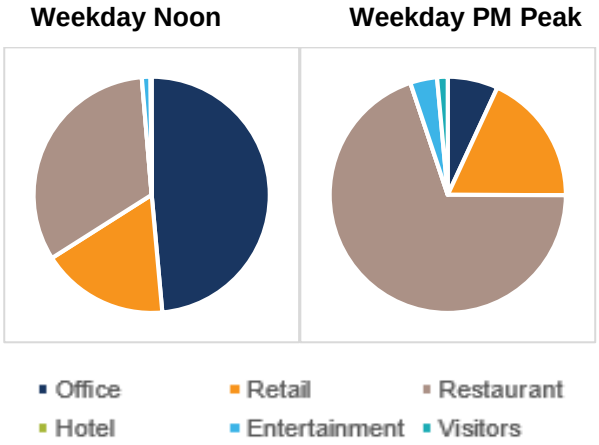


Figure 5-3 Artarmon Peak Parking Demand



Artarmon Parking Function

Artarmon's Local Centre is divided by the rail line – with pedestrian connection limited to the pedestrian underpass at the Artarmon Station.

This makes it unlikely that visitors to the Centre will choose to park on the north side of the rail line.

Short-stay visitor parking demand is largely accommodated within on-street parking zones along Hampden Road and Hampden Lane.

This short-stay parking supply is considered to be sufficient to accommodate the majority of the demand, with some minor overspill into the adjacent residential streets.

Long-stay employee parking is which is generally in small on-site parking facilities within individual lots. The inefficiency of this situation is likely to result in overspill onto adjacent streets. However, employee parking must compete for convenient spaces with commuters using the network streets as park and ride.

A dedicated long-stay parking facility is provided for commuters to the north of the station. This Artarmon Car Park has 30 bays long-stay 24P bays, plus 24 3P bays. Long-stay demand in this area exceeds the dedicated commuter supply by some margin, with commuter parking extending along Burra Road, Cameron Road and Hampden Road for 300m.

Employees are therefore pushed further away from the Centre, up Broughton Road and other minor streets, where they conflict with residents parking surplus vehicles on-street.

Parking Recommendations

The existing 1/2P free parking is likely too short to support many of the uses along Hampden Road, and is difficult to enforce.

Recommendation (Management):

Increase 1/2P duration restrictions along Hampden Road to 1P.

The overlapping requirements for long-stay parking from the Centre employees, commuters to Artarmon Station and residents of the area create a degree of parking scarcity within the Precinct.

One option to rectify this is to introduce a combination of 2P duration restrictions (in residential zones), and paid long-stay parking (within the Artarmon Car Park and key streets adjacent to the Station). The associated fee is expected to be minimal, but enough to establish a price signal which would relocate commuter traffic further from this station.

The impact of this measure would likely require some form of residential permit scheme through a transition period.

Recommendation (Management):

Consider introduction of localised paid parking for long-stay bays in the Precinct.

Future Parking Needs

The Local Centres Strategy for Artarmon identifies an opportunity to provide a substantial quantum of shop-top housing in the Centre, supporting a non-residential development increase of almost 50%.

The high proportion of hospitality uses identified in the Local Centres Strategy would tend to increase the potential for conflict between visitors and residents.

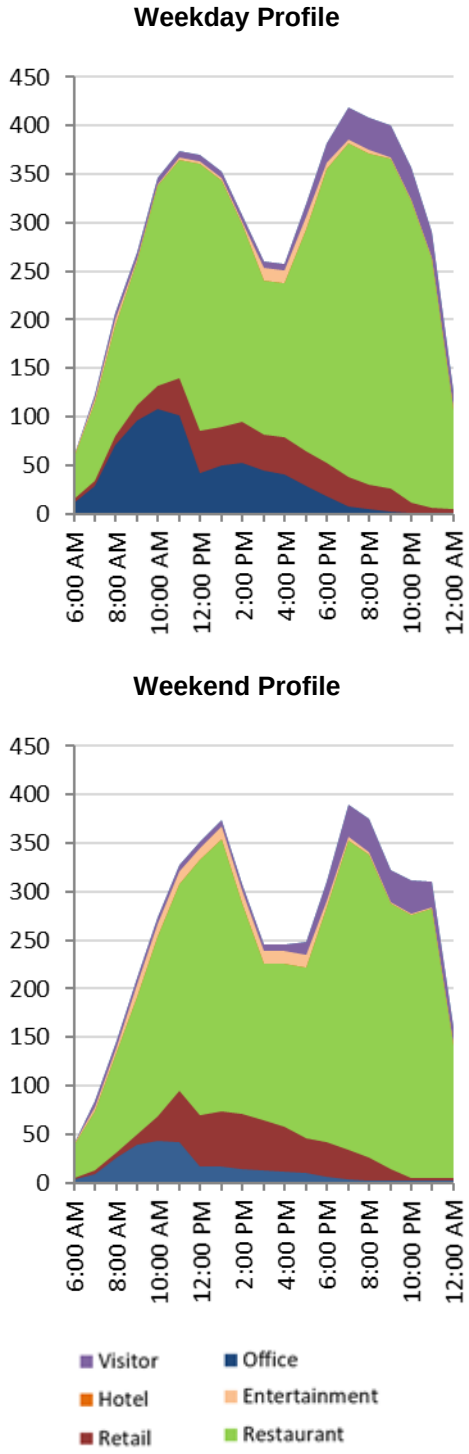
In particular, this would exacerbate the insufficiency of parking supply in the Precinct to allow for on-street storage of private vehicles by new residents.

This development increase would need to coincide with an intensification of parking management on the west side of the Station.

As such, a combination of duration/timing restrictions and residential parking permits (see Section 4.2.2) in surrounding streets is likely to be necessary to support Centre function. Paid parking may ultimately become necessary as unrestrained demand exceeds the capacity of the local parking catchment.

It is expected that these restrictions would result in a mode shift away from car-as-driver modes. The proximity of the Artarmon Station to the Precinct provides substantial capacity to support this mode shift.

Figure 5-4 Artarmon Future Non-Residential Parking Demand



5.2 Castlecrag Local Centre

Figure 5-5 Castlecrag Activity Centre

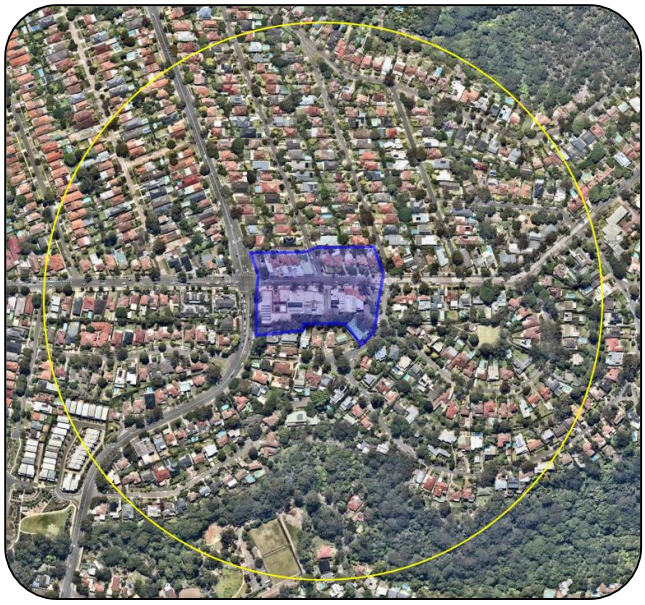


Table 5-2 Castlecrag Land Use Mix

Town Centre	
Office/Commercial	1,700 m^2
Medical	300 m^2
Shopping/Retail	2,700 m^2
Restaurant	350 seats
Health/Fitness	150 m^2
Detached Housing	4 dwellings
Parking	
Off-Street Supply	170 spaces
On-Street Supply	35 spaces
Peak Non-Residential Parking Demand	140 spaces
Surrounds (400m)	
Detached Housing	530 dwellings
Attached Housing	30 dwellings

Figure 5-6 Castlecrag Parking Profiles

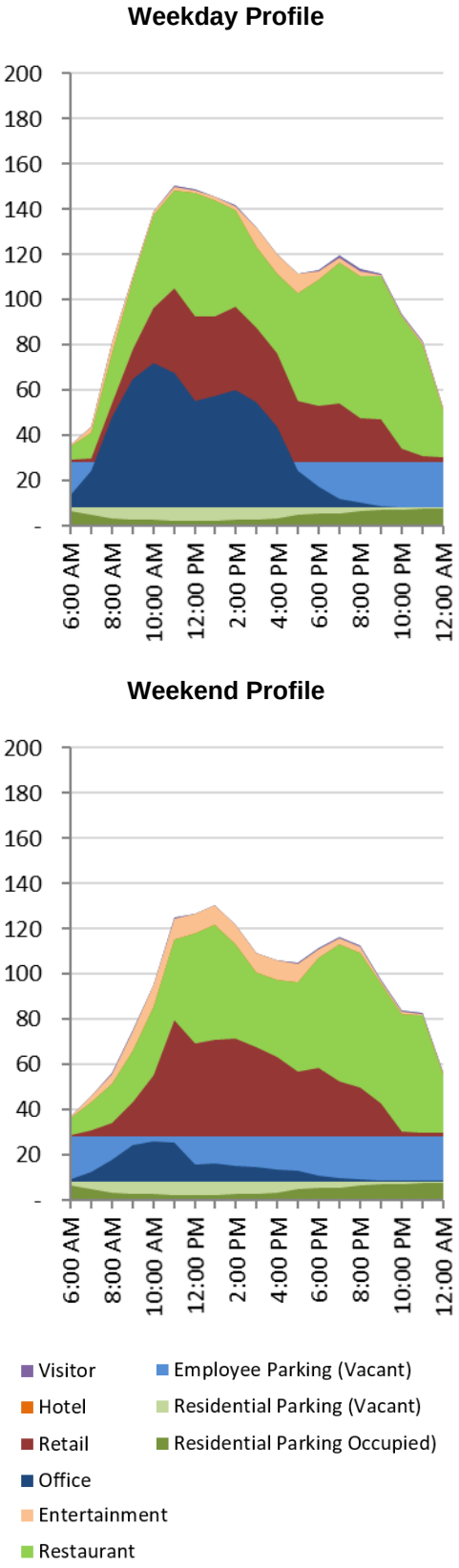
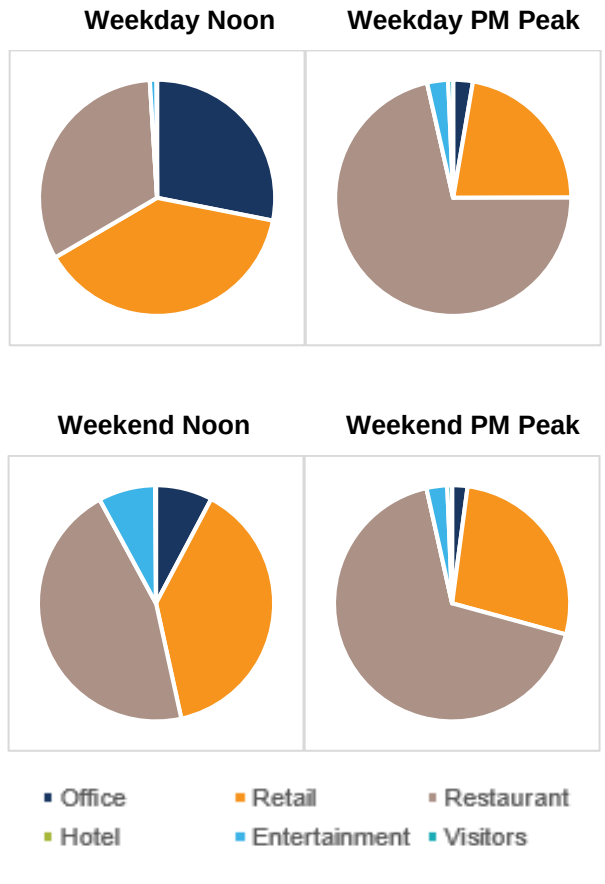


Figure 5-7 Castlecrag Peak Parking Demand



Castlecrag Parking Function

A significant majority of parking demand in this Local Centre is associated with the restaurant/café uses along Edinburgh Road.

This demand is facilitated by on-street parking here and on Redburn Avenue, and by a small off-street car park accessed via Chandler Lane. However, the primary supply of visitor parking is located within the Quadrangle Shopping Village, with 117 2-hour car parking bays.

Overall, this short-stay supply is considered sufficient to accommodate peak demand.

Employee parking, in contrast, is scarce – limited to a dedicated off-street car park accessed via The Postern. This creates significant overspill into the adjacent residential streets, including along The Postern, Rutland Road and Edinburgh Road east to Charles Street.

Parking Recommendations

Recommendation (Infrastructure):

Improve wayfinding signage to the Quadrangle Shopping Village car park on the approach to Castlecrag.

Explore possibilities to provide additional parking for employees.

Future Parking Needs

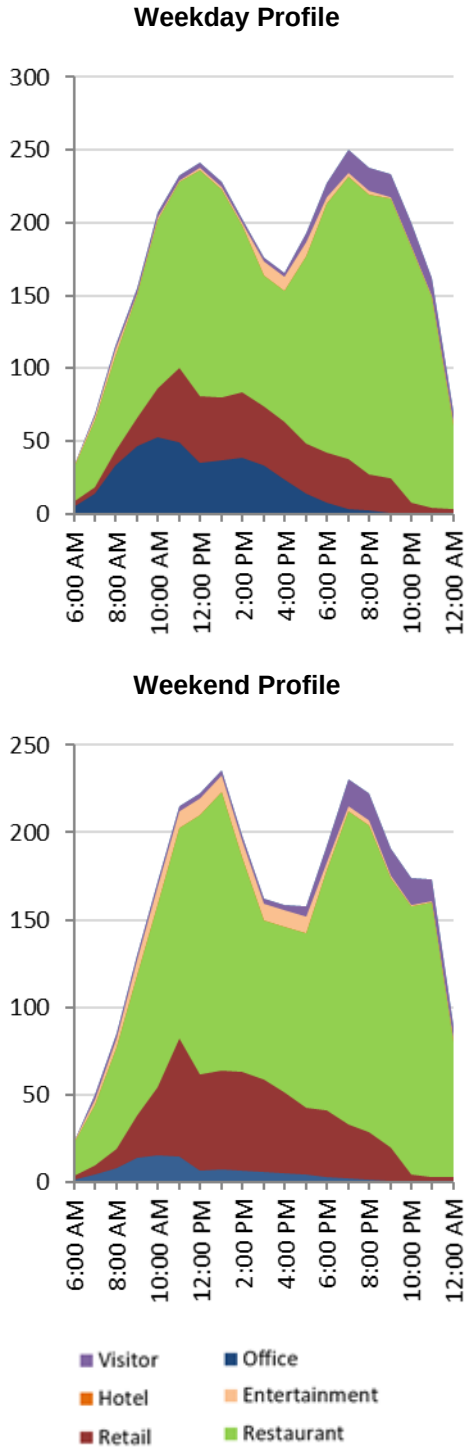
Demand projections for Castlecrag indicate that non-residential parking would increase by approximately 100 spaces. The ultimate demand of 250 spaces could include as many as 100 employees, which cannot be accommodated by the current provision.

As such, any redevelopment will need to consider reallocation of on-street or off-street parking provision to provide for employees. Given that the primary non-residential demand is expected to be hospitality-related, there is also potential for additional conflict between residents and restaurant patrons in the evenings.

As such, a combination of duration/timing restrictions and residential parking permits (see Section 4.2.2) in surrounding streets is likely to be necessary to support Centre function.

As visitor demand intensifies, this may also trigger the need for paid parking along Edinburgh Street under a 'demand responsive pricing' methodology to incentivise alternative transport.

Figure 5-8 Castlecrag Future Parking Profiles



5.3 East Chatswood Local Centre

Figure 5-9 East Chatswood Local Centre

Table 5-3 East Chatswood Land Use Mix

Town Centre	
Office/Commercial	2500 m^2
Shopping/Retail	7,600 m^2
Gasoline/Service Station	8 pumps
Restaurant	700 seats
Detached Housing	15 dwellings
Attached Housing	120 dwellings
Parking	
Off-Street Supply	165 spaces
On-Street Supply	130 spaces
Peak Non-Residential Parking Demand	255 spaces
Surrounds (400m)	
Detached Housing	470 dwellings
Attached Housing	880 dwellings

Figure 5-10 East Chatswood Parking Profiles

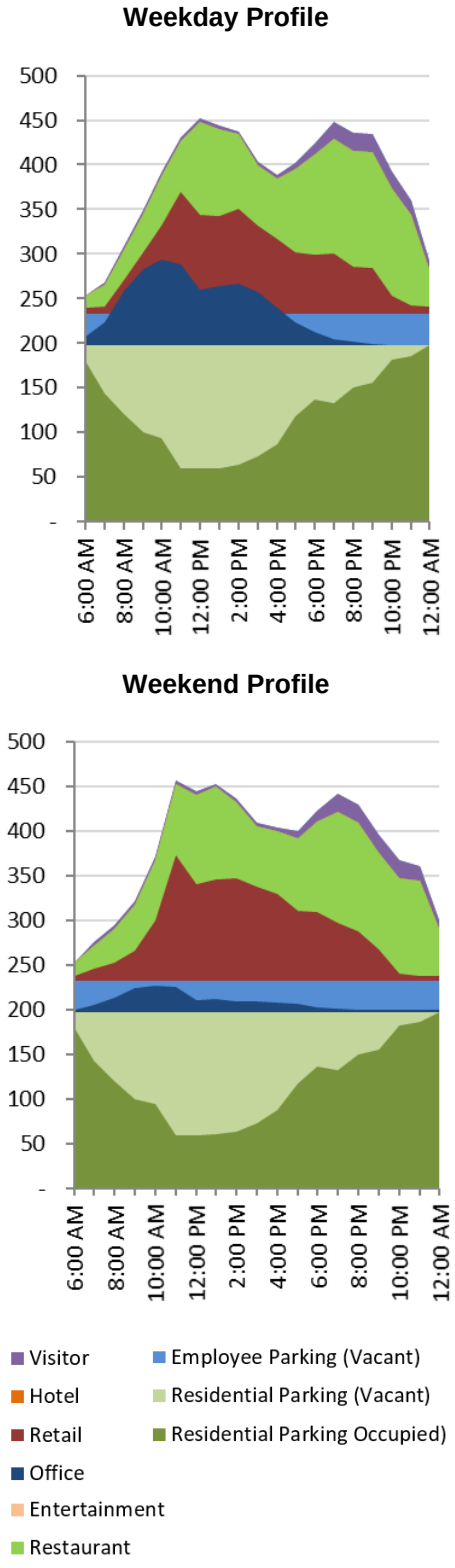
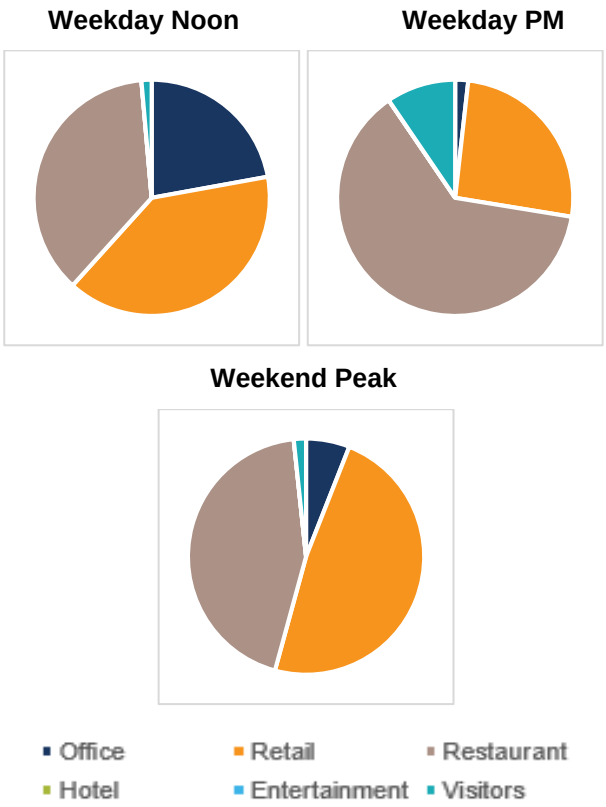


Figure 5-11 Peak Parking Composition (Non-Residential)



East Chatswood Parking Function

Parking in this area is dominated by retail and restaurant parking, particularly during the evenings and the weekend peak.

Employee parking demand is understood to be in the order of 80 spaces per day, representing almost 1/3 of the total supply. Only a small proportion of this parking is accommodated on-site, with the majority provided for in the adjacent streets.

Visitation to this Local Centre is likely to exceed the availability of parking during the midday and evening peaks, resulting in overspill into the nearby residential area.

This effect is exacerbated by the use of on-street parking by residents, particularly in the evenings, as well as in high-demand locations (e.g. Macmahon Street) where residential permits allow for parking on-street all day. This results in cars occupying valuable spaces throughout the weekday, even while their owners use alternative modes to access employment.

Parking Recommendations

The combination of residential on-street parking and restaurant uses has the potential to place some stress on the local supply during the evening and weekend periods. Nevertheless, alternatives exist in the surrounding network and there are few opportunities for consolidated parking in this area.

The existing 1/2P free parking is likely too short to support many of the uses along Penshurst Street, and is difficult to enforce.

Recommendation (Management):

Standardise parking along Penshurst Street and Victoria Avenue (within the Centre) to a 1P standard.

On-street parking in other streets within the Centre should be 2P, with unrestricted parking beyond.

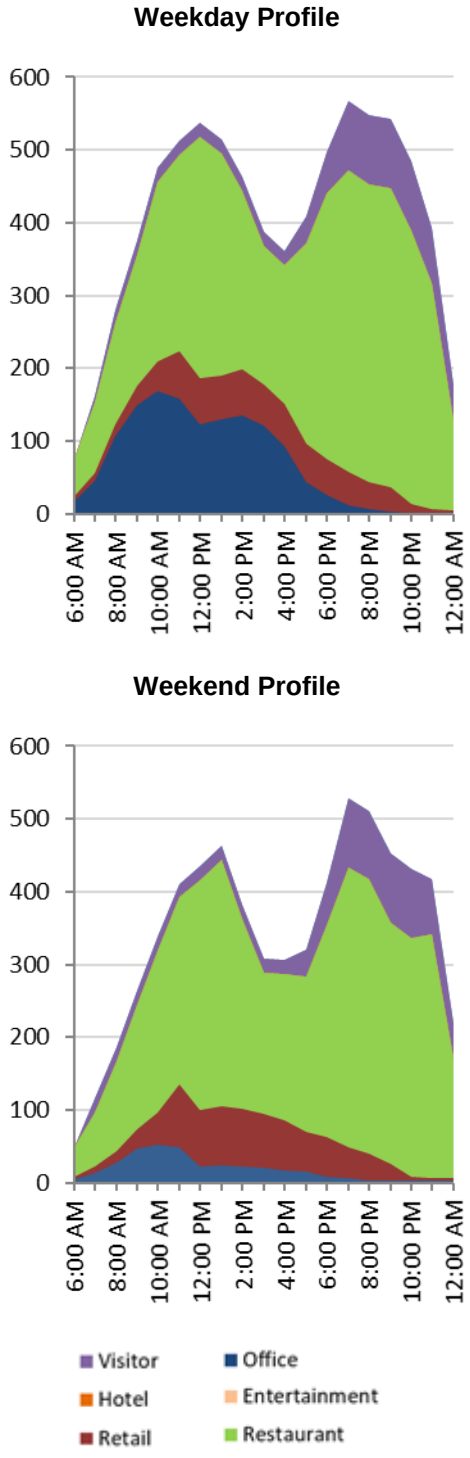
Future Parking Needs

Parking demand in East Chatswood is expected to double within the time horizon, assuming business-as-usual travel behaviour.

This demand is projected to include as much as 250 long-stay employees, with a maximum peak occupancy of over 500 bays. This suggests that the supply for employee parking would need to increase significantly; either in the form of shared public parking in multi-deck facilities/basement parking or through reallocation of on-street peripheral parking for long-stay purposes (e.g. along streets radiating away from the Centre: Royal Street, McMahon Street etc.).

The much higher proportion of restaurant land uses in the Centre indicates that there may be an increase in conflicts between visitors and residential on-street parking in the surrounding catchment, making this Centre a good candidate for the expanded parking permit regime described in Section 4.2.2 and the implementation of 'demand responsive pricing' along key roads such as Victoria Street and Penshurst Street.

Figure 5-12 East Chatswood Future Non-Residential Parking Demand



5.4 High Street Local Centre

Figure 5-13 High Street Activity Centre

Table 5-4 High Street Land Use Mix

Town Centre	
Office/Commercial	200 m^2
Medical	120 m^2
Shopping/Retail	1,500 m^2
Restaurant	170 seats
Primary School	360 Students
Parking	
Off-Street Supply	65 spaces
On-Street Supply	75 spaces
Peak Non-Residential Parking Demand	85 spaces
Surrounds (400m)	
Detached Housing	610 dwellings
Attached Housing	320 dwellings

Figure 5-14 High Street Peak Parking Demand

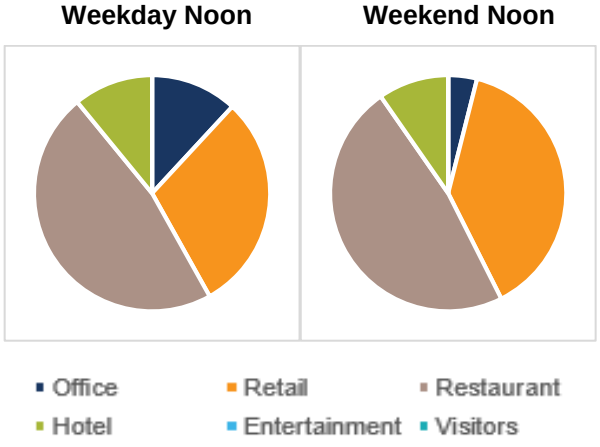
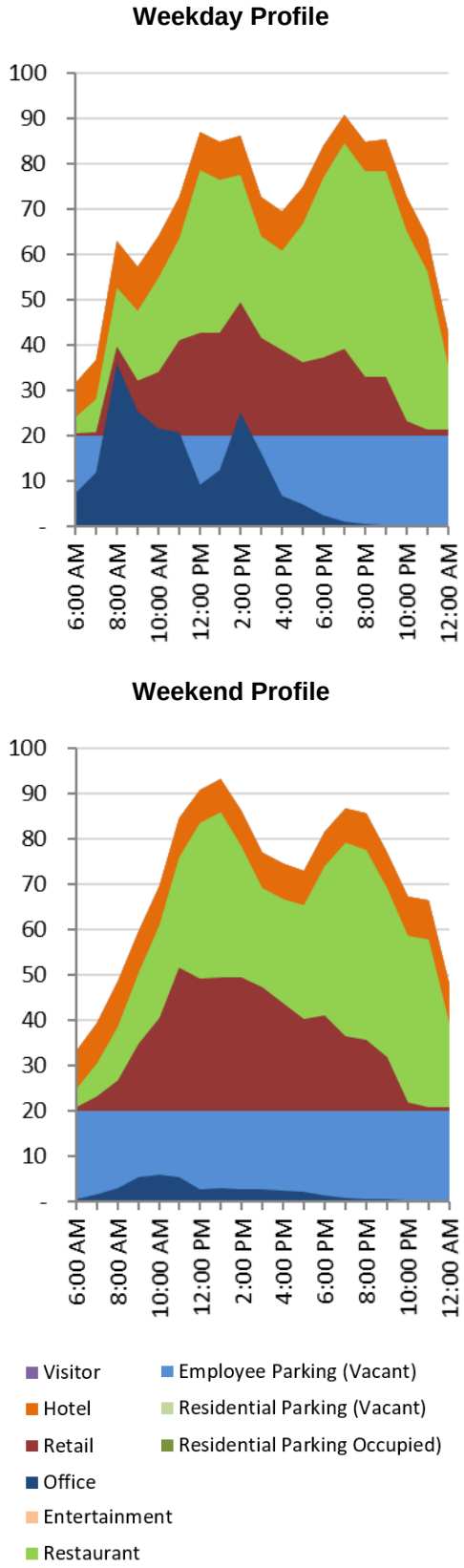


Figure 5-15 High Street Parking Profiles



High Street Parking Function

This small Local Centre is a well-defined retail/restaurant hub, with consolidated off-street parking and easily accessible on-street supply.

It is expected that visitation will exceed the off-street parking supply, resulting in some level of conflict between residents parking on-street and restaurant parking in the evenings.

The adjacent private Primary School is expected to generate high-intensity short-term peak parking and traffic demands along High Street which may adversely impact the safety of the bike lanes along this corridor. Interventions along minor roads (e.g. Glover Street, Alexander Avenue), suggest that school activities have caused localised issues near High Street in the past.

Employee parking is located in residential on-street facilities, and there is ample parking available to accommodate this demand.

Parking Recommendations

Despite the relatively small size of the Centre, it is apparent that the immediate vicinity does not have sufficient parking to easily accommodate the visitor demand during the weekday peak.

The existing 1/2P free parking is likely too short to support many of the uses along Penshurst Street, and is difficult to enforce.

Recommendation (Management):

Introduce 1P parking restrictions along Alexander Avenue, McClelland Street and Glover Street (within 100m of High Street).

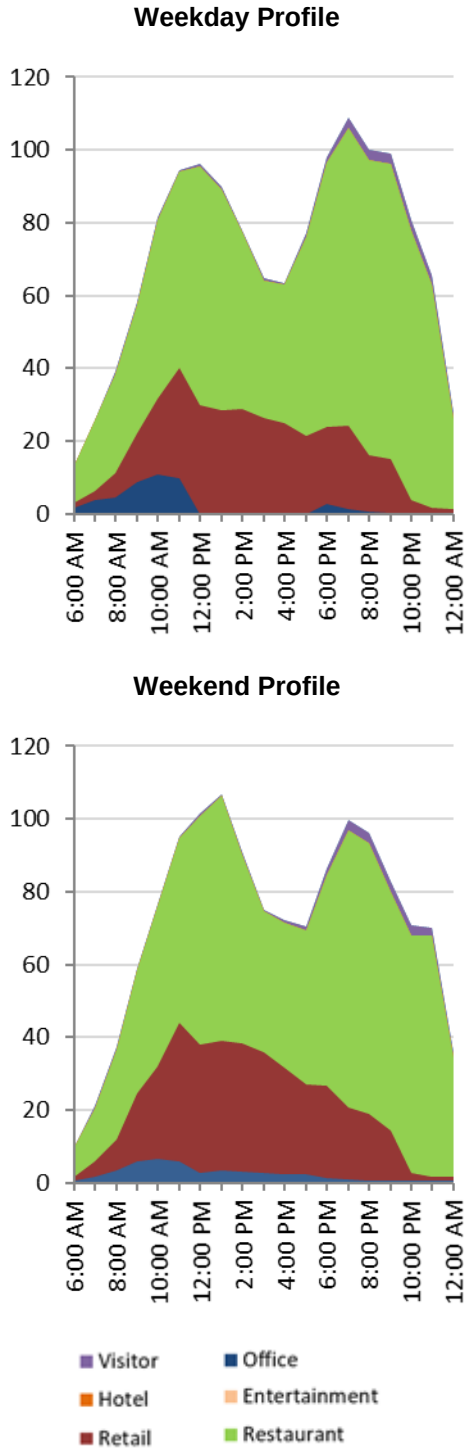
Increase 1/2P duration restrictions along High Street to 1P.

Future Parking Needs

The changes to land uses in the High Street Centre are expected to result in only modest growth in parking demand, from 85 spaces to 110 spaces.

This demand can generally be accommodated within the surrounding streets, provided any expansion of the Primary School includes sufficient parking to accommodate staff.

Figure 5-16 High Street Future Non-Residential Parking Demand



5.5 Naremburn Local Centre

Figure 5-17 Naremburn Activity Centre

Table 5-5 Naremburn Land Use Mix

Town Centre	
Medical	170 m^2
Shopping/Retail	1,200 m^2
Restaurant	280 seats
Health/Fitness	440 m^2
Detached Housing	29 dwellings
Parking	
Off-Street Supply	25 spaces
On-Street Supply	100 spaces
Peak Non-Residential Parking Demand	80 spaces
Surrounds (400m)	
Detached Housing	450 dwellings

Figure 5-18 Naremburn Activity Centre Peak Parking Demand

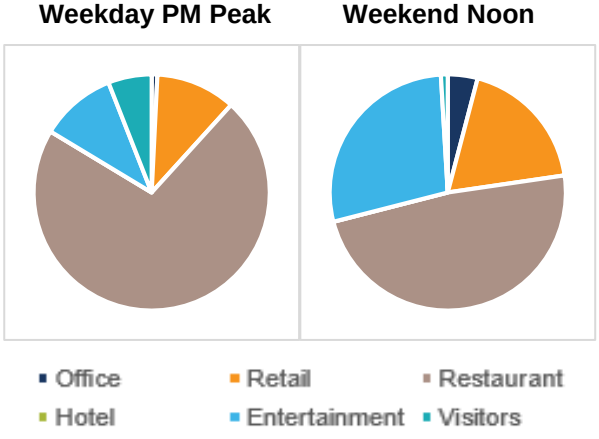
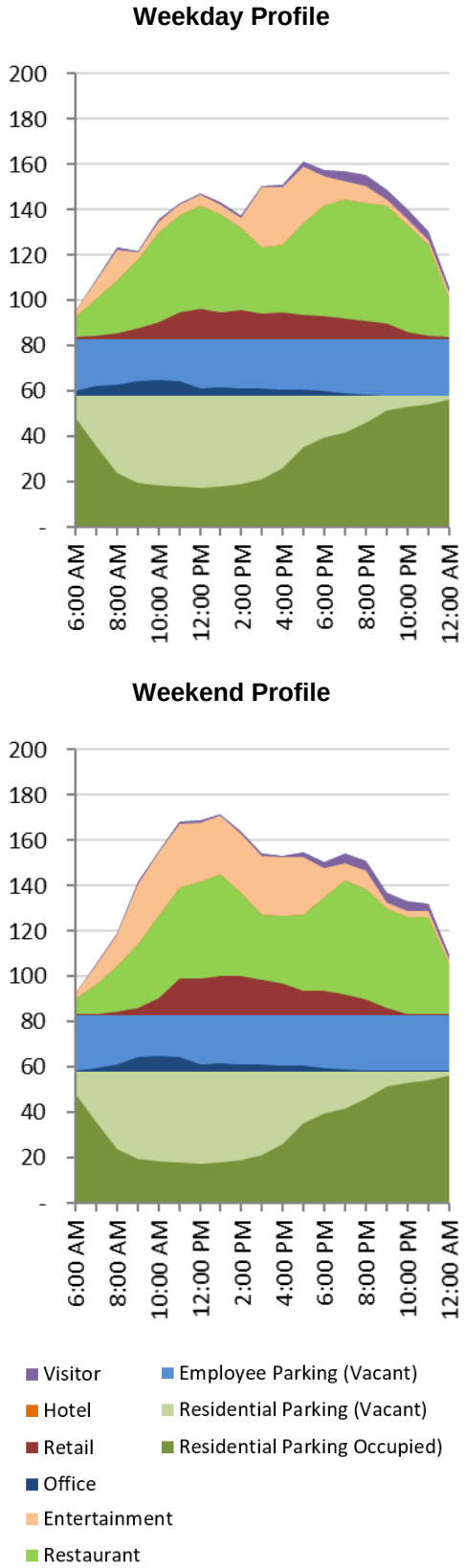


Figure 5-19 Naremburn Parking Profiles



Naremburn Parking Function

This small Centre is located immediately adjacent to the Gore Hill Freeway, but is served primarily by quiet residential streets with ample on-street parking supply.

The main parking generators are the restaurants and fitness centre, for which the adjacent supply is considered to be sufficient.

Parking Recommendations

There is a small 11-space car park associated with the Shopping Centre car park, accessed via Willoughby Road at the inside of the bend. Given the complexity of the access arrangement, its proximity to the signalised intersection, and its apparent function as a local bypass from Gore Hill Freeway, this area may be better suited to an alternative use. For example, as a play space, al fresco dining, plaza etc.

It is acknowledged that this parking area is likely to be the most popular spot for customers of the adjacent retail shops. However, a better parking arrangement along Rohan Street and Glenmore Street (perpendicular or angled parking) could provide a reasonable alternative.

Recommendation (Infrastructure):

Consider redevelopment of the Naremburn Shopping Centre car park to reduce conflict potential caused by historic access decisions.

Increase parking supply along Rohan Street and Glenmore Street to compensate for loss of bays, include streetscape improvements to increase net benefit to businesses.

Future Parking Needs

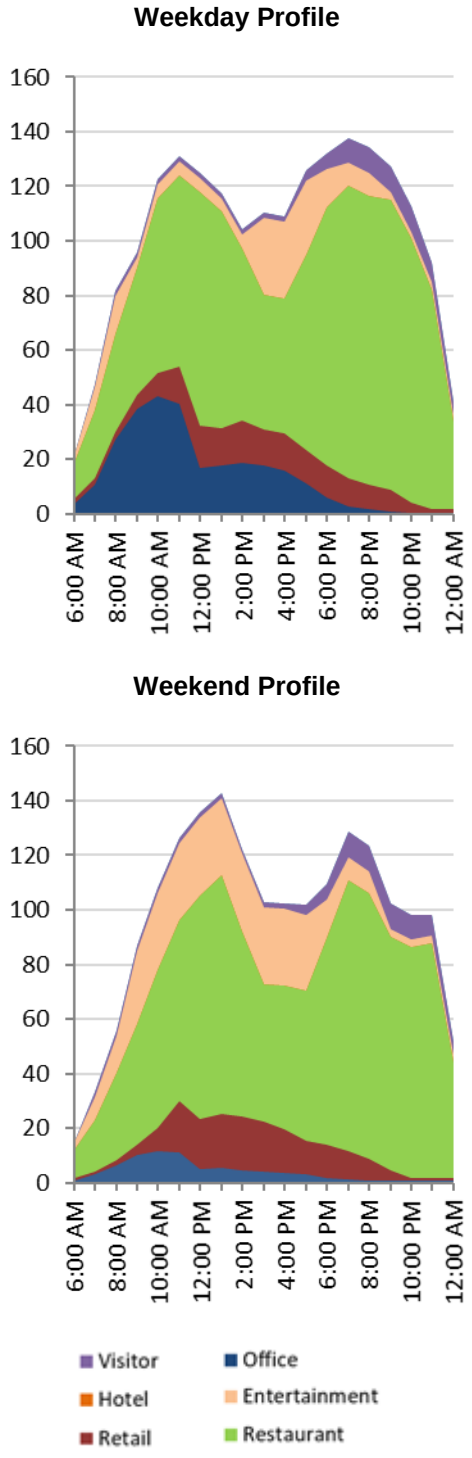
The increase in parking demand by office/commercial land uses will result in additional employee parking. If this cannot be accommodated on-site, then additional parking may be required along Glenmore Street.

The overall growth of mostly office/commercial parking could increase demand by as much as 80-90 bays. This cannot be accommodated in the current supply.

To address this, either the future commercial uses would construct parking on-site sufficient to accommodate their demand, or there would be an increased pressure on the on-street parking supply to the west of the Centre.

This implies that this Centre could be a candidate for an expanded parking permit regime despite its small scale, to help resolve conflicts between the residential and hospitality uses.

Figure 5-20 Naremburn Future Non-Residential Parking Demand



5.6 Northbridge Local Centre

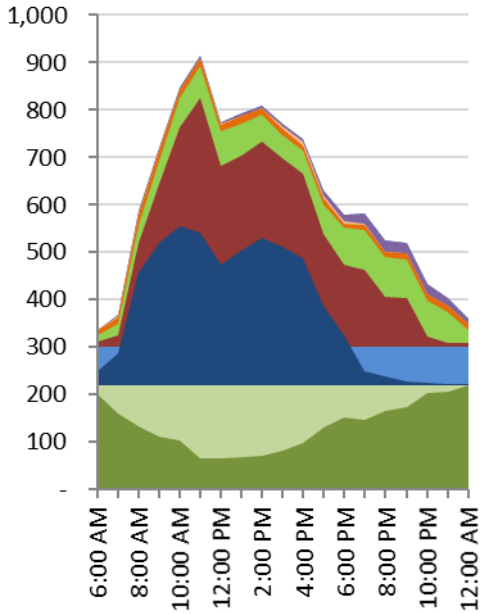
Figure 5-21 Northbridge Town Centre

Table 5-6 Northbridge Land Use Mix

Town Centre	
Office/Commercial	5,400 m^2
Warehouse/Showroom	4,600 m^2
Medical	2,700 m^2
Shopping/Retail	10,000 m^2
Restaurant	450 seats
Health/Fitness	120 m^2
Service Station	10 pumps
Hotel	32 rooms
Detached Housing	16 dwellings
Attached Housing	130 dwellings
Parking	
Off-Street Supply	450 spaces
On-Street Supply	140 spaces
Peak Non-Residential Parking Demand	700 spaces
Surrounds (400m)	
Detached Housing	450 dwellings
Attached Housing	80 dwellings

Figure 5-22 Northbridge Parking Profiles

Weekday Profile



Weekend Profile

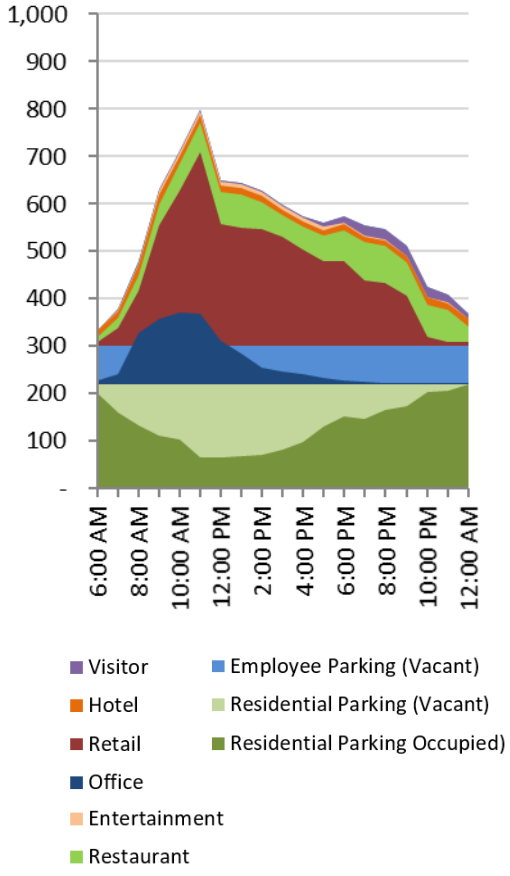
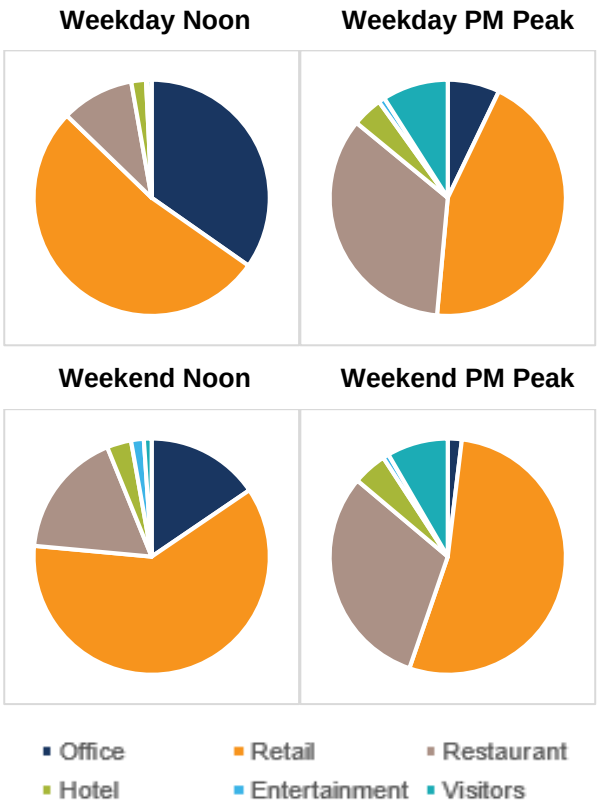


Figure 5-23 Northbridge Peak Parking Demand



Northbridge Parking Function

Long stay employee parking demand represents approximately 300 spaces during the weekday peak period. Another 400 spaces are required to accommodate short-stay retail and visitor parking.

The primary constituents of the short-stay demand are restaurant visitors, retail shoppers and medical centre patients. 1-hour and 2-hour parking is generally considered to be sufficient to accommodate these groups, though specific treatments may require 4-6 hour parking, though patients are usually dropped-off rather than parking all day.

The 385 combined short-stay parking bays within and adjacent to the Northbridge Plaza provide a consolidated destination for trips to the Local Centre. Improvements to wayfinding signage, including internal wayfinding, may assist to maximise the efficiency of these bays.

Secured employee parking is available within the Northbridge Plaza car park, but this supply represents only a small fraction of the total requirement for the Centre.

With the function of the arterial roads Eastern Valley Way, Sailors Bay Road and Strathallen Avenue all prioritising traffic throughput over parking, and duration restrictions (with permit exceptions) along residential streets, there appears to be insufficient parking to support the level of employee demand.

Parking Recommendations

The at-grade Council car park adjacent to the Northbridge Plaza shopping Centre is well-located as a site for a future multi-deck car park.

This would necessarily operate as a paid facility, and could be funded through cash-in-lieu contributions as the Centre develops.

The management of such a facility would impact the function of the surrounding private car parking, and this should be considered as part of any business case.

Recommendation (Infrastructure):

Consider redevelopment of the existing Council car park as a consolidated short-stay and long-stay multi-storey facility.

Future Parking Needs

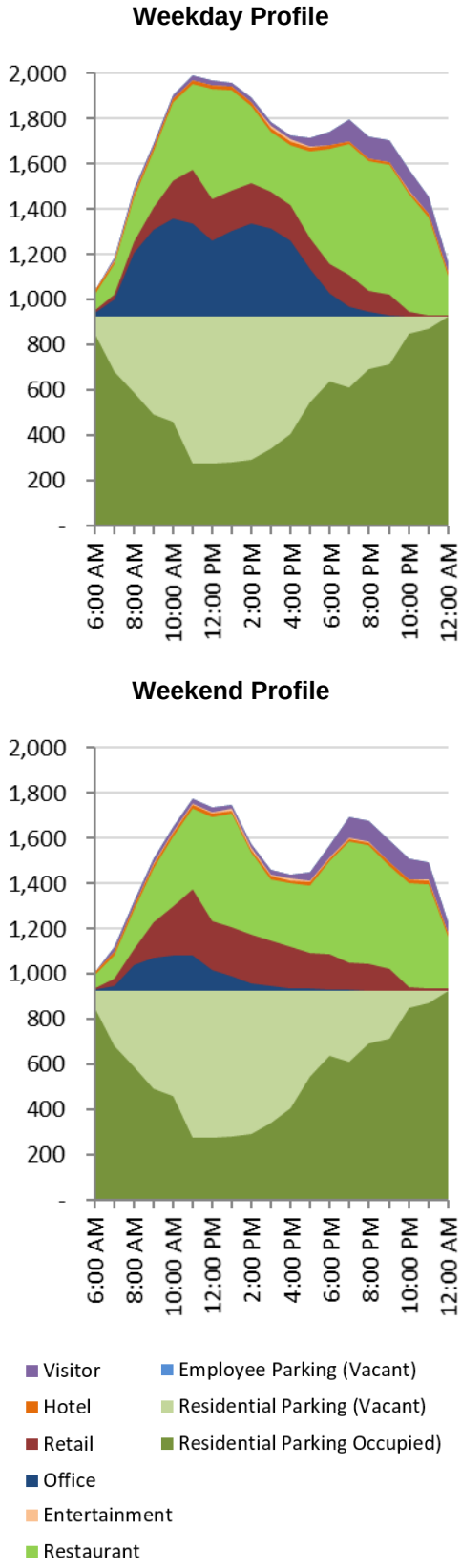
The increase in parking demand in Northbridge is predominantly in hospitality uses, resulting in a significant growth in short-stay parking demand of up to 200 spaces, particularly during the evening and weekend. However, overall parking demand is not expected to change markedly, as this is largely a reallocation from existing

These short-stay bays would need to be located in areas in close proximity to the Centre, generally constituting large-scale communal multi-deck car parking either stand-alone or integrated into the development.

More impactful is the large increase in residential development predicted by the Local Centres Strategy. There is insufficient on-street parking available to sustain a 200% growth in dwellings if residents continue to use the street for private vehicle storage.

Measures will be necessary to curtail this behaviour, comprising a combination of duration limits, paid parking and appropriately priced residential permits.

Figure 5-24 Northbridge Future Parking Profiles



5.7 Penshurst Street Local Centre

Figure 5-25 Penshurst Street Activity Centre

Table 5-7 Penshurst Street Land Use Mix

Town Centre	
Office/Commercial	2,500 m^2
Medical	800 m^2
Shopping/Retail	6,100 m^2
Warehouse/Showroom	1,200 m^2
Restaurant	120 seats
Health/Fitness	460 m^2
Detached Housing	11 dwellings
Attached Housing	8 dwellings
Parking	
Off-Street Supply	160 spaces
On-Street Supply	105 spaces
Peak Non-Residential Parking Demand	240 spaces
Surrounds (400m)	
Detached Housing	580 dwellings
Attached Housing	350 dwellings

Figure 5-26 Penshurst Street Parking Profiles

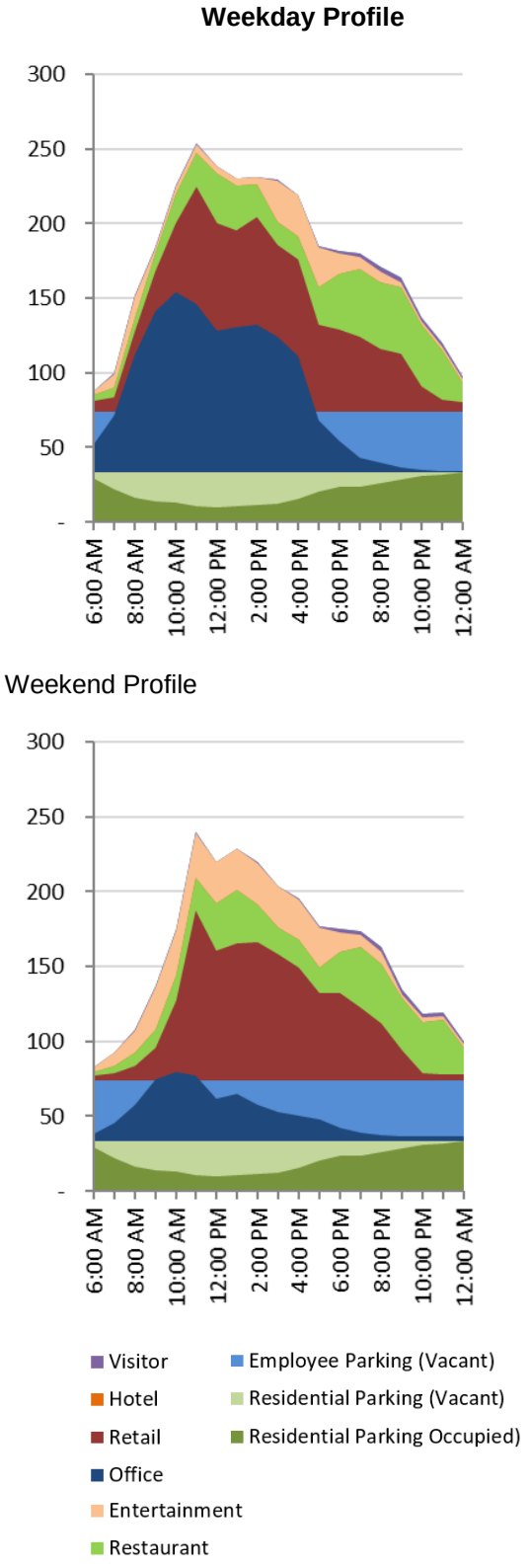
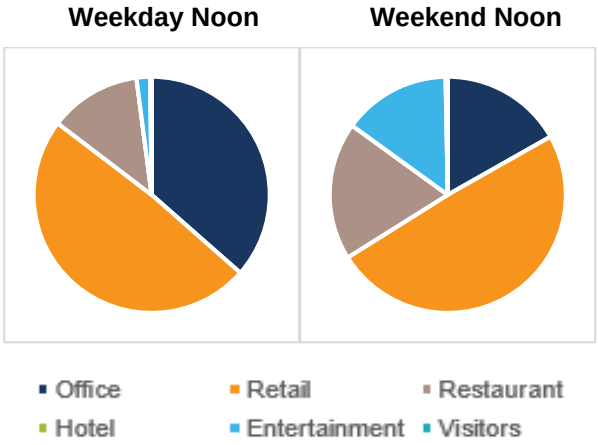


Figure 5-27 Penshurst Street Peak Parking Demand



Penshurst Street Parking Function

The Penshurst Street Local Centre is largely defined by the arterial road function of Penshurst Street itself, as well as Mowbray Road/Willoughby Road.

Off-street car parks to the north (via Oakville Road) and south (via Mowbray Road) are well-utilised but insufficient to accommodate demand.

The Centre geometry supports little on-street parking apart from in the Clearways, though there is supplementary on-street supply along Oakville Road, Penshurst Street south of Mowbray Road.

The parallel Ward Street supports additional parking, but accessibility is limited due to the lack of connections mid-block.

Additional peak demands for traffic and parking associated with the Willoughby Girls' High School conflict with the function of the Centre. Ideally, school activity would be focused along Keary Street, to segregate regional and Local Centre traffic from student pick-up/drop-off activity. However, it is likely that this demand is spread across the Centre, including within the Chaffer Lane Public Car Park during the afternoon school peak.

The type of land uses within the Local Centre point towards a high proportion of all-day employee parking. This type of demand is not well supported by the Centre, beyond rudimentary parking areas at the rear of individual lots. All remaining employee parking demand is satisfied by on-street parking well beyond the Centre boundary (streets such as Laurel Street).

Parking Recommendations

The existing 1/2P free parking is likely too short to support many of the uses along Penshurst Street, and is difficult to enforce.

The private car park at Laurelbank Function Centre represents a potential opportunity for additional public parking, as its utilisation appears to be extremely low. Given the dearth of supply in this area, an arrangement with the owner to open up access to this parking could be beneficial to all groups.

The lack of long-stay parking in the vicinity of the Centre suggests that additional supply may be required.

Recommendation (Management):

Increase 1/2P duration restrictions along Penshurst Street to 1P.

Formalise Kiss & Ride Parking along Oakville Street and Keary Street to improve compliance.

Consider a partnership with Laurelbank Function Centre to allow for use of this dormant asset.

Relax parking controls along Penshurst Street (south of Mowbray Road) or Ward Street to provide sufficient long-stay parking for employees.

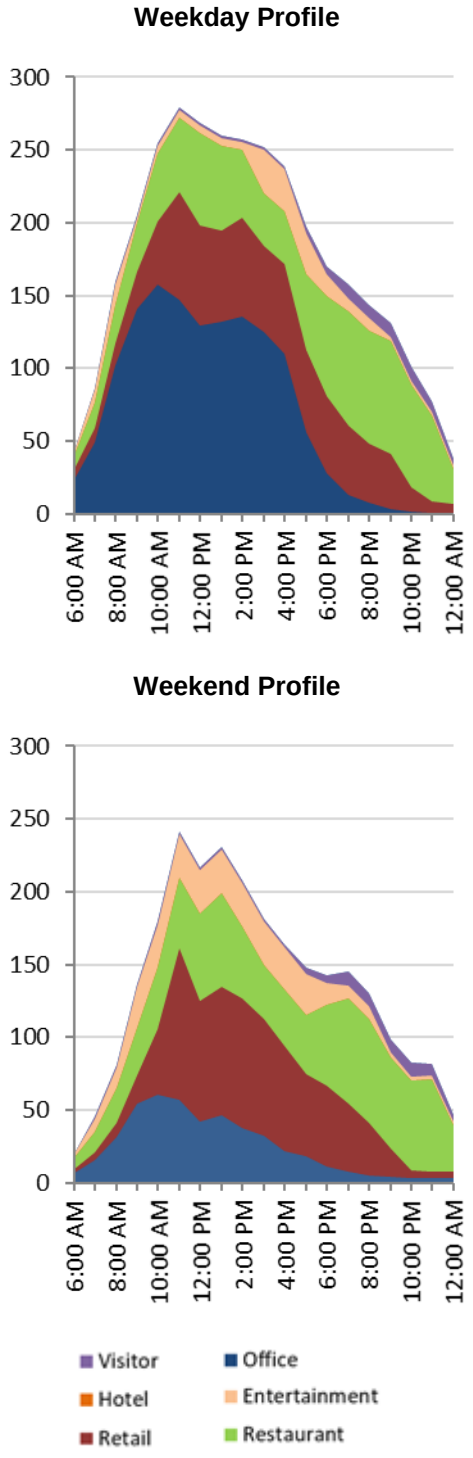
Future Parking Needs

Only a minor increase in non-residential uses is expected for the Penshurst Street Local Centre, resulting in an increased parking demand of 20-40 spaces. This can be generally accommodated within the local street network.

However, the quantity of proposed residential development (a 230% increase) *could* stress the on-street parking supply if residents continue to use the street network as private vehicle storage. This impact is not as profound in the Penshurst Street Centre due to the relatively low proportion of hospitality uses.

As such, continued use of duration restrictions should be sufficient to support the Centre through to the development horizon.

Figure 5-28 Penshurst Street Future Non-Residential Parking Demand



5.8 Willoughby South Local Centre

Figure 5-29 Willoughby Activity Centre

Table 5-8 Willoughby South Land Use Mix

Town Centre	
Office/Commercial	3,300 m^2
Medical	300 m^2
Shopping/Retail	4,850 m^2
Restaurant	350 seats
Health/Fitness	120 m^2
Service Station	9 pumps
Hotel	32 rooms
Attached Housing	30 dwellings
Parking	
Off-Street Supply	130 spaces
On-Street Supply	80 spaces
Peak Non-Residential Parking Demand	250 spaces
Surrounds (400m)	
Detached Housing	680 dwellings
Attached Housing	360 dwellings

Figure 5-30 Willoughby South Parking Profiles

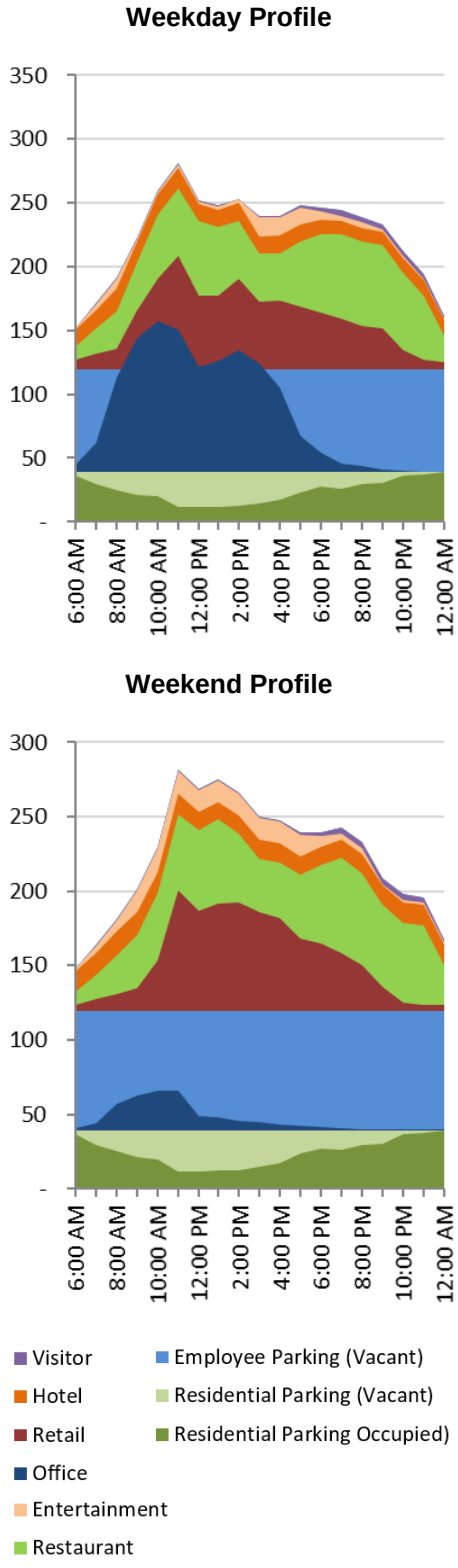
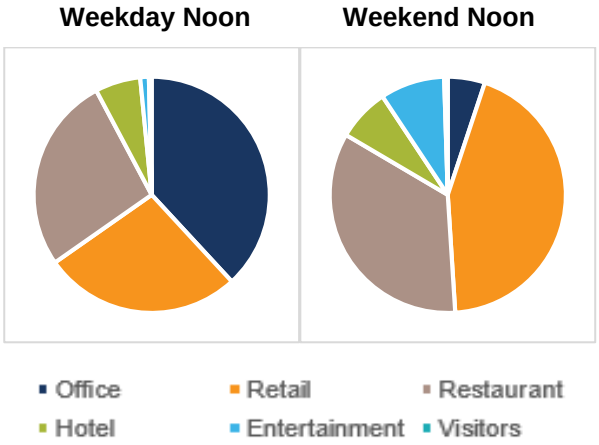


Figure 5-31 Willoughby South Peak Parking Demand



Willoughby South Parking Function

The Willoughby South Local Centre generates approximately 110 spaces in employee parking demand, which is partly contained in small on-site parking facilities within individual lots. This form of parking is intrinsically inefficient, and likely results in a high degree of overspill into the local road network (Edward Street, Chiltern Road and Tulloh Street).

Short-stay visitor parking has been determined to be in the order of 140 spaces during the peak weekday period, and as much as 200 spaces on the weekend.

The existing provision of short-stay parking is limited to approximately 60-70 off-street parking bays accessed via Borlaise Street, and available on-street parking along minor roads and in Clearway zones along Willoughby Road.

Parking Recommendations

Recommendation (Infrastructure):

Improve wayfinding signage to the Borlaise Street car parks from both directions along Willoughby Road.

Restrict parking to short-stay (2P) on minor roads connecting with Willoughby Road.

Willoughby Road parking should be standardised to allow 1P outside of clearway periods.

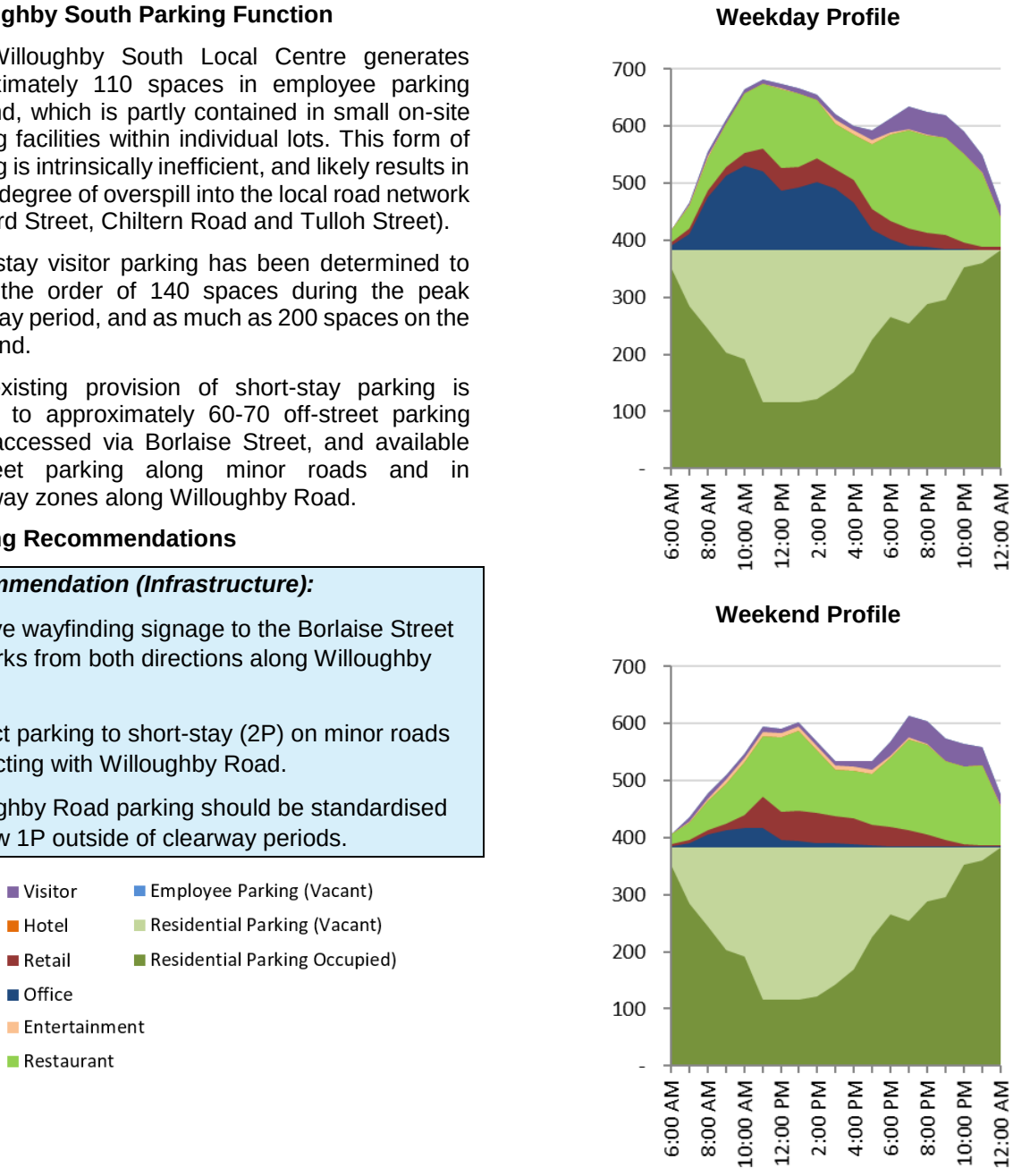
Future Parking Needs

Only a minor increase in non-residential uses (8% overall growth) is expected for the Willoughby South Local Centre. This can be generally accommodated within the existing parking supply.

However, the quantity of proposed residential development could stress the on-street parking supply if residents continue to use the street network as private vehicle storage.

Measures will be necessary to curtail this behaviour, comprising a combination of duration limits, paid parking and appropriately priced residential permits, as discussed in Sections 3.2 and 4.2.2.

Figure 5-32 Willoughby South Future Parking Profiles



About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Contact

11 Harvest Terrace
West Perth WA 6005
Australia

Phone +61 8 9273 3888
Fax +61 8 9486 8664

Web Address
www.cardno.com .